



# Environmental Audit Committee

House of Commons, London SW1A 0AA

020 7219 8890 - [eacom@parliament.uk](mailto:eacom@parliament.uk) - [www.parliament.uk/eacom](http://www.parliament.uk/eacom) - [@CommonsEAC](https://twitter.com/CommonsEAC)

Rt Hon Kwasi Kwarteng MP  
Secretary of State for Business, Energy and Industrial Strategy  
Department for Business, Energy and Industrial Strategy  
1 Victoria Street  
London SW1H 0ET

*Sent by email only*

28 March 2022

Dear Secretary of State –

## **Technological Innovations and Climate Change: Negative Emissions Technologies (NETs)**

The Environmental Audit Committee has been examining the potential role and contribution of negative emissions technologies in supporting the UK Government's targets to reach net zero carbon emissions, as part of the Committee's continuing inquiry into *Technological Innovations and Climate Change*. The Committee is aware of the possible contribution of a range of technologies, as well as of nature-based solutions, but this inquiry has focused largely on engineered greenhouse gas removals concerning Bioenergy with Carbon Capture and Storage (BECCS) and Direct Air Carbon Capture and Storage (DACCS) as these have been cited as the most viable by the Committee on Climate Change (CCC) and in the UK Government's own Net Zero Strategy.

Our call for evidence, issued in September 2021, resulted in over fifty responses, including a response from your Department.<sup>1</sup> We also held two oral evidence sessions on this topic on 25 November 2021 and on 5 January 2022, at which we heard from with 13 witnesses, including academic researchers, industry representatives, the CCC, and other key stakeholders.<sup>2</sup> The wide range of evidence we have suggests that there is a lively debate about the role and potential contribution of NETs to achieving net zero.

I am now writing to indicate a number of issues raised in the evidence that we have received, on which the Committee seeks clarification as to the Government's approach.

### **1. The contribution of NETs in reaching net zero**

The Government has committed to reducing CO<sub>2</sub> emissions to net zero by 2050: the pathway to this has been laid out in the Net Zero Strategy published in October 2021. In the Strategy, the Government says that engineered greenhouse gas removals, or negative emissions technologies, 'must not be pursued as a substitute for decisive action across the economy to reduce emissions, often referred to as mitigation deterrence'.<sup>3</sup> **The Committee supports this approach.**

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<sup>1</sup> The responses to the call for evidence are [published on the Committee's website](#).

<sup>2</sup> The transcripts of the evidence sessions are [published on the Committee's website](#).

<sup>3</sup> UK Government, [Net Zero Strategy](#), p.187.

The Government's ambition is that 5 MtCO<sub>2</sub> emissions per year by 2030 are removed through engineered solutions, rising to 23 MtCO<sub>2</sub> by 2035 and reaching up to 81 MtCO<sub>2</sub> by 2050. In the evidence we received, it has been repeatedly noted that such removals targets should be entirely separated from emissions reduction that might otherwise be offset or slowed down due to a focus on NETs.<sup>4</sup>

**The Committee believes that there is a strong case for establishing separate targets for emissions reductions and for removals attributable to NETs. Please therefore:**

- **explain the rationale for combining reductions targets with removals targets as part of the Net Zero Strategy;**
- **review the Government's approach, in the light of the evidence the Committee has received, and**
- **set out the steps the Government plans to take to ensure that progress on achieving emissions reductions is not compromised because of focus on engineered reductions.**

Pathways for reaching net zero emissions frequently rely on BECCS and DACCS. In our evidence, we heard some concern about the development of these technologies to date. For example, Dr Steve Smith (CO2RE, University of Oxford) pointed out that "all of these are at zero or close to zero levels of deployment, certainly in the UK, arguably with the exception of planting trees, but even there the Government have a policy and targets that we are not meeting".<sup>5</sup> Others pointed out that BECCS and DACCS "might not deliver" and described the technology as "nascent" and "highly uncertain".<sup>6</sup> By contrast, we have also heard from industry representatives that the barriers to deployment are not technological but economic, and that these are not "risky" technologies.<sup>7</sup>

**Please therefore:**

- **explain why the Government considers it appropriate to rely on NETs as a principal element of the net zero pathway;**
- **outline how the Government will monitor the effectiveness of NETs, and**
- **indicate what (if any) safeguards or alternatives the Government envisages to reach net zero if NETs do not deliver the anticipated outcomes.**

## ***2. Support for the rollout and development of NETs***

A key theme from our written and oral evidence is the level of support required for NETs. This falls within two broad areas: (i) economic support for developing markets; and (ii) political and societal support for the use of NETs in reaching net zero.

Industry representatives stressed to us that economic support in this area is their "number one ask": specifically, industry is keen for financeable revenue streams to be established so as to bring private infrastructure investors on board.<sup>8</sup> The Carbon Capture and Storage Association emphasised the importance of confirming funding for business models within the next 12 months,

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<sup>4</sup> [NETS0043](#) (Green Alliance); Q83, Q138, and Q161, [HC 738](#), 5 January 2022.

<sup>5</sup> Q4, [HC 738](#), 25 November 2021.

<sup>6</sup> See, respectively: Q91, Q106 and Q152, [HC 738](#), 5 January 2022. This was also raised in written evidence. See, for example, [NETS0043](#) (Green Alliance) and [NETS0048](#) (Neil Grant).

<sup>7</sup> Q93, [HC 738](#), 5 January 2022.

<sup>8</sup> Q146, [HC 738](#), 5 January 2022.

otherwise the UK will “lose our advantage in terms of being a world leader in this”.<sup>9</sup> In the written and oral evidence received are several proposals to support the establishment of a market to overcome this barrier to NETs deployment. One is to include NETs as part of the UK Emissions Trading Scheme: a commitment to consider this was included in the Net Zero Strategy.<sup>10 11</sup> A second is to implement a contract for difference (CfD) approach for NETs based on carbon pricing.<sup>12</sup>

**Please set out in response the progress made to date in the development of economic support for further development and rollout of NETs, with particular reference to the expansion of the UK ETS to include NETs and the introduction of a CfD approach to support for NETs.**

The Tyndall Centre for Climate Change Research explained to us that, in order for NETs deployment to be effective and sustainable, explicit consideration of the social, political and equity issues was essential, but that these were routinely excluded from climate assessments and decision-making processes. As a result, technologies may not be deployed in a fair and equitable way.<sup>13</sup> This view was echoed in other written submissions, such as from Professor Nick Pidgeon (Cardiff University), Dr Rob Bellamy (University of Manchester) and Neil Grant (Imperial College London).<sup>14</sup> In oral evidence, our witnesses also highlighted the importance of public engagement. Dr Steve Smith (CO2RE, University of Oxford) explained that “there are some limited studies of what the public think about removals. ... in the detailed work that has been done ... people view this as not solving the root cause of the problem, which is emissions”.<sup>15</sup> The consensus from across our written and oral evidence has been, as Dr David Joffe explained to us, that “there needs to be a strategy from the Government to make sure that people understand [the role of NETs]”.<sup>16</sup>

**Please set out the Government’s strategy for public engagement over the role of engineered NETs in reaching net zero, and how it is intended to mitigate any public concern around the use of NETs.**

### **3. Transport and storage infrastructure**

A key theme from our evidence concerns the development and integration of the transport and storage infrastructure required to deliver the UK Government’s targets for engineered greenhouse gas removals. Among the evidence received, there is great consensus that the UK is well situated to deliver NETs, given its access to some of the best offshore geological storage in Europe, as your Department said in its written evidence to the Committee.<sup>17</sup>

The Committee observes that there are significant opportunities for the UK economy if the UK takes the lead on delivering NETs. Indeed, the evidence suggests that the UK could have comparative advantage in this area and should be a key priority.<sup>18</sup> While the Carbon Capture and

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<sup>9</sup> Q33-34, [HC 738](#), 25 November 2021.

<sup>10</sup> [NETS0045](#) (Storegga); [NETS0011](#) (Rolls Royce); [NETS0041](#) (SSE plc); Q161, [HC 738](#), 5 January 2022.

<sup>11</sup> UK Government, [Net Zero Strategy](#), p.42.

<sup>12</sup> Q16, [HC 738](#), 25 November 2021; [NETS0021](#) (Carbon Engineering); Q146 and Q162-64, [HC 738](#), 5 January 2022.

<sup>13</sup> [NETS0025](#) (Tyndall Centre for Climate Change Research).

<sup>14</sup> [NETS0052](#) (Professor Nick Pidgeon); [NETS0012](#) (Dr Rob Bellamy); [NETS0048](#) (Neil Grant).

<sup>15</sup> Q38, [HC 738](#), 25 November 2021; see also Q119, Q173 and Q174, [HC 738](#), 5 January 2022.

<sup>16</sup> Q158, [HC 738](#), 5 January 2022.

<sup>17</sup> [NETS0010](#) (BEIS).

<sup>18</sup> Q23, [HC 738](#), 25 November 2021; Q157, [HC 738](#), 5 January 2022..

Storage Association told us that the Government is currently taking the right approach with the Carbon Capture Utilisation and Storage (CCUS) clusters, progress needs to be made more quickly, and more clarity is needed over track 1 and track 2 clusters.<sup>19</sup> This was echoed by other industry representatives.<sup>20</sup>

**Please provide an update on progress on the Government’s investment in transport and storage infrastructure projects, and in particular further clarity over the role of track 1 and track 2 clusters, together with a more detailed timeframe and delivery plan for the development of these projects.**

#### **4. Monitoring, reporting and verification (MRV) of NETs**

The requirement for robust systems to monitor, report and verify the contribution of NETs in capturing, storing and removing CO<sub>2</sub> was consistently referred to in evidence.

The Government has said that monitoring, reporting and verification (MRV) is essential to the deployment of NETs at scale.<sup>21</sup> The Committee welcomes this recognition.

Several issues around MRV have nevertheless been raised in the evidence received:

- The Committee heard that, while international accounting rules and standards currently exist for DACCS or are in development, a framework has not yet been introduced for the UK. This has been cited as a barrier to development of the technology.<sup>22</sup> We have also received evidence raising questions about the potential efficiency of the proposed BECCS powerplant.<sup>23</sup> More generally, we heard that while some technologies like BECCS and DACCS, which produce a gaseous or liquid flow of CO<sub>2</sub>, can be monitored, it is not clear how the contribution of other technologies (for instance, enhanced weathering and biochar) to producing negative emissions can be monitored and their contribution verified.<sup>24</sup> **Please provide an update on the monitoring, reporting and verification (MRV) processes which are currently being developed, or have been developed, for the range of NETs technologies currently considered for deployment under the Net Zero Strategy.**
- **Regulation for the safe and secure storage of CO<sub>2</sub>.** Alongside the potential strengths of transport and storage infrastructure for the UK, as described above, we have heard a small number of concerns about the safety and security regarding storage sites and pipelines.<sup>25</sup> Dr David Joffe of the CCC told us that the accurate monitoring and verification of CO<sub>2</sub> flowing into storage was important.<sup>26</sup>

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<sup>19</sup> Q22, [HC 738](#), 25 November 2021.

<sup>20</sup> Q146, [HC 738](#), 5 January 2022..

<sup>21</sup> UK Government, [Net Zero Strategy](#), p.187.

<sup>22</sup> Q135, [HC 738](#), 5 January 2022.

<sup>23</sup> Q55-56, [HC 738](#), 25 November 2021; Drax have explained their efficiency in supplementary evidence to us ([NETS0054](#) (Drax)).

<sup>24</sup> Q47, [HC 738](#), 25 November 2021; Q175.

<sup>25</sup> Q119, [HC 738](#), 5 January 2022; though see Q26, [HC 738](#), 25 November 2021.

<sup>26</sup> Q175, [HC 738](#), 5 January 2022.

**Please clarify the assurances the Government has in place to ensure that captured CO<sub>2</sub> will be stored securely, safely and permanently at proposed UK offshore sites, and explain how these assurances will be reviewed as monitoring, reporting and verification (MRV) procedures for NETs are developed and implemented.**

- A more general point arises about the role of MRV in the design and implementation NETs as part of the UK's net zero ambitions. Specifically, questions have been raised about the arrangements for accountability for the performance of NETs if the technologies do not deliver the outcomes required: who will be held to account if technologies or companies do not deliver, and what mitigation measures may need to be put in place? **Please explain how the Government plans to ensure that MRV processes provide accountability for the performance of these technologies, and how Ministers will ensure that the development and deployment of such technologies is in line with public expectations for their use in reaching net zero.**
- A significant area of concern brought to the Committee's attention regards the sustainability of biomass feedstocks used for BECCS, specifically the import of biomass for the proposed Drax plant.<sup>27</sup>
  - *The sustainability of biomass and particular types of feedstocks:* while Drax has clarified that it is to use thinnings and low-grade roundwood, others have expressed concern that the demand for biomass will increase with the growth of BECCS and also from other countries looking to deliver NETs. This will place increasing pressure on the availability of biomass for BECCS, alongside concerns over changes in land use change and the consequent potential impact on levels of global biodiversity.<sup>29</sup>
  - *The source of biomass for BECCS:* at present, the majority of fuel for the proposed Drax BECCS plant is sourced internationally. The UN accounting rules for imported biomass assume it to be carbon neutral on entering the UK. Such an approach does not encompass the whole lifecycle of the biomass feedstock, such as transportation emissions and loss of carbon stocks. Evidence the Committee received also raised concerns over the degree to which reliance for accurate reporting of these emissions is placed on the exporting/originating country. This raises questions over industry claims that BECCS will be carbon neutral.<sup>30</sup> The CCC's Dr David Joffe told us that the UK should not rely on biomass imports for BECCS.<sup>31</sup>

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<sup>27</sup> [NETS0019](#) (Ember); [NETS0024](#) (Dr Daniel Quiggin), [NETS0018](#) (RSPB), [NETS0030](#) (BIOFUELWATCH).

<sup>28</sup> Q72, Q66, Q80, [HC 738](#), 25 November 2021

<sup>29</sup> Q158, [HC 738](#), 5 January 2022.

<sup>30</sup> Q154, Joffe.

The Committee shares these concerns. Please therefore explain:

- the Government’s policy on the current and future sourcing of biomass for use in BECCS;
- how it is compatible with overall policy objectives on domestic and global biodiversity and carbon neutrality;
- what account the Government takes of the whole lifecycle of biomass feedstock to be used in BECCS installations in the UK;
- how the Biomass Strategy currently in preparation plans to ensure the sustainability of biomass to be used in BECCS;
- the MRV systems to be put in place to ensure that BECCS is robustly and transparently monitored, including in respect of feedstock origins, and
- the actions to be taken in the event that BECCS deployment is shown to be incompatible with the Government’s policy objectives for biodiversity and net zero.

### **5. NETs and other sectors**

NETs overlap with a range of sectors in the UK, not only through supporting decarbonisation across industries, but also in creating a market for the re-use of CO<sub>2</sub> and supporting the creation of other products.

With respect to decarbonisation, the written and oral evidence received was split on the appropriate use of NETs. Some advocated only a very limited use of NETs for the so-called “hard-to-decarbonise” or “hard-to-abate” sectors (i.e. high CO<sub>2</sub> emitting sectors in which decarbonisation solutions are prohibitively expensive or where no other solutions exist).<sup>31</sup> Others have suggested that there are wide-ranging opportunities across sectors to make use of NETs.<sup>32</sup> Professor Jon Gibbins suggested that some industries should be required, or incentivised, to invest in NETs.<sup>33</sup> This suggests that there are important questions about the relationship of NETs to other sectors, and about the current degree of reliance of NETs for achieving net zero.

Please explain:

- the extent to which NETs will be used in abating emissions;
- whether (and how) their use is to be linked across different sectors, and
- whether their use is to be limited to only the very hard-to-abate sectors.

With respect to co-benefits and the re-use of CO<sub>2</sub>, we heard that certain sectors, such as cement and steel, have strong synergies and could be engaged in the co-development of NETs.<sup>34</sup> Carbon Engineering explained their commitment to the development of sustainable aviation fuels (SAFs) to support the aviation industry’s decarbonisation efforts.<sup>35</sup> This echoes the evidence received which explained a possible link between NETs and SAFs.<sup>36</sup> Some witnesses nevertheless counselled caution about the use of captured CO<sub>2</sub>.<sup>37</sup>

<sup>31</sup> [NETS009](#) (Dr Nils Markusson, Professor Rebecca Willis, Dr Duncan McLaren), [NETS0046](#) (Greenpeace UK) and [NETS0043](#) (Green Alliance).

<sup>32</sup> [NETS0036](#) (Carbon Capture and Storage Association), [NETS0047](#) (Coalition for Negative Emissions, Drax).

<sup>33</sup> Q40, [HC 738](#), 25 November 2021.

<sup>34</sup> Q28, [HC 738](#), 25 November 2021.

<sup>35</sup> Q121, [HC 738](#), 5 January 2022.

<sup>36</sup> [NETS0054](#) (Sovacool et al.); [NETS0040](#) (EasyJet).

A wider concern regarding the re-use of CO<sub>2</sub> is its permanence—how quickly captured CO<sub>2</sub> is re-emitted into the atmosphere. Significant concerns were also raised over the re-use of CO<sub>2</sub> for enhanced oil recovery, and witnesses called for this to be ruled out as an option for engineered greenhouse gas removals.<sup>38</sup>

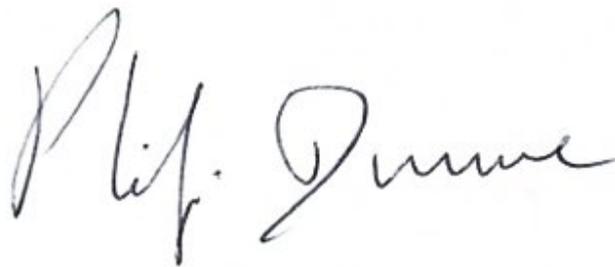
**Please explain:**

- **whether the Government supports the reuse in other applications of CO<sub>2</sub> removed by NETs;**
- **what evidence the Government is relying on in its assessment of the permanence of recovered CO<sub>2</sub>, and**
- **whether the Government supports the use of NETs in enhanced oil recovery, and what assessment Ministers have made of the risks of recovered CO<sub>2</sub> used in such applications returning to the atmosphere.**

I should be grateful for a written response to the questions above, and any further observations you may wish to make, by **Thursday 14 April**. This letter will be published on the Committee's website, and I expect the Committee will also wish to publish your response.

I am copying this letter to the Chair of the Business, Energy and Industrial Strategy Committee, the Chair of the House of Lords Environment and Climate Change Committee and the Chairs of the Science and Technology Committees in both Houses.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Philip Dunne', written in a cursive style.

**Rt Hon Philip Dunne MP**  
**Chair of the Environmental Audit Committee**

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<sup>37</sup> Q42, [HC 738](#), 25 November 2021; Q164 and Q168-69, [HC 738](#), 5 January 2022.

<sup>38</sup> Q127-Q130, [HC 738](#), 5 January 2022; Q17, [HC 738](#), 25 November 2021