APPLICANT'S RESPONSES TO ISSUES RAISED AT DEADLINE 2

Drax Bioenergy with Carbon Capture and Storage

Infrastructure Planning (Examination Procedure) Rules 2010

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Appendix A

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 document does not include a response to the new comments in Biofuelwatch's Written Representation in relation to Air Quality and Biodiversity. In light of the detail set out in that Written Representation and the number of third party sources it refers to, the Applicant is still developing its response to these points and anticipates being able to submit this by Wednesday 15 March, which will still give all parties and

the Examining Authority the time to consider the Applicant's responses in their preparation for the forthcoming Hearings.

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)	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**). 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. Until satisfactory agreement has been reached with the Promoter on all matters, Network Rail must continue to reserve the right to make further submissions to the examination at a later date.	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) .

3. ROBERT PALGRAVE

Table 3-1 – Robert Palgrave

Air quality impacts		
3.1 (48 - 53)	The data presented by the Applicant regarding the levels of amines and nitrosamines emitted by the Proposed scheme is subject to uncertainties. 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). The Variation Request states: "7.14.10.1.1Amines & Nitrosamines *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 maximum-modelled PC concentrations from both the PCC activity and Keadby 3 (Keadby Generation Ltd, May 2021) project were summed, as follows:*	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. 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. However, the Applicant confirms that the proposed emissions for Drax, as presented in Air Quality Technical Note 1 (AS-019) are robust and significantly lower than set out within the Environment Statement for Keadby.

	• *Amine (as MEA) cumulative maximum 1-hourmean PC (µg/m3) = 0.24 (PCC) + 25.2 (Keadby 3) = 25.44 µg/m3* • *Amine (as MEA) cumulative maximum 24-hour mean PC (µg/m3) = 0.06 (PCC) + 0.22 (Keadby 3) = 0.28 µg/m3* • *Nitrosamine (as NDMA) cumulative maximum annual mean PC (ng/m3)= 0.017 (PCC) + 0.064 (Keadby 3) = 0.081 ng/m3 "* 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. For Amines, the Keadby figure is between four and ten times that given for Drax, and for Nitrosamines, the ratio is just under four. I do not have the expertise to argue that the figures for the Proposed Scheme (Drax) are wrong, but request that ExA 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
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 **Part II: Natural England's detailed advice Table 1**		
4.1 Key Issue 19	**Internationally designated sites** • Lower Derwent Valley SAC • Lower Derwent Valley Ramsar **Issue Summary** Impacts of acid deposition from aerial emissions on Lower Derwent Valley SAC / Ramsar designated features (alone and in-combination) **Natural England Commentary:** 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.	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. 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.

	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. Natural England are waiting for an updated air quality assessment including additional emissions reductions, which is currently being prepared by the Applicant. 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). 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. 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).	

	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.	
4.2 Key Issue 20	**Internationally designated sites:** • Thorne Moor SAC • River Derwent SAC **Issue Summary:** Impacts of nitrogen deposition from aerial emissions on Thorne Moor SAC (in-combination) and River Derwent SAC designated features (alone and in- combination). (O) **Natural England Commentary:** Thorne Moor SAC 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. Natural England are waiting for an updated air quality assessment including additional emissions reductions, which is currently being prepared by the Applicant. 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	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. 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. 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

	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. 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 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. <u>River Derwent SAC</u> At this stage, Natural England's position broadly remains as set out in our Relevant Representations Version 1.2 (AS-011). Natural England are waiting for an updated air quality assessment including additional emissions reductions, which is currently being prepared by the Applicant. 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	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. 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 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.

	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. 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. 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). 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.	
4.3 Key Issue 21	**<u>Internationally designated sites:</u>** • <u>Thorne Moor SAC</u> **Issue Summary:** Impacts of ammonia from aerial emissions on Thorne Moor SAC designated features (in-combination). (O) **Natural England Commentary:**	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. This demonstrates that with the revisions to the dispersion (air quality) modelling as set out in the Note, there is no longer predicted to be an exceedance of the 1% screening criterion for

	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. 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/m^3 in-combination and there is no declining trend. 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. 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 proposed mitigation measures and a detailed monitoring plan). 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.	ammonia concentrations, either alone or in-combination. As such, LSE are no longer predicted to arise in relation to the effects of the Proposed Scheme on concentrations of ammonia. 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.

4.4 Key Issue 22	**Internationally designated sites** • Lower Derwent Valley SAC and Ramsar • Thorne Moor SAC • River Derwent SAC • Skipwith Common SAC **Issue Summary:** 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) **Natural England Commentary:** Natural England welcomes the further information provided on the proposed operational emissions abatement 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). 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. The reduction in permitted concentrations of sulphur dioxide is noted, and that the realistic worst-case scenario is based on these revised permit limits. 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	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. 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) modelling which predicts reduced impacts on European Sites. 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.

	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. 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. 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). 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.	
4.5 Key Issue 27	**Internationally designated sites** • Humber Estuary SPA • Humber Estuary Ramsar **Issue Summary:** Impacts from potential loss of functionally linked land (Construction phase) associated with Humber Estuary SPA/Ramsar in the overhead line (OHL) and	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. 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

	Telecommunications line (T CL) Order Limits for Proposed Change 02 (PC-02). **Natural England Commentary:** 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). Table 6-1 Environmental Appraisal for PC-02 (8.5.1 Proposed Changes Application Report) states that *"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."* 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. 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	functionally-linked land. This is because Work Number 8 includes negligible potential for permanent habitat change, with all habitats present to be reinstated following the proposed undergrounding works. It would therefore not be possible for Work Number 8 to trigger loss of functionally-linked land. 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.

	Ecological Data Centre), in addition to a desk-based assessment of aerial photography, mapping, habitat maps and relevant ecological literature, where appropriate. 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 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. Natural England advises that the requirement for additional mitigation measures will depend on the outcome of the assessment.	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): **Page 28**: *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. 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. 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.* **Page 42 to 43:** *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*

[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

		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 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. 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 Statement[2] 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 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. The Applicant notes and agrees with the findings of the SEGL HRA at **Page 42 and 43**, which state: *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*

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

		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. *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 Derwent Valley SPA / Ramsar regarding visual and noise disturbance to birds using FLL.* 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. 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 Council[3].

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

4.6 Key Issue 24	**Nationally Designated Sites:** • Barn Hill Meadows SSSI, • Breighton Meadows SSSI • Derwent Ings SSSI **Issue Summary:** Impacts of acid deposition from aerial emissions on Barn Hill Meadows SSSI, Breighton Meadows SSSI, Derwent Ings SSSI (alone and in- combination) (O). **Natural England Commentary** 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. Our advice regarding the potential impacts of acid deposition from aerial emissions of on the Breighton 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). 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 appropriate for the same habitat type as a result of the level of designation that site has received.	Please see the Applicant's response within this document to Response Reference 4.1.

	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 (Breighton Meadows SSSI and Derwent Ings SSSI). 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).	
4.7 Key Issue 25	**Nationally Designated Sites** **Issue Summary:** 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) **Natural England Commentary:** Our advice regarding the potential impacts of nitrogen deposition from aerial emissions upon the Thorne, Crowle 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). 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.	Please see the Applicant's response within this document to Response Reference 4.2.

4.8 Key Issue 26	**Nationally Designated Sites:** • Barn Hill Meadow • Breighton Meadows SSSI • Derwent Ings SSSI • Melbourne and Thornton Ings SSSI • Thorne, Crowle, and Goole Moors SSSI • River Derwent SSSI • Skipwith Common SSSI **Issue Summary:** Proposed mitigation for impacts of aerial emissions on Barn Hill Meadows, Breighton Meadows SSSI; Derwent Ings SSSI; Melbourne and Thornton Ings SSSI; Thorne, Crowle, and Goole Moors SSSI; River Derwent SSSI; and Skipwith Common SSSI. (O) **Natural England Commentary** Our advice regarding proposed mitigation for impacts of aerial emissions on Breighton 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).	Please see the Applicant's response within this document to Response Reference 4.4.

	This assessment should also consider additional relevant nationally designated site Barn Hill Meadows SSSI. 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).	
4.9 Key Issue 28	**Nationally designated sites:** • Humber Estuary SSSI **Issue Summary:** 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). **Natural England Commentary:** 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). Natural England advises that the requirement for additional mitigation measures will depend on the outcome of the assessment.	Please see the Applicant's response within this document to Response Reference 4.5.
4.10 Key Issue 9	**Protected Species:** Badger (C) **Natural England Commentary:**	The Applicant notes and is grateful to Natural England for confirming agreement to the proposed scope of pre-construction surveys for Badger.

	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). Natural England is now satisfied that pre-construction surveys proposed in relation to badger are appropriate. 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. We advise that the requirement for a draft licence application will depend on the outcome of the badger surveys. Natural England advises that the requirement for a draft licence application will depend on the outcome of the pre-construction badger surveys. The surveys specified in E3 of the REAC must be included in the CEMP and rigorously implemented.	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 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.
4.11 Key Issue 11	**Biodiversity Net Gain** **Issue Summary:** Additional information required in order to demonstrate that a 10% biodiversity net gain will be achieved (C). **Natural England Commentary:** 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.	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. The Applicant continues to engage with Natural England regarding the BNG assessment work, and is in the process of updating the S106 agreement for the Proposed Scheme to reflect the

	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). We highlight that Natural England's previous advice (as detailed in our Relevant Representations (AS-011)) should be considered when updating the BNG strategy. 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-site) must be legally secured and maintained for the minimum 30 year period. 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).	latest updates to the proposals for achieving 10% BNG and to secure its delivery. An updated S106 Legal Agreement is submitted at Deadline 3. 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.
4.12 Key Issue 12	**Biodiversity Net Gain**	Please see the Applicant's response within this document to Response Reference 4.11.

	Issue Summary: River BNG units achieve no get gain in either of the scenarios currently presented. **Natural England Commentary** 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. Natural England's advice regarding the mechanism for securing relevant BNG measures coincides with the above advice (Natural England key issue reference 11).	
4.13 Key Issue 14	**Biodiversity Net Gain** **Issue Summary:** 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) **Natural England Commentary:** 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	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. 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: *Government response and summary of responses document (updated 21 February 2023) relating to Defra's Consultation on Biodiversity Net Gain regulations and Implementation*

	provided by Natural England in our Relevant Representations Version 1.2 (AS-011). 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. However, the currently proposed approach does not align with the discretionary advice provided by Natural England to 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. We highlight that this advice is in line with the *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."* 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 *""On-site" includes all land within the boundary of a project. In a planning context, this usually means within a red line boundary."* 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.	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). 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.
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 BI0.1.14 in Table 2 (above), we highlight that consideration should be given to the phrase 'substantially in accordance with…' in this context.	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 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)	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). 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).	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. 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).

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)	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. 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 Development proceeds in consultation and agreement with National Highways	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.

	and with the appropriate protections in place, as set out in this submission.	
5.2	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. The draft DCO does not include any protective provisions for the benefit of National Highways. 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: • 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; • Detailed design information to appropriately consider and approve the specification of works in accordance with technical standards; • Appropriate maintenance obligations and defects liability periods;	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. 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. 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.

	• 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. 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 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. 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.	

6. ENVIRONMENT AGENCY

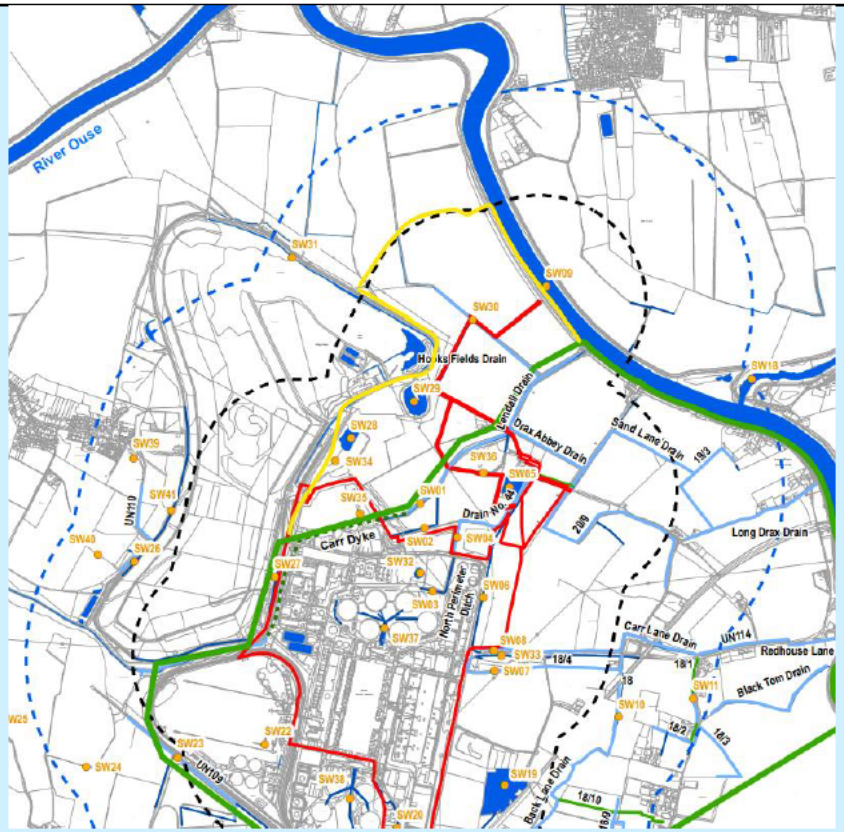
Table 6-1 – Environment Agency

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
6.1 (para 4)	Biodiversity Net Gain Assessment 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 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. 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. Furthermore, discussions on this matter continue with both the EA and NE.

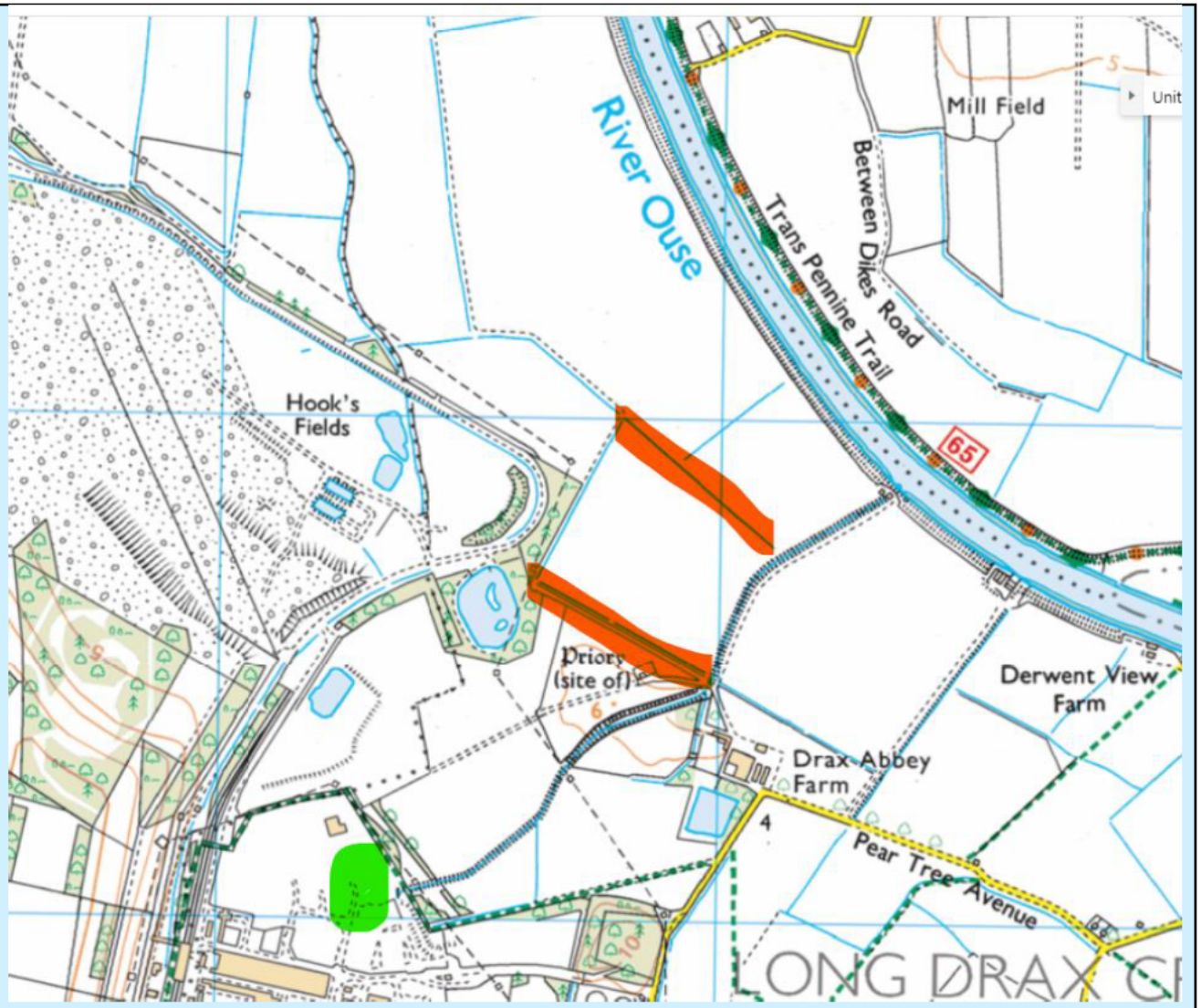
	the Environment Agency has no mandated role for BNG, we are well placed to help ensure biodiversity net gain embeds successfully.	
6.2 (para 5)	Schedule 2 Requirements Additional text in Requirement 11 We have discussed with the Applicant how to provide reassurance that there is an effective mechanism 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	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 pro-actively 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.

	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.	
6.3 (para 6)	Register of Environmental Actions and Commitments WE14 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 REAC to be amended	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.

	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:



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:



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 the yellow area and the only works proposed north of the Carr Dyke are as follows: 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. 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 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. 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).

7. JUST TRANSITION WAKEFIELD

Table 7-1 – Just Transition Wakefield

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
7.1 (3.3)	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. *Assessing credible maximum scenarios for nationally significant infrastructure projects, new settlements or urban extensions* *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.*	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. 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. 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. The FRA and the DCO also provide for further steps to be taken if the design life extends beyond 25 years.

	In other cases, such as new settlements or significant urban extensions, you may also need to assess the flood risk from a high impact climate change scenario. In these circumstances you should use: • *the H++ climate change allowances for sea level rise* • *the upper end allowance for peak river flow* • *the sensitivity test allowances for offshore wind speed and extreme wave height* • *an additional 2mm for each year on top of sea level rise allowances from 2017 for storm surge* *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.* 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.	
Regulation and monitoring		
7.2 (6.3.1 – 6.3.2)	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. 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.	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). 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 "*To summarise, measurement of nitrosamines in the ambient air at the levels expected around CCS processes (sub ng/m3) appears possible but difficult (considering issues such as humidity and breakthrough) at the present time*" (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.

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.	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. 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 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”. 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. 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. 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. 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. 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

[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.

		peak month of construction during the overall construction programme (Chapter 5 (Traffic and Transport) (APP-041)). The construction, operation and decommissioning of the Proposed Scheme would generate direct, indirect and induced jobs. 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.
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 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. 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. The Applicant has set itself a challenging ambition of sourcing 80% of construction materials domestically and has engaged suppliers nationally through a series of supplier events held in 2022 in an effort to realise this aim. 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. 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.
8.3 (A4 and A5)	Leeds Trades Union Council raised concerns around the vagueness of jobs protections, failure to consider comparison scenarios and the climate jobs we really need.	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 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. 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. 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.

9. BIOFUELWATCH

Table 9-1 - Biofuelwatch

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
Flood Risk and Water Environment		
9.1 **(Paragraph 387)**	Biofuelwatch raised concerns in relation to the management of surface water run-off and drainage systems.	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. 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. 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 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.
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.	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. 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 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. 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.
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 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. 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.
9.6 **(Paragraph 404)**	Biofuelwatch raised concerns in relation to the reasonable worst case scenario.	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 9[6]: 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 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

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

		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.

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)	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. 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. This submission is made on behalf of NGET in response to the Examining Authority's (**ExA**) examination timetable. For the purposes of the Planning Act 2008 and section 127, NGET is a statutory undertaker and the land 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.	NGET's position is understood, and the Applicant is actively engaging with NGET's lawyers to agree appropriate protective provisions.

	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.	
NGET'S APPARATUS		
10.2 (2.1 - 2.7)	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. The details of the electricity assets are as follows: • 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 and 2; and 4VJ001-4VJ003A AND SPAN 400kV Drax to Eggborough 1 and 2 As noted in NGET's relevant representation, the DRAX4 (400kV) Substation (**the Drax Substation**) has been designated as a Critical National Infrastructure (**CNI**) site. 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. 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.	The protective provisions being negotiated with NGET include protection for SEGL2.

	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. 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 – 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.	
Protective Provisions		
10.3 (3.1 - 3.5)	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. 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. 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. 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.	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.

	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.	
Compulsory Acquisition Powers		
10.4 (4.1 - 4.5)	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). 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. 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. 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 detriment to NGET's undertaking. The same considerations apply to plots 01-20, 01-22 and 01-25.	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. With those provisions in place, the Applicant considers that NGET will not suffer serious detriment to the carrying on of its undertaking. 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

	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.	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. 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. 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. The land included within the Order Limits has been incorporated to account for the different design 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.

11. CLIMATE EMERGENCY POLICY AND PLANNING (CEPP)

Table 1111.1 – Climate Emergency Policy and Planning (CEPP)

Response Ref. (Location in Original Submission)	Comment	Applicant's Response
11.1 (Summary Paragraph 1 and 2)	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. 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.	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. 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, CO_2 is removed from the atmosphere, and when this biomass is combusted, this CO_2 returns to the atmosphere. Therefore, there is no net change in CO_2 in the atmosphere due to the combustion of the biomass.

11.2 (Summary Paragraph 3 and 4)	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. 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. 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, but regrowth is uncertain and takes time, decades to a century or more. The science appended shows, then, that the transboundary, long-term impacts on the global carbon cycle of the LULUCF	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 (https://www.drax.com/northamerica/sustainability/sustainable-bioenergy/sourcing-sustainable-biomass/). This data has been applied to the do nothing and do something scenarios to quantify emissions from the biomass supply chain. 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. 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 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

	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. 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 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. 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	Scheme, and therefore cannot be an upstream effect or implication of the Proposed Scheme. 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. 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 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. 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.

	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. 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 under the 2017 regulations, and for the Secretary of State to be able to make a determination under section 104 of the 2008 Act.	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: • 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 biogenic sources, such as biomass, where emissions are rated as zero. • 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

		This means there is no 'error' within the GHG assessment presented in Chapter 15 (Greenhouse Gases) (APP-051). 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).
11.3	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	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).

	statements, for decision making on the application. 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 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.	

APPLICANT'S RESPONSES TO ISSUES RAISED AT DEADLINE 2

APPENDIX A

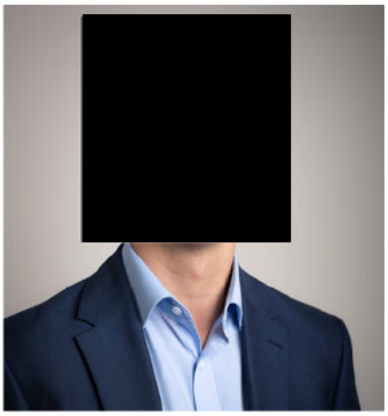
Drax Bioenergy with Carbon Capture and Storage

JUNE 2019

REA POSITION PAPER

GOING NEGATIVE:
Policy Proposals for UK Bioenergy with Carbon Capture and Storage (BECCS)

RENEWABLE ENERGY ASSOCIATION



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/CO_2 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.

KEY MESSAGES

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 2050[i]. BECCS could play an important role in doing this cost-effectively whilst providing wider co-benefits, with the potential to abate around 51 $MtCO_2yr^1$ of the projected 90 - 130 $MtCO_2yr^{-1}$ 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 CO_2 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 $MtCO_2yr^{-1}$) 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/CO_2 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 CO_2 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 CO_2 from the flue gases. Pre-combustion capture is also possible on specially designed plants[vii]. In the case of biofuel production, CO_2 is captured directly from processes like fermentation as an off-gas; whereas in anaerobic digestion CO_2 is separated from biogas in the process of upgrading it to biomethane.

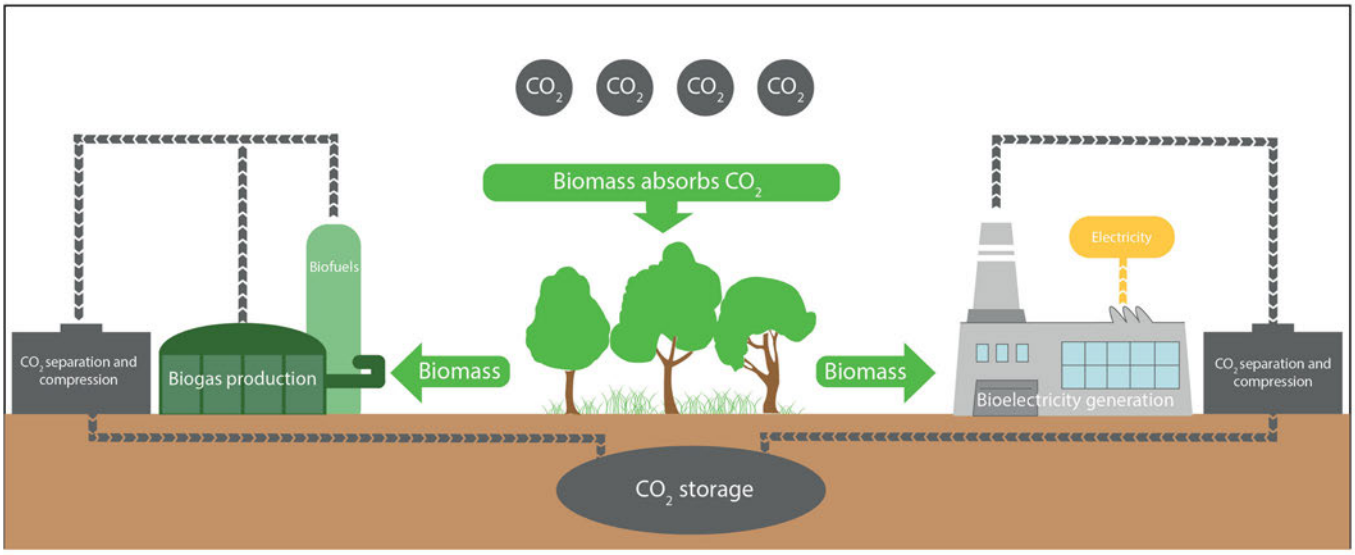


Figure 1 (above): Diagram showing three BECCS pathways, biogas-CCS, biofuel-CCS and bioelectricity-CCS © REA 2019[viii].

BECCS features prominently in the climate debate because of its potential to deliver negative emissions - removing more CO_2 from the atmosphere than is released via the bioenergy process (combustion, fermentation or digestion). This is possible because the biomass used as fuel fixes CO_2 from the atmosphere during growth. When it is then processed this same CO_2 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 $MtCO_2yr^{-1}$ [xvi]. This is because there will be an estimated 'residual' of emissions (90 - 130 $MtCO_2yr^{-1}$) 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 CO_2 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/tCO_2[1], 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 CO_2 transport and storage as well as a CO_2 emissions charge (despite their use of biogenic fuel) which applies to the residual 10% not captured[2]. 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 CO_2 emitted and change this to a payment for every tonne of biogenic CO_2 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 CO_2 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 available[4].

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 CO_2/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 $MtCO_2yr^{-1}$) to 2050 BECCS targets (50 $MtCO_2yr^{-1}$), 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 CO_2/MJ compared to 79g CO_2/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 CO_2 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 sectors[5]. 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. CO_2 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/tCO_2, comprised of the European Emissions Trading Scheme (EU ETS) element at £24/tCO_2 and the domestic Carbon Price Support (CPS) at £18/tCO_2[6]. 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 carbon[7].

[5] It is also the case that CCS costs must be compared against the cost of avoided CO_2 (see Roussanaly, S. [2019] 'Calculating CO_2 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 ETS[8]. 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 price[9] of around £50/tCO_2 from 2020 with a range of £40 - 100tCO_2e depending on the sector in which it is applied[xli]. 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 tCO_2 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[xlii].

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 BECCS[10]. 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/CO_2 in 2050[xliii]. 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 emissions[11]. 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[xliv]. 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 replacement[12]. 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 Pot[13].

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 CO_2. The value of the allowances could be tiered depending on whether the CO_2 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 CO_2 at $50 and $30/tonne, respectively[xlvi]. For the capture and storage of CO_2 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 bioenergy[14].

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 CO_2e mitigated under the fossil baseline (94.1 gCO_2e/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 consequences[15]. 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[xlvx]. 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.

CO_2 transport and storage infrastructure

CO_2 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 achieved[l]. 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 CO_2 infrastructure is deployed at scale, the earlier CCS can be deployed cost effectively[li]. 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 CO_2 per annum in 2030 rising to 20 Mt CO_2 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 CO_2 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 CO_2 per annum in 2030 rising to 20 Mt CO_2 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 CO_2 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 CO_2 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/CO_2 from 2020. A clear trajectory should be given until at least 2035, when prices should be around £80t/CO_2. The Government should also consider the creation of an 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.

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For further information please contact:

Samuel Stevenson
Policy Analyst - Bioenergy, REA
[redacted]

Mark Sommerfeld
[redacted]

Lindsay Barnett
Head of Membership, Marketing & Events
[redacted]

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RENEWABLE ENERGY ASSOCIATION
GROWING THE RENEWABLE ENERGY & CLEAN TECH ECONOMY

REA, 80 Strand, London, WC2R 0DT