

Written evidence for:  
Committee for Agriculture, Environment and Rural Affairs  
Northern Ireland Assembly

From:  
Professor Jon (Jonathan) Gibbins  
Professor of Carbon Capture and Storage  
University of Sheffield  
Director, UK CCS Research Centre

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This evidence is being supplied in a personal capacity, from a perspective of experience in the energy field and in approaches to cutting net greenhouse gas emissions to atmosphere, particularly through the use of carbon capture and storage and related technologies such as hydrogen.

### **Evidence on Climate Change (No. 2) Bill [AS INTRODUCED] - NIA Bill 28/17-22**

1. Northern Ireland will need to participate actively in combined activities to achieve the overall UK target of net zero greenhouse gas (GHG) emissions by 2050.
2. It is expected that this UK target is best achieved through collaborative action by all parts of the UK, with appropriate burden-sharing reflecting local factors and with the main source of technical and policy advice on methods and targets coming from the UK's Committee on Climate Change (CCC). The CCC can have oversight of the whole UK situation and can also provide a critical mass of supporting analysis efficiently.
3. A comprehensive analysis of a collaborative 2050 emissions target for Northern Ireland was recently provided in a letter to the Minister of Agriculture, Environment and Rural Affairs from Lord Deben, the Chairman of the CCC, date 1 April 2021. In this letter it was recommended that any climate legislation for Northern Ireland include a target to reduce all GHG emissions by at least 82% by 2050, as part of a fair contribution to the UK's Net Zero target in 2050 and the UK's international obligations under the Paris Agreement.
4. The basis for an 82% reduction in GHG emissions in Northern Ireland, as part of a 100% reduction for the whole UK, was stated to be that the CCC's *"analysis shows that Northern Ireland's position as a strong agri-food exporter to the rest of the UK, combined with more limited capabilities to use 'engineered' greenhouse gas removal technologies, means that it is likely to remain a small net source of greenhouse gas emissions – almost entirely from agriculture – in any scenario where the UK reaches Net Zero in 2050. It is fair that those residual emissions should be offset by actions in the rest of the UK."*
5. Engineered carbon dioxide removal technologies (CDR) principally comprise Biomass Energy with Carbon Capture and Storage (BECCS) and Direct Air Carbon Capture with Storage (DACCS). Both of these technologies involve the removal of CO<sub>2</sub> from the air and its permanent storage a kilometre or more underground in porous rock layers isolated beneath impermeable layers of rock. In BECCS, CO<sub>2</sub>, which has been taken out of the air by plants during photosynthesis, is released when the plants biomass is burnt to generate heat or electricity. The CO<sub>2</sub> can then be captured from the biomass combustion products, purified and compressed, and transported by pipeline, or shipping, to a suitable location, in the UK invariably offshore where it can be stored deep under the sea bed. In DACCS the CO<sub>2</sub> is taken directly from the air by reversible reactions with suitable liquids or solids and, after being released – usually by heating the solid or liquid – is similarly compressed and taken to secure offshore geological storage.
6. The overwhelming majority of the UK's prospective geological storage for CO<sub>2</sub> lies in the North Sea, in areas similar to where oil and gas has been found. There is a limited amount of storage potential in the Irish Sea, but this is expected to be best accessed by pipelines from England and North Wales. Northern Ireland is not, therefore, expected to be able to access secure geological storage sites for CO<sub>2</sub> without an expensive pipeline or the use of ship transport of CO<sub>2</sub> (and the latter still only for coastal locations).
7. But there is no need at all for the engineered CO<sub>2</sub> removals required to indirectly capture and store Northern Ireland's residual CO<sub>2</sub> emissions, and to compensate for the warming effect of other GHGs such as methane and nitrous oxide, to take place in Northern Ireland. The atmosphere is well mixed so the GHG

removal can take place wherever it can be done most effectively, in the UK or indeed in the world, and it also need not take place at exactly the same time as the emissions. The main thing is that the polluter pays for the removal.

8. Currently the expectation is that BECCS and DACCS in the UK will most effectively be sited so as to be able to access the CCS transport and storage infrastructure that is being planned for clusters along the East Coast of Britain and in a cluster in the NW of England. Further details of planned UK CCS initiatives can be found in topical presentations available on the UK CCS Research Centre web site (see <https://ukccsrc.ac.uk/web-series/ukccsrc-summer-2021-web-series/>). BECCS and DACCS can also probably be advantageously integrated, through transfer of heat, power and possibly hydrogen, with other energy intensive processes taking place in the clusters.

9. These limitations on the use of CCS and CDR arise as an inevitable consequence of Northern Ireland's geography and geology, plus the inherently hard-to-avoid nature of emissions arising from agriculture. They provide the justification for the CCC's recommendation of only an 82% reduction by 2050.

10. But although Northern Ireland may not have ready access to a CO<sub>2</sub> transport and storage system it might still be possible for it to participate in UK BECCS activities by shipping biomass to coastal sites around Britain with such access, where the biomass can then be used for power generation or other processes with CCS. Even allowing for the costs and GHG emissions of biomass transport, the substitution of carbon-free energy vectors such as electricity and hydrogen for biomass as an energy source in Northern Ireland, plus the negative emissions associated with capture and storage of the biomass CO<sub>2</sub>, has the potential to give a net overall climate benefit. Any future climate legislation in Northern Ireland should therefore not preclude such activities taking place if they deliver an overall positive climate outcome (see 12 below). A report of shipping waste-derived fuels, which will contain some biogenic material, to combustion facilities that have applied for funding to have CCS retrofitted<sup>1</sup> is given in the Irish News, 25 August 2021<sup>2</sup>. This states that 'RE-GEN Waste has signed a contract which will see the Newry company supply 100,000 tonnes of refuse derived fuel to Oslo', Norway for use in energy-from-waste plants. For international transfers it is necessary to clarify where the credit is taken for the carbon dioxide removal from the atmosphere, in order to avoid double-counting. The carbon accounting is less complex for transfers within the UK, but appropriate regulations and incentives still need to be developed.

11. Also in the future, Northern Ireland can benefit from dispatchable low-emission electricity supplies, via grid interconnectors, from power plants with CCS elsewhere, in order to provide support for intermittent output from local renewable generation sources such as wind and solar. Again, this effective integration should also not be precluded by any Northern Ireland climate legislation.

12. The Bill states the following:

*(3) The Northern Ireland removals of a gas for a period are removals of the gas from the atmosphere in the period due to—*

- (a) land use in Northern Ireland;*
- (b) land-use change in Northern Ireland; and*
- (c) forestry activities in Northern Ireland.*

This list clearly does not include the engineered greenhouse removals that the CCC explicitly states will be required in 2050. As described above, engineered GGR activities could take place in Northern Ireland with the actual removal taking place within the boundaries of Northern Ireland and the CO<sub>2</sub> being shipped, or otherwise transported, elsewhere for permanent storage. Notwithstanding the apparent scope for future changes offered by clause (4) it is strongly recommended that engineered greenhouse gas removals are specifically identified in clause (3) as a valid removal option.

13. While CCC advice is that actions will take place elsewhere in the United Kingdom to compensate for the 18% of residual emissions that an 82% 2050 target for Northern Ireland implies, the CCC letter does not cover the issue of who will pay for the costs of such actions, expected principally to be engineered CDR. In

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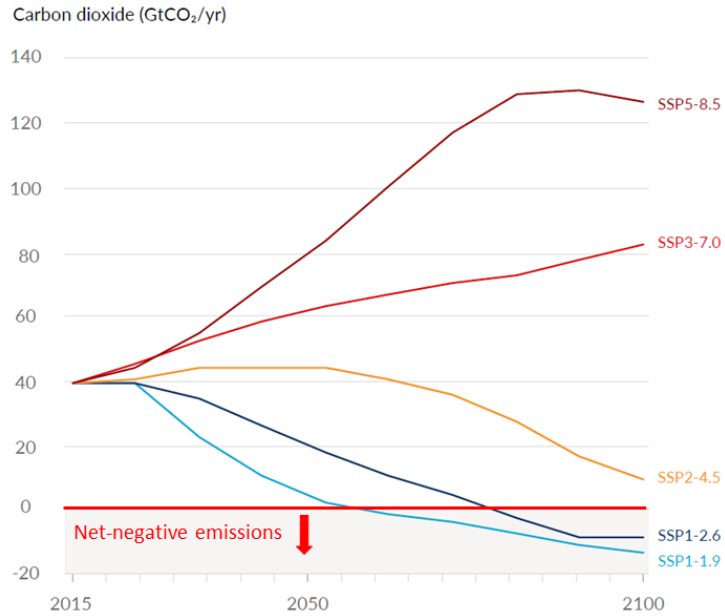
<sup>1</sup> <https://www.fortum.com/media/2018/11/full-scale-carbon-capture-and-storage-ccs-project-initiated-norway>

<sup>2</sup> <https://www.irishnews.com/business/2021/08/25/news/newry-s-re-gen-in-export-fuel-deal-with-norwegian-energy-giant-2426675/>

general, though, these costs should be expected to fall on the emitters, the well-known ‘polluter pays’ principle; to do otherwise is clearly likely to introduce perverse incentives. In all relevant Northern Ireland government policy leading up to 2050 the cost of GHG emissions to atmosphere should therefore be valued at the cost of the necessary compensatory engineered CO<sub>2</sub> removals. Northern Ireland GHG emitters cannot rely on getting a hidden subsidy, in the form of their carbon dioxide wafting across the Irish Sea to be sucked out of the air by CDR facilities in Britain’s CCS clusters, with costs being paid for by some combination of non-Northern Ireland consumers and tax-payers.

14. It is also unfortunately necessary for all UK governments to note the latest advice from the Intergovernmental Panel on Climate Change (IPCC – see below), which shows that very significant net negative emissions are likely to be required in the second half of the century – so within perhaps just 30 years – if dangerous climate change is to be avoided. Northern Ireland’s climate-related policies should reflect the climate science that underlies this likely future net negative requirement and, in particular, not be based on the assumption that an 82% reduction in net emissions within its boundaries is all that will be required in the future if Northern Ireland is to participate in appropriate global action.

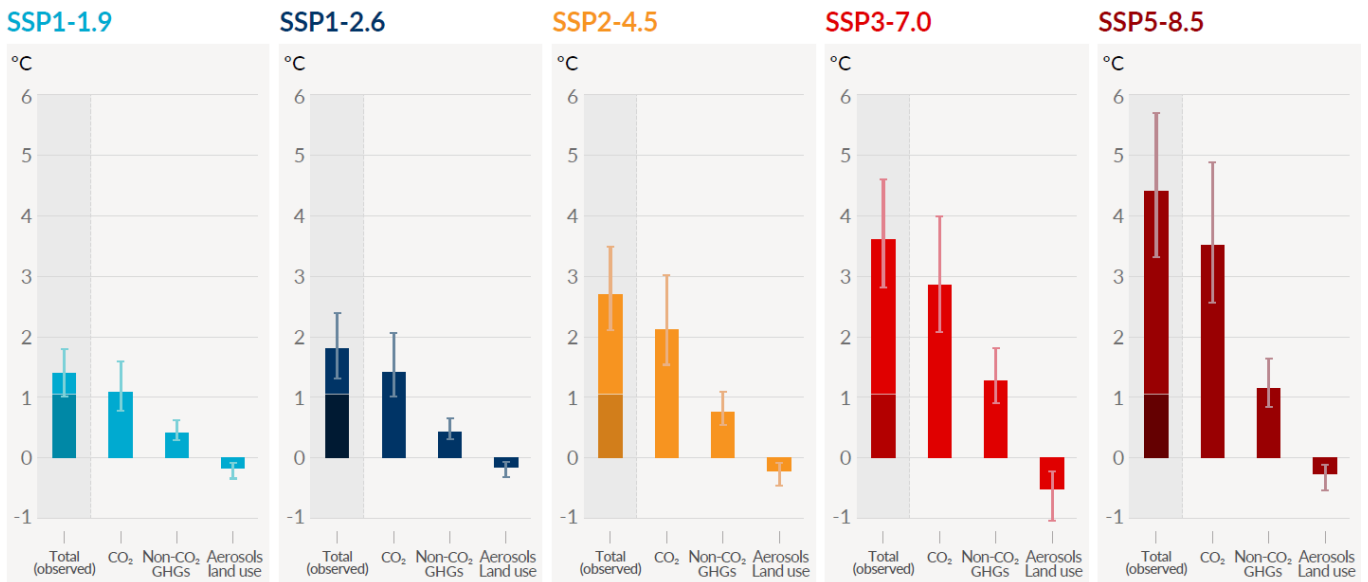
It is therefore suggested that the Bill includes a note that reductions greater than 82% may be required in the future and that other clauses do not conflict with this.



**Figure 1 Global CO<sub>2</sub> emission pathways from the latest IPCC report**

The figure shows five illustrative scenarios, referred to as SSPx-y, where 'SSPx' refers to the Shared Socio-economic Pathway or 'SSP' describing the socio-economic trends underlying the scenario, and 'y' refers to the approximate level of radiative forcing (in W m<sup>-2</sup>) resulting from the scenario in the year 2100. For corresponding average global temperature rises by 2100 see Figure 2 below.

<https://www.ipcc.ch/report/sixth-assessment-report-working-group-i/>



**Figure 2 Change in average global surface temperature in 2081-2100 relative to 1850-1900 (°C)**