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Date 10th January 2022
Ref Sent by email

Dear Mr Breen,

Thank you for your letter of December 7th 2021 requesting further clarification of the costs associated with achieving Net Zero greenhouse gas emissions by 2050 in Northern Ireland. This response draws on advice and analysis previously provided by the Climate Change Committee (CCC). We have attempted to answer your questions to the full extent of the current evidence.

In your letter you asked for clarity on the cost estimate we provided in our letter to Minister Edwin Poots on [April 1st 2021](#) and follow-up discussions. In that letter we said:

“Our analysis has not produced a scenario for UK Net Zero in 2050 that sees Northern Ireland reach Net Zero in the same year. We are not therefore able precisely to calculate the costs of Northern Ireland reaching Net Zero, but they will almost certainly be higher than those of the 82% reduction target, by up to £900 million per year by 2050 if engineered removals technologies are used.”

In our letter of April 1st, we explained that the £900 million figure is calculated by applying the projected unit costs of engineered greenhouse gas removals¹ (GGR) at a volume equal to the residual emissions in Northern Ireland in 2050, assuming that emissions reductions otherwise follow the CCC's Balanced Net Zero Pathway.

Annual costs would not begin at £900 million but would likely to ramp up in the years preceding 2050. The cost profile over the preceding years could vary significantly, depending on the type of GGR technology and the rate of scale-up.

In follow-up discussion with officials, the example we gave was a linear increase in additional GGR expenditure, starting in 2030 and increasing to £900 million annually by 2050. This linear path was provided only to illustrate that costs would rise over time to the 2050 value. The precise profile of cost will depend on the emissions pathway for Northern Ireland to 2050.

¹ The assumed cost of engineered removals in 2050 is 180 £/tCO₂e. Applying this cost to the 5 MtCO₂e of residual annual emissions in Northern Ireland according to this pathway gives a total of £900 million/year in 2050.

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As yet, we have not undertaken new pathway analysis for Northern Ireland, beyond those in our UK Sixth Carbon Budget advice. The five scenarios detailed in that advice all achieve Net Zero by 2050 at UK level, but none see Net Zero achieved in Northern Ireland. In our previous correspondence we have set out the barriers to achieving Net Zero in Northern Ireland, most notably the challenge of reducing emissions from Northern Ireland's relatively large agriculture sector.

In your letter, you asked a number of additional questions. In the annex to this letter, we have provided answers to the extent possible from the existing CCC analysis. Going further would require us to construct a new pathway for Northern Ireland emissions, to give a more detailed picture of the cost implications of Net Zero in Northern Ireland in 2050 or 2045, as well as revised interim targets. I would be happy to discuss a formal commission for that analysis if that would be useful.

I look forward to continuing to engage with you on these important matters.

Yours sincerely,



Chris Stark
Chief Executive of the Climate Change Committee

Annex

Costs of Northern Ireland achieving Net Zero by 2050 with engineered removals

- *“Can you provide clarity as to why the expenditure on engineered removal technologies would only begin in 2030? Was this just what was considered a reasonable lead in time for incrementally increasing the use of the technology and on what basis is this reasonable (as opposed to starting in e.g. 2025 or 2035)?”*

The start date of 2030 is considered a reasonable lead-in time. However, different start dates are possible depending on the required profile of emissions reductions, the type of engineered removals used, and the rate of scale-up for the necessary infrastructure. The CCC has not modelled this for Northern Ireland, so further analysis would be needed to give a more accurate estimate.

- *“Why do the costs associated with the Tailwinds scenario (including the reference to the additional costs to get to net zero) appear to be higher than the suggested costs for reaching net zero (using the phased in approach where costs increase by £45m per annum from 2030) in the advice which the CCC has provided the CAERA and RaiSe?”*

Assuming Net Zero is reached by using engineered removals in addition to either Tailwinds or the Balanced Pathway, **the less costly option is Tailwinds**. This is consistent with the advice we provided in the April 1st letter. Tailwinds is an exploratory scenario, designed to illustrate a highly optimistic path to Net Zero for the UK. In contrast, the Balanced Pathway, on which our recommendations are based, is designed to be more realistic, recognising the likelihood of friction and cost barriers to progress in some areas.

The outline cost implications of the two pathways, augmented with additional engineered removals, are compared here:

– **Net Zero Northern Ireland achieved through the Balanced Net Zero Pathway and engineered removals:**

The Balanced Net Zero Pathway would see emissions from Northern Ireland fall by 82% on 1990 levels by 2050. The remaining 5 MtCO₂e of emissions would be removed at the **additional cost of £900 million per year by 2050**.

– **Net Zero Northern Ireland through the Tailwinds scenario and engineered removals:**

The Tailwinds scenario sees emissions in Northern Ireland fall by 94% on 1990 levels by 2050. This would cost around £300 million more than the 82% reduction in the Balanced Pathway. The remaining 1.7 MtCO₂e of emissions would be removed at an additional cost of £300 million, assuming that the cost of removals is the same in both scenarios.² This gives a total **additional cost of £600 million by 2050**.

² For both examples presented here, a common cost of 180 £/tCO₂e for engineered removals in 2050 has been assumed. However, the cost future cost of engineered removals is highly uncertain, and our

The CCC has not modelled scenarios where Northern Ireland reaches Net Zero, so these are approximate estimates subject to high uncertainty. Tailwinds appears to offer a less costly basis for Net Zero Northern Ireland, but this is due to the optimistic assumptions in the scenario itself. When publishing the Tailwinds scenario we described it as “stretching feasibility in a wide range of areas and going beyond the current evidence in others” and that we “consider it unlikely that the Tailwinds scenario could be delivered across the board”, and should not be the basis of legally-binding emissions targets.

We continue to recommend that estimates of feasible emissions reductions, and costs associated with achieving particular targets, are based on those provided for the Balanced Pathway.

Other potential costs in addition to engineered removals technologies

- *“Does the (up to) £900 million per annum by 2050 include anything other than the projected costs for using GHG engineered removals technologies?”*

No, the £900 million per annum by 2050 is assuming that the extra costs will be entirely due to GHG engineered removals.

- *“Is it likely that there will also potentially be other additional costs (over and above the costs which would have been incurred to achieve the at least 82% target) incurred, in addition to the costs on engineered removals technologies, in order to meet a net zero target, interim targets and carbon budgets? E.g., the costs associated with reductions in livestock numbers and the potential purchase of carbon credits?”*

We have only provided an estimate of the additional cost to reach Net Zero in 2050 using GHG engineered removals with respect to our Balanced Pathway, in which case no additional costs would be required. We have not estimated costs for alternative interim targets as this would require further pathway analysis.

- *“What scale of costs would it be reasonable to assume in addition to those associated with engineered removal technologies in a scenario where Northern Ireland net zero is the target?”*

As noted above, no extra costs are required to meet Net Zero on top of those associated with engineered GHG removals, beyond those in the Balanced Pathway, unless other methods of abatement are used.

Projected costs beyond 2050

“If Northern Ireland has to rely on significant investment in engineered removals technologies on an annual basis to reach net zero in 2050, DAERA is assuming that Northern Ireland will continue to have to rely on such investment to remain at net zero well beyond that date (effectively until those emissions can be reduced through other means).”

- *“Can the CCC confirm that this assumption is correct?”*

Yes, this is correct – once engineered removals have been deployed, their operation (and thus sustained investment) will be necessary unless the remaining emissions can be eliminated by different policies.

- *“What would be the projected spend for the years after 2050 on engineered removals technologies on the assumption that these will still be required to keep Northern Ireland at net zero?”*

Though we have not modelled pathways beyond 2050, the residual emissions in Northern Ireland will mostly be from agriculture, which we do not expect to decline further without additional policy. As a result, we would expect levels of annual funding for the required engineered removals technologies to balance these emissions in the years after 2050 to be similar to those in 2050.

- *“In this scenario, does the CCC have any views as to when Northern Ireland would no longer have to rely on the investment in engineered removals technologies?”*

The available evidence does not suggest a date at which the requirement for engineered removals could be avoided or even significantly reduced. Based on current evidence, to remain at Net Zero post-2050, Northern Ireland would continue to rely on engineered removals unless new opportunities to reduce emissions become available that go beyond those currently considered feasible.

Who will the up to £900m costs be borne by?

- *“Will the up to £900 million costs (i.e. the additional costs of reaching net zero rather than the costs of getting to at least 82%) be borne by the Northern Ireland Executive alone or by both the public and private sectors?”*

The question of who pays the additional costs required to reach Net Zero is a policy choice for the Northern Ireland Executive to make. While our pathways model the actions and costs required for emissions reductions, they do not determine how they will be funded, or how those costs might be split between the public and private sectors.

Costs of a 2045 Net Zero target

“The RalSe paper in Annex A stated, ‘The CCC estimated that the costs of “bridging the gap” from an 82% reduction in emission (as under the DAERA Bill), to net-zero (as under the PMB) [i.e. by 2045], could incur costs of up to £900m per year by 2050’.”

- *“Can the CCC confirm the above statement is correct?”*

The costs of up to £900m per year by 2050 presented in the CCC’s letter on 1st April 2021 assume that Net Zero is reached in 2050, not 2045.

- *“How would the additional costs change in terms for reaching net zero in 2045 (as opposed to 2050)? How much extra costs (in comparison to the CCC’s Balanced Pathway at least 82% target) might be incurred and when would they begin to be incurred?”*

We have not modelled a pathway to Net Zero for Northern Ireland by 2045. To reach Net Zero in 2045, there is a larger emissions reduction gap to bridge, since the Balanced Pathway only sees a 76% fall on 1990 emissions by 2045 in Northern Ireland with residual emissions of 7 MtCO₂e (compared to an 82% reduction by 2050 with residual emissions of 5 MtCO₂e). The costs of reaching Net Zero in 2045 would therefore be greater. In addition, the cost of removals per tCO₂ is likely to be greater in 2045 than 2050, as a greater proportion of the investment would have occurred in earlier years before the technologies are fully mature. As well as additional costs, an earlier date would bring greater risks of falling short of the necessary emissions reductions across the economy.