

# Understanding the distinctive role of methane in Irish climate policy

Opening statement for the Oireachtas Joint Committee on Agriculture, Food and the Marine

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I thank the Joint Committee for the opportunity to provide evidence on the issues arising from the role of methane in climate policy design. I am a Professor in the Faculty of Engineering and Computing at [DCU](#), researching climate mitigation policy, especially from the Irish national perspective. I am accompanied (remotely) at today's session by my colleague Mr. Paul Price who currently holds a research Fellowship at DCU awarded by the Climate Change Advisory Council, and this opening statement is on behalf of us both. We are here as independent academic researchers, and do not speak on behalf of either DCU or the Climate Change Advisory Council. Together, we have been involved over the past several years in detailed assessment and modelling of potential tradeoffs in mitigation impact between climate action measures that specifically affect emissions of different greenhouse gases.

We see the following points as key to ongoing assessment of the role of methane emissions in Irish climate policy:

- Ireland is a voluntary party to the [Paris Agreement](#). While the Agreement has many weaknesses and limitations, it provides the *only* current global multilateral framework for responding to the climate emergency. It is therefore essential that all parties participate ambitiously and in good faith. This specifically includes the commitment to quantitative limits on global temperature rise, achieved on a basis of *equity* (global and local) and informed by the *best available science*.
- In Ireland's case, this has been transposed into domestic legislation through the [Climate Action and Low Carbon Development \(Amendment\) Act of 2021](#). That Act established a statutory national "carbon budget" framework, and requires this to be implemented in a manner *consistent* with Ireland's equitable obligations under the Paris Agreement.
- Ireland's carbon budgets must therefore be designed and assessed first and foremost by whether they represent an equitable contribution to meeting the Paris temperature rise goals.
- In the light of the [IPCC Special Report on Global Warming of 1.5°C](#) degrees [SR15], and the actual experience of already rapidly destabilising global climate conditions, this is now understood to mean limiting global temperature rise to 1.5°C over pre-industrial levels with absolutely minimal overshoot of that level in both temperature and time.
- Global scenarios assessed in the most recent [IPCC Assessment Report 6](#) [AR6] are unequivocal that meeting this commitment requires rapid and deep cuts in the emissions of *all three* of the most significant greenhouse gases arising from human activities: carbon dioxide (CO<sub>2</sub>), nitrous oxide (N<sub>2</sub>O) and methane (CH<sub>4</sub>).
- Some technical, scientific, issues do arise in assessing the temperature impacts from these different gases, particularly when they are combined into a single aggregate "carbon" budget for policy purposes, as under the Irish Act. In general, this requires adoption of a particular method for assessing the "carbon dioxide equivalent" of emissions of nitrous oxide and methane (and also other lesser greenhouse gases).
- The *de facto* approach to this uses a method referred to as Global Warming Potential over 100 years, or GWP-100 and the first Irish carbon budget programme has been expressed with this method.
- However, it is recognised that this particular method, *if used in isolation*, may give a poor representation of the tradeoffs in warming impact that are associated with the

physical characteristics of the different gases. Of the three main greenhouse gases, this particularly affects methane; due to its shorter atmospheric lifetime compared to carbon dioxide and nitrous oxide.

- Indeed, this appears to be recognised in the Act, which requires appropriate consideration of the “distinctive” characteristics of methane. Unfortunately the text of the Act qualified this further by referring to “biogenic” methane, which serves rather to obscure than to clarify. While there is a significant distinction in warming impact of methane versus the other gases, there is only a very minor (effectively immaterial) distinction in warming impact between methane from biogenic versus non-biogenic (fossil) sources. This has led to some unnecessary confusion in the interpretation of the Act’s provisions.
- In any case, it is important to state that, in developing its recommendations for the first carbon budget programme, [the Climate Change Advisory Council did explicitly take account these provisions of the Act](#) by analysing the limitations of GWP-100 aggregation in respect of how a mixed-gas budget relates to temperature impact. They showed that indeed, with any fixed GWP-100 budget, the temperature impact will vary significantly depending on how that budget is distributed across the different gases. They presented a number of scenarios for this distribution, and showed that those with relatively smaller budget allocations for methane (deeper reductions in annual mass emissions) corresponded directly to lower aggregate temperature impact.
- Separate work at DCU, originally undertaken in [research supported by the EPA](#), has developed an [open source modelling tool](#), which allows for the investigation of the warming impact of a wide variety of multi-gas GHG budget scenarios. It does this by applying an alternative methodology, called GWP\* (GWP-star), for calculating “carbon dioxide *warming* equivalent” emissions. This was recently developed at the University of Oxford ([Oxford Martin School](#)) by a team led by [Professor Myles Allen](#). The Committee will already have heard evidence on this directly from Professor Allen. To our knowledge, this was the first application of GWP\* to examine multi-gas GHG budgets at a national level. In updated [analysis presented in June this year](#) at the [2nd International Conference on Negative CO<sub>2</sub> Emissions](#) we showed that there is a clear tradeoff in Irish climate policy between the degree of reduction in annual mass emissions of methane and tacit commitment to future, large scale, *net removals* of carbon dioxide from atmosphere. Based on particular criteria for alignment with the Paris Agreement temperature goals, and constraints on carbon dioxide removal, we estimate that the annual mass emissions of methane in Ireland would need to fall by about 50% by 2050, relative to 2018 levels. The faster this reduction is achieved, the lower the risk of overshoot of the Irish contribution to global temperature rise. Note that this *still* requires aggregate mass emissions of carbon dioxide and nitrous oxide to be reduced by *more than 100%* (becoming net negative) over the same period of time.
- Some commentary in relation to the distinctive characteristics of methane in general, and the GWP\* methodology in particular, has suggested that it would be sufficient for Irish climate goals if annual mass emissions of methane were initially stabilised and then declined at a very slow rate (about 0.3% per annum). Unfortunately this is based on a misleading conflation of climate stabilisation with meeting the global temperature rise constraint. These are complementary, but quite separate, goals. While stabilisation is *necessary*, it is not *sufficient*: we must stabilise at a temperature where

meaningful, managed, climate adaptation is still possible. This temperature limit is the overriding goal: and to achieve it, it is absolutely essential that mass emissions of methane fall rapidly and substantially. This is true globally, and is especially true for Ireland because of its unusually large per capita emissions of methane. While improvements in methodology can help in refining the quantitative assessment of the required level of reduction, they do not alter the underlying physics.

- Methane emissions in Ireland are dominated by ruminant agriculture. The relationship with cattle *numbers* is complex; but it scales very directly with *total output* (litres of milk and kilos of beef). This has been clearly apparent during the recent rapid, policy-led, expansion in dairy production. [Previous evidence to this Committee from Mr. Price](#) has addressed this in more detail and will not be repeated here. We would simply emphasise that we sympathise greatly with the Committee in confronting the distinctive, systemic, challenges now facing this sector in Ireland. We would not seek in any way to downplay the difficulties involved. However, we emphasise that, as has been manifest in recent extreme weather events on a global basis, the physical climate system is, unfortunately, entirely indifferent to these difficulties. It will respond not to our aspirations, but only to our actions: and specifically to our ongoing emissions of greenhouse gases.

We look forward to addressing any questions the Committee may have.