Achieving Net Zero

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To achieve the ambitions of the Paris Agreement (limit the rise in global temperatures and establish a balance between sources and sinks in the latter half of the century) will require not only steep reductions in emissions of greenhouse gases but also the widespread deployment of proposed Greenhouse Gas Removal (GGR) techniques.

While such GGR techniques are assumed in the vast majority of scenarios that cap the rise in global mean temperatures between 1.5 and 2 °C above pre-industrial levels, it is unclear whether such techniques could be deployed at the scale implied without creating countervailing side-effects on other societal goals.

The Greenhouse Gas Removal Instruments and Policies (GRIP) project seeks to develop appropriate policies relating to proposed techniques to draw down carbon dioxide from the atmosphere. There are a wide range of proposed techniques – in some instances, it may be necessary to restrict proposed techniques that may cause societal harms, while in other instances it may be appropriate to incentivise proposed techniques which result in net benefits to society.

We undertook a series of workshops and public engagement exercises within the UK and conducted over 50 hours of semi-structured interviews with key stakeholders with expertise in the area of GGR from policymaker, academic, industry and civil society circles.

While a significant number of modelling studies and a small amount of field work has been undertaken on what could be termed the 'supply side' of GGR (namely, characterising what proposed techniques could be deployed and at what scale), there has been a lack of attention to the 'demand side' of GGR (namely, on what might incentivise the deployment of proposed GGR techniques). We make recommendations for how a range of existing instruments within the UK policy context could be adapted to appropriately incentivise proposed GGR techniques.

In addition, we commissioned reports from policy experts in six other jurisdictions around the world to understand the extent to which policy proposals specific to the UK could potentially be applied elsewhere.

Achieving the ambition of net zero emissions will require not only far steeper reductions in emissions but also the capacity to counter any remaining emissions with removal of greenhouse gases. Currently, the ambition of achieving net zero is not matched by the action required to realise that ambition - this presentation will set out policy recommendations to bridge that gap.

More information

https://www.oxfordmartin.ox.ac.uk/research/programmes/geoengineering

The Meaning of Net Zero for Agriculture

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Methane, a greenhouse gas generated in large quantities by ruminant livestock and rice cultivation, causes strong warming while it remains in the atmosphere, but does not accumulate in the atmosphere like carbon dioxide (CO_2) as it has a half-life of around a decade. Because CO_2 emissions accumulate, halting the rise in global temperature requires net CO_2 emissions to be reduced to zero. This presentation will focus on what "net zero warming" would mean for methane emissions, in particular for agriculture.

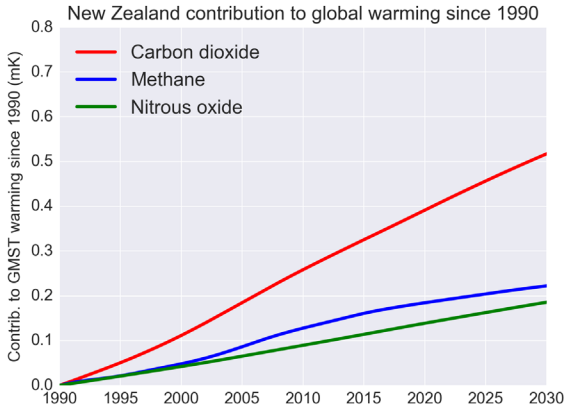
How the climate responds to short-lived pollutants like methane is well understood. Sources of methane that have been stable for centuries cause no further warming. For sources that increased over the past century, a gradual emissions decline offsets the slow deep ocean climate response to that past increase, and also results in net zero warming.

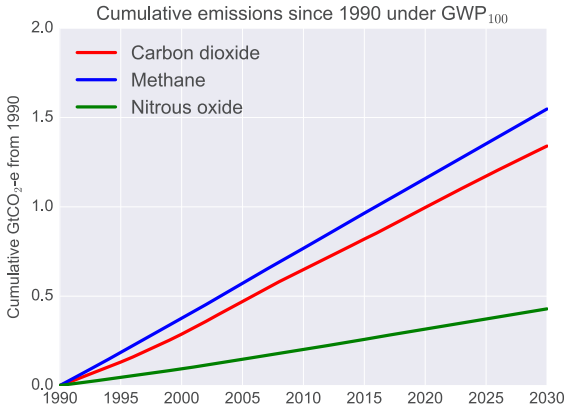
If policies are to reflect the warming impact of emissions, then these differences in short- and long-lived gases need to be taken into account. New Zealand can be used as an example of how this can be done because a large proportion of its total emissions are from agriculture.

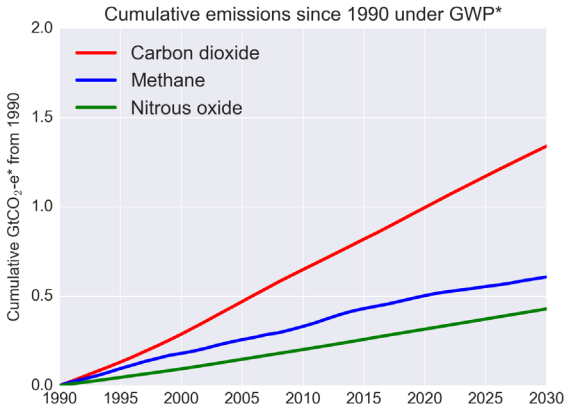
The top graph shows the global warming caused by New Zealand's emissions of CO_2, methane and nitrous oxide from 1990 to the present and projected to 2030. Methane generates less than half the warming of CO_2 over this period.

In pursuit of a long-term temperature goal, it is helpful to compare emissions of different gases using methods that reflect their respective contributions to global temperatures. In the middle graph, emissions are compared conventionally by expressing methane and nitrous oxide as "CO_2-equivalent" (CO_2-e), by multiplying by GWP_{100}. This suggests that New Zealand's CO_2-e emissions of methane are higher than CO_2, even though the CO_2 emissions cause more warming.

The lower graph uses an alternative usage of GWP_{100}, GWP*, which equates a permanent change in methane emission rate with a one-off emission of a fixed number of tonnes of CO_2. Cumulative CO_2-e* emissions are in line with their warming impacts. This is therefore a better method for evaluating climate policies and framing carbon budgets.







More information

https://www.oxfordmartin.ox.ac.uk/research/programmes/pollutants