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Climate Change

EN0100166 Connah's Quay Low Carbon Power

Contents

D3 / PART A / SECTION A INTRODUCTION **3**

A.1 EVIDENTIAL BASIS OF THIS SUBMISSION 3
A.2 LEGAL FRAMEWORK AND THE CORE ISSUE 4

D3 / PART A / SECTION B *UPSTREAM EMISSION FACTOR (WTT) AND LIFECYCLE EMISSIONS ASSESSMENT* **7**

B.1 NESO MODELLING OF FUTURE GAS SUPPLY (AND SUPPLY DYNAMICS) 7
B.1 (A) Annual average supply pathways 9
B.1 (B) Dynamic supply modelling 11
B.2 NATIONAL AND INTERNATIONAL INITIATIVES 14
B.3 RESPONSIVENESS OF THE DESNZ NATURAL GAS WTT FACTOR TO LNG SHARES 16
B.3 (A) Structural Basis of the DESNZ WTT Factor 16
B.3 (B) Empirical Relationship between LNG Share and Published WTT factor 18
B.3 (C) The Legal Consequence of Methodology Opacity 19
B.3 (D) Structural limits of the DESNZ WTT factor 20
B.3 (E) Materiality and Variability of the Upstream Emissions Parameter 20
B.3 (F) Implications for the ES 24
B.4 ISEP GUIDANCE AND USE OF GOVERNMENT CONVERSION FACTORS 25
B.5 THE NZT PRECEDENT CLAIM 28
B.6 CONCLUSION ON DATASET RELIANCE AND COMPARABILITY 30
B.6 (A) "Standard dataset" does not equate to "sufficient for EIA" 30
B.6 (B) Comparability cannot override robustness 31
B.6 (C) The issue is uncertainty, not dataset legitimacy 31
B.6 (D) Two further points 31
B.6 (E) Concluding Position 32
B.6 (F) Link to section C: Variability affects short-term climate impacts 32

D3 / PART A / SECTION C *CLIMATE METRICS AND THE TEMPORAL ASPECTS OF THE CLIMATE IMPACTS* **33**

C.1 IPCC FRAMING FOR SHORT-TERM IMPACTS AND LONG TERM CLIMATE STABILISATION EFFECTS OF METHANE 33
C.2 ADEQUACY OF THE STANDARD UK GOVERNMENT CONVERSION FACTORS 38
C.3 EIA AND CARBON BUDGET ADVICE 38
C.4 EIA CONTEXTUALISATIONS AND SHORT-TERM CLIMATE IMPACTS 39

D3 / PART A / SECTION D THE CO_2 CAPTURE RATE **40**

D.1 OVERALL: LEGAL FRAMEWORK, MUTUALLY REINFORCING REGULATORY ASSUMPTIONS ACROSS REGIMES, AND EIA ADEQUACY 41
D.1 (A) The UK Emissions Trading Scheme (UK ETS) 41
D.1 (B) The EA permitting regime 42
D.1 (C) Mutually reinforcing regulatory assumptions across regimes 43
D.1 (D) H2 Teesside DCO examination report 43
D.1 (E) The National Policy Statement (EN-1) 44
D.2 WHY RELIANCE ON AN ENVIRONMENTAL PERMIT DOES NOT "SECURE" 95% CAPTURE (NZT EXAMPLE) 45
D.3 UKCCSRC / BAT RELIANCE DOES NOT DEMONSTRATE OPERATIONAL ATTAINMENT OF 95% 46
D.3 (A) The Emerging Techniques Reclassification and its Legal Consequences 47
D.4 MODELLING OF THE DEVELOPMENT 51
D.5 CONCLUSION AND REQUESTED CLARIFICATION 51

D3 / PART A / SECTION E *CONCLUSIONS*....52
E.1 CESL's conclusion....52
E.2 Cumulative Directional Bias Across the Three Parameters....53
D3 / PART A / SECTION F COMMENTS ON 6.1.5 AND 6.2.1....54
APPENDIX A: FES 2025 DATA WORKBOOK EXTRACTS....55
APPENDIX B: GWP20 AND GWP100 ILLUSTRATION....58
Differing impacts of GWP20 and GWP100 for the development....59
APPENDIX C: IPCC AR6 WGI SUMMARY FOR POLICYMAKERS FIGURE SPM.2....60
APPENDIX D: IPCC AR6 WGI FIGURE 6.16....61
APPENDIX E: EIR REQUEST TO DESNZ REGARDING THE NATURAL GAS WTT EMISSION FACTOR CALCULATION METHODOLOGY....62
Background and Purpose....62
Contact History....62
EIR Request (submitted before D3 deadline)....63
Significance for the Examination....65
APPENDIX F: EIR REQUEST TO ENVIRONMENT AGENCY CONCERNING POST-COMBUSTION CARBON DIOXIDE CAPTURE EVIDENCE REVIEW (MARCH 2024)....66
EIR Request (submitted before D3 deadline)....66

Tables and Figures

TABLE 1: OVERVIEW OF EVIDENCE SOURCES IN CESL D3 PART A....4
FIGURE 1: FUTURE ENERGY SCENARIOS (FES), FIGURE 68 REPRODUCED....9
FIGURE 2: GSSA METHODOLOGY STATEMENT: TABLE 4 REPRODUCED....11
TABLE 2: NATURAL GAS WTT FACTOR AND LNG SHARE, 2017 - 2025....18
TABLE 3: OPERATIONAL LIFECYCLE EMISSIONS (30-YEAR)....21
TABLE 4: EMISSION FACTOR RATIO CALCULATION FROM SCIENTIFIC LITERATURE....58
TABLE 5: REP1-077 TABLE 2 MODIFIED FOR GWP20 AND GWP100....59
FIGURE 3: IPCC AR6 WGI SPM FIGURE SPM.2 REPRODUCED....60
FIGURE 4: IPCC AR6 WGI FIGURE 6.16 REPRODUCED....61
TABLE 6: CONTACT HISTORY WITH DESNZ GHG STATISTICS DEPARTMENT....62

D3 / Part A / Section A ***Introduction***

1 Climate Emergency Science Law (CESL), established in 2017 by Dr Andrew Boswell, brings together multidisciplinary expertise in science, computing, energy and climate governance, and evidence-based legal and policy analysis to deliver rigorous, scientifically grounded scrutiny of UK climate decision-making. A resume of my professional background was provided at Section F of my Part A Written Representation (D1 Part A submission, [REP1-077]).

2 This submission (Part A of my deadline D3 submissions) provides my comments on the "Applicant's Response to Deadline 1 Submissions" [REP2-019].

3 I have used an AI tool to assist with drafting and refining the textual content of submissions to the examination for clarity and presentation. A full statement[1] on the use of AI is provided at Section G of my Part A Written Representation (D1 Part A submission, [REP1-077]).

4 This submission has four in-document short appendices. In addition, sixteen full documents have been submitted to the examination library, as noted in the footnote[2].

A.1 Evidential basis of this submission

5 CESL's D3 (Part A) submission is grounded in a detailed evidential record drawn from multiple independent sources, including these summarised below.

6 These evidence streams are used to test the assumptions embedded in the ES, and the applicant's D2 submission "Applicant's Response to Deadline 1 Submissions" [REP2-019], and to examine whether the assessment demonstrates robustness to reasonably

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[1] In accordance with PINS guidance on "Use of artificial intelligence in casework evidence", 6 September 2024

[2] Appendices provided as full documents for the examination library:

(1) Data tables for "UK 2020—2024 gas supply (mmboe)" and "2024 UK gas supply, emissions and intensities", North Sea Transition Authority

(2) NESO, Future Energy Scenarios (FES), 2025

(3) NES, FES 2025, Assumptions for Natural Gas supply projections

(4) NESO, "Gas Supply Security Assessment", Nov 2025

(5) OIES, "UK Gas: Demand Volatility Requires Supply Flexibility", Dr Jack Sharples, October 2025

(6) MethaneSAT, 2026, "First look at a system wide view",

(7) IPCC (2021). Climate Change 2021: The Physical Science Basis. Working Group I Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Summary for Policymakers

(8) IPCC (2021). Climate Change 2021: The Physical Science Basis. Working Group I, section 6.6

(9) IPCC (2021). Climate Change 2021: Mitigation of Climate Change. Working Group III, section 3.3.2

(10) IEA (2025), Global Methane Tracker

(11) Environmental Permit, Net Zero Teesside

(12) Decision Document, NZT Environmental Permit

(13) Environmental Permit, Viridor Energy Runcorn CCUS Limited

(14) Environmental Permit, Humber Refinery (Phillips 66 Limited)

(15) 2025 Government Greenhouse Gas Conversion Factors for Company Reporting, Methodology Paper for Conversion Factors Final Report

(16) National Gas, *Securing Britain's Energy*, February 2026

foreseeable variability in the parameters identified. Full references and further relevant information are supplied in footnotes.

Issue examined	Primary evidence sources	Purpose in CESL analysis	Usage in D3 PART A
UK gas supply composition	UK government gas-supply datasets: DESNZ[3] / DUKES[4] statistics	Establish empirical supply mix and LNG share	Section B.1
Future gas supply modelling	National Energy System Operator modelling: NESO Future Energy Scenarios (FES 2025)	Examine future annual gas supply projections (including Norwegian pipeline and LNG shares)	Section B.1
UK Gas system operation under stress	NESO Gas Supply Security Assessment (GSSA), National Gas Securing Britain's Energy policy paper	Examine marginal supply sources during peak demand conditions	Section B.1
UK and international gas-market dynamics	Oxford Institute for Energy Studies (OIES)	Assess LNG as marginal global supply source	Section B.1
Methane leakage evidence	Recent peer-reviewed methane measurement-based studies	Evaluate uncertainty in upstream methane intensity	Sections B.2, B.3
Climate forcing of methane and near time climate impacts	Peer-reviewed climate science and IPCC Sixth Assessment Report	Examine temporal characteristics of methane warming	Section C
CCS operational performance	Environmental permitting decisions: Net Zero Teesside and more recent CCS environmental permits	Regulation and assessment bounding of assumed capture rate	Section D

Table 1: Overview of evidence sources in CESL D3 Part A

A.2 Legal Framework and the Core Issue

7 Schedule 4, paragraph 5 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 requires the Environmental Statement (ES) to include a description of the likely significant effects of the development on the climate, including greenhouse gas emissions, and to address direct and indirect, and short-, medium- and long-term effects.

8 Exercising that duty, here, concerns three parameters that materially influence the quantified greenhouse-gas outcome presented in the ES: the upstream well-to-tank emission factor applied to natural gas supply, the climate metric used to characterise short-term methane effects, and the assumed operational CO_2 capture rate. Each is a quantitative parameter used in the ES to derive a total for lifecycle operational greenhouse-gas emissions and the resulting significance conclusion.

9 This submission examines the sufficiency and completeness of environmental information placed before the decision-maker in exercising the duty across all three parameters.

10 CESL reserves the right to make subsequent submissions on the significance assessment in the EIA.

11 On the Applicant's own lifecycle accounting, the dominant quantified share of operational emissions once capture is applied is the upstream well-to-tank component, meaning that the parameter used to represent upstream methane intensity has a particularly important

[3] Department for Energy Security and Net Zero

[4] Digest of United Kingdom Energy Statistics

influence on the emissions outcome assessed (as addressed in Section B of this submission).

12 National Policy Statement EN-1 recognises that greenhouse gas emissions are a material consideration and are to be assessed[5] within the Environmental Impact Assessment process. The present submission concerns whether the ES satisfies the requirements of the 2017 EIA Regulations in describing the likely significant greenhouse gas effects of the Proposed Development. The emissions profile of the project is required to be accurately and sufficiently described. And exercise of the duty precedes and informs the planning balance under the National Policy Statement.

13 As stated, here, the quantified lifecycle emissions depend materially upon three numerical parameters, each of which forms part of the description of the likely significant effect:

(a) the measure of upstream supply chain emissions by an upstream well-to-tank (WTT) emission intensity factor;

(b) the measure of the temporal aspects of the climate impacts by choice about how to use the Global Warming Potential (GWP) climate metrics available;

(c) the specified CO_2 capture rate.

14 Of these parameters, the upstream well-to-tank (WTT) emission factor has a particularly significant influence on the lifecycle greenhouse-gas outcome presented in the Environmental Statement, because upstream emissions constitute the dominant share of operational lifecycle emissions once capture is applied (see Section B.3(D)).

15 Each of these parameters is subject to reasonably foreseeable variability over the operational life of the development where credible evidence demonstrates that its value may vary substantially over operation. Standard EIA practice then requires that the ES must demonstrate either that the value selected reasonably bounds that variability in the environmental effects, or that the significance conclusion remains robust across that range through appropriate sensitivity or bounding analysis, so that the decision-maker is able to understand the likely real-world scale of the project's greenhouse-gas effects.

16 This principle does not require elimination of uncertainty, but it does reflect established EIA jurisprudence that the decision-maker must have before them sufficient information to understand the nature, scale and temporal distribution of likely significant effects, including where quantitative assumptions materially influence the outcome.

17 CESL's concerns about the exercising of the duty – which is the only submission being made by CESL - is therefore narrow. It is whether the choice of the above parameters (a), (b) and (c) reflect in themselves the full material impacts of the environmental effects. Take the example of one of the parameters, the Government WTT conversion factors. CESL does not contend that they are unlawful or unusable. The question is whether, in the circumstances of this development — a 30-year gas-reliant project operating in a system where supply composition and marginal delivery dynamics are projected to evolve — the ES demonstrates that the applied upstream intensity factor adequately describes and bounds the reasonably foreseeable variability of upstream emissions.

[5] Section 5.3.8, DESNZ (2023) "Overarching National Policy Statement for Energy (EN-1)"; Section 5.3.8, DESNZ (2025) "Overarching National Policy Statement for Energy (EN-1)

18 CESL's submission is that the absence of sensitivity testing or bounding analysis addressing that variability for each of the three parameters means that the material description of the effects is, as yet, incomplete and that the reasoning chain between emissions calculation and significance conclusion also, consequently, remains incomplete.

19 The Examining Authority and Secretary of State must be satisfied, on the evidence before them, that the reasonably foreseeable upstream outcomes have been encompassed within the assessment.

20 Sections B, C and D provide the evidential record for the insufficiency of each of the three parameters, structured as responses to the Applicant's entries in Table 6 of REP2-019. Each section opens with CESL's Written Representation conclusion, followed by CESL's response to the Applicant's comments in the order that best allows the argument to develop logically, which is not necessarily the same order as the Applicant's entries.

21 A further and independent point arises from the combined effect of all three parameters. Each of the three parameters examined in Sections B, C and D — the upstream WTT factor, the exclusive use of GWP100, and the assumed 95% capture rate — is applied in the ES at a value that, if it departs from the actual operational outcome, will do so in the same direction: by understating the development's assessed greenhouse gas effects. The directional alignment is structural, not coincidental. It arises because each parameter is set at a central estimate or design optimum without sensitivity testing, and in each case the evidence supports the conclusion that actual outcomes may be higher than the central estimate. <u>This means the ES's lifecycle emissions total and its significance conclusion are, on the evidence before the Examining Authority, more likely to understate the development's actual climate effects than to overstate them.</u> The Applicant's claim at paragraph 20.6.69 of the ES that the Reference Case represents 'the worst-case scenario for GHG emissions' therefore cannot be sustained: it is a maximum volume scenario at minimum assumed intensity, not a worst case in the sense required by EIA law. The full analysis of this cumulative directional bias is set out at Section E.2 below.

<u>D3 / Part A / Section B</u> *<u>Upstream Emission Factor (WTT) and Lifecycle Emissions Assessment</u>*

22 The fundamental distinction underpinning Section B is between annual average gas supply composition and marginal stress-period supply. CQLCP is a dispatchable plant — it operates when the electricity system requires flexible generation, which is precisely when the gas system is under stress and the marginal source of gas supply is drawn from the flexible import layer. Under NESO's Gas Supply Security Assessment merit-order structure, that layer includes LNG as a key component. The annual average supply mix is therefore not the relevant measure for EIA purposes. The question is the upstream intensity of gas supplied during the operational conditions in which this plant runs — conditions in which LNG is a structurally foreseeable and material component of marginal supply.

23 **Comments under 6.1.1 [Table 6, REP2-019].** CESL's first WR conclusion was:

> *"CESL requests that the ExA directs the applicant to provide a sensitivity analysis of operational lifecycle GHG emissions using an upstream emission factor representative of a likely future high-LNG supply scenario."*

24 This request was for a sensitivity test case of operational lifecycle GHG emissions representing reasonably foreseeable marginal supply conditions for LNG in the fuel mix to ensure that the ES bounds the reasonable worst-case and provides sufficient environmental information on likely significant effects for the decision maker.

25 In section 6.1.1 the applicant resists this request based on these main assertions:

- future UK gas supplies being predominantly sourced from Norwegian pipelines;
- national and international policy initiatives for reducing methane leakage;
- exclusive legitimacy is afforded to the DESNZ Natural Gas WTT emission factor by the IEMA/ISEP guidance;
- an assumed existing responsiveness of the DESNZ Natural Gas WTT emission factor to LNG shares;
- decision maker reliance on the DESNZ Natural Gas WTT emission factor in a previous DCO decision.

26 CESL now provides comments on each of these in turn.

B.1 NESO modelling of future gas supply (and supply dynamics)

> **[Applicant's response]** "*But it is important to note that LNG is not the only source of imported gas. The UK benefits from two large capacity gas pipelines from Norway – Langeled and Vesterled – which allow the UK direct access to Norwegian gas production fields with low transport costs. Natural gas produced in the Norwegian sector of the North Sea also has an upstream carbon intensity around 70% lower than that of domestic UK production. The Future Energy Scenarios (FES) published by the National Energy System Operator (NESO) in 2025 indicate that in all scenarios over the period to 2050, substantially more gas is likely to be imported via pipeline from Norway compared to imports of LNG*".

27 The Applicant submits that the UK is likely to import substantially more gas via pipeline from Norway than LNG over the period to 2050, relying on the 2025 Future Energy Scenarios (FES) ("FES 2025") published by the National Energy System Operator (NESO), and supplied as a separate appendix. This submission appears to rely on the FES 2025 chapter "Gas supply, storage and networks"[6] and data in figures like Figure 68 which CESL reproduces below (further information is also supplied in Appendix A of this document).

28 By background to the FES 2025 Figure 68, official 2024 supply data[7] published by the North Sea Transition Authority (NSTA) show that UK gas supply comprised approximately:

- UK Domestic supply: 164 mmboe[8,9]
- Norway (pipeline): 190 mmboe[10];
- Belgium & Netherlands (pipeline): 1 mmboe[11]; and
- LNG (total): 63 mmboe[12] (approximately equivalent to 9.9 bcm)

29 These figures reflect physical deliveries to the National Transmission System (NTS) in 2024 and align with the empirical baseline used in FES Figure 68.

30 Of the LNG imports in 2024, approximately 68%[13] originated from the United States[14].

31 An important distinction, to note for later, is between annual average supply pathways and the hour-by-hour dynamics of gas supply. By background, the FES 2025 projections in Figure 68 below do not model the dynamics of gas supply stress-periods and marginal dispatch conditions: they illustrate annual average supply pathways to 2050, using the data above for 2024 as the base year. We will come to the dynamics of supply later in this section.

32 Dispatchable gas-fired generation such as CQLCP does not operate evenly across the annual average supply mix. It operates primarily during periods when system flexibility is required — typically when renewable output is constrained and marginal gas supply sources are activated within the gas and electricity systems.

[6] Pages 152-154 of NESO, Future Energy Scenarios (FES), 2025, supplied as stand-alone appendix

[7] provided as a stand-alone Appendix, "NSTA Data for 2024 UK gas supply"

[8] mmboe = million barrels of oil equivalent

[9] approximately equivalent to 25.8 bcm, bcm = billion cubic metres. Conversion factor used 1 bcm ≈ 6.37 mmboe (based on 39 MJ/m³ gas calorific value)

[10] approximately equivalent to 29.8 bcm

[11] approximately equivalent to 1 bcm

[12] approximately equivalent to 9.9 bcm

[13] US LNG was 43 mmboe and 68.3% of the total LNG imports

[14] This corresponds to footnote 13 of [REP1-077] where I state "The US LNG export market has rapidly expanded from scratch since 2015. In 2024, 68.2% of UK LNG imports were from the US; the corresponding figure for 2025Q1-3 is 73.9% (from GOV.UK spreadsheet "Energy Trends gas tables (ODS)" https://assets.publishing.service.gov.uk/media/6941a0e11ec67214e98f3045/Gas_DEC_25.ods) from GOV.UK webpage "Energy Trends: UK gas", last update 06/01/2026, downloaded 22/01/2026, https://www.gov.uk/government/statistics/gas-section-4-energy-trends"

B.1 (A) Annual average supply pathways

33 In FES 2025 Figure 68, Norwegian pipeline volumes remain a substantial component across scenarios, and NESO also shows an explicit minimum LNG stream. FES includes a further residual category, "Generic Imports", which NESO describes as a balancing item that may comprise LNG and/or continental pipeline imports. The key point is that Figure 68 is that the real-world dynamics of gas supply under stress (for example, where weather conditions constrain the share of renewables on the grid) leaves the composition of "Generic Imports" contingent on market and system conditions.

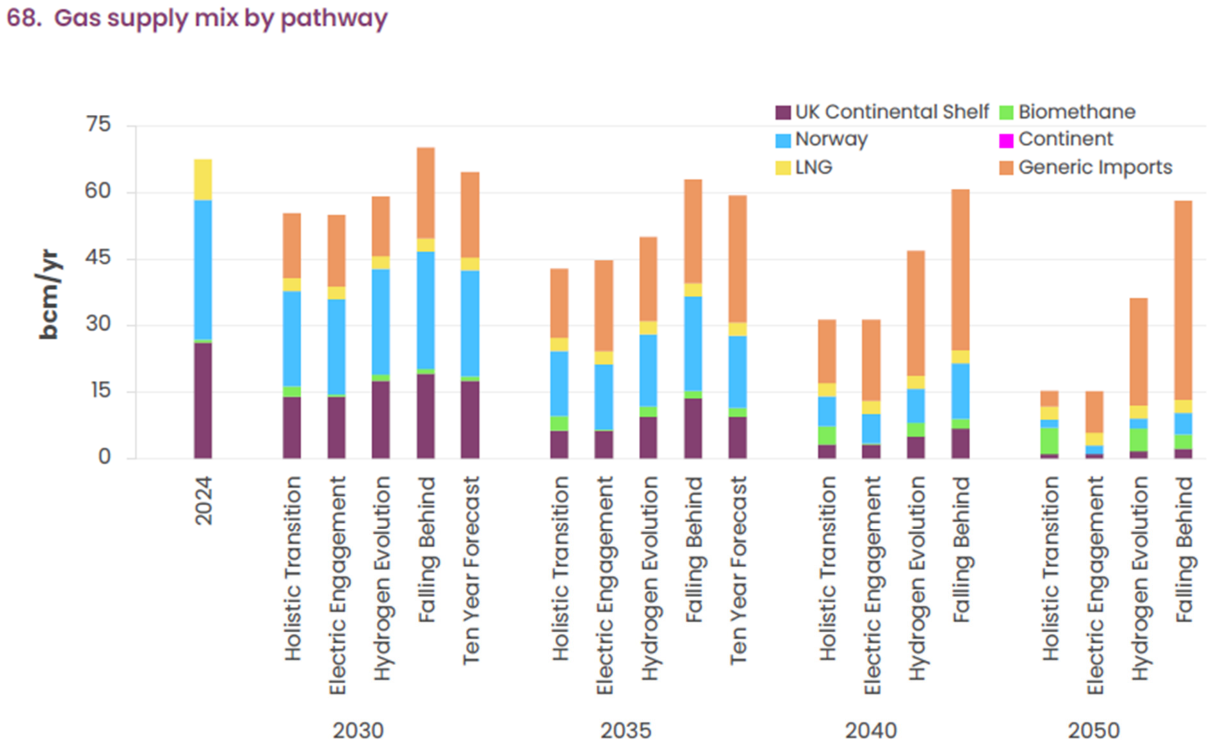

Figure 1: Future Energy Scenarios (FES), Figure 68 reproduced "Gas supply mix by pathway"

34 The FES documentation explains that the model balances supply and demand by allocating UKCS first, then Norwegian pipeline, then minimum LNG and minimum continental/interconnector flows, with residual demand met through "Generic Imports" [15]. Accordingly, the LNG shown <u>separately</u> in Figure 68 (i.e. the yellow bars above) is not a cap on LNG in the system: LNG also contributes share within "Generic Imports" depending on market outcomes—particularly where continental pipeline availability is constrained and flexible cargoes clear at the margin.

[15] NESO state "*The annual supply match allocates gas supplies to meet demand using a ranking order. We allocate indigenous gas production — UKCS, shale and green gas — to our supply match first, because it is all UK based and will have large domestic supply chain investments in place. There is also less opportunity for these supplies to reach other markets, unlike LNG for example. Following this we allocate the Norwegian imports, the levels of which are driven by the pathway framework. Then <u>minimum levels of LNG and continental gas imports</u> are added. Finally, a supply/demand match is achieved by allocating generic import, which as mentioned above and can be made up of either LNG or continental pipeline gas or both",* See page 51/52, "FES Modelling Methods : How we model FES: NESO pathways to Net Zero", https://www.neso.energy/document/364701/download, Accessed 18 February 2026

35 This "Generic Imports" component is a significant fraction of annual supply – for example, in the bars for 2035 in the charts below, the generic imports can be seen by eye to be around the same bcm/yr quantity as Norwegian pipeline imports. By 2040, generic imports are significantly greater than Norwegian pipeline supplies.   This is across all scenarios.

36 Figure 68 from the Future Energy Scenarios (FES) uses four different NESO scenarios[16] "Holistic Transition", "Electric Engagement", "Hydrogen Evolution", "Falling Behind", and a Ten Year Forecast (10YF)[17]. Figure 68 captures snapshots of the natural gas allocation for 2024 (essentially the same data as the NSTA data above), and then projections for each scenario in 2030, 2035, 2040 and 2050. The data table behind Figure 68 is reproduced from the FES 2025 Data Workbook in Appendix A along with the full graphs for each scenario.

37 In 2024, NSTA data (as reproduced in Figure 68) indicate that non-Norwegian continental pipeline imports were negligible (approximately 1 mmboe), and that residual imports beyond Norwegian pipeline supply were overwhelmingly LNG. The data table in Appendix A shows that NESO project a <u>minimum</u> of 2.92 bcm/yr of LNG (the yellow bar); however in 2024, the actual LNG imports were 9.2 bcm/yr. This demonstrates that, in practice, where Norwegian and domestic production were insufficient in 2024, residual imports were overwhelmingly LNG. It illustrates how LNG operates as a major flexible balancing source. Figure 68 and the graphs reproduced in Appendix A show that this role is set to increase over time, as UKCS and Norwegian supplies decrease.

38 FES 2025 does not assume unconstrained growth in Norwegian flows to the UK. In all net-zero aligned scenarios[18], UK gas demand declines materially to 2050, and Norwegian supply contracts in line with that demand reduction[19]. Further information is in the FES 2025 assumptions for Natural Gas which is supplied as a stand-alone Appendix[20].

39 It is reasonably foreseeable that a non-trivial share of "Generic Imports" would, in higher-demand or constrained conditions, be met by supply drawn from the flexible import layer of the system. Those are the conditions in which a dispatchable plant such as CQLCP would be expected to operate. Under the FES gas allocation hierarchy, Norwegian pipeline volumes are allocated first, followed by minimum LNG and minimum continental/interconnector flows, with residual demand met through "Generic Imports", whose composition is not fixed and is contingent on market conditions.

40 The FES 2025 charts therefore, whilst only showing averages, do reflect the dynamic allocation order. The explicit LNG volumes shown in Figure 68 and the charts in Appendix A

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[16] See page 26 of NESO, Future Energy Scenarios (FES), 2025, supplied as stand-alone appendix

[17] "The 10YF is used for downstream security of supply planning.", page 27 of FES 2025, ibid.

[18] "Holistic Transition", "Electric Engagement", "Hydrogen Evolution", and the Ten Year Forecast

[19] Norwegian production is constrained to currently producing fields, approved developments and limited "Yet To Find" volumes, with no automatic expansion of exploration or export capacity . Critically, Barents Sea gas — including YTF volumes — is not assumed to be available to the UK in those pathways because insufficient demand exists to justify new pipeline infrastructure; only in the high-demand "Falling Behind" case is such investment assumed . Furthermore, NESO allocates Norwegian flows to the UK using historic minimum/average shares in low-demand pathways, meaning the UK's proportional access declines as domestic demand falls . Physical constraints also apply: continental imports are capped by BBL (Balgzand (NL) → Bacton (Norfolk, UK) pipeline) and IUK interconnector (Zeebrugge (Belgium) ↔ Bacton (UK)) capacity, and BBL forward capacity has been reduced. <u>FES 2025 therefore indicates declining absolute Norwegian volumes to the UK in net zero pathways, not structural growth</u>. See more details in stand-alone Appendix on NESO FES 2025 Natural Gas supply assumptions.

[20] As extracted from NESO, FES 2025, https://www.neso.energy/document/364561/download - "FES Pathways Assumptions 2025 (workbook)_0.xlsx", downloaded 26 February 2026

reflect only the minimum of LNG participation in the system. Residual demand is projected to increase, and it is projected to be met through the flexible import tranche, including LNG.

B.1 (B) Dynamic supply modelling

41 This allocation logic is consistent with NESO's Gas Supply Security Assessment (GSSA), which models deliverability and margins under a 1-in-20 cold snap[21]. GSSA defines a merit-order grouping in which LNG sits within the flexible Group 3 tranche (alongside storage and other flexible imports), dispatched after UKCS and the core high-reliability Norwegian pipeline tranche[22] - see Table 4 reproduced below. Where Group 3 is required, sources are blended according to deliverability. LNG is therefore explicitly treated as part of the marginal/flexible supply layer deployed in stress conditions.

Table 4: Merit order supply groups and sources

Group	Sources
Group 1	UKCS, NCS SEGAL, NCS non-Gassco delivered, biomethane
Group 2	NCS Langeled
Group 3a	LNG, underground storage
Group 3b	Interconnectors, NCS Vesterled

Figure 2: GSSA Methodology Statement: Table 4 reproduced "Merit order supply groups and sources"

42 The GSSA further models LNG as internationally traded and price-responsive, with UK competing to attract cargoes during market tightness. NESO expects increasing structural reliance on LNG and sustained high utilisation of UK LNG terminals through the 2030s. That expectation is directly relevant to the reasonable worst-case assessment of a dispatchable plant expected to run more during constrained system conditions.

43 As LNG supply responds to global price signals, it provides flexibility to the marginal layer of the system. LNG therefore forms a core component of the flexible marginal supply layer under stressed or elevated demand conditions, alongside storage and certain interconnector flows. It follows that, where "Generic Imports" (as shown in FES 2025, Figure 68) are required to meet residual demand, a significant material proportion of the increment is met structurally by LNG.

44 By contrast, continental pipeline imports do not provide such flexibility, being contingent on European market conditions and physical availability.

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[21] Winter 2030/31 (5-year horizon), Winter 2035/36 (10-year horizon)

[22] The Applicant's reliance on "Norwegian pipeline imports" as a stable, low-intensity counterweight to LNG materially overstates security of supply. NESO's Gas Supply Security Assessment does not treat all Norwegian imports as equivalent. In the merit-order framework, only Langeled is isolated as a high-reliability source (Group 2), whereas NCS Vesterled is placed in Group 3b alongside interconnectors. This reflects materially different forward risk assumptions: NESO applies no production decay to Langeled over the assessment horizon, but applies substantial decay factors to Vesterled (0.651 at five years; 0.265 at ten years). In other words, NESO itself recognises that not all Norwegian pipeline flows exhibit the same structural resilience. Only Langeled is treated as firm winter baseload; other Norwegian flows are modelled as more contingent and market exposed. It follows that generic references to "Norwegian imports" obscure this differentiation and risk overstating the degree to which future marginal or stress-period supply can be assumed to be low-intensity Norwegian pipeline gas rather than LNG-backed flexibility.

45 GSSA also notes that NCS deliverability may become more uncertain as production declines[23] and producers retain flexibility across markets[24]. In NESO's modelling structure, only Langeled is treated as the high-reliability Norwegian pipeline tranche, whereas Vesterled is grouped with other less-reliable import routes and subject to higher decay assumptions. The Applicant's suggestion that "*substantially more gas is likely to be imported via pipeline from Norway compared to imports of LNG"* is inconsistent with the evidence from the relevant FES 2050 data and charts. It also does not engage with the logic of the dynamics of gas delivery in stress periods (see GSSA Table 4 above).

46 GSSA places underground storage within the same flexible Group 3 tranche as LNG and other imports, and models depletion and deliverability over the stress period. Storage is therefore part of the same balancing layer deployed once core pipeline flows are exhausted. In a system where flexible supply becomes increasingly import-dependent, it is unsafe for EIA purposes to assume that Norwegian gas can supply that demand during stress periods.

47 Recent independent analysis by OIES[25] confirms that once domestic production and Norwegian pipeline imports reach their winter plateau, short-run supply flexibility is provided primarily by LNG send-out and storage withdrawals. The fast-cycle nature of medium-range storage means that the storage replenishment is materially dependent on the composition of imports over the relevant season. Where incremental imports are LNG-dominated—as in 2024—the upstream intensity associated with storage-derived gas cannot be assumed to reflect a low-intensity Norwegian average.

48 LNG terminal tank stocks relied upon in stress deliverability are, by definition, LNG-origin. Any reduction in storage resilience (including potential changes at Rough) would tend to increase dependence on flexible imports, reinforcing the need to test LNG-linked upstream intensity as part of reasonable worst-case assessment

49 The EIA question is not solely which source predominates in annual average supply. It must address whether the upstream factor applied in the ES sufficiently bounds the reasonably foreseeable variability in the upstream intensity of gas supplied during the periods in which the plant operates. Dispatchable plants such as CQLCP operate when marginal system supply is required. Under the GSSA allocation hierarchy, additional demand during such periods is drawn from the flexible import tranche, including the LNG-dominated Group 3 sources. Where upstream variability is acknowledged and stress-period supply draws from that tranche, the absence of sensitivity testing leaves untested — and therefore unexamined within the Environmental Statement — whether lifecycle greenhouse-gas effects have been assessed on a reasonable worst-case basis.

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[23] A Changing Context, page 7, NESO , "Gas Supply Security Assessment", Nov 2025. https://www.neso.energy/document/372661/download Accessed 18 February 2026 "*During periods of peak demand in the 2030s, we expect GB's import dependency could rise above 90%.... NCS production is projected to decline in the coming years, with the rate dependent on the delivery of any new production opportunities.*"

[24] Executive Summary, page 5, NESO , "Gas Supply Security Assessment", Nov 2025. https://www.neso.energy/document/372661/download Accessed 18 February 2026. "*Deliveries from the NCS could also become more uncertain as overall production declines and producers retain the flexibility to supply multiple markets through the NCS system. As a result, we expect GB to become increasingly reliant on LNG, with sufficient global availability expected to enable high utilisation rates at GB terminals.*"

[25] OIES, "UK Gas: Demand Volatility Requires Supply Flexibility", Dr Jack Sharples, October 2025, https://www.oxfordenergy.org/wpcms/wp-content/uploads/2025/10/NG201-UK-Gas-Volatility-of-Demand-and-Flexibility-of-Supply.pdf, provided as stand-alone Appendix

50 The system architecture described by NESO and OIES[26] indicates that, under foreseeable higher-demand or stressed conditions — precisely those conditions in which dispatchable gas-fired plant would operate — both LNG send-out and a proportion of storage-derived gas used during stress periods are structurally linked to the composition of flexible imports, increasingly LNG, during the relevant season.

51 Taken together, OIES, FES and GSSA establish that Norwegian pipeline gas will not increase in the operational circumstances over the life of the Proposed Development. They demonstrate that marginal and stress-period supply relies upon a flexible import layer in which LNG is a foreseeable and major participant - including LNG and LNG-backed storage.

52 Further confirmation of the increasing role of LNG in the UK gas supply system is provided in a recent policy paper by National Gas, *Securing Britain's Energy* (February 2026), submitted in response to the Government's recent consultation on gas system security of supply, and supplied as a stand-alone Appendix to the examination library. National Gas observes that the UK has already become a net importer of gas and is now "more reliant on LNG, and more exposed to global market volatility" than under the historic supply framework[27]. The paper further identifies declining domestic production and evolving market conditions as drivers of increasing reliance on flexible gas imports.

53 In assessing potential supply shortfalls under stress scenarios, National Gas identifies a potential deficit of approximately 127 mcm/day, equivalent to roughly six floating storage and regasification units (FSRUs) each delivering around 20 mcm/day, or several Rough-scale storage facilities[28]. While this figure refers to peak system deliverability rather than annual average flows, it illustrates the scale of flexible import capability that may be required to maintain system resilience. In the context of recent UK LNG imports of approximately 9–10 bcm/year, the analysis indicates that future security-of-supply policy <u>may involve materially expanded LNG import capability relative to current utilisation levels</u>. This further reinforces the conclusion reached above: increasing LNG participation in UK gas supply is structurally foreseeable over the operational life of the Proposed Development and cannot reasonably be excluded from upstream emissions scenarios relevant to the Environmental Impact Assessment.

54 Network infrastructure planning by National Gas also reflects the expectation of increasing import-led supply flows. The West Import Resilience programme is designed to increase the capability of the National Transmission System to transport gas from LNG import terminals into the wider network, responding to increasing west-to-east gas flows driven by LNG imports[29]. Complementary reinforcement projects, including the South East Resilience programme, are intended to ensure the network can accommodate larger flows from southern entry points such as the Isle of Grain LNG terminal and Bacton import routes.

55 These transmission upgrades do not themselves expand LNG terminal capacity, but they enable substantially greater throughput of imported gas within the national network. Their purpose is therefore consistent with the structural shift identified above: the UK gas

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[26] ibid

[27] National Gas, *Securing Britain's Energy*, February 2026, supplied as stand-alone Appendix, discussion of increasing LNG reliance.

[28] National Gas, *Securing Britain's Energy*, ibid, discussion of potential 127 mcm/day deficit and FSRU equivalence.

[29] National Gas website, https://www.nationalgas.com/wir. "West Import Resilience (formerly Western Gas Network)", accessed 10 March 2026 states: *"Liquified Natural Gas (LNG) which comes from overseas and then enters the UK network is a significant part of maintaining energy security between now and 2050. Once LNG is converted back into gas it is then distributed around the country in underground gas pipelines. National Gas has identified that the existing stretch of pipeline which runs between South Wales and Warwickshire needs to be upgraded to ensure <u>it can accommodate the increased capacity which is anticipated in the coming years</u>."*

transmission system is being reconfigured to accommodate increased reliance on imported gas, including LNG. In EIA terms this constitutes further evidence that LNG-linked upstream supply scenarios are reasonably foreseeable over the operational life of the Proposed Development.

56 Thus, within the modelled UK gas supply architecture described by National Gas, NESO and GSSA, it is reasonably foreseeable that marginal system supply — during periods in which dispatchable plant operates — will draw from the flexible import layer, of which LNG is a principal component. As established above, the EIA duty requires that foreseeable variability in the upstream intensity of that supply to be tested, not merely that its annual average share be identified.

57 Accordingly, CESL contends that both the average LNG supply shares and dynamic LNG-linked marginal outcomes are reasonably foreseeable over a 30-year operational life. In those circumstances, a sensitivity case, as per CESL's conclusion in D1 [REP1-077] using a higher-intensity upstream factor would allow the Examining Authority to determine whether the Environmental Statement adequately bounds the reasonably foreseeable range of lifecycle greenhouse-gas effects.

B.2 National and International Initiatives

> **[Applicant's response]** *"The Applicant would also note that there is a range of international initiatives aimed at identifying and reducing emissions of methane, including within the energy sector. These include the Global Methane Pledge, the Oil and Gas Methane Partnership, the World Bank Global Flaring and Methane Reduction Partnership, the Global Methane Initiative, and the International Methane Emissions Observatory. Within the UK, the North Sea Transition Deal contains measures to decarbonise the oil and gas industry, while the Carbon Budget and Growth Delivery Plan also contains policies to control upstream emissions of methane from the energy sector.*
>
> *Across these national and international initiatives, there is considerable scope to achieve significant reductions in upstream methane emissions using existing technology."*

58 The Applicant refers to a range of national and international initiatives aimed at identifying and reducing methane emissions across the oil and gas sector, including the Global Methane Pledge, the Oil and Gas Methane Partnership and other multilateral programmes.

59 CESL does not dispute that initiatives exist or that abatement technologies are available. However, voluntary initiatives and policy ambition do not determine the upstream intensity of gas delivered to UK in future stress conditions, nor do they remove the EIA requirement to identify and assess likely significant effects on a reasonable worst-case basis.

60 Recent peer-reviewed studies and satellite-based measurement programmes have in many cases identified emission levels materially higher than those reflected in national inventory-based factors. Measurement-based studies (source references in the footnote[30])

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[30] Alvarez et al. (2018, *Science*), https://doi.org/10.1126/science.aar7204

Zhang et al. (2020, *Science Advances*), https://doi.org/10.1126/sciadv.aaz5120

Chen et al. (2022, *Environmental Science & Technology*), https://doi.org/10.1021/acs.est.1c06458 demonstrate that upstream methane intensity varies widely across producing regions and gas supply systems, and evidence that upstream methane emissions exhibit a wide distribution rather than a single fixed value. Alvarez et al. (2018) estimate methane emissions from the U.S. oil and gas supply chain at 2.3 % of gross gas production, approximately 60 % higher than the U.S. EPA inventory estimate while Zhang et al. (2020) report leakage rates of approximately 3.7 % of production in the Permian Basin. Chen et al. (2022) reports materially higher regional estimates[31] in some cases. Howarth and Jacobson (2022) report lifecycle analysis of LNG supply chains has estimated methane leakage of approximately 3–4 % of production in some shale gas systems[32]. Consistent with this variability, the International Energy Agency[33] reports that methane emissions intensities across oil and gas producers vary more than 100-fold between the best and worst performers.

61 These studies consistently demonstrated substantial variability in upstream methane emissions between producing basins and operators, which arises from differences in regulatory regimes, infrastructure age, operational practices and monitoring coverage. The complex issue of fugitive methane emissions is not eliminated simply by the presence of international initiatives, as confirmed by MethaneSAT in early 2026 with very recent data gathered by its satellite showing *"that emissions from the global oil and gas industry consistently exceed the figures reported in commonly cited inventories by significant margins. … For those basins with at least 20 percent of the energy produced coming from natural gas, emissions were three times higher than reported in inventories."*[34].

62 The EIA question is not whether abatement initiatives may reduce future emissions, but whether the ES demonstrates that the applied upstream factor bounds reasonably foreseeable variability over the operational life. Policy ambition does not eliminate evidential uncertainty.

63 Accordingly, reliance on policy ambition or technological potential cannot substitute for a transparent assessment of reasonably foreseeable upstream variability. For the purposes of the EIA Regulations, the Secretary of State must be satisfied that likely significant effects have been assessed on a reasonable worst-case basis, taking account of material uncertainty in upstream intensity over the life of the Proposed Development.

Howarth and Jacobson, (2022, *Energy Science and Engineering*), https://doi.org/10.1002/ese3.956

IEA (2025), Global Methane Tracker 2025, https://iea.blob.core.windows.net/assets/b83c32dd-fc1b-4917-96e9-8cd918801cbf/GlobalMethaneTracker2025.pdf , Supplied as stand-alone Appendix.

[31] Chen et al(2022), ibid, made measurement studies which showed that methane emissions are highly unevenly distributed, with a small proportion of sites ("super-emitters") responsible for a large share of total emissions. This produces a heavy-tailed distribution in which average values may not capture high-emission outcomes. They reported some basin-wide airborne surveys estimating methane losses approaching ~9 % of gas production in parts of the Permian Basin, illustrating the heavy-tail nature of upstream emissions distributions.

[32] Howarth and Jacobson (2022), ibid, use a baseline value of 3.5%, with sensitivity tests at 4.3%, 2.54%, and 1.54% for their modelling.

[33] IEA Global Methane Tracker 2025, ibid, p.9

[34] MethaneSAT, 2026, "First look at a system wide view", article provided as stand-alone Appendix, https://www.methanesat.org/project-updates/first-look-system-wide-view, downloaded 22 Feb 2026.

B.3 Responsiveness of the DESNZ Natural Gas WTT Factor to LNG shares

> **[Applicant's response]** "*The Applicant accepts that the upstream WTT carbon intensity of natural gas is variable and has changed in the past, with the UK Government's WTT factor already taking into account the relative proportions of different sources of natural gas into the UK gas network. An increase in the proportion of LNG in the UK gas network in 2019 was reflected in a corresponding rise in the upstream carbon intensity published in 2021. Since that time, the published WTT factor for natural gas has fallen slightly, and has remained constant since the dataset published in summer 2023.*"

64 The applicant states that the UK Government's upstream WTT factor for natural gas is "*already taking into account the relative proportions of different sources of natural gas into the UK gas network*", and that an increase in LNG share in 2019 was reflected in a corresponding rise in the published upstream carbon intensity in 2021. That characterisation requires clarification.

B.3 (A) Structural Basis of the DESNZ WTT Factor

65 The DESNZ methodology papers[35] show fixed midstream and upstream emission intensities are applied in calculating the (upstream Scope 3) natural gas emission factor which are derived from:

- Prior to 2017, the UK Natural Gas WTT factor was derived from the JEC Well-to-Wheels data[36] (2010–2012 assumptions); and
- From 2017 and thereafter the UK Natural Gas WTT factor was derived from the Exergia[37] et al (2014/2015) report, developed for the EU.

66 DESNZ methodology papers state that DUKES data on gas import composition data are used to weight source shares, which are then multiplied by source-specific upstream emission intensities to derive a weighted UK WTT factor. This structure allows annual updating of source shares; without further evidence, it does not demonstrate that updating of the underlying source intensities has occurred since the Exergia report[38] was written in 2015, and used as a basis for the DESNZ emissions factor since 2017.

67 In fact, the DESNZ methodology papers from 2017 continue to cite Exergia (2015) as the principal basis for upstream and midstream source intensities. Those papers do not evidence systematic recalibration of those intensities to incorporate post-2015

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[35] For example, 2017 Government GHG Conversion Factors for Company Reporting – Methodology Paper, para 2.16, https://assets.publishing.service.gov.uk/media/5a81f757ed915d74e340102c/2017_methodology_paper_FINAL_MASTER.pdf, Accessed 20 February 2026, *"Information on quantities and source of imported gas are available annually from DUKES and can be used to calculate the proportion of gas in UK supply coming from each source. These can then be combined with the Exergia et al emissions factors for gas from each source, to calculate a weighted emissions factor for UK supply."*

[36] Prior to 2017, the UK Natural Gas WTT factor was derived from the JEC "Well-to-Wheels Analysis of Future Automotive Fuels and Powertrains in the European Context" (Version 3c, 2011; Version 4/4a, 2013–2014). The JEC study is a transport-sector lifecycle model which includes upstream (Well-to-Tank) emission intensities for fuels such as CNG and LNG based on EU-average supply conditions at the time of publication. The UK conversion factors adopted these upstream intensities for general fuel accounting purposes. However, those intensities reflect modelling assumptions circa 2010–2012 and were not designed as a forward-looking, measurement-updated assessment of UK upstream methane emissions.

[37] https://energy.ec.europa.eu/system/files/2015-08/Study%2520on%2520Actual%2520GHG%2520Data%2520Oil%2520Gas%2520Final%2520Report_0.pdf

[38] https://energy.ec.europa.eu/system/files/2015-08/Study%2520on%2520Actual%2520GHG%2520Data%2520Oil%2520Gas%2520Final%2520Report_0.pdf

measurement-based methane studies or satellite-derived basin data. The relevance for this examination is not academic: where the ES applies a single central factor over a 30-year project life, the ExA must be satisfied that the factor either bounds reasonably foreseeable upstream variation or that such variation has been tested.

68 CESL does note that the 2021 methodology report notes a change to the calculation for natural gas WTT factors[39] for the "*transmission and distribution*" element, although the details are not clear.

69 The reports state that the methodology allows for annual updates and changes in LNG to be reflected in the emissions value[40]. The changes document for 2021 notes that the LNG share increased[41] (in DUKES year 2019). There appear to have been no updates reported for natural gas WTT factors since the 2021 report.

70 So whilst the calculation uses the fuel source shares, including the LNG share, from recent DUKES reports[42], and structurally incorporates them into the weighted average, it appears that the midstream and upstream source emission intensities themselves remain anchored in legacy modelling studies based largely on pre-2015 data from the Exergia report.

71 Accordingly, variation in the weighted average driven by changes in the annual shares of gas types is not equivalent to demonstrating that upstream methane assumptions are current, nor that the ES has bounded the upper envelope of reasonably foreseeable upstream intensity. This distinction is material. The EIA duty concerns sufficiency of information on likely significant effects, not the formal provenance of a dataset.

[39] 2021 Methodology report, section 1.11 (e) "*The methodology for calculating the indirect/WTT emission factors for natural gas and CNG have been improved to utilise updated DUKES data on leakage and energy use in transmission and distribution.*"

[40] 2021 Methodology report, section 2.20 "*The methodology developed allows for the value calculated for gas supply in the UK to be updated annually This allows changes in the sources of imported gas, particularly LNG, to be reflected in the emissions value.*"

[41] 2021 Government Greenhouse Gas Conversion Factors for Company Reporting, Major changes to the Conversion Factors, page 8, reference 43: Magnitude of change vs 2020 update: "*31% to 32%*"

[42] The methodology reports refer to the annual DUKES reports. So for example, the 2025 methodology report refers at section 2.19 to DUKES with the reference to "DESNZ, 2023a)", and Table 4 gives the "Imports of LNG into the UK as a share of imports and net total natural gas supply" from 2011 to 2023. On this basis, the DUKES data from 2023 (and up to 2023) is used for the DESNZ 2025 conversion factors. The 2025 Methodology paper is provided as a stand-alone Appendix to the examination library.

B.3 (B) Empirical Relationship between LNG Share and Published WTT factor

72 For illustration and discussion purposes only, CESL provides comparisons of DESNZ spreadsheet values for Natural Gas WTT ($kgCO_2e/kWh$, Net CV) from 2017 published data onwards against the LNG share of UK gas supply (2012–2025) as taken from Table 4 of the 2025 Methodology paper (which is provided as a stand-alone Appendix to the examination library), in Table 1 below:

DESNZ Year	Spreadsheet WTT ($kgCO_2e/kWh$ Net CV)	Unit converted WTT ($kgCO_2e/GJ$, Net CV)	2025 Methodology Table 4 - LNG imports % of UK supply	DUKES Year	Source basis
2017	0.03094	8.59	18.8%	2015	Exergia (2015) weighted UK mix
2018	0.02841	7.89	11.6%	2016	Exergia (2015) weighted UK mix
2019	0.02657	7.38	7.7%	2017	Exergia (2015) weighted UK mix
2020	0.02649	7.36	8.2%	2018	Exergia (2015) weighted UK mix
2021	0.03474	9.65	21.7%	2019	Exergia (2015) weighted UK mix, and T&S change
2022	0.03446	9.57	24.7%	2020	Exergia (2015) weighted UK mix, and T&S change
2023	0.03347	9.30	18.8%	2021	Exergia (2015) weighted UK mix, and T&S change
2024	0.03347	9.30	35.5%	2022	Exergia (2015) weighted UK mix, and T&S change
2025	0.03347	9.30	30.0%	2023	Exergia (2015) weighted UK mix, and T&S change

Table 2: Natural gas WTT factor and LNG share, 2017 - 2025

73 The increase of the WTT factor in 2021 from 7.36 to 9.65, which is linked to the rise in the percentage of LNG from 8.2% to 21.7% in 2019 DUKES data is clear (highlighted yellow row).

74 The empirical pattern in Table 2 raises a specific question that the Applicant and DESNZ have not answered: why did the published WTT factor remain static at 9.30 $kgCO_2e/GJ$ across publication years 2023–2025, when the LNG share of UK gas supply varied between 18.8% and 35.5% over the corresponding DUKES data years? On the Applicant's own characterisation of the DESNZ methodology — that it is designed to *"allow changes in the sources of imported gas, particularly LNG, to be reflected in the emissions value"* — that question is not rhetorical. The methodology is stated to be LNG-responsive. The data shows it has not responded. An explanation is owed.

75 The consequence is that no party to this examination other than DESNZ and the Applicant can verify the published figure — and neither has provided that verification on the record of this examination.

76 Whether this reflects an artefact of the weighting methodology, a lag in the DUKES data feed, or some other structural feature of the calculation is not evidenced in the methodology papers available to CESL. That absence of explanation is itself material: where the dominant upstream emissions parameter fails to respond to a near-doubling in the share of the highest-intensity supply source, the ES cannot rely on that parameter as a reliable representation of current or foreseeable upstream intensity without further explanation from the Applicant.

77 The methodology papers describe the weighting structure at a level of generality that does not allow a third party to replicate the published values, identify which Exergia table entries are used at each boundary, confirm how LNG provenance (United States, Qatar, other) is differentiated or blended, or verify whether and how transmission and distribution estimates were revised in 2021. The calculation is, in that sense, a black box. The burden of demonstrating that the factor adequately bounds the reasonably foreseeable upstream intensity rests with the Applicant, who has chosen to rely on the factor as the basis for 63.4% of the lifecycle emissions total

B.3 (C) The Legal Consequence of Methodology Opacity

78 The opacity of the calculation methodology is not merely an academic inconvenience. It is directly material to this examination for three reasons.

79 First, the Applicant relies on the DESNZ WTT factor as the single quantitative basis for 63.4% of the lifecycle emissions total presented to the decision-maker (see Table 3 in section B.3(E) below). Where a dominant assessment parameter is derived from a calculation that cannot be independently verified or reproduced from published documentation, the ES cannot demonstrate that the parameter adequately bounds the reasonably foreseeable range of upstream outcomes. Methodological opacity does not substitute for robustness: it compounds the insufficiency.

80 Second, the Applicant's assertion that the factor is *"responsive"* to LNG share changes — advanced in REP2-019 at 6.1.1 to resist CESL's sensitivity analysis request — is not demonstrated by the published record. It is a characterisation of the methodology, not a verification of its outputs. Given that the factor has been flat for three consecutive publication years during which the LNG share has varied by 16.7 percentage points, the assertion of responsiveness requires evidential support, not mere assertion. In the absence of the working calculations, neither the Examining Authority nor the Secretary of State can verify whether the responsiveness the Applicant describes is operating as stated.

81 Third, CESL has sought the working calculations from DESNZ directly. As detailed in Appendix E of this submission, CESL has made three separate attempts to obtain the methodology and working files from DESNZ: by direct contact with the DESNZ Greenhouse Gas Statistics team in January 2024, by further contact in February 2026, and by formal EIR request submitted before this Deadline. Neither direct contact has received a response. The EIR request has been acknowledged but a substantive response is not expected before the D3 deadline of 10 March 2026.

82 The burden of demonstrating that the DESNZ WTT factor adequately bounds the reasonably foreseeable upstream intensity does not rest with CESL. It rests with the Applicant, who has chosen to rely on that factor as the basis for 63.4% of the lifecycle emissions total in an ES presented to a decision-maker. The Applicant has access to DESNZ and could, if it wished, request the working methodology and verify the calculation. CESL invites the Examining Authority to direct the Applicant either to provide that verification — demonstrating that the flat 2023–2025 factor is arithmetically consistent with the stated LNG-responsive methodology applied to the DUKES supply shares for those years — or to provide the WTT sensitivity analysis requested in CESL's D1 submission and reiterated here. Until one or other of those steps is taken, the assertion that the factor adequately describes the upstream emissions profile of a 30-year dispatchable gas plant is unverified and insufficient for EIA purposes.

B.3 (D) Structural limits of the DESNZ WTT factor

83 The 2023 – 2025 data above do not support the applicant's submission that because the DESNZ factor has varied historically, it is responsive and therefore representative.

84 In summary, the Applicant is correct that the DESNZ Natural Gas WTT factor was revised once since 2017 — in the 2021 dataset — to reflect an increase in LNG within UK gas supply[43]. However, there is no clear evidence that recent changes in the LNG share have been reflected in recently published WTT factors. Further information would be required to determine the extent to which the published factors reflect current upstream supply conditions. The present submission does not contend that the use of a government conversion factor is in itself inappropriate; rather, the issue is whether the Environmental Statement demonstrates that the resulting lifecycle emissions outcome is robust to reasonably foreseeable variation in upstream methane intensity, as required for the adequate description of likely significant effects under the EIA Regulations. The fundamental point is that where a single central factor is used to represent upstream methane intensity in a project-level assessment, the Environmental Statement must demonstrate that the resulting emissions outcome remains robust across a range of reasonably foreseeable upstream supply conditions. Further, robustness cannot be demonstrated by a single alternative parameter value where credible evidence demonstrates a wide range of upstream methane intensities across supply basins.

85 In any case, the upstream emission intensities, to which the weighting is applied, are derived from the legacy EU modelling study by Exergia (2015): this applies to the conversion factors since 2017. This study was based on modelling assumptions and supply conditions prevailing at the time of publication and the methodology papers do not evidence systematic recalibration using subsequent satellite-based methane measurement datasets or basin-specific leakage reassessments. The annual weighting mechanism therefore adjusts source proportions within a fixed upstream intensity framework; the underlying methane emission assumptions appear to not being regularly updated with new evidence. Accordingly, the fact that the published WTT factor has changed over time does not demonstrate that it reflects current upstream methane science or resolves uncertainty in the project assessment over the project lifetime.

86 In the context of a 30-year gas-reliant project, limited historical variation in a central factor does not resolve uncertainty as to the upper envelope of upstream emissions. Where a quantitative parameter materially determines the scale of assessed effects, established EIA principles require that either (i) the parameter is demonstrated to bound reasonably foreseeable outcomes, or (ii) the robustness of the significance conclusion is demonstrated across foreseeable variation <u>sufficient to enable the decision-maker to reach a reasoned conclusion on likely significant effects</u>.

B.3 (E) Materiality and Variability of the Upstream Emissions Parameter

87 On the Applicant's own operational lifecycle accounting (Table 20-8 [APP-058], reproduced at Appendix B, Table 5, Column 1), the upstream well-to-tank ("WTT") term is not peripheral: it is the <u>dominant quantified component</u> of the Scope 1 and Scope 3 fuel-use total. This is shown in the summary table below.

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[43] As evidenced in the 2021 methodology report

88 The parameter used to represent upstream methane intensity therefore directly and materially influences the scale of lifecycle emissions presented to the decision-maker and the conclusions subsequently drawn regarding the significance of the project's climate effects.

89 On the Applicant's baseline, post-capture Scope 1 emissions from natural gas combustion are 6,648,512 tCO_2e, while upstream well-to-tank (WTT) emissions are 24,242,682 tCO_2e. The total Scope 1 and Scope 3[44] fuel-use lifecycle figure is therefore 38,243,395 tCO_2e over the 30-year operational period.

90 It should be noted that this fuel-use total does not represent the full operational emissions of the Proposed Development. Table 20-8 [APP-058] reports total operational emissions of 42,654,595 tCO_2e when grid electricity consumption, raw materials and other operational sources are included.

91 Within the fuel-use lifecycle figures, the WTT component therefore represents approximately <u>63%</u> of the total and is approximately <u>3.65 times</u> the post-capture residual stack emissions. The parameter used to represent upstream methane intensity therefore functions as a determinative input to the lifecycle emissions outcome presented to the decision-maker.

Component (fuel-use lifecycle)	Quantity (tCO_2e)	Share of Total Scope 1 and Scope 3
Scope 1 post-capture stack residual (natural gas "non-captured")	6,648,512	17.4%
Scope 3 WTT upstream natural gas supply chain	24,242,682	63.4%
Other (T&S unavailability gas to atmosphere + diesel + diesel WTT) *	7,352,201	19.2%
Total Scope 1 + Scope 3 (fuel usage)	**38,243,395**	**100%**

Table 3: Operational lifecycle emissions (30-year) Applicant's accounting (GWP100 baseline)

92 Because the Applicant's WTT calculation is implemented by applying a single ratio (0.165) — itself derived from the DESNZ upstream emission factor — to gross combustion totals, any change in the upstream emission factor produces a direct proportional change in the assessed lifecycle emissions total. The materiality of upstream intensity is therefore not theoretical: it is arithmetically embedded in the figure presented to the decision-maker and capable of affecting the stated significance conclusion.

93 Table 5 in Appendix B provides illustrative lifecycle figures using upstream emission factors derived from recent peer-reviewed scientific studies of LNG supply chains. Under those illustrative scenarios the Scope 1 + Scope 3 (fuel-use) lifecycle total increases to 144,234,272 tCO_2e (GWP100) and 263,025,819 tCO_2e (GWP20), compared with 38,243,395 tCO_2e in the Applicant's reference case based on the DESNZ WTT factor.

94 In these scenarios the upstream supply-chain component represents <u>90.3%</u> and <u>94.7%</u> of the fuel-use lifecycle total respectively, compared with 63.4% in the Applicant's reference case.

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[44] Note: the Applicant's table structure allocates the "T&S unavailability" atmospheric emissions line, and also Diesel and Diesel WTT, within "Scope 3 totals"

95 These calculations are provided solely to illustrate the quantitative sensitivity of the lifecycle emissions outcome to variation in upstream methane intensity and metric choice. They are not intended to represent a substitute Environmental Statement, nor to assert that any particular upstream supply pathway will occur.

96 Where the dominant emissions component of a development is determined by a single input parameter, and where that parameter is recognised in the scientific literature as variable across gas supply systems, the Environmental Statement should demonstrate that the selected value adequately represents the range of upstream intensity outcomes evidenced in the literature.

97 This is particularly necessary where, as shown above, that parameter materially determines the magnitude of lifecycle emissions presented to the decision-maker. Absent such demonstration, the Environmental Statement cannot show that the magnitude of the project's principal climate effect has been fully described for the purposes of Schedule 4 of the Infrastructure Planning (EIA) Regulations 2017.

98 Upstream methane intensity is widely recognised in the scientific literature to vary materially across basins, production assets, and measurement methods. The DESNZ well-to-tank factor represents a historically based national average rather than a bound on upstream emissions outcomes.

99 The scientific evidence on upstream methane variability has been set out section B.2 above. As there demonstrated, measurement-based studies consistently show that upstream methane intensity is not a fixed value but spans a wide and heavy-tailed distribution, with the IEA reporting more than 100-fold variation between the best and worst performers, and MethaneSAT (2026) finding that actual emissions from the global oil and gas industry exceed reported inventories by significant margins. That evidence is directly material here: where the dominant emission type in the lifecycle emissions total (63.4%) exhibits this degree of variability across supply systems, the ES cannot adequately describe likely significant effects by applying a single central factor without sensitivity testing.

100 These studies indicate that upstream methane intensity spans a distribution of possible outcomes rather than a single deterministic value. Lifecycle assessments that rely on a single central factor therefore implicitly assume a fixed upstream intensity, notwithstanding evidence that methane emissions across supply systems exhibit wide dispersion and heavy-tailed distributions. The use of a single central well-to-tank emission factor without any accompanying sensitivity or range analysis is methodologically equivalent to assuming that upstream methane intensity is known with certainty, notwithstanding the substantial variability in methane emissions documented across gas supply systems in the scientific literature. The cited studies are not advanced as predictions of the specific origin of future UK gas supply but as evidence that upstream methane intensity is widely recognised to vary materially across supply systems.

101 This submission advances the proposition that where a single quantitative parameter arithmetically determines a dominant share of the lifecycle GHG emissions total — here 63.4% — that parameter functions as an intensity component of the Rochdale envelope[45] for the development's greenhouse gas assessment. The Rochdale principle is not confined to spatial or physical parameters: it requires that the parameters used to bound the maximum

[45] Sections 4.3.10-4.3.12, and footnote 106, DESNZ (2023) "Overarching National Policy Statement for Energy (EN-1)"; Sections 4.3.10-4.3.12, , and footnote 86, DESNZ (2025) "Overarching National Policy Statement for Energy (EN-1)

scale of assessed effects are demonstrated to reflect the reasonable worst case. Just as the spatial footprint of a development must be bounded to its worst-case extent, so must the intensity parameters that are the dominant determinants of the quantified outcome. An ES that bounds operational volume while holding dominant intensity parameters at untested central values or design optima does not satisfy the Rochdale requirement in relation to greenhouse gas effects, because it cannot demonstrate that the assessed emissions total represents the worst case — only that it represents the maximum throughput at the minimum assumed intensity. The present case illustrates why this distinction matters: the Applicant asserts at paragraph 20.6.69 of the ES that the Reference Case is 'the worst-case scenario for GHG emissions.' On the Applicant's own accounting, 63.4% of the emissions total is determined by a single upstream intensity factor that has not been sensitivity-tested. That is a maximum volume scenario, not a demonstrated worst-case intensity scenario. It follows that where a numerical parameter materially determines the scale of assessed effects, and where that parameter is subject to acknowledged variability, the ES must assess likely worst-case effects and bound worst-case parameters (the Rochdale envelope) — including intensity parameters that are dominant determinants of the quantified emissions outcome.

102 The evidence above establishes both that upstream methane intensity varies materially across supply systems and that the applied WTT factor functions as a dominant determinant of the project's lifecycle emissions outcome. The adequacy of the Environmental Statement therefore turns on whether that variability has been tested.

103 In practical terms, this means that any sensitivity analysis must be capable of demonstrating whether the Environmental Statement's significance conclusion remains robust across reasonably foreseeable upstream supply conditions. The purpose of such analysis is not to determine which upstream emission factor is most likely to occur, but to enable the Examining Authority to understand whether the lifecycle emissions outcome presented in the ES is materially sensitive to upstream methane intensity over the operational lifetime of the development.

104 Given the evidence presented in this submission concerning the variability of upstream methane emissions between supply sources — and the role of LNG as a marginal supply source during periods of constrained system supply — sensitivity analysis confined to small adjustments around the central DESNZ factor would not resolve the question identified in this submission. The relevant question is whether the lifecycle emissions outcome is materially affected under supply scenarios that reflect higher upstream methane intensities associated with different gas supply compositions.

105 A meaningful robustness assessment would therefore examine scenarios reflecting materially different upstream methane intensities associated with differing gas supply compositions, rather than minor numerical variation around the central estimate.

106 Similarly, where the temporal characteristics of methane forcing are material to understanding the climate effects of a project operating over multiple decades, sensitivity analysis using a shorter-time-horizon metric such as GWP20 may provide relevant contextual information regarding the timing and magnitude of climate impacts. The purpose of such analysis would not be to replace the conventional GWP100 metric used in reporting frameworks, but to ensure that the Environmental Statement adequately describes the nature and significance of the climate effects associated with methane-related emissions. This is discussed in section C.

B.3 (F) Implications for the ES

107 In circumstances where upstream fuel-supply emissions form a substantial component of the lifecycle greenhouse-gas profile of the Proposed Development, the parameter used to represent upstream methane intensity materially influences the magnitude of emissions presented to the decision-maker. The upstream emission factor therefore functions as the principal determinant of the lifecycle outcome in the Environmental Statement, and the ES must demonstrate that the assessment remains robust to reasonably foreseeable variation in that parameter.

108 The purpose of the proposed sensitivity analysis would not be to determine which upstream intensity is most likely to occur, but to enable the Examining Authority and Secretary of State to understand how sensitive the Environmental Statement's emissions outcome is to that variability.

109 In short, where the magnitude of assessed lifecycle emissions is materially determined by a single parameter that is subject to recognised variability, the ES should demonstrate that the resulting emissions outcome is robust across that range.

110 Absent such demonstration, the decision-maker cannot be satisfied that the lifecycle greenhouse-gas profile presented in the ES represents the range of reasonably foreseeable climate effects associated with the development.

111 The assessment of significance logically follows the identification and quantification of the reasonable worst-case effect. Where a quantitative parameter materially determines the scale of emissions and is subject to acknowledged variability, the decision-maker cannot conclude, without further analysis, that the stated significance classification remains robust. The decision-maker must be satisfied that higher reasonably foreseeable upstream outcomes have been encompassed within the assessment. Without such bounding, the significance conclusion rests on an untested central assumption, and the Environmental Statement does not demonstrate that the likely scale of the project's greenhouse-gas effects has been robustly assessed.

112 For illustration only, if Norwegian pipeline upstream intensity is materially lower than LNG-linked upstream intensity, even modest increases to the background average LNG supply shares and in the proportion of higher-intensity supply during marginal operation would proportionally increase lifecycle GHG totals. Evidence has been given above from NESO and OIES that the average and dynamic shares of LNG in the UK gas supply system are likely to increase, with associated greater upstream emissions intensities. Over a 30-year operational life, even a modest percentage increase in upstream intensity would aggregate to a substantial absolute quantity of additional CO_2e. The ES does not demonstrate that such an increment would leave the stated significance conclusion unchanged.

113 The present issue concerns the adequacy of the ES under the EIA Regulations. The statutory requirement to identify and describe likely significant greenhouse gas effects precedes and informs the planning judgment under the National Policy Statement. Where, as here, the magnitude of lifecycle emissions is materially determined by a single upstream emissions parameter, the adequacy of the ES necessarily depends upon whether the effects associated with that parameter have been fully described.

114 It ensures that the environmental information before the decision-maker properly describes the emissions profile of the proposed development as required by Regulation 5(2) and Schedule 4.

115 The statutory duty to provide sufficient environmental information rests with the Applicant. Where material variability in a quantitative parameter is identified and acknowledged, it is not incumbent upon an interested party to construct alternative lifecycle modelling in order to demonstrate insufficiency. Rather, the ES must itself demonstrate that the significance conclusion is robust to reasonably foreseeable variation in that parameter. In the absence of such demonstration, the decision-maker is left without quantified assurance that higher foreseeable upstream outcomes have been encompassed within the assessment.

116 The central point is whether the ES's description of effects and significance conclusion is sensitive to upstream intensity variation. Where the magnitude of lifecycle operational emissions is materially determined by that parameter, the adequacy of the Environmental Statement necessarily turns on whether its variability has been properly assessed. In the absence of sensitivity testing of that parameter, the Examining Authority cannot be satisfied whether lifecycle effects have been assessed on a reasonable worst-case basis.

B.4 ISEP Guidance and Use of Government Conversion Factors

> **[Applicant's response]** "*The GHG assessment was carried out in accordance with the guidance issued by the Institute of Sustainability and Environmental Professionals (ISEP, formerly IEMA) in their 2022 document "Assessing Greenhouse Gas Emissions and Evaluating their Significance". Appendix A to this guidance provides information including suitable sources of GHG Information. This states that: "The Government conversion factors for greenhouse gas reporting are suitable for use by UK based organisations of all sizes, and for international organisations reporting on UK operations." The professional body issuing the formal guidance under which the GHG assessment was carried out, therefore. explicitly approves the use of the dataset from which the emissions factor in question was taken.*"

117 The Applicant relies on the ISEP (formerly IEMA) 2022 guidance document "Assessing Greenhouse Gas Emissions and Evaluating their Significance"[46] as authority for two propositions: first, that the Government conversion factor dataset is an appropriate source for upstream WTT emissions factors; and secondly, that an assessment conducted in accordance with that guidance is thereby rendered adequate for EIA purposes [REP2-019, 6.1.1]. The Applicant is correct that Appendix A to the guidance refers to Government conversion factors as a suitable source of greenhouse gas information. However, the Applicant's interpretation overstates the effect of that reference and mischaracterises what the guidance as a whole requires. On a careful reading, the ISEP guidance does not support the Applicant's position — it undermines it.

118 ***Appendix A is indicative, not prescriptive.*** The relevant reference appears within Appendix A, which lists examples of commonly used datasets under the heading "Potential stakeholders, sources of environmental information and carbon tools." It does not prescribe exclusive reliance on any dataset, nor does it state that use of a listed source automatically satisfies EIA requirements. Significantly, the Government conversion factors do not appear in Appendix B, which is the guidance's "List of Standards." Appendix A is informative rather than prescriptive. The body of the guidance (Section 5.3, Step 4, pp.19–20) refers to Appendix A as giving "examples" of GHG emission factors. The operative requirements of the guidance — transparency, justification of assumptions, treatment of uncertainty, and

[46] Institute of Environmental Management & Assessment (IEMA) (2022). *Assessing Greenhouse Gas Emissions and Evaluating their Significance (2nd Edition).* February 2022.

reasoned significance conclusions — are found in the body of the guidance, not in Appendix A. Citation of a dataset listed in Appendix A cannot, of itself, demonstrate that material uncertainty has been bounded for EIA purposes.

119 ***The Appendix A wording relates to organisational reporting***, not project EIA. The reference[47] relied upon by the Applicant describes the Government conversion factors as suitable "for greenhouse gas company reporting" by UK-based organisations of all sizes. That context is corporate or inventory-style reporting, the purpose of which is consistency and comparability across reporting entities. Project-level Environmental Impact Assessment under the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 is a materially different exercise. It requires identification of likely significant effects; transparent explanation and justification of assumptions; consideration of material uncertainty; and a reasoned conclusion capable of withstanding scrutiny. The ISEP guidance does not provide that citation of a nationally published factor removes the need to explain whether that factor adequately reflects material variability relevant to the specific development under assessment.

120 **The guidance does not prescribe a fixed dataset, nor specific methodology. It does prescribe methodological rigour, including the consideration of bespoke emission factors, bounding conditions and actual monitored data.** The ISEP guidance establishes binding methodological principles for EIA practitioners. It requires that the assessment " *must include all material emissions … direct or indirect … during the whole life of the proposed project. <u>The boundary of the assessment should be clearly defined, in alignment with best practice</u>*." (Section 5.2, p.15). It requires that the assessment "*seek to present a reasonable worst case*" and that "*any exclusions, limitations, assumptions and uncertainties should be justified and reported where appropriate*" (Section 5.2, p.15). The methodology section (Section 5.3, Step 3, p.19) requires:

> *"The methodology should result in <u>a relevant, complete, consistent, transparent and accurate assessment of the reasonable worst case</u>. In most cases, the assessment should use activity data and emissions factors. However, <u>where possible, it may be preferable to generate bespoke emissions factors (e.g. through mass balance calculations) or use actual monitored data</u>. The methodology chosen should follow best practice guidance, such as the GHG protocol, and it is not the aim of this guidance to provide this."*

121 Far from prescribing a fixed data set for emissions factors, the guidance encourages generating what is appropriate, or bespoke. The above is the methodological standard, under IEMA, against which EIA adequacy falls to be assessed, and it apply regardless of which data source an applicant has selected.

122 ***The guidance requires scrutiny of data quality, including vintage and provenance.*** On the selection of emissions factors, the ISEP guidance states that factors vary in scope and coverage and that care should be taken to select and reference the right factors, with explicit consideration of data quality dimensions including: age of data; geography; technology specificity; methodology; and competency of the entity that developed the data (Section 5.3, Step 4, pp.19–20). This expressly requires scrutiny of the evidential basis and history of any upstream methane leakage factor used. The ES does not provide any examination of the provenance or responsiveness to changes in UK gas supply composition of the DESNZ

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[47] The relevant section heading states "*A1 Potential stakeholders, <u>sources of environmental information</u> and carbon tools*" and the conversion factors are described as "*The Government conversion factors for greenhouse gas reporting are suitable for use by UK based organisations of all sizes, and for international organisations reporting on UK operations.*"

2025 WTT factor. CESL's structural analysis demonstrates that the factor's underlying source intensity data derive from the Exergia (2015) study and have not been updated to reflect the material changes in supply composition and underlying source emissions intensities.

123 ***The core question for this examination:*** the issue is not whether Government conversion factors may be used in principle — they clearly may, and CESL does not suggest otherwise. The issue is whether the ES demonstrates that: upstream variability has been transparently evaluated; material uncertainty has been addressed; and the significance conclusion remains robust across reasonably foreseeable variation in upstream intensity. ISEP guidance requires methodological clarity and sufficiency of reasoning on all three counts. It does not provide that inclusion of a listed dataset, by itself, establishes compliance. Where upstream WTT emissions constitute 63.4% of the ES's own baseline total, making the WTT factor the single most material parameter in the entire assessment, proportionality as well as the guidance's own reasonable worst-case requirement demand that the assessment address the range of plausible outcomes, not merely the central estimate.

124 ***The Applicant's reliance on ISEP guidance is self-defeating.*** Assessed against the standards the guidance actually sets, the ES as submitted falls short on three independent counts. First, the ES does not provide explicit justification of the selected WTT factor including its data age and provenance, as required by Section 5.3 Step 4. Secondly, the ES does not transparently report the uncertainties and limitations associated with the WTT factor, as required by Section 5.2. Thirdly, the ES does not present a reasonable worst-case sensitivity analysis in circumstances where credible higher-leakage evidence — including the supply dynamics modelling and upstream methane studies now before this ExA — demonstrates that materially higher outcomes are reasonably foreseeable.

125 The assessment therefore does not satisfy the ISEP guidance's own requirements for completeness, transparency, reasonable worst-case representation, or proper contextualisation. An applicant cannot selectively invoke professional guidance as a shield while the same guidance, properly read, identifies the respects in which the assessment is deficient.

126 ***Legal primacy.*** For completeness, compliance with professional guidance is not a substitute for compliance with the EIA Regulations. The legal standard — that an ES must contain the information reasonably required to assess likely significant effects — is set by the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, not by ISEP guidance. The significance of the analysis above is that the ISEP guidance and the legal standard point in precisely the same direction: both require more than the Applicant has provided. That alignment reinforces the conclusion that the ES is inadequate on the WTT factor, but the legal standard would apply independently even if the guidance were silent.

B.5 The NZT Precedent Claim

> **[Applicant's response]** "*The use of the UK Government emissions factor dataset, and specifically the upstream WTT emissions factor for natural gas, was explicitly deemed appropriate by both the Examining Authority and the Secretary of State for Energy Security and Net Zero in relation to the GHG assessment for the Net Zero Teesside Project that received development consent in February 2024.*"

127 The Applicant relies on the treatment of the WTT factor at the Net Zero Teesside (NZT) examination and in the NZT Decision Letter as authority for the proposition that the DESNZ factor is appropriate and that no further analysis of upstream emissions is required [REP2-019]. For the reasons set out below, that reliance does not withstand scrutiny. Each ground is capable of standing alone; taken together, they demonstrate that the NZT record provides no material support for the Applicant's position in this examination.

128 ***No legal precedent.*** An ExA report and a Decision Letter are fact-specific administrative determinations on the evidence before that decision-maker at that time. They create no legal precedent and bind no subsequent decision-maker. This ExA is required to reach its own judgment on the evidence now before it. The proposition that a previous ExA's acceptance of an emissions factor — on a different evidential record, in a different examination, at a different time — constrains the approach available to this ExA has no basis in the structure of the PA2008 regime or in the law of EIA.

129 ***The NZT determinations addressed a different question.*** It is necessary to identify with precision what the NZT record actually decided. The NZT ExA at ER 5.3.48 — and the NZT Secretary of State at paragraph 4.37 of the Decision Letter — refused to insert a DCO operational control requiring the CCGT to operate only when carbon intensity was below IEA projections. That is the question those paragraphs determined. Neither the NZT ExA nor the SoS was asked to determine, and neither determined, whether an Environmental Statement must demonstrate robustness to reasonably foreseeable WTT variability through sensitivity analysis as a condition of EIA sufficiency. That question — which is what CESL now places before this ExA — was not before the NZT examination in that form and remains undetermined as a matter of EIA law and practice.

130 ***The evidential record before this ExA is qualitatively different.*** The WTT issue at NZT was raised in post-examination correspondence, principally by reference to an RSC journal paper on UK upstream underreporting and a general observation about LNG proportion. The evidence now before this ExA is materially different in kind and depth. It includes: NESO FES 2025 supply scenario modelling across all pathways to 2050; the November 2025 NESO Gas Security of Supply Assessment, which establishes the merit-order position of LNG and Norwegian pipeline gas under constrained supply conditions; OIES analysis (October 2025) identifying LNG as the marginal source of UK gas supply; MethaneSAT findings (February 2026) that global oil and gas emissions consistently exceed inventory figures by significant margins, with gas-weighted production basins emitting at rates substantially higher than those reported; a structural analysis of the DESNZ WTT methodology demonstrating that its underlying source intensity data are anchored in the Exergia (2015) study and are not updated to reflect actual changes in supply composition; and a quantified demonstration — drawn from the Applicant's own ES Table 20-8 — that WTT upstream emissions constitute 63.4% of the baseline total, making the WTT factor the single most material parameter in the entire assessment. None of this material was before the NZT ExA or the NZT SoS. Their conclusions were necessarily contingent on an evidential record that has since been substantially developed.

131 ***The NZT ExA's own language is temporally qualified.*** The NZT ExA at ER 5.3.47 accepted the DESNZ factor as representing "the best data and understanding available at the current time." That temporal qualification was deliberate. A decision-maker who limits a conclusion in this way is recording that the conclusion is contingent on the state of knowledge at that moment, not making a durable ruling for the benefit of future applicants in future examinations. The Applicant's attempt to treat a temporally qualified, evidence-contingent judgment as settled authority is inconsistent with the NZT ExA's own framing of its conclusion.

132 ***The evidential premise underlying the NZT ExA's balance has been materially weakened.*** The NZT ExA at ER 5.3.47 balanced the acknowledged uncertainty about future gas supply against what it described as a recognised international effort to reduce methane emissions, including leakage, which "could lead to reduction in carbon intensities." That counterweight — the expectation of improvement through international initiatives — has been directly contradicted by subsequent evidence. MethaneSAT's February 2026 findings establish that emissions from the global oil and gas industry consistently exceed reported inventory figures by significant margins. This is not a marginal refinement of the 2023 picture; it is a finding that the optimistic premise on which the NZT ExA rested its balancing exercise has not been borne out. A judgment that depended on that premise cannot now be treated as authoritative.

133 ***The NZT SoS's post-examination treatment acknowledged variability without resolving the EIA sufficiency question.*** At paragraphs 4.49 and 4.54 of the Decision Letter, the NZT SoS acknowledged that WTT factors "could increase or decrease" over the project lifetime and noted "the likelihood of variation in future emission factors." Those acknowledgments confirm that variability in the WTT factor is accepted as a matter of fact. However, the SoS's expression of continued satisfaction with the Applicant's approach was reached in the context of post-examination correspondence raising relatively limited arguments, not a structured EIA sufficiency challenge supported by supply dynamics modelling and structural methodology analysis of the kind now assembled. Satisfaction expressed in that context does not constitute a determination that sensitivity analysis is unnecessary for EIA adequacy purposes.

134 ***The question for this ExA is EIA sufficiency, not factor selection.*** CESL does not invite this ExA to substitute a different emissions factor for the DESNZ central estimate, nor to impose any operational control on the development with respect to upstream supply chains. The submission is that, properly applying the Rochdale Envelope framework, where a material parameter is subject to reasonably foreseeable variation that could affect the significance of assessed effects — and where that parameter accounts for 63.4% of the baseline total — the ES must demonstrate robustness to that variability through sensitivity analysis. That is a requirement of EIA adequacy, not a request for a planning condition. The NZT record contains no determination on that question. It is before this ExA for the first time, on evidence that was not available at NZT, and falls to be answered on its merits.

135 Paragraph 4.46 of the NZT Secretary of State's Decision Letter records the SoS's acceptance, on the evidential record before her in that case, of the NZT ExA's conclusions on greenhouse gas assessment. It does not determine the issues now raised in this examination for three reasons. First, paragraph 4.46 reflects a judgment about EIA sufficiency on the evidence and arguments then advanced; it does not address the implications of subsequently available evidence, nor does it consider whether acknowledged uncertainty in upstream emissions should be bounded through sensitivity testing where that uncertainty materially determines the scale of assessed effects. Secondly, paragraph 4.46 does not engage with whether non-spatial quantitative assumptions — such as upstream emission factors — operate as parameters defining the maximum scale of greenhouse gas

effects for the purposes of a Rochdale Envelope assessment; that issue was not before the NZT SoS and is raised expressly for the first time in this examination. Thirdly, the NZT SoS herself acknowledged at paragraph 4.49 of the same Decision Letter that WTT factors "could increase or decrease" over the project lifetime, and at paragraph 4.54 noted "the likelihood of variation in future emission factors." Those acknowledgments sit alongside her expression of satisfaction with the Applicant's approach, but they confirm that variability in the WTT factor is an accepted fact. The question they leave open — whether that variability requires sensitivity analysis for EIA adequacy — is precisely what this examination must now resolve.

136 In summary, the present submission raises questions of bounding and sensitivity that were not expressly determined in NZT. NZT therefore provides context but not determinative authority on the sufficiency question now before this ExA. In particular, the NZT examination did not address whether upstream WTT intensity operates as a non-spatial quantitative parameter requiring sensitivity testing and bounding analysis where supply composition and marginal delivery dynamics are projected to evolve materially over the operational life of a development. The present submission raises that specific issue expressly.

B.6 Conclusion on Dataset Reliance and Comparability

> **[Applicant's response]** "*The Applicant maintains that the GHG assessment has been carried out using up to date emissions factors that are appropriate for the purpose. The upstream, or Well to Tank (WTT), factor applied to the natural gas consumed within the Connah's Quay Low Carbon Power Project has been taken from the conversion factor dataset issued by the UK Government in summer 2025. This dataset remains the standard to be applied across operators, installations, companies and projects – its use allows the carbon data generated to be directly and meaningfully compared between projects; this is not possible if assessments are carried out using disparate factors.*"

137 CESL does not dispute that the 2025 UK Government conversion factor dataset is nationally published, widely used, and suitable for corporate reporting and cross-project comparison. However, the existence of a nationally standardised dataset does not, in itself, resolve the methodological question under the EIA Regulations and the IEMA 2022 guidance.

138 The purpose of an Environmental Impact Assessment is not to ensure inter-operator comparability, but to enable the decision maker to reach a lawful and reasoned conclusion on likely significant effects. That requires transparency of assumptions, justification of methodological choices, and consideration of material uncertainty — particularly where emissions are structurally significant to the lifecycle profile of the development.

139 Three concluding points follow.

B.6 (A) "Standard dataset" does not equate to "sufficient for EIA"

140 The Government conversion factors are designed primarily for reporting consistency and comparability. However, the EIA Regulations require sufficient information to enable a reasoned conclusion on likely significant effects. Where (as here) WTT emissions constitute the <u>majority</u> of the quantified operational lifecycle total (~63% on the Applicant's own figures), reliance on a single central WTT factor <u>without bounding or sensitivity</u> leaves the core determinant of the emissions total untested. In those circumstances, "comparability"

cannot substitute for the EIA requirement to demonstrate that the stated significance conclusion is robust across reasonably foreseeable upstream outcomes.

B.6 (B) Comparability cannot override robustness

141 If credible evidence exists that upstream methane intensity varies materially by supply source — and that LNG, in stressed conditions, comprises a significant marginal supply source — then methodological robustness may require sensitivity testing, even if that reduces superficial comparability with other projects that have not undertaken such analysis.

B.6 (C) The issue is uncertainty, not dataset legitimacy

142 CESL does not contend that the Government dataset is illegitimate or unusable. The issue is whether:

- The selected factor adequately reflects foreseeable upstream variability;
- The assessment demonstrates that the stated significance classification remains robust under higher-intensity supply scenarios; and
- The Secretary of State can be satisfied that likely significant lifecycle effects have been sufficiently assessed.

143 If upstream intensity is both material and variable, the absence of sensitivity or bounding analysis creates a gap in the reasoning chain between emissions calculation and significance determination.

B.6 (D) Two further points

144 The fact that the emissions factor applied is nationally published does not, of itself, demonstrate that the likely significant effects have been assessed on a reasonable worst-case basis. Recent Government EIA guidance[48] in other regimes reiterates that where scope 3 emissions are estimated using conversion factors, the ES should explain and justify the methodology adopted, including assumptions and associated uncertainties, and ensure that the baseline reflects up-to-date environmental information. CESL's concern remains whether the acknowledged variability in upstream emissions has been sufficiently bounded within the assessment presented.

145 CESL also notes that the Applicant's D2 response at 6.1.1 focuses on restating its choice of emissions dataset. It does not engage with the central submission advanced by CESL at D1, namely that where uncertainty in upstream emissions is expressly acknowledged and accepted as potentially higher, the ES must demonstrate that such higher-impact outcomes are encompassed within the assessment presented. That bounding question has not been addressed.

[48] DESNZ (2025), "Environmental Impact Assessment (EIA) – Assessing effects of downstream scope 3 emissions on climate"

B.6 (E) Concluding Position

146 The solution sought is proportionate. CESL invites the ExA to ensure that where upstream variability is acknowledged and may materially influence lifecycle totals, the ES demonstrates—through sensitivity testing—that likely significant effects have been assessed on a reasonable worst-case basis. Absent that demonstration, the reasoning chain between emissions calculation and significance conclusion remains incomplete.

147 Given (i) NESO's published security-of-supply merit-order structure, in which flexible supply groups include LNG as a key component under higher-demand / stress conditions, and (ii) the established evidence that upstream methane intensity varies materially by supply source and measurement method, a bounded WTT sensitivity is not speculative. It is a foreseeability check required to confirm that the ES's lifecycle totals — and hence its significance conclusion — remain valid under the operational conditions in which dispatchable gas capacity is most likely to run.

148 Recent system-planning analysis by National Gas in its recent policy paper, *Securing Britain's Energy* (February 2026), identifying a potential supply deficit equivalent to approximately six LNG regasification units under stress scenarios, further reinforces that LNG-linked supply forms a structurally foreseeable component of the UK gas system over the lifetime of the Proposed Development and therefore cannot reasonably be excluded from the upstream emissions scenarios relevant to the Environmental Impact Assessment.

149 Given the evidence presented regarding the role of LNG as a marginal supply source during periods of system stress, sensitivity analysis limited to small numerical adjustments around the central DESNZ factor would not address the core issue identified in this submission. A meaningful test must consider scenarios reflecting supply compositions that materially increase upstream methane intensity relative to the central estimate.

150 If sensitivity analysis is undertaken in response to the issues raised in this submission, it must be capable of demonstrating whether the Environmental Statement's significance conclusion remains robust across reasonably foreseeable upstream supply conditions. That analysis should therefore examine scenarios reflecting materially different upstream methane intensities associated with differing gas supply compositions, rather than minor adjustments around the central DESNZ factor. Sensitivity testing confined to small parameter variation would not resolve the question identified in this submission, namely whether the lifecycle emissions outcome is materially sensitive to upstream supply composition over the operational life of the development.

151 In the absence of sensitivity analysis, the Secretary of State would be required to conclude—without quantified evidence—that reasonably foreseeable upstream variability could not affect the lifecycle emissions total or its significance. CESL submits that such a conclusion would require further evidential support.

B.6 (F) Link to section C: Variability affects short-term climate impacts

152 The variability of upstream methane emissions is particularly material because methane is a short-lived climate pollutant with strong near-term warming effects, meaning that both the quantity of upstream methane emissions and the metric used to characterise their climate impact influence how the project's climate effects are described in the ES. The choice of climate metric used to represent those emissions may materially influence how the timing and scale of the project's climate effects are described. This is now explained in Section C.

D3 / Part A / Section C *Climate metrics and the temporal aspects of the climate impacts*

153 **Comments under 6.1.2 [Table 6, REP2-019]:** CESL's second WR conclusion was:

"CESL requests that the ExA directs the applicant to provide a sensitivity analysis of the impact on assessed emissions using a GWP20 metric for methane, to understand the project's near-term climate forcing".

154 In section 6.1.2 the applicant resists this request based on these main assertions:

- GWP100 is much better suited to modelling and understanding the impacts of carbon dioxide and other gases that control long-term global temperature increases;
- the standard (GWP100 based) UK Government conversion factors are adequate;
- the CCC use a similar approach in advising the government on setting carbon budgets;
- making a sensitivity test against GWP20 is not suitable for contextualisation of the climate impacts of the project.

155 CESL now provides comments on each of these in turn.

C.1 IPCC Framing for short-term impacts and long term climate stabilisation effects of Methane

[Applicant's response] *'The use of a standard 100-year time horizon for Global Warming Potentials by the IPCC and national governments is neither an arbitrary choice nor a quirk of history, as CESL assert. This value was selected because it is better oriented towards understanding the warming impacts of carbon dioxide and other long-lived greenhouse gases. Long-term temperature increases, such as the limit of 2°C to which the Paris Agreement seeks to limit global warming, is controlled almost entirely by cumulative emissions of CO_2, rather than by shorter lived gases such as methane.*

As Working Group III of the IPCC state in their Technical Summary to the 6th Assessment Report (AR6) in 2023:

> *"The choice of GWP100 was made inter alia for consistency with decisions under the Rulebook for the Paris Agreement and because it is the dominant metric used in the literature assessed by WGIII. Furthermore, for mitigation pathways that limit global warming to 2°C (>67%) or lower, using GWP100 to inform cost-effective abatement choices between gases would achieve such long-term temperature goals at close to least global cost within a few percent (high confidence)."*

Both the Applicant and the IPCC (Op Cit) acknowledge that a GWP with a 100-year time horizon is less well suited to reflect the short-lived warming effects of gases such as methane. But ultimately, GWP100 is much better suited to modelling and understanding the impacts of carbon dioxide and other gases that control long-term global temperature increases.'

156 The EIA is required to identify, describe and assess the likely significant effects of the Proposed Development on the climate system. That obligation is not confined to long-run stabilisation outcomes reflected in cumulative carbon dioxide metrics (ie GWP100), but extends to the temporal distribution and magnitude of greenhouse gas effects over the operational life of the project.

157 It is correct that long-run stabilised global temperature levels are approximately proportional to cumulative carbon dioxide emissions, as recognised in IPCC AR6 Working Group I. However, AR6 also demonstrates that methane has made a substantial contribution to observed anthropogenic warming to date and that its radiative forcing materially influences near-term temperature trajectories (i.e. climatic impacts).

158 IPCC AR6 WGI Summary for Policymakers[49,50] Figure SPM.2 attributes approximately 0.5°C of the 1.07°C observed anthropogenic warming (2010–2019 relative to 1850–1900) to methane — that is, on the order of one third of the total anthropogenic warming presented in the figure. Figure SPM2.2 is reproduced in Appendix C. AR6 further explains that methane's shorter atmospheric lifetime results in a substantially greater warming effect when evaluated over a 20-year horizon than under a 100-year horizon. The AR6 mitigation assessment further explains that changes in short-lived climate forcers such as methane dominate the warming response in the near term and that reductions in methane concentrations can drive down near-term non-CO_2 warming before net zero CO_2 is reached.

159 AR6 WGI Figure 6.16 (see stand-alone Appendix) identifies methane as a dominant short-lived climate forcer whose total current emission levels[51] induce warming on 10–20 year time scales <u>at least as large</u> as total current emission levels of CO_2 emissions[52]. Figure 6.16 is reproduced in Appendix D, and shows that a one-year pulse of current emissions ("current" is 2014) produces a global mean temperature response of 0.022 °C for CO_2 and 0.029°C for methane i.e. current levels of methane emissions cause a greater temperature rise after 10 years than current levels of CO_2 emissions.

160 Reductions in methane emissions therefore have a proportionately greater influence on near-term temperature outcomes, and thereby the climatic impacts of the development, than would be indicated by long-lived greenhouse gas metrics alone. This is consistent with AR6 WGIII[53] explanations that strong methane mitigation is a critical component of pathways that limit warming consistent with the Paris goals. The end of Para 3.2.2.2 in IPCC AR6 WGIII Chapter 3 says "*In addition to reaching net zero CO_2 emissions, a strong reduction in*

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[49] IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 3–32, doi:10.1017/9781009157896.001.

[50] Supplied as a stand-alone Appendix to the examination library

[51] Based in the IPCC AR6 report on 2014 annual levels

[52] IPCC (2021), *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the IPCC*, Chapter 6 ("Short-Lived Climate Forcers"), Sections 6.6.1–6.6.2: SLCFs — chiefly methane — contribute significant near-term temperature response, comparable to CO_2 over 10–20 year periods, and their effects decay quickly thereafter. Particularly see Figure 6.16 | Global mean temperature response 10 and 100 years following one year of present-day (year 2014) emissions. Section 6.6 is supplied as a stand-alone Appendix to the examination library.

[53] IPCC (2022), *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the IPCC*, Chapter 3 ("Mitigation Pathways Compatible with Long-Term Goals"), concluding that strong reductions in methane emissions are a critical component of non-CO_2 mitigation in pathways that keep long-term climate goals within reach. Section 3.3.2 is provided as a stand-alone Appendix to the examination library.

methane emissions is the most critical component in non-CO_2 mitigation to keep the Paris climate goals in reach …" Sections of relevant IPCC chapters are provided as stand-alone appendices to the examination library.

161 AR6 WGI Chapter 7 (including section 7.6 and Box 7.3) states that the choice of emissions metric depends on the objective of the analysis and the time horizon of relevance[54]. While GWP100 is commonly used for long-term mitigation pathway modelling, GWP20 more fully reflects warming impacts associated with methane emissions in the near-term, such as the period during which the Proposed Development would operate.

162 The Secretary of State has recently stated to the UK parliament that methane reduction is a priority component of the UK's vision for international climate action, describing methane and other non-CO_2 greenhouse gases as "super-pollutants" [55] and emphasising that cutting methane is among the fastest and most effective means of slowing global warming in the near term[56]. These statements demonstrate, in line with the IPCC AR6 report, that the temporal distribution of methane-related warming is regarded by the decision-maker as a matter of requiring urgent action.

163 The Proposed Development would operate during the period in which near-term methane forcing is climatically material[57]. Where upstream methane emissions form a component of lifecycle greenhouse gas totals, the weighting applied to those emissions materially affects the quantified impact during the operational lifetime of the project.

164 Exclusive reliance on a 100-year time horizon, as applied in the current EIA, does not fully describe the magnitude and timing of methane-related warming over shorter periods that coincide with the project's operational lifetime. In effect, reliance solely on the GWP100

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[54] IPCC (2021), AR6 WGI, Chapter 6 (Short-Lived Climate Forcers) and Chapter 7 (The Earth's Energy Budget, Climate Feedbacks and Climate Sensitivity), sections 7.6–7.7.

AR6 WGI Chapter 6: Szopa, S., V. Naik, B. Adhikary, P. Artaxo, T. Berntsen, W.D. Collins, S. Fuzzi, L. Gallardo, A. Kiendler-Scharr, Z. Klimont, H. Liao, N. Unger, and P. Zanis, 2021: Short-Lived Climate Forcers. In Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 817–922, doi:10.1017/9781009157896.008.

AR6 WGI Chapter 7: Forster, P., T. Storelvmo, K. Armour, W. Collins, J.-L. Dufresne, D. Frame, D.J. Lunt, T. Mauritsen, M.D. Palmer, M. Watanabe, M. Wild, and H. Zhang, 2021: The Earth's Energy Budget, Climate Feedbacks, and Climate Sensitivity. In Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 923–1054, doi:10.1017/9781009157896.009.

[55] Before the recent UN COP30 Climate summit in Brazil, the Secretary of State for Energy Security and Net Zero told Parliament (4 November 2025) "*We will also drive forward progress in tackling super-pollutants such methane, in order to deliver climate action and cleaner air*", Hansard, 4 November 2025, https://hansard.parliament.uk/commons/2025-11-04/debates/251104100000008/UKCOP30Priorities

[56] When launching a joint initiative with Brazil, called the "Super Pollutant Country Action Accelerator" (9 November 2025), the Secretary of State for Energy Security and Net Zero said "*Cutting methane and other non-CO_2 greenhouse gases is one of the fastest and most effective ways to slow global warming and clean our air. The United Kingdom is proud to be at COP30 to work alongside our international partners to turn ambition into concrete action on tackling the climate crisis. The UK is leading the way through our Methane Action Plan which will drive real progress towards a safer, fairer, and cleaner future for our children and grandchildren.*" From "A Turning Point for Methane: Leaders Move to Pull the Climate Emergency Brake at COP30", Press Release, Climate and Clean Air Coalition (CCAC) Secretariat, 9 November 2025, https://www.ccacoalition.org/news/turning-point-methane-leaders-move-pull-climate-emergency-brake-cop30, downloaded 26 February 2026

[57] Ibid, IPCC AR6 WG1 Chapter 7 above. With respect to these short-term impacts, the IPCC Sixth Assessment Report (AR6) Working Group I (Physical Science Basis) provides global warming potential values for multiple time horizons, including 20-year and 100-year metrics, and explicitly shows that methane's shorter atmospheric lifetime results in a substantially higher warming impact over 20 years than over 100 years, see WGI Chapter 7 Figure 7.15 (page 1017). Box 7.3 below Figure 7.15 on emissions metric choice says "*The choice of metric will depend on which aspects of climate change are most important to a particular application or stakeholder and over which time horizons.*"

metric acts as a filter that attenuates the near-term climate impacts of methane within the assessment. The temporal profile of methane forcing is therefore material to understanding the climate implications of a development operating over multiple decades. Sensitivity analysis using a shorter time-horizon metric, such as GWP20, would provide decision-makers with relevant information about the nature, magnitude, and timing of these climate effects.

165 The purpose of a GWP20 sensitivity case is not to displace GWP100 for quantifying longer-term climatic effects but to augment it so that short-term climatic effects are adequately described. GWP20 provides a specific analytical function: to illuminate the temporal distribution of methane-related warming during the operational period of the Proposed Development, as required by Schedule 4's reference to short-, medium- and long-term effects. It is therefore a tool of descriptive completeness.

166 Whether the use of GWP100, in relation to methane and other short-lived climate forcers, fully captures all aspects of climate impact in the context of national accounting is not the question before the Examination. The issue here is the adequacy of the environmental information describing the effects of this particular project. For that purpose, CESL's request is procedural and proportionate: it is that the Applicant should additionally provide a GWP20 sensitivity case so that the Examining Authority and the Secretary of State are properly informed as to the near-term warming implications of methane within the project's lifecycle emissions.

167 Where lifecycle greenhouse gas totals are used to inform conclusions on climate significance, and where those totals include methane emissions whose quantified impact varies materially depending on the time horizon applied (as demonstrated by the differential weighting assigned to methane under GWP20 and GWP100), a sensitivity analysis is a proportionate means of ensuring that the assessment fully describes the range and distribution of potential effects.

168 At REP1-077 paragraph 55 onwards, CESL provided an indicative sensitivity test drawing upon Howarth (2024) as a recent peer-reviewed source from the scientific literature for deriving an upper-bound estimate of upstream methane intensity under LNG supply conditions. This sensitivity test effectively combined sensitivity testing of LNG supply conditions and the short-term climate impacts of methane.

169 As noted at Section B.3(E) above, Appendix B in this submission illustrates the effect of separating the LNG supply conditions and the short-term climate impacts of methane by applying the GWP100 and GWP20 emission factor ratios derived from that literature to the applicant's own combustion totals.

170 As shown in Table 5 of Appendix B, the Applicant's upstream natural gas supply chain emissions are quantified at 24,242,682[58] tCO_2e (Table 20-8 [APP-058]). Applying the indicative Howarth GWP100 upstream ratio increases this figure to 130,233,559 tCO_2e — an uplift of approximately 106 million tonnes, or more than 430% relative to the Applicant's baseline upstream figure. Applying the GWP20 ratio increases upstream emissions to 249,025,106 tCO_2e — an uplift of approximately 225 million tonnes, or more than 925% relative to the Applicant's upstream baseline. In this illustrative case, the GWP100 calculation gives a measure of the long-term climate impacts in a high-LNG supply case; the

[58] Table 20-8 [APP-058] gives Total Scope 3 emissions as 31,590,077 tCO_2e – this figure comprises 7,346,267 tCO_2e from T&S unavailability, 1128 from Diesel Scope 3 emissions and 24,242,682 tCO_2e Scope 3 upstream natural gas emissions – see REP1-077, Table 1.

GWP20 calculation provides an additional measure of the short-term climate impacts during the course of the project lifecycle from the methane emissions.

171 In total Scope 1 & 3 terms, the Applicant's figure of 38,243,395 tCO_2e increases to 144,234,272 tCO_2e under the GWP100 sensitivity case (an uplift of approximately 106 million tonnes, or ~277%), and to 263,025,819 tCO_2e under the GWP20 sensitivity case (an uplift of approximately 225 million tonnes, or ~588%). These figures are presented solely to illustrate the sensitivity of quantified lifecycle emissions to plausible variation in upstream methane intensity and time-horizon weighting; they are not advanced as a prediction of actual future supply composition. The scale of change demonstrates that the choice of upstream methane intensity and time horizon materially affects quantified totals.

172 These uplifts arise solely from differing upstream methane intensity and time-horizon weighting; no alteration is made to combustion volumes, capture rate, or other operational assumptions.

173 Absent such analysis, the environmental information does not transparently disclose the magnitude and temporal distribution of methane-related warming during the operational life of the Proposed Development.

174 Under Regulation 5(2) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, the Environmental Impact Assessment must identify, describe and assess the likely significant effects of the development, including on climate. Schedule 4, paragraph 5 expressly requires the description of effects to address short-, medium- and long-term impacts. The "description" of effects is not confined to their aggregate magnitude when expressed under a single accounting metric, but extends to their nature, characteristics and temporal distribution. Where a greenhouse gas such as methane exerts materially different warming influence over 10–20 year horizons compared with 100-year horizons, the time profile of that warming forms part of the characteristics of the effect. The operational life of the Proposed Development overlaps with the period in which short-lived climate forcers dominate the climatic impacts.

175 Accordingly, a supplementary GWP20 sensitivity case is advanced as a proportionate means of ensuring that the environmental information transparently describes the temporal distribution and near-term forcing of lifecycle methane emissions. Without such information, the Examining Authority is asked to assess significance on the basis of an aggregated metric that does not disclose the differing time-profiles of the climate impact of the emissions assessed. That is a question of adequacy of environmental description under Regulation 5(2)(a).

176 CESL is not inviting the Examination at this stage to determine how any supplementary GWP20 sensitivity case should ultimately be applied within the significance assessment or its contextualisation. The prior question is whether the environmental effects of the Proposed Development have been fully and transparently described. Exclusive reliance on a 100-year time horizon does not disclose the temporal distribution of methane-related warming over the operational life of the project. A proportionate supplementary GWP20 sensitivity case would provide additional, relevant information concerning the magnitude of near-term climate forcing associated with upstream methane emissions. Until that information is available, the range and temporal character of the project's climate effects have not been fully described, and it is therefore premature to consider how robust conclusions as to significance may be made.

177 In circumstances where the quantified lifecycle emissions of the Proposed Development vary by several hundred per cent depending solely upon the time horizon applied to

upstream methane emissions — and where that variation arises from metrics expressly recognised within IPCC AR6 as scientifically appropriate for analysis of different time horizon impacts — the Secretary of State must be satisfied that he has before him environmental information that enables an informed judgment as to the nature, scale and timing of the project's climate effects.

178 The assessment presently relies exclusively upon a 100-year time horizon, notwithstanding that the project's operational life overlaps with the near-term temperature response window in which methane exerts its strongest climate forcing. If no supplementary sensitivity analysis is undertaken, and if materially different quantified outcomes under a recognised alternative metric are not examined, it would be necessary to explain why the near-term warming implications of upstream methane emissions are considered irrelevant to the assessment of likely significant effects. Without such explanation, there is a risk that the decision would proceed without a transparent understanding of the temporal distribution and magnitude of the climate impacts attributable to the Proposed Development.

C.2 Adequacy of the standard UK Government conversion factors

> **[Applicant's response]** *"The emissions factors from the standard UK Government conversion factor dataset have been developed using Global Warming Potentials (GWPs) effective over a 100-year time horizon, as explained in the methodology paper that accompanies the 2025 dataset used for the GHG Assessment."*

179 Section B identified structural limitations in the standard Government conversion factor dataset, including its reliance on static historical modelling assumptions, its fixed treatment of future gas supply pathways, lack of responsiveness to dynamic market conditions in stressed supply conditions, lack of incorporation of recent satellite and remote imaging data, and its incorporation of GWP100 as the sole metric for the associated climate impacts. Those features limit its ability to reflect variability in upstream methane intensity and near-term climatic effects.

180 Section C.1 above shows how the IPCC AR6 makes clear that GWP100 is designed primarily for long-term mitigation pathway comparison and carbon accounting, and that climate metrics with alternative time horizons (i.e. GWP20) may be more informative where the objective is to understand near-term climatic impacts. As the standard Government conversion factor dataset is constructed exclusively using GWP100, it does not disclose the higher near-term weighting of methane's impact on the climate, reflected under shorter time horizons. As above, CESL submits that a supplementary GWP20 sensitivity case would allow the short-term distribution of warming effects of the project to be assessed, and the EIA is incomplete without it.

C.3 EIA and Carbon Budget advice

> **[Applicant's response]** *"The same approach has been taken in the development by the Climate Change Committee (CCC) of the UK's statutory carbon budgets, against which the GHG impact of infrastructure projects such as the Proposed Development can be contextualised. The methodology report for the Seventh Carbon Budget proposed by the CCC in February 2025 states unequivocally that the 7th Carbon Budget was developed applying GWP100, in line with the IPCC's Fifth Assessment Report. The CCC notes that the use of the GWP100 values allows them to aggregate their sectoral modelling outputs into their overall Balanced Pathway."*

181 In advising on statutory carbon budgets, the CCC undertakes macroeconomic mitigation pathway modelling at national scale. That exercise concerns aggregate sectoral trajectories and long-term carbon budget compliance. The Examination, by contrast, concerns the adequacy of environmental information relating to the specific effects of a single project. The methodological choices made for national aggregation do not determine the sufficiency of project-level effect description under the EIA Regulations.

C.4 EIA contextualisations and short-term climate impacts

> **[Applicant's response]** *"Providing a sensitivity analysis applying a different GWP value for methane would generate data that was not comparable with the emissions totals calculated using standard factors and in line with national and international protocols. The emissions could not be contextualised against the UK's or Wales' statutory carbon budgets and would therefore be misleading in characterising the overall, long-term climate impact of the Proposed Development."*

182 The provision of a supplementary GWP20 sensitivity case would not prevent continued presentation of GWP100-based totals. Rather, it would provide additional information concerning temporal climate impacts, leaving any ultimate choice of contextual comparison methodology to the significance assessment stage. To be precise about what is requested: the GWP20 sensitivity case is sought solely to discharge the Schedule 4, paragraph 5 obligation to describe short-term effects. It is requested as a piece of descriptive environmental information to explain the temporal distribution of methane-related warming during the operational period. The GWP20 sensitivity is additional, not alternative. The Applicant's concern that a GWP20 figure would be 'misleading' therefore mischaracterises the purpose for which it is sought: it could only possibly be misleading if presented as the sole significance metric, which CESL does not request.

183 The submission is that, for the purposes of Schedule 4's requirement to describe the short-, medium- and long-term characteristics of climate effects, the ES should include a GWP20 sensitivity case for methane-related emissions. That sensitivity would enable the decision-maker to understand the scale and timing of near-term climate forcing attributable to upstream methane, which is significantly attenuated by a GWP100-only presentation and may therefore remain materially under-described for EIA purposes.

184 In circumstances where methane emissions form part of the assessed lifecycle greenhouse gas total, and where the quantified impact of those emissions varies materially depending on the time horizon applied, the provision of a supplementary GWP20 sensitivity case is a proportionate and technically straightforward means of ensuring that the Examining Authority and the Secretary of State are fully informed as to the temporal distribution of climate effects during the operational life of the Proposed Development. In the absence of such analysis, the Secretary of State would be required to consider whether the environmental information before him adequately describes the temporal distribution of methane-related effects and whether conclusions on significance are robust in light of that omission.

D3 / Part A / Section D The CO_2 capture rate

185 **Comments under 6.1.3 [Table 6, REP2-019]:** CESL's third WR conclusion was:

> *"CESL requests that the ExA directs the applicant to provide the detailed evidence base supporting the assumption of a sustained 95% CO_2 capture rate, and to provide a sensitivity analysis and reasonable worst-case based on such a delivery rate not being deliverable."*

186 In section 6.1.3 the applicant resists this request based on these main assertions:

- the percentage capture rate of the carbon capture plant, is aligned with a guidance document from the Environment Agency;
- the BAT capture rate of 95% is based on studies carried out by the UK CCS Research Community (UKCCSRC);
- the Environmental Permit regime that is likely, given the BAT guidance issued by the EA, to require a 95% capture rate;
- the overall emissions from the Proposed Development will be additionally regulated through the operator's participation in the UK Emissions Trading Scheme (UK ETS) that will financially incentivise greater capture rates;
- the CO_2 mass flow data taken from the Heat and Material Balance (HMB) dataset generated for the Proposed Development models the capture rate at over 95%.

187 CESL provides comments on each of these following the applicant's response quoted below.

> **[Applicant's response]** *'The design of the Proposed Development, and specifically the percentage capture rate of the carbon capture plant, is aligned with the Environment Agency's guidance document <u>Post-combustion carbon dioxide capture: emerging technologies</u> published in 2021 and updated in 2024. That guidance states that:*
>
> > *"The purpose of the PCC [post-combustion carbon dioxide capture] plant is to maximise the capture of CO_2 emissions for either use or secure geological storage."*
> >
> > *"You should aim to design your plant to achieve a CO_2 capture rate of at least 95% during normal operating conditions, although operationally this can vary, up or down."*
>
> *The PCC guidance goes on to note that:*
>
> > *"Capturing at least 95% of the CO_2 in the flue gas during normal operating conditions is considered [Best Available Technique]. You can base this on average performance over an extended period (for example, a year). To achieve this, you should make sure the design capture level for flue gas passing through the absorber equates to at least 95% of the CO_2 in the total flue gas from the plant. Over the averaging period, your capture level may vary up or down."*
>
> *The BAT capture rate of 95% is based on studies carried out by the UK CCS Research Community (UKCCSRC) in partnership with the Environment Agency*

and other environmental regulators to identify Best Available Techniques for CCS-related technologies.

The operation of the Proposed Development (including the carbon capture plant) will be subject to the requirements of an Environmental Permit that is likely, given the BAT guidance issued by the EA, to require a 95% capture rate.

Furthermore, overall emissions from the Proposed Development will be additionally regulated through the operator's participation in the UK Emissions Trading Scheme (UK ETS) that will financially incentivise greater capture rates. The UK-wide cap for the UK ETS (the total amount of CO_2 that can be collectively emitted by all installations participating in the scheme) is now aligned with the UK's statutory net zero target.

For all these reasons, the Applicant does not believe that it is necessary to carry out a sensitivity analysis on the basis of lower carbon capture rates than those specified in the EA's BAT guidance.

For information, the effective capture rate of 95.2367% derived by CESL in their submission is based on CO_2 mass flow data taken from the Heat and Material Balance (HMB) dataset generated for the Proposed Development. This figure is clearly compatible with the EA's BAT guidance of "at least 95%". '

D.1 Overall: Legal Framework, Mutually reinforcing regulatory assumptions across regimes, and EIA Adequacy

188 Under Regulation 5(2) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, the Environmental Impact Assessment must identify, describe and assess the likely significant effects of the development, including on climate. Schedule 4, paragraph 5 expressly requires the description of effects to address short-, medium- and long-term impacts.

189 Where the ES quantifies operational Scope 1 emissions on the basis of a 95% capture rate, the Applicant must therefore demonstrate that this parameter reflects the reasonably foreseeable operational performance envelope of the Proposed Development for the purposes of identifying and describing likely significant effects.

190 It is not sufficient to show that 95% is a design objective or an aspirational performance benchmark. The question for the Examination is whether 95% capture represents a realistic and secured basis for quantifying operational emissions across reasonably foreseeable modes of operation, or whether lower performance is reasonably foreseeable and therefore requires assessment.

D.1 (A) The UK Emissions Trading Scheme (UK ETS)

191 The UK Emissions Trading Scheme (UK ETS) regulates aggregate emissions through a cap-and-trade mechanism and imposes a financial cost on residual emissions. It does not mandate a minimum capture efficiency. Economic incentive is not equivalent to a secured operational envelope. UK ETS therefore cannot secure the 95% capture assumption as the lower-bound operational parameter used in the ES.

D.1 (B) The EA permitting regime

192 In the ES Climate Change chapter [APP-058], the applicant lays out operational mitigation and design principles at section 20.5.1. The first bullet notes that the design will be based on the *"European Best Available Technique (BAT) reference documents (BRefs) for CCGT plants and UK Guidance on Emerging Techniques for Post-Combustion Carbon Capture (Ref 20-36)".* This is the Environment Agency guidance "Post-combustion carbon dioxide capture: emerging techniques" (published 2 July 2021; updated 27 March 2024) – referred to here as the "EA Guidance"[59].

193 The applicant goes on to state under 20.5.1 "*the Environmental Permit application (developed post submission) would include a report setting out how the Proposed Development would meet these BAT requirements. The GHG assessment presented within this chapter has been modelled for high levels of thermal efficiency."*

194 Under the 'emerging techniques' classification, no settled sectoral BAT reference document (BRef) exists for post-combustion CCS. The regulatory significance of this is addressed at section D.3(A) below; for present purposes, it means the design parameter of 95% is not derived from a settled sectoral BAT standard but from guidance that is itself provisional and is applied on a case-by-case basis.

195 What the guidance does state is that the purpose of the PCC plant is to maximise CO_2 capture, and that operators should "aim to design" their plant to achieve a CO_2 capture rate of at least 95% "during normal operating conditions," noting that capture can vary "up or down." It also states that—except where regulations apply—this guidance "is not a regulatory requirement" but identifies best practice which regulators expect operators to follow (or to propose an equivalent approach).

196 The guidance does state that capturing at least 95% of the CO_2 in the flue gas during normal operating conditions is considered BAT. But the same passage frames this as average performance over an extended period (for example, a year), and expressly states that capture may vary "up or down" over that averaging period. The guidance also requires identification and management of "other than normal operating conditions" (OTNOC), including start-up and shutdown, and gives as an example OTNOC when the CO_2 transport and storage network is down. Accordingly, the guidance supports (at most) that 95% is a benchmark for annual-average performance during "normal" operation; it does not, without further evidence and enforceable constraints, demonstrate that 95% is a secured lower-bound capture rate across all reasonably foreseeable operating modes for the purposes of EIA quantification.

[59] "Post-combustion carbon dioxide capture: emerging techniques", https://www.gov.uk/guidance/post-combustion-carbon-dioxide-capture-best-available-techniques-bat

D.1 (C) Mutually reinforcing regulatory assumptions across regimes

197 The Applicant contends that the Environmental Permit regime will in the future secure 95% capture performance. At the same time, the Applicant states that the design is based upon BAT reference documents, under the EA Guidance, for which no settled sectoral BAT reference document yet exists for post-combustion CCS.

198 The position advanced by the Applicant depends on a structure of mutually reinforcing regulatory assumptions between the planning assessment and the future permitting regime. On the basis of this design, the ES applies a fixed parameter of 95% for the capture rate in quantifying emissions for the EIA. The Applicant asserts that operating at this capture rate will be secured in the future by the Environmental Permit.

199 The ES assumes 95% because the design targets it; the design targets it because the guidance describes it as BAT; the EP will in future require it, but not enforce it, because the design describes it; and the design description is said to be what the EP will rely upon.

200 Nor does the development's draft DCO, provided with the application, secure the 95% design parameter, despite the permit regime being said to rely upon the design description contained within the application. However, even if the draft DCO were amended to include such a specification, it would not resolve the EIA description question — as explained at section D.1(D) below.

201 In these circumstances, 95% remains an assumed design case rather than a demonstrated lower-bound performance parameter for the capture rate.

202 Accordingly, reliance on the EP and ETS regimes does not establish that 95% capture is legally secured as the reasonably foreseeable operational performance for the purposes of EIA quantification.

203 Put another way: it has not been demonstrated in this Examination that the permitting regime provides a continuously enforceable minimum capture rate aligned with the capture rate assumption in the ES, or that it precludes sustained operation below 95% provided overall compliance with other aspects of the permit are achieved. This is demonstrated by reference to the Environmental Permit issued for the analogous Net Zero Teesside development, addressed in section D.2 below.

D.1 (D) H2 Teesside DCO examination report

204 The Examining Authority's attention is drawn to the H2 Teesside examination (EN070009, ExA Report 28 May 2025)[60]. In that examination, the ability of the Environmental Permit regime to secure a 95% carbon capture rate was considered for another CCS project employing different capture technology[61]. The H2 Teesside ExA was satisfied that 95% capture was adequately secured, but its satisfaction rested on a specific and identifiable mechanism: Schedule 1 of the H2 Teesside DCO itself specified that each hydrogen production unit must be "*designed to capture a minimum rate of 95% of the CO_2 emissions*" during full load operation [H2T ER 3.5.61, 3.5.65]. The draft DCO for CQLCP contains no

[60] H2 Teesside examination (EN070009, ExA Report 28 May 2025), https://nsip-documents.planninginspectorate.gov.uk/published-documents/EN070009-002187-H2Teesside%20Recommendation%20Report%20-%20Final.pdf

[61] H2 Teesside was designed to employ autothermal reforming and "Closed Loop" carbon capture, rather than post combustion carbon capture

equivalent DCO minimum capture rate specification: note, CESL has proposed similar changes[62] in REP1-078, Appendix A to the CQLCP dDCO [APP-019].

205 However, the H2 Teesside ExA's conclusion that the explicit DCO capture rate plus EP regime 'adequately secures' 95% capture does not resolve the EIA description question that CESL raises for CQLCP. The question is not whether 95% is a design specification — it is whether the ES has demonstrated that 95% represents the reasonably foreseeable operational lower bound for a 30-year lifecycle emissions assessment, including during start-up, ramping, part-load, solvent degradation cycles and periods of T&S constraint.

206 Even where a DCO specification exists — such as that present in the H2 Teesside DCO — it concerns design intent for defined full-load operating conditions. It does not establish the operational performance envelope across all reasonably foreseeable operating modes, nor does it constitute the sensitivity analysis required under the EIA Regulations. Equally, an Environmental Permit granted under the "emerging techniques" framework regulates what the plant must be designed and operated to achieve under defined normal conditions — it does not itself constitute a sensitivity analysis of the emissions consequences of performance below that level.

207 Together, a DCO specification and an EP do not, of themselves, establish what the plant will achieve across all foreseeable operating conditions, nor do they constitute the sensitivity analysis required to describe the range of Scope 1 emissions that are reasonably foreseeable over the CQLCP project's operational life. H2 Teesside does not engage with that question; it was not before the H2T ExA in that form. The Environmental Permit "emerging technique" status is further discussed at section D.3(A).

D.1 (E) The National Policy Statement (EN-1)

208 The H2 Teesside ExA applied EN-1 paragraph 4.12.10 — which directs the Secretary of State to assume the pollution control regime will be properly applied and not to duplicate its controls — to support its conclusion that the EP regime adequately secured 95% capture [H2T ER 3.5.67]. CESL does not invite this ExA to duplicate pollution control regime requirements. The argument is different and narrower: it is that the ES does not demonstrate, as a matter of EIA description, that the stated 95% capture assumption reflects the reasonably foreseeable operational lower bound across all foreseeable operating conditions, and that this gap in the environmental information cannot be closed by pointing to a regulatory regime that will, by design, set conditions after the DCO is granted. EN-1 paragraph 4.12.10 directs the ExA not to re-exercise the Environment Agency's functions. It does not direct the ExA to treat the future exercise of those functions as a substitute for present EIA description adequacy. The H2 Teesside ExA did not separately address that distinction; the question of whether sensitivity testing of the capture rate assumption is required for EIA adequacy was not before it in that form. The H2 Teesside examination is addressed further in section D.3 below in the context of the achievability of the 95% design target.

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[62] Under Article 2 "Interpretation", add in alphabetic order:

> ' *"CCP" means the carbon capture plant, which is designed to capture a minimum rate of 95% of the carbon dioxide emissions of the generating station operating at full load;'*

Under Schedule 2 "Requirements", add new section "Carbon dioxide capture transfer and storage" which contains at least these clauses:

> "*Work No. 1 (a) may not be brought into commercial use without Work Nos. 1 (b), 1(c), 1(e), 7 and 8 also being brought into commercial use and Works No. 7 and 8 being connected to an operational storage site.*"

209 The National Policy Statement for Energy (EN-1) requires that applicants assess greenhouse gas emissions[63]. It does not state that reliance on the environmental permitting regime obviates the need to identify and describe the likely significant effects of the development under the EIA Regulations[64].

210 The Applicant's position, here, therefore extends beyond what EN-1 requires. The issue before the Examination is not whether 95% capture is desirable or consistent with policy, but whether the ES has demonstrated that it represents the secured reasonably foreseeable operational performance necessary to comply with Regulation 5(2) and Schedule 4 of the 2017 Regulations.

D.2 Why reliance on an Environmental Permit does not "secure" 95% capture (NZT example)

211 The Environmental Permit and Decision Document issued for Net Zero Teesside (NZT) are supplied as stand-alone Appendices. These provide an example of the EP for a similar development to CQLCP using the same BAT permitting regime relied upon by the applicant.

212 The documents demonstrate that reliance on this permitting regime does not secure a continuously enforceable minimum 95% capture rate[65].

213 The NZT permit expressly allows operation in both CO_2 abated and unabated modes and frames 95% as a design capture performance specification assessed during "normal operation" and capable of varying up or down.

214 Capture efficiency is calculated as an annual average during normal operation, excluding periods classified as operating techniques not operating normally conditions (OTNOC), including transport and storage unavailability.

215 Critically, Improvement Condition IC10 (page 20 of the NZT EP) provides that where capture efficiency falls below 95%, the operator may either propose remedial measures or justify that 95% is not reasonably achievable. This condition demonstrates that 95% capture rate is treated as a design specification, not an absolute minimum; operation below 95% is anticipated as a real possibility; the regulator expressly allows a pathway where <95% is accepted; compliance can be maintained without achieving 95%, provided justification is accepted.

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[63] Section 5.3.8, DESNZ (2023) "Overarching National Policy Statement for Energy (EN-1)"; Section 5.3.8, DESNZ (2025) "Overarching National Policy Statement for Energy (EN-1)

[64] Section 4.12.10, DESNZ (2023) "Overarching National Policy Statement for Energy (EN-1)"; Section 4.12.10, DESNZ (2025) "Overarching National Policy Statement for Energy (EN-1)

[65] The Environment Agency's environmental permit decision for the Net Zero Teesside Power installation (permit EPR/PP3501LR, decision document dated 14 May 2024) appears to treat the post-combustion carbon capture system as compliant with Best Available Techniques (BAT), notwithstanding three material factors. First, the permit application dossier itself does not contain a substantive BAT demonstration for the carbon capture technology: for example, compliance with relevant BAT Reference (BRef) documents or BAT Conclusions (BATc) document as these apparently do not yet exist. Second, prior to the permit determination, the Environment Agency's guidance on post-combustion carbon capture had been reclassified (27 March 2024) as "emerging techniques", indicating that the technology is not yet fully established as BAT. Third, the evidence base relied upon in the permit determination does not demonstrate that the proposed installation will achieve the assumed ~95% CO_2 capture rate across its operational envelope; the documents instead refer to design intent or expectations during steady-state operation. Taken together, these factors indicate that the permit determination appears to assume BAT compliance for the capture technology without a corresponding evidential demonstration within the application record.

216 IC10 therefore expressly provides a regulatory pathway for continued operation below 95% capture, with no automatic prohibition on such operation. That is not a mechanism that secures 95% as reasonably foreseeable operational performance for EIA purposes. In fact, the NZT EP therefore illustrates that the Environmental Permit regime operationalises 95% as a monitored design objective. The EP provides an express regulatory route for the operator to justify that 95% is not reasonably achievable with no further remedial enforcement. It therefore does not secure 95% capture as a continuously enforceable operational minimum for the purposes of EIA quantification.

217 The NZT permit illustrates the means by which the permitting regime intends to operationalise capture efficiency through monitoring, averaging and flexibility mechanisms. And the structure of the regime demonstrates that reliance on the existence of an Environmental Permit does not, without more, equate to a continuously enforceable minimum capture rate.

218 As addressed at Section D.1 above in the context of the H2 Teesside examination, EN-1 paragraph 4.12.10 directs the ExA not to re-exercise the Environment Agency's functions; it does not direct the ExA to treat the future exercise of those functions as a substitute for present EIA description adequacy. The NZT EP record demonstrates why: even if the permit is fully and properly applied, the framework it establishes does not secure 95% as a continuously enforceable operational minimum.

D.3 UKCCSRC / BAT Reliance Does Not Demonstrate Operational Attainment of 95%

219 The Applicant states that the 95% capture rate is based on studies undertaken by the UK CCS Research Community (UKCCSRC) in partnership with the Environment Agency and other regulators to identify Best Available Techniques (BAT). That assertion does not resolve the issue raised.

220 Identification of BAT establishes what regulators consider technically achievable under defined operating conditions. It does not, without more, evidence the range of performance variability that may arise across the operational envelope of a large-scale dispatchable gas-fired plant, nor does it demonstrate that 95% capture is continuously maintained across start-up, ramping, part-load operation, solvent management cycles, or foreseeable transport and storage constraints.

221 The EA guidance itself (as quoted by the Applicant) refers to "aiming to" design for 95% capture during normal operating conditions, but as described in Section D.1, it does not demonstrate that 95% is the lower-bound performance for capture rate across all reasonably foreseeable modes of operation.

222 For the purposes of Regulation 5(2)(a), the question is whether the ES has demonstrated that 95% capture represents the reasonable worst-case lower bound for quantifying Scope 1 operational emissions. Reference to UKCCSRC studies identifying BAT does not, in itself, provide empirical operating evidence or quantified performance ranges capable of establishing that conclusion.

223 If reliance is placed on specific UKCCSRC studies to justify the 95% assumption, those studies should be identified and their relevance to sustained commercial-scale performance under equivalent operating conditions demonstrated. In the absence of such material, reference to UKCCSRC remains a statement of theoretical achievability rather than

evidence that the ES assumption reflects the foreseeable operational performance envelope.

224 CESL is aware that the H2 Teesside ExA accepted the applicant's claim, in that case, that 95% carbon capture rate was achievable [H2T ER 3.5.59] [66]. Three distinctions are material.

225 **First,** H2 Teesside involved pre-combustion carbon capture (autothermal reforming with a closed-loop process[67]), which is a different and more integrated process than the post-combustion capture proposed for CQLCP. Following an underlying evidence review (March 2024), which is not publicly available (see below), the EA Guidance[68] reclassified post-combustion capture as an 'emerging technique.' Under the Industrial Emissions Directive, an 'emerging technique' is defined as a novel technique not yet fully commercially developed to the level of established BAT across a sector. The EA Guidance itself frames 95% capture as something operators should 'aim to design' their plant to achieve — language that confirms design aspiration rather than demonstrated operational attainment at commercial scale. This characterisation was not before the H2 Teesside ExA, which reported in May 2025 on evidence assembled during the examination and before the March 2024 "emerging technique" update.

226 **Second**, the H2 Teesside examination did not have before it the EA's October 2025[69] permit decision document, addressed at section D.3(A) below, which records that post-combustion CCS is treated as emerging technology requiring improvement and pre-operational verification conditions precisely because commercial-scale performance is not yet established.

227 **Third**, the H2 Teesside ExA was presented with a Schedule 1 DCO specification of a minimum 95% design capture rate, which provided a planning-law anchor for the achievability claim that is absent from the CQLCP dDCO. CESL's submission does not contend that 95% capture is unachievable; it contends that the ES has not demonstrated it as a secured operational lower bound given the foreseeable range of operating conditions and the state of the commercial-scale evidence base.

D.3 (A) The Emerging Techniques Reclassification and its Legal Consequences

228 The Government guidance page[70] for "Post-combustion carbon dioxide capture" was updated on 27 March 2024. The update log records that it "*updated the guidance in several sections to reflect feedback from stakeholders including changing the title from 'best available techniques' to 'emerging techniques'*." The significance of this change lies not in any withdrawal of BAT status for the 95% design target — which the guidance still describes

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[66] H2 Teesside examination (EN070009, ExA Report 28 May 2025), https://nsip-documents.planninginspectorate.gov.uk/published-documents/EN070009-002187-H2Teesside%20Recommendation%20Report%20-%20Final.pdf

[67] CESL notes that it is not aware on any commercial demonstration of 95% capture rate with ATR technology, and considers that the 95% claim for it remains unsubstantiated.

[68] "Post-combustion carbon dioxide capture: emerging techniques", https://www.gov.uk/guidance/post-combustion-carbon-dioxide-capture-best-available-techniques-bat

[69] Environment Agency (2025) Permitting Decisions- Variation: Humber Refinery (Phillips 66 Limited), variation no EPR/UP3230LR/V021, 31 October 2025. Internal ref LIT 11951 – Decision document https://assets.publishing.service.gov.uk/media/690dfe0743f8a163237298ec/Application_Variation_V021_Decision_document_-_31102025.pdf

[70] "Post-combustion carbon dioxide capture: emerging techniques", 27 March 2024, https://www.gov.uk/guidance/post-combustion-carbon-dioxide-capture-best-available-techniques-bat, accessed 1 March 2026

as BAT — but in the legal and regulatory meaning of “emerging technique” as a term of art under the Industrial Emissions Directive and the Environmental Permitting Regulations 2016[71].

229 Under the regulations, an “emerging technique” is defined as a novel technique that, if commercially developed, could provide a higher level of environmental protection than existing BAT, or similar protection with greater cost savings. The definition explicitly frames an emerging technique as not yet fully “commercially developed” to the level of established BAT across a sector. When the Environment Agency applies this classification, it does so because no settled sectoral BAT reference document (BRef) yet provides complete coverage for the technology — and it therefore sets permit conditions case-by-case using its own Annex III assessment rather than applying pre-established sector-wide conclusions. The consequence for post-combustion CCS is that the regulator’s BAT determination for each installation is made on the basis of limited and evolving industrial-scale evidence, and is explicitly provisional.

230 The 'emerging techniques' framing nonetheless matters for EIA. The EA Guidance[72] defines 'emerging techniques' as novel techniques that, if commercially developed, could provide improved environmental protection or equivalent protection with cost savings — language that itself implies the technique is not yet fully commercially developed at scale. The classification therefore confirms that no settled sectoral BAT reference document exists for post-combustion CCS, that the regulator's BAT determination for each installation is made case-by-case on the basis of evolving evidence, and that real-world operational performance ranges and constraints remain developing and must be evidenced rather than assumed.

231 CESL notes a further procedural matter bearing on the weight to be given to the emerging technique reclassification. The GOV.UK guidance page[73] records that the March 2024 update was informed by an evidence review prepared with the UKCCSRC, UK regulators, and industry stakeholders, and directs readers to the UKCCSRC website for that review. The UKCCSRC website in turn links back to the GOV.UK guidance page. The underlying evidence review from March 2024 is not publicly accessible at either location. No party to this examination can therefore verify the evidence base on which the reclassification from 'best available techniques' to 'emerging techniques' was made, the specific findings on commercial-scale performance, or the reasoning for the change. That circularity does not diminish the legal and regulatory significance of the reclassification itself — the GOV.UK page records it as a deliberate and stakeholder-consulted update — but it does mean that the Applicant's reliance on the guidance as demonstrating settled BAT performance at 95% rests on an evidence base that is neither publicly available nor independently verifiable in this examination. To the extent the Applicant contends that the guidance and its underlying review support the 95% assumption as a secured operational parameter, CESL submits the Applicant should be invited to identify and produce the specific studies within the evidence review on which it relies.

232 Environment-permitting decision documents applying the guidance further show how regulators treat the relationship between “emerging techniques” and BAT in practice. BAT for post combustion CCS is applied via the “emerging techniques” framework because the

[71] The Environmental Permitting (England and Wales) Regulations 2016, https://www.legislation.gov.uk/uksi/2016/1154/contents/made

[72] “Post-combustion carbon dioxide capture: emerging techniques”, https://www.gov.uk/guidance/post-combustion-carbon-dioxide-capture-best-available-techniques-bat

[73] “Post-combustion carbon dioxide capture: emerging techniques”, https://www.gov.uk/guidance/post-combustion-carbon-dioxide-capture-best-available-techniques-bat

sectoral BAT reference and BAT conclusion documents do not yet exist. For example, the EA has stated in a carbon capture plant decision document (Viridor Energy Runcorn CCUS Limited, July 2025, EPR/QP3724SE/A001[74]) that it is satisfied the plant will operate in accordance with the "*emerging techniques guidance which is considered to be BAT*," and that meeting the guidance (or an equivalent approach) demonstrates the use of BAT. Separately, in another permitting decision (October 2025, Humber Refinery (Phillips 66 Limited), EPR/UP3230LR/V021[75]) the EA notes that a particular PCC application "*has not yet seen many commercial applications at an industrial scale"* and hence is treated as emerging. The permitting record therefore supports a nuanced position: the "emerging techniques" guidance functions as the benchmark through which BAT is being applied for this sector, while the regulator simultaneously acknowledges novelty and limited industrial-scale replication in some contexts.

233 As described in Section D.1, the guidance states that capturing at least 95% of CO_2 during normal operating conditions is considered BAT, assessed as an average over an extended period (for example, a year). <u>The critical feature of this formulation for EIA purposes is not whether 95% is called BAT, but what the operational and legal framework around it actually secures</u>. The averaging methodology, the exclusion of OTNOC periods, and — as established in Section D.2 above by reference to the Net Zero Teesside Environmental Permit — the IC10-type improvement condition that allows operators to justify capture below 95% as not reasonably achievable, mean that 95% functions as a monitored design target under defined conditions, not as an absolute continuously enforceable operational minimum. Furthermore, because the regulator's BAT determination under the emerging technique framework is made on provisional evidence and is explicitly subject to change as operational experience develops, that determination cannot be treated as equivalent to a settled, empirically validated performance standard of the kind that would justify fixing 95% as the lower bound for a 30-year EIA assessment.

234 The consequence for the ES is not that 95% is irrelevant, but that the ES must reflect the *full content* of the guidance relied upon: 95% is framed as an annual-average benchmark during "normal" operating conditions; capture is expected to vary "up or down"; and OTNOC (including start-up/shutdown and CO_2 T&S outages) is explicitly contemplated. In those circumstances, the Applicant's reliance on the existence of the guidance (and on likely future permitting and UK ETS incentives) does not remove the need—under the EIA Regulations—to test whether the ES significance conclusions remain robust at lower, but reasonably foreseeable, effective capture performance.

235 The Rochdale envelope principle requires the ES to define parameters that bound the reasonable worst case across foreseeable operating conditions. Where the primary emissions-reducing technology is characterised by its regulator as an 'emerging technique' — meaning that comprehensive settled BAT conclusions do not yet exist for it and that the regulator's own BAT determination is provisional and subject to change as operational

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[74] Supplied as stand-alone Appendix to examination, Environment Agency, 'Determination of an Application for an Environmental Permit under the Environmental Permitting (England & Wales) Regulations 2016: Decision document recording our decision-making process' (EPR/QP3724SE/A001; permit no EPR/QP3724SE, determined 14 July 2025), Viridor Energy Runcorn CCUS Limited, https://assets.publishing.service.gov.uk/media/68778cc42bad77c3dae4dc60/Decision_Document_QP3724SE.pdf

[75] Environment Agency (2025) Permitting Decisions- Variation: Humber Refinery (Phillips 66 Limited), variation no EPR/UP3230LR/V021, 31 October 2025. Internal ref LIT 11951 – Decision document https://assets.publishing.service.gov.uk/media/690dfe0743f8a163237298ec/Application_Variation_V021_Decision_document_-_31102025.pdf states under "2.2 Operating techniques and BAT assessment":

> *"It should be noted that post-combustion carbon capture from mineral oil refining flue gases, and in particular from the FCCU regenerator process, is a novel concept that has not yet seen many commercial applications at an industrial scale. Hence, we consider the application to consist of emerging technologies."*

experience accumulates — the reasonable worst case for Scope 1 emissions cannot be determined by reference to design modelling alone. Neither the HMB modelling addressed at Section D.4 below, nor the Applicant's reliance on UKCCSRC studies, addresses either of these requirements: both evidence design achievability in principle, not the secured operational lower bound required for EIA quantification. The consequence for this examination is set out in section D.5 below.

236 CESL does not contend that the emerging techniques classification means the development should not proceed, or that post-combustion CCS is incapable of achieving 95% capture. The submission is narrower. The evidence review underlying the March 2024 update, and the EA's own decision documents for analogous installations, establish that large-scale commercial CCS performance is insufficiently evidenced to treat 95% as a settled, empirically validated operational floor. The EA's October 2025 decision document (Humber Refinery (Phillips 66 Limited), EPR/UP3230LR/V021[76]) explicitly states its BAT determination for commercial-scale post-combustion carbon capture from refining processes is "subject to change" as evidence develops[77]. In those circumstances, an ES that applies 95% as the fixed lower bound for a 30-year lifecycle emissions assessment — without sensitivity testing for lower performance — does not demonstrate that the stated significance conclusion is robust to the foreseeable range of capture outcomes. The regulatory framework reinforces rather than resolves the EIA adequacy concern raised in Sections D.2 and D.3 above.

237 CESL notes that the March 2024 update — and with it the evidence review recording that large-scale CCS performance is not yet reliably established and that the regulator's BAT position is provisional — occurred a full year before the publication of the ES in August 2025. The ES does not engage with the evidence review, does not acknowledge the provisional nature of the EA's emerging-technique BAT determination, and does not address whether the sensitivity of the Scope 1 emissions total to capture rate variability has been assessed in light of the regulatory and evidential context that was on the public record at the time of the ES.

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[76] Environment Agency (2025) Permitting Decisions- Variation: Humber Refinery (Phillips 66 Limited), variation no EPR/UP3230LR/V021, 31 October 2025. Internal ref LIT 11951 – Decision document https://assets.publishing.service.gov.uk/media/690dfe0743f8a163237298ec/Application_Variation_V021_Decision_document_-_31102025.pdf states under "2.2 Operating techniques and BAT assessment":

> *"It should be noted that post-combustion carbon capture from mineral oil refining flue gases, and in particular from the FCCU regenerator process, is a novel concept that has not yet seen many commercial applications at an industrial scale. Hence, we consider the application to consist of emerging technologies."*

[77] Environment Agency (2025) Permitting Decisions- Variation: Humber Refinery (Phillips 66 Limited), variation no EPR/UP3230LR/V021, 31 October. Internal ref LIT 11951 – Decision document https://assets.publishing.service.gov.uk/media/690dfe0743f8a163237298ec/Application_Variation_V021_Decision_document_-_31102025.pdf states under "2.2 Operating techniques and BAT assessment":

> *"Our BAT determination is therefore based on our current understanding of these emerging technologies and takes into account the fact that this is the first project developed in the UK for this type of installation. Our position on the determination of BAT for post-combustion carbon capture from refining processes is subject to change as we receive more applications for similar plants and we develop and consolidate our positions on specific BAT issues. This may also happen as the result of the continuous exchange of information and engagement with industry and other key stakeholders, the review of received applications and the regulation of the permitted sites brought into operation. We also refer to the consultation responses in section 4 for a summary of representations we have received from stakeholders in relation to this application, and how we have taken them into consideration as part of this variation determination."*

D.4 Modelling of the development

238 The Applicant's reliance on CO_2 mass flow data derived from the Heat and Material Balance (HMB) modelling demonstrates the assumed design performance of the capture plant under modelled steady-state conditions. It does not establish that such performance represents a secured minimum capture rate across the full operational envelope of the Proposed Development. Engineering design modelling is not equivalent to enforceable operational performance. The Environmental Permit regime, as discussed above, regulates performance by reference to normal operating conditions and annual averages, and allows flexibility below 95% where justified. The HMB modelling therefore evidences the design intent, but does not provide empirical performance evidence, nor the lower-bound emissions case for EIA purposes.

D.5 Conclusion and Requested Clarification

239 The guidance on which the Applicant relies is not itself a regulatory requirement — it is best practice guidance framing 95% as a design aim under normal operating conditions assessed on an annual average. The gap between best practice design guidance and a secured operational minimum is the central issue in Section D.

240 Further, the guidance on which the Applicant relies is neither publicly accessible nor independently verifiable: the GOV.UK page directs readers to the UKCCSRC website for the underlying evidence review, the UKCCSRC website links back to the GOV.UK page, and the review document itself is not available at either location. By contrast, CESL has shown that the NZT Environmental Permit, which is a fully identified and publicly available document supplied as a stand-alone appendix to this examination, does not secure 95% as a continuously enforceable operational minimum.

241 The issue is therefore not whether a 95% capture rate is technically achievable or desirable. The question for the purposes of the EIA Regulations is whether the Environmental Statement demonstrates that 95% represents the lower bound of reasonably foreseeable operational performance across the project's lifecycle.

242 In these circumstances, CESL does not contend that a 95% capture rate is technologically inappropriate or inconsistent with policy. The submission is narrower and procedural. Each of the four matters addressed in Sections D.1 to D.4 above — the legal framework, the NZT EP record, the provisional nature of the emerging-technique BAT determination, and the limitations of HMB design modelling — points to the same conclusion. The Applicant has not demonstrated that 95% represents a secured lower-bound capture performance across the operational envelope of the Proposed Development for the purposes of Regulation 5(2) and Schedule 4 of the 2017 Regulations.

243 CESL therefore invites the Applicant either (i) to identify the specific enforceable mechanism by which a minimum capture rate equivalent to the ES assumption will be secured in practice, or (ii) to provide proportionate sensitivity testing reflecting reasonably foreseeable operational variability below 95%, so that the likely significant short-, medium- and long-term climate effects of the development are transparently identified and described.

D3 / Part A / Section E *Conclusions*

244 **Comments under 6.1.4 [Table 6, REP2-019]:** CESL's fourth WR conclusion was:

> *"CESL requests that that the Examining Authority finds that the current ES Chapter 20 lacks robustness on these key issues and cannot be relied on for decision-making until these analyses are provided and considered."*

245 In section 6.1.4 the applicant resists this request as follows:

> *"The Applicant maintains that the Greenhouse Gas Assessment presented within Chapter 20: Climate Change [APP-058] of the ES has been prepared in accordance with established guidance and recognised good practice applicable to Nationally Significant Infrastructure Projects such as the Proposed Development.*
>
> *The methodology, data sources, assumption and assessment boundaries have been transparently set out, and the assessment has been carried out in line with professional guidance (issued by the Institute of Sustainability and Environmental Professionals) on the assessment of GHG emissions and the evaluation of their significance.*
>
> *For these reasons, and for the technical reasons specifically set out above, the Applicant submits that the GHG assessment is robust, proportionate and fit for purpose, and that it provides a reliable basis upon which the Examining Authority can consider the GHG impact of the Proposed Development in the planning balance."*

E.1 CESL's conclusion

246 The Applicant's reliance on compliance with established guidance and professional practice does not resolve the specific sufficiency issues identified in Sections B, C and D above.

247 The issue is whether the ES demonstrates that key quantitative assumptions which materially determine the scale and temporal character of greenhouse gas effects — namely the upstream WTT factor, the exclusive use of GWP100, and the assumed 95% capture rate — have been tested against reasonably foreseeable variability of climatic impacts over the operational life of the Proposed Development.

248 Where acknowledged uncertainty exists in upstream methane intensity; where exclusive reliance on a single long-term climate metric (GWP100) materially masks the description and assessment of near-term warming; and where the assumed capture performance is contingent on future regulatory controls rather than secured operational parameters within the assessment itself, methodological robustness requires that those variables be bounded or tested through sensitivity analysis.

249 In the absence of such analysis, the ES does not demonstrate that the quantified emissions outcome represents a reasonable worst-case or that the stated significance conclusion is robust to foreseeable variation. The reasoning chain between input assumptions, quantified effects and evaluative judgment is therefore incomplete for EIA purposes, and the Secretary of State cannot be satisfied that he has before him environmental information sufficient to

enable an informed assessment of the nature, magnitude and temporal characteristics of the project's climate effects.

E.2 Cumulative Directional Bias Across the Three Parameters

250 Sections B, C and D address the three parameters individually. A further and independent point arises from their combined effect. Each of the three parameters — the upstream WTT factor, the exclusive use of GWP100, and the assumed 95% capture rate — is applied in the ES at a value that, if it departs from the actual operational outcome, will do so in the same direction: by understating the development's assessed greenhouse gas effects. This shared directional bias is not coincidental — it is structural. It arises because each parameter is set at a central estimate or design optimum without sensitivity testing, and in each case the evidence supports the conclusion that actual outcomes may be higher than the central estimate.

251 The directional alignment of the three parameters is as follows:

(a) The DESNZ WTT factor (0.165 ratio) represents a historically based national average. Where marginal supply draws from the flexible LNG-linked import layer — as NESO's own modelling indicates it will under the operating conditions in which a dispatchable plant runs — the actual upstream intensity is likely to be higher than the national average, not lower. The factor therefore biases the assessed lifecycle emissions total downward relative to that for the operational conditions most relevant to this development.

(b) The exclusive use of GWP100 for methane structurally understates the near-term climate forcing of upstream methane emissions during the operational period of the development, because GWP100 weights methane's warming effect over a 100-year horizon rather than the 20-year horizon that better reflects its actual atmospheric lifetime and climate impacts (radiative forcing). For a development operating from 2035 to 2064, the near-term forcing during the operational period is understated by GWP100 relative to GWP20. This parameter therefore biases the temporal description of near-term climate effects downward.

(c) The assumed 95% capture rate represents a design objective under steady-state modelled conditions. As demonstrated by the NZT Environmental Permit and the emerging techniques reclassification, the regulatory framework does not secure 95% as a continuously enforceable operational minimum. Actual average capture performance may be lower, particularly during start-up, ramping, part-load operation and periods of T&S system unavailability. This parameter therefore biases the assessed Scope 1 emissions downward relative to the foreseeable operational envelope.

252 In each case, therefore, the ES parameter is set at a value that, if the actual outcome differs, will produce a higher emissions figure than the ES presents. This is not a situation where some parameters might be overestimated and others underestimated, such that the modelled sensitivities might cancel. <u>All three parameters share the same downward directional bias.</u> The combined effect is that the ES's lifecycle emissions total and its significance conclusion are, on the evidence before the Examining Authority, more likely to understate the development's actual climate effects than to overstate them.

253 This matters beyond the reasons already addressed in Sections B, C and D. First, it bears on the Applicant's claim in paragraph 20.6.69 of the ES that the Reference Case represents "*the worst-case scenario for GHG emissions*". That claim is made in relation to operational volume — full baseload, unconstrained operation. But a genuine reasonable worst case

requires both volume and emission intensity to be at their reasonable upper bounds. The ES maximises volume while holding all three intensity parameters at untested central values or design optima. A worst case constructed in this way is not a worst case in the sense required by EIA law: it is a maximum throughput scenario at minimum assumed intensity. The directional alignment of the three parameters means that the true worst case, properly constructed, is higher than the Reference Case on all three intensity dimensions simultaneously.

254 Second, CESL invites the Examining Authority to direct the Applicant to demonstrate, through sensitivity analysis, that the significance conclusion remains robust (1) when each parameter is tested individually across its reasonably foreseeable range, and (2) when the cumulative directional bias is considered. That is a proportionate and targeted ask. The alternative — accepting the significance conclusion without that testing — requires the Secretary of State to proceed on the implicit assumption that three parameters, each with a demonstrated downward bias, have together produced a reliable worst case. On the evidence before this Examination, that assumption is not supported.

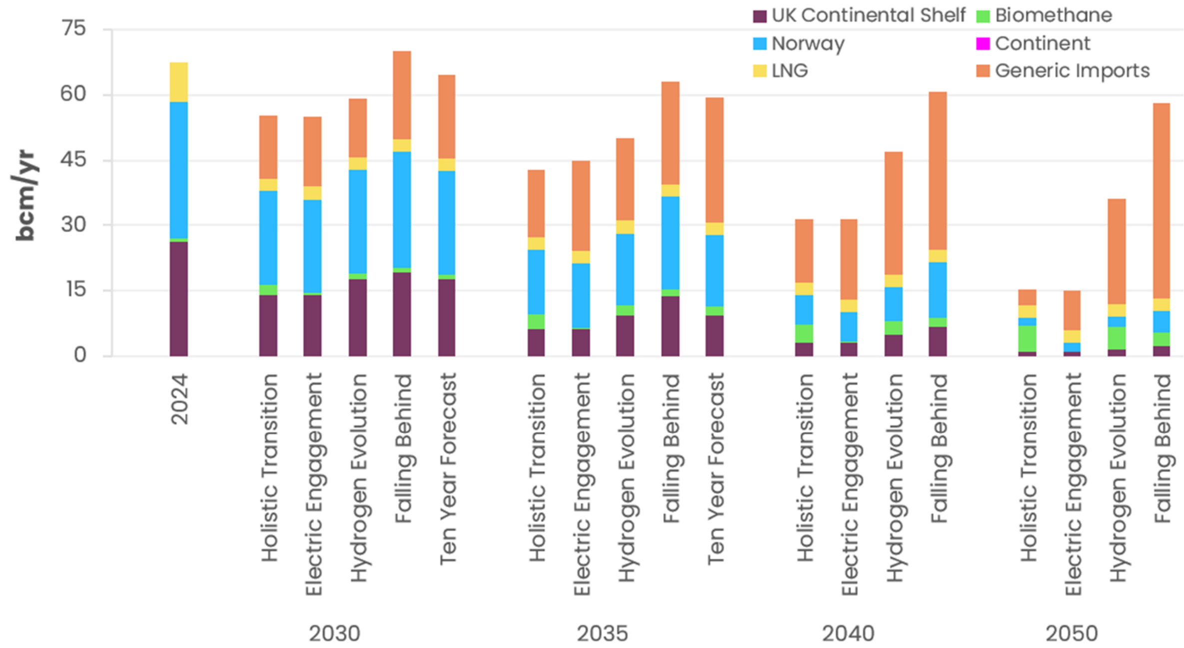
D3 / Part A / Section F Comments on 6.1.5 and 6.2.1

CESL notes the applicant's comments at 6.1.5 of Table 6 [REP2-019] that it reserves the right to provide further submissions in response to the points made within Part A of CESL's Written Representation [REP1-077] at Deadline 3, and at 6.2.1 that it will provide a response to the points made within Part B of CESL's Written Representation [REP1-078] at Deadline 3.

Appendix A: FES 2025 Data Workbook Extracts

255 Extracts from FES 2025 Data Workbook[78], Tab “F.21” (F.21: Gas supply sources by pathway)

F.21: Gas supply sources by pathway

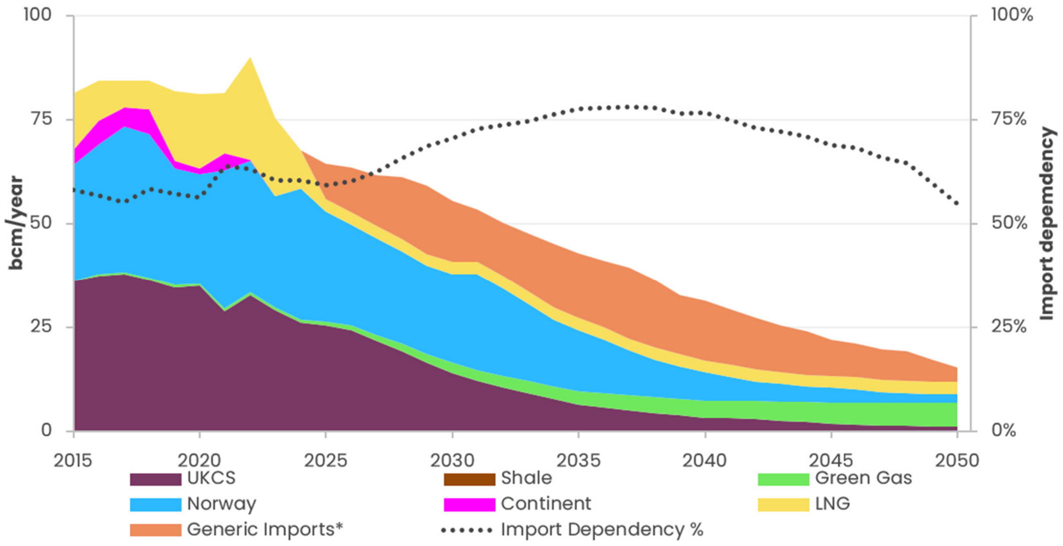


Annual gas supply snapshot. bcm/yr

		UKCS	Green Gas	Norway	Continent	LNG	Generic Imports*
	2024	26.18	0.68	31.51	0	9.2	0
2030							
	Holistic Transition	13.96	2.4	21.42	0	2.92	14.67
	Electric Engagement	13.96	0.5	21.42	0	2.92	16.17
	Hydrogen Evolution	17.54	1.33	23.9	0	2.92	13.41
	Falling Behind	19.16	1.04	26.65	0	2.92	20.36
	Ten Year Forecast	17.54	1.04	23.9	0	2.92	19.19
2035							
	Holistic Transition	6.34	3.26	14.67	0	2.92	15.66
	Electric Engagement	6.34	0.22	14.67	0	2.92	20.68
	Hydrogen Evolution	9.4	2.3	16.39	0	2.92	19.02
	Falling Behind	13.63	1.57	21.35	0	2.92	23.55
	Ten Year Forecast	9.4	1.94	16.39	0	2.92	28.72
2040							
	Holistic Transition	3.19	4.13	6.73	0	2.92	14.32
	Electric Engagement	3.19	0.18	6.73	0	2.92	18.35
	Hydrogen Evolution	4.87	3.28	7.61	0	2.92	28.2
	Falling Behind	6.79	2.09	12.59	0	2.92	36.36
2050							
	Holistic Transition	1.06	5.85	1.93	0	2.92	3.47
	Electric Engagement	1.06	0	1.93	0	2.92	9.22
	Hydrogen Evolution	1.61	5.21	2.21	0	2.92	24.21
	Falling Behind	2.26	3.15	4.94	0	2.92	44.87

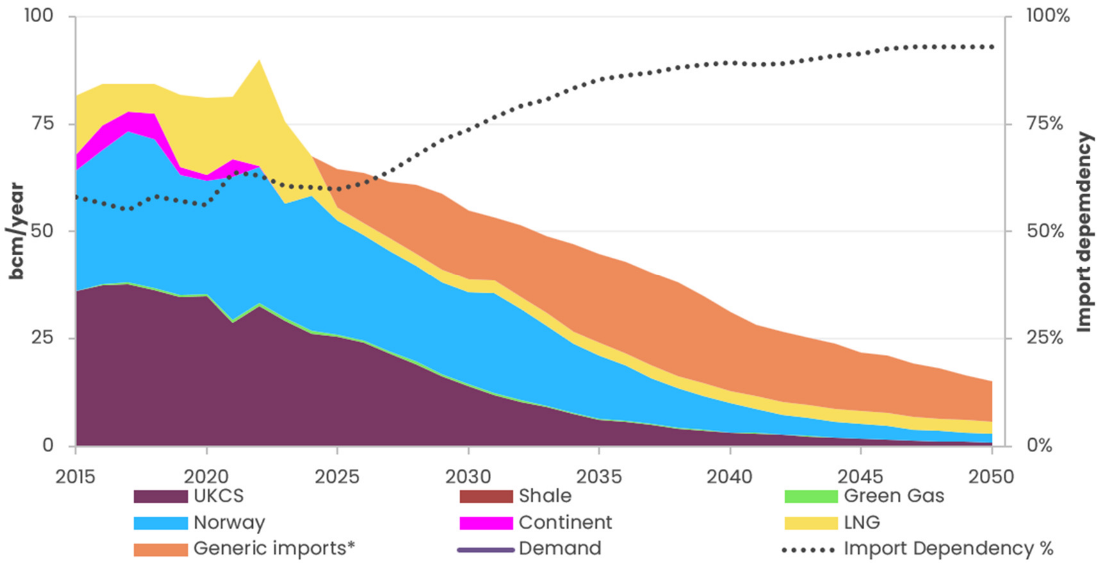
[78] As extracted from NESO, FES 2025, https://www.neso.energy/document/364561/download - “FES Pathways Assumptions 2025 (workbook)_0.xlsx”, downloaded 26 February 2026

Annual gas supply and import dependency in Holistic Transition



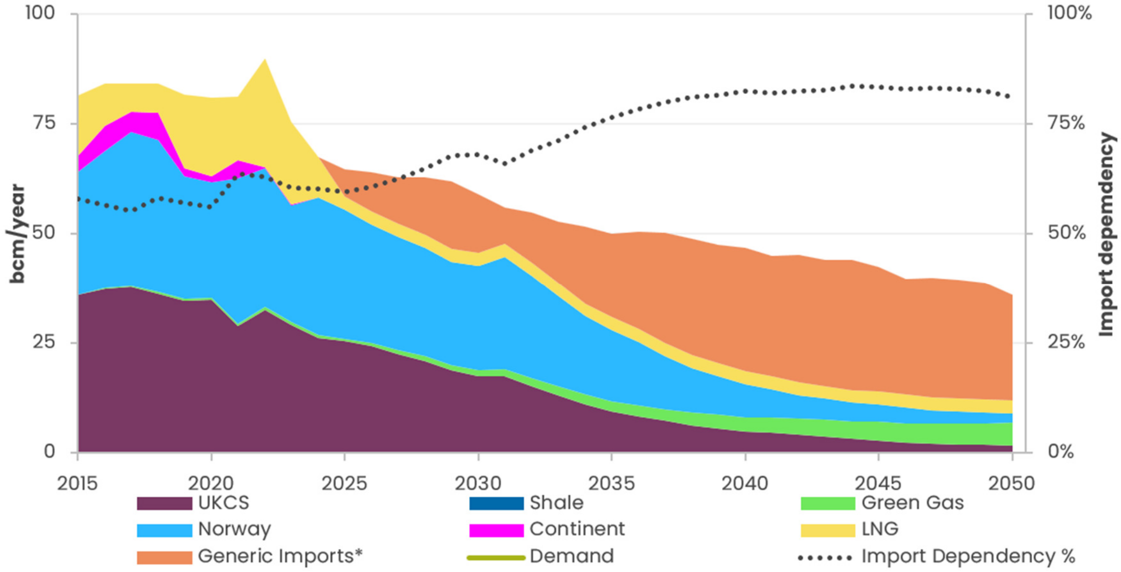
**Generic imports refers only to LNG and/or pipeline imports from the continent*

Annual gas supply and import dependency in Electric Engagement



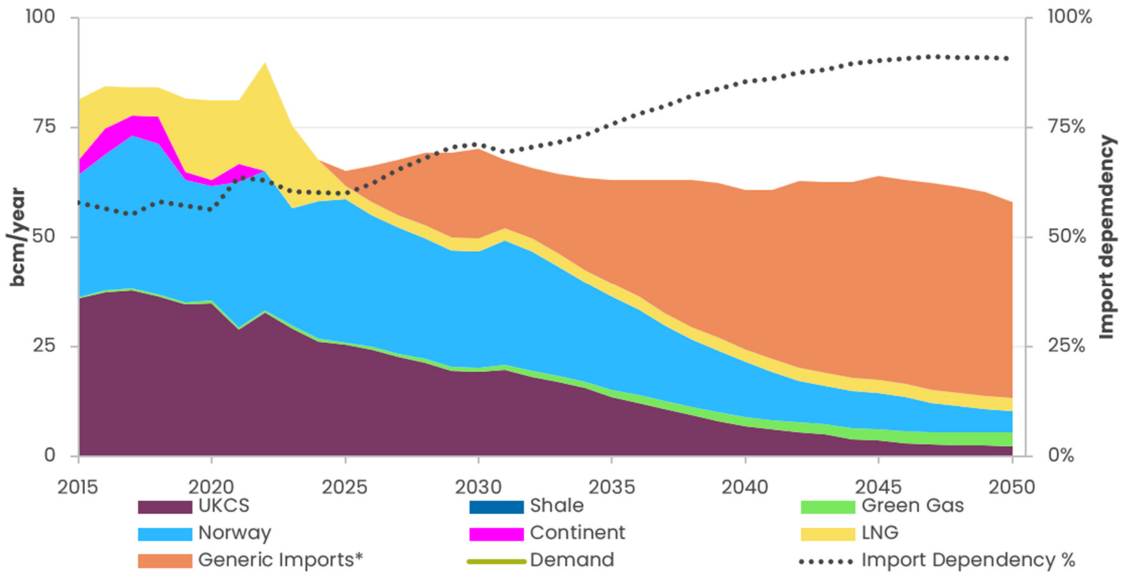
**Generic imports refers only to LNG and/or pipeline imports from the continent*

Annual gas supply and import dependency in Hydrogen Evolution



Generic imports refers only to LNG and/or pipeline imports from the continent

Annual gas supply and import dependency in the Falling Behind



Generic imports refers only to LNG and/or pipeline imports from the continent

Appendix B: GWP20 and GWP100 illustration

256 The full supplementary materials from Howarth (2024) are supplied as REP1-087. CESL relies on this paper solely as a recent peer-reviewed example from the scientific literature quantifying upstream methane emissions for LNG supply chains. It is not presented as a prediction of the specific geographic origin of future gas supply to the Proposed Development.

257 The calculations below extract the upstream-only emission factors from Supplementary Table B for a dual-fuel two-stroke LNG tanker configuration. This configuration was selected in REP1-077 as an efficiency-reflective example of modern LNG transport. The purpose is to derive an indicative upstream-to-combustion emission factor ratio from recent literature for bounding purposes.

258 The ratios calculated below provide comparable upstream/combustion ratios to the 0.165 ratio derived from the DESNZ conversion factors and used by the Applicant[79]. They are applied to the Applicant's own combustion totals solely to illustrate the quantitative sensitivity of lifecycle emissions to variation in upstream methane intensity and time-horizon metric (GWP100 versus GWP20).

(Howarth Supplementary Table B)			**GWP100**	**29.8**		
			GWP20	**82.5**		
	CO_2	CH4	CH4	CH4	TOTAL	TOTAL
			GWP20	**GWP100**	**GWP20**	**GWP100**
2-stroke engine tankers powered by LNG	g CO_2/kg	g CH_4/kg	g CO_2-eq/kg	g CO_2-eq/kg	g CO_2-eq/kg	g CO_2-eq/kg
Upstream & midstream emissions	720	33.9	2796.75	1010.22	3516.75	1730.22
Liquefaction	359	3.6	297	107.28	656	466.28
Emissions from tanker	104	1.4	115.5	41.72	219.5	145.72
Final transmission & distribution	0	3.2	264	95.36	264	95.36
Combustion by final consumer	2,750	0	0	0	2750	2750
					7406.25**	**5187.58**
				Upstream ONLY	**4,656****	**2,438**
Emission Factors Ratios						
Howarth data in units of gCO_2e/kg		Combustion	Upstream	Total	Factor = Upstream / Combustion	
2-stroke engine tankers powered by LNG	**GWP20**	**2,750**	**4,661****	**7,411****	**1.69491**	
2-stroke engine tankers powered by LNG	**GWP100**	**2,750**	**2,438**	**5187.58**	**0.88639**	

Table 4: Emission factor ratio calculation from scientific literature

259 ** Minor rounding differences arise from presentation of values in the Howarth supplementary materials. For clarity, the upstream-only figures used in the ratio calculations are 4,656 gCO_2e/kg (GWP20) and 2,438 gCO_2e/kg (GWP100), with combustion emissions of 2,750 gCO_2/kg. To maintain consistency with REP1-077, the upstream-to-combustion ratios of 1.69491 (GWP20) and the newly calculated 0.88639 (GWP100) are taken forward. These ratios are used in Table 3.

[79] as explained in REP1-077 para 60

Differing impacts of GWP20 and GWP100 for the development

260 The table below reproduced Table 2 from REP1-077 with an additional column calculating GWP100 for the Howarth data. The table reproduces key figures in the applicant's Table 20-8 structure and applies the alternative upstream/combustion ratios derived above. This exercise is an indicative sensitivity test designed to demonstrate the quantitative effect of plausible variation in upstream methane intensity and time-horizon weighting. It is not a substitute ES, nor does it assert that any particular supply route will occur.

Emissions (tCO_2e) over 30-year operation period "Fuel Usage (CCGT emissions and other fuels)" (only)				
	Application		Evolving nature of natural gas supplies	Evolving nature of natural gas supplies
	GWP100		**GWP100**	**GWP20**
	Column 1 **(Table 20-8)**	**Column 2** **Description**	**Column 3A** **(ST1A)**	**Column 3B** **(ST1B)**
A	146,925,347	**Scope 1 : unabated natural gas combustion**	146,925,347	146,925,347
B	5%	**T&S Unavailability = 5%**	5%	5%
C=A*B	7,346,267	**Scope 3: emissions to atmosphere (T&S unavailability)**	7,346,267	7,346,267
D=A-C	139,579,079	**Remaining emissions available for CCS**	139,579,079	139,579,079
E	95.2367%	**Capture rate parameter**	95.2367%	95.2367%
F=D*E	132,930,567	**Captured emissions**	132,930,567	132,930,567
G=D-F	6,648,512	**Scope 1: Natural Gas : Non-captured emission**	6,648,512	6,648,512
H	0.165	**Emission factor ratio: Upstream natural gas supply chain emissions**	0.88639	1.69491
J=A*H	24,242,682	**Scope 3: Upstream natural gas supply chain emissions**	130,233,559	249,025,106
K	4806	**Scope 1: Diesel: 50tonnes/yr, 30 years (EF=3203.9/1000)**	4806	4806
L	1128	**Scope 3: Diesel (EF ratio = 0.2347)**	1128	1128
M=G+K	6,653,318	**Total Scope 1 "Fuel Usage (CCGT emissions and other fuels)"**	6,653,318	6,653,318
N=J+L+ C	31,590,077	**Total Scope 3 "Fuel Usage (CCGT emissions and other fuels)"**	137,580,954	256,372,501
P=M+N	38,243,395	**Total Scope 1 & 3 "Fuel Usage (CCGT emissions and other fuels)"**	144,234,272	263,025,819

Table 5: REP1-077 Table 2 modified for GWP20 and GWP100 Sensitivity test on "Fuel Usage (CCGT emissions and other fuels)" – Indicative sensitivity tests of uncertainties of GHG forecasting
(for bounding purposes only; not a substitute ES)

Appendix C: IPCC AR6 WGI Summary for Policymakers[80] Figure SPM.2

Summary for Policymakers

SPM

Observed warming is driven by emissions from human activities, with greenhouse gas warming partly masked by aerosol cooling

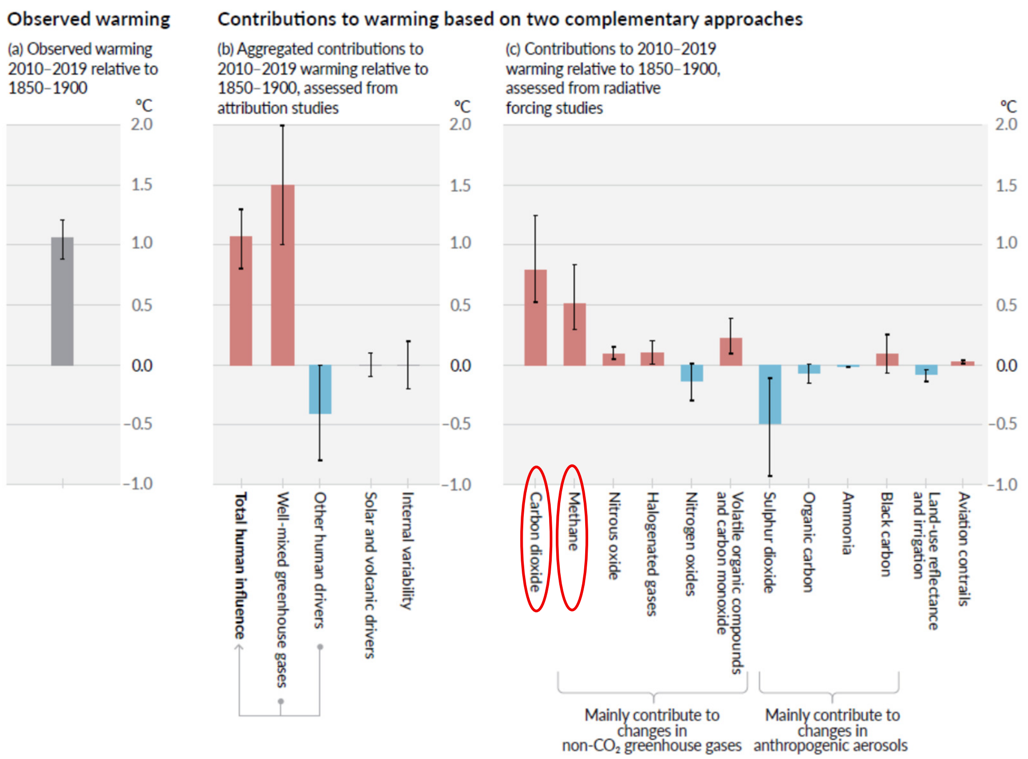


Figure SPM.2 | Assessed contributions to observed warming in 2010–2019 relative to 1850–1900

Panel (a) Observed global warming (increase in global surface temperature). Whiskers show the *very likely* range.

Panel (b) Evidence from attribution studies, which synthesize information from climate models and observations. The panel shows temperature change attributed to: total human influence; changes in well-mixed greenhouse gas concentrations; other human drivers due to aerosols, ozone and land-use change (land-use reflectance); solar and volcanic drivers; and internal climate variability. Whiskers show *likely* ranges.

Panel (c) Evidence from the assessment of radiative forcing and climate sensitivity. The panel shows temperature changes from individual components of human influence: emissions of greenhouse gases, aerosols and their precursors; land-use changes (land-use reflectance and irrigation); and aviation contrails. Whiskers show *very likely* ranges. Estimates account for both direct emissions into the atmosphere and their effect, if any, on other climate drivers. For aerosols, both direct effects (through radiation) and indirect effects (through interactions with clouds) are considered.

{Cross-Chapter Box 2.3, 3.3.1, 6.4.2, 7.3}

Figure 3: IPCC AR6 WGI SPM Figure SPM.2 reproduced

261 The temperature impacts from CO_2 and methane highlighted with red rings.

[80] IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 3–32, doi:10.1017/9781009157896.001.

Appendix D: IPCC AR6 WGI Figure 6.16

Chapter 6 Short-lived Climate Forcers

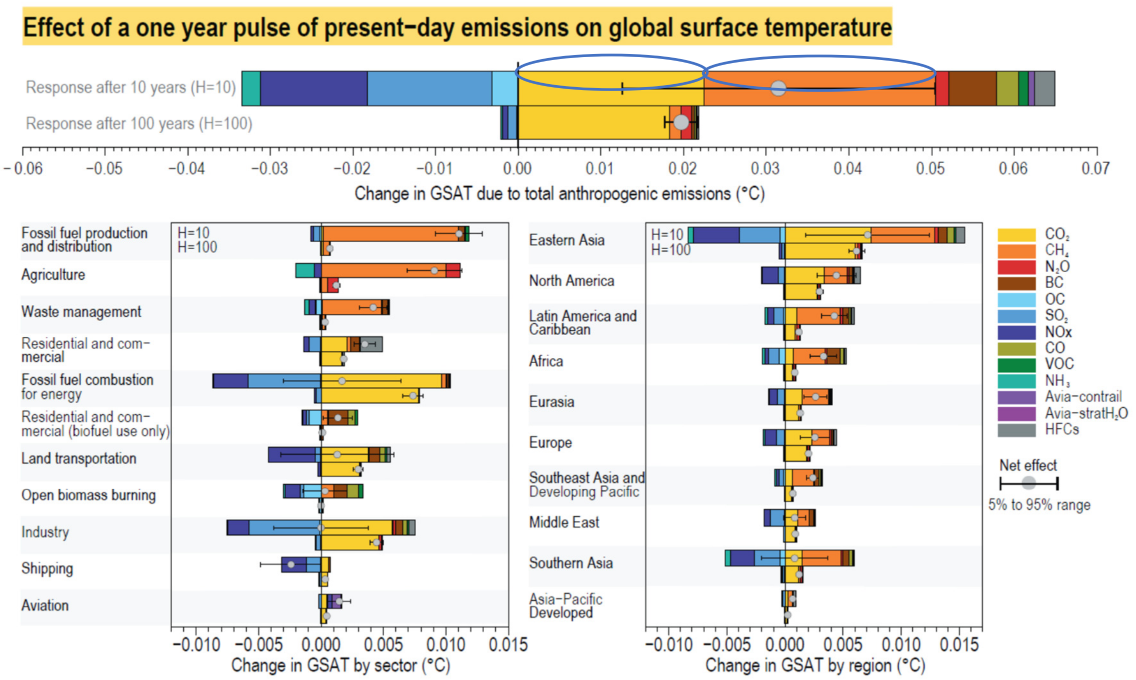


Figure 6.16 | Global mean temperature response 10 and 100 years following one year of present-day (year 2014) emissions. The temperature response is broken down by individual species and shown for total anthropogenic emissions (top), sectoral emissions (left) and regional emissions (right). Sectors and regions are sorted by (high-to-low) net temperature effect on the 10-year time scale. Error bars in the top panel show uncertainty (5–95% interval) in net temperature effect due to uncertainty in radiative forcing *only* (calculated using a Monte Carlo approach and best estimate uncertainties from the literature – see Lund et al. (2020) for details). CO_2 emissions are excluded from open biomass burning and residential biofuel use due to their unavailability in the Community Emissions Data System (CEDS) and uncertainties around non-sustainable emission fraction. Emissions for 2014 originate from the CEDS (Hoesly et al., 2018), except for HFCs which are from Purohit et al. (2020), open biomass burning from van Marle et al. (2017), and aviation H_2O which is from Lee et al. (2021). The split of fossil fuel production and distribution and combustion for energy and residential and commercial fuel use into fossil fuel and biofuel components is obtained from the GAINS model (ECLIPSE version 6b dataset). Open biomass burning emissions are not included for the regions. Emissions are aggregated into fossil fuel production and distribution (coal mining, oil and gas production, upstream gas flaring and gas distribution networks), agriculture (livestock and crop production), fossil fuel combustion for energy (power plants), industry (combustion and production processes, solvent-use losses from production and end use), residential and commercial (fossil fuel use for cooking and heating as well is HFCs leakage from A/C and refrigeration), waste management (solid waste, including landfills and open trash burning, residential and industrial waste water), transport (road and off-road vehicles, and HFC leakage from A/C and refrigeration equipment), residential and commercial (biofuels use for cooking and heating), open biomass burning (forest, grassland, savanna fires and agricultural waste burning), shipping (including international shipping), and aviation (including international aviation). Further details on data sources and processing are available in the chapter data table (Table 6.SM.3).

Figure 4: IPCC AR6 WGI Figure 6.16 reproduced

262 10-year temperature response from CO_2 and methane are highlighted with blue rings.

Appendix E: EIR Request to DESNZ Regarding the Natural Gas WTT Emission Factor Calculation Methodology

Background and Purpose

263 This Appendix reproduces the Environmental Information Regulations 2004 (EIR) request submitted by Dr Andrew Boswell (CESL) to the Department for Energy Security and Net Zero (DESNZ) concerning the methodology used to derive the Natural Gas Well-to-Tank (WTT) emission factor published in the annual DESNZ Greenhouse Gas Conversion Factors dataset.

264 The request is included in this submission for three purposes. First, it demonstrates that CESL has actively sought to obtain the methodological information necessary to evaluate the Applicant's reliance on the DESNZ factor, and that this information is not publicly available in a form that permits independent verification of the published values. Second, it places on the public examination record the fact that the methodology underlying a parameter relied upon for 63.4% of the ES lifecycle emissions total ((see Table 3 in section B.3(E)) is not independently reproducible from published documentation. Third, it supports CESL's submission that the burden of demonstrating methodological adequacy rests with the Applicant, not with CESL, and that the Applicant has the means to obtain that demonstration if it chooses to do so.

Contact History

265 Prior to the formal EIR request, CESL made two direct attempts to obtain information from the DESNZ Greenhouse Gas Statistics team at greenhousegas.statistics@energysecurity.gov.uk, as directed by the DESNZ Greenhouse Gas Conversion Factors spreadsheet itself:

Date	Subject	Route	Outcome
11 Jan 2024	*"Question: Scope 3 emissions for Natural Gas"*	Direct email to DESNZ statistics team. Follow-up nudge 19 Jan 2024.	**No response received.**
21 Feb 2026	*"Clarification request – Methodology and calculation steps for Natural Gas WTT factor"*	Direct email to DESNZ statistics team.	**No response received.**
2 Mar 2026	Formal EIR request — full text reproduced below	Submitted to foi.requests@energysecurity.gov.uk	Acknowledged. Substantive response not expected before D3 deadline.

Table 6: Contact history with DESNZ GHG statistics department

266 The history of non-response to two direct requests — the first made over two years before this submission — demonstrates that the methodology underlying the DESNZ WTT factor is not accessible to third parties through normal inquiry channels. This is not a criticism of DESNZ as an institution; it reflects that the working methodology for Government conversion

factors is not published at the level of detail required for independent verification. That absence of transparency is precisely the problem that CESL's submission identifies: a parameter relied upon for 63.4% of the ES lifecycle emissions total cannot be verified, challenged, or bounded by any party other than DESNZ and the Applicant.

EIR Request (submitted before D3 deadline)

267 The full text of the EIR request is reproduced below:

EIR REQUEST — REPRODUCED IN FULL

Dear foi.requests@energysecurity.gov.uk

I write under the Environmental Information Regulations 2004 ("EIR").

This request concerns the Natural Gas Well-to-Tank (WTT) emission factor published in the annual DESNZ Greenhouse Gas Conversion Factors (advanced user datasets), specifically for the publication years 2019-2025 inclusive.

The requested information constitutes "environmental information" within the meaning of Regulation 2(1)(b) and (c), as it relates directly to greenhouse gas emissions, lifecycle carbon intensity of fossil fuels, and factors used in public environmental assessment and policy.

1. INFORMATION REQUESTED

(A) Full calculation methodology

A complete, step-by-step description of the methodology used to derive the Natural Gas WTT emission factor for each publication year 2019-2025, including:

- Identification of the exact Exergia (2015) tables and stage boundaries used;
- Clarification of which lifecycle stages are included within the WTT-fuels boundary (including explicit confirmation of the treatment of: extraction, processing, liquefaction, shipping, gas transmission, gas distribution, storage, dispensing);
- Confirmation of whether the Exergia "Gas distribution, transmission and storage" stage is: included, excluded, or replaced with a UK-specific estimate;
- A precise description of how DUKES data are used in weighting, including: which DUKES edition corresponds to each publication year, the data year used in each calculation, treatment of interconnector imports, treatment of LNG provenance (e.g. whether Qatar, USA and other sources are differentiated or blended);
- Confirmation of whether upstream production and LNG intensities have been updated since Exergia (2015), and if so, how.

(B) Working calculation files

All working spreadsheets, internal models, scripts, intermediate calculation sheets, or other computational artefacts used to derive the published Natural Gas WTT values for 2019-2025.

(C) Documentation relating to the 2021 methodology revision

The 2021 Methodology Report states: "The methodology for calculating the indirect/WTT emission factors for natural gas and CNG have been improved to utilise updated DUKES data on leakage and energy use in transmission and distribution."

Please provide:

- Any internal documentation explaining this revision;
- Any comparison of pre-2021 and post-2021 calculation methods;

- Any decision records describing boundary changes or reallocation of transmission/distribution emissions;
- Any assessment undertaken of the impact of the revision on published values.

(D) Post-2021 recalculation practice

For publication years 2023-2025, the Natural Gas WTT factor remains constant at 9.30 kgCO_2e/GJ (Net CV). Please provide:
- Confirmation of whether the factor was recalculated annually for 2023-2025 using updated DUKES data;
- If recalculated, the working demonstrating how updated supply shares produced identical values;
- If not recalculated, documentation explaining the decision not to update;
- Any internal discussion of smoothing, averaging, or freezing of the Natural Gas WTT factor post-2021.

2. PUBLIC INTEREST AND TRANSPARENCY

The Natural Gas WTT factor is relied upon in Environmental Impact Assessments, planning decisions, infrastructure appraisals, and carbon accounting frameworks. There is a clear and substantial public interest in ensuring the factor is transparently derived, the boundary definition is explicit, the calculation is independently reproducible, and the upstream methane assumptions are scientifically current. Given the presumption in favour of disclosure under Regulation 12(2), any exceptions relied upon must be interpreted restrictively.

3. ANTICIPATED EXCEPTIONS

If DESNZ considers that any exception under Regulation 12 applies, please: specify the exact Regulation relied upon; explain why the exception applies; provide the public interest balancing assessment; confirm whether partial disclosure is possible; confirm whether redacted versions of working files can be provided.

4. FORMAT

Please provide the requested information electronically in original file format where possible (e.g. Excel workbooks, calculation models). If any requested information is not held, please confirm explicitly.

5. NOTE

This FOI/EIR request follows two attempts to acquire information relating to the above by email from the DESNZ Statistics team at greenhousegas.statistics@energysecurity.gov.uk:

(1) Email subject "Question: Scope 3 emissions for Natural Gas", Date: 11 Jan 2024 — follow-up nudge 19 Jan 2024 — Outcome: no response.

(2) Email subject "Clarification request - Methodology and calculation steps for Natural Gas WTT factor", Date: 21 Feb 2026 — Outcome: no response.

Yours sincerely
Dr Andrew Boswell
Climate Emergency Science Law (CESL)

[End of EIR request]

Significance for the Examination

268 The EIR request identifies four specific information gaps that are directly material to this examination:

(a) Whether upstream production and LNG intensities have been updated since Exergia (2015) — directly relevant to CESL's submission at Section B.3(A) that the factor relies on pre-2015 modelling;

(b) Whether the factor was recalculated annually for 2023–2025, and if so, how identical values resulted from materially different LNG supply shares — directly relevant to CESL's submission at Sections B.3(B) and B.3(C) above;

(c) How LNG provenance (US, Qatar, other) is treated in the weighting — directly relevant to CESL's submission that US LNG, which comprised 68% of UK LNG imports in 2024, has materially higher upstream methane intensity than Norwegian pipeline gas;

(d) The boundary treatment of the 2021 revision — directly relevant to understanding whether the 2021 uplift reflected a genuine recalibration of upstream intensities or a boundary change that does not address the measurement-based evidence now available.

269 The Examining Authority and Secretary of State are invited to note that this information has been sought from DESNZ through three separate channels over a period of more than two years, without substantive response. The Applicant, who relies on the DESNZ factor for the dominant component of its lifecycle emissions assessment, is in a position to request and obtain this information from DESNZ directly. CESL invites the Examining Authority to consider whether, in those circumstances, the Applicant should be directed to obtain and provide that verification as part of its response to CESL's submissions.

Appendix F: EIR Request to Environment Agency concerning Post-Combustion Carbon Dioxide Capture Evidence Review (March 2024)

270 This Appendix reproduces the Environmental Information Regulations 2004 (EIR) request submitted by Dr Andrew Boswell (CESL) to the Environment Agency for its Post-Combustion Carbon Dioxide Capture Evidence Review (March 2024).

EIR Request (submitted before D3 deadline)

271 The full text of the EIR request is reproduced below:

EIR REQUEST — REPRODUCED IN FULL

I am writing to make a request under the Environmental Information Regulations 2004 (EIR).

Information requested

I request the following documents:

1. The evidence review described on the GOV.UK guidance page "Post-combustion carbon dioxide capture: emerging techniques" (https://www.gov.uk/guidance/post-combustion-carbon-dioxide-capture-best-available-techniques-bat) as having been prepared with the UKCCSRC, UK regulators, and industry stakeholders to inform the March 2024 update to that guidance.
2. Any accompanying documents, correspondence, or records setting out the reasons for the change of title of that guidance from "best available techniques" to "emerging techniques" made on 27 March 2024.
3. Any consultation responses received in connection with the evidence review and the March 2024 update.

Reasons this is environmental information

The requested documents concern the regulation of post-combustion carbon dioxide capture technology under the Industrial Emissions Directive and the Environmental Permitting Regulations 2016. They relate directly to measures and activities affecting or likely to affect the elements and factors referred to in Regulation 2(1) of the EIR 2004, including air, atmosphere, and measures designed to protect those elements. They are accordingly environmental information for the purposes of the EIR.

Background and relevance

The GOV.UK guidance page referred to above states that the March 2024 update was informed by an evidence review prepared with the UKCCSRC and other stakeholders. The page directs readers to the UKCCSRC website (https://ukccsrc.ac.uk/best-available-technology-bat-information-for-ccs/) for that review. The UKCCSRC website links back to the GOV.UK page. The underlying evidence review is not publicly accessible at either location. This circular reference means that the evidence base for the reclassification from "best available techniques" to "emerging techniques" — including any findings on commercial-scale performance, operational evidence, and the reasoning for the change — is not in the public domain.

This request is made in the context of the ongoing DCO examination of the Connah's Quay Low Carbon Power project (EN0100166) before the Planning Inspectorate, in which the EA's guidance and the March 2024 reclassification are material to the assessment of greenhouse gas emissions under the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. The information is therefore required urgently. I would be grateful if the EA could treat this request as urgent and respond as quickly as possible, and in any event within the 20 working day statutory period.

Format

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I would prefer the documents in electronic format by email.

Yours faithfully,
Dr Andrew Boswell Climate Emergency Science Law
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<END-OF-DOCUMENT>