

Understanding greenhouse gas emissions on Irish farms

What is climate change?

Climate is the average weather in a place over many years. Climate change is a shift in those average conditions. It is driven predominately by an increase in global temperatures caused by emission of greenhouse gases (GHGs) from human activities.

What are the main GHGs relevant to agriculture?

There are three main GHGs: carbon dioxide (CO₂); methane (CH₄); and, nitrous oxide (N₂O). While CO₂ is released mostly from burning fossil fuels, for agriculture, the main GHGs are methane (71%) and nitrous oxide (22%).

In Ireland, agriculture currently contributes 38% of the total GHGs emitted. GHG emissions on Irish farms come primarily from methane belched by cattle and sheep, nitrous oxide from chemical fertiliser and animal excrement, and carbon dioxide from diesel (Figure 1). Figure 2 presents the breakdown of the emissions from Irish Agriculture.

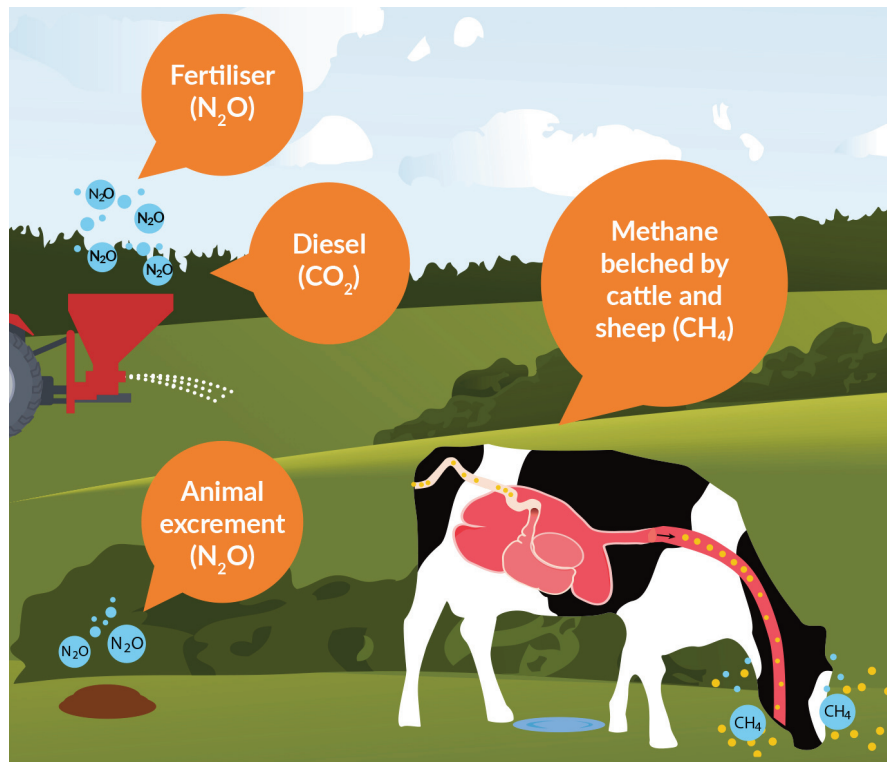


Figure 1: Sources of GHGs on farms.

Agriculture GHG emissions 2023 (EPA).

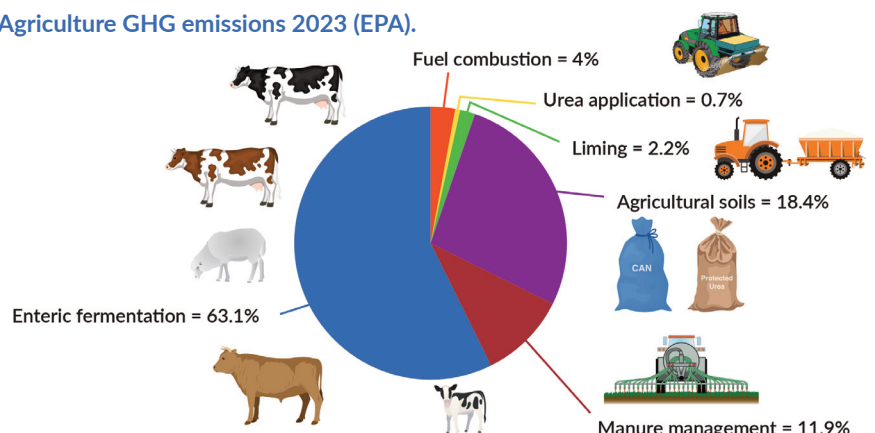


Figure 2: Sources of Irish agricultural emissions.

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How do the GHGs cause an increase in temperature?

GHGs act like a blanket around the Earth. That's because heat from the sun reflects off the Earth and is trapped by layers of these gases in the atmosphere. Without this, the Earth would be frozen. Increased amounts of GHGs in the atmosphere in recent decades have meant that more heat is trapped within the atmosphere, leading to the so-called greenhouse effect. This has caused global temperatures to rise, which causes climate change.

Temperature change in Ireland over the last 120 years

Figure 3 is a visual representation of the change in temperature in Ireland as measured over the past 120 years. Each stripe represents the average temperature over a year. The blue indicates cooler than average annual averages, and red warmer than average. Similar to most nations, the warming being observed for Ireland has intensified in the past two decades. Ireland's average air temperature in 2019 was around 10.5°C, which was 0.9°C above the 1961-1981 long-term average.

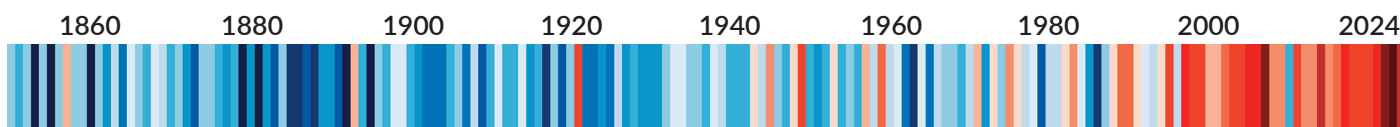


Figure 3: Temperature warming stripes (1860-2024). Source: Met Eireann, 2025.

Graphics and lead scientist: Ed Hawkins, National Centre for Atmospheric Science, University of Reading., National Centre for Atmospheric Science, UoR. Data: Berkeley Earth & ERA5-Land, NOAA, UK Met Office, MeteoSwiss, DWD, SMHI, UoR & ZAMG Licence link: <https://creativecommons.org/licenses/by/4.0/>

National Emissions Inventory

The national inventory is an accounting system, overseen by the Environmental Protection Agency (EPA), which accounts for the total GHG emissions released within the border of Ireland during a given year. The EPA reports national GHG emissions across a number of sectors, one of which is agriculture.

In contrast to other sectors, which are dominated by carbon dioxide, the Irish agricultural sector is dominated by methane and nitrous oxide, contributing over 90% of total agricultural GHG emissions. Figure 4 provides an overview of the GHG emission sources from the agricultural sector reported in the national inventory.

Did you know

The two primary sources of GHGs from agriculture are animals and nitrogen (N) fertiliser. The emissions associated with animals relate to emissions directly from animals, as well as emissions associated with grazing, housing and manure management. Emissions associated with fertiliser relate to the quantity and type of N fertiliser used.

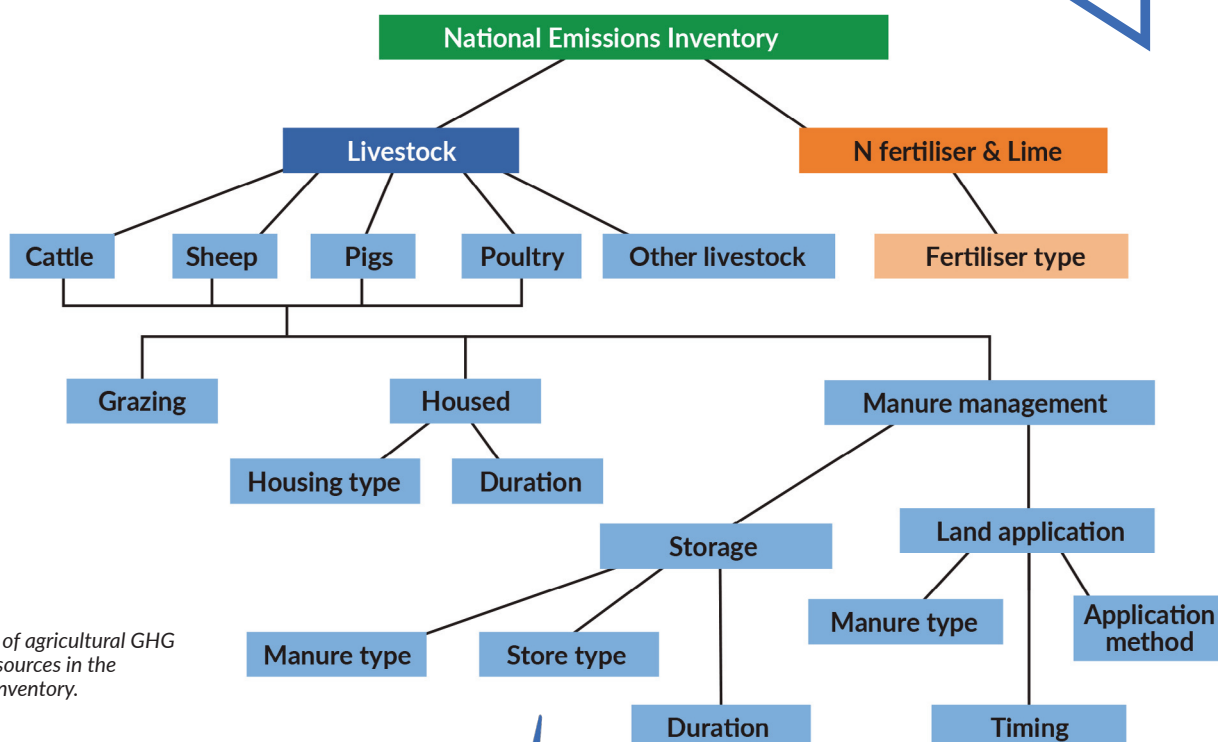


Figure 4: Overview of agricultural GHG emission sources in the national inventory.



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Climate Action Plan 2023 – Targets for agriculture by 2030



Teagasc Climate Action strategy – the roadmap for agriculture

The Teagasc Marginal Abatement Cost Curve (MACC) 2023 identifies technical measures to reduce greenhouse gas (GHG) emissions across Agriculture, Land-Use, Land-Use Change and Forestry (LULUCF), and Bioenergy. The MACC includes three potential agricultural activity scenarios based on projected animal numbers to 2030 and two technical measure adoption rate pathways – adoption rates similar to previous MACC or a very high level of adoption.

For more information on MACC check out Factsheet No. 2 in this series and click here:

<https://teagasc.ie/environment/climate-centre/publications/reports/marginal-abatement-cost-curve-2023/>



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Why engage with climate change?

Climate change is perhaps the greatest challenge facing the world right now. There are a number of reasons why Irish farmers are taking climate action now.

Social responsibility

We are fortunate to live in a beautiful and diverse part of the world. Our children, and all future generations of farmers, local communities and the wider society, deserve the same opportunity.

Protect our markets

Climate change is central to our licence to farm and to supply our quality food products onto international markets.

Climate change will impact how we farm

We will have wetter winters, drier summers, more extreme weather events as well as increased risk of pests and disease.

Policy

We are bound by international agreements, EU and national policies to reduce GHG emissions. These policies will lead to the implementation of regulations in the coming months and years to achieve the targets set.

Improved farm profitability

Many of the technologies farmers are being asked to implement to reduce emissions will also reduce costs and improve profitability. Farmers are part of the solution to emissions; this will create opportunities for income generation.

Where do I start?

1. Register for the Signpost Advisory Programme.
2. Establish a baseline assessment of the current actions being implemented on your farm.
3. Identify the total emissions figures for your farm (know your number) using AgNav (www.agnav.ie). This is an important starting point. It's hard to change what you don't measure.



4. Develop an action plan for the farm in conjunction with an advisor (make my plan). Being able to assess, select and commit to the actions that are most appropriate to the farm will help in creating this action plan.
5. You will be supported to enable you to make the plan happen through a range of advisory supports, including both group based and individual follow-up and advice.

Figure 6 shows the farmer journey through the Signpost Advisory Programme.

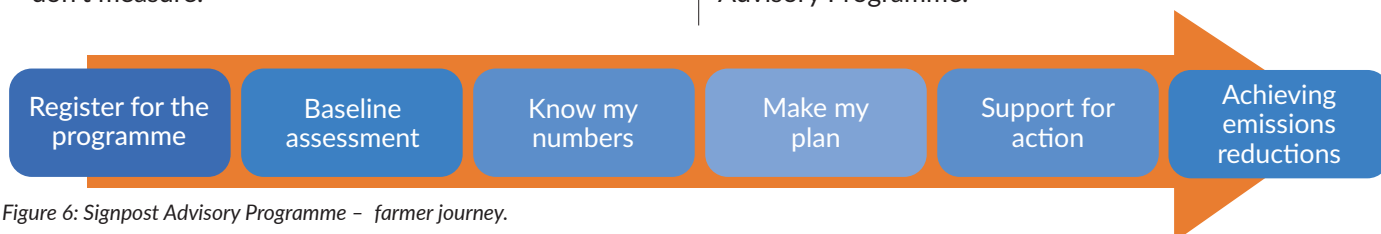


Figure 6: Signpost Advisory Programme – farmer journey.

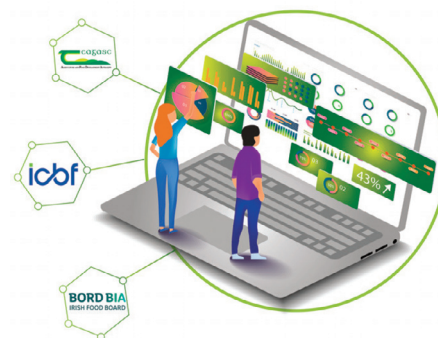
Know my number



As farmers, you are being asked to reduce GHG emissions from your farming system to control global warming. To do this you need to know the current carbon emissions for your farm. It's hard to change what you don't measure.

AgNav is a digital sustainability platform that helps Irish farmers measure, understand, and reduce their farm's environmental impact by tracking emissions and guiding sustainability improvements.

AgNav was created by a partnership of Teagasc, Bord Bia, and the Irish Cattle Breeding Federation (ICBF). AgNav is supported by the Department of Agriculture, Food and the Marine.



The Signpost Programme is a collaborative partnership of farmers, industry and State agencies, working together for climate action. For more information please visit: www.teagasc.ie/signpost. The Teagasc Climate Centre is a virtual centre to co-ordinate agricultural climate and biodiversity research and innovation across Teagasc.