Agricultural emissions in Irish climate change mitigation policy: Science and Solutions

Summary briefing from Stop Climate Chaos
3rd June 2020

Introduction

This briefing is intended to provide some clarifications on the role of agriculture in Ireland's climate policies and emissions profile. It is not as such a set of recommendations for agricultural policy. However, Stop Climate Chaos believes that Ireland needs a new agriculture policy that ensures farmers are supported to secure public goods, and which has at its centre cutting greenhouse gas emissions and protecting and restoring biodiversity.

The purpose of this briefing is to counter some of the claims coming from certain interests in relation to methane in particular. The science behind short-lived climate pollutants such as methane is complex but to depict it as a benign, short-lived gas overlooks its potency and warming impacts and its significant contribution to Ireland's greenhouse gas emissions. Furthermore, it is important to ascertain a realistic and science-based understanding of the role for soil, hedgerows and forests as potential carbon sinks, which are often incorrectly reported as sufficient to offset emissions from livestock.

The briefing is structured as follows:

- Understanding why we need to take action on all greenhouse gas emissions in Ireland, and not just those related to fossil fuel use
- Where national policy is currently weak
- Demystifying recent claims about a new metric for methane
- Understanding the role of wetlands, soils, and forestry in carbon sequestration
- Why offsetting is a flawed solution for livestock emissions
- How to support a policy shift that benefits rural communities and farmers
- Key policy interventions
- The role of the climate governance and Climate Change Advisory Council

For climate action to be meaningful in the agricultural and land-use sectors in Ireland, we need to see reductions in the emissions of methane and nitrous oxide gases, along with reductions in the million tonnes of carbon dioxide released annually from grasslands and peatlands. Nothing else counts as real mitigation. It defies logic – and IPCC science - to argue that 20 million tonnes of carbon dioxide equivalent released every year from the agricultural sector can disappear into hedgerows and soils, or into to commercial forest plantations that will ultimately be

harvested. It is vital that the current negotiations to form a government are not misinformed by faulty science getting coverage due to its supposed novelty.

We are not proposing any particular target for agricultural methane. But there are international precedents Ireland could usefully follow in this regard. The most important intervention that can be made is a commitment to no further increases in methane and nitrogen, steady declines in methane emissions and a cap on nitrogen use which in turn will drive further methane reductions.

1. Climate action means reducing ALL greenhouse gases

Immediate and rapid reductions in the use of fossil fuels to cut emissions of carbon dioxide (CO_2) are urgently required for effective climate action. However, nitrous oxide and methane are also potent climate pollutants. Ireland's emissions profile is unusual in having relatively high nitrous oxide and methane emissions, primarily due to the agricultural inputs of chemical nitrogen fertiliser and outputs in the form of manure, and methane from beef and dairy cattle digestion. About 90% of Ireland's methane and nitrous oxide emissions are from agriculture. These emissions have been increasing steadily since 2011 and are projected to continue to increase over the next decade. On a per person basis Ireland has about three times the EU average emissions of non-CO_2 greenhouse gases, therefore reducing methane and nitrous oxide emissions must be an essential component of climate action in Ireland.

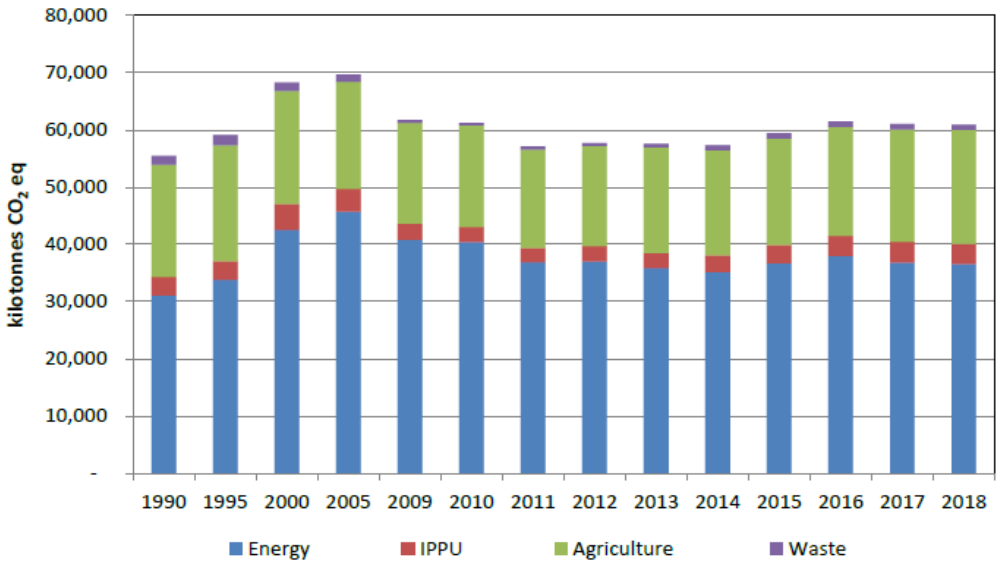

Figure 2.1 National total Greenhouse Gas emissions (excluding LULUCF) 1990-2018

The most significant drivers for the increased emissions since 2011 are higher dairy cow numbers. Nitrogen fertiliser use also increased by 10.7% in 2018. Grasslands emitted almost 7MtCO_2e, (in contrast to the perception that soil carbon compensates for agricultural emissions[1]), and wetlands released approximately 1.7MtCO_2e in 2018. Grasslands do have the potential to be a carbon sink, but they revert to being a source of emissions under certain types of management such as draining of organic soils which is currently prevalent in Ireland. Under current business-as-usual plans, cattle numbers and fertiliser use is expected to continuing increasing over the next decade (+11% and + 6% to 2030 respectively). Agricultural policies and the trend in climate polluting emissions are very closely correlated in Ireland. Changes in beef and cattle numbers and fertiliser inputs are the key drivers of these increases. Feeding a larger herd requires more grass and/or feed, and thus more nitrogen fertiliser, even when efficiency is improving. This is because even if milk production is improving marginally, each cow is producing more methane due to a higher feed intake. According to the EPA's National Inventory Report published in 2020 which reports emissions between 1990-2018, the increases in agricultural emissions are due to national plans to expand milk production under Food Wise 2025 (developed by the agri-food industry in 2015 and approved by the government), and the removal of the milk quota in 2015.[2]

2. National policy is unclear, relies on voluntary measures and shifts the mitigation burden to other sectors

Ireland's agreed EU 2030 non-ETS target aims to cut the aggregate CO_2-eq emissions combining agriculture, transport, building heating and waste by 30% compared to the total in 2005. Ireland has the most generous "flexibilities" (45 MtCO_2eq) given to any EU Member State to help achieve its 2030 target but has yet to produce any effective policy to limit emissions outside of the power generation sector. Since 2011 Ireland has removed and reversed previously successful policies in limiting agricultural emissions. So the most important objective for the agricultural sector in the context of Ireland's 2030 targets under the Effort Sharing Decision and any increase in ambition therein would be to reinstate limits to either milk production, or Nitrogen fertiliser applications, or methane emissions. Without an enforced limit, the market incentive will simply continue to drive up herd numbers and emissions.

The 2019 Climate Action Plan launched by Minister Bruton set indicative targets for greenhouse gas mitigation from the agricultural sector. However, the achievement of these reductions will depend on the effectiveness of on-farm advisory services, and

[1] See Table 6.2 Emissions and Removals from Land Use Land-Use Change and Forestry 1990-2018 (kt CO2 eq) in EPA (2020) *Ireland's National Inventory Report* p.180. http://www.epa.ie/pubs/reports/air/airemissions/ghg/nir2020/
[2] Ibid.

the voluntary uptake of Teagasc efficiency measures which to date have not delivered promised absolute emission reductions. If current policy is not working, it needs to be changed.

3. Adopting a new metric for measuring methane would not mean less or no effort

Recent scientific publications have proposed a new way of accounting for methane that captures its warming impact more accurately.[3] After carbon dioxide (CO_2), methane (CH_4) is the second most important greenhouse gas contributing to human-induced climate change. It has been responsible for 20% of the global warming produced by all greenhouse gases since the Industrial Revolution. It is mistaken to suggest that the shorter life cycle of the gas in the atmosphere, by comparison with carbon dioxide, implies that control of its emissions is somehow less important. Even though an emission of one tonne of methane in 2018 will have long since been removed from the atmosphere by 2118, it will still have been responsible for 34 times more heat trapping than the tonne of carbon dioxide emitted at the same time. The research of the Oxford Martin group has been misrepresented by some sectoral interests who seek to downplay the role of methane in climate mitigation strategies. The GWP* method seeks to more accurately link emissions to warming. This means that the true impact of an emission pathway on global temperature can be easily assessed. For countries with high methane emissions from agriculture this can make a huge difference to how their progress in emission reductions is judged. But it does not mean that methane emissions do not need to be substantially reduced.

All choices of metric contain implicit value-related judgements such as type of effect considered and weighting of effects over time. The 100-year global warming potential over 100 years or GWP_{100} is the greenhouse gas metric currently used in UNFCCC and EU emissions accounting and there are no indications that the IPCC or UNFCCC bodies propose to change the metric for methane accounting.[4]

GWP_{100} values are directly related to the annual quantity of methane released so they are a good measure of the total to be reduced by policy. However, the use of GWP_{100} does not correctly reflect the climate response generated by *changes* in short-lived pollutants such as methane emissions. The GWP* has been developed by the Oxford Martin research group as an alternative GHG equivalence metric. However GWP* does not provide any new understanding of methane, it simply provides a new formula to enable calculation of CO_2-we (warming-equivalent) annual

[3] Allen, M.R., Shine, K.P., Fuglestvedt, J.S. *et al.* A solution to the misrepresentations of CO_2-equivalent emissions of short-lived climate pollutants under ambitious mitigation. *npj Clim Atmos Sci* **1,** 16 (2018). https://doi.org/10.1038/s41612-018-0026-8

[4] The UNFCCC COP in Warsaw 2013 set the GWP values and accounting rules to be used by parties to the Convention. UNFCCC (2013) Report of the Conference of the Parties on its nineteenth session, held in Warsaw from 11 to 23 November 2013 http://unfccc.int/resource/docs/2013/cop19/eng/10a03.pdf#page=2

emissions directly from a national GWP_{100} CO_2-eq time series values in a way that accurately approximates the climate system response.

The choice of metric does not reduce the urgency for society to reduce all emissions of all GHGs from all sectors of the economy, including agricultural nitrous oxide and methane. Reducing methane is particularly important because changes in these emissions have a disproportionately large effect on climate action.

4. The role of forestry, wetlands, and soils

Land use in Ireland is a net emitter under IPCC methodology. In other words, even when carbon sequestration is taken into account, we are still emitting more from land-use and land-use change than we are absorbing.

Increasing sequestration by rewetting bogs, afforestation (including natural regeneration) and improving soil carbon are slow, highly uncertain methods for climate action through land use management. Such measures can be highly beneficial for biodiversity and soil health if planned appropriately, but they are of limited benefit to near-term climate mitigation. If the additional carbon dioxide removed (sequestered) from the atmosphere is to be measured with required accuracy, it requires costly monitoring, measuring and verification.

Prioritising retention of existing carbon *stocks* by ending all peat extraction as fast as possible, ending drainage and restoring wetlands, limiting forest harvesting, and changing agricultural practices on organic soils are fast, more certain land-use policies for immediate climate action.

Non-native conifer plantations offer few climate mitigation benefits: one either plants trees for long-term carbon storage, or for timber/biomass, not both. One cannot store carbon and simultaneously plan to burn it as fuel. In Ireland, monoculture plantations of commercial forestry have had adverse environmental impacts on water and soil quality, and biodiversity. In construction, timber as an alternative material will only replace concrete if reductions in concrete are achieved (in which case reducing use of concrete could be required through regulation).

Hedgerow and carbon stocks have only been roughly estimated, they are already included in EPA reporting, and these values are subject to large uncertainty. A recent EPA report suggests total hedgerow length has decreased in Ireland, and a widely reported increase in hedgerow cutting also suggests a net loss of carbon.[5]

[5] Black, K. et al, *Carbon Sequestration by Hedgerows in the Irish Landscape: Towards a National Hedgerow Biomass Inventory for the LULUCF Sector Using LiDAR Remote Sensing - CCRP Report No.32*. Prepared for the EPA https://www.epa.ie/pubs/reports/research/climate/ccrp-32-for-webFINAL.pdf; see also the NPWS 6th National Biodiversity Report which states '[o]ver the past 30 years agriculture has been transformed with significant changes in the intensity and specialisation of production which have been accompanied by losses of habitats such as small wetlands, species-rich grassland and hedgerows'.

Commitments to conducting and updating county-level hedgerow surveys have not materialised. Soils store a large amount of carbon, but it is very difficult to measure local changes in carbon stock. Moreover, increases in soil carbon are limited by saturation effects and can easily be lost through management changes or climate impacts (drying etc). The cost of accurate, ongoing measurement of soil carbon sequestration could be large and would likely remain highly uncertain.

5. The concept of offsetting is complex and flawed in climate policy

Offsetting emissions from any sector does not make sense in climate policy except in the context of a declining cap on fossil carbon and reactive nitrogen usage by a sector or society. Without such a cap, there is no way of demonstrating that the offset mechanism is responsible for any additional mitigation. In Irish agriculture the trend in reactive nitrogen usage and resulting N_2O and CH_4 absolute emissions is upward, therefore any claimed offsets are merely distracting from the fact of this policy trajectory.

Secondly, land use CO_2 removals (e.g. by afforestation) can only be meaningfully offset against land use CO_2 emissions (deforestation, in this example). Vulnerable land storage of CO_2 is not of the same value as geologically stored fossil carbon. In other words, it does not make sense to use forestry to offset emissions from fossil fuel combustion. Offsetting land use removals makes more sense against N_2O emissions (in terms of atmospheric lifetime vs. likely durability of land carbon storage). Offsetting land carbon removals against CH_4 emissions does not make climate sense, particularly in terms of the current GWP_{100} accounting. Steady and permanent reductions in all CH_4 emissions is a requirement for climate action.

6. But isn't the farming sector important to the Irish economy? Will a policy change impact negatively on the rural economy?

Farming itself is a small fraction of Ireland's economy if measured in terms of gross added value. However, the rural economy as a whole relies on a vibrant farming sector and related activities. Most beef and sheep farmers in Ireland are highly dependent on income support from EU CAP funding and are classified as economically vulnerable. If funding to low intensity farmers is maintained for carbon

https://www.npws.ie/sites/default/files/files/NPWS%20Biological%20Diversity%20web.pdf. The National Inventory Report (*ibid.* p.234) notes that a consistent time series of changes in hedgerow extent or condition is not available and methodological issues still exist with respect to their mapping and change over time. The EPA recommends additional work to quantify change and has commissioned research in respect of hedgerow extent and condition.

storage and biodiversity conservation, then there need be no negative impact on that part of the rural economy. But this economic activity is very different from the regional-specific rural economy which has developed particularly in the South and East of Ireland through intensification of dairy (and beef to a lesser extent) that has taken place due to agri-food and agri-chemical industry influence on policy since 2010. The marketing policy that generates export demand should also be reconsidered. This intensive agriculture economy is having highly negative impacts on the environment by increasing GHG emissions, polluting air and water, further damaging biodiversity. Ultimately, intensification will amplify the financial risks farmers are exposed to as a result of worsening climate impacts such as drought and the need to import feedstocks.

The new EU Commission Farm to Fork policy spells out a far more sustainable pathway that is needed to support extensive and organic farmers and reduce chemical intensive farming. In Ireland, we have seen that an emphasis on cheap inputs and high profits for processors based on possibly ephemeral exports to parts of Asia, Africa and the Middle-east, comes at a cost to small local farmers, our own food security, and sustainable livelihoods elsewhere. Whilst Ireland's food production strategy benefits bigger farms and farmers willing to incur greater risk and debt, they are also highly exposed if the strategy fails.

7. What are the key policy interventions that need to be made to address GHGs, water pollution and help halt biodiversity loss from agriculture?

Ireland needs a new agriculture policy that ensures farmers are supported to secure public goods, and which has at its centre, cutting greenhouse gas emissions and protecting and restoring biodiversity. An agricultural policy that is consistent with Ireland's commitments under the Paris Agreement should include a reducing cap on *total* national reactive nitrogen (and phosphorus) usage *combined with* a long-term national food strategy to achieve nature preservation and restoration, based on a assessment of the rate of nitrogen application that is appropriate and sustainable for biodiversity and local water catchments.

For instance, such a policy could target an urgent reversal of nitrogen usage (in fertiliser and feed) to the 2011 level within 3 years, and then decreasing thereafter. If Irish agriculture is efficient, then there is no reason for the large increase in nitrogen seen since 2011. Fertiliser use could be reduced by means of a package of measures including for example:

- A tax on all nitrogen fertilisers, consistent with other EU member states and the existing VAT on smaller quantities

- Limits on fertiliser application consistent with the national carbon budget and local water catchment and biodiversity status and objectives
- Effective enforcement, ongoing monitoring, and educational/ knowledge transfer initiatives
- End to subsidies that encourage or facilitate intensification

A national food strategy (as opposed to the current export oriented agri-strategies) should prioritise Ireland's contribution to global and national food security by emphasising net nourishment per hectare at the lowest climate and environmental impact. If meat and dairy consumption continues to rise at its current rate, by 2050 global greenhouse gases (GHGs) from food production will increase by 80 per cent. According to international research, unless demand for animal products is reduced, agricultural emissions will increase to the point where dangerous climate change is unavoidable.

There is now also a serious risk of increasing use of nitrogen (over and above cattle pasture usage) to produce grass and woody biomass for biogas and wood pellet energy production. However, if such policies rely on high levels of subsidy and continued synthetic nitrogen use, they will defeat the purpose of climate action.

8. Climate governance and the role of the Climate Change Advisory Council

In order for Ireland to implement the recommendations of the IPCC Special Report on Climate Change and Land (2019) and meet our commitments under the Paris Agreement, a new analysis is urgently required to show the implications for Ireland of the global illustrative pathways to achieving the 1.5 degree warming limit. The Climate Change Advisory Council is the most appropriate body for such an analysis; however, its membership does not currently include any climate scientists. Such an analysis could at least inform near-term policy choices and long-term policy direction for Ireland and assist in the establishment of any separate target in law for methane within the overall carbon budget for Ireland as is proposed by the parties in negotiation to form a government. However, it is important to recognise that cuts in agricultural methane of a minimum of 30% relative to 2010 would likely be required for Ireland to contribute to the achievement of Article 2 of the Paris Agreement, in addition to cuts in fossil fuel usage.

Secondly, there is a strong case for considering the adoption of a separate target for methane reductions in law, as is the case now in New Zealand. The target should be determined with reference to IPCC science and EU policy but is ultimately a societal

and political choice. To date climate action in the agricultural sector has been entirely voluntary and reliant on effective knowledge transfer, and good agricultural practices at farm level whilst the market and national policy is driving emissions in the opposite direction. A clear target, set down in law, would provide much-needed guidance for this sector, whilst giving a clear, fairer indicator of the mitigation effort required of other sectors.

Any new functions for the Climate Change Advisory Council in amended legislation must specify clearly that its mandate includes the protection and enhancement of biodiversity. Its functions should be amended to give independent, expert advice on climate mitigation across all sectors of the economy beyond merely evaluating existing plans.

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