**Game & Wildlife Conservation Trust response to the Department for Business, Energy & Industrial Strategy's call for evidence on**

**Greenhouse Gas Removals**
**26th February 2021**

The Game & Wildlife Conservation Trust ("GWCT") welcomes the opportunity to provide evidence to BEIS in relation to Greenhouse Gas Removal technologies. Our areas of expertise (biodiversity, conservation, agri-environment and farming systems) require us to adopt a practical approach this consultation and to consider the questions posed in the context of the wider policy framework of agriculture and the environment. If we are to tackle climate change let's try to do so in a way that preserves peoples livelihoods, produces income and food, and provides habitats for wildlife whilst also storing and protecting our carbon stocks. Not to do so is a missed opportunity.

Whilst, as requested, we have addressed some of the questions posed, we wish to commence by making some general observations.

Although this consultation is not considering evidence or views on afforestation or habitat restoration as these are considered to be 'mature' (we note monitoring, reporting and verification of these methods is and we consider this below) we feel that these two nature-based GGR methods provide some useful guidance on how other nature-based technologies (including engineered options with a land use element) might be accommodated. Firstly our knowledge of ecosystem interactions and responses is not comprehensive and as scientific understanding develops, policy responses need to be adaptive. Monitoring responses to these initiatives, not just in terms of carbon emissions/budgets but also other considerations such as biodiversity impacts (species assemblage changes, habitat fragmentation etc), climate change impacts (albedo, other GHG emissions and feedback cycling effects) and risks to other public goods need to be accounted for.

Secondly restoring woodland (afforestation) and peatland are valuable GGR methods and have wider public good benefits, which reinforces their 'value'. However in both cases on-going management needs to be considered as well. Previous incentives to plant woodland for example have not included pest control or subsequent management (thining, coppicing etc) and so the overall value of the woodlands is lost.

Finally, the finite nature of our land resource as an island nation means that each hectare of land has to work hard to produce multiple goods and services (ecosystem services/public goods/food/housing/transport etc). Pursuing GGR technologies such as BECCS and biochar that demand purpose-grown biomass, and therefore the re-purposing of land (a risk, we acknowledge, that is noted in

the consultation document), is of concern unless it can be demonstrated that multiple goods and services result. We are already seeing this with afforestation where the "right tree in the right place" approach is being promoted to maximise the delivery of more than net zero ambitions and to minimise the risk of planting trees on land that is carbon rich. Delivering multiple goods and services usually involves trade-offs; for example, maximising the biodiversity of a biomass crop may result in lower yielding varieties or less intensive production or focussing on bio-waste generated biochar may limit its adoption potential given environmental risks and competing more efficient uses.

With these points in mind we have answered Q1, Q2, Qs4-6, Q10, Q11 and Q27 (those not answered have been deleted).

1. **Do you give permission for your evidence to be shared with third party contractors for the purpose of analysis?** Yes

2. **Do you agree that some greenhouse gas removal methods will be required to achieve the UK's net zero target by 2050? What are your views on the suitability and mix of different technologies in supporting the delivery of net zero?**

   We agree that GGR methods will be required to achieve 2050 ambitions although they should be seen as an 'insurance' against unforeseen overshoots (such as from climate feedbacks not currently understood) and not a substitute for emission reductions. Agriculture is considered a hard to decarbonize sector but simple land-based small, farm-scale options should be used before nascent technologies such as biowaste or biomass biochar are adopted. In most cases these options are already understood and in practical delivery.

   For example whilst soil carbon sequestration remains an area of debate as to its contribution to future C sequestration given estimates of saturation in 10-20 years, many of the practices thought to increase soil C are already available to farmers and land managers such as cover crops, conservation tillage, improved crop rotations and grazing optimization. Whilst the overall contribution may be small in our opinion focusing on GGR approaches such as this which support other policy ambitions whilst minimizing impacts on other land uses is important now whilst some of the more advance nascent technologies are fully tested.

   Increasing the contribution of soil carbon sequestration to greenhouse gas removal may require it to be combined with other primers such as biochar. Biochar can be created from any plant material including chaff, straw, hedge cuttings and other sources warrant further investigation.

   In addition gene editing could quickly develop deep-rooted crop varieties and develop grassland swards that minimize emissions from livestock.

The current focus on carbon removal technologies has the potential to increase other GHG emissions such as nitrous oxide from increased applications of Nitrogen to biomass crops.

4. **Is there any evidence you would like to submit in relation to other nascent GGR methods not outlined in Figure 1? If so, please provide a clear description of the method and the evidence available in respect to the categories listed above, including deployment potential in the UK. If evidence is not available, please outline why and when it might become available.**

   We propose consideration of two other nature-based GGR methods which are variations on the habitat restoration option:

   ***Upland biochar from managed burning***: Although we are not in a position to provide detailed evidence (as it is not available as the necessary research has not yet been done) we wish to highlight the potential for biochar (pyrogenic carbon) produced in the uplands following prescribed/managed burning. Research is available to demonstrate its value to carbon fluxes in peatlands, both globally and in the UK; see for example:

   - Jones *et al* 2019 "Our results demonstrate that pyrogenic carbon production by landscape fires could be a significant but overlooked sink for atmospheric CO2. " (https://doi.org/10.1038/s41561-019-0403-x )
   - Leifeld *et al* 2017 "Our estimate indicates a substantial and hitherto unquantified contribution of northern peatlands to global PyC storage. " (https://doi.org/10.1002/ldr.2812)
   - Heinemeyer *et al* 2018 looked at the impact of biochar on carbon accumulation within peatlands managed for red grouse. This study, which was the first of its kind in the UK, found a positive relationship between moorland burn frequency and carbon accumulation through time, with charcoal being identified as the key factor behind the relationship. (https://doi.org/10.1002/geo2.63)

   ***Hedgerows***: We believe there is considerable potential to increase the carbon storage capacity of the nation's extensive inventory of hedgerows. Hedgerows are able to sequester carbon at twice the rate of woodland as they capture more sunlight due to their three-dimensional structure. Many of our hedges were removed between the 1950's and the 1990's although since then there has a been a net increase. We should look at the potential to increase the length of our national stock. We should also look at the quality of our hedgerows. Many are flailed down low and are gappy. Simply by allowing hedgerows to expand both upwards and outwards, and filling in the gaps would greatly increase their sequestration potential. Research has also shown that where hedges are layed they increase the density of carbon stored per metre although even when flailed much of the dead wood is stored inside the hedge structure. The

below ground sequestration of carbon is also substantial, accounting for around 40% of the overall biomass. Because hedges grow on land which is not producing food (although they can provide important "services" to adjacent agricultural land through providing shelter or harboring beneficial insects), they also lend themselves to incorporating tree planting along the hedge line. If we were to plant a tree every 20 metres in existing hedge-lines we'd have enough space for 40 million trees with no loss of productive land, even allowing for planting strategies that omit open landscapes and consider other biodiversity requirements – "right hedge, in right place".

5. **What do you consider to be the main barriers to the development and deployment of GGRs?**

   As already stated, the requirement for natural GGR and engineered biochar to work alongside existing land uses and management and the constraints of a finite land resource. We are also concerned that the lead-in time for the development of engineered options may result in undue emphasis on land-based options.

6. **What principles would you like to see included in a framework for incentivisation of greenhouse gas removals?**

   We propose a mitigation hierarchy where GGR approaches are addressed from the bottom up, starting with policy aimed at improving existing management and 'mature' technologies and ending with highly engineered options such as DACCS. This would be accompanied by an appropriate comparative risk assessment for each option – considering the risks as well as benefits and the risks/benefits of action and inaction.

   Above all the principles should ensure that GGR complements existing policy directions such as the 25YEP and SDGs.

10. **Which factors should be considered when assessing the suitability of different policy options for businesses?**

    Need to provide clear and precise templates for nature-based GGR with appropriate supporting natural capital accounting guidance as allowing market to develop without this guidance could see negative consequences such as the re-purposing of highly value land if policy incentives to support GGR has a better gross margin than the original use to which the land was put. Economics should not overwhelm other public good delivery – hence need for natural capital accounting.

    With respect to farming, the suitability of biochar as an option may be improved if it can be combined with energy cogeneration. Smith et al 2019 (https://doi.org/10.1146/annurev-environ-101718-033129) suggested that the use of the permanent pyrogases for heat generation by combustion is useful for many locations where a demand for heat exists

and where fossil energy sources can be replaced, e.g., for drying materials, animal stables, greenhouse or domestic heating. Such an opportunity could be maximised through the development of on-farm biochar pyrolysis units which would encourage the use of biomass (straw, chaff or grain husks, hedge cuttings, thinnings etc) and other bio-waste for energy and biochar production for subsequent use on soil. Their adoption could be encouraged through capital grants.

**11. Are there any existing business models in other sectors – such as power, industry, transport or land use – that could complement new schemes to incentivise GGRs?**

The new ELMS could be used to promote nature-based GGR technologies – indeed many of the soil carbon sequestration options will be supported through this scheme (and were supported in previous incarnations).

**27. What are the most significant barriers to developing a robust monitoring, reporting and verification system for GGRs?**

Given the complexity of nature-based GGR there is a genuine lack of knowledge about how some of the nascent technologies may impact on our ecosystem and therefore our ability to capture all the risks/benefits involved at this stage is limited. This should not however be a hurdle; it should merely encourage continuing research to develop our understanding supported by adaptive, flexible policy approaches with comprehensive monitoring systems in place to capture all possible data. As we stated in the introduction monitoring should not only cover GHG related considerations but also other public goods such as biodiversity and climate change impacts. This is important as we feel any verification system needs to ensure that all policy initiatives are addressed.

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