



APPLICANT'S RESPONSES TO ISSUES RAISED AT DEADLINE 2 (UPDATED)

Drax Bioenergy with Carbon Capture and Storage

Infrastructure Planning (Examination Procedure) Rules 2010

Document Reference Number: 8.10.2

Applicant: Drax Power Limited

PINS Reference: EN010120



REVISION: 02

DATE: 28 March 2023

DOCUMENT OWNER: Drax Power Limited

AUTHOR: Various

APPROVER: C. Fountain/E. Simpson

PUBLIC

TABLE OF CONTENTS

TABLE OF CONTENTS	1
1. INTRODUCTION	1
1.1. Purpose of This Document.....	1
2. NETWORK RAIL INFRASTRUCTURE LIMITED	2
3. ROBERT PALGRAVE	4
4. NATURAL ENGLAND	7
5. NATIONAL HIGHWAYS LIMITED	35
6. ENVIRONMENT AGENCY	39
7. JUST TRANSITION WAKEFIELD	46
8. LEEDS TRADES UNION COUNCIL	50
9. BIOFUELWATCH	57
10. CMS ON BEHALF OF NATIONAL GRID ELECTRICITY TRANSMISSION PLC	107
11. CLIMATE EMERGENCY POLICY AND PLANNING (CEPP)	114

TABLES

Table 2.1 – Network Rail Infrastructure Limited	2
Table 3.1 – Robert Palgrave	4
Table 4.1 – Natural England	7
Table 5.1 – National Highways Limited	35
Table 6.1 – Environment Agency	39
Table 7.1 – Just Transition Wakefield	46
Table 8.1 – Leeds Trades Union Council.....	50
Table 9.1 - Biofuelwatch.....	57
Table 10.1 - CMS on Behalf of National Grid and Electricity Transmission PLC.....	107
Table 11.1 – Climate Emergency Policy and Planning (CEPP)	114

APPENDICES

Appendix A.....	121
-----------------	-----

1. INTRODUCTION

1.1. PURPOSE OF THIS DOCUMENT

- 1.1.1. On 23 May 2022, Drax Power Limited ("the Applicant") made an application ("the Application") for a Development Consent Order (DCO) to the Secretary of State for Business, Energy and Industrial Strategy ("the SoS"). The Application relates to the Drax Bioenergy with Carbon Capture and Storage (BECCS) Project ("the Proposed Scheme") which is described in detail in Chapter 2 (Site and Project Description) of the Environmental Statement (ES) (APP-038).
- 1.1.2. The Application was accepted for Examination on 20 June 2022.
- 1.1.3. This document, submitted at Deadline 3 of the Examination, contains the Applicant's responses to the Written Representations submitted by the various Interested Parties at Deadline 2.
- 1.1.4. The Applicant has not commented further where other parties have agreed with its position or have provided a response that aligns with the Applicant's response to the same question. Where another party's response does not agree or align with the Applicant's response to a question, the Applicant has not repeated its response and has only commented where doing so adds to what it has said in its original response.
- 1.1.5. At Deadline 2 the Applicant has submitted new or revised versions of documents submitted with the Application, and some documents have been updated further and submitted at Deadline 3, where appropriate. These documents are referred to where relevant in the responses to the written questions in this document.
- 1.1.6. In this document the Applicant has focussed on responding to points that have not already been made (or in which more detail is provided on previous points) by Interested Parties or in order to show where progress has been made on outstanding matters.
- 1.1.7. In particular, further to its Response to Relevant Representations and submissions at the first round of Hearings, the Applicant has not provided a further response to points raised in relation to the continued operation of biomass at Drax Power Station or the sustainability credentials of these operations.
- 1.1.8. The Applicant's response to these previous points can be found in its Response to Relevant Representations, its Summary of Oral Submissions at ISH1 and OFH1 and ISH2, its response to First Written Questions and its Response to Issues Raised at Deadline 1.
- 1.1.9. Please note that this 'updated' document includes a response to the new comments in Biofuelwatch's Written Representation in relation to Air Quality and Biodiversity. All additions made to this 'updated' document are in **red text**.

2. NETWORK RAIL INFRASTRUCTURE LIMITED

Table 2.1 – Network Rail Infrastructure Limited

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
2.1 (Paragraphs 1 - 3)	<p>Further to Network Rail Infrastructure Limited's (Network Rail) relevant representation dated 20 September 2022, NR wishes to make this written representation in relation to Drax Power Limited's (Promoter) application for a development consent order (DCO).</p> <p>As set out in Network Rail's previous representation, the Promoter proposes to carry out works in close proximity to the Goole and Selby Railway (Railway). The Network Rail project team are liaising with the Promoter to agree a private agreement to regulate how works in proximity to the Railway are undertaken to ensure the continued safe operation of the Railway and ensure any necessary asset protection agreements are entered into in lieu of protective provisions being included within the DCO. Progress on the agreement is progressing well and the parties are confident that this will be completed before the close of the examination.</p> <p>Until satisfactory agreement has been reached with the Promoter on all matters, Network Rail must continue to</p>	<p>The Applicant agrees with the summary of the current position provided by Network Rail. Network Rail has drafted a Deed of Undertaking (DoU) which the Applicant is currently considering. The Applicant agrees that agreement is expected before the close of the Examination. The Applicant expects that once the agreement is entered into, protective provisions for Network Rail will be removed from the dDCO (REP2-007).</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	reserve the right to make further submissions to the examination at a later date.	

3. ROBERT PALGRAVE

Table 3.1 – Robert Palgrave

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
Air quality impacts		
3.1 (48 - 53)	<p>The data presented by the Applicant regarding the levels of amines and nitrosamines emitted by the Proposed scheme is subject to uncertainties.</p> <p>In the Environmental Permit Variation Request referenced above, the Applicant gives figures for the cumulative impacts on air quality of the Proposed Scheme together with a nearby proposed scheme at Keadby, consisting of a gas-fired power station with carbon capture using amines. (Keadby 3 Low Carbon Gas Power Station Project, Planning ref EN010114).</p> <p>The Variation Request states:</p> <p>“7.14.10.1Amines & Nitrosamines</p> <p><i>As detailed in Section7.14.5, a quantitative modelling assessment of cumulative impacts for amine and nitrosamine concentrations was not considered appropriate. However, to provide a qualitative and conservative judgement on potential cumulative impacts, the</i></p>	<p>The emissions of amines and nitrosamines assessed by the Applicant are specific to the proposed carbon capture technology. They have been derived from an analysis of the results of trials undertaken by the technology supplier and based on the specific exhaust characteristics of the Drax biomass units. The emissions concentrations will be enshrined within the Environmental Permit as both an Emission Limit Value and a monitoring methodology. Therefore emission concentrations assessed by the Applicant are robust and the assessment has been undertaken conservatively.</p> <p>The Applicant understands that the technology being proposed for use at Keadby is different to that proposed for Drax but cannot comment on their specific proposals for emission limits.</p> <p>However, the Applicant confirms that the proposed emissions for Drax, as presented in Air Quality</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p><i>maximum-modelled PC concentrations from both the PCC activity and Keadby 3 (Keadby Generation Ltd, May 2021) project were summed, as follows:</i></p> <ul style="list-style-type: none"> • <i>Amine (as MEA) cumulative maximum 1-hour mean PC ($\mu\text{g}/\text{m}^3$) = 0.24 (PCC) + 25.2 (Keadby 3) = 25.44 $\mu\text{g}/\text{m}^3$</i> • <i>Amine (as MEA) cumulative maximum 24-hour mean PC ($\mu\text{g}/\text{m}^3$) = 0.06 (PCC) + 0.22 (Keadby 3) = 0.28 $\mu\text{g}/\text{m}^3$</i> • <i>Nitrosamine (as NDMA) cumulative maximum annual mean PC (ng/m^3) = 0.017 (PCC) + 0.064 (Keadby 3) = 0.081 ng/m^3 “</i> <p>The purpose of drawing the ExA's attention to these figures is to highlight that the levels of emissions forecast for the Proposed Scheme are significantly lower than those for Keadby. Noting that Keadby is proposed to be rated at approximately 300MW, whereas as the Drax biomass units with PCC will be just under 1000MW, i.e. three times larger.</p> <p>For Amines, the Keadby figure is between four and ten times that given for Drax, and for Nitrosamines, the ratio is just under four.</p> <p>I do not have the expertise to argue that the figures for the Proposed Scheme (Drax) are wrong, but request that ExA</p>	<p>Technical Note 1 (AS-019) are robust and significantly lower than set out within the Environment Statement for Keadby.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	invite the Applicant to comment on this point, given the considerable difference from the Keadby figures.	

4. NATURAL ENGLAND

Table 4.1 – Natural England

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
<p>Natural England's Written Representations and Responses to the Examining Authority's Written Questions (Version 1.1, dated 22 February 2023) in respect of Drax Bioenergy with Carbon Capture and Storage Project</p> <p>Part II: Natural England's detailed advice Table 1</p>		
<p>4.1 Key Issue 19</p>	<p>Internationally designated sites</p> <ul style="list-style-type: none"> • Lower Derwent Valley SAC • Lower Derwent Valley Ramsar <p>Issue Summary</p> <p>Impacts of acid deposition from aerial emissions on Lower Derwent Valley SAC / Ramsar designated features (alone and in-combination)</p> <p>Natural England Commentary:</p> <p>Discussions with the Applicant are ongoing on this matter. Natural England are waiting for an updated air quality assessment including additional emissions reductions, which is currently being prepared by the Applicant.</p>	<p>The Applicant acknowledges the response received from NE at Deadline 2, however the Applicant's position to this 'Key Issue' remains as set out in Applicant's Responses to Examining Authority's First Written Questions (REP2-060), Table 3.1 ExA ref BIO1.27, BIO1.28 and BIO1.29.</p> <p>Air Quality Technical Note (REP2-065) which contains updated dispersion (air quality) modelling and the updated Habitats Regulations Assessment Report (REP2-101) also provide an updated assessment of air quality impacts and effects on European Sites.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>At this stage, Natural England's position broadly remains as set out in our Relevant Representations Version 1.2 (AS-011).</p> <p>Discussions with the Applicant are ongoing on this matter. Natural England are waiting for an updated air quality assessment including additional emissions reductions, which is currently being prepared by the Applicant.</p> <p>We note that the justification provided in the current Habitats Regulations Assessment (HRA, dated May 2022) (e.g., 4.2.173 onwards for the project alone and 4.3.29 onwards for the project in-combination) largely relate to the modelling assumptions used, the small scale of the impact, and the overall "favourable" condition of the site. However, while these points are relevant, we highlight that justification should also make reference to site-specific considerations, and the relevant conservation objectives of the designated sites (as detailed in our relevant representation).</p> <p>Natural England considers that monitoring, recording and reporting to the regulator (Environment Agency) as part of the future environmental permit is appropriate to ensure emissions from the plant itself remain within the assumed emissions used in the assessments.</p>	

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>We recommend that monitoring of the protected sites should also be carried out for acid deposition. This requirement should be secured by the DCO or permit variation application (outlining proposed mitigation measures and a detailed monitoring plan).</p> <p>Natural England advises that the requirement for additional mitigation measures and approach to securing such measures will depend on the outcome of the updated air quality assessment including additional emissions reductions, which is currently being prepared by the Applicant.</p>	
<p>4.2 Key Issue 20</p>	<p><u>Internationally designated sites:</u></p> <ul style="list-style-type: none"> • <u>Thorne Moor SAC</u> • <u>River Derwent SAC</u> <p><u>Issue Summary:</u></p> <p><u>Impacts of nitrogen deposition from aerial emissions on Thorne Moor SAC (in-combination) and River Derwent SAC designated features (alone and in- combination). (O)</u></p> <p><u>Natural England Commentary:</u></p> <p><u>Thorne Moor SAC</u></p>	<p>The Applicant acknowledges the response received from NE at Deadline 2, however the Applicant's position to this 'Key Issue' remains as set out in Applicant's Responses to Examining Authority's First Written Questions (REP2-060) Table 3.1 ExA ref BIO1.27 and BIO1.29.</p> <p>The Applicant has also submitted a Technical Note in relation to habitats at the River Derwent SAC (REP2-107) and an Air Quality Technical Note (REP2-065). These provide additional assessment of air quality impacts and effects on European Sites.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>At this stage, Natural England's position broadly remains as set out in our Relevant Representations Version 1.2 (AS-011).</p> <p>Discussions with the Applicant are ongoing on this matter. Natural England are waiting for an updated air quality assessment including additional emissions reductions, which is currently being prepared by the Applicant.</p> <p>Based on the additional information provided in the Applicant's Response to Relevant Representations and Additional Submissions [AS-038], Natural England accepts that the applicant has used other evidence within NECR210 to consider the impact of nitrogen deposition. However, no additional evidence is used in the assessment of potential impacts of the project on Thorne Moor SAC specifically. For example, consideration should be taken of the relevant habitats and important species, the predicted pollution footprint, trends in nitrogen deposition in the area.</p> <p>Although the predicted contribution of nitrogen is acknowledged to be small, given critical loads are exceeded in-combination and there is a "restore" conservation objective for air quality at the site, it is important to establish if the proposed development will undermine the ability to deliver this objective. In particular, APIS records nitrogen</p>	<p>The River Derwent Technical Note provides assessment of the habitats present at and adjacent to the SAC. It was used by the Applicant to select the most appropriate habitat(s) for assignment of critical loads for 'proxy habitats' of the River Derwent. The Technical Note concludes that 'fen, marsh, and swamp' is the most appropriate habitat for modelling as a 'proxy habitat' for the River Derwent. The use of 'fen, marsh, and swamp' as a proxy habitat was requested by Natural England in their Relevant Representation (AS-011). Dispersion modelling for this proxy habitat demonstrates that the impact of the Proposed Scheme on rates of nitrogen deposition, both alone and in-combination, does not exceed 1% of critical load. This supports the finding presented in the DCO submissions HRA Report (APP-185) and latest revision of the HRA Report (REP2-101) that air quality impacts will not trigger LSE on the River Derwent SAC.</p> <p>The Applicant notes Natural England's observation that APIS records nitrogen deposition to have increased in the area (i.e. in the vicinity of Thorne Moor) recently. The Applicant understands that the recent upwards trend may in part be driven by</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>deposition to have increased in the area recently. Therefore, we advise that further detailed assessment is carried out to determine whether an adverse effect on integrity from any additional input can be excluded.</p> <p><u>River Derwent SAC</u></p> <p>At this stage, Natural England's position broadly remains as set out in our Relevant Representations Version 1.2 (AS-011).</p> <p>Natural England are waiting for an updated air quality assessment including additional emissions reductions, which is currently being prepared by the Applicant.</p> <p>We are involved in ongoing conversations with the Applicant regarding the assessment of impacts of nitrogen deposition from aerial emissions on the River Derwent SAC. We have recently received an additional Technical Note from the Applicant regarding the River Derwent SAC. However, Natural England have been unable to complete a review of this information in the absence of the anticipated updated air quality assessment prior to the Written Representations deadline. Therefore, we will continue to engage with the Applicant on this matter.</p>	<p>changes in the approach to processing and presenting nitrogen deposition data that were made by APIS for the last mid-year averaged period (i.e. 2018 to 2020, with mid-year 2019), but also acknowledges and agrees with Natural England that the general trend between mid-years 2017 to 2019 is on an upward trajectory, albeit there is a generally flat trend between mid-years 2005 to 2017.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>Natural England considers that monitoring, recording and reporting to the regulator (Environment Agency) as part of the future environmental permit is appropriate to ensure emissions from the plant itself remain within the assumed emissions used in the assessments.</p> <p>We recommend that monitoring of the protected sites should also be carried out for nitrogen deposition. This requirement should be secured by the DCO or permit variation application (outlining proposed mitigation measures and a detailed monitoring plan).</p> <p>Natural England advises that the requirement for additional mitigation measures and approach to securing such measures will depend on the outcome of the updated air quality assessment including additional emissions reductions, which is currently being prepared by the Applicant.</p>	
<p>4.3 Key Issue 21</p>	<p><u>Internationally designated sites:</u></p> <ul style="list-style-type: none"> • <u>Thorne Moor SAC</u> <p>Issue Summary:</p> <p>Impacts of ammonia from aerial emissions on Thorne Moor SAC designated features (in-combination). (O)</p>	<p>The Applicant considers that this point has already been addressed in Air Quality Technical Note 2 (REP2-065) which contains updated dispersion (air quality) modelling.</p> <p>This demonstrates that with the revisions to the dispersion (air quality) modelling as set out in the</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>Natural England Commentary:</p> <p>At this stage, Natural England's position remains as set out in our Relevant Representations Version 1.2 (AS-011). Discussions with the Applicant are ongoing on this matter. Natural England are waiting for an updated air quality assessment including additional emissions reductions, which is currently being prepared by the Applicant.</p> <p>We are awaiting further assessment in the HRA and highlight that the appropriate assessment should present evidence that the conservation objectives of the site will not be undermined by the proposed development. This is particularly important given the background levels of ammonia exceed the critical level of 1µg/m³ in-combination and there is no declining trend.</p> <p>Natural England considers that monitoring, recording and reporting to the regulator (Environment Agency) as part of the future environmental permit is appropriate to ensure emissions from the plant itself remain within the assumed emissions used in the assessments.</p> <p>We recommend that monitoring of the protected sites should also be carried out for ammonia. This requirement should be secured by the DCO or permit variation application (outlining</p>	<p>Note, there is no longer predicted to be an exceedance of the 1% screening criterion for ammonia concentrations, either alone or in-combination.</p> <p>As such, LSE are no longer predicted to arise in relation to the effects of the Proposed Scheme on concentrations of ammonia.</p> <p>The Applicant would also direct the ExA to the Applicant's Responses to Examining Authority's First Written Questions (REP2-060), response reference BIO1.27.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>proposed mitigation measures and a detailed monitoring plan).</p> <p>Natural England advises that the requirement for additional mitigation measures and approach to securing such measures will depend on the outcome of the updated air quality assessment including additional emissions reductions, which is currently being prepared by the Applicant.</p>	
<p>4.4 Key Issue 22</p>	<p>Internationally designated sites</p> <ul style="list-style-type: none"> • Lower Derwent Valley SAC and Ramsar • Thorne Moor SAC • River Derwent SAC • Skipwith Common SAC <p>Issue Summary:</p> <p>Proposed mitigation for impacts of aerial emissions on Lower Derwent Valley SAC/Ramsar; Thorne Moor SAC; River Derwent SAC; and Skipwith Common designated features. (O)</p> <p>Natural England Commentary:</p> <p>Natural England welcomes the further information provided on the proposed operational emissions abatement</p>	<p>The Applicant acknowledges the response received from NE at Deadline 2, however the Applicant's position to this 'Key Issue' remains as set out in Applicant's Responses to Examining Authority's First Written Questions (REP2-060), Table 3.1 ExA ref BIO1.27, BIO1.28 and BIO1.29.</p> <p>Air Quality Technical Note 2 (REP2-065), which contains updated dispersion (air quality) modelling, and the updated Habitats Regulations Assessment Report (REP2-101) also provide an updated assessment of air quality impacts and effects on European Sites and have been updated since Natural England's observations in Key Issue 22 were made, including with updated dispersion (air quality)</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>mitigation and its implementation in 5.34 of Table 5.1 in the Applicant's Responses to Relevant Representations and Additional Submissions document (AS-038).</p> <p>We accept the justification provided regarding the proposed technology to be used to achieve the operational emissions abatement and the measures for securing the currently proposed mitigation for operational emissions.</p> <p>The reduction in permitted concentrations of sulphur dioxide is noted, and that the realistic worst-case scenario is based on these revised permit limits.</p> <p>We remain in discussion with the Applicant regarding the assessment of effects of operational emissions on some designated sites, and hence the need for additional mitigation cannot be ruled out at this point in time. Natural England notes that the Applicant is preparing further information regarding additional emissions abatement, and looks forward to receiving this in due course.</p> <p>Natural England considers that monitoring, recording and reporting to the regulator (Environment Agency) as part of the future environmental permit is appropriate to ensure emissions from the plant itself remain within the assumed emissions used in the assessments.</p>	<p>modelling which predicts reduced impacts on European Sites.</p> <p>The Applicant considers no additional air quality monitoring and mitigation measures are necessary. The Applicant remains in discussion with Natural England with a view to resolving the remaining areas under discussion as promptly as possible.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>We recommend that monitoring of the protected sites should also be carried out for identified pollutants (acid and nitrogen deposition, and ammonia). This requirement should be secured by the DCO or permit variation application (outlining proposed mitigation measures and a detailed monitoring plan).</p> <p>Natural England advises that the requirement for additional mitigation measures and approach to securing such measures will depend on the outcome of the updated air quality assessment including additional emissions reductions, which is currently being prepared by the Applicant.</p>	
<p>4.5 Key Issue 27</p>	<p>Internationally designated sites</p> <ul style="list-style-type: none"> • Humber Estuary SPA • Humber Estuary Ramsar <p>Issue Summary:</p> <p>Impacts from potential loss of functionally linked land (Construction phase) associated with Humber Estuary SPA/Ramsar in the overhead line (OHL) and Telecommunications line (T CL) Order Limits for Proposed Change 02 (PC-02).</p>	<p>All of Work Number 8 is located within 120 m of either a main road and/or occupied commercial or residential premises, reducing the likelihood of significant use by bird species associated with the Humber Estuary SPA and Ramsar.</p> <p>The Applicant would also highlight that even if the land present were to receive low-level use by SPA / Ramsar bird species, there could be no loss of functionally-linked land. This is because Work Number 8 includes negligible potential for permanent habitat change, with all habitats present to be reinstated</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>Natural England Commentary:</p> <p>Our position regarding impacts on internationally designated sites from the Proposed Changes (PC-02) is as set out in our Relevant Representation for PC-02 (submitted online, dated 09 February 2023).</p> <p>Table 6-1 Environmental Appraisal for PC-02 (8.5.1 Proposed Changes Application Report) states that <i>“The areas comprising the [overhead line] OHL and [Telecommunications line] TCL Order Limits are not in proximity to any statutory or non-statutory designated sites, nor are there evident impact pathways connecting the areas where construction works would take place with such protected sites, that are predicted to give rise to likely significant effects.”</i> However, the OHL and TCL Order Limits are located within 4km of the Humber Estuary SPA/Ramsar, which are designated for mobile bird species that may also rely on areas outside of the site boundary. On the basis of the information provided, Natural England advises that there is currently not enough information to rule out the likelihood of significant effects from loss of/disturbance to functionally linked land associated with the Humber Estuary SPA/Ramsar.</p>	<p>following the proposed undergrounding works. It would therefore not be possible for Work Number 8 to trigger loss of functionally-linked land.</p> <p>Work Number 8 is limited in spatial extent and is expected to be completed over a period of approximately four weeks, after which habitats would be reinstated. Work Number 8 would lead to temporary disturbance of a maximum of approximately 2.7 hectares of grassland and farmland crops (assuming a worst-case scenario of all habitat within the Order Limits being directly affected which is unlikely), for a period of up to approximately four weeks. This is a short period of time, and there is abundant alternative comparable habitat present in the wider landscape, including closer to the River Ouse. The temporary non-availability of this limited extent of land is comparable to temporary fluctuations in land use in the wider surrounding agricultural landscape. As highlighted above, there is abundant farmland in the wider landscape which could be utilised by SPA / Ramsar bird species, in the unlikely event these make significant use of habitats within or adjacent to Work Number 8.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>We therefore recommend that further assessment of the potential suitability of the proposed Order Limits and adjacent areas for SPA birds is carried out to inform an update/addendum to the HRA. This should include a data search from appropriate source/s (for example, the local Ecological Data Centre), in addition to a desk-based assessment of aerial photography, mapping, habitat maps and relevant ecological literature, where appropriate.</p> <p>We note that Table 6-1 of the 8.5.1 Proposed Changes Application Report refers to “OHL locations are adjacent to an existing main road and public footpaths, with residential and commercial properties present” and advise that such factors may inform the assessment. However, these factors alone are not considered sufficient justification to rule out likely significant effects from the OHL and TCL in this case. The OHL1/TCL1 are located within a wider network of fields, and the 8.5.3.4 Appendix 4 – Ecological Walkover Technical Note – Proposed Changes gives an indication of the availability of improved grassland and arable land within/in proximity to OHL1/TCL1, which extends beyond the areas</p>	<p>The Applicant also notes the following text from the Habitats Regulations Assessment for the Scotland to England Green Link 2 (SEGL2)¹ (Applicant's emphasis added):</p> <p>Page 28: <i>The Humber Estuary SPA / Ramsar and Lower Derwent Valley SPA / Ramsar are designated for a suite of birds of prey, waterfowl and waders, which will be associated with varying degrees of sensitivity to visual and noise disturbance. Appendix 13C: Construction Noise Modelling of the ES provides noise modelling data associated with different construction activities, based on the plant / equipment utilised in the respective construction phases. <u>Overall, it is anticipated that the trench excavation period is to last approx. 42 months, with the potential for different sections of the cable route being worked on simultaneously.</u> The amount of noise generated along the working area will depend on the construction activities being undertaken, but associated noise levels are predicted to remain comparatively low.</i></p>

¹ Aecom (2022) Scotland England Green Link 2 - English Onshore Scheme Appendix 7F: Habitat Regulations Assessment Report. Available at https://publicaccess1.selby.gov.uk/PublicAccess_LIVE/Document/ViewDocument?id=9940F52A318A42ADB45FAA664B3E8264

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>immediately adjacent to the road and commercial properties. Therefore, we advise that the potential suitability of the area as functionally linked land should be assessed in more detail.</p> <p>Natural England advises that the requirement for additional mitigation measures will depend on the outcome of the assessment.</p>	<p>Page 42 to 43: <i>SPA / Ramsar birds roosting and / or foraging in agricultural fields adjoining the English Onshore Scheme are sensitive to visual and noise disturbance during the construction period. However, noise modelling undertaken for the ES indicates that, in most locations, the daytime noise levels emanating from the cable installation works will reduce to 69 dBA (a level of noise that is unlikely to result in disturbance) within 100 m from the working area. Furthermore, only a narrow section of land, some of which is considered unsuitable for SPA / Ramsar birds, surrounding the proposed converter station would be subject to noise levels above 69 dBA. Visual and noise disturbance from works at the proposed converter station (approx. 84m to the north of a small lake that supports >1% of the qualifying populations of wigeon and mallard) will not negatively impact the SPA / Ramsar birds. The presence of a natural woodland barrier between the proposed converter station and the lake, reduces the potential for visual and, to a lesser extent, noise disturbance to waterfowl using the lake. Moreover, the construction noise will have dropped to below 69 dB, i.e. non-disturbing levels, by about 59 m from the lake. Generally, the magnitude of noise disturbance</i></p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p><i>associated with the English Onshore Scheme is unlikely to exceed that experienced by birds due to routine farming operations (e.g. ploughing). Considering this, it is concluded that there will be no adverse effects of the English Onshore Scheme on the Humber Estuary SPA / Ramsar and Lower Derwent Valley SPA / Ramsar regarding visual and noise disturbance to birds using FLL.</i></p> <p>The Applicant notes that the SEGL cable route crosses the River Ouse and would involve excavation and cable installation across a substantially greater area of land (up to 36ha at any one time), with a considerably more extensive overall construction programme (42 months) than Work Number 8. The Applicant has also reviewed the Ecology Chapter of the SEGL Environmental Statement² and notes that there appear to be no targeted mitigation measures designed to lessen the effects of functionally-linked land disturbance on SPA bird species. Embedded measures appear to be restricted to demarcation of the working footprint. Equally, other than generic noise</p>

² Aecom (2022) Scotland – England Green Link 2 – English Onshore Scheme. Environmental Statement Chapter 7: Ecology and Nature Conservation.

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>mitigation measures which are not specified in relation to SPA bird species, no mitigation for noise and visual disturbance effects on SPA bird species appears to be included.</p> <p>The Applicant notes and agrees with the findings of the SEGL HRA at Page 42 and 43, which state:</p> <p><i>Overall, given the temporary nature of this impact and the low numbers or absence of SPA / Ramsar bird records along the cable route and proposed converter station respectively, it is concluded that the English Onshore Scheme will not result in adverse effects on the integrity of the Humber Estuary SPA / Ramsar and Lower Derwent Valley SPA / Ramsar regarding temporary or permanent loss of functionally linked habitat.</i></p> <p><i>Generally, the magnitude of noise disturbance associated with the English Onshore Scheme is unlikely to exceed that experienced by birds due to routine farming operations (e.g. ploughing). Considering this, it is concluded that there will be no adverse effects of the English Onshore Scheme on the Humber Estuary SPA / Ramsar and Lower</i></p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p><i>Derwent Valley SPA / Ramsar regarding visual and noise disturbance to birds using FLL.</i></p> <p>The Applicant considers that, given the far reduced scale and duration of Work Number 8 relative to SEGL2, there is no prospect of Work Number 8 contributing to LSE on Humber Estuary SPA / Ramsar bird species.</p> <p>The Applicant also notes that Natural England have agreed to the findings of the SEGL2 HRA Report, as set out in the Natural England consultation advice to East Riding of Yorkshire Council³.</p>
4.6 Key Issue 24	<p>Nationally Designated Sites:</p> <ul style="list-style-type: none"> • Barn Hill Meadows SSSI, • Brighton Meadows SSSI • Derwent Ings SSSI <p>Issue Summary:</p>	<p>Please see the Applicant's response within this document to Response Reference 4.1.</p>

³ Letter ref 418912 dated 31 January 2023. Available at: https://publicaccess1.selby.gov.uk/PublicAccess_LIVE/Document/ViewDocument?id=B82D8EB138A94854865696309E99D8D1

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>Impacts of acid deposition from aerial emissions on Barn Hill Meadows SSSI, Brighton Meadows SSSI, Derwent Ings SSSI (alone and in- combination) (O).</p> <p>Natural England Commentary</p> <p>At this stage, Natural England's position broadly remains as set out in our Relevant Representations Version 1.2 (AS-011). Discussions with the Applicant are ongoing on this matter.</p> <p>Our advice regarding the potential impacts of acid deposition from aerial emissions of on the Brighton Meadows SSSI and Derwent Ings SSSI coincides with our advice regarding the potential impacts upon the Lower Derwent Valley SAC as detailed above (Natural England key issue reference 19).</p> <p>We would highlight that the potential impact of acid deposition on nationally designated sites (SSSIs) would be the same as for a similar habitat designated as a European Habitat Site (SAC, SPA, Ramsar). However, it is acknowledged that a higher threshold for harm has historically been applied to SSSIs. There is no scientific evidence to suggest differing thresholds for harm are</p>	

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>appropriate for the same habitat type as a result of the level of designation that site has received.</p> <p>We therefore advise that similar consideration is given to the assessment of potential impacts of acid deposition from aerial emissions on Barn Hill Meadows SSSI (which does not underpin a European designation) as the Lower Derwent Valley SAC as detailed above (Natural England key issue reference 19) and underpinning SSSIs (Brighton Meadows SSSI and Derwent Ings SSSI).</p> <p>Natural England's advice regarding mitigation measures coincides with our advice regarding Lower Derwent Valley SAC/Ramsar as detailed above (Natural England key issue reference 19).</p>	
<p>4.7 Key Issue 25</p>	<p>Nationally Designated Sites</p> <p>Issue Summary:</p> <p>Impacts of nitrogen deposition from aerial emissions on Thorne, Crowle, and Goole Moors SSSI (in-combination); and River Derwent SSSI (alone and in- combination). (O)</p> <p>Natural England Commentary:</p> <p>Our advice regarding the potential impacts of nitrogen deposition from aerial emissions upon the Thorne, Crowle</p>	<p>Please see the Applicant's response within this document to Response Reference 4.2.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>and Goole Moors SSSI and River Derwent SSSI coincides with our advice regarding the potential impacts upon the Thorne Moor SAC and River Derwent SAC as detailed above (Natural England key issue reference 20).</p> <p>Natural England's advice regarding mitigation measures coincides with our advice regarding Lower Derwent Valley SAC/Ramsar as detailed above (Natural England key issue reference 20)f.</p>	
<p>4.8 Key Issue 26</p>	<p>Nationally Designated Sites:</p> <ul style="list-style-type: none"> • Barn Hill Meadow • Brighton Meadows SSSI • Derwent Ings SSSI • Melbourne and Thornton Ings SSSI • Thorne, Crowle, and Goole Moors SSSI • River Derwent SSSI • Skipwith Common SSSI <p>Issue Summary:</p> <p>Proposed mitigation for impacts of aerial emissions on Barn Hill Meadows, Brighton Meadows SSSI; Derwent Ings</p>	<p>Please see the Applicant's response within this document to Response Reference 4.4.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>SSSI; Melbourne and Thornton Ings SSSI; Thorne, Crowle, and Goole Moors SSSI; River Derwent SSSI; and Skipwith Common SSSI. (O)</p> <p>Natural England Commentary</p> <p>Our advice regarding proposed mitigation for impacts of aerial emissions on Brighton Meadows SSSI; Derwent Ings SSSI; Melbourne and Thornton Ings SSSI; Thorne, Crowle, and Goole Moors SSSI; River Derwent SSSI; and Skipwith Common SSSI coincides with our advice regarding Lower Derwent Valley SAC/Ramsar; Thorne Moor SAC; River Derwent SAC; and Skipwith Common SAC (Natural England key issue reference 22).</p> <p>This assessment should also consider additional relevant nationally designated site Barn Hill Meadows SSSI.</p> <p>Natural England's advice regarding mitigation measures coincides with our advice regarding Lower Derwent Valley SAC/Ramsar as detailed above (Natural England key issue reference 22).</p>	
<p>4.9 Key Issue 28</p>	<p>Nationally designated sites:</p> <ul style="list-style-type: none"> • Humber Estuary SSSI <p>Issue Summary:</p>	<p>Please see the Applicant's response within this document to Response Reference 4.5.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>Impacts from potential loss of / disturbance to functionally linked land associated with Humber Estuary SSSI in the overhead line (OHL) and Telecommunications line (TCL) Order Limits for Proposed Change 02 (PC-02).</p> <p>Natural England Commentary:</p> <p>Our advice regarding the impacts from potential loss of / disturbance to functionally linked land associated with Humber Estuary SSSI coincides with our above advice regarding the Humber Estuary SPA/Ramsar (Natural England key issue reference 27).</p> <p>Natural England advises that the requirement for additional mitigation measures will depend on the outcome of the assessment.</p>	
<p>4.10 Key Issue 9</p>	<p>Protected Species:</p> <p>Badger (C)</p> <p>Natural England Commentary:</p> <p>Natural England welcomes the further information provided in Table 5.1 (Natural England RR Response) in the Applicant's Responses to Relevant Representations and Additional Submissions document (AS-038).</p>	<p>The Applicant notes and is grateful to Natural England for confirming agreement to the proposed scope of pre-construction surveys for Badger.</p> <p>The Applicant wishes to clarify that no further badger surveys have been completed by the Applicant since the surveys that informed the Environmental Statement were completed and does not intend to complete further surveys at any point during Examination of the Proposed Scheme. Such surveys</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>Natural England is now satisfied that pre-construction surveys proposed in relation to badger are appropriate.</p> <p>However, Natural England are aware that further badger surveys have been carried out and we are yet to review these results and proposed approach; therefore, we cannot confirm whether this topic is resolved at this stage.</p> <p>We advise that the requirement for a draft licence application will depend on the outcome of the badger surveys.</p> <p>Natural England advises that the requirement for a draft licence application will depend on the outcome of the pre-construction badger surveys.</p> <p>The surveys specified in E3 of the REAC must be included in the CEMP and rigorously implemented.</p>	<p>are not considered necessary given the previously recorded negative survey results for badger setts within 30 m of areas that would be subject to clearance and/or construction activities for the Proposed Scheme.</p>
<p>4.11 Key Issue 11</p>	<p>Biodiversity Net Gain</p> <p>Issue Summary:</p> <p>Additional information required in order to demonstrate that a 10% biodiversity net gain will be achieved (C).</p> <p>Natural England Commentary:</p>	<p>The Applicant is submitting an updated BNG Report at Deadline 3 (APP-196, Rev 02 being submitted at Deadline 3), which will capture updates to the Proposed Scheme since submission of the DCO application, including the inclusion of Work Numbers 7 and 8.</p> <p>The Applicant continues to engage with Natural England regarding the BNG assessment work, and is</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>At this stage, our position remains as set out in our Relevant Representations Version 1.2 (AS-011). However, we welcome continued discussions and progress in this area.</p> <p>It is noted and welcomed that an updated BNG report is to be submitted to the Examination which states that a 10% biodiversity net gain can be achieved for all habitat types identified on the site. Natural England will review this information when provided, to ensure it addresses the concerns raised in our Relevant Representations Version 1.2 (AS-011).</p> <p>We highlight that Natural England's previous advice (as detailed in our Relevant Representations (AS-011)) should be considered when updating the BNG strategy.</p> <p>Natural England note the clarification provided in Table 5.1 – Natural England RR Response regarding the proposed approach to securing 10% Biodiversity Net Gain post-development. Natural England are in broad agreement with the principal of securing the overall biodiversity net gain requirements via a Section 106 Agreement; however, we highlight that regardless of the approach taken, all habitats accounted for in the metric and contributing toward the achievement of 10% Biodiversity Net Gain (on-site and off-</p>	<p>in the process of updating the S106 agreement for the Proposed Scheme to reflect the latest updates to the proposals for achieving 10% BNG and to secure its delivery. An updated S106 Legal Agreement is submitted at Deadline 3.</p> <p>In relation to river units, the Calder and Colne Rivers Trust (CCRT) Black Brook River and Floodplain Restoration Scheme has been identified by the Applicant as being suitable to deliver at least 10% BNG in relation to the Proposed Scheme. Ongoing management and monitoring would be implemented to ensure that the CCRT Scheme is in place for at least 30 years and this will be secured via a Section 106 agreement which is currently being drafted by the Applicant in consultation with the landowner and CCRT.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>site) must be legally secured and maintained for the minimum 30 year period.</p> <p>We recommend clarity is provided regarding how all on and off-site biodiversity net gain is to be secured. We highlight that all off-site BNG units should be included in a Section 106 agreement, as already committed to for River Units in the REAC (AS-027).</p>	
<p>4.12 Key Issue 12</p>	<p>Biodiversity Net Gain Issue Summary:</p> <p>River BNG units achieve no net gain in either of the scenarios currently presented.</p> <p>Natural England Commentary</p> <p>Natural England's position on River BNG units remains as set out in our Relevant Representations Version 1.2 (AS-011) at this stage. However, we are currently in discussions with the Applicant regarding provision of River BNG units and welcome continued progress in this area.</p> <p>Natural England's advice regarding the mechanism for securing relevant BNG measures coincides with the above advice (Natural England key issue reference 11).</p>	<p>Please see the Applicant's response within this document to Response Reference 4.11.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
4.13 Key Issue 14	<p>Biodiversity Net Gain</p> <p>Issue Summary:</p> <p>The Habitat Provision Area within the order limits should be included as on-site in the Biodiversity Net Gain Assessment, and therefore subject to 10% net gain. (C)</p> <p>Natural England Commentary:</p> <p>Natural England notes the clarification provided in 5.26 of Table 5.1 (Natural England RR Response) in the Applicant's Responses to Relevant Representations and Additional Submissions document (AS-038) that the on-site Habitat Provision Area within the order limits has not been included in the on-site habitat baseline of the Biodiversity Metric Calculations, contrary to the commentary and advice provided by Natural England in our Relevant Representations Version 1.2 (AS-011).</p> <p>It is welcomed that an update to the metric calculations submitted within the DCO application has been carried out, which now demonstrates that a 10% biodiversity net gain can be achieved whether the on-site habitat provision area is included in the baseline or not.</p> <p>However, the currently proposed approach does not align with the discretionary advice provided by Natural England to</p>	<p>The Applicant is submitting an updated BNG Report at Deadline 3 (APP-196, Rev 2), which will capture updates to the Proposed Scheme since submission of the DCO application, including the inclusion of Work Numbers 7 and 8.</p> <p>The Applicant can confirm that the Habitat Provision Area is included in the 'on-site' part of the Biodiversity Metric 3.1 calculations, in accordance with Natural England's advice and the recent result of the Consultation outcome: <i>Government response and summary of responses document (updated 21 February 2023) relating to Defra's Consultation on Biodiversity Net Gain regulations and Implementation</i></p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>WSP (on behalf of Drax Power Limited) on 5 May 2022. As per Natural England's formal response to the Consultation on Biodiversity Net Gain Regulations and Implementation document issued by the Department for Environment, Food and Rural Affairs (Defra), an approach of considering any mitigation lands within the development boundary (or order limits) as "off-site" would not be supported.</p> <p>We highlight that this advice is in line with the <i>Consultation outcome: Government response and summary of responses document (updated 21 February 2023) relating to Defra's Consultation on Biodiversity Net Gain regulations and implementation. Section 4.3 states that "We do not intend to make a distinction for NSIPs between on-site habitats (which are subject to BNG) and any dedicated environmental mitigation areas included in the project boundary. This maintains consistency with the approach for TCPA development. We will consult further on this proposal through the draft biodiversity gain statement."</i></p> <p>This also aligns with the Biodiversity Metric 3.1 User Guide (Natural England, 2022) which in respect to on-site land states in Paragraph 3.2 <i>"On-site" includes all land within the boundary of a project. In a planning context, this usually means within a red line boundary."</i></p>	

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	Natural England's advice regarding the mechanism for securing relevant BNG measures coincides with the above advice (Natural England key issue reference 11).	
Natural England's Relevant Representations, Part IV, Table 3		
4.14 Table 3, 38	Natural England notes that the Applicant proposes to secure 10% biodiversity net gain via a Section 106 Agreement, rather than via a Requirement. We recommend clarity is provided regarding how all on and off-site biodiversity net gain is to be secured. As detailed in Table 1 above (Natural England reference 11), we highlight that regardless of the approach taken, all habitats accounted for in the metric and contributing toward the achievement of 10% Biodiversity Net Gain (on-site and off-site) should be legally secured, maintained and monitored for the minimum 30-year period.	<p>The delivery of BNG and the commitment to 30 year delivery has formed part of the Heads of Terms of the proposed section 106 Agreement that was submitted with the application, and is contained in the section 106 Agreement (updated at Deadline 3, REP-030, Rev 2).</p> <p>The Applicant is working on the drafting of a separate section 106 Agreement (as it will involve other LPAs) to provide for the same securing in respect of the Rivers BNG works.</p>
4.15 (38)	Natural England welcomes Requirement 8 and highlights that the principles set out in the outline lighting strategy are essential to the robustness of the Habitats Regulations Assessment. However, as detailed above in our response to BIO.1.14 in Table 2 (above), we highlight that consideration	Without the term "substantially", "in accordance with" can be construed as meaning exactly the same as. This is not appropriate for Requirement 8, or indeed any other Requirement in the draft DCO, as it is an 'outline' lighting strategy that sets the outline for the final plan to be developed based on the detailed

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	should be given to the phrase 'substantially in accordance with...' in this context.	design of the Scheme and any update in legislation or guidance. It is therefore important that the term "substantially" remains as part of this Requirement in order to build in the flexibility needed for the plan to be developed in response to the greater level of detail that will be known at a later stage.
4.16 (40)	<p>Natural England welcomes Requirement 14 and highlights that the construction environmental management plan (CEMP) is essential to the robustness of the Habitats Regulations Assessment. However, as detailed above in our response to BIO.1.14 in Table 2 (above), we highlight that consideration should be given to the phrase 'substantially in accordance with...' in this context. We also note that the requirement for additional mitigation measures will depend on the outcome of the assessment of potential impacts on internationally and nationally designated sites (Table 1 above).</p> <p>Natural England do not require to be consulted on the soil management matters in the CEMP, subject to soil handling being carried out in accordance with the measures specified in GC2 of the Register of Environmental Actions and Commitments (REAC) (AS-027).</p>	<p>Without the term "substantially", "in accordance with" can be construed as meaning exactly the same as. This is not appropriate for Requirement 14, or indeed any other Requirement in the draft DCO (REP2-007), as it is a final plan to be developed based on the detailed design of the Scheme and any update in legislation or guidance. It is therefore important that the term "substantially" remains as part of this Requirement in order to build in the flexibility needed for the plan to be developed in response to the greater level of detail that will be known at a later stage.</p> <p>The Applicant notes NE's comment regarding soil management matters in the CEMP, and has amended text in GC2 of the REAC (REP2-053, Rev05 being submitted at Deadline 3).</p>

5. NATIONAL HIGHWAYS LIMITED

Table 5.1 – National Highways Limited

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
5.1 (1.3 - 1.4)	<p>The strategic road network affected by the Authorised Development is the M62, which is a key trans-pennine transport link connecting Liverpool and Hull. National Highways is concerned with the management of the works on the strategic highway network. The responsibility for delivery of the works on the strategic highway network has not yet been agreed and is being actively discussed by the Applicant and National Highways. In the absence of agreement and to mitigate the potential safety concerns associated with the Applicant carrying out works to the highway, National Highways requires that protective provisions are secured to manage any potential interface between the Authorised Development and the highway. National Highways does not object to the principle of the development subject to the inclusion of protective provisions and resolution with the Applicant on the delivery of the works.</p> <p>It is critical to the operation of the strategic road network, the safety of the travelling public and to ensure the proper efficient use of public resources that the Authorised</p>	<p>The Applicant agrees with National Highways' proposal for protective provisions to be included within the DCO to manage any potential interface between the Authorised Development and the highway. The Applicant and National Highways are in active discussions with respect to the protective provisions currently, and the Applicant anticipates agreement being reached during the Examination, and the dDCO (REP2-007) being updated to include the agreed provisions.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	Development proceeds in consultation and agreement with National Highways and with the appropriate protections in place, as set out in this submission.	
5.2	<p>The Applicant's draft DCO submitted as part of the DCO application includes rights to construct the Authorised Development and to interfere with rights in the highway and to temporarily stop up the highway.</p> <p>The draft DCO does not include any protective provisions for the benefit of National Highways.</p> <p>Discussion with the Applicant on the form of protective provisions is ongoing and we anticipate being in a position to agree the draft prior to the close of the Examination. The latest copy of the protective provisions is included at Appendix 1. National Highways has specific requirements where works are proposed to the highway (including street furniture), these include securing:</p> <ul style="list-style-type: none"> • Bonds, cash deposits and commuted sums to ensure that National Highways is not exposed financially as a consequence of the Applicant's works; • Road space booking procedures to ensure that network occupancy requirements are managed effectively for the safety of the public and contractors; 	<p>The Applicant agrees with the current position as set out by National Highways. Both parties are actively engaging with respect to protective provisions and it is anticipated these will be agreed, and the agreed form included in the dDCO during the course of the Examination.</p> <p>Most recently the Applicant has received National Highways' amended protective provisions which include the elements set out in its Written Representation, and the Applicant is currently considering these.</p> <p>In the unlikely event agreement is not reached towards the end of the Examination, the Applicant will make submissions as to why the protective provisions it proposes are appropriate to ensure there is no serious detrimental effect to the strategic road network as a result of the Scheme.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<ul style="list-style-type: none"> • Detailed design information to appropriately consider and approve the specification of works in accordance with technical standards; • Appropriate maintenance obligations and defects liability periods; • Collateral warranties from contractors and designers in respect of works undertaken on behalf of the Applicant; • Restrictions on the commencement of works and the use of powers until detailed design specifications are agreed and safety implications have been satisfactorily addressed; • Handover of maintenance responsibilities; • Payment of all reasonable fees incurred by National Highways in respect of the Authorised Development; • Indemnities for any loss incurred by National Highways in respect of the Authorised Development; • Dispute resolution provisions. <p>While negotiations with the Applicant on protective provisions are in progress and National Highways is hopeful that agreement can be reached during the course of the</p>	

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>Examination, in the absence of an agreement that safeguards its interests, National Highways requests that the Examining Authority (ExA) recommend that the attached protective provisions are included as Part 5 of Schedule 12 to the draft DCO.</p> <p>Without these protective provisions being secured in the draft DCO, National Highways considers that the Authorised Development will have a serious detrimental impact on the operation of the strategic road network and could prevent National Highways from discharging its statutory licence obligations. Until such provisions are secured, National Highways is unable to withdraw its objection to the DCO.</p>	

6. ENVIRONMENT AGENCY

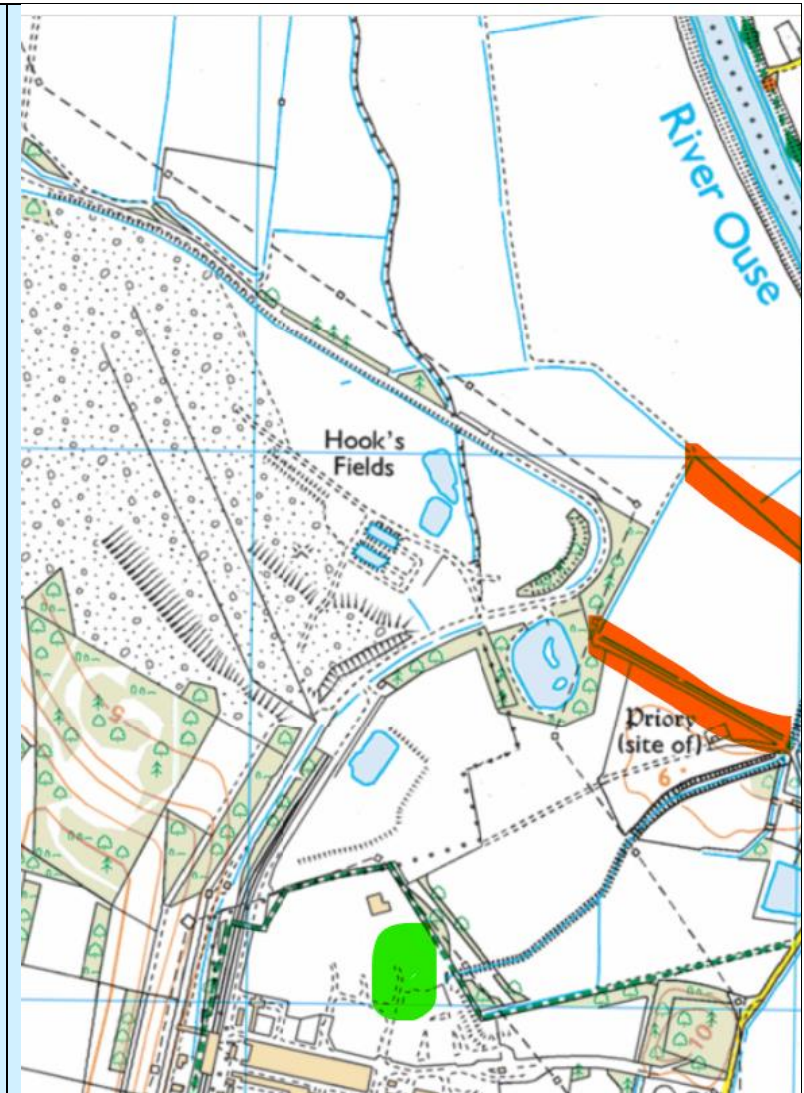
Table 6.1 – Environment Agency

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
6.1 (para 4)	<p>Biodiversity Net Gain Assessment</p> <p>We note the Applicant's response [AS-038] to our comments [RR-051] on Biodiversity Net Gain [BNG]. We welcome the Applicant's work to identify an appropriate offsite solution that satisfies BNG trading rules for rivers and including us in the ongoing discussions with Natural England on a solution for increasing the river units. Whilst the Environment Agency has no mandated role for BNG, we are well placed to help ensure biodiversity net gain embeds successfully.</p>	<p>The latest position on providing river BNG units was set out in the Applicant's Responses to Issues Raised at Deadline 1 (REP2-067) Response Ref. 2.33 and is updated below.</p> <p>The Applicant has identified an opportunity for the delivery of the required river units, through supporting habitat enhancement and restoration measures to be delivered by the Calder and Colne Rivers Trust (CCRT). The Applicant expects these measures to be more than able to deliver 10% BNG for the Rivers, Ditches and Streams component of BNG. This has been reflected in an update to the BNG Report for the Proposed Scheme, which the Applicant has submitted into the Examination at Deadline 3 (APP-196, Rev02). The Applicant is currently also in the process of drafting appropriate wording for the S106 agreement, to secure the delivery of CCRT's proposed habitat enhancement and restoration measures and their allocation to the Proposed Scheme's BNG allocation.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		Furthermore, discussions on this matter continue with both the EA and NE.
6.2 (para 5)	<p>Schedule 2 Requirements</p> <p>Additional text in Requirement 11</p> <p>We have discussed with the Applicant how to provide reassurance that there is an effective mechanism for securing a future review of flood risk should the lifetime of the development be extended beyond 25 years. We have agreed that this should be via additional text within R11. We understand that proposed revised wording for R11 will be included by the Applicant in their submission. We will then review this wording and discuss with the Applicant any changes that we may require.</p>	<p>The Applicant discussed the EA's concerns in relation to Requirement 11, the FRA and possible extended design life prior to Deadline 2, and its updates to the dDCO and FRA at Deadline 2 and has sought to proactively deal with these concerns. At the time of writing the Applicant considers it has addressed the EA's concerns within the proposed amendments, but is awaiting confirmation of this from the EA.</p>
6.3 (para 6)	<p>Register of Environmental Actions and Commitments</p> <p>WE14</p> <p>In our response to ExQ1 we have requested that the text 'Watercourse Pollution Prevention Plan including a contingency plan in case of an accident/pollution incident' is added to the list in section 1.1.4 as a document to be included in the CEMP. We would expect section WE14 of the</p>	<p>The Environment Agency's comments are noted, and the REAC has been updated to include the Watercourse Pollution Prevention Plan in the list in Section 1.1.4. Ref ID WE14 of the REAC has also been amended to include 'A contingency plan in case of an accident/pollution incident'. An updated REAC (REP-053, Rev06) has been submitted at Deadline 3.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	REAC to be amended to include in the list of details 'A contingency plan in case of an accident/pollution incident'.	
Draft Development Consent Order		
6.4 (para 7)	Appendix A – CEMP Watercourse Pollution Prevention Plan We welcome the plan in Appendix A which shows the CEMP Watercourse Pollution Prevention Plan boundary. Whilst this is in line with previous discussions, we have had with the Applicant we wish to reiterate that included in the CEMP should be justification for any water features within the 500m buffer that are not within this boundary.	The Applicant remains in discussions with the Environment Agency to agree the water features which are excluded from the Watercourse Pollution Plan Boundary. The Environment Agency require justification for the exclusion of the areas marked in yellow in the plan below:

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>In the yellow area the OS mapping shows that there are only two minor watercourses of significance, they are highlighted in red in the plan below:</p>



The Applicant considers that these watercourses do not need to be included in the watercourse prevention plan as the Carr Dyke provides a cut off from the works and will therefore prevent pollution reaching much of

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>the yellow area and the only works proposed north of the Carr Dyke are as follows:</p> <ul style="list-style-type: none"> A) The AGI terminal in the main site boundary (green mark in the above plan), any surface water runoff / accidental spills would preferentially flow into the Carr Dyke (assuming drainage / mitigation systems are bypassed – i.e. full at the time of the spill). B) BNG planting, which is envisaged to be tree whips planted by hand which are not anticipated to result in environmental impacts. <p>Furthermore, the IDB pumping station on the Carr Dyke / River Ouse confluence will pump waters into the River Ouse preventing back flow (i.e. any waters containing contaminants) up the small channels (highlighted in red in the above plan) apart from times of extreme flood. During times of extreme flood there would be significant dilution of pollutants by flood water, and measures in the CEMP (as secured in the draft DCO Requirement 14) would be implemented as detailed in the REAC (REP02-053 to be submitted at Deadline 3), in particular WE10 and WE14, which would prevent works taking place that are most likely</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>to generate pollution and would manage and mitigate a pollution event should one occur. These measures together would result in minimising the risk of pollution occurring overall.</p> <p>The Environment Agency have agreed with this on the basis that the Carr Dyke does provide a cut-off and that the measures set out in the REAC (particularly WE14 which requires a Watercourse Pollution Prevention Plan to be prepared and agreed with) ensure that no run-off that may enter Carr Dyke in case of an accident, may escape and enter the nearby drains. Further evidence will be provided to the Environment Agency as part of the submission of the Watercourse Pollution Prevention Plan, which is to show the outline flow of these watercourses and demonstrate there is no connectivity. Should conditions change, for example excessive wet weather, the Watercourse Pollution Prevention Plan will be reviewed and revised as necessary. This has been captured in the REAC (REP02-053 to be submitted at Deadline 3).</p>

7. JUST TRANSITION WAKEFIELD

Table 7.1 – Just Transition Wakefield

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
7.1 (3.3)	<p>The 3rd UK Climate Change Risk Assessment requires significantly enhanced assessments. The passage below is from UK government guidance (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#credible-maximum-scenarios) makes this clear. It is not clear that Drax's Flood Risk Assessment took all of this guidance into account.</p> <p><i>Assessing credible maximum scenarios for nationally significant infrastructure projects, new settlements or urban extensions</i></p> <p><i>Nationally significant infrastructure projects (NSIPs) are major infrastructure projects such as new harbours, roads, power stations and power lines. If you develop NSIPs you may need to assess the flood risk from a credible maximum climate change scenario. Check the relevant national policy statement.</i></p> <p><i>In other cases, such as new settlements or significant urban extensions, you may also need to assess the flood</i></p>	<p>The UK Government Guidance is published to provide guidance for all types of development with a set of parameters, it is recognised that a one size fits all approach does not work in all cases.</p> <p>The guidance is developed for new developments, not one that is part of an existing power station. As such the design life of the scheme is 25 years rather than the 100 years which the guidance document is prepared upon.</p> <p>In light of this a different approach was agreed with the Environment Agency, as evidenced in in the SoCG (REP-019). The EA in its Deadline 2 submissions, has confirmed it is content with the Applicant's approach.</p> <p>The FRA and the DCO also provide for further steps to be taken if the design life extends beyond 25 years.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p><i>risk from a high impact climate change scenario. In these circumstances you should use:</i></p> <ul style="list-style-type: none"> • <i>the H++ climate change allowances for sea level rise</i> • <i>the upper end allowance for peak river flow</i> • <i>the sensitivity test allowances for offshore wind speed and extreme wave height</i> • <i>an additional 2mm for each year on top of sea level rise allowances from 2017 for storm surge</i> <p><i>You should treat this as a 'sensitivity test'. It will help you assess how sensitive your proposal is to changes in the climate for different future scenarios. This will help to ensure your development can be adapted to large-scale climate change over its lifetime.</i></p> <p>From the above evidence, we are clear in our expectations that whether this proposal is consented or not, by 2050, Drax Power Station and its surroundings can expect to be flooded every year on average. This includes the connecting rail network. In fact, on current trends, we expect the situation by 2050 to be worse than these projections.</p>	

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
Regulation and monitoring		
7.2 (6.3.1 – 6.3.2)	<p>The SEPA report referenced above (paragraph 6.1) was clear that the scientific research data on amine solvents and their degradation products is not extensive, and neither is evidence about the health effects at differing exposure levels.</p> <p>The SEPA report also highlights that chemical measuring techniques are not adequate to monitor the likely concentrations of the amines and their degradation products. We respectfully point out that the lack of knowledge and understanding is not a proxy for lack of risk. If the applicant is successful in seeking permission to retrofit these two units, this will likely be the first large-scale CCS unit commissioned, meaning that it will not just be rural East Riding communities suffering chemical fall-out, but other communities will soon join them. Again, it seems that the precautionary principle is not being applied with sufficient rigour.</p>	<p>The regulation of carbon capture processes is subject to ongoing review by Environment Agency, and considerable progress has been made since the publication of the SEPA report in August 2015. Uncertainties in the assessment of impacts and the derivation of Environmental Assessment Levels have been widely acknowledged by the Applicant within Chapter 6 (Air Quality) (APP-042) and associated technical notes, and made allowance for in the use of a highly conservative approach to the assessment. Indeed, as noted in responses above in Response to 7.33 (6.1), UKHSA consider the approach to the assessment of amines and degradation products to be appropriately conservative, as stated in their Responses to the Examining Authority's Written Questions (REP2-097).</p> <p>The SEPA report (August 2015) does not state that chemical measuring techniques are not adequate to monitor the likely concentrations of the amines and their degradation products. For example, in the final paragraph on page 62 of the document, SEPA state that <i>"To summarise, measurement of nitrosamines in the ambient air at the levels expected around CCS processes</i></p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p><i>(sub ng/m3) appears possible but difficult (considering issues such as humidity and breakthrough) at the present time"</i> (The Applicant further notes that the concentration of nitrosamines in ambient air is significantly lower than the concentration of the amines and the concentration of the amines and nitrosamines in the exhaust gases, and that the techniques reviewed by SEPA are deemed suitable for the measuring the concentration of these pollutants in ambient air). Further work is being undertaken by Environment Agency (as the SEPA paper goes on to recognise was needed) as they progress their approach to the regulation of large scale carbon capture processes including the formal specification of monitoring techniques.</p>

8. LEEDS TRADES UNION COUNCIL

Table 8.1 – Leeds Trades Union Council

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
A) Predictions of jobs numbers		
8.1 (A2)	Leeds Trades Union Council raised concerns around the forecast of jobs at Drax.	<p>The response from Leeds Trades Union Council (Leeds TUC) refers to figures from a 2020 report by Vivid Economics, published on the Drax website. This particular report is not referred to, or appended within the Population, Human Health, and Socio-economics chapter (Chapter 16 of the ES) (APP-052) or the Needs and Benefits Statement (APP-033) and should not be considered as part of the Application. The Vivid Economics report (Capturing Carbon at Drax: Delivering Jobs, Clean growth and Levelling up the Humber, 2021) that is appended to the Needs and Benefits Statement (Appendix C, APP-033) is different to the report referred to by Leeds TUC and provides analysis of employment generation. This Vivid Economics Report (2021) has not been referred to by Leeds TUC in their response.</p> <p>The Population, Health, and Socio-economics chapter (Chapter 16 of the ES) (APP-052) and Needs and Benefits Statement (APP-033) report the gross direct</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>average construction employment per annum, based on the analysis of direct economic impact of the Proposed Scheme in the Vivid Economics report (Appendix C, APP-033). The estimate of construction employment generation outlined is based on an annual average projection of 4,000 gross direct jobs during construction of the Proposed Scheme. It is clearly noted in the Population, Health, and Socio-economics chapter (APP-052) that “the number of construction employees on-site at any one time would be considerably lower”.</p> <p>The figures referred to in the Leeds TUC response should not be ‘taken together’ (as stated in their response) or compared. They refer to a Vivid Economics report which is not part of the Application, and also compare peak and average figures, which are not comparable.</p> <p>We refer Leeds TUC to Table 13.1 – ‘Job Creation and Economic Benefits’ of the Applicant’s Response to Relevant Representations and Additional Submissions document (PDA-002), the Needs and Benefits Statement (APP-033), and Population, Health, and Socio-economics chapter (Chapter 16 of the ES) (APP-052) which outline a projected annual average of 4,000 gross direct jobs during construction.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>The estimate of operational employment generation (resulting in a projected 375 gross direct jobs) has been made applying assumptions based on a worst case, in line with best practice guidance on economic impact assessment. This is accepted best practice for calculating employment projections, and the relevant factors and assumptions applied in the Vivid Economics report (Appendix C, APP-033) are outlined clearly.</p> <p>It is anticipated that an average of 4,000 gross direct construction employees (4,500 total net construction employees) would be employed per annum as a result of the Proposed Scheme. Of the 4,500 total net construction employees, there would be 3,000 total net direct employees (i.e. construction workers) and 1,500 total net indirect⁴ and induced⁵ employees.</p> <p>However, it should be noted that the number of construction employees on-site at any one time would be considerably lower. The total peak construction workforce on-site is projected to be 1,000 construction workers; this figure represents the capacity in the peak month of</p>

⁴ Employment growth that would arise locally through manufacturing services and suppliers to the construction process.

⁵ Employment opportunities that would arise due to part of the construction workers and suppliers income being spent in the region.

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>construction during the overall construction programme (Chapter 5 (Traffic and Transport) (APP-041)).</p> <p>The construction, operation and decommissioning of the Proposed Scheme would generate direct, indirect and induced jobs.</p> <p>There is an existing pool of manufacturing and construction workers within Selby District Council. These workers would be well suited to work on the construction and decommissioning of the Proposed Scheme. There is the opportunity for these workers to access construction positions, and possibly undertake further training on the job or through up-skilling to access specialist construction positions.</p>
8.2	Leeds Trades Union Council raised concerns around local jobs.	Requirement 21 of the draft DCO (REP2-007) secures the approval and implementation of a Local Employment Plan. At deadline 3 the Applicant has submitted a draft of the Outline Local Employment Plan ("OLEP"). The OLEP provides that the Local Employment Plan will "set out the details and mechanism for securing the use of local labour contractors, goods and services during the construction period and operational period of the authorised development". The Applicant considers that this is a robust and legally secure means of delivering

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>local employment opportunities as part of the Proposed Scheme. The Leeds TUC WR has drawn attention to aspects of the OLEP which exclude certain contracts and has criticised the Applicant's commitments in the OLEP. Given the nature of the Proposed Scheme, certain contracts are not able to be subject to the commitments in the OLEP and this is not unusual in the Applicant's experience. Further, whilst the Applicant can make commitments as to how it will promote and make opportunities available under the OLEP, the Applicant cannot be required to award any contract pursuant to the terms of the OLEP. That position is also a very standard approach. Given the current stage of the application, it is not possible to secure a further commitment to guarantee local employment benefits.</p> <p>By promoting the use of local suppliers and contractors (through activities such as supplier and skills engagement programmes currently ongoing), the Applicant will ensure that local people and businesses have the ability to benefit from direct, indirect, and induced employment associated with the Proposed Scheme during the construction phase.</p> <p>The Applicant has set itself a challenging ambition of sourcing 80% of construction materials domestically and</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>has engaged suppliers nationally through a series of supplier events held in 2022 in an effort to realise this aim.</p> <p>The Applicant is working with its appointed contractor to explore opportunities for local people to access construction jobs and associated training opportunities. These could include providing opportunities for new trainees in the construction industry and equipping them with a skilled trade, as well as working in partnership with key local stakeholders (such as Jobcentre Plus, local colleges, business alliances and skills improvement programmes) and up-skilling existing construction workers.</p> <p>Overall, the construction and operation of the Proposed Scheme will offer the opportunity to create high quality jobs in a range of fields, including manual jobs and technical jobs requiring a range of qualifications. There are likely to be opportunities for upskilling and further training which could lead to the retention of residents with a variety of qualifications in the local area and wider region.</p>
8.3 (A4 and A5)	Leeds Trades Union Council raised concerns around the vagueness of jobs protections, failure to consider	The estimate of operational employment generation (resulting in a projected 375 gross direct jobs) refers to a combination of retained and new jobs needed to serve the

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	comparison scenarios and the climate jobs we really need.	<p>Proposed Scheme (i.e. BECCS at Drax), as outlined in the Needs and Benefits Statement (APP-032). The proportions of retained vs new roles is not possible to determine at this stage of the application, until the functioning requirements of the Proposed Scheme are established once it is operational.</p> <p>The local and regional benefits that the Proposed Scheme will help to deliver are set out in Table 13.1 – ‘Job Creation and Economic Benefits’ of the Applicant’s Response to Relevant Representations and Additional Submissions document (PDA-002). The Applicant is of the view that the Proposed Scheme will self-evidently have economic benefits through the construction phase and will provide employment opportunities in the longer term.</p> <p>No assessment has been undertaken to determine whether ‘thousands of jobs’ could be created in other ways, as Leeds TUC asserts. This is neither relevant, nor a requirement for the application.</p>

9. BIOFUELWATCH

Table 9.1 - Biofuelwatch

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
Flood Risk and Water Environment		
<p>9.1 (Paragraph 387)</p>	<p>Biofuelwatch raised concerns in relation to the management of surface water run-off and drainage systems.</p>	<p>A temporary / construction phase drainage system will be implemented (REAC [WE8] (REP2-053, to be updated at deadline 3)) this will prevent an increase in contaminants (particularly silt and gravel) being discharged to the Carr Dyke and River Ouse.</p> <p>The Applicant has committed (REAC [WE14] (REP2-053 to be updated at deadline 3)) to producing a Watercourse Pollution Prevention Plan which will demonstrate which drains are hydraulically connected to each other and the river system prior to the commencement of construction works. This, and the responses provided by the Applicant (Ref. 4.3), in the Applicant's Responses to Relevant Representations (PDA-002) have resolved the Environment Agency's query on the scoping out of the drains listed in 2.1.3 of RR-051.</p> <p>The proposed / additional waste water treatment works form part of the process equipment and as such have a steady load to treat, the system itself will have sufficient</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		capacity / bunded areas to manage any emergency flows associated with the carbon capture plant.
9.2 (Paragraph 390)	Biofuelwatch raised concerns in relation to amine emissions to water.	The process wastewater treatment plant (which is the water treatment plant referred to in the draft DCO) will remove the amines from the water stream for containment and treatment offsite, therefore, there will be no potential for discharge of water containing amines to the water environment.
9.3 (Paragraph 392)	Biofuelwatch raised concerns in relation to drought.	Drax operates within both an Environmental Permit and also an abstraction licence which are both regulated by the Environment Agency, to ensure that there are no adverse impacts on the environment. The abstraction licence limits the volumetric abstraction of water from the relevant waterbody and the Proposed Scheme will not exceed the permitted volumes which can be abstracted (i.e. that there will be no change to the abstraction licence as a result of the Proposed Scheme), and so the Proposed Scheme does not affect the baseline position in relation to drought. In any event, it is also worth recognising that the River Ouse is tidal at the point of abstraction and hence a drought affecting the river would be extremely unlikely.

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
Accidents and Natural Disasters		
9.4 (Paragraphs 394 to 397)	Biofuelwatch raised concerns in relation to accidental leaks, containment of spills, chemical checks and leakage detection systems.	<p>The Proposed Surface Water Drainage Strategy will be designed to ensure that accidental leaks / spills are contained onsite and are not discharged into the water environment. The minimum requirements are detailed in Section 6.4 of the Surface Water Drainage Strategy (REP2-043) and paragraphs 12.10.3 to 12.10.12 of ES Chapter 12: Water Environment (APP-048) and as detailed within WE1 to WE5 of the REAC (REP2-053 to be updated at Deadline 3). The mitigation measures within the REAC are secured within the draft Development Consent by Requirement 14. It should also be noted that the Environment Agency may require additional measures to be implemented as part of the Environment Permit which will be required to operate the Proposed Scheme and which is being determined outside of the DCO process.</p> <p>The Applicant operates an Environmental Management System (EMS) which is regularly audited and is certified to ISO14001 and this is also a requirement of the Environmental Permit. The EMS specifically deals with issues associated with accidents and emergencies and the relevant protocols which are required. In terms of the</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>proposed scheme and specific to the amine storage systems, secondary containment systems will be in place and appropriately sized to contain any spillages. Storage areas will be designed with sumps which have level detection systems and the surface water drainage system will be capable of being controlled and isolated at various locations within the plant. The firewater systems will also be designed appropriately to contain any firewater generated. Ultimately firewater can be contained onsite through shutting off the purge pump (the pump which pumps water from Drax Power Station Site to the River Ouse). Infrastructure including secondary containment systems, pipework and delivery areas are regularly inspected to check for any issues of concern.</p> <p>Referring to the use and storage of amines; the pipework metallurgy has been specifically selected to deal with the relevant solvents/chemicals as has the gasket material whilst also the number of pipework joints minimised to reduce potential leak points along the system. Pipework will be run over containment areas where sumps will hold any leak whilst also the fitment of a conductivity meter will be installed in each area sump to confirm if a solvent or chemical leak has occurred.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
9.5 (Paragraphs 399 to 401)	Biofuelwatch raised concerns in relation to fire risk and risks from increased temperatures and weather events.	Drax Power Station operates as a lower tier COMAH site and hence is required to comply with specific requirements associated with the COMAH Regulations, 2015. As a lower tier site, Drax Power Station operates a Major Accidents Prevention Policy (MAPP) which is regularly reviewed and audited by the HSE. The Applicant has operated as a COMAH site for a number of years and is both a competent and responsible operator. The risks associated with the various substances onsite are carefully assessed and controlled and management systems designed to deal with any incidents to prevent their escalation. Drax Power Station has a fire crew on standby based at the power station site and hence are available and capable of dealing with various incidents and emergencies. Fundamentally, Drax Power Station deals with highly flammable and combustible materials and hence plans are in place to deal with fires in the unlikely event that they occur. It should be noted that the Applicant has been operating for over 40 years and hence has significant experience of handling and managing these types of materials. The risk of these events has been considered 'low' due to the existing regulatory mechanisms that are in place, including the Fire Protection and Detection standards

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>which are included in Appendix 14.2 (Fire Standards) (APP-167). Measure Ref ID D2 in the REAC (REP2-053, to be updated at Deadline 3) which is secured by Requirement 6 in the draft Development Consent Order (REP2-007) includes provision for the extension of the current firewater system. This includes the installation of an additional firewater tank for the BECCS process area.</p> <p>With regard to climate events, the Proposed Scheme will be constructed using materials that comply with current UK Building Regulations and BE EN codes. Where no BS EN code exists, the Eurocodes and ISO standards will be adopted.</p>
<p>9.6 (Paragraph 404)</p>	<p>Biofuelwatch raised concerns in relation to the reasonable worst case scenario.</p>	<p>The use of 'reasonable' or 'realistic' worst-case is EIA standard practice. The basis of this approach is the Rochdale Envelope, which is discussed in Section 4.7 of Chapter 4 (EIA Methodology) (APP-040) and detailed within the Planning Inspectorate Advice Note 9⁶: Rochdale Envelope. As detailed in Advice Note 9, the 'Rochdale Envelope' is a parameter-based approach which is used when design details of the project have not</p>

⁶ <https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-nine-rochdale-envelope/>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>been confirmed at the time of submission. This allows for a project to be assessed on the basis of project design parameters that are not finalised at the time of writing, but that are indicated with a range of potential values. The design parameters on which the assessments presented in ES Chapters 5 to 18 (APP-041 – APP-054) are based are detailed in ES Chapter 2 (Site and Project Description) (APP-038) and secured within Schedule 14 of the Draft DCO (REP2-007). These design parameters present the maximum envelope within which the Proposed Scheme would be built, and an assessment of these parameters ensures that a “reasonable” or “realistic” worst-case is assessed. This ensures that the environmental effects associated with the Proposed Scheme would be no worse than those reported within the Environmental Statement.</p>
Air Quality and Emissions		
9.7 (33 – 37)	<i>Biofuelwatch raised concerns about Incorrect Figures</i>	<p>There are no incorrect figures in the tables identified by Biofuelwatch as being of concern.</p> <p>Tables 1.3 and 1.15 of Appendix 6.4 (REP2-032) show the 99.79th percentile of hourly mean impacts under the mid-merit and full load (“worst case”) operating scenarios</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>respectively. The 99.79th percentile of hourly mean impacts is the 18th highest possible hourly impact over a calendar year. Over a year, meteorological conditions vary and the rate of dispersion of the power plant plume will vary accordingly. The maximum hourly impacts occur when the operation of the power plant coincides with the specific meteorological conditions giving rise to the maximum ground level impacts.</p> <p>The fact that the numbers in Tables in 1.3 and 1.15 are the same merely indicates that, unsurprisingly, the 18 highest possible hourly impacts occur when 4 biomass units are operating, whether non-CCS (baseline) or part-CCS (with Proposed Scheme). The difference between the mid-merit and full load scenarios for the hourly impacts is merely that the probability of the worst case impacts occurring in reality is higher with full load operation. That is to say, with theoretical full load operation, the operation of 4 units will (and must) coincide with the meteorological conditions giving rise to the maximum impacts on the ground, whereas, in the mid merit scenario, since 4 units are only operating for 4000 hours (with the remainder having just 2 units operating) it is possible that the 4 unit operation does not coincide</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>with these meteorological conditions and actual worst case impacts will be lower.</p> <p>This probability of impact is not reflected in the tables since, to ensure a conservative assessment, it is always assumed that the worst case impacts could occur.</p> <p>Other tables in Appendix 6.4 (REP2-032) where Biofuelwatch identify identical numbers e.g. Table 1.9 and 1.21 for Amine concentrations, also relate to short term impacts where the same principles apply. It should also be noted that even with 'full load operations' – it is assumed that there may be short periods of operation of 2 BECCS units alone, and hence, again to ensure a conservative assessment, we take the maximum short term impacts from either the runs with 2 CCS units alone, or 2 CCS and 2 non-CCS units.</p> <p>For the annual mean metrics (including Aldehydes), it is assumed in the full load (worst case emissions) scenario that the plant operates for 8760 hours with 2 CCS and 2 non-CCS units operating. As discussed in 5.28 in the Applicant's Responses to Relevant Representations and Additional Submissions (PDA-002) this results in lower impacts than the mid merit scenario because there is a) less difference in plume buoyancy between baseline and</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		with Proposed Scheme and b) no difference in electricity generation in the full load case.
9.8 (57 – 58)	<i>Biofuelwatch raised concerns about the Limited Modelled Area</i>	<p>The modelled study area extends a minimum of 15km from the stack in all directions, and covers an area 30km x 30km centred on the main stack at Drax. The use of a study area that extends 15km from the stack at Drax is well established and consistent with Environment Agency guidance “Air emissions risk assessment for your environmental permit” which can be found at: https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit</p> <p>Whilst the maximum impacts for annual mean nitrosamines occur at the edge of the study area, additional dispersion processes come into play beyond 10-15km from the stack that will reduce the modelled concentrations, primarily related to variations in meteorological conditions over space and time. Moreover, photolytic degradation of the nitrosamines has not been taken into account in the amine chemistry modelling, which will lead to overestimation of pollutant concentrations at distance from the stack.</p> <p>Together these effects would act to reduce concentrations beyond the study area and, it is therefore</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		concluded that study area is sufficient to capture the maximum likely impacts of the Proposed Scheme
9.9 (59 – 74)	<i>Biofuelwatch raised concerns about Cumulative Impacts</i>	<p>Biofuelwatch raise a number of concerns around the modelling of cumulative impacts, although there are three key themes:-</p> <p>Theme 1: Insufficient evidence provided that estimated cumulative impacts are conservative</p> <p>Biofuelwatch state that insufficient evidence has been provided that summing the maximum impacts from Drax to the maximum impacts from Keadby 3 and assuming that these impacts are coincident in space is a conservative approach, suggesting that the increased air pollutants (NO_x and O₃) from multiple sources might increase the reaction rates.</p> <p>The Applicant responds as follows:</p> <p>It is implausible that this is a significant effect at the point of maximum impact.</p> <p><i>Firstly</i>, the contribution of Drax and Keadby to total NO_x concentrations is significantly lower than the background contribution to these pollutants, whether taken alone or cumulatively. <i>Secondly</i>, there remains a significant excess of these pollutants in the air, implying that adding</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>a minor contribution from another source will not significantly affect reaction rates. <i>Thirdly</i>, to ensure a conservative assessment, the amine module was run using background NO_x and NO₂ concentrations from Hull Freetown AURN station which are markedly higher than concentrations in more rural areas where the impacts from Drax are a maximum. Testing undertaken by the Applicant at the outset of the project to evaluate the sensitivities of the ADMS Amine Chemistry Module showed that the formation of nitrosamines was higher with the Hull Freetown background concentrations (NO_x annual mean ~38µg/m³ in 2016) than alternative rural sites such as at Ladybower in Derbyshire (NO_x annual mean ~9µg/m³ in 2016). As such, it can be robustly concluded that the addition of maximum to maximum impacts is indeed conservative.</p> <p>Theme 2: No assessment of short term cumulative impacts</p> <p>As stated in the assessment, no impact of short term cumulative impacts has been undertaken since there is a low likelihood of peak operating conditions for all plants considered in the cumulative assessment coinciding. Moreover, for short term impacts from multiple plants to coincide, meteorological conditions in a particular hour</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>must be such that the plumes must both coincide in space. This is an impossibility for 3 stations unless aligned in a row, and possible for only a very narrow range of wind directions for 2 stations such as Drax and Keadby, and then furthermore, the location of maximum ground level impact as a function of distance from the stacks would also need to coincide. Given the distance between Keadby and Drax and the difference in stack heights, the chances of this occurring are vanishingly small. As such, it is unrealistic and unnecessary to undertake a cumulative assessment of short term impacts.</p> <p>Theme 3: Emissions from other processes should be included in the cumulative assessment including from biomass combustion, other pollutants, naturally occurring amines and nitrosamines, amine breakdown chemistry, emissions from domestic wood burning and emissions from other consented plants.</p> <p>In relation to emissions of amines from biomass combustion, firstly it must be acknowledged that the DCO is not concerned with the combustion of biomass as an issue, rather the application is for the installation of carbon capture. Secondly, whilst theoretically possible, it</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>is necessary to make a distinction between a risk of formation and the likely exposure to any emissions. Amine emissions from controlled biomass burning, as opposed to natural / open burning of biomass, are not considered amongst the key environmental impacts from biomass burning, as set out, for example within the Best Available Technology Reference Document for Large Combustion Plants [Thierry Lecomte, José Félix Ferrería de la Fuente, Frederik Neuwahl, Michele Canova, Antoine Pinasseau, Ivan Jankov, Thomas Brinkmann, Serge Roudier, Luis Delgado Sancho; Best Available Techniques (BAT) Reference (BRef) Document for Large Combustion Plants; EUR 28836 EN; doi:10.2760/949]. Amines are mentioned within the BRef document, but only in the context of carbon capture. Drax's current permit to operate makes no reference to any requirement to either control or monitor emissions of amines. Amines are not new to science but have received increased attention recently due to the potential emissions from carbon capture plants. Therefore, it is logical to conclude that the impacts of amines from the biomass combustion are not of environmental concern and any change to the impacts associated with the Proposed Scheme will be</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>correspondingly smaller still. They do not, therefore, warrant inclusion in the assessment of impacts.</p> <p>Of the remaining sources suggested for inclusion, those such as domestic wood burning etc are not affected by Proposed Scheme and therefore do not require inclusion in the assessment.</p> <p>Amine chemistry has been included on a source by source basis, with the response to Theme 1 above dealing with the cumulative pollutant issue.</p> <p>It is acknowledged within Chapter 6 (Air Quality) (APP-042) that background concentrations for amine and degradation products are unavailable for the study area. However, the impacts have been interpreted accordingly, with, following Environment Agency screening guidance Environment Agency screening guidance (https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit), impacts from amines being screened as negligible irrespective of the background concentration and the impacts from nitrosamines have been interpreted in the context of negligible additional cancer risk.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>Overall, therefore, it is concluded that the assessment of cumulative impacts is appropriate and robust.</p> <p>In paragraph 67, Biofuelwatch reference the SEPA report (Review of amine emissions from Carbon Capture Systems, version 2.01, 2015) as stating that aldehydes are an amine degradation product. Reference is made within the report to aldehydes in the emissions from carbon capture plants rather than as degradation products in ambient air. It is, therefore, entirely appropriate to consider primary emissions of aldehydes only in the Applicant's air quality impact assessment.</p> <p>See previous response (to Biofuelwatch paragraphs 7 – 58) above in relation to comments on the study area extent.</p> <p>In paragraph 70, Biofuelwatch refer to theoretical studies on building carbon capture plants within the same airshed. These are theoretical studies that do not reflect the specific impacts of Drax and the dispersion of pollutants from a main stack that is 259m tall. They are not relevant considerations for this application.</p>
9.10 (75 – 84)	<i>Biofuelwatch raised concerns about Modelling Prediction Uncertainties</i>	Biofuelwatch suggest that the Applicant's assessment of uncertainty is inadequate. This is predicated on a

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>fundamental misunderstanding of the modelling undertaken and a failure to acknowledge the full extent of the study.</p> <p>It is suggested that sensitivity testing is limited to an alternative operating scenario and testing of the amine reaction coefficients. This neglects the sensitivity testing of the meteorological parameters i.e. the model is run for 5 years of meteorological data, and the impacts are assessed against the worst of those years and moreover assessed at the point of maximum impact irrespective of the presence of receptors at that location.</p> <p>It is also suggested that no modelling has been undertaken with only the BECCS units operational. This is incorrect, the modelling for the mid merit operational scenario explicitly includes partial operations when only the BECCS units are operating. The Applicant has assessed an operating scenario, the mid-merit scenario, that reflects a worst likely operating scenario whilst retaining a degree of conservatism. An assumption that the non-BECCS units do not operate at all in the future is unrealistic and irrelevant and would require a wholesale change in government policy. The primary driver for impacts on amines, nitrosamines and aldehydes is the mass emission rate. By assuming that the BECCS units</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		operate continuously, this mass emission is maximised and the scenarios retain a degree of conservatism. It is wholly incorrect to assert that the impacts on nitrosamine concentrations may be significantly higher than predicted.
9.11 (85 – 106)	<i>Biofuelwatch raised concerns about ADMLC and AD Modelling System Uncertainties</i>	<p>The ADMS suite of models is the most widely used dispersion model in the UK. As identified by Biofuelwatch, it has been validated against available datasets. Whilst the dispersion of pollutants in the atmosphere is extremely complex, the environment at Drax is well represented in the model i.e. there is only a single source – the main stack, on flat terrain without coastal effects and, given the difference in height, only minor influence from buildings (the cooling towers). As such, the idealised wind tunnel and field studies used for model validation are directly applicable to the Applicant's modelling.</p> <p>The modelling was undertaken using v5.2.4. The software version naming convention is such that where a model is named X.Y.Z, major changes to the software warrant an update to the number X, minor changes update number Y and number Z updates are minor patches. The model validation studies undertaken for</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>ADMS version 5 will be applicable to all versions starting with number 5.</p> <p>Later, at paragraph 158, Biofuelwatch state that the dispersion model developer (CERC) has not undertaken any validation of the amine chemistry module within the dispersion model. Taking into account the low concentrations of the degradation products and potentially confounding impacts from other sources of nitrosamines, it is, in practical terms, impossible to validate the chemistry module in field trials. However, the model developer has undertaken extensive testing of the module using the data and conclusions of the Atmospheric Degradation of Amines (ADA) project (Nielson <i>et al</i>, Atmospheric Degradation of Amines. Summary Report: Photooxidation of Methylamine, Dimethylamine and Trimethylamine. Climit project no. 201604. Norwegian Institute for Air Research. January, 2011). The aims of the ADA project were, <i>inter alia</i>, to verify/update/develop atmospheric photo-oxidation schemes for amines to account for all products formed under natural conditions, and to develop gas phase chemistry models for implementation in dispersion models. Photo-oxidation experiments were undertaken in chambers in Innsbruck,</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>Oslo and Valencia and used in the ADA Project verification process. The compound specific reaction rates used in the Drax application of the CERC amine chemistry module were provided by the technology supplier.</p> <p>Biofuelwatch quote research showing that variations in the treatment of calm conditions can lead to significant differences in predictions between models. Whilst the Applicant has not reviewed this research in detail, it notes that in the meteorological data used for the air quality assessment, calm conditions account for less than 0.7% of hours in the year and these differences are, therefore, insignificant within the context of the assessment of the Proposed Scheme.</p> <p>As has been stated within the air quality assessment, the Applicant's treatment of uncertainty in the modelling has been:</p> <ul style="list-style-type: none"> • to use a well validated dispersion model (ADMS); • to ensure that model inputs parameters are set at their worst case e.g. emission rates, where there is potential variability; • to undertake sensitivity testing including for meteorological conditions; and

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<ul style="list-style-type: none"> to assess the Proposed Scheme against the maximum modelled concentrations over all model scenarios. <p>Finally Biofuelwatch note that the EfW at Kirk Sandall has been modelled without buildings. This is correct but this has no significant impact on the conclusions of the assessment. The primary impact of buildings on dispersion is to rapidly mix pollutants from lofted plumes down to ground level due to enhanced turbulence in the wake of the building. However, once a plume has become well mixed with the atmospheric boundary layer, as happens with distance downwind from a source, the impact of any enhanced mixing near the source is much reduced. Kirk Sandall EfW lies 20km south-south-west of the Drax power station and where there is potential for cumulative impacts between the Proposed Scheme and Kirk Sandall, the influence of near source building effects will, therefore, be negligible.</p>
9.12 (107 – 115)	<i>Biofuelwatch raised concerns about Technology Uncertainties</i>	The dispersion modelling has assumed that the plumes from the various flues within the main stack at Drax merge and can be assumed to behave as a single plume. Widely available images of the plumes at Drax show the gases from individual flues merging rapidly on exit from the stack. The representation of the emissions as a

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>single release is a pragmatic representation of the readily observable phenomenon.</p> <p>In relation to the sulphur dioxide concentrations within the BECCS and non-BECCS units, the proposed mitigated concentrations will be adopted and secured via the permitting process. Further, in contrast to the suggestion in para 115 of Biofuelwatch's representation, it should be reiterated that it is proposed that sulphur emissions are reduced not increased in the future. The flue gas cooler system also known as the quench column uses a water fed spray system to cool the flue gas down. The water used in the quench column can be adjusted for pH to augment the removal of the SO₂ in the flue gas to meet the proposed reduction in emissions.</p> <p>Furthermore, it is emphasised that the carbon capture technology has been optimised for the Drax exhaust specifications and the modelled emission limits for nitrosamines and amines take account of the performance of the unit under Drax-specific conditions. As such, there will not be the 'unacceptable consequences' including higher levels of toxic nitrosamines identified by Biofuelwatch.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
9.13 (116 – 118)	<i>Biofuelwatch raised concerns about Measurement Uncertainties</i>	<p>The regulation of the Drax power plant is a matter for the Environment Agency and the permitting regime, and not a matter for consideration within the DCO. Drax will require a permit to operate and will be required to meet the conditions of that permit.</p> <p>The example quoted by Biofuelwatch of a lack of regulatory action being taken with emissions of up to 169% of the limit is entirely hypothetical. Both continuous and periodic emissions monitoring are managed by a regulated well understood quality controlled system underpinned by regulation determined through the environmental permit variation. All standards and instruments for the monitoring of emissions have to conform with the required regulations and associated international, British and or European standards, including regular calibration.</p> <p>Furthermore, it is unnecessary and unrealistic to model the impacts of the plant at levels that would invoke regulatory intervention since by definition these emissions would be promptly rectified via the permitting process.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
9.14 (119 – 123)	<i>Biofuelwatch raised concerns about assumed emission rates and parameters</i>	<p>Emissions from the Keadby plant and the Proposed Scheme should not be compared since different technology providers are used in each case. The specific amine emissions limit values proposed for Drax, which are lower than those proposed for Keadby, will be secured via the permitting process.</p> <p>The exhaust conditions, including temperature and flow, reflect the expected conditions based on the actual biomass combustion flue gas conditions and changes to the gas stream for capture units the associated with the operation of the technology. Emission monitoring including peripherals such as velocity and flow are regulated under the permit.</p>
9.15 (124 – 139)	<i>Biofuelwatch raised concerns about EALs</i>	<p>Biofuelwatch suggest that the Environment Agency derived EALs are inadequate for nitrosamines. The Environment Agency state in their response to WQs at Deadline 2 (REP2-077) that their approach to the development of EALs has been subject to public consultation and is based on expert-led review of the scientific evidence on mammalian and human toxicity for individual chemicals and considers recommendations made by UKHSA. Furthermore, UKHSA in response to WQ AQ1.11 (see REP2-097) stated that it is satisfied that</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>the applicant's risk assessment for amine emissions from the proposed post-combustion carbon capture plant is appropriately conservative.</p> <p>The Applicant has shared details of the Technology Supplier's derivation of process-specific EALs with Environment Agency for review. The methodology follows the Environment Agency's methodology and has made the EALs more stringent for amines. The revised EALs have been applied conservatively.</p> <p>Biofuelwatch (para 137) identified a missing Table reference in Air Quality Technical Note 1 (AS-019). The identified statement should read:</p> <p><i>Table 2 shows the original (June 2022 ES) and revised EALs and how they were applied in the ES and permit application where 'Table 2' in this sentence refers to Table 2 of the Air Quality Technical Note 1.</i></p>
9.16 (140 – 179)	<i>Biofuelwatch raised concerns about nitrosamine uncertainties</i>	Detailed information on the proprietary amine solvents and their degradation products have been shared with the Environment Agency. The carbon capture plant has been designed to align with the Drax emissions profile.

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>Biofuelwatch make reference to statements about the application of the ADMS chemistry module to MEA. As stated in the air quality assessment, the assessment of impacts is based on the technology specific compounds and not MEA. These comments are not, therefore, relevant. Nitrosamines and nitramines are formed, at compound specific reaction rates, from both the primary and secondary amines emissions.</p> <p>The Applicant confirms that the ozone concentrations used in the ADMS chemistry module have been taken from hourly sequential data from the Hull Freetown AURN station and have been applied on a year specific basis i.e., hourly mean background concentrations for 2016 to 2020 have been applied to model runs using meteorological data from 2016 to 2020. Moreover, initial sensitivity testing showed that using data for Hull Freetown gave greater nitrosamine and nitramines formation than using data for Ladybower – a more rural site.</p> <p>It is reiterated that the Applicant acknowledges the uncertainties inherent in all air quality assessments and has undertaken a highly conservative assessment to ensure that this does not lead to underestimation of potential impacts. UKHSA in response to WQ AQ1.11</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>(REP2-097) stated that it is satisfied that the applicant's risk assessment for amine emissions from the proposed post-combustion carbon capture plant is appropriately conservative.</p> <p>Concerns relating to the validation of the amine chemistry module in the dispersion model, raised in paragraphs 158 - 162 are addressed in response 9.11 above.</p>
9.17 (180 – 187)	<i>Biofuelwatch raised concerns about the regulation of the process</i>	<p>As noted by Biofuelwatch, the regulation of the process is a matter for the permitting regime not the DCO application.</p> <p>On the matter of concerns over uncertainty, it is reiterated that UKHSA in response to WQ AQ1.11 (REP2-097) stated that it is satisfied that the applicant's risk assessment for amine emissions from the proposed post-combustion carbon capture plant is appropriately conservative.</p>
9.18 (188 – 190)	<i>Biofuelwatch raised concerns about the lack of environmental monitoring</i>	<p>Biofuelwatch request that "environment concentrations ... are determined prior to the planning and permitting assessment being made because without such concentrations it is impossible to determine cumulative impacts" (para 180).</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>The Environment Agency will determine the permit in line with the modelling that has been carried out. The Applicant has responded to the concerns in relation to cumulative impacts above.</p> <p>Notwithstanding this, it is, noted that under Environment Agency screening criteria (https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit) it is possible to screen impacts as insignificant without reference to environmental concentrations.</p>
<p>9.19 (191 – 195)</p>	<p><i>Biofuelwatch raised concerns about Dioxin Emissions</i></p>	<p>In the first instance, it is reiterated that the DCO application relates to the installation of a carbon capture plant and not to the use of biomass as a fuel. The Applicant has a permit to operate biomass units and this permit does not require continuous monitoring of Dioxin emissions and this has never been raised as a concern by Environment Agency.</p> <p>Notwithstanding this, the reference identified by Biofuelwatch (Zhang et al, Emission characteristics of polychlorinated dibenzo-p-dioxins and dibenzofurans from industrial combustion of biomass fuels, 2022.)</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		relates to the combustion of biomass in industrial boilers used for heat production in China. It is not relevant to the combustion of biomass in large combustion plant subject to regulation under the Industrial Emissions Directive, including stringent controls on emissions of particulate matter.
9.20 (196 – 199)	<i>Biofuelwatch raised concerns relating to fugitive emissions</i>	<p>Fugitive emissions and the management thereof within and from the installation is a fundamental concern associated with the Environmental Permit; BAT guidance provides the following direction which the regulator will require compliance with:</p> <p>3.5 Unplanned emissions to the environment</p> <p><i>You should propose a leak detection and repair programme that is appropriate to the solvent composition. This should use industry best practice to manage releases, including from joints, flanges, seals and glands.</i></p> <p><i>Your hazard assessment and mitigation for the plant must consider the risks of accidental releases to environment. This should also consider the actual composition of the fluids, gases and vapours that could</i></p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<i>be released from the plant after an extended period of operation. (Not only fresh solvent as initially charged.)</i>
9.21 (200 – 204)	<i>Biofuelwatch raised concerns relating UKHSA position</i>	<p>Biofuelwatch state (para 204) “As well as their decision not to comment on the public health emissions to air and water and the assessment of the risks of these emissions (including the use of unvalidated modelling prediction software for air emissions), the UKHSA is also providing no guidance on the proposal to use unproven BECCS technology...”</p> <p>The Applicant reiterates that UKHSA in response to WQ AQ1.11 (REP2-097) stated that it is satisfied that the applicant’s risk assessment for amine emissions from the proposed post-combustion carbon capture plant is appropriately conservative.</p>
9.22 (205 – 211)	<i>Biofuelwatch reiterate their concerns relating to the air quality impacts of the powerplant and the potential to monitor impacts in the future</i>	<p>Biofuelwatch identify that EN-1 requires necessary measures to be implemented to ensure “no significant pollution”. The detailed air quality assessment submitted in support of the DCO application demonstrates that no significant air pollution will arise as a result of the Proposed Scheme. Furthermore, the parallel permitting process will ensure that the plant will operate within the parameters assessed within the DCO ES.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		The Applicant concurs with Biofuelwatch's statement (para 211) that "it is doubtful that it would be practical to install equipment to measure nitrosamine concentrations at a large number of locations".
Biodiversity and Ecology		
9.23 (214 – 217)	<p><i>Biofuelwatch raised concerns about the Risk of Amine Deposition on Ecology</i></p> <p><i>Some products from the degradation of amines have a long half life in certain environments and "they may fulfil criteria for persistence" (Nitramines in sediments≈300 days106). The breakdown rate of amines and derivatives in the environment depends on temperature so worst case breakdown rates should be considered to ensure amines and their products do not accumulate to harmful levels particularly at certain times of the year107. The breakdown rate also depends on the source with synthetic amines taking longer to breakdown108. Consideration must be given to whether the breakdown figures used reflect the proprietary solvent used.</i></p>	<p>In these paragraphs of their Deadline 2 Written Representation, Biofuelwatch make a number of references to a Norwegian study of potential effects of CCS amines and their breakdown products on human health, and on ecological receptors including terrestrial vegetation, marine algae, aquatic invertebrates and fish. The Applicant has not been able to obtain a copy of the paper referred to by Biofuelwatch. The Applicant has instead been able to obtain the underpinning research task papers⁷. The paper identifies a range of potential critical loads in relation to amines and their breakdown products. The Applicant has completed preliminary evaluations of the Proposed Scheme's emissions</p>

⁷ Matthias, K., Brooks, S., Wright, R., and Knudsen, S. Amines Worst Case Studies: Worst Case Studies on Amine Emissions from CO2 Capture Plants

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p><i>215 The applicant's ecology report also draws attention to the long-term nature of the impacts "at up to an international geographical scale"¹⁰⁹ (although Biofuelwatch considers the applicant has provided insufficient evidence and especially insufficient consideration of uncertainties and the limitations of current scientific knowledge, to be confident that such impacts are of "minor magnitude" and "reversible").</i></p> <p><i>216. Since the applicant predicts international scale impacts, Biofuelwatch asks the Examining Authority to consider what international consultation should occur before the proposal is approved.</i></p> <p><i>217. There is a risk that chemically produced N-nitrosamines and N-nitramines can accumulate in the surrounding environment and endanger human health.¹¹⁰ It is therefore unclear that air dispersion modelling alone (even if the chemistry and the solvents under consideration were fully understood) would be able to fully assess the risks to human health and the environment.</i></p>	<p>relative to the most sensitive critical loads identified in the Norwegian study.</p> <p>For amines, the Proposed Scheme would generate up to 0.095% of critical load, using the recommended critical load for the most sensitive ecological receptor (aquatic algae) of 3kg/ha/yr. For nitramines, the Proposed Scheme would generate up to 0.152% of critical load, again using the recommended critical load for the most sensitive ecological receptor (also aquatic algae) of 0.08kg/ha/yr. For nitrosamines, the Proposed Scheme would generate up to 0.175% of critical load, using the recommended critical load for the most sensitive ecological receptor (also aquatic algae) of 0.01kg/ha/yr. It should be noted that in all instances, the percentages of critical loads reported here are for the point of maximum impact anywhere within the 15km Study Area. That is to say, the impacts will be lower than reported in this paragraph, elsewhere within the 15km Study Area for operational emissions.</p> <p>The Applicant would also highlight, that as suggested by the title of the research paper (<i>Worst Case Studies on Amine Emissions from CO₂ Capture Plants</i>), the Norwegian study and underpinning research were based on a series of inherently precautionary and conservative</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>assumptions and approaches. These include, for example, applying risk factors of up to 1000 to set critical loads, relative to the levels at which observable effects from amines and their breakdown products were recorded in laboratory toxicity studies. The Applicant would highlight that a range of risk factors were used in the study ranging from 50 to 1000; the risk factor of 1000 applied to nitrosamines is therefore particularly precautionary. The Applicant also notes that the Norwegian study concludes that additional work is needed to assess CCS amines and their breakdown products. On the basis of that study's findings and with due regard to the conservatism also inherent in the dispersion (air quality) modelling completed by the Applicant, the Applicant continues to consider that there is negligible risk of significant effect on aquatic algae and other organisms from the Proposed Scheme's emissions.</p> <p>In relation to paragraphs 215 to 216, impacts are predicted at an 'international geographical scale' in terms of the importance of the ecological features being assessed. The receptors in question that Biofuelwatch are referring to are presumably the Special Areas of Conservation, Special Protection Areas, and Ramsar</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>Sites considered in the Ecology chapter of the ES (APP-044). In accordance with Section 4.7 of CIEEM guidance on ecological impact assessment⁸, ecological features should be considered within a defined geographical context (a copy of the guidelines was provided in REP2-062). The identification (pre-mitigation) of the potential for effects significant at 'up to an international scale' reflects the relative importance of the receptors in line with a defined geographical context, as per the CIEEM guidelines; not that the impacts would have a transboundary, international, impact. The Applicant wishes to clarify that this does not mean that significant effects would occur across an internationally significant area, or that direct air quality impacts of Drax could be significant at International scale.</p> <p>For context, the Ecology chapter paragraph (8.9.103) that has been partially quoted in the Biofuelwatch Written Representation is set out below. This summarises the pre-mitigation assessment of operational effects on</p>

⁸ CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester.

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>internationally and nationally designated sites provided with the Application:</p> <p><i>'Given the nature and scale of the modelled air quality impacts and potential hydrological impacts, these are predicted to lead to impacts that are of minor magnitude, long-term, reversible, and are considered to be significant at up to an international geographical scale.'</i></p> <p>Again, the Applicant would draw the ExA's attention to the fact that the quoted text is a pre-mitigation assessment. In paragraphs 8.11.13 to 8.11.14 of the ES Ecology Chapter, the assessment of operational effects on internationally and nationally designated sites is revisited with the application of mitigation considered. Following the application of mitigation, this concludes that impacts are predicted to be negligible and hence effects would be not significant during operation.</p> <p>No impacts are predicted to European Sites or other important ecological features outside the UK and the Applicant therefore considers no international consultation is required.</p>
<p>9.24 (220 – 224)</p>	<p><i>Biofuelwatch raised concerns about amines on aquatic ecology as a result of deposition and cooling water</i></p>	<p>The Applicant is unclear of the mechanism by which Biofuelwatch suggest amines would enter the cooling</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>water system and hence then be discharged to the River Ouse. Emissions from the site are monitored and will have to comply with limits set by the Environment Agency assuming that the Environment Agency agree that there is a realistic possibility of emission and at a level which will require monitoring and reporting. Concentrations of amines entering aquatic habitats are believed to be below levels which represent any risk to aquatic ecosystems, however, again emissions will be monitored where required and reported through the Environmental Permit.</p> <p>The Applicant considers that the risk of deposition impacts is low, due to the inherently low amine and nitrosamine emissions, and their efficient dispersion resulting from the stack height, exit velocity and plume temperature. This is however a matter that will be dealt with in the Environmental Permit that will set parameters for emissions from the operational phase of the Proposed Scheme. Emissions from cooling water will also be dealt with in the Environmental Permit.</p>
9.25 (225)	<i>Biofuelwatch raised concerns about Deposition Impacts and uncertainties</i>	In relation to paragraph 225, The Applicant notes that Biofuelwatch have correctly referenced Table 3-14 of the HRA Report (APP-185) and Tables 1.17 and 1.18 of

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p><i>“The predicted cumulative impact on annual nitrogen deposition and acid deposition at Thorne Moor SAC/SPA/SSSI is nearly double the 1% significance screening criterion with the critical load already exceeded. The cumulative ammonia prediction also exceeds the 1% screening threshold with that critical level also exceeded. The applicant’s tables show these predictions include the mitigation proposed by the applicant but the figures account for neither the modelling uncertainties considered earlier in this document nor the significant deposition uncertainties (considered later in this subsection).”</i></p>	<p>Appendix 6.5 of the ES Air Quality chapter (AS-015). The Applicant would highlight that the updates to the dispersion (air quality) modelling as set out in Air Quality Technical Note 2 (REP2-065) predict lessened cumulative nitrogen and acid deposition relative to the older assessment documents referred to by Biofuelwatch.</p> <p>The updated results of the dispersion modelling for acid deposition and nitrogen deposition are set out in Table 9 of Air Quality Technical Note 2. The updated modelling predicts a maximum cumulative acid deposition impact for Thorne Moor SAC (and underpinning SSSI) equivalent to 1.5% of critical load. A maximum cumulative nitrogen deposition impact equivalent to 1.3% of critical load is predicted for Thorne Moor SAC. With the updates to the dispersion modelling at Deadline 2, there is no longer predicted to be a cumulative exceedance of the 1% significance screening threshold for ammonia, for Thorne Moor SAC. Also as set out in Air quality Technical Note 2, the updated modelling predicts a reduced maximum cumulative acid deposition impact for Lower Derwent Valley SAC and Ramsar site equivalent to up to 1.6% of critical load. Further</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>considerations on this point are set out in the Applicant's response to FWQ BIO 1.29.</p> <p>As set out in paragraph 6.5.55 of the Air Quality chapter of the ES (APP-142), a number of elements of conservatism have been embedded into the dispersion modelling, which demonstrate the precautionary and conservative approach that has been taken during modelling and assessment of operational air quality effects.</p>
9.26 (242 (a-d))	<i>Biofuelwatch raised concerns about Deposition Impacts and uncertainties</i>	<p>Biofuelwatch has correctly identified that the Applicant's assessment has applied the deposition velocity for ammonia to amines and their degradation products. This is commensurate with the dry deposition velocities proposed by Karl 2009 and actually double the value proposed by Karl for amines. Dry deposition relates to the deposition of pollutants onto surfaces via direct turbulent interactions rather than via the scavenging of pollution by raindrops and subsequent deposition onto surfaces. However, the assumption that the dry deposition behaviour of amines and nitrosamines is akin to ammonia is appropriate since the high solubility of</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>these pollutants directly affects its uptake by plants even when deposited by 'dry deposition'.</p> <p>It is also noted that the concentration of nitrosamines in air is extremely small (of the order of nanogrammes (one (1) nanogramme = 0.000000001grammes). The maximum contribution of total nitrosamines to nitrogen deposition is imperceptible (~0.0001% of the lowest critical load for any habitat within the study area). Notwithstanding the Applicant's position that their assessment has been undertaken on a conservative basis, uncertainties in the deposition velocity will not impact on this conclusion.</p>
<p>9.27 (243 – 244)</p>	<p><i>Biofuelwatch raised concerns about Deposition Impacts and uncertainties</i></p> <p><i>As well as the toxic impacts of the depositions of the amines, nitrosamines and nitramine compounds themselves, these compounds also add to the total nitrogen deposition. Biofuelwatch requests consideration of the potential harm to important ecological sites.</i></p>	<p>The Applicant can confirm that the potential contribution of amines, nitramines, and nitrosamines to Proposed Scheme nitrogen deposition has been included within the dispersion (air quality) modelling reported in the ES Air Quality chapter (APP-042) and all subsequent iterations of the dispersion modelling. In assessing the contribution, the Applicant has applied the deposition velocity for ammonia to the deposition of amines and degradation products on a precautionary basis.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p><i>244. If precautionary deposition velocities were to be used for nitrogen (including amines, nitrosamines and nitramines), there is the likelihood that the predictions would show nitrogen deposition poses an unacceptable risk to other ecological sites too.</i></p>	
<p>9.28 (246 – 247)</p>	<p><i>Biofuelwatch raised concerns about the River Derwent and River Ouse Acid Impacts</i></p> <p><i>246. The applicant has highlighted how close the River Derwent and the River Ouse are to the site:</i></p> <p><i>“The River Ouse lies adjacent to the Site, which further downstream forms part of the Humber Estuary Ramsar Site, Special Conservation Area (SAC), Special Protection Area (SPA) and Site of Special Scientific Interest (SSSI). The River Derwent is the closest SAC located north of the Power Station”</i></p>	<p>Based on the acid neutralising capacity of the River as set out in Appendix 5 to the HRA Report (APP-193) which reports Environment Agency monitoring data⁹, the Applicant does indeed consider that this means the minor cumulative acid deposition predicted would not lead to likely significant effects on the River Derwent SAC. The Applicant would also draw the ExA's attention to the River Derwent SAC habitat monitoring Technical Note (REP2-107), which is relevant to the wider air quality assessment of the River Derwent SAC and underpinning SSSI. The Lower Derwent Valley Habitats and Soil Analysis Technical Note (document reference 6.8.3.8; Rev-01 submitted at Deadline 3) also provides additional assessment relevant to the assessment of</p>

⁹ Environment Agency. (2022, February). Derwent from Elvington Beck to River Ouse Water Body. Retrieved from Environment Agency Catchment Data Explorer: <https://environment.data.gov.uk/catchment-planning/WaterBody/GB104027068311>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p><i>247. The applicant considers that the River Derwent and River Ouse have a high acid buffering capacity¹⁴⁴ and refers to Environment Agency monitoring data 2022. Whilst the acid neutralising capacity of the River may be high (as reported by the EA), this does not mean that the proposal will not have an adverse impact on the river nor that acidic air pollution may not harm important habitats near the River. Otters have been observed in the vicinity¹⁴⁵ and the River Derwent SSSI is important for breeding birds and the Humber Estuary SPA/SSSI/Ramsar is internationally and nationally important for the numbers of wintering waterfowl, nine passage waders, and nationally important assemblage of breeding birds.</i></p>	<p>acid deposition on the Lower Derwent Valley SAC and underpinning Brighton Meadows SSSI.</p> <p>As set out between paragraphs 4.3.30 to 4.3.33 of the HRA Report, no adverse effects on the otter population associated with the Lower Derwent Valley SAC and River Derwent SAC are predicted due to acid deposition. As set out in Appendix 5 of the HRA Report (APP-193) which is based on information from the Air Pollution Information System (APIS), none of the bird qualifying interests of the Humber Estuary SPA and SSSI or of the Lower Derwent Valley SPA and underpinning SSSI are considered sensitive to the effects of acid deposition.</p>
<p>9.29 (248)</p>	<p><i>Biofuelwatch raised concerns about the River Derwent and River Ouse Acid Impacts</i></p> <p><i>248. Biofuelwatch request further consideration of the impact of acid air pollutants on these rivers and neighbouring habitats important to the River's ecology and request that such consideration should give attention to:</i></p>	<p>a. It is of course correct that the level of the River Derwent will fluctuate within and between years. The Applicant would highlight again that there have been significant historical declines in acid reduction to designated sites in the Zol of the Proposed Scheme since the 1970s, as set out in Section 4.3 of the HRA Report (REP2-101) and our response to First Written Question BIO1.29, as set out in Table 1 of the Applicant's Responses to First Written Questions (REP2-060). As</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p><i>a. the potential for variations in river levels for part of river plant species to be above the water and so exposed to acidic air pollution</i></p> <p><i>b. riverine trees (which may support lichens and bryophytes that may be particularly sensitive to acidic air pollutants) and</i></p> <p><i>c. whether there is sufficient evidence to show beyond doubt that acidic air pollutants will not cause harm to habitats and protected species.</i></p>	<p>described in our response in the row above, the Applicant considers that the high acid neutralising capacity of the river means the minor in-combination acid deposition that would occur would not trigger Likely Significant Effects (LSE) to the riverine habitats present, regardless of the proportion of riverine vegetation that is above or below the surface of the water at any given time.</p> <p>b. The Applicant would note that the woodland in proximity to the River Derwent SAC and SSSI is primarily 'alluvial woodland', as per the SAC citation data for the Lower Derwent Valley SAC (see Table 3.2 in the HRA Report; REP2-101) and the walkover survey conducted by the Applicant in November 2022 (REP2-107). This habitat type is identified as being 'not sensitive' to acid deposition impacts (or nitrogen deposition impacts) as set out on APIS¹⁰. The significant historical declines in SO₂ emissions and acid deposition are also relevant, as referred to above. In addition, the Applicant would highlight that in</p>

¹⁰ <https://www.apis.ac.uk/app>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>relation to ammonia concentrations (a particularly relevant pollutant and impact pathway for the epiphytic¹¹ lichens and bryophytes (mosses) as referred to in the Biofuelwatch Written Representation), there would be no exceedance of the 1% screening threshold. This applies regardless of whether the 3µg/m³ or 1µg/m³ critical level is used, with the lower threshold normally used in relation to lichens and bryophytes¹². This is evidenced in Table 1.15 of Appendix 6.5 of the updated Air Quality chapter of the ES (REP2-035), which shows a maximum impact of 0.007µg/m³ for the Lower Derwent Valley. If the 1µg/m³ critical level is applied, this equates to a cumulative impact of 0.7% of the critical level, i.e. under the 1% screening threshold. It should also be noted that deposition of ammonia onto trees tends to increase rather than decrease bark pH, as set out on APIS¹³, and</p>

¹¹ An epiphytic plant, is a plant which grows on another plant. In this instance the term refers to lichens and mosses growing on trees.

¹² <https://www.apis.ac.uk/node/868>

¹³ <https://www.apis.ac.uk/node/868>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>would therefore have an opposite effect on bark pH to acid deposition.</p> <p>For the reasons as set out above, in the updated HRA Report and supporting appendices, in the Applicant's Responses to First Written Questions, Applicant's Responses to Written Representations and Additional Submissions, Applicant's Responses to Issues Raised at Deadline 2, and Applicant's Comments On Responses to the Examining Authority's First Written Questions, the Applicant considers that there is sufficient evidence to show beyond reasonable doubt that acid deposition will not cause harm to the designated sites assessed and the protected species and qualifying interests they support.</p>
<p>9.30 (260 – 261)</p>	<p><i>260. There are also green-winged orchids to the north of the power station. The Ecology report says:</i></p> <p><i>"... the green-winged orchid is classified as Near Threatened on the Vascular Plant Red Data List for Great Britain. It is scarce within North Yorkshire, with only one or two sites recorded as supporting this</i></p>	<p>The Applicant notes the observation from Biofuelwatch. In relation to the academic study highlighted by Biofuelwatch¹⁴, the Applicant has been unable to obtain a copy of the whole article but has been able to review the abstract. The Applicant notes that the study reports the results of experimental additions of nitrogen, phosphate, potassium, and magnesium fertilizers to a</p>

¹⁴ Silvertown J., Wells D.A., Gillman M., Dodd M.E., Robertson H. & Lakhani K.H. (1994) Short-term effects and long-term after-effects of fertilizer application on the flowering population of green-winged orchid *Orchis morio*. Biological Conservation, 69, 191-197.

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p><i>species and no records within Selby District. Green-winged orchid is considered to be an Important Ecological Feature of District importance.”</i></p> <p>261. There is insufficient information to be confident that the rare orchid would not be harmed by any increased air pollution including accidental or fugitive emissions of amines. Since the plant is harmed by higher nutrient levels, it is likely that the plant would be impacted by increased nutrient enrichment from air pollutants.</p>	<p>series of plots in a hay meadow that supported a population of green-winged orchid. The study reports, as Biofuelwatch seem to have correctly inferred, that increased applications of these fertilisers was likely to be correlated with a reduction in flowering activity by the orchid.</p> <p>The Applicant would highlight that the experimental additions of nitrogen-based fertilisers, as reported in the abstract for the paper, ranged from 22 – 88kgN/ha/yr. The experimental additions applied in the study are therefore massive compared to the amount of nitrogen deposition predicted from the Proposed Scheme in combination with other plans and projects (after operational emissions abatement), which are modelled to be a maximum of 0.17kgN/ha/yr for woodland habitats (so would be less again for ‘short habitats’, such as those supporting the green-winged orchid population at the Proposed Scheme). The Proposed Scheme and other plans and projects collectively contribute less than 1% of the lowest nitrogen-based fertiliser application referred to in the study. Although the Applicant has not specifically modelled the location of the green-winged orchid colony (or the proposed receptor site for these at the Off-site Habitat Provision Area), the location of the orchids was</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>modelled within the grid of receptors covering the study area, as was the Off-site Habitat Provision Area. It is likely based on the modelling that has been completed that these locations would experience a maximum nitrogen impact equivalent to less than 0.5% of the lowest nitrogen fertilizer application referred to in the study. The impact of the Proposed Scheme alone is likely to be in the region of 0.2% of the lowest fertilizer application referred to in the study.</p> <p>The Applicant therefore considers that there is no prospect of operational nitrogen deposition impacts, including cumulatively with other plans and projects, detrimentally affecting the green-winged orchid population.</p> <p>Drax has operated as a COMAH site for a number of years and is both a competent and responsible operator. The risks associated with the various substances onsite are carefully assessed and controlled and management systems designed to deal with any incidents to prevent their escalation. Drax has a fire crew on standby based at the power station site and hence are available and capable of dealing with various incidents and emergencies.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>The Environmental Permit will set out measures to control fugitive emissions, with leak detection specifically set out as a requirement of the Permit. These measures are designed to prevent the escape and/or accidental release of fugitive amine emissions, as per the Environmental Permit; please also see response to Row 9.20 (196 – 199). Drax Power Station operates as a lower tier COMAH site and hence is required to comply with specific requirements associated with the COMAH regulations, 2015. As a lower tier site, Drax Power Station operates a Major Accidents Prevention Policy (MAPP) which is regularly reviewed and audited by the HSE.</p>
<p>9.31 (262 – 264)</p>	<p><i>262. The wintering bird species include rare and protected bird species and are of considerable ecological importance. The bird species deserve the highest levels of protection:</i></p> <p><i>“Of the resident species, two are listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended); eleven are identified as Species of Principal Importance (SPI) under the Natural Environment and Rural Communities (NERC) Act 2006; nine are identified as Birds of Conservation Concern (BoCC) red list species;</i></p>	<p>The Applicant wishes to highlight to the ExA, that the wintering bird surveys referred to by Biofuelwatch were completed when the Proposed Scheme included the potential for deliveries of AIL to arrive at Drax via the Drax Jetty and Redhouse Lane / Carr Lane. As the ExA will be aware, the Drax Jetty and associated access route was subsequently removed from the Proposed Scheme.</p> <p>The wintering bird surveys referred to by Biofuelwatch were completed prior to the removal of the Drax Jetty, and therefore included survey of it, the adjoining River</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p><i>and thirteen are identified as BoCC amber list species. Additionally, 15 species are listed as priority species on the Selby Local Biodiversity Action Plan.”</i></p> <p><i>263. Moreover, Drax’s Ecology Report notes that habitats within and close to the project site are suitable to support protected and notable species and these areas will be impacted. These areas can be expected to include the rare and protected birds with the survey finding “67 bird species were recorded on Site during the wintering bird surveys” and “37 of the species recorded are legally protected or species of conservation concern”.</i></p> <p><i>264. These impacts include the loss of functionally-linked land which could impact the River Derwent SAC, Lower Derwent Valley SPA, Lower Derwent Valley Ramsar, Humber Estuary SPA and Humber Estuary Ramsar. The applicant considers other internationally important sites could also be impacted through the same pathways: Eskhamhorn Meadows SSSI, Burr Closes SSSI, Humber Estuary SSSI, and Thorne, Crowle and Goole Moors SSSI.</i></p>	<p>Ouse, and intervening habitats between the Drax Jetty and the Drax Power Station Site. A number of the bird species were recorded in areas that were relevant to the assessment of ecological effects when the Drax Jetty was part of the Proposed Scheme, but were not recorded in areas that are relevant to the assessment of effects of the Proposed Scheme following removal of the Drax Jetty. These include for example marsh harrier, which was only recorded adjacent to the River Ouse, in excess of 2 km from the Proposed Scheme current Order Limits. The Applicant would refer the ExA to the assessment of effects on wintering birds in Chapter 8 of the ES (APP-044), which is based on the Order Limits for the Proposed Scheme with the Drax Jetty removed.</p> <p>In relation to paragraph 264, the Applicant wishes to correct the record. Biofuelwatch states that ‘... <i>The applicant considers other internationally important sites could also be impacted through the same pathways...</i>’, but the paragraph being quoted refers to Nationally, not Internationally important sites.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
9.32 (284 to 286)	<p>284. It is very concerning that Natural England accepts the destruction of badger setts as part of the development:</p> <p><i>"It should be noted that a licence to exclude badgers and the destruction of setts is unlikely to be granted between the months of December to June."</i></p> <p>285. In the same document, Natural England said: <i>"Natural England is not yet satisfied that the project will not adversely affect the following nationally protected species: badger"</i></p> <p>286. Biofuelwatch requests that the Examining Authority asks Natural England to explain why it might be <i>"satisfied"</i> that the destruction of badger setts would not adversely affect the nationally protected badger.</p>	<p>The Applicant would highlight that at present, no setts are expected to be lost or disturbed as a consequence of the Proposed Scheme. The proposed pre-construction monitoring as set out in the REAC and modified in response to Natural England's comment (REP2-054) has been designed to reconfirm the status of badgers and their setts within the Zol of the Proposed Scheme prior to site clearance and construction commencing. This will enable a sett exclusion/disturbance licence to be obtained from Natural England, in the unlikely event one is required. The Applicant would also highlight that in Table 1, Key Issue 9 of the latest Natural England Written Representation (REP2-085), Natural England have stated that <i>"...Natural England is now satisfied that pre-construction surveys proposed in relation to badgers are appropriate..."</i></p> <p>In relation to paragraph 286 of the Biofuelwatch Written Representation, the Applicant would highlight that badger setts are regularly closed safely and humanely under licence to Natural England (and Scottish Natural Heritage and Natural Resources Wales in the respective devolved administrations). Such activities are subject to strict licensing procedures. Where main setts (i.e. those setts that form the main place of shelter for a clan of</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		<p>badgers) are required to be closed, it is usual practice for an alternative place of shelter to be provided. This usually takes the form of an artificial sett, with design, location, and other specific requirements agreed through the licensing process. Again, there is currently no expectation that any badger sett exclusions will need to take place for the Proposed Scheme, but an appropriate licensing framework exists to facilitate this, in the unlikely event it is required.</p> <p>The ExA will be aware that it is unfortunately necessary at times to relocate badgers from a development location, to ensure their welfare is protected in the course of development activities, as per the Protection of Badgers Act 1992. Licences for such activities in England are assessed and granted by Natural England. Whilst unnecessary closures of badger setts should always be avoided where practicable, it is at times unavoidable that this need occur. The legal protections for badger under the 1992 act largely arose in order to protect the welfare of badgers, rather than for reasons of nature conservation.</p>

10. CMS ON BEHALF OF NATIONAL GRID ELECTRICITY TRANSMISSION PLC

Table 10.1 - CMS on Behalf of National Grid and Electricity Transmission PLC

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
10.1 (1.1 - 1.6)	<p>The draft DCO (dDCO) for the Drax Bioenergy with Carbon Capture and Storage Project (the Project) being promoted by Drax Power Limited (the Promoter) contains development which may affect NGET's apparatus.</p> <p>NGET is the holder of an electricity transmission licence (the Transmission Licence), granted pursuant to section 6 of the Electricity Act 1989 (the 1989 Act). NGET owns, manages and operates the electricity transmission network in England and Wales, with day-to-day responsibility for balancing supply and demand. NGET has a statutory duty (under Section 9 of the 1989 Act) to maintain 'an efficient, co-ordinated and economical' system of electricity transmission.</p> <p>This submission is made on behalf of NGET in response to the Examining Authority's (ExA) examination timetable.</p> <p>For the purposes of the Planning Act 2008 and section 127, NGET is a statutory undertaker and the land</p>	<p>NGET's position is understood, and the Applicant is actively engaging with NGET's lawyers to agree appropriate protective provisions.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>included within the order limits is statutory undertakers' land. NGET require the protective provisions secured within the dDCO to be in their preferred form to ensure that there is no serious detriment to the carrying on of NGET's undertaking.</p> <p>We make this submission further to NGET's relevant representation dated 1 September 2022. NGET set out its requirements for adequate protection in that response.</p>	
NGET'S APPARATUS		
<p>10.2 (2.1 - 2.7)</p>	<p>NGET has a number of substations and associated apparatus and a high voltage electricity overhead transmission line within or in close proximity to the proposed Order Limits including overhead lines and substations.</p> <p>The details of the electricity assets are as follows:</p> <ul style="list-style-type: none"> • Substations: Drax 400kV Substation; Drax 132kV substation; Associated cable fibre; and Associated 400kV cables. • Overhead Lines: 4VH001 AND SPAN 400kV Drax – Keadby – Thorpe Marsh Drax – Thorpe Marsh; 4VC341 AND SPAN 400kV Drax to Thornton 1 	<p>The protective provisions being negotiated with NGET include protection for SEGL2.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>and 2; and 4VJ001-4VJ003A AND SPAN 400kV Drax to Eggborough 1 and 2</p> <p>As noted in NGET's relevant representation, the DRAX4 (400kV) Substation (the Drax Substation) has been designated as a Critical National Infrastructure (CNI) site.</p> <p>NGET is promoting the Scotland to England Green Link 2 (SEGL2) project, a 2 GW electricity transmission network connection which proposes to increase the capability of our network between Scotland and the rest of the UK with a link between Peterhead and Drax.</p> <p>NGET has submitted a planning application (ref: 2022/0711/EIA) to Selby District Council and a planning application (ref: 22/01990/STPLFE) to East Riding of Yorkshire Council for the delivery of the SEGL2 project. The SEGL2 project also connects to the Drax Substation.</p> <p>NGET wishes to ensure that there is no impact on the delivery of their SEGL2 project from the Project, in addition to protecting its existing infrastructure.</p> <p>The need for SEGL2 was set out in NGET's relevant representation. Ofgem has approved the initial needs case and the final needs case for the SEGL2 Project, with the final needs case approved in the Eastern HVDC –</p>	

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>Conditional Decision: Final Needs Case dated 8 July 2022 (the Ofgem FNC Decision). In the Ofgem FNC Decision, Ofgem confirmed that the SEGL2 Project is necessary and will deliver significant benefits for consumers by allowing additional renewable generation to connect to the network and reduce constraint costs. There is a national need for the SEGL2 project.</p>	
Protective Provisions		
<p>10.3 (3.1 - 3.5)</p>	<p>As a responsible statutory undertaker, NGET's primary concern is to meet its statutory obligations and ensure that any development does not impact in any adverse way upon those statutory obligations.</p> <p>As such, NGET has a duty to protect its position in relation to infrastructure and land which is within or in close proximity to the draft Order Limits.</p> <p>As noted, NGET's rights to retain its apparatus in situ and rights of access to inspect, maintain, renew and repair such apparatus located within or in close proximity to the Order Limits should be maintained at all times and access to inspect and maintain such apparatus must not be restricted.</p>	<p>The Applicant agrees with the summary of the current position in terms of negotiation of the protective provisions. Parties are actively engaging and anticipate reaching agreement during the course of the Examination, and including the agreed provisions in the dDCO.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>NGET will require protective provisions to be included within the draft Development Consent Order (the Order) for the Project to ensure that its interests are adequately protected and to ensure compliance with relevant safety standards. The draft Order includes protection for NGET's apparatus and the electricity transmission network. However, it does not include the specific protection provisions that NGET requires to prevent serious detriment to his undertaking.</p> <p>NGET is liaising with the Promoter in relation to such protective provisions, along with any supplementary agreements which may be required. NGET expects to reach agreement with the Promoter in due course.</p>	
Compulsory Acquisition Powers		
10.4 (4.1 - 4.5)	<p>As noted, where the Promoter intends to acquire land or rights, or interfere with any of NGET interests in land, NGET will require further discussion with the Promoter. The Promoter cannot be authorised to acquire NGET's land or rights over NGET's land, or interfere with NGET's existing interests and other rights (including rights of access).</p>	<p>Article 28 of the draft DCO (REP2-007) gives the undertaker certain powers in relation to compulsory acquisition of rights belonging to statutory undertakers within the Order limits. That article is subject to the protective provisions in Schedule 12 of the draft DCO. As noted above, these are currently being negotiated with a view to reaching agreement as to the form which provides adequate protection for NGET's assets.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>In particular, NGET has concern over the extent of Work No. 1F on the works plans and the land included within Plot 01-23 on the Land Plans. Plot 01-23 extends over the entirety of the Drax Substation site. This work and the extent of the land in Plot 01-23 is disproportionate and includes more land than NGET consider is necessary to connect to the Drax Substation. NGET do not consider that this meets the tests for compulsory acquisition pursuant to the Planning Act 2008 and requests that the Promoter reconsider this.</p> <p>Plot 01-23 houses existing operational assets belonging to NGET and should not, therefore, be subject to the proposed powers of compulsory acquisition. NGET requests that the extent of Plot 01-23 is reduced so as to avoid interference with NGET's existing operational assets.</p> <p>Whilst the dDCO includes plot 01-23 in Schedule 8 the extent of the rights that the Promoter is proposing to acquire over Plot 01-23 are so broad that, in effect, they amount to the acquisition of the land; they allow the Promoter to remove buildings and apparatus, and this is disproportionate in respect of an electrical connection to NGET's infrastructure. This would cause serious</p>	<p>With those provisions in place, the Applicant considers that NGET will not suffer serious detriment to the carrying on of its undertaking.</p> <p>As currently drafted, the provisions for the protection of NGET provide that the Applicant may not appropriate or acquire or take temporary possession of any land interest or appropriate, acquire, extinguish, interfere with or override any easement, other interest or right and/or apparatus of National Grid otherwise than by agreement. NGET's consent is also required for any "specified works", which includes works within 15 metres of NGET apparatus or works which may otherwise adversely affect NGET's apparatus.</p> <p>The ability of the Applicant to exercise the powers in the DCO with respect to NGET's interests and apparatus will therefore be subject to the above restrictions (and any further protection agreed) in the DCO.</p> <p>The Applicant therefore considers that NGET will not suffer serious detriment to the carrying on of its undertaking, given the above controls and protections that are intended to be in place.</p> <p>The land included within the Order Limits has been incorporated to account for the different design</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>detriment to NGET's undertaking. The same considerations apply to plots 01-20, 01-22 and 01-25.</p> <p>NGET reserves the right to make further representations as part of the Examination process in relation to specific interactions with its assets but in the meantime will continue to liaise with the Promoter with a view to reaching a satisfactory agreement.</p>	<p>responses that may be required by NGET in their Mod App response to the Applicant and as the Applicant cannot fully anticipate what NGET may require, the Applicant has allowed for the various possibilities which may need to be delivered.</p>

11. CLIMATE EMERGENCY POLICY AND PLANNING (CEPP)

Table 11.1 – Climate Emergency Policy and Planning (CEPP)

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
11.1 (Summary Paragraph 1 and 2)	<p>This Written Representation considers the legal and scientific implications of the land use, land-use change, and forestry (“LULUCF”) greenhouse gas (“GHG”) emissions of the scheme. These are indirect emissions of the project, but comprise a very significant, and centuries long climate change impact associated with the proposed Drax facility.</p> <p>Consideration of these LULUCF emissions and their impacts shows that the biomass combustion process cannot be considered “carbon neutral” within the timescales of current national climate policy (ie until 2050). The biomass combustion might eventually be carbon neutral (for example after 2200), but the centuries long climate change impact remains from increased absolute carbon emissions in the atmosphere until carbon neutrality is reached.</p>	<p>The Applicant's position is that biomass is zero rated at the point of combustion, not that it is carbon neutral. This aligns to guidance from the IPPC, the GHG protocol and the UK Environmental Reporting Guidelines for quantifying emissions of GHG from biogenic sources, such as biomass, where emissions are rated as zero.</p> <p>The Climate Change Committee's balanced pathway to net zero, the UK Government's Industrial Decarbonisation Strategy and BEIS' Biomass Policy Statement (the “Policy Statement”), note that the reason carbon accountancy practice and policy rates CO₂ emissions from biomass as zero is because (unlike fossil sources) the emissions are considered short cycle. This is because as the biomass grows, CO₂ is removed from the atmosphere, and when this biomass is combusted, this CO₂ returns to the atmosphere. Therefore, there is no net change in CO₂ in the atmosphere due to the combustion of the biomass.</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
11.2 (Summary Paragraph 3 and 4)	<p>Irrespective of the fact that carbon capture and storage (“CCS”) is proposed, the severe carbon accounting error on the biomass combustion process itself means that all other subsequent assessment is flawed, and deeply incorrect in scientific terms. <u>Without proper calculation, description and significance assessment of the LULUCF emissions of the project, the impact of the Drax BECCS project on the UK national legally binding targets and budgets is simply unquantified and unknown.</u></p> <p>The science on this matter has been available since at least 2009. Three key papers are supplied in Appendices. Recent modelling is described from one of the papers. This shows, in terms of the effects of LULUCF emissions from the biomass fuel process associated with the project on global carbon cycles, that forest regrowth might eventually remove carbon dioxide generated by Drax from the atmosphere,</p>	<p>Emissions (kgCO₂e/MWh), from each stage of the biomass supply chain from processing at origin to combustion have been quantified and assured by Bureau Veritas [REDACTED]</p> <p>[REDACTED] This data has been applied to the do nothing and do something scenarios to quantify emissions from the biomass supply chain.</p> <p>Upstream logging and transport emissions from feedstock production are included within the assessment (See Plate 15.1 within ES Chapter 15: Greenhouse Gases (APP-051)). Upstream land use change emissions are included within the assessment. These were within scope of the supply chain emissions calculations that were third party verified by Bureau Veritas (see 15.5.45. point K within ES Chapter 15: Greenhouse Gases (APP-051)). These were zero because there are no land use change emissions associated with the sourcing of biomass. No additional commercial forestry areas are expected to be developed due to the proposed development.</p> <p>It is also important to note that the Proposed Scheme, being the installation of carbon capture to an existing biomass power station, does not in and of itself lead to any changes to the consented operation of the existing Drax Power Station. At the moment Drax Power station can and does run at ‘full merit’ with a biomass supply. The existence of the Proposed Scheme, by</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>but regrowth is uncertain and takes time, <u>decades to a century or more</u>.</p> <p>The science appended shows, then, that the transboundary, long-term impacts on the global carbon cycle of the LULUCF emissions have a duration of centuries. The Environmental Impact Assessment regulations require that such indirect impacts (including transboundary, cumulative, short-term, long-term significant effects) are identified, described and assessed within the Environmental Statement. They have not been on the Drax application which is a breach of the 2017 regulations. Under section 104 (5) of the Planning Act 2008 such a breach overrides according with the applicable national policy statements, for decision making on the application.</p> <p>I note the Office for Environmental Protection has recently intervened in the appeal of R (Finch) v Surrey County Council on the matter of the “principles for</p>	<p>itself, will not change the nature of extent of that biomass supply to the Power Station. As such, even if it was included within scope, there is no land use change at the point of conversion to commercial forestry that is a direct result of the Proposed Scheme, and therefore cannot be an upstream effect or implication of the Proposed Scheme.</p> <p>The Applicant notes that it has been clear that it has defined the scope of its assessment, including of appropriate upstream considerations, with reference to relevant and appropriate Guidance. By contrast, the Interested Party has stated that this is necessary, but not set out on what basis it considers the ‘line’ should be drawn for such an assessment in this regard. The Finch judgement (noting that the Supreme Court judgement in that case is awaited) that is referenced by the Interested Party made clear that the question of where and how that line should be drawn can be a matter of planning judgement, which can only be challengeable on public grounds of unreasonableness and irrationality. In the Applicant’s submission, it would be unreasonable and irrational for the Secretary of State to depart from clear guidance on this matter, particularly in light of the lack of any alternative.</p> <p>As explained at ISH1, the Applicant would note that the Biomass Policy Statement quote referenced by CEPP at paragraph 23 of their WR is not an obligation imposed on applicants of any one CCS project – the assessment there is being undertaken by</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>determining the proper approach to the assessment of indirect effects under the EIA legislation” and I explain the similar nature of the legal issues involved my main text.</p> <p>The UK now has a legal and policy framework on Climate Change which contains several legal requirements, for example: the Net Zero target 2050, the Sixth Carbon Budget, the 2030 68% reduction target, the 2035 78% reduction target; and policy to deliver these legal requirements, for example, the Net Zero Strategy. Without proper calculation, description and significance assessment of the LULUCF emissions of the project, the impact of these legally binding targets and budgets is unknown. This is a short-term impact which just is not known or presented by the applicant in the Environmental Statement.</p> <p>The key issue is then how the LULUCF emissions from upstream fuel production may be calculated, described, and assessed. This is a necessary step for the application to discharge the requirements</p>	<p>Government to support its policy work in relation to the roll out of the full extent of the CC transport and storage process within the UK's clusters.</p> <p>In light of all of the above, and its response to the ExA's FWQ CC1.2, the Applicant considers that its assessment is statutorily and policy compliant.</p> <p>8. Finally, the Applicant responds to the Interested Party's suggested 'errors' in chapter 15, at section 3.6 of its Written Representation, as follows:</p> <ul style="list-style-type: none"> • The assessment of GHG emissions within the Chapter 15 of the environmental statement has been undertaken in line with The EIA regulations (Schedule 4 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 • The assessment of GHG emissions within the Chapter 15 of the environmental statement has been undertaken in-line with the Institute of Environmental Management & Assessment (IEMA) “Assessing greenhouse gas emissions and evaluating their significance” (2022). • As mentioned above biomass is zero rated at the point of combustion. This aligns to guidance from the IPPC, the GHG protocol and the UK Environmental Reporting Guidelines for quantifying emissions of GHG from

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<p>under the 2017 regulations, and for the Secretary of State to be able to make a determination under section 104 of the 2008 Act.</p>	<p>biogenic sources, such as biomass, where emissions are rated as zero.</p> <ul style="list-style-type: none"> As mentioned above biomass is zero rated upstream land use change emissions are included within the assessment. These were within scope of the supply chain emissions calculations that were third party verified by Bureau (see 15.5.45. point K). These were zero because there are no land use change emissions associated with the sourcing of biomass. No additional commercial forestry areas are expected to be developed due to the proposed development <p>This means there is no 'error' within the GHG assessment presented in Chapter 15 (Greenhouse Gases) (APP-051).</p> <p>The Proposed Scheme is compliant with the EIA regulations as it identifies, describes and assesses all direct and indirect significant effects of the proposed development on the climate, in-line with all emission sources that were scoped in at the EIA scoping stage of the DCO application.</p> <p>The application assesses the cumulative effects by assessing the GHG emissions of the Proposed Scheme against various contextual scales (Local, Regional, National). Alongside this, a detailed assessment of the intra-project combined effects and inter-project cumulative effects has been carried out and</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
		presented in Chapter 18 (Cumulative Effects) of the ES (APP-054).
11.3	<p>The science appended shows, then, that the transboundary, long-term impacts on the global carbon cycle of the LULUCF emissions have a duration of centuries. The Environmental Impact Assessment regulations require that such indirect impacts (including transboundary, cumulative, short-term, long-term significant effects) are identified, described and assessed within the Environmental Statement. <u>They have not been on the Drax application which is a breach of the 2017 regulations.</u> Under section 104 (5) of the Planning Act 2008 such a breach overrides according with the applicable national policy statements, for decision making on the application.</p> <p>I note the Office for Environmental Protection has recently intervened in the appeal of R (Finch) v Surrey County Council on the matter of the <i>"principles for determining the proper approach to the</i></p>	<p>Please see the Applicants response within this document, Response Ref 11.2 regarding the zero rating of biomass emissions, and the consideration of LULUCF emissions from the proposed scheme. The Proposed Scheme is compliant with the EIA regulations as it identifies, describes and assesses all direct and indirect significant effects of the proposed development on the climate, in-line with all emission sources that were scoped in at the EIA scoping stage of the DCO application. The application assesses the cumulative effects by assessing the GHG emissions of the Proposed Scheme against various contextual scales (Local, Regional, National). Alongside this, a detailed assessment of the intra-project combined effects and inter-project cumulative effects has been carried out and presented in Chapter 18 (Cumulative Effects) of the ES (APP-054).</p>

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
	<i>assessment of indirect effects under the EIA legislation</i> " and I explain the similar nature of the legal issues involved my main text.	

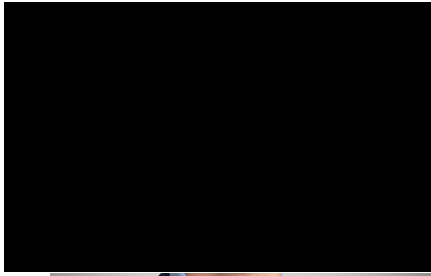
APPLICANT'S RESPONSES TO ISSUES RAISED AT DEADLINE 2 (UPDATED) - APPENDIX A

REA POSITION PAPER

GOING NEGATIVE:

**Policy Proposals for UK Bioenergy
with Carbon Capture and Storage (BECCS)**





Samuel Stevenson
Policy Analyst - REA
Report Author

SUMMARY

Bioenergy paired with Carbon Capture and Storage (BECCS) technologies has the potential to play a critical role in meeting the UK's net zero ambitions, but achieving this potential involves immediate action at a number of scales.

The REA recommends increasing the UK total carbon price to around £50t/CO₂ from 2020 with a clear trajectory to at least 2035 in order to promote rapid emission reductions.

The UK should also explore a mechanism which rewards negative emissions, such as tradeable negative emissions allowances under a domestic emissions trading scheme.

Finally, the UK should incentivise the deployment of demonstration projects at several scales that prioritise the use of lowest carbon feedstocks whilst making BECCS plant eligible for support under existing UK policy, such as the Contracts for Difference (CfD) mechanism.

1

BECCS has the potential to play a critical role in meeting the UK's net zero ambitions. According to the Committee on Climate Change (CCC), the UK will require Carbon Capture and Storage (CCS) at scale in order to achieve net zero by 2050ⁱ. BECCS could play an important role in doing this cost-effectively whilst providing wider co-benefits, with the potential to abate around 51 MtCO₂yr⁻¹ of the projected 90 - 130 MtCO₂yr⁻¹ residual emissions in 2050 from difficult to decarbonise sectors such as agriculture, aviation and industry^{ii,iii}. The scale-up of both domestic and international sustainable biomass can facilitate this shift with potential economic and environmental benefits across the agricultural and forestry sectors, including rural development^{iv}. Recent modelling suggests that BECCS could reduce annual CO₂ emissions in the UK by ~6%, whilst also providing low carbon power, heat and additional co-benefits^v. Developing CCUS technology, expertise, and transport and storage in the UK brings further economic opportunities.

2

Scaling up and deploying UK BECCS is complex and will require significant investment and policy change. Whilst the UK has a strong bioenergy sector, accounting for 7.4% of primary energy supply, it does not have an established CCS industry^{vi}. Policy will need to shift in order to correctly price carbon, offer long-term support to bioenergy and incentivise CCUS technologies, infrastructures and business models, alongside negative emissions from BECCS. Scaling up either domestic biomass production or imports to match the levels required (51 MtCO₂yr⁻¹) demands a coordinated and robust approach which ensures rigorous carbon accounting throughout feedstock supply chains. Whether international or domestic, supply chains used for BECCS should be the lowest carbon option available.

3

A number of actions can be taken now which utilise the existing policy trajectory and expedite BECCS deployment and the delivery of a net zero society. As part of a portfolio of renewable energy and clean technology deployment, Greenhouse Gas Removal (GGR) strategies and immediate mitigation efforts, we recommend i) increasing the UK total carbon price to around £50t/CO₂ with a clear trajectory between at least 2020 - 2035; ii) creating a mechanism to reward negative emissions (e.g. tradeable Negative Emissions Allowances under a UK emissions trading scheme); iii) modifying existing UK supportive policy, such as the Contracts for Difference mechanism (CfD) to support BECCS at scale; iv) developing BECCS demonstration projects at a number of scales that make use of lowest carbon feedstocks; and v) stimulating increased research into a variety of potential feedstock genotypes to improve bioenergy yields and sustainably meet requisite feedstock demand.

ADDRESSING KEY QUESTIONS

What is BECCS?

Bioenergy with Carbon Capture and Storage (BECCS) is a way of capturing and permanently storing CO₂ released by bioenergy processes. Bioenergy is the energy generated from the conversion of solid, liquid and gaseous products derived from renewable organic biomass such as wood, agricultural crops, and various kinds of waste. Biomass can be burned directly or processed into biofuels such as ethanol and methane. In the case of combustion, as in biomass power, heat or energy from waste, compounds are used to separate and capture CO₂ from the flue gases. Pre-combustion capture is also possible on specially designed plants^{vii}. In the case of biofuel production, CO₂ is captured directly from processes like fermentation as an off-gas; whereas in anaerobic digestion CO₂ is separated from biogas in the process of upgrading it to biomethane.

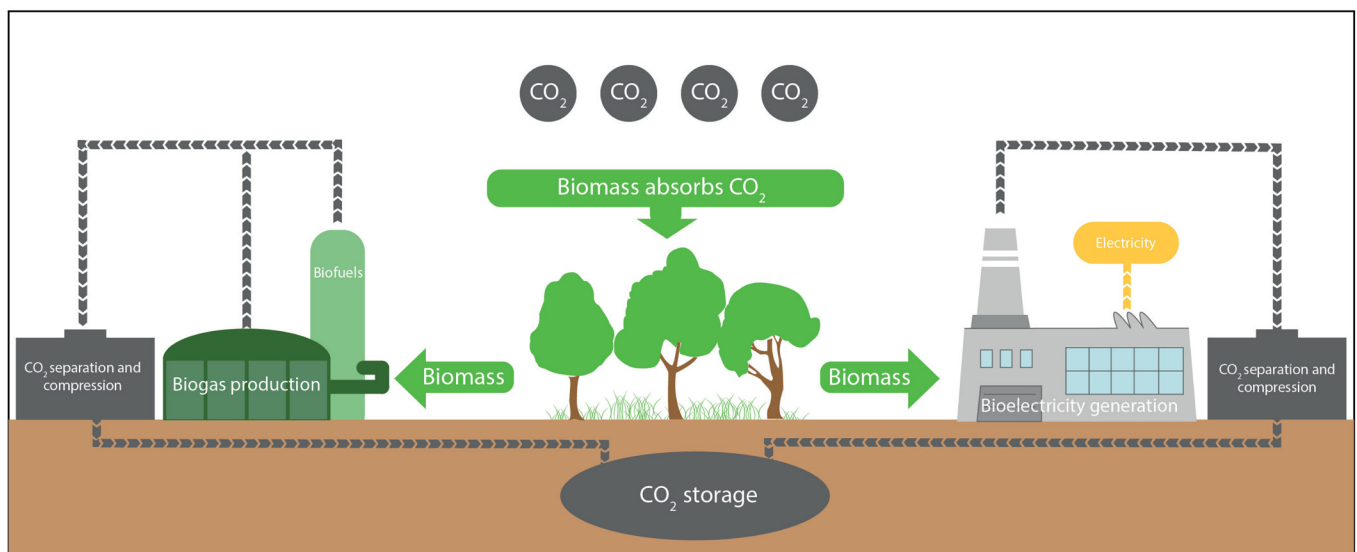


Figure 1 (above): Diagram showing three BECCS pathways, biogas-CCS, biofuel-CCS and bioelectricity-CCS © REA 2019^{viii}.

BECCS features prominently in the climate debate because of its potential to deliver negative emissions - removing more CO₂ from the atmosphere than is released via the bioenergy process (combustion, fermentation or digestion). This is possible because the biomass used as fuel fixes CO₂ from the atmosphere during growth. When it is then processed this same CO₂ is released but rather than being returned to the atmosphere, it is captured and permanently stored. Captured carbon may also be used as a feedstock in chemical and industrial processes, for example in the manufacture of bio-based carbon products such as building materials, and in the production of synthetic transport fuels; hence Carbon Capture Usage and Storage, or CCUS.

Is BECCS a single technology?

BECCS is not a single technology. Rather, CCUS is compatible across a range of bioenergy configurations including: Biofuels (biochemical and thermo-chemical); Anaerobic Digestion (AD); Energy from Waste (EfW) and Biomass (heat and power)^{ix, x, xi}. Despite its theoretical versatility, however, BECCS is still firmly in the developmental stages with a mixture of small-scale demonstrational projects primarily concentrated in CCU and CCS with biofuel production (particularly in the United States)^{xii}, CCU and CCS with EfW (Netherlands and Japan)^{xiii, xiv}, and CCS with biomass power (UK)^{xv}.

Is BECCS necessary to meet climate targets?

Achieving net zero is not possible without a portfolio of GGR strategies, most likely including BECCS at between 24 - 51 MtCO₂yr⁻¹^{xvi}. This is because there will be an estimated 'residual' of emissions (90 - 130 MtCO₂yr⁻¹) in 2050, even with maximum reduction efforts in all areas, due to those hard to decarbonise sectors such as aviation, shipping, and industry that have no, or only very high cost, options to fully decarbonise. CCS currently presents the cheapest or only option to decarbonise many industrial applications^{xvii}. Developing BECCS will capture CO₂ and deliver negative emissions which expedite the route to net zero whilst also compensating for residual emissions, thereby significantly reducing the cost of UK decarbonisation. This being said, pursuing BECCS need not preclude vigorous economy-wide mitigation efforts and the rapid deployment of renewable and clean technologies.

How much will BECCS cost?

The Committee on Climate Change's 'Net Zero' report estimates that the assumed abatement cost for BECCS is between £125 - 300/tCO₂¹, depending on whether imported or domestic biomass is used and the demand for BECCS in other countries as a mitigation technology^{xviii}. Elsewhere, analyses of UK BECCS costs are limited to configurations such as biomass power with CCS, and conclude that it will be more expensive overall than its coal- and gas-fired comparators, at between £170 - 204 /MWh^{xix}. In this analysis, the biomass cases with a 90% carbon capture efficiency are more expensive because they pay the cost of CO₂ transport and storage as well as a CO₂ emissions charge (despite their use of biogenic fuel) which applies to the residual 10% not captured². They must also pay the price of a more expensive feedstock and different load factors (versus a Combined Cycle Gas Turbine, for example). Whilst early BECCS configurations are likely to be more expensive than fossil fuel-CCS, cost reductions are expected as the supply chains, system and technology efficiencies improve^{xx}. Equally, as the storage and transport infrastructure develops, associated costs are expected to fall^{xxi}.

In addition to the above, neither of the given cost estimates considers the possible value awarded to BECCS for generating negative emissions. A future mechanism which appropriately prices carbon economy-wide and rewards negative emission will bring down the operational costs of BECCS and drive demand in carbon dioxide removals.

Overall, it is likely that a significant proportion of the cost of BECCS can be managed through well-designed domestic policy. For example, if the UK were to take the carbon price charged for every tonne of fossil CO₂ emitted and change this to a payment for every tonne of biogenic CO₂ captured, in other words from a penalty to an incentive, then the case for biomass with CCS looks very different. Here, BECCS cases become competitive at between £53.1 - 112.8 /MWh^{xxii, 3}.

How should UK BECCS be deployed?

To expedite BECCS deployment the UK should initially focus on delivering 'anchor' projects in at least three CCUS clusters, as recommended by the BEIS Select Committee inquiry into CCUS deployment^{xxiii}. The most suitable technology for this at present is large-scale bioelectricity, either from biomass power or EfW. This approach takes advantage of the existing policy trajectory alongside sustainable, mature and rigorously audited bioenergy supply chains^{xxiv}. It also allows the necessary technologies, transport and storage infrastructure to develop, laying the groundwork for exploring future BECCS at different scales.

¹ CCC assumes that £300/tCO₂ estimate becomes global trading price for GGRs, based on the cost of Direct Air Capture and Storage (DACs), rather than BECCS.

² Biomass power currently does not pay the CO₂ emissions charge, so its inclusion here skews the cost comparison. It is unclear why the addition of CCS would require biomass to pay this charge in the future.

³ Whilst this should be explored by Government, it is not a policy proposal of this paper. Rather, it indicates that slightly modifying just one aspect of current UK policy can make BECCS considerably more competitive. As noted later on, it is likely that several complimentary policies will be needed to support UK BECCS.

Following this, the UK can investigate the potential for small- to medium- scale BECCS - for example, the capture of CO₂ from AD plants which is then either utilised in the wider bioeconomy (CCU) or compressed and transferred for injection in nearby transport and storage infrastructure (CCS).

How can the sustainability of UK BECCS be ensured?

The sustainability and negative emissions delivered by BECCS will depend on the scale at which it is deployed^{xxv}. At the small- to medium-scale, BECCS is likely to be most sustainable when plants are dispersed across the UK and supplied with local agricultural, forestry and municipal residues to produce heat at high efficiencies^{xxvi, xxvii}. Separately, large-scale BECCS, such as biomass power, is likely to be fuelled by sustainably expanding feedstock imports^{xxviii}. This is because both the lifecycle carbon and cost are much lower from long-distance haulage via ship or rail than using road transport to supply domestic resource at a handful of large-scale plants. This being said, BECCS at any scale should be fuelled using the lowest carbon feedstock available⁴.

The UK currently has the most stringent biomass sustainability criteria in the world and is therefore well placed to manage the development of BECCS. These criteria manage imported biomass resource by stipulating a minimum carbon efficiency of 47 - 60% compared to the carbon intensity of European biopower (~79g CO₂/MJe)^{xxix}. In the context of large-scale bioelectricity projects, initially utilising existing, mature and low carbon bioenergy supply chains will ensure the sustainability of BECCS.

As noted, utilising small-to-medium-scale BECCS may also offer the UK significant economic and environmental benefits. A decentralised approach to BECCS using small scale combined heat and power (CHP) projects and a distributed supply of sustainable domestic bioenergy crop production has the potential to contribute significantly (~20 MtCO₂yr⁻¹) to 2050 BECCS targets (50 MtCO₂yr⁻¹), whilst providing wider environmental benefits and having little impact on food production^{xxx}. The overall GHG emissions from BECCS under such a scenario have been modelled at well below the UK's Renewables Obligation (RO) sustainability threshold (30 - 50g CO₂/MJ compared to 79g CO₂/MJ) and indicate that, in addition to the delivery of negative emissions, air and water quality might also be improved^{xxxi}. BECCS of this kind which utilises sustainable domestic biomass resource has the potential to reduce annual CO₂ emissions by up to ~6%, whilst also providing low carbon power and heat^{xxxii}.

At all scales there is a clear potential for the sustainable growth of domestic and international bioenergy resource which utilises residues, wastes and perennial bioenergy crops^{xxxiii}. There is also the potential to build on existing sustainability criteria, with the European RED II Directive stipulating that large scale heat and biomass power plant must demonstrate an 80% emissions reduction against a fossil fuel comparator, including land-use change emissions.

The UK will need to consider its position regarding the implementation of RED II and how this compares to its own sustainability criteria. It should also review recommendations made by the CCC, such as embedding sustainability criteria into procurement and financing rules to regulate biomass outside of support mechanisms like the Contracts for Difference (CfD), Renewable Heat Incentive (RHI) or RO^{xxxiv}. In any case, sustainability is imperative to BECCS and so the onus must be on ensuring best possible practice and regulation. Negative emissions rely on the efficacy of these measures.

Does BECCS present an economic opportunity to the UK?

Biomass produced domestically in the UK has the potential to significantly increase the current bioenergy market. The CCC has estimated that domestic biomass could contribute between 5-10% of the UK's total energy demand by 2050, and that UK forest cover should increase to between 17-19% by the same date^{xxxv, xxxvi}. BECCS development would therefore establish positive climate and economic synergies

⁴ Lowest carbon feedstock refers here to supply chain emissions. However, it is possible that in the future it will be desirable to use the highest possible carbon feedstocks, so as to maximise carbon sequestration.

between the agricultural, forestry and energy sectors.

As the BEIS Select Committee concluded in a recent report, CCUS deployment should be prioritised because it presents an opportunity to reduce the overall cost of meeting the UK's emissions reduction targets^{xxxvii}. For the UK, one of the main economic benefits of BECCS will likely be significantly lowering the costs of domestic decarbonisation, particularly for the agricultural industry and energy sectors⁵. Mobilising local resources would also stimulate feedstock supply chains to domestic BECCS configurations (e.g. AD or CHP) and contribute to the rural economy^{xxxviii, xxxix}. These benefits can be explored and better understood through appropriately scaled demonstration projects in the late 2020s.

For CCUS more broadly, there are significant potential economic opportunities in developing strong UK-based technological innovation, expertise and storage infrastructure, which could service international markets. Additionally, there are synergies between BECCS and the decarbonisation of hard to abate sectors, such as transport. CO₂ captured from BECCS can be combined with renewable hydrogen via electrolysis to produce synthetic fuels, particularly for use in aviation, shipping and heavy haulage. As the CCC has noted, at least one of the early CCUS regional clusters should involve the significant production of low-carbon hydrogen by 2030 to achieve net zero^{xl}. BECCS configurations situated at such clusters are therefore well placed to facilitate this pathway to decarbonised transport fuels.

BECCS also has a place in the wider bioeconomy where long-lived products can be made from bio-based carbon, such as buildings, civil engineering, as well as structural components of consumer durables. Examples of materials include bio-based carbon fibre and bio-based resins as well as engineered wood.

Finally, the CCC argues that imported biomass alone has the potential to meet around 5% of UK energy demand by 2050. As such, international biomass supply chain development, of which the UK is a global leader, has the additional co-benefit of exporting proven sustainability criteria that stimulate sustainable forestry and economic development in parts of North America, Europe, the Baltics and beyond. The importation of international resource also provides investment in domestic port, rail and logistics infrastructure.

How could BECCS be incentivised?

There are several possible options for incentivising UK BECCS. One approach, explored below, requires three significant changes to policy:

- i) a marked increase in, and expansion of the UK carbon price;
- ii) the implementation of a mechanism to reward negative emissions;
- iii) the adaptation of existing supportive UK policy to include BECCS.

Carbon pricing

The UK currently has a total carbon price of around £42/tCO₂, comprised of the European Emissions Trading Scheme (EU ETS) element at £24/tCO₂ and the domestic Carbon Price Support (CPS) at £18/tCO₂⁶. The domestic element of this total price, which currently only applies to large-scale power generation, will need to be significantly increased in order to incentivise the capture and long-term usage or storage of carbon⁷.

⁵ It is also the case that CCS costs must be compared against the cost of avoided CO₂ (see Roussanaly, S. [2019] 'Calculating CO₂ avoidance costs of Carbon Capture and Storage from industry. *Carbon Management*, 1- 8)

⁶ Figures correct as at 10.06.19 – CPS currently frozen at 18/tCO₂ until 2021.

⁷ Any changes should also be accompanied by supportive policies to protect the fuel poor, such as increased funding for energy efficiency.

The level of increase to the CPS required depends on a number of factors, such as policies augmenting the instrument to create a UK total carbon price; and our future participation in the EU ETS⁸. In any case, an economy-wide price on carbon will likely be needed to generate demand for negative emissions from BECCS. This would make unabated (without CCS) fossil fuel generation and industrial processes uneconomic, thereby driving adaptation into emissions reductions and removals.

Recent analysis from the Grantham Research Institute on Climate Change and the Environment suggests that, in order for the UK to reach net zero by 2050, the UK will need a shadow carbon price⁹ of around £50/tCO₂ from 2020 with a range of £40 - 100tCO₂e depending on the sector in which it is applied^{xii}. The authors suggest that in order to incentivise negative emission technologies like BECCS, this price will need to reach around £75 in 2030 and £160 per tCO₂ in 2050.

A UK ETS

A significantly raised, gradually expanding and progressively increased UK carbon price is a fundamental precondition to BECCS, but alone it cannot fund negative emissions^{xiii}.

To do this, the UK could create a domestic emissions trading scheme (ETS) where actors can purchase Negative Emissions Allowances (NEAs). These allowances permit participants to offset unabated emissions and remunerate negative emissions technologies, such as BECCS¹⁰. The UK's future relationship with the European Union would dictate whether this is also linked to a negative emissions market in the EU ETS, although it suggested here that linking the two would be beneficial. A linked market would increase liquidity, reduce market volatility and maximise opportunities for negative emissions. In addition, it would allow the UK to service international markets, capitalising on its extensive geological storage capacity.

Such a scheme could be administered by the Department for Business, Energy and Industrial Strategy (BEIS), as is currently the case under EU ETS arrangements. This being said, it should be noted that an EU ETS-linked UK ETS with a facility for negative emissions will create additional complexities and therefore require a review of the current accounting methodology.

Alternatively, negative emissions could be funded by revenue generated from a gradually increasing, economy-wide carbon tax. However, others have noted that this would require a carbon price of between £125 - 300t/CO₂ in 2050^{xiii}. As such, it is likely that additional technology support will be required for BECCS whilst the carbon price, and therefore the cost of securing negative emissions, increases over time. Possible options are explored in the following section.

In any case, it is clear that a specific mechanism will be needed to go beyond 'positive' emissions reductions and drive negative emissions¹¹. This is because hard to abate sectors such as aviation, agriculture and industrial sub-sectors will still have significant residual emissions by 2050, even after the implementation of strong domestic policies such as an elevated and expanded carbon price^{xiv}. Achieving net zero across the UK will therefore require offsetting these emissions with greenhouse gas removals from technologies such as BECCS.

⁸ Government has expressed a preference for an EU ETS-linked UK ETS following its departure from the UK, but a domestic Carbon Emissions Tax has also been proposed.

⁹ The price used by Government to guide public investment decisions

¹⁰ Other Negative Emission Technologies (NETs) could also be utilised, but are not considered here.

¹¹ The options outlined above are not mutually exclusive, but Government should explore the best sequence of implementation and how this might interact with additional policies.

Technology-specific support

A suitable incentive for BECCS depends on both the scale and technological configuration.

For medium- to large-scale plant generating renewable electricity, such as biomass- or EfW-CCS pathways, both the power and negative emissions will require support. For the electricity generation, utilising existing UK policy such as the Contracts for Difference (CfD) mechanism could provide funding on either an auction or bilateral negotiation basis. The CfD is a Government support mechanism wherein a generator of renewable electricity is paid the difference between the 'strike price' - a price for electricity reflecting the cost of investing in a particular low carbon technology - and the 'reference price' - a measure of the average market price for electricity in the GB market^{xlv}. At present, bilateral negotiation is the means through which nuclear CfDs are awarded; however, given nuclear's waning capacity, medium- and large-scale configurations of bioelectricity-CCS could offer a tenable replacement¹². Alternatively, bioelectricity-CCS could be included under the CfD on an auction basis either by stipulating a minimum capacity of CCS-enabled generation (e.g. 300MW), or by creating a separate CCS technology Pot¹³.

Government should consult on whether BECCS configurations under the CfD are rewarded for their power generation and negative emissions separately, so as to allow other CCS technologies, like Direct Air Capture (DAC), to compete. However, rewarding only the negative emissions from BECCS would disregard its wider benefits to the energy system. Beyond the CfD, NEAs awarded under a UK ETS could provide support for BECCS, but the scale of this support would depend on the demand for negative emissions.

For small-to-medium plant, such as a distributed network of AD or biomass CHP units with CCS, payments could be received in the form of NEAs for the demonstrable capture and storage (or use) of CO₂. The value of the allowances could be tiered depending on whether the CO₂ is stored or used, and the carbon benefits afforded. A similar approach is taken in the United States under '45Q', a tax credit scheme which remunerates the capture or long-term use of CO₂ at \$50 and \$30/tonne, respectively^{xlvi}. For the capture and storage of CO₂ from UK BECCS, rather than requiring dedicated transport and storage infrastructure which extends to smaller plant, NEAs could be awarded at the point of injection into a shared network. In addition to rewarding negative emissions, an appropriate mechanism should also be available to support the generation of renewable heat from bioenergy¹⁴.

For biofuel-CCS configurations or biogas-CCS with a pathway to biomethane in transport, the UK should look to its Greenhouse Gas (GHG) Regulations under the European Fuel Quality Directive^{xlvii}. The GHG Regulations set an obligation on fuel suppliers to reduce GHG emissions from their fuel by 4% in 2019 and 6% in 2020. One GHG credit is awarded for every kilogram of CO₂e mitigated under the fossil baseline (94.1 gCO₂e/MJ). The GHG Regulations are suited to the use of CCS in the production of transport fuels because they reward those fuels with the lowest carbon intensities. Unfortunately, the GHG Regulations are set to end in 2020. Extending this policy would encourage the application of BECCS to reduce the carbon intensity of transport fuels.

Alternatively, the UK could adapt its Renewable Transport Fuel Obligation (RTFO), which currently places an obligation on fuel suppliers to source a proportion of their fuel from renewable sources, by shifting it

¹² Government has already made provision under the CfD for bilaterally negotiated CCS contracts, but there are currently no precedents https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/233004/EMR__Contract_for_Difference__Contract_and_Allocation_Overview_Final_28_August.pdf

¹³ 300 MW is considered the minimum capacity needed for BECCS power generation at a reasonable cost (Brown, 2019 REA Bioenergy Strategy – Phase 2: A Vision to 2032 and Beyond).

¹⁴ The need for this would depend on a number of factors, including how high the price of carbon is set. A high carbon price would improve the case for biomethane from AD and biomass heat against the comparators of fossil gas and oil, but a low carbon price might require additional support such as an obligation on gas suppliers to provide a proportion of green gas or a steadily increasing duty on fossil fuel use in heating.

it from a volumetric to a GHG basis. However, Government should consult carefully on such a change so as to minimise any unintended consequences¹⁵. Beyond these options, biofuel-CCS or biogas-CCS configurations could also be eligible for NEAs under a UK ETS, providing further support.

Finally, providing a time-limited classification of BECCS projects as 'emerging technologies' would allow for the receipt of multiple support options under State Aid regulations, thereby expediting development and deployment.

Incentivising BECCS feedstocks

Although the UK will likely need to mobilise a significant volume of sustainable domestic resource, (estimated at 5.7 - 7.3 Mt yr⁻¹ in 2050) imported biomass will still be necessary^{xlviii}. Incentives for the production of local, innovative and sustainable feedstock supplies which do not adversely impact food systems or biodiversity could promote the development of BECCS as well as bioenergy more broadly. The UK currently imports over one-quarter of its bioenergy feedstock and it is projected that this could sustainably increase to meet ~5% of the UK's energy demand by 2050^{xlvix}. Thus, scaling international feedstock supply will be central to securing BECCS at the required scale.

Increasing domestic production could be achieved through payments for suitable crops on marginal land and wastes as well as R&D Tax Credits for research into widening the range of potential feedstocks. International feedstock supply can be increased by exporting the UK's world leading sustainability criteria to low-risk areas, thereby expanding the available resource pool. Again, this should be carefully managed by embedding the UK's sustainability criteria into financing and procurement rules. The efficacy of UK BECCS depends on the success of these efforts as without a combination of sufficient and genuinely sustainable domestic and international resource, the UK cannot achieve the necessary levels of either bioenergy or negative emissions to reach net zero by 2050.

CO₂ transport and storage infrastructure

CO₂ transport and storage (T&S) infrastructure is a precondition for BECCS. Although such infrastructure is not the focus of this paper, it is worth outlining current thinking.

The UK's CCUS Action Plan currently states that deployment at scale should only be supported if 'sufficient' cost reductions are achievedⁱ. This language fails to give certainty to investors and therefore impedes the development of infrastructure required for BECCS. It also runs counter to the CCC's view that the earlier CO₂ infrastructure is deployed at scale, the earlier CCS can be deployed cost effectivelyⁱⁱ. This paper supports the BEIS Select Committee's recommendation that Government should adopt a clear strategy for the scale and timing of CCUS deployment which is consistent with a target of capturing 10 Mt CO₂ per annum in 2030 rising to 20 Mt CO₂ per annum in 2035. We add further that this should prioritise BECCS to secure maximal negative emissions. Government should also aim to establish BECCS-enabled T&S infrastructure in at least three storage regions of the UK by the 2020s in order to facilitate negative emissions.

In terms of funding, models for carbon capture should be kept separate from those of transport and storage^{lii, liii}. Government will consult on funding CO₂ T&S infrastructure in 2019, where the REA encourages the exploration of a Regulated Asset Base (RAB) model to initially develop BECCS at the UK's proposed industrial clusters.

The UK should also utilise existing policy through the *Industrial Strategy* and *CCUS Action Plan* to establish at least one commercial large-scale BECCS project and several smaller demonstration scale BECCS projects by the late 2020s.

¹⁵ Changing from a volumetric to GHG basis under the RTFO might encourage high volumes of crop-based biodiesel in the UK which could impact food production and have wider environmental impacts.

This approach will expedite the technological developments and cost reductions required to roll out BECCS more widely, delivering the negative emissions needed to reach net zero.

SUMMARY OF POLICY PROPOSALS

Biomass sustainability

- The UK currently has the world's most stringent sustainability criteria, but will need to consider its position regarding the implementation of RED II and how this compares to its own policies. It should also review recommendations made by the CCC, such as embedding sustainability criteria into procurement and financing rules to regulate biomass outside of support mechanisms like the CfD, RHI and RO.
- BECCS should make best use of the lowest carbon feedstocks and existing sustainable supply chains.

CCUS

- Government should adopt a clear strategy for the scale and timing of CCUS deployment which is consistent with a target of capturing 10 Mt CO₂ per annum in 2030 rising to 20 Mt CO₂ per annum in 2035. Priority should be given to BECCS in order to maximise negative emissions.
- Government should seek to establish BECCS-enabled transport and storage infrastructure in at least three cluster regions of the UK by the 2020s to allow all industrial clusters to access negative emissions.
- Government should increase low-carbon cluster funding from £170m overall to £100m per low carbon cluster hub as part of the upcoming Spending Review, with the aim of developing at least 3 hubs by the mid-2020s.
- Government has committed to consult on CO₂ transport and storage infrastructure in 2019 and should consider within this the most effective model for funding (e.g. Regulated Asset Base).
- Government should consult on the option of enabling technologies with CCUS from 2030 as part of the UK's *CCUS Action Plan*. All CO₂ point sources above a certain threshold should be CCUS-enabled by 2030.

Carbon pricing

- The UK carbon price should be gradually expanded economy-wide to accurately reflect the true cost of carbon and promote renewable and clean technologies. Any changes should also be accompanied by supportive policies to protect the fuel poor, such as increased funding for energy efficiency.
- A proportion of proceeds from either an emissions trading scheme or economy-wide carbon tax could be used to fund CCUS projects (including BECCS), expediting development and deployment whilst remaining near cost-neutral to Treasury.
- Government should increase the current UK total carbon price to around £50t/CO₂ from 2020. A clear trajectory should be given until at least 2035, when prices should be around £80t/CO₂. The Government should also consider the creation of an EU ETS-linked UK ETS with a facility for negative emissions. Taken together these mechanisms will drastically reduce domestic emissions, create demand for negative emissions and provide a revenue stream for negative emissions technologies such as BECCS.

Incentivising BECCS technologies

- Government should consult on options for incentivising negative emissions from BECCS configurations. These could include: modifying the CfD to provide support for large-scale bioelectricity-CCS; using Negative Emission Allowances (NEAs) as part of a UK ETS in order to reward BECCS across heat and transport; and extending the GHG Regulations to provide credits for biofuel (including biomethane) production with CCUS.
 - Government should consider additional policies which support the bioenergy technologies underpinning BECCS (Anaerobic Digestion, Energy from Waste, Biomass Power, Biomass Heat and Biofuel production).
 - Government could include BECCS under the State Aid exemption category for emerging technologies in order to allow multiple support instruments for its development and deployment.
 - Government should establish at least one commercial large-scale BECCS project and several smaller demonstration scale BECCS projects by the late 2020s.
-

FOOTNOTES AND REFERENCES

- ⁱ Committee on Climate Change (2019) 'Net Zero: The UK's contribution to stopping global warming', pg. 23
- ⁱⁱ Committee on Climate Change (2019) 'Net Zero Technical Report' pg. 269 <https://>
- ⁱⁱⁱ Committee on Climate Change (2019) 'Net Zero: The UK's contribution to stopping global warming', pg. 171, Figure 5.9
- ^{iv} Albanito et al. (2019) 'Mitigation potential and environmental impact of centralized versus distributed BECCS with domestic biomass production in Great Britain' *Global Change Biology Bioenergy*
- ^v Albanito et al. (2019) 'Mitigation potential and environmental impact of centralized versus distributed BECCS with domestic biomass production in Great Britain' *Global Change Biology Bioenergy*
- ^{vi} REA (2019) 'REA Bioenergy Strategy Phase 1: Bioenergy in the UK - The State of Play' https://www.r-e-a.net/resources/pdf/347/REA_Bioenergy_Strategy_-_Phase_1_State_of_Play_Web.pdf
- ^{vii} Rackley, S.A. (2017) Carbon capture from power
- ^{ix} EBTP-ZEP (2014) Bio-CCS – The Way Forward for Europe
- ^x Quader and Ahmed (2017) 'Bioenergy with Carbon Capture and Storage (BECCS): Future Prospects of Carbon-Negative Technologies'
- ^{xi} Pour et al. (2017) 'A Sustainability Framework for Bioenergy with Carbon Capture and Storage (BECCS) Technologies' <https://www>.
- ^{xiv} IEAGHG (2016) Waste Power CCU Projects in Japan
- ^{xv} Drax (2018) Europe's first bioenergy carbon capture and storage pilot now underway
- ^{xvi} Committee on Climate Change (2019) 'Net Zero Technical
- ^{xvii} Committee on Climate Change (2019) 'Net Zero Technical Report' <https://>
- ^{xviii} Committee on Climate Change (2019) 'Net Zero Technical Report' pg. 281
- ^{xix} Wood Group Plc. (2018) Assessing the Cost Reduction Potential and Competitiveness of Novel (Next Generation) UK Carbon Capture Technology, pg. 142 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/730562/BEIS_Final_Benchmarks_Report_Rev_3A__2_.pdf
- ^{xx} BEIS SelCom (2019) Carbon capture usage and storage: third time lucky?
- ^{xxi} Committee on Climate Change (2019) 'Net Zero: The UK's contribution to stopping global warming' pg. 206
- ^{xxii} BECCS for Negative CO2 Emissions from Power (2019)
- ^{xxiv} Clean Growth Strategy CCUS Action Plan (2018) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/759637/beis-ccus-action-plan.pdf
- ^{xxv} Fajardy et al. (2019) BECCS deployment: a reality check Grantham Institute Briefing Paper
- ^{xxvii} REA (2019) Bioenergy Strategy Phase 2 – Bioenergy in the UK – A Vision to 2032 and Beyond
- ^{xxviii} Ibid.
- ^{xxix} DECC (2012) UK Bioenergy Strategy, pg. 86 – 88
- ^{xxx} Albanito et al. (2019) 'Mitigation potential and environmental impact of centralized versus distributed BECCS with domestic biomass production in Great Britain' *Global Change Biology Bioenergy*
- ^{xxxi} Ibid., pg.22
- ^{xxxii} Albanito et al. (2019) 'Mitigation potential and environmental impact of centralized versus distributed BECCS with domestic biomass production in Great Britain' *Global Change Biology Bioenergy*
- ^{xxxiv} Committee on Climate Change (2019) 'Net Zero: The UK's contribution to stopping global warming' pg. 151

^{xxxvii} Committee on Climate Change (2019) 'Net Zero: The UK's contribution to stopping global warming' pg. 35 [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] critical role of CCS [REDACTED] /
view/1043/508/
^{xxxix} Pöyry and Element Energy (2015) Potential CCS Cost Reduction Mechanisms [REDACTED]
[REDACTED] /
^{xi} Committee on Climate Change (2019) 'Net Zero: The UK's contribution to stopping global warming' pg. 34 [https://\[REDACTED\]](#)
^{xii} Burke et al. (2019) 'How to price carbon to reach net-zero emissions in the UK'. Grantham Research Institute on Climate Change on the Environment [REDACTED]
[REDACTED]
^{xiii} Fridahl and Lehtveer (2018) Bioenergy with carbon capture and storage (BECCS): Global potential, investment preferences, and deployment barriers *Energy Research and Social Science* 42, pgs. 155- 165.
^{xiiii} Burke et al. (2019) 'How to price carbon to reach net-zero emissions in the UK'. Grantham Research Institute on Climate Change on the Environment [REDACTED]
[REDACTED]
^{xliv} Committee on Climate Change (2019) 'Net Zero: The UK's contribution to stopping global warming' pg. 206 [REDACTED]
[REDACTED] f
^{xlv} Electricity Market Reforms (2017): Contracts for Difference <https://www.gov.uk/government/collections/electricity-market-reform-contracts-for-difference>
^{xlvi} 45Q Carbon Capture Incentives [REDACTED]
[REDACTED]
^{xlviii} Albanito et al. (2019) 'Mitigation potential and environmental impact of centralized versus distributed BECCS with domestic biomass production in Great Britain' *Global Change Biology Bioenergy* [REDACTED]
^{xlix} Committee on Climate Change (2018) 'Biomass in a Low-Carbon Economy' [REDACTED]
[REDACTED]
ⁱ CCUS Action Plan (2018) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/759637/beis-ccus-action-plan.pdf
ⁱⁱ Committee on Climate Change (2019) 'Net Zero: The UK's contribution to stopping global warming' pg. 198 [REDACTED]
[REDACTED]
ⁱⁱⁱ *Ibid.*, pg.198
ⁱⁱⁱⁱ BEIS SelCom (2019) Carbon capture usage and storage: third time lucky? [REDACTED] 19/
[REDACTED]

ACKNOWLEDGEMENTS

Special thanks are due to those who provided advice, comments and feedback on earlier drafts. These include:

Adam Brown (Energy Insights); Benedict McAleenan (REA Policy); Fabrizio Albanito (University of Aberdeen); Frank Gordon (REA Policy); Gaynor Hartnell (REA Policy); Jonathan Scurlock (National Farmers Union); Joshua Burke (Grantham Research Institute on Climate Change and the Environment); Karl Smyth (Drax); Luke Warren (CCSA); Mark Sommerfeld (REA Policy); Mirjam Roeder (Supergen Bioenergy Hub); Richard Gow (Drax); Ruby Ray (Wood Group Plc).

For further information please contact:

Samuel Stevenson

Policy Analyst - Bioenergy, REA
s Stevenson@r-e-a.net

Mark Sommerfeld

Policy Manager, REA

Lindsay Barnett

Head of Membership, Marketing & Events



RENEWABLE ENERGY ASSOCIATION
GROWING THE RENEWABLE ENERGY & CLEAN TECH ECONOMY

REA, 80 Strand, London, WC2R 0DT

020 7925 3570

