



# **From Policy to Pasture:**

Bridging the Gap Between Climate  
Targets and Irish Agricultural Realities

by Alan Matthews and Matthew G. O'Neill



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## Foreword

On behalf of the Institute of International and European Affairs (IIEA), I am pleased to introduce this report, entitled *From policy to Pasture: Bridging the Gap Between EU Climate Policy and Irish Agricultural Realities*. It is the first of several planned outputs from our new project *Pathways: Ireland's Agricultural Future*, which has been in development at the IIEA for some time.

This initiative represents the IIEA's first foray into the topic of agriculture and climate since our highly successful - and prescient - 2016 project *A Climate-Smart Pathway for Irish Agricultural Development: Exploring the Leadership Opportunity*. Much has changed at the international and European level since that time, and many new and serious crises have emerged, but the challenges facing Irish agriculture in the face of increasingly ambitious climate targets at EU and national level remain. It therefore continues to be an important topic of policy discussion and this is a timely juncture for us to be discussing it.

The economic significance of the agricultural sector remains undisputed, as a significant employer and contributor to Ireland's GDP. But it is also acknowledged that it remains a substantial contributor to greenhouse gas emissions in Ireland. Extending from this, Ireland's agri-food trade is also significant – it is the country's oldest and largest indigenous exporting sector, and promoting the growth of our agricultural trade with new markets has been a significant element of Irish foreign policy in recent years. This, however, creates a tension - how to allow these sectors to grow and prosper, while also reconciling this prosperity with Ireland's international commitments with respect to climate change?

This project was conceived to examine these issues facing Irish agriculture and to provide, firstly, an inclusive and neutral forum for stakeholders and the public to discuss and input their views into the debate; and, secondly, a source of independent and unbiased research, informed by discussion among diverse partners and in turn feeding into the national and European debate.

As laid out below by the authors, Professor Alan Matthews and Dr Matthew O'Neill, this first paper aims to act as a scene-setter for the work to come. It describes the current state of play in the policy landscape at both EU and national level, as well as highlighting the unique challenges Ireland faces in reconciling its position as a major agricultural producer with increasingly ambitious climate targets at national and EU level.

We hope that it will provoke among its readers discussion and ideas, and we would be grateful to hear thoughts from our members and the wider readership of this paper in Ireland and further afield.

As Director General of the IIEA, I would like to extend my gratitude to all who assisted in the creation of the project and this first paper, including the IIEA's Research and Creative teams, the various stakeholders who have so generously given their time to discussion and feedback, the IIEA's network of thinktank partners in Europe, and of course to the co-authors, Professor Alan Matthews and Dr Matthew O'Neill.

The IIEA also extends its gratitude to the European Climate Foundation, whose support in the establishment of this project is greatly appreciated.

**Alex White SC**  
**Director General, IIEA**

# Executive Summary

## Context

The agricultural sector plays a pivotal role in Ireland's economy, contributing 6% to modified Gross National Income (GNI) and employing 173,000 individuals in 2023. As well as its economic significance, agriculture is Ireland's largest source of greenhouse gas (HG) emissions, responsible for 38% of the nation's total emissions, creating a distinctive challenge compared to other EU Member States where agriculture typically represents around 10% of total emissions. The challenge lies in balancing the sector's economic contribution with the need to meet climate targets, including a 25% reduction in agricultural emissions by 2030 and contributing to climate neutrality by 2050.

This working paper, *From Policy to Pasture: Bridging the Gap Between Climate Policy and Irish Agricultural Realities*, is the first publication under the *Pathways: Irelands Agricultural Future* initiative undertaken at the Institute. The project examines Ireland's position as a major agricultural producer facing national and European Union climate targets and the possible pathways Ireland can take to achieving these targets while stabilising the economic viability of the sector.

## Research objective

The aim of this paper is to provide an overview of the state of play to inform and enhance the discourse on agriculture's current emission trends performance in Ireland against national and EU targets. It describes the policy levers put in place to reduce emissions from the agricultural sector, and identifies important climate policy initiatives expected in 2025.

## Key Themes

### Theme One: Economic and Environmental Context

Agriculture generated €17.3 billion in gross value in 2023, while agri-food exports were valued at €18 billion. Ireland demonstrates high emissions efficiency in dairy and beef production compared to its EU peers and international competitors, but the sector's large contribution to the national total means that absolute emissions reduction remains imperative.

Emissions from Irish agriculture are primarily methane and nitrous oxide due to ruminant livestock. Dairy farming, while economically robust, has disproportionately high emissions per hectare compared to other farming systems. Furthermore, the Land Use, Land Use Change, and Forestry (LULUCF) sector has transitioned from being a carbon sink to a net emissions source, largely due to peatland degradation and reduced afforestation rates.

### Theme Two: Emissions Trends and Performance

Ireland has improved its agricultural emissions efficiency by 45% since 2013, due to improvements in technical efficiency over the period, and also to the growing share of dairying in agricultural output. However, absolute emissions reductions remain insufficient to meet climate targets. Overall national emissions are projected to fall by only 29% by 2030 even with envisaged additional measures, falling short of the legally-binding 51% reduction target. The Environmental Protection Agency projects agricultural emissions to fall by just 1% by 2030 relative to 2018 with existing measures in place, increasing to 18% with envisaged additional measures, which would still fall significantly short of the mandated 25% reduction target under agriculture's sectoral emissions ceiling for 2030. Projections with only existing measures in place suggest that agricultural emissions may actually increase in absolute terms by 2050 compared to 2018 baseline levels. An additional concern is that the LULUCF sector has shifted to a net emissions source in 2023 due to peatland degradation and reduced afforestation rates.

### Theme Three: Policy and Legislative Landscape

Ireland is subject to both the EU climate regime and national targets. The EU's climate framework sets ambitious goals for emissions reduction, including a collective 42% reduction under the Effort Sharing Regulation, which includes agricultural emissions, by 2030. A Commission proposal to raise the overall reduction ambition to 90% in 2040 relative to 1990 levels is expected in 2025, to which agriculture will be expected to contribute. Non-compliance with EU climate targets could cost Ireland up to €20 billion by 2030 on one estimate, emphasising the urgency for effective mitigation measures.

Ireland's climate framework is established under the 2021 Climate Act as amended. It establishes the obligation to reduce total emissions by 51% by 2030 relative to 2018, and mandates a system of carbon budgets and sectoral emissions ceilings to achieve this target. Ireland has a national target to reduce agricultural emissions by 25% by 2030 relative to 2018. Under both EU and national targets, there is an obligation to reduce net emissions from the LULUCF sector by an absolute amount of 0.626 Mt CO<sub>2</sub>e by 2030 relative to net emissions in the period 2016-2018.

The policy measures to incentivise the necessary changes in behaviour to reduce emissions are set out in successive national Climate Action Plans. For agriculture, the 2024 Climate Action Plan builds on the Marginal Abatement Cost Curve developed by Teagasc. This identifies potential technical mitigation options in agriculture as well as abatement options from land use management and land use change. On the assumption that there is a very high adoption of all the measures included in the Teagasc toolkit, achieving the 25% reduction required is very challenging but feasible.

Success will require unprecedented cooperation between policymakers, farmers, and other stakeholders. The transition must balance environmental imperatives with economic viability and food security concerns. New funding mechanisms, including the Infrastructure, Climate and Nature Fund, will be crucial in supporting this transformation. Implementation challenges remain significant, particularly in achieving high adoption rates for mitigation measures while maintaining farm incomes. However, the agricultural sector has demonstrated improving emissions intensity over time, suggesting that with appropriate support, funding and policy frameworks, substantial progress is possible and can be achieved.

## **Future developments**

The paper concludes by sketching some of the events and decisions expected in 2025 that will shape the continuing evolution of both national and EU climate policy. These include government approval of carbon budgets for the 2031-2040 period and, following that, the establishment of emissions ceilings for the various sectors including agriculture and land use. At EU level, discussion will begin on setting a 2040 reduction target and how agriculture might contribute to this, including whether agriculture should be included in some kind of emissions trading scheme or not. The Commission's proposal for the EU's long-term budget, the Multi-annual Financial Framework, and its legislative proposal for the next CAP, are also expected later in 2025. These initiatives will indicate the extent of financial support that may be available from the EU to assist Irish agriculture in the journey to lower emissions. Many of these decisions may end up in the hands of Ireland's EU Presidency period in the second half of 2026. This working paper is intended to contribute to clarifying the decisions that may be needed by that time.

# 1. Introduction

The intersection of climate policy and agriculture presents a critical challenge for Ireland's economic and environmental future. This paper examines the complex architecture of climate change policies at both European Union and national levels, with a specific focus on Ireland's agri-food sector. Against a backdrop where agriculture contributes 37.8% of national greenhouse gas emissions while simultaneously generating €17.3 billion in gross value added and employing 173,400 people, Ireland faces the fundamental challenge of aligning its agricultural sector with EU and national climate targets while maintaining its position as a global food producer.

This paper, which is the first of an IIEA project entitled *Pathways: Ireland's Agricultural Future*, explores the multifaceted policy pathways available to Ireland, considering both the urgent need for emissions reduction and the economic imperatives of maintaining international competitiveness. This research is particularly timely given the rapid evolution of climate policy frameworks and their implementation mechanisms. Through examination of current emissions trends, economic contributions, and existing policy structures, this paper maps the interconnected policy dimensions facing Irish agriculture in its transition to a low-carbon future.

Irish farmers have already started on the path to lower emissions, but the pace of progress must be greatly accelerated. Later papers in this series will address how this might be done while minimising the trade-offs between economic and climate objectives. The purpose of this paper is primarily to set the scene, to describe what has been happening to date both in terms of emissions trends and policies. It is not the purpose of this paper to make recommendations on policy which will come later in the project.

Section 2 describes some relevant characteristics of the Irish farming sector, including both its contribution to the broader economy as well as emphasising the great heterogeneity of farm sizes and incomes within the sector. It also describes the most recent trends in both agricultural and land use emissions.

Section 3 describes the relevant climate architecture at EU level. The 2030 EU targets were all increased following the adoption of the European Climate Law in 2021. These EU targets are legally binding and, while there is no specific EU-wide target covering agricultural emissions, agriculture is fully integrated into these targets. The section looks forward to the upcoming debate on setting a 2040 target for the reduction in EU-wide emissions. Once this target is established, a further ramping up of the targets in individual elements of the climate architecture will be expected. This increase in ambition will also have obvious implications for the agri-food sector.

Section 4 then examines the corresponding national targets for agricultural emissions. These targets derive from the carbon budgeting mechanism introduced in the amendment to Ireland's Climate Act in 2021. Carbon budgets set the maximum limit on allowed emissions over successive five-year periods, consistent with meeting Ireland's obligations under the Paris Agreement as well as the legal obligations under the Climate Act. These maximum ceilings are then distributed across the major sectors of the economy as sectoral emissions ceilings. Both agriculture and the land sector have separate ceilings under this process.

Section 5 looks at the policies Ireland has put in place to achieve its ambitious agricultural and land use targets. These are set out in successive Climate Action Plans which are now updated on an annual basis. The 2024 Climate Action Plan integrated for the first time estimates in the more recent version of the Teagasc Marginal Abatement Cost Curve (MACC) of the potential abatement achievement using different technical mitigation options as well as land use management and land use change. It demonstrated a pathway to achieving the ambitious 2030 reduction target for agricultural emissions on the assumption of a very high adoption uptake of the recommended practices. A pathway also exists for the LULUCF sector but it is clear already from the lower-than-hoped-for adoption rates (particularly of afforestation) that these targets will not be met.

The final Section 6 is forward-looking. It identifies some of the key events and milestones in 2025 that will impact on the context in which agricultural emissions reduction and land use removals in Ireland takes place.

## 2. Understanding the challenge of climate action for the Irish agri-food sector

### 2.1 Contribution of the agri-food sector to output, employment and exports

The agri-food sector is a cornerstone of the Irish economy, making a substantial contribution to national GDP, employment, and exports. In 2023, the Gross Value Added (GVA) at factor cost for the agriculture and food sectors amounted to €17.3 billion, contributing 6% to Ireland's GNI\* (modified Gross National Income). This contribution is even more significant when considering the sector's deep integration into rural economies, supporting local communities and fostering economic resilience.

Employment in the agri-food sector is another testament to its economic importance, with approximately 173,400 individuals engaged in agricultural activities, food production, and related industries in 2023. This workforce represents a significant share of total employment in Ireland, particularly in rural areas where job opportunities are often limited, thus underscoring the sector's role in sustaining livelihoods and promoting regional development.

Irish agri-food trade is characterised by its strong export orientation and diverse market reach. In 2023, the total value of agri-food exports reached €18.28 billion, accounting for 9.3% of the country's total merchandise exports. Ireland is renowned for the high quality of its agri-food products, with approximately 90% of beef, sheep meat, and dairy produce exported annually. Around 38% of Irish agri-food exports go to the UK, 34% go to EU markets and 29% are exported to other countries outside the EU. These exports play a pivotal role in strengthening Ireland's trade balance, fostering international trade relationships, and reinforcing the country's reputation for agri-food excellence.

In 2023, dairy and meat products were the principal contributors to export earnings, with dairy exports valued at €6.3 billion and meat exports at €3.4 billion. Dairy exports particularly have seen robust growth in volume, increasing from 1.2 million tonnes in 2015 to 1.6 million tonnes in 2022, reflecting sustained global demand for Irish milk and dairy products. Beef exports have shown a more variable trend, peaking at 530,000 tonnes annually between 2018 and 2020 before reverting to 480,000 tonnes in 2022. Geographically, Irish beef exports are evenly split between the EU and other developed country markets, primarily the UK, with only 5% destined for emerging markets. However, around one-third of dairy exports is sold to developing countries, highlighting Ireland's significant role in global food trade and its capacity to adapt to shifting demands across various markets.

Seventy per cent of Ireland's land in 2021 was allocated to agricultural use, made up of 59% grassland and 11% cropland. A further 17% was made up of wetlands, including peatlands, and 11% was under forest. The remaining 2% was allocated to settlement and urban use.<sup>1</sup>

The importance of grassland is reflected in the composition of agricultural output, which is dominated by the products of ruminant livestock. Averaging over the period 2020-2023, production of beef and lamb accounted for 41% of the value of agricultural output at producer prices, with a further 37% coming from dairy products. Crop production accounted for 23% of the value of output, of which 12% consisted of forage plants used for animal feed. The importance of ruminant livestock to the agri-food economy is underlined by these figures.

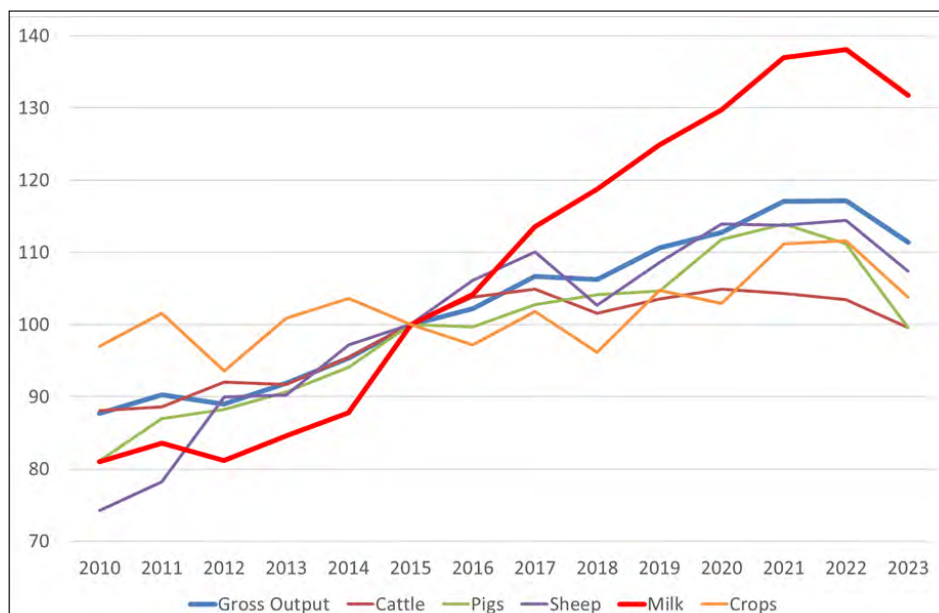
This reflects both climate and soil quality factors which favours grass production at the expense of tillage production. For land that is not suitable for tillage production, ruminant grazing makes an addition to our food supply by converting cellulose-rich grassland which otherwise cannot be consumed by humans into bio-available nutrients (Shalloo and Herron, 2024).

Specifically, dairying has been the engine of growth in Irish agriculture over the past one and a half decades. This is due not only to the higher profitability of dairying compared to other uses of agricultural land, but it was facilitated specifically by the relaxation and later removal of the EU milk quota regime from 2011 onwards. Between 2012 and 2022, milk output expanded by 70% compared to growth in overall agricultural output of 32% and growth in beef output by 12% over the same period (Figure 1).

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<sup>1</sup> CSO, Land use categories <https://www.cso.ie/en/releasesandpublications/ep/p-eii/environmentalindicatorsireland2023/landuse/>

**Figure 1. Dairying has been agriculture’s engine of growth**



Source: CSO, *Volume indices for output, inputs and income in agriculture (base 2015 = 100), chain-linked to 2023 data using the base 2020=100.*

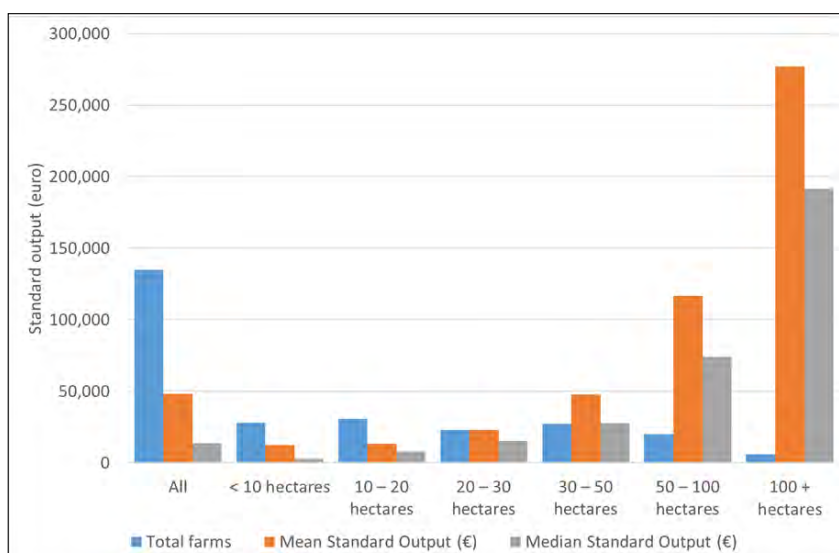
## 2.2 The income situation in farming

Income from farming compares unfavourably with average earnings in the non-farm sector. This is immediately evident from the macro statistics which show that agriculture employs 4.4% of the national workforce but contributes only 1.8% of national value added. The average income from farming per annual work unit (a standardised unit that corrects for time worked) was €18,197 in 2023 compared to the average wage of €53,055 in the non-farm sector.

An important feature of Irish farming is the great heterogeneity of Irish farms. The size structure of farms can be measured in various ways, for example, by area farmed or by economic size. Economic size is measured in terms of Standard Output (SO), defined as the average monetary value of the agricultural output at farm-gate prices. SO is not a measure of farm income. It does not take account of costs, direct payments, value added tax or taxes on products. The distribution of farms by agricultural area is shown in Figure 2. For each size group, the chart shows the number of farms and the average and median level of output.

Around one-fifth of farms in the two largest size groups above 50 ha (25,600 farms in total) account for three-fifths of Standard Output. It would not be unreasonable to deduce that they also contribute around three-fifths of total agricultural greenhouse gas (GHG) emissions.

**Figure 2. Number of farms by farm size (AAU) and economic size (SO), 2020**



Source: CSO, [Census of Agriculture 2020 Detailed Results](#).

Note: The median SO in each size group is the level of output that separates the lower half of the holdings in that size group from the upper half. The median of a distribution is lower than the average when the distribution is positively skewed, meaning that there can be a few very high values that pull the mean upwards.

Average figures also conceal the wide disparity in incomes from farming. The Teagasc National Farm Survey covers only commercial farms, defined as those with a Standard Output greater than €8,000. The average family farm income on the one-third of farms that were full-time in 2022 (which was an unusually good year for farm income) was €106,214 (this figure must remunerate the capital invested in the farm as well as the average of 1.4 family members engaged on those farms). Conversely, the average income from farming on the remaining two-thirds of part-time farms was only €11,426 (the definition of full-time and part-time here refers to whether the farm has sufficient size and activity to require the time of a full-time person or not, not whether the farmer has off-farm employment).

These disparities are also visible when making comparisons across farming systems (Table 1). Farms are classified into systems according to the proportion of the total SO of the farm which comes from the main enterprises after which the systems are named. The Eurostat methodology only allows for one cattle system in which cattle rearing and fattening are combined. In the Teagasc National Farm Survey, this system is further broken down between cattle rearing (where suckler cows are the dominant enterprise) and cattle fattening.

**Table 1. Numbers of farms and average income and direct payments per farm by farming system**

	2010	2020	2020	2023	2023	2023	2023
	<i>No. holdings</i>	<i>No. holdings</i>	<i>Share of all farms</i>	<i>Family farm income (€)</i>	<i>Direct payments (€)</i>	<i>Pillar 1 CAP payments (€)</i>	<i>Pillar 2 CAP payments (€)</i>
<b>Tillage</b>	14,470	12,760	10%	21,399	33,052	21,508	11,544
<b>Dairying</b>	15,650	15,310	12%	49,432	21,667	15,865	5,802
<b>Cattle rearing and fattening</b>	77,740	73,640	57%				
- Cattle rearing				7,425	17,137	8,250	8,887
- Other				14,735	16,505	9,758	6,747
<b>Sheep</b>	25,750	23,400	18%	12,625	20,283	11,739	8,544
<b>Mixed livestock</b>	5,210	4,030	3%	15,848	34,658	23,759	10,900
<b>Pigs and poultry</b>	740	830					
<b>Other</b>	360	220					
<b>Total</b>	<b>139,920</b>	<b>130,190</b>	<b>100%</b>	<b>19,925</b>	<b>19,628</b>	<b>11,988</b>	<b>7,641</b>

Sources: Numbers of holdings from Eurostat, Main farm indicators by organic farming, utilised agricultural area, economic size, farm type of agricultural holding and NUTS 2 [ef\_m\_org]; average income and direct payments per farm from Teagasc, National Farm Survey 2023, 2024.<sup>2</sup>

Combining dairying (12%), cattle (57%) sheep (18%) and mixed livestock (3%) together, 90% of Irish farms had a dominant ruminant livestock enterprise in 2020, while the remaining 10% of farms had a dominant tillage enterprise (intensive pig and poultry as well as horticultural and fruit farms between them make up less than 1% of the total). The total number of holdings has been rather stable between the two agricultural censuses in 2010 and 2020. The largest fall in numbers was in the pigs, poultry and horticultural 'other' group, and the smallest fall in numbers among specialist dairy farms.

The Teagasc National Farm Survey reports the average income on commercial farms within each farming system as well as the direct payments received. The results for 2023 are shown in Table 1, but there can be large variability from year to year. Dairying is by far the most remunerative farm enterprise, with a family farm income on specialist dairy farms of €49,400 in 2023. Tillage farms also generate a family farm income above the average, while all the drystock farming systems have family farm incomes below the average. The average family farm income on suckler cow farms in 2023 was particularly low, at €7,425. It should be underlined that these figures refer to the income from farming for these farm households and not total farm household income. These patterns have been very stable over time (Table 2).

<sup>2</sup> The proportion of farms in the different farming systems differs from the population proportions shown in the Teagasc National Farm Survey as the latter only covers commercial farms whereas the data in Table 1 cover all farms.

**Table 2. Average income from farming by farming system, 2016-2023**

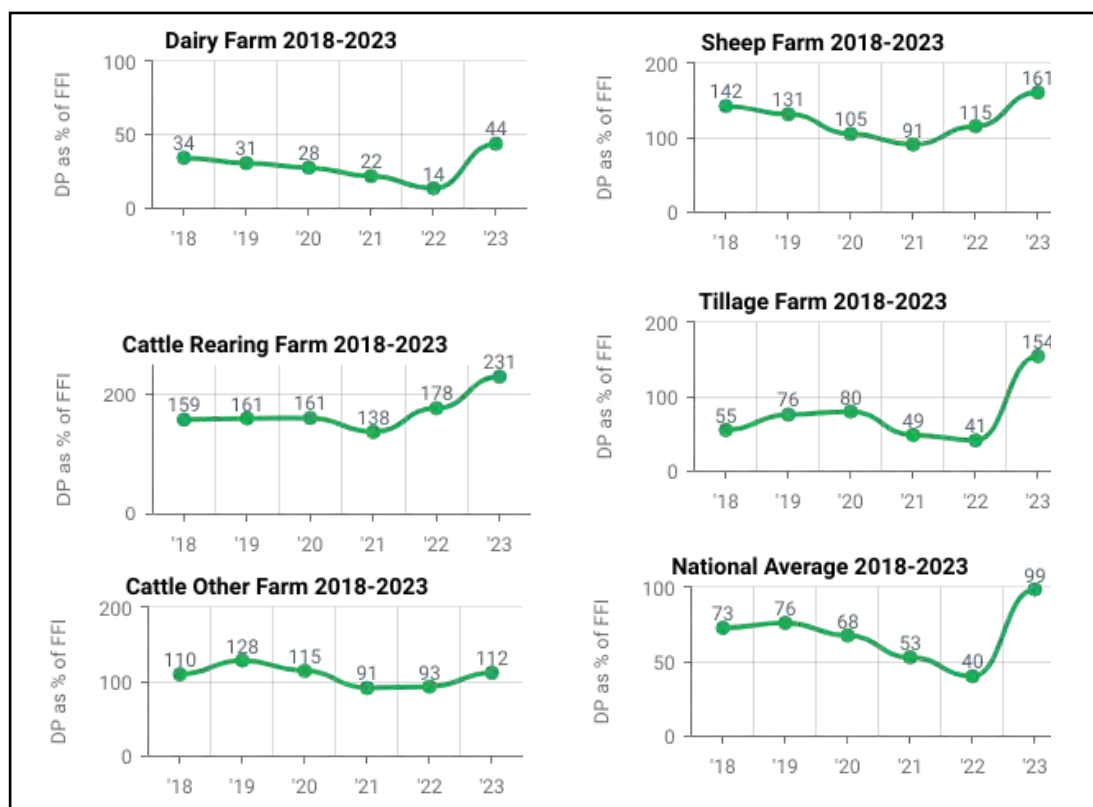
	2016-2018	2017-2019	2018-2020	2019-2021	2020-2022	2021-2023
— Dairy	53,300	56,961	53,082	62,959	85,677	77,516
— Cattle	15,361	14,792	13,866	15,008	16,082	16,913
— Sheep	14,676	14,614	14,757	16,844	17,220	15,673
— Tillage	41,734	41,734	39,716	48,799	68,333	61,989
— All Farms	24,001	24,330	23,024	26,522	32,883	31,132

Source: Teagasc, National Farm Survey Sustainability Report 2023, 2024.

The final column in Table 1 shows the dependence on CAP direct payments for the different farming systems in 2023. Among CAP payments, Pillar 1 payments are largely area-based direct payments intended for income support, though in 2023 they also include payments arising from enrolment in eco-schemes as well as payments to young farmers. Pillar 2 payments are mainly payments under the ACRES Agri-Climate Rural Environment Scheme or its predecessor GLAS Green Low-Carbon Agri-Environment Scheme, but also include payments to farmers in areas of natural constraints. They are thus a mixture of payments for ecosystem services (including the eco-schemes in Pillar 1) as well as payments intended for income support. In 2022, €59 million in environment taxes was paid by the Agriculture, Forestry and Fishing sector while €306 million was received in subsidies (CSO 2024).

The most striking feature of Table 1 is that the family farm income on the average Irish farm was almost exactly equal to the CAP direct payments received in 2023. Only dairying had a positive return from the market alone. In the case of all other enterprises, market returns failed to cover total expenses. But 2023 was also an unusual year, as can be seen from the trend in the share of direct payments in family farm income over the period 2018-2023 by farming system shown in Figure 3. But even in the longer-term, only dairying and tillage show positive market returns, with family farm income in the drystock enterprises (cattle and sheep) being regularly less than the CAP direct payments received. One can interpret this by saying that farmers are subsidising the continuation of their drystock enterprises out of their CAP payments.

**Figure 3. Share of CAP direct payments in family farm income by farming system, 2018-2023**

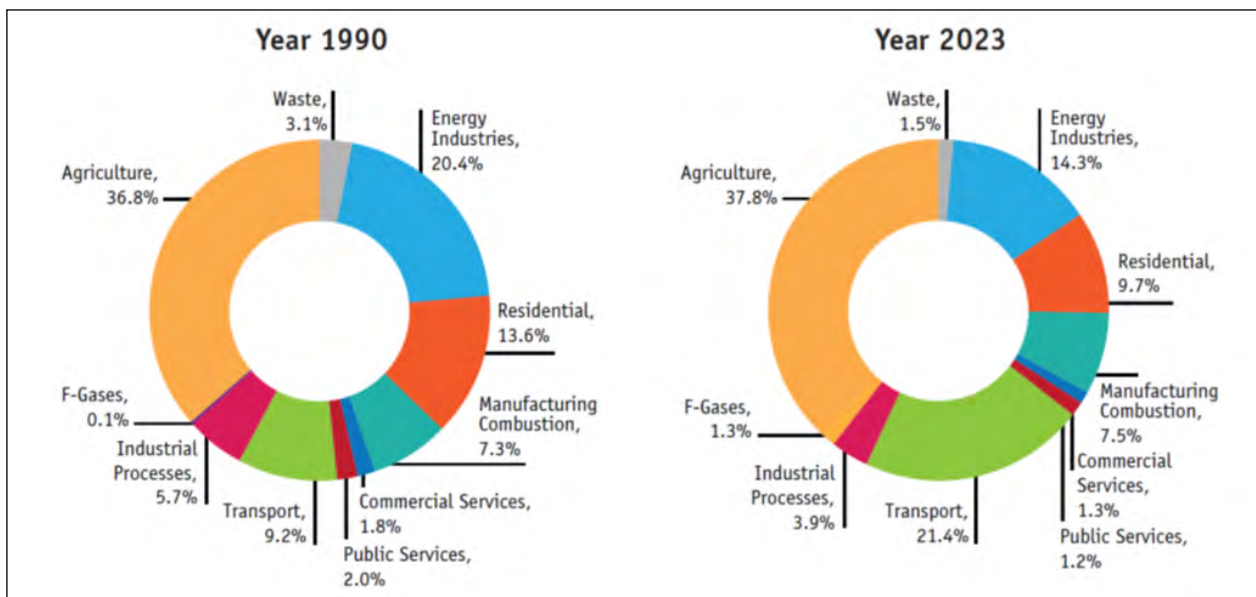


Source: Teagasc, National Farm Survey 2023, 2024.

## 2.3 Agriculture and land use emissions

Provisional agricultural emissions accounted for 37.8% of total territorial emissions in 2023 (excluding emissions from the Land Use, Land Use Change and Forestry (LULUCF) sector), a slight increase on its share in 1990 (Figure 4). Compared to other sectors, agriculture has a distinctive emissions profile, consisting mainly of nitrous oxide (N<sub>2</sub>O) and methane (CH<sub>4</sub>) arising from the use of fertilisers, enteric fermentation in ruminant animals, and manure management. Although affected by agricultural management, changes in soil carbon due to emissions and removals of CO<sub>2</sub> from agricultural land are counted separately in the EU inventory accounts under the LULUCF heading. The LULUCF category also includes emissions from wetlands and net emissions or sinks in the forest sector and from harvested wood products.

**Figure 4. Profile of GHG Emissions (excluding LULUCF net emissions) in 1990 and 2023 by Sector**



Source: EPA, Provisional Greenhouse Gas Emissions 1990-2023, 2024

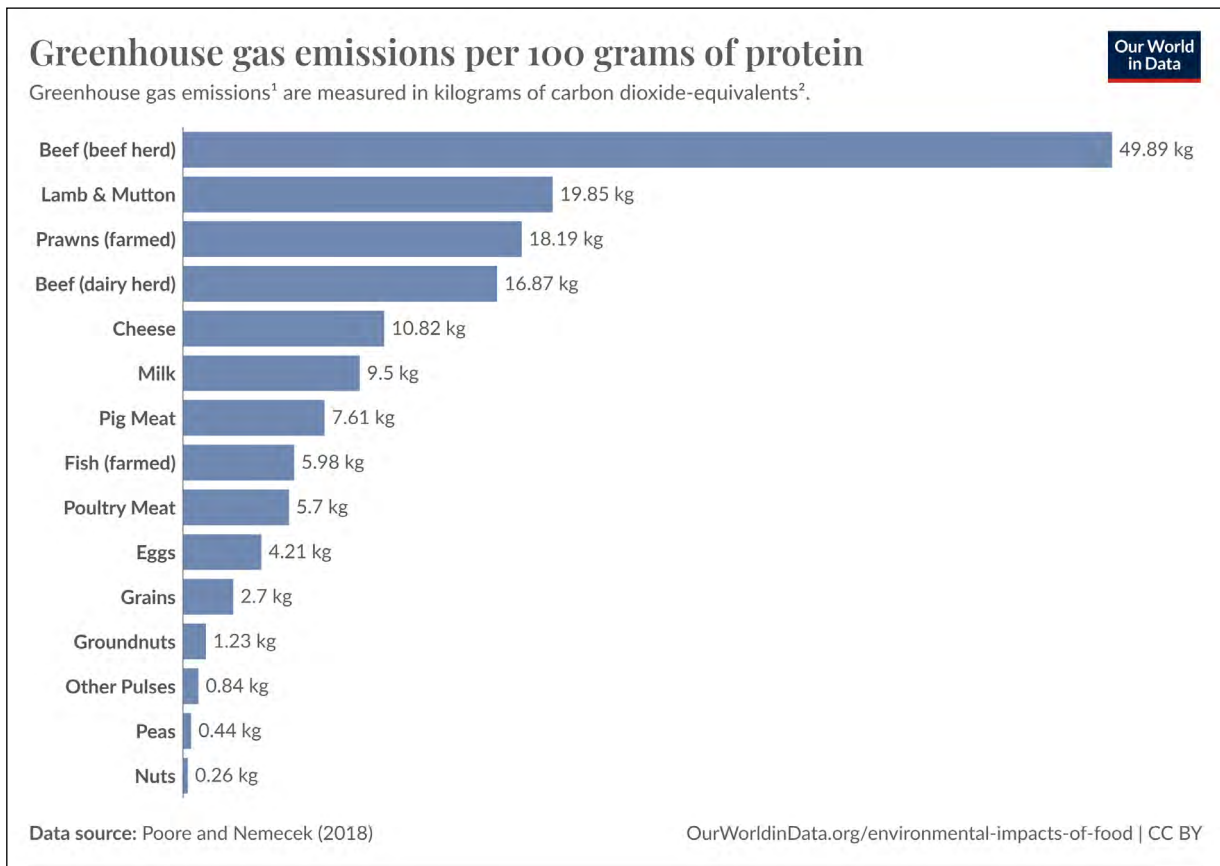
Note: The EPA data for the agricultural sector includes CO<sub>2</sub> emissions from the burning of fossil fuels for energy in agriculture, fishing and forestry.

Agriculture accounted for 39% of emissions, 1% of gross value added, and 4% of employment in 2022 (CSO 2024). The high share of agricultural emissions in total national emissions is primarily due to the high contribution of ruminant livestock products to Irish agricultural output noted earlier, while the relative absence of heavy industry with a high dependence on fossil fuels is also a contributory cause.

The significance of the role of ruminant livestock in Irish agriculture for climate action is because of their high emissions intensity per unit of output, whether output is measured by weight, by the amounts of calories or protein delivered, or by value. The ranking of different foods by grams of protein is shown in Figure 5, as animal source foods are mainly consumed as a source of protein. The data are based on a meta-analysis of global studies and Irish data would be different. For example, Irish emissions per kg of beef or dairy produced are among the lowest globally for these types of products. Nonetheless, the overall ranking of different food groups in terms of GHG intensity remains valid even if the differences are narrowed based on Irish data. The data show that the GHG intensity of animal source foods is considerably higher than for plant-based foods. Within the animal source foods category, meat and dairy products which are derived from ruminant animals have a higher GHG footprint than meat from pigs or poultry.

Many other dimensions must be considered when comparing the environmental and health impacts of different foods, including differences in the nutritional quality of different protein sources, different impacts on biodiversity, food versus feed competition, as well as animal welfare considerations. These issues will be explored in later stages of this project. But focusing only on GHG emissions, reducing Irish agricultural emissions is primarily a question of reducing the emissions from ruminant livestock.

Figure 5. Greenhouse gas emissions per 100 grams of protein

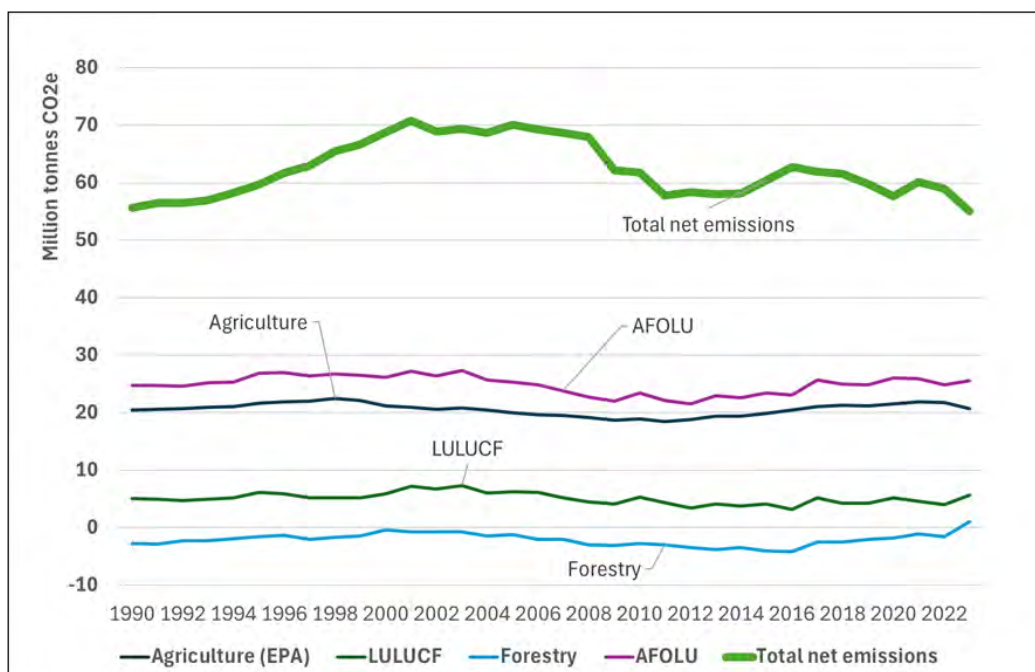


Source: Our World in Data, based on Poore and Nemecek (2018), <https://ourworldindata.org/grapher/ghg-per-protein-poore>

## 2.4 Trends over time in agriculture and land use emissions

The trends over time in agricultural and land use emissions are shown in Figure 6. Total national GHG emissions were on a rising trend in the 1990s, fell in the 2000s, have been flat in the 2010s, and have shown a decline in the three years 2021-2023 (the dip in 2020 reflects the impact of the COVID-19 lockdowns in that year). Agricultural emissions show a similar pattern of an increase in the early years, followed by a gentle decline to 2011, after which emissions rose again in response to the relaxation and eventual elimination of the EU milk quota regime. Emissions fell in 2022 and 2023.

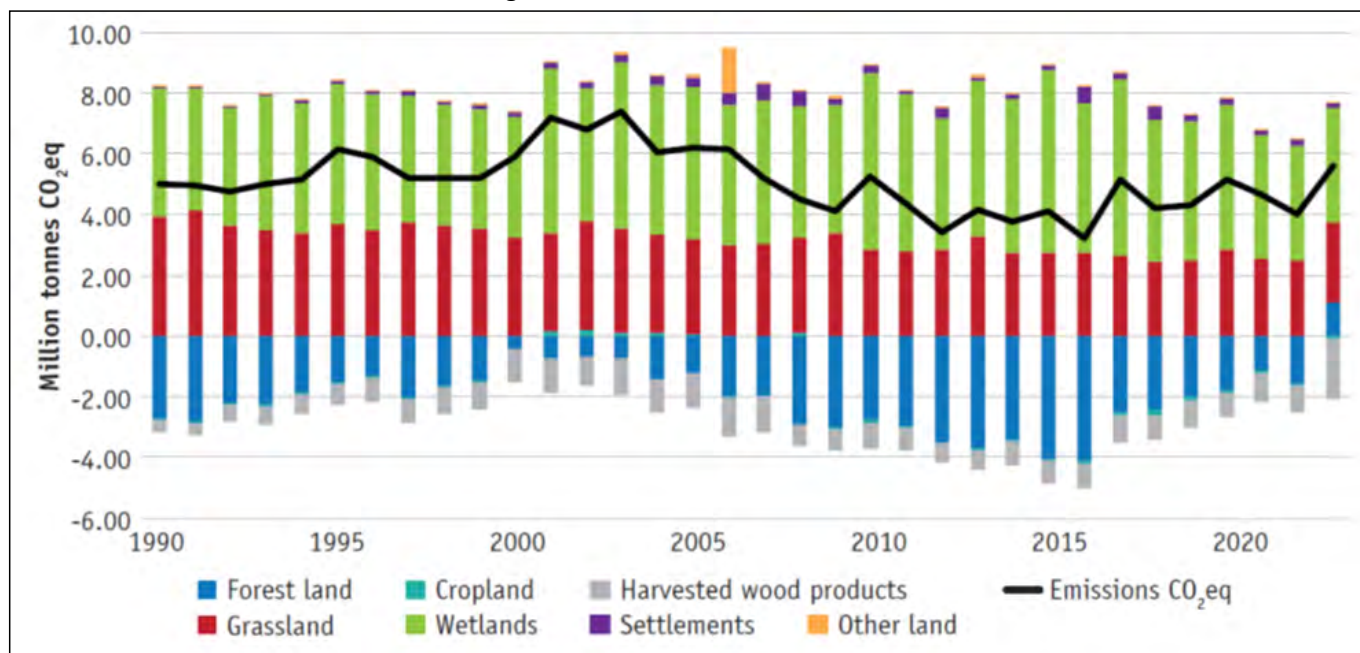
Figure 6. Trends in agriculture and land use emissions, 1990-2023



Source: EPA, GHG Provisional Emissions 1990-2023, 2024.

The LULUCF sector in Ireland, unlike most other EU countries, is a net source of emissions due to high emissions from peatlands and wetlands, even though forestry has been a net sink during the period (Figure 7). However, in 2023 forestry became a net source of emissions for the first time to the amount of 1 million tonnes CO<sub>2</sub>e, reflecting an increased level of harvest and a low rate of afforestation in recent years. Agricultural land is also a net source of emissions, mainly from grassland on organic soils, though net emissions from this source have fallen over time.

Figure 7. Trend in LULUCF, 1990-2023



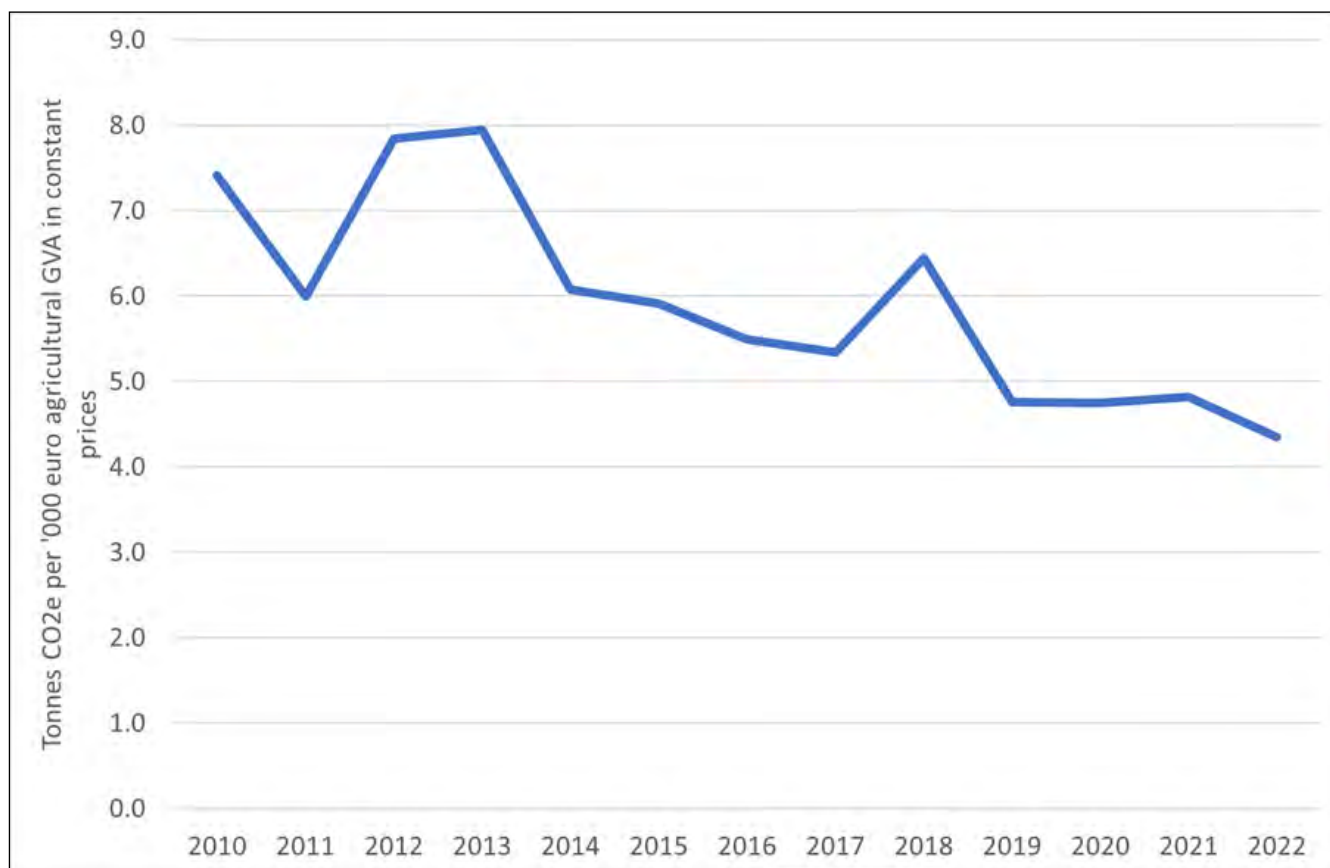
Source: EPA, GHG Provisional Emissions 1990-2023, 2024.

## 2.5 Success in reducing emissions intensity over time

The GHG emissions indicators used in this paper are calculated following the IPCC methodology's accounting conventions and where Irish emission factors as employed in the 2023 National Inventory Report for Ireland (Duffy et al., 2023). The IPCC based methodology reflects so called territorial emissions by IPCC sector. This means that the IPCC based approach measures the agriculture-based emissions that occur on farms in Ireland, but it excludes emissions relating to the production of imported farm inputs (e.g., synthetic fertilisers) by Irish agriculture. This definition differs from the more holistic approach that is typically used in the Life Cycle Assessment (LCA) approach, which defines an end output (e.g., milk) and captures emissions along the chain of the production process, including emissions associated with inputs to the production process, even if those inputs are produced outside the territory of Ireland.

Based on CSO macro statistics, agriculture has steadily improved the emissions intensity of its production over time, and particularly since 2013 (Figure ). Fluctuations in the series are due to the volatility in agricultural output but there is no mistaking the downward trend. Since 2013, the emissions intensity of agricultural output has almost halved (a fall of -45%). This is due to improvements in technical efficiency over the period, but also to the growing share of dairying in agricultural output (Figure 1). Per euro of output, dairy is a much more emission-efficient enterprise than drystock. According to the 2023 Teagasc National Farm Survey Sustainability Report, the average emissions of dairying per euro of output over the 2018-2023 period was just 2.6 kg CO<sub>2</sub>e, compared to a figure of 4.6 kg CO<sub>2</sub>e per euro of output in the cattle sector.

Figure 8. Emissions intensity per euro of agricultural output, 2010-2022



Source: CSO, 2024. The output value is measured in constant 2023 prices to reflect changes in volume.

Micro farm-level statistics tell a similar story. Teagasc initiated measurement of average farm-based emissions and carbon footprint in 2013 based on representative farm data included in its National Farm Survey, making it a European leader in this regard. The main objective of this research is to establish indicators through which changes in the sustainability performance of Irish farms can be documented and evaluated. Emphasis should not be placed on the absolute level of the carbon footprint measure, since this will be the subject of ongoing revision to reflect developments in scientific understanding. Of greater relevance is the trajectory of the indicator over time.

Table 3 shows the trend in agricultural GHG emissions per euro of output by farming system. The figures are not directly comparable to the sectoral average shown in Figure 8 as output in the former is measured in constant prices whereas the figures in Table 3 use current prices. Agricultural output prices increased by over 43% between 2016 and 2023. This would inflate the denominator of the emissions per euro output ratio and steepen any observed improvement in emissions intensity. There is an improvement in the emissions intensity of all enterprises over time. The change over the six years 2016-2018 to 2021-2023 of 36% is comparable to the trend shown at the sectoral level in Figure 8 when the much shorter time period as well as the use of current prices are accounted for.

Table 3. Agricultural GHG emissions per euro of output by farming system, 3 year rolling average 2018-2023

	2016-2018	2017-2019	2018-2020	2019-2021	2020-2022	2021-2023
— Dairy	3.2	2.9	2.9	2.7	2.4	2.2
— Cattle	5.9	5.9	5.4	5.0	4.4	3.7
— Sheep	5.6	5.8	5.5	5.1	4.4	3.7
— Tillage	1.7	1.7	1.7	1.6	1.3	1.0
— All Farms	5.0	5.0	4.7	4.3	3.8	3.2

Source: Teagasc, National Farm Survey Sustainability Report 2023, 2024.

A rather different view of the data is available in Table 4. The overall farm average agricultural GHG emissions per hectare have stabilised over the study period (5.2 tonnes CO<sub>2</sub>e per hectare). Due to the more intensive nature of production in dairy systems compared to all other grassland systems, agricultural GHG emissions per hectare on dairy farms are 2 to 4 times higher compared to other farm systems. The main trends observed are a slight increase in dairy emissions per hectare and the relative stability or reduction in emissions per hectare across the other farm systems. From the point of view of reaching emissions reduction targets, it is emissions per ha rather than emissions per euro that are relevant. In this respect, the relative stability in the trends in emissions per ha shown in Table 4 matches closely the relative stability in aggregate agricultural emissions shown in Figure 6 over the same period.

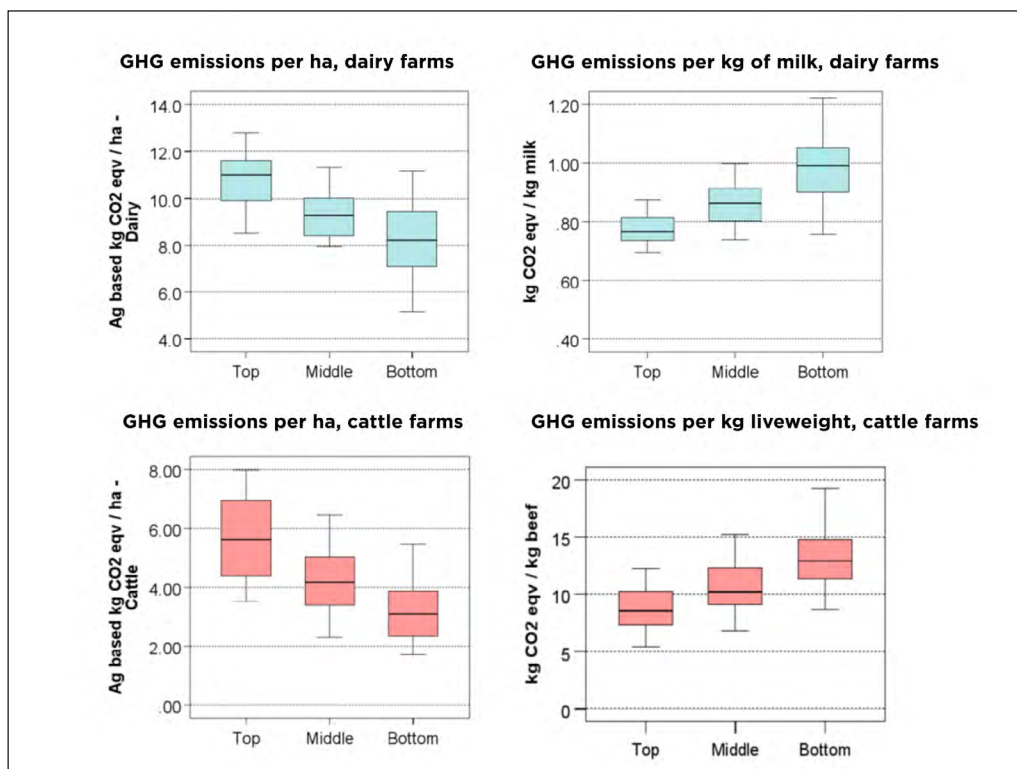
**Table 4. Agricultural GHG emissions per hectare by farming system, 3 year rolling average 2018-2023**

	2016-2018	2017-2019	2018-2020	2019-2021	2019-2022	2021-2023
🐄 Dairy	9.2	9.4	9.4	9.5	9.6	9.6
🐄 Cattle	4.7	4.6	4.6	4.5	4.5	4.5
🐑 Sheep	4.6	4.5	4.3	4.2	4.0	4.0
🌱 Tillage	2.2	2.2	2.3	2.2	2.1	2.0
🏠 All Farms	5.3	5.3	5.2	5.2	5.2	5.2

Source: Teagasc, National Farm Survey Sustainability Report 2023, 2024.

A final important contrast is illustrated in Figure 9. This figure compares emissions per ha and per euro of output for both dairying and cattle production, disaggregated by the economic performance of the relevant farms. The important point is to note that, also within farming systems, there are significant differences in emissions intensity, and not only between farming systems. For both dairying and cattle, the top economically-performing farms also had the highest emissions per hectare, but the lowest emissions per unit of output. The fact that these two indicators move in opposite directions is another tension to be resolved when considering appropriate climate action.

**Figure 9. Agricultural GHG emissions per ha and per kg of milk, dairy farms 2023**



Source: Teagasc, National Farm Survey Sustainability Report 2023, 2024.

## 2.6 The issues to be addressed

Emissions from agriculture are almost entirely made up of the non-CO<sub>2</sub> gases of methane and nitrous oxide arising from microbial action in the soil, in animal manure, and in the stomachs of ruminants. This is a key difference between fossil fuel and agricultural and land use emissions. While food is produced, it is not possible to eliminate these emissions although of course they can and must be reduced and minimised. The biogenic nature of agricultural emissions makes them much more complex to measure than emissions from fossil fuels because they vary both spatially and temporally with soil type, precipitation, and temperature. Emissions reported using the lower-level tiers in the UNFCCC inventory accounting system fail to capture the complexity of different management systems and practices. As a result, it can be difficult to get credit for efforts made to reduce microbial emissions from agriculture (and indeed also the storage of carbon in agricultural land) in national inventories. While mitigation that affects the amount of an activity can be counted relatively easily (e.g. reduced livestock numbers, lower fertiliser sales), much greater effort is needed to capture mitigation resulting from changes in *emission factors* (e.g. timing of fertiliser application, the management of manure). There is a pressing need for better activity data recording particularly in terms of farm facilities and documenting on-farm behavioural change.

To accelerate the reduction of agricultural emissions in Ireland, several pressing challenges and opportunities must be addressed. A key question is how to balance the important economic role of the agri-food sector with the need for significant emissions reductions. Livestock farming, which dominates Irish agriculture, is both a significant economic activity and the main source of emissions. Reducing livestock numbers or changing production practices raises concerns about potential impacts on farm incomes, rural employment, and Ireland's agri-food exports. How can policymakers support farmers in adopting sustainable practices while ensuring economic viability? Technical mitigation possibilities exist, but these solutions may require substantial investment and knowledge transfer. Where technical mitigation possibilities are insufficient, changes in land use to reduce the importance of livestock farming will be necessary. But what are the business models that would facilitate these land use changes?

Another challenge lies in the current reliance on CAP subsidy payments, particularly for less profitable drystock farms. These payments underpin much of the sector's financial stability, yet they may need to be repurposed to incentivise emission reductions. How can CAP payments be structured to encourage environmentally sustainable farming while avoiding undue financial hardship for farmers? At the same time, there is an opportunity to leverage CAP's eco-schemes and rural development programs to align farm incomes with broader climate and biodiversity goals.

The new CAP 2023-2027 agreed in 2021 already moved to repurpose payments to achieve a higher level of environmental and climate ambition. The measures included the introduction of eco-schemes in Pillar 1 and enhanced conditionality attached to receipt of direct payments. The allocation of direct payments to eco-schemes was set at a minimum of 25% of the direct payments ceiling. Enhanced conditionality involved strengthening some of the standards for Good Agricultural and Environmental Condition (GAEC standards) as well as introducing the obligation to observe two additional Statutory Management Requirements. Also within Pillar 2 of the CAP, the minimum allocation for agri-environment-climate schemes was increased to 35%. These changes were introduced in the context of a CAP budget which at best was held constant in nominal terms and whose real value, in terms of income support, was reduced in part because of the potentially higher costs to comply with the environmental requirements but also because of the rampant inflation in recent years. This was a contributing factor to the farmer protests that appeared in several EU Member States in the spring of 2024.

The Commission responded by proposing a simplification measure which rolled back some of the higher environmental demands introduced in the 2021 reform. For example, the mandatory requirement to ensure a minimum of 4% of non-productive land on arable farms was removed and Member States were instead required to introduce an eco-scheme that would pay farmers for this measure. The report of the Strategic Dialogue on the Future of Agriculture published in September 2024 recommended that, in future, farmers should be rewarded to undertake environmental and climate action through funding outside the CAP, and proposed to establish two new funds, a Nature Restoration Fund and a temporary Agri-Fund Just Transition Fund, to support farmers and land managers to undertake environmental action. EU funds for this purpose will likely be very limited in this regard given the competing priorities for spending in the next Multi-annual Financial Framework, the long-term EU budget, but the Irish government has indicated that national funds will be made available (see Section 5.5 below).

Finally, improving data collection on farm practices and emissions factors is essential to accurately measure and reward progress. The 2024 Climate Action Plan noted that the modelling of the abatement potential of mitigation measures that underlie the EPA projections of agricultural emissions is limited because specific performance indicators are difficult to track. The Plan noted that further action must be taken to improve data availability so that performance indicators can be tracked more precisely. It is also crucial that the national inventory is fully enabled to capture and account for the mitigation efforts that farmers are making.

Addressing these issues will require a multi-stakeholder approach, balancing economic, environmental, and social considerations to ensure a just and effective transition.

### 3. EU climate policy

#### 3.1 EU climate architecture

Over the past 30 years, the EU has developed an increasingly comprehensive climate policy framework through an incremental “learning by doing” approach (Delbeke and Vis, 2020). Key milestones include the adoption of the Kyoto Protocol (1997), the establishment of the EU Emissions Trading System (2005), the 2020 climate and energy package, the 2030 climate and energy framework, and most recently the European Green Deal aiming for climate neutrality by 2050. The climate ambition of the Green Deal was implemented through the ‘Fit for 55’ package of legislation that both raised the ambition of the EU’s 2030 climate targets and significantly altered the architecture of the EU’s climate policy.

The most important step was the passage of the European Climate Law (Regulation (EU) 2021/1119)). The law commits the EU to achieving net-zero GHG emissions by 2050 and sets an intermediate target of reducing net GHG emissions by at least 55% by 2030 compared to 1990 levels. These overarching targets shape the EU’s climate policy architecture, which is structured around four key pillars: the Emissions Trading System (ETS), the Effort Sharing Regulation (ESR), a new ETS2 covering emissions from buildings and road transport, and the Land Use, Land-Use Change, and Forestry (LULUCF) Regulation. Along with related sectoral policies, these mechanisms collectively drive emission reductions across sectors, including agriculture.

The EU Emissions Trading System (Directive 2003/87/EC, as amended by Directive (EU) 2018/410) has been the cornerstone of EU climate policy. It covers emissions from energy-intensive industries, power generation, and intra-EU aviation, representing around 40% of total EU emissions. Operating on a cap-and-trade basis, the ETS sets an annually declining cap on emissions, within which companies can trade emission allowances. The revised ETS now targets a 62% emissions reduction by 2030 compared to 2005 levels. Approximately 90% of ETS auction revenues are distributed among Member States based on their share of verified emissions under the ETS. Agricultural emissions are not directly included in the ETS but are indirectly affected through costs of energy and inputs like fertilisers, which are covered under the scheme. Furthermore, increased revenues from ETS auctions can support mitigation measures in the agricultural sector, such as funding for low-emission technologies.

The Effort Sharing Regulation (Regulation (EU) 2018/842) complements the ETS by addressing emissions from sectors not covered under the trading system, such as transport, buildings, waste, and agriculture. These sectors account for approximately 60% of total EU emissions. Under the ESR, Member States are assigned binding national targets, collectively aiming for a 40% reduction by 2030 compared to 2005 levels (increased from 30% under revised ‘Fit for 55’ targets).

Ireland, under the ESR, faces a particularly ambitious target of reducing emissions by 42% by 2030 relative to 2005 levels. In addition to the 2030 targets, the ESR imposes annual ceilings for Annual Emissions Allocations (AEAs) for each Member State, ensuring steady progress throughout the decade. This structure encourages early action to avoid accumulating a shortfall in emissions reductions. Flexibility mechanisms are built into the ESR, allowing Member States to bank unused AEAs for future years, borrow AEAs from subsequent years (up to 7.5% of allocations), or trade allowances with other Member States. These provisions enhance cost-effectiveness and provide a buffer for addressing unexpected circumstances.

Further flexibility is provided by mechanisms that allow Member States to transfer allowances between the ETS and ESR sectors or use credits from the LULUCF sector to offset a portion of their ESR obligations. For example, surplus credits

from afforestation or wetland restoration projects under LULUCF can be used to help meet ESR targets. However, these transfers are subject to strict limits to ensure that reductions in non-ETS sectors remain the primary focus. Under the ESR, Ireland can transfer up to 4% of its ETS allowances to meet its ESR targets between 2021 and 2030. This flexibility recognizes the challenges Ireland faces in achieving steep reductions in agriculture and transport, allowing it to compensate for ESR sector emissions using surplus ETS allowances from sectors like power generation.

Additionally, Ireland can use credits from the LULUCF sector to offset part of its ESR obligations, up to 26.8 million tonnes of CO<sub>2</sub>e over 2026–2030. These credits could arise from carbon removals through afforestation, peatland rewetting, and improved grassland management. However, leveraging these LULUCF credits will require significant investments in land-use changes and ecosystem restoration projects to reverse the increasing trend in net emissions shown in Figure 7.

A significant new addition to the EU's climate policy architecture is the Emissions Trading System 2 (ETS2), established under the Fit for 55 Package. This scheme targets emissions from buildings and road transport, sectors previously covered only under the ESR. ETS2 is set to become operational in 2027, applying a carbon price to fuel suppliers, which is expected to incentivize efficiency improvements and shifts to low-carbon alternatives. The introduction of ETS2 will be accompanied by a Social Climate Fund (SCF) (Regulation (EU) 2023/955). It will address the potential regressive effects of introducing a carbon price in the buildings and road transport sectors under ETS2. Scheduled to begin operation in 2026, and funded through ETS2 revenues and national co-financing, the SCF will provide financial support to vulnerable households, micro-enterprises, and transport users who may face disproportionate energy cost increases.

The LULUCF Regulation (Regulation (EU) 2018/841, amended by Regulation (EU) 2021/1119) targets a net removal of 310 million tonnes of CO<sub>2</sub>e across the EU by 2030 compared to 2016-2018 levels. Each Member State has a binding target for net carbon removals or emissions in these intervals. For Ireland, the target is to reduce our net LULUCF emissions by 0.626 million tonnes CO<sub>2</sub>e relative to average inventory data for 2016-2018. Unlike the annual ceilings imposed under the ESR, Member States' net removals and emissions are assessed over five-year periods, with interim periods from 2021-2025 and 2026-2030. Compliance is determined by comparing the actual balance of removals and emissions against the target at the end of the cycle, rather than on an annual basis. In the first period, Member States must observe a 'no net debit' rule that mandates that carbon removals from land use and forestry at least offset emissions from the sector using accounting rules derived from Kyoto Protocol practice. If a Member State fails to meet its target, it must offset the shortfall by obtaining credits from other Member States, increasing efforts in subsequent cycles, or transferring credits from other EU climate frameworks like the ESR (subject to specific limits).

This summary of the EU climate regime underlines that agricultural emissions are covered by the targets in the ESR while land use emissions are governed by the LULUCF Regulation target. There is no specific target in EU legislation for agricultural emissions alone. Agricultural emissions make up almost half of Irish emissions governed by the ESR, which is a much larger share than in other EU Member States. Thus, the legally-binding ESR target of a reduction of 42% in covered emissions by 2030 relative to 2005 has greater relevance for agriculture in Ireland than might be the case for targets in other Member States. The LULUCF target is also challenging in the light of the increase in net emissions from this sector in recent years.

## 3.2 EU 2040 targets and agriculture

The European Climate Law required the European Commission to propose an intermediate 2040 target for emissions reduction on the pathway to net zero at the latest within six months of the first global stocktake carried out under the Paris Agreement and which was concluded at COP28 in Dubai in December 2023. In February 2024, following a public consultation, the Commission published its Communication *Securing our future: Europe's 2040 climate target and path to climate neutrality by 2050 building a sustainable, just and prosperous society* (European Commission 2024b). In this Communication, the Commission recommended a 90% net greenhouse gas emissions reduction by 2040 compared to 1990 levels, noting that a legislative proposal would be made by the incoming Commission. This recommendation followed the publication of advice from the European Scientific Advisory Board on Climate Change which had proposed both a 2040 target and an overall greenhouse gas budget (i.e. cumulative emissions) for the period 2030 to 2050 in a report published in June 2023 (ESABCC 2023). To remain within its recommended GHG budget, it estimated that the EU must strive for net emissions reductions of 90-95% by 2040, relative to 1990 levels.

In her *Political Guidelines for the Next European Commission 2024-2029* seeking endorsement of her nomination as Commission President, Ursula von der Leyen committed to a 90% emission reduction target for the next Commission. In her Mission Letter to the incoming Commissioner for Climate, Net Zero and Clean Growth Wopke Hoekstra, she directed him to “propose to enshrine the 90% emission-reduction target for 2040 in our European Climate Law. Following this, and in line with foreseen reviews, you will prepare a climate policy architecture beyond 2030. You will work on the necessary enabling conditions, supporting the competitiveness of European industry, ensuring a just transition and a level playing field. You will organise strategic dialogues on the post-2030 framework with all stakeholders” (Von der Leyen 2024).

The Commission’s Communication was accompanied by an impact assessment which examined the feasibility and impacts of different emission reduction pathways to 2040 and to 2050 (European Commission 2024a). The Commission modelled three main scenarios for the 2031-2040 period, evaluating their impacts on climate and economy as well as other factors.

- Scenario 1 targets an 80% reduction, following a linear trajectory between 2030 and 2050 targets, largely maintaining current policies without specific mitigation of non-CO<sub>2</sub> emissions until 2040. By 2040, agricultural emissions are projected to reach 351 Mt CO<sub>2</sub>e (around 8% lower than 2015 levels).
- Scenario 2 aims for 85-90% reduction by incorporating carbon capture technology, e-fuels deployment, and significant reductions in the land sector, including both agricultural emissions and LULUCF carbon removals. By 2040, agricultural emissions are projected to reach 302 MtCO<sub>2</sub>e, a 22% reduction compared to 2015 levels.
- The most ambitious Scenario 3 pushes for 90-95% reduction, requiring a comprehensive carbon management industry by 2040 that would cover all industrial process emissions, deliver substantial carbon removals, and features increased e-fuel production compared to Scenario 2. This third scenario represents the Commission’s preferred pathway, though it notably assumes rapid deployment of novel carbon removal technologies in the coming decade. Agriculture is assumed to make full use of nitrification inhibitors, precision agriculture technologies as well as restoration of drained organic soils by 2040. Agricultural emissions are projected to reach 271 MtCO<sub>2</sub>e in 2040, representing a 30% reduction compared to 2015 levels.
- The impact assessment models a further scenario (LIFE) that allows an assessment of the sensitivity of the scenario analyses to assumed societal trends that can change the future evolution of GHG emissions. Its purpose is to illustrate how demand-side actions can complement the supply-side technology deployment analysed in the core scenarios. For the food system, LIFE assumes that consumers gradually shift to healthier and more sustainable diets, while production follows the Farm to Fork Strategy and Biodiversity Strategy objectives, in particular reducing nutrient surplus and fertilisers needed to bring nature and biodiversity back to a healthy state and reducing food waste. Specifically, LIFE introduces a 25% shift towards the suggested EAT-Lancet Commission diet as well as a reduction in food waste. In the LIFE scenario, agricultural emissions are projected to fall to 209 MtCO<sub>2</sub>e by 2040, representing a 46% reduction relative to 2015 levels.

The scenarios examined are based on modelling assumptions and do not prejudge the future design of EU climate policy. The modelling assumptions can take the form either of explicit elements within the policies, such as targets of CO<sub>2</sub> performance standards for cars and vans in a given year, or change can be induced by modelling drivers such as carbon values applied to the different sectors, which reflect generic incentives altering investment decisions towards abatement of GHG emissions. They are not a forecast of the possible future evolution of carbon prices. They represent the marginal abatement cost per ton of CO<sub>2</sub>e covered in the respective scenario. Table 5 shows the carbon values used in the different scenarios in the impact assessment. These carbon values are then combined with information on the Marginal Abatement Cost Curves in these sectors to estimate the likely emissions reduction that can be achieved.

In the S1 scenario aiming for an 80% reduction, no additional effort beyond existing measures in place is assumed for the agriculture sector. Some additional effort is expected from agriculture in the S2 scenario aiming for an 85-90% reduction, while in the S3 scenario aiming for a 90-95% reduction by 2040 agriculture is assumed to be subject to same level of incentives (whether through regulation, subsidy or explicit carbon pricing) as all other economic sectors. The LIFE scenario which assumes some contribution from demand-side measures reduces the assumed carbon value needed to achieve the S3 targets in the S3 scenario. The carbon value chosen for the LULUCF sector is that assumed to be required to meet the 2030 LULUCF reduction target (see above). Implementing higher carbon values would imply such significant potential changes in land use that they are not used in the final scenarios.

Table 5. Carbon values applied on emissions in the different sectors

EUR/t CO <sub>2</sub> e	2040				2050
	S1	S2	S3	LIFE + S3	
Energy and industry	160	240	290	250	470
Non-CO <sub>2</sub> emissions from sectors other than agriculture	0	240	290	250	470
Non-CO <sub>2</sub> emissions from agriculture	0	55	290	250	470
LULUCF	0	50	50	50	50

Source: European Commission, Impact Assessment Part 2, Annex 6, p. 43.

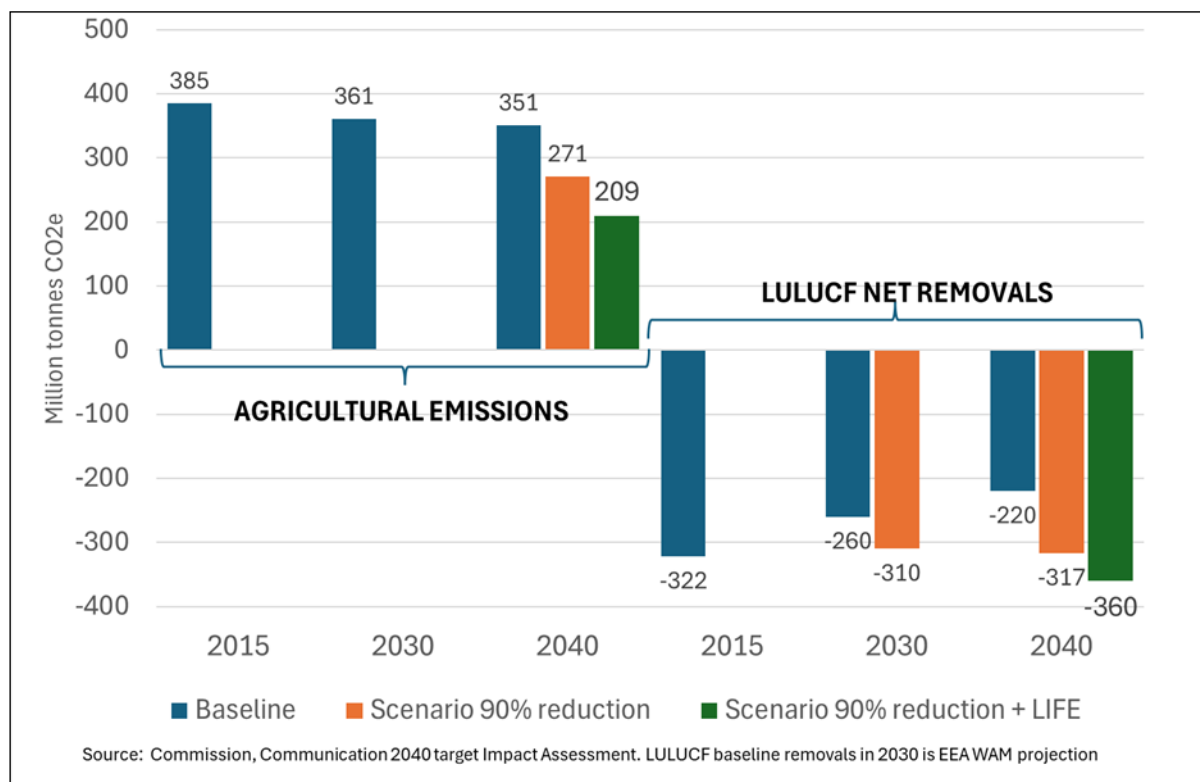
The outcome of the modelling exercise is shown in Table 6. It must be stressed again that these are hypothetical pathways to the 2040 target in each scenario, driven by the assumptions made by the modellers. They are not proposed sectoral targets. The modelled pathways suggest that agricultural emissions will need to be reduced by between 22% and 30% in the two most ambitious scenarios to meet a net 90% overall reduction target by 2040, relative to 2015 levels. The impact assessment, using the same model, projects that in the baseline (i.e. without additional measures to those currently in place) agricultural emissions will fall by 9% in 2040 relative to 2015. A net 90% reduction target by 2040 will therefore require significantly higher ambition in the agricultural sector at the EU level than is currently foreseen (Figure 10).

Table 6. Sectoral net GHG emissions in the different 2040 scenarios

	2015	2040		Change in emissions 2040 S3 vs 2015	2050	Change in emissions 2040 S3 vs 2015
		S1	S2	S3		S3**
Reduction vs 1990, %	-24%	-78%	-88%	-92%	-101%	
Net GHG emissions	3592	1051	578	356	-38	-90%
Power and district heating	1031	120	8	-10	-39	-101%
Other energy sectors	237	71	45	11	-19	-95%
Industry	605	267	181	89	16	-85%
Residential and services	519	119	92	75	19	-86%
Other non-energy sectors	130	33	26	25	22	-81%
Domestic transport	780	190	143	120	7	-85%
Agriculture	385	351	302	271	249	-30%
Waste management	120	65	52	52	28	-57%
LULUCF net removals	-322	-218	-316	-317	-333	-2%

Source: European Commission 2040 climate target impact assessment, Part 1, Table 5, p. 43  
 Note: \*\* The 2050 values for S1 and S2 scenarios are similar to S3 and not reproduced here.

**Figure 10. Potential pathways for the land sector towards 2040 in a net 90% reduction scenario**



Source: Own diagram based on the Commission’s Impact Assessment for the 2040 Target.

**The significance of metrics.** In compiling its inventory accounts and setting its targets for progress towards climate neutrality, the EU follows IPCC practice in aggregating different greenhouse gases using the GWP<sub>100</sub> metric. Global Warming Potential (GWP) is a measure of the total energy that a gas absorbs over a specific period of time, in this case 100 years. Key factors affecting the GWP of any given gas include its average atmospheric lifetime and the ability of that molecule to trap heat. While methane is a highly potent GHG for a short period of time after its initial release, its capacity to trap heat dissipates after approximately 12 years. By comparison, excess atmospheric carbon from CO<sub>2</sub> emissions is only slowly removed by mixing with the oceans and biosphere over several hundreds of years and some emissions will remain for millennia. The level of warming caused by CO<sub>2</sub> emissions is determined by total cumulative CO<sub>2</sub> emissions to date, while the level of warming due to methane is determined more by the current rate of methane emissions in any given decade, and depends much less on historical methane emissions. Recent research has suggested that a new metric to aggregate short-lived and long-lived gases, GWP\*, provides a better representation of the temperature impact of different baskets of emissions than GWP<sub>100</sub>. Given the large share of methane emissions in emissions from agriculture, the metric used to assess the warming impact of agricultural emissions can have a significant impact.

As part of the Paris Agreement Rulebook agreed in 2018 in Katowice, Poland specified that parties shall use the 100-year time-horizon global warming potential (GWP) values from the IPCC Fifth Assessment Report, or 100-year time-horizon GWP values from a subsequent IPCC assessment report, to report aggregate emissions and removals of GHGs, expressed in CO<sub>2</sub>e (Decision 18/CMA.1 of the Report of the Parties)<sup>3</sup>. This decision to use the GWP<sub>100</sub> metric for reporting under the UNFCCC was confirmed at COP27 held in Sharm-el-Sheikh, Egypt in 2022 (Decision 7/CP.27).<sup>4</sup>

IPCC Working Group I in its Sixth Assessment Report discussed physical considerations in emission metric choice (IPCC 2021, Chapter 7, Box 7.3). It recommended that clear and transparent representation of the global warming implications of future emission pathways could be achieved either by specifying pathways for individual greenhouse gases, or by aggregating them to carbon dioxide equivalents using either the GWP\* or another suggested measure the combined Global Temperature Potential. Working Group III, on the other hand, favoured retention of the GWP<sub>100</sub> metric largely on economic grounds, as it approximates the relative damage due to CH<sub>4</sub> emissions under social discount rates, and results in close to global least-cost mitigation pathways for temperature increase limits of 2°C or lower. It recognised that the more recently-developed step/pulse metrics such as GWP\* and CGTP make them well suited to estimate the effect on the remaining carbon budget of more or less ambitious mitigation of short-lived greenhouse

<sup>3</sup> The Rulebook is available for download at <https://unfccc.int/resource/tet/0/00mpg.pdf>.

<sup>4</sup> The decision is available for download at [https://unfccc.int/sites/default/files/resource/cp2022\\_10a01\\_E.pdf?download](https://unfccc.int/sites/default/files/resource/cp2022_10a01_E.pdf?download).

gases such as methane. It concluded that their potential application in wider climate policy is contested and relevant literature still limited (IPCC 2022, Box TS:2).

An in-session technical workshop was held under the auspices of the UNFCCC Subsidiary Body for Scientific and Technological Advice in June 2023 to discuss the findings on emission metrics contained in the IPCC Sixth Assessment Report.<sup>5</sup> No decisions were taken at the workshop, and it was agreed to continue discussions on metrics at SBSTA 66 to be held in June 2027. The Irish government, in its 2025 Programme for Government (see Section 5.5 below) has determined to advocate for the accounting of biogenic methane to be re-classified at EU and international level. There is a clear opportunity to contribute to international discussions on this issue.

Another metric decision to keep in mind is that emissions from fossil fuel consumption are attributed to where the fossil fuel is consumed, not produced, whereas emissions from industrial processes and agricultural production are attributed to where the production takes place, not where the products are used or consumed. The origins of this differential treatment go back to the 1996 UNFCCC/IPCC guidelines for emissions accounting, which established the territorial (production-based) approach, although with the important exception of fossil fuel emissions. This decision was likely made for reasons of practicality and data availability. Most countries have good statistics on energy use, whereas consumption-based accounting systems for industrial and agricultural products require tracking global supply chains, and most countries have lacked systems to monitor emissions embedded in imports and exports.

The criticism of this approach is that it can allow a country to report that it is reducing emissions (measured on a territorial basis) when it may simply be displacing those emissions abroad by substituting domestic production with imports for which it does not have responsibility. For exporting and importing sectors, there can be a significant difference between their emissions measured on a production or consumption basis. The argument for production-based accounting is that the producing country has control over its production processes and can implement measures to reduce emissions. Because the producing country benefits economically from the production and export of goods, arguably it should also bear the responsibility for the associated emissions. But as we see, this argument is not applied to fossil fuel emissions. Here, consumption-based accounting places responsibility on the end consumers who are driving the final demand. This approach holds consumers responsible for their carbon footprint and encourages them to make more sustainable choices. At a minimum, it would make sense to provide for dual reporting (both production and consumption-based) to improve transparency.

### 3.3. Supporting EU legislation

Among the enabling factors to bring about further emissions reduction at EU level which are also relevant to agriculture are other legislative measures, in particular the Corporate Sustainability Reporting Directive (CSRD), the Corporate Sustainability Due Diligence Directive, the Carbon Removals and Carbon Farming Regulation, the Green Claims Directive, and the Carbon Border Adjustment Mechanism.

**Corporate Sustainability Reporting Directive.** The CSRD is a legislative measure aimed at enhancing and standardising corporate sustainability reporting across the European Union. It expands and updates the existing Non-Financial Reporting Directive to ensure greater transparency and comparability in how companies report their environmental, social, and governance (ESG) impacts.

Under the Directive, large companies must disclose detailed information about their environmental and social impacts, governance practices, and sustainability strategies related to human rights, diversity, and anti-corruption measures as well as their impacts on climate change. Sustainability information must undergo independent assurance, similar to financial audits, to enhance credibility. The companies affected are those meeting at least two of the following criteria: more than 250 employees, €40 million or more in net turnover, or €20 million or more in total assets. All EU-listed companies, except micro-enterprises, are also covered, as are non-EU companies generating more than €150 million in turnover in the EU and having at least one subsidiary or branch in the EU. The Directive is being gradually introduced between 2024 and 2028.

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<sup>5</sup> The agenda and relevant documents are available at <https://unfccc.int/event/ipcc-in-session-technical-workshop-on-findings-on-emission-metrics-contained-in-its-sixth-assessment>. The report of the meeting provides an excellent overview of the arguments put forward.

Food companies face significant obligations under the CSRD, particularly concerning Scope 3 emissions reporting. Food companies have complex supply chains with substantial upstream and downstream environmental impacts, making Scope 3 emissions a critical part of their sustainability footprint. Scope 3 emissions include indirect emissions from a company's value chain (e.g., farm level emissions, transportation, product use). This requires collaboration with suppliers and a robust methodology for calculating emissions, using guidelines such as the Greenhouse Gas Protocol.

Food companies using raw materials like soy, palm oil, or cocoa will need to report on deforestation risks and compliance with initiatives such as the EU Deforestation Regulation. Reporting on biodiversity impacts, such as habitat loss due to agricultural expansion, will also be required. Reporting will include water use and pollution impacts, especially for companies in water-stressed areas or those reliant on irrigation-intensive crops. Fair trade and ethical sourcing practices will also need to be disclosed, aligning with EU efforts to enhance corporate accountability in global supply chains.

The consequence is that food companies covered by the Directive (and, given the trend towards increasing concentration at both processing and retail level, most food companies will be affected either directly or indirectly as part of another company's supply chain) will pay increasing attention to the emissions intensity of their purchases in their efforts to reduce their Scope 3 emissions over time. Companies that have already set reduction targets for their Scope 3 emissions and that are important purchasers of Irish food products include Nestlé, Danone, McDonalds, Tesco, Kerry Group, PepsiCo and others. Many of these companies are encouraging their suppliers to adopt regenerative farming techniques which can contribute to reduced agricultural emissions.

The Commission has announced that it will publish an Omnibus Proposal intended to reduce the administrative and reporting obligations arising from the CSRD and other regulations relevant to sustainable finance reporting by end of February 2025. It is likely to create a new category of medium-sized companies with less onerous reporting obligations. It also intends to "address the trickle-down effect to prevent smaller companies along the supply chains from being subjected in practice to excessive reporting requests that were never intended by the legislators" (EC 2025). The Commission has refuted suggestions that its simplification proposals will undermine the objectives of the legislative act, but once the legislative amendments are debated in the Council and Parliament, more extensive revisions to the legislation than what the Commission might propose could be added.

**Corporate Sustainability Due Diligence Directive.** This Directive (EU) (EU) 2024/1760 (the CSDDD) obliges large companies to identify, mitigate and, where necessary, remedy human rights and environmental impacts in their operations and 'chain of activities'. It also mandates companies to establish a transition plan to ensure they make their business model compatible with the 1.5°C 2050 climate neutrality objective of the Paris Agreement. While the CSRD requires companies affected to report on their material sustainability impacts, the CSDDD requires companies covered to take action to address environmental and social impacts.

The Directive is seen as "an important legislative tool to ensure corporate transition to a sustainable economy, including to reduce the existential harms and costs of climate change, to ensure alignment with 'global net zero' by 2050, to avoid any misleading claims regarding such alignment and to stop greenwashing, disinformation and fossil fuels expansion worldwide in order to achieve international and European climate objectives" (O.J. 2024). Member States have until 26 June 2026 to transpose the requirements of the Directive into national law.

The Directive requires that in-scope companies must adopt and implement a transition plan for climate change mitigation. The plan should ensure, through best efforts, that the company's business model and strategy are compatible with the goal of limiting global warming to 1.5°C in line with the Paris Agreement and the EU's objective of achieving climate neutrality by 2050. The Directive requires that the transition plan should include the following elements:

- Time-bound targets related to climate change for 2030 and in five-year steps up to 2050. These targets should be based on conclusive scientific evidence and, where appropriate, absolute emission reduction targets for Scope 1, Scope 2 and Scope 3 greenhouse gas emissions.
- A description of the decarbonisation levers identified as well as the key actions planned to reach the company's time-bound targets.
- An explanation and quantification of the investments and funding supporting the plan's implementation.
- Plans must be updated every 12 months and should contain a description of progress made towards achieving the company's time-bound targets.

- Companies found in breach of their obligations will be penalised through “naming and shaming” and through fines. Member States will set the maximum fine in implementing legislation but it cannot be less than 5% of the company’s global net turnover.
- Companies are also subject to civil liability and may be liable to pay compensation to those adversely affected if they intentionally or negligently fail to comply with their CSDDD obligations.

Although the thresholds defined in the Directive mean that only very large food companies will be directly affected, other food companies may be indirectly affected if they are part of different chains of activities, at a minimum by being asked to provide information required by larger business partners that are covered. The Commission’s Omnibus Proposal expected in February 2025 will also cover the CSDDD so some of these requirements may be modified in future legislation.

**Carbon Removals and Carbon Farming Directive.** The EU Carbon Removals and Carbon Farming Regulation (CRCF) establishes a certification framework to promote high-quality carbon removal and soil emission reduction activities within the EU. The framework encompasses permanent carbon storage, temporary carbon sequestration in products like wood, and carbon farming practices (e.g., restoring forests or wetland management and soil emission reduction). By July 2026 the Commission should examine whether emissions from livestock farming (enteric fermentation and manure management) should also be covered. Certification requires adherence to quantification, additionality, long-term storage, and sustainability criteria, ensuring that activities provide verifiable climate benefits while supporting biodiversity and soil health. One purpose of the Regulation is to promote the ability of farmers to sell carbon credits to private actors by ensuring that only high-quality credits are certified.

The Commission has established an Expert Group on Carbon Removals to develop robust protocols for measuring carbon farming removals under the CRCF. By developing tailored methodologies for different carbon farming practices, such as agroforestry, wetland restoration, and soil management, the Expert Group aims to enhance the accuracy and reliability of removal data. This process not only enables certification but also ensures that carbon farming contributes meaningfully to climate neutrality goals. Use of the EU certification will be voluntary in the voluntary carbon market but may be mandatory for companies that wish to make climate claims.

**Green Claims Directive.** The Green Claims Directive was proposed by the Commission in March 2023 to ensure that consumers receive reliable, comparable and verifiable environmental information on products. It complements and further operationalises the Directive on empowering consumers in the green transition adopted in February 2024 (sometimes referred to as the Greenwashing Directive). The Green Claims Directive is still in the legislative process. The European Parliament adopted its first reading position in March 2024 and the Council adopted its general position in June 2024. Trilogues between the two institutions are now underway (Ragonnaud and Ashton 2024).

With respect to climate-related claims, the Commission proposal would require companies to report greenhouse gas offsets in a transparent way: separating greenhouse gas emissions offsets from greenhouse gas emissions reductions, specifying whether the offsets concern emission reductions or removals, and providing information on the quality of the offsets. Companies must provide detailed information about carbon credits, including type, quantity, methodology, and permanence, distinguishing between contribution claims (credits for climate action) and offset claims (credits to balance emissions). It would also require claims to be based on widely recognised scientific evidence, using accurate information and international standards. Any claims made by a company would have to be verified by an accredited third party, thus prohibiting self-certified claims. The verifier would provide a certificate of conformity certifying that the claim or the label complies with the requirements of the Directive. Companies can only use certified carbon credits that comply with recognised standards, such as those outlined in the Carbon Removals Certification Framework.

The Council in its general position further specifies the substantiation requirements for climate-related claims, including those involving carbon credits. It proposes that such claims are to be substantiated with reference to the trader’s total greenhouse gas emissions, emission reductions and use of carbon credits.

The Parliament’s amendments to the Commission’s proposal would considerably tighten the limits around the use of carbon credits to make climate-related claims. It proposes that “compensation claims” (i.e. where carbon credits are used by a company towards a climate target) may **only** be made in respect of its ‘residual emissions’. The Commission will be required to adopt a method defining ‘residual emissions’ within 12 months of the adoption of the GCD. They

would likely be defined as those left after approximately 90-95% of GHG emission reduction. MEPs also proposed that carbon credits used by companies for their residual claims must be certified units issued in accordance with the CRCF. Where the use of the carbon credits is for compensation of residual fossil fuel emissions, only permanent removals, as defined under the CRCF, will be considered as adequate compensation.

The final shape of this legislation will be decided in the upcoming trilogue negotiations. The final outcome will influence the interest of companies to invest in carbon farming credits which could be a potential additional source of income for farmers in the green transition.

**Carbon Border Adjustment Mechanism.** Another important legislative initiative has been the introduction of an EU Carbon Border Adjustment Mechanism (CBAM). While this only covers a limited number of goods initially, it represents a willingness by the EU legislature to address competitiveness and carbon leakage impacts of climate mitigation regulations by border measures to level the playing field between domestic and foreign producers. It also has an objective to stimulate more ambitious climate action in exporting countries, with the carrot that they could then be exempted from paying the border climate levy.

CBAM is closely integrated with the EU Emissions Trading System (ETS). It replaces the allocation of free allowances to those industries deemed likely to be at risk of carbon leakage because of their high emissions intensity and exposure to international trade. Currently, the CBAM applies to six commodities: cement, iron and steel, aluminium, fertilisers, hydrogen and electricity. Importers must purchase allowances at a carbon price equal to the weekly ETS price (minus any carbon price paid in the exporter's country). The levy applies to direct emissions (scope 1) as well as indirect emissions from generation of electricity (scope 2) released during the production process of the covered goods, but also covers embedded emissions in inputs used in the production of complex goods. The tax base is the actual verified emissions embedded in imports, with use of default values where necessary. The use of CBAM revenue is not specified in the Regulation, although the Commission proposes to add it to the EU's budget own resources. Others suggest that revenue raised on imports from Least Developed Countries might be returned to them. The legislation is dynamic, as it provides for the Commission to evaluate whether coverage should be extended to more products and more emission sources over time.

The justification for applying a CBAM is that emissions from the sectors covered must already purchase ETS allowances within the EU, and that it is reasonable that importers of these products should pay a similar amount for emissions embodied in the products they import. Because no similar market-based pricing mechanism applies to agricultural emissions in the EU, there are no grounds to introduce such a levy at the moment on agri-food imports. One weakness in the design of the current CBAM is that it does not (yet) apply to exports. Firms that rely on exports, as do many agri-food firms, would still be disadvantaged in export markets because they do not receive a rebate for the ETS allowance price they may have paid in their production process. The Commission is mandated in the CBAM legislation to produce a WTO-compatible proposal if there is a risk of carbon leakage in goods produced for exports.

## 4 National climate targets and performance

### 4.1 Irish Climate Policy

In addition to climate targets under EU legislation, climate targets are also set under the Irish Climate Act. These targets and progress towards them are reviewed in this section.

Irish climate policy targets are set out in the Climate Action and Low Carbon Development Act 2015 as amended in 2021.<sup>6</sup> The Act sets as a national climate objective to “pursue and achieve, by no later than the end of the year 2050, the transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral economy” (Article 3(1)). It sets out five mechanisms to implement this climate objective, namely, carbon budgets, sectoral emissions ceilings, a climate action plan, a national long term climate action strategy, and a national adaptation strategy (Article 3(2)).

In preparing the annual climate action plans as well as the long-term climate action strategy, the Act requires the government to take account of several matters. These include the need to deliver the best possible value for money and to maximise the net benefits to society taking into account the impact of greenhouse gas emissions; the need to promote sustainable development and restore, and protect, biodiversity; relevant scientific or technical advice; climate justice;

<sup>6</sup> The consolidated Act including amendments can be found at <https://revisedacts.lawreform.ie/eli/2015/act/46/revised/en/html#SEC3>.

recommendations or advice of the Advisory Council; the social and economic imperative for early and cost-effective action in relation to climate change; the need to maximise employment, the attractiveness of the State for investment and the long-term competitiveness of the economy; the evolving means for ensuring a climate neutral economy including the scientific consensus as well as emerging technologies; the role of behavioural change on the part of individuals and different sectors of society; the risk of substantial and unreasonable carbon leakage as a consequence of the measures implemented by the State to pursue the national climate objective; the requirement for a just transition to a climate neutral economy which endeavours to maximise employment opportunities and as well to support persons and communities that may be negatively affected by the transition; the protection of public health; the National Planning Framework and the National Spatial Strategy; **the special economic and social role of agriculture, including with regard to the distinct characteristics of biogenic methane**; the most recently approved national long term climate action strategy; the most recently approved climate action plan; and the most recently approved national and sectoral adaptation plans (bold added) (Article 4(8)).

Fundamental to the achievement of the national climate objective is the preparation of five-year carbon budgets. A carbon budget defines the total amount of greenhouse gas emissions that are permitted during the budget period. The Act provides that carbon budgets for three sequential five-year periods should be made at each five-year update (with the carbon budget for the third period made in draft form and referred to as a 'provisional carbon budget'). Responsibility for proposing these carbon budgets is given to the Climate Change Advisory Council established under the Act. The Act requires that the first two carbon budgets proposed by the Advisory Council should provide for a reduction in greenhouse gas emissions (including LULUCF) of 51% in 2030 compared to 2018. The Act also specifies the criteria that the Council should consider when preparing its carbon budgets. These include the objectives of the Paris Agreement, relevant scientific advice including with regard to the distinct characteristics of biogenic methane; international best practice on the reporting of GHG emissions and removals: in so far as practicable, the need to maximise employment, the attractiveness of the State for investment and the long term competitiveness of the economy; and have regard to climate justice (Article 6A(9)). In principle, removals are permitted as offsets against a particular carbon budget and the associated sectoral emissions ceilings (Article 6A(10)).

Although the carbon budgets are proposed by the Advisory Council, it is up to the government and the Oireachtas to establish these by law. Under the Act, the government must present the carbon budgets, together with any amendments, to the Oireachtas for approval. Dáil Éireann may refer the carbon budget to a joint committee of the Oireachtas which can make recommendations to both Houses of the Oireachtas within two months. Where the government has amended the carbon budgets proposed by the Advisory Council, the responsible Minister shall set out his or her reasons for doing so (Article 6B).

Once the carbon budget programme has been approved, the responsible Minister must then prepare sectoral emissions ceilings (SECs) that, within the limits of the carbon budget, set out the maximum amount of greenhouse gas emissions that are permitted in different sectors of the economy during a carbon budget period. These are approved by the government and can be amended if the respective carbon budgets are revised. When an SEC has been set, the Act places the responsibility on the Minister responsible for each sector to comply with the SEC that applies to his or her sector (Article 6C).

The carbon budgets are cumulative on the pathway to the national climate objective. Where total GHG emissions for a preceding budget period are less than the carbon budget for that period, the Minister may carry forward the surplus from the preceding budget period to the current budget period and the current carbon budget is increased by the surplus carried forward. Where total GHG emissions for a preceding budget period exceed the carbon budget for that period, the Minister carries forward the excess GHG emissions from the preceding budget period to the current budget period. The current carbon budget is then decreased by the amount of greenhouse gas emissions that are carried forward. This would also require a modification of the SECs to reflect the more limited carbon budget. Note that, in the case of a surplus in a carbon budget period, the Minister has flexibility whether or not to increase the subsequent carbon budget, but in the case of a deficit, it is mandatory to deduct that deficit from the succeeding carbon budget (Article 6D).

Article 2A provides that “no remedy or relief by way of damages or compensation is available with respect to or arising out of any failure, of whatever kind, to comply with any provision of this Act or any obligation or duty created thereunder”. Despite this clause, the provisions of the Act remain an obligation which the State is legally required to fulfil.

## 4.2 Carbon budgets and sectoral emissions ceilings to 2030

The SECs established for different sectors for the first and second carbon budget periods 2021-2025 and 2026-2030 are shown in Table 7. The electricity sector has the largest reduction requirement with a mandated 75% reduction, followed by transport at 50%, buildings at 44%, industry at 35%, and agriculture at 25%. This sectoral allocation reflects both the technical feasibility of reductions and the socio-economic importance of different sectors, with agriculture

notably receiving a lower target given its more limited technical abatement potential and its significance to Ireland's economy and rural communities. Because of uncertainties over the LULUCF inventories, no specific targets were initially established for this sector, though an implicit pathway can be derived by comparing the Total (exc. LULUCF) with the legally binding targets shown in Table 7. The 2024 Climate Action Plan (see next section) has established that the target for the LULUCF sector will be aligned with the Irish target under the EU LULUCF Regulation, which is a requirement to reduce net emissions by 0.626 Mt CO<sub>2</sub> by 2030 compared to 2016-2018.

The SECs do not fully achieve the mandated 51% reduction in emissions by 2030 relative to 2018. Provision is made for "unallocated savings" amounting to 26 Mt CO<sub>2</sub>e of reduction to be distributed across the economy between 2025 and 2030. This provision acknowledges the potential role of emerging technologies and innovations in achieving emission reductions. This approach introduces an element of uncertainty and potentially risks delaying immediate action in favour of anticipated future solutions. An assessment how these unallocated savings might be achieved will be completed by quarter 1 2025 (Government of Ireland, 2024).

**Table 7. Sectoral emissions ceilings by sector for first two carbon budget periods**

Sector	2018 Baseline MtCO <sub>2</sub> e	SEC 2012-2025 MtCO <sub>2</sub> e	SEC 2026-2030 MtCO <sub>2</sub> e	Target 20230 emissions MtCO <sub>2</sub> e	Per cent reduction in 2030 relative to 2018
Electricity	10	40	20	3	75%
Transport	12	54	37	6	50%
Built environment - residential	7	29	23	4	40%
Built environment - commercial	2	7	5	1	45%
Industry	7	30	24	4	35%
Agriculture	23	106	96	17.25	25%
LULUCF	5	xxx	xxx	xxx	xxx
Other (F-gases, waste)	2	9	8	1	50%
Unallocated savings			-26	-5.25	
Total	68	xxx	xxx	xxx	
Total (exc. LULUCF)	63	275	187	31	
Legally binding carbon budgets and 2030 Emission Reduction Target	-	295	200	34	51%

Source: Government of Ireland, Sectoral Emissions Ceilings, September 2022

## 4.3 Progress towards national targets

Based on current EPA data Ireland's greenhouse gas emissions are not on target to meet either the national emissions reduction targets or EU targets. The current trajectory indicates a shortfall in achieving Ireland's national target of a 51% emissions reduction by 2030. With existing measures (WEM) projections show only an 11% reduction by 2030, while implementation of additional measures (WAM) could potentially achieve a 29% reduction, leaving a considerable gap to the intended target (EPA, 2024).<sup>7</sup>

Examining the carbon budgets across multiple periods demonstrates levels of projected exceedance. The first budget period (2021-2025) and second budget period (2026-2030) establish limits of 295 Mt CO<sub>2</sub>e and 200 Mt CO<sub>2</sub>e, respectively. Current projections indicate these budgets will be exceeded by 135 Mt (27%) under existing measures,

<sup>7</sup> The 'With Existing Measures' (WEM) scenario models outcomes based on currently implemented policies, while the 'With Additional Measures' (WAM) scenario incorporates proposed but not yet legislated interventions.

and 86 Mt (17%) even with additional measures implemented. This deviation from planned trajectories will require more aggressive mitigation strategies.

Regarding EU compliance requirements, Ireland faces similar challenges in meeting its mandated 42% reduction in non-ETS emissions by 2030. Current projections indicate a mere 9% decrease under existing measures, with potential for improvement to 25% through implementation of additional measures. Even with the application of available flexibilities under both the ETS and LULUCF frameworks, projections suggest exceedances ranging from 17.7 Mt CO<sub>2</sub>e in the best-case scenario to 61.2 Mt CO<sub>2</sub>e in the worst case.

In 2018, agricultural emissions are now recorded at 21.39 Mt CO<sub>2</sub>e. This reflects revisions in the agricultural emissions inventory in 2024. Specifically, estimates of CH<sub>4</sub> and N<sub>2</sub>O emissions associated with non-dairy cattle and sheep categories have been revised. For sheep emissions, the methodology has changed to a Tier 2 approach, while for non-dairy cattle there has been additional disaggregation of production systems which allows for more refined estimation of daily average liveweight gain. By 2023, emissions in this sector saw a slight reduction to 20.78 Mt CO<sub>2</sub>e, reflecting a decrease of approximately 2.9% over the past five years. The EPA comments: “The two largest sectors; Agriculture and Transport, have reduced emissions by the lowest amounts, -2.9% and -4.2% since 2018 and have the furthest to go to achieve their indicative percentage reduction targets” (EPA 2024b).

**Table 8. Sectoral emissions reduction targets and progress**

Sector	2018 (Mt CO <sub>2</sub> eq)	2023 (Mt CO <sub>2</sub> eq)	% change 2018-2023	Indicative % reduction by 2025	Indicative % reduction by 2030
Electricity	10.24	7.56	-26.2%	~40%	~75%
Transport	12.31	11.79	-4.2%	~20%	~50%
Buildings (Residential)	7.00	5.35	-23.6%	~20%	~40%
Buildings (Commercial and Public)	1.55	1.41	-8.9%	~20%	~45%
Industry	6.95	6.29	-9.6%	~20%	~35%
Agriculture	21.39	20.78	-2.9%	~10%	~25%
Other	2.14	1.83	-14.6%	~25%	~50%
LULUCF	4.19	5.61	34.1%	NA	NA
<b>National Total (incl LULUCF)</b>	<b>65.77</b>	<b>60.62</b>	<b>-7.8%</b>		<b>51%</b>

Source: EPA Ireland’s Provisional GHG emissions 1990-2023, 2024

Note that the SECs for agriculture for the two carbon periods shown in Table 7 were based on the previous, unrevised, series for agricultural emissions. When agricultural emissions using the revised series are compared to the SEC set in 2022 for agriculture in the 2021-2025 period, the agriculture sector appears to be well within its SEC. The EPA’s 2024 report on provisional GHG estimates suggests that agricultural emissions need only remain stable in 2024 and 2025 (specifically, an annual reduction of 0.1% is required) to remain inside its SEC (see Figure 5 in EPA, 2024b). However, a footnote to the figure explains that this benign interpretation of the remaining distance to SEC is largely a result of the refinements to the agricultural inventory. From Table 8, there has been a 0.6 Mt CO<sub>2</sub>e (2.9%) reduction in emissions from 2018 to 2023. By comparison, the refinement of the agricultural inventory has led to an 8.5 Mt CO<sub>2</sub>e reduction in the inventory across this time period which also contributes to meeting the agriculture sector SEC. The percentage reductions shown in Table 8 remain the reductions required if Ireland is to meet its overall 51% reduction in national emissions in 2030 compared to 2018.

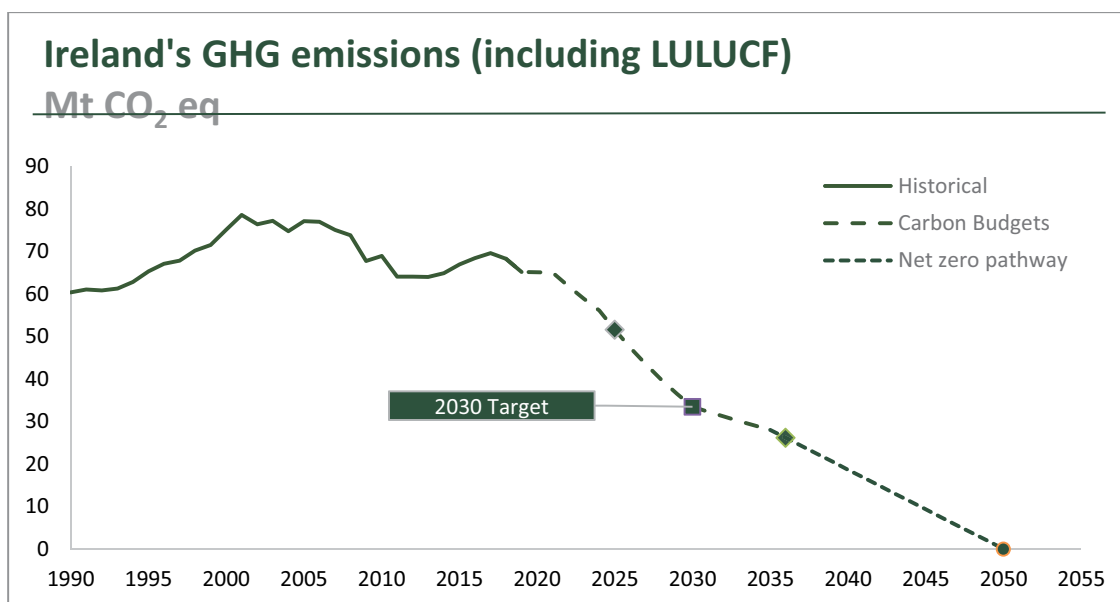
The EPA has begun publishing quarterly estimates of GHG emissions, with the first results now available for Q1 and Q2 2024 with year-on-year comparisons (EPA 2024c). The agricultural sector showed encouraging signs of reduction in the first quarter of 2024. Reductions of 2.6% and 4.9% were achieved in Q1 and Q2 2024, respectively, relative to the

corresponding quarters in 2023. The reduction was due to broadly-based reductions in the national herd, milk production, nitrogen fertiliser use and limestone sales. It will be important to monitor whether these reductions represent a sustainable trend or are primarily driven by temporary factors such as weather conditions and seasonal variations.

#### 4.4 Ireland’s Long Term Climate Strategy

Preparation of a long term climate strategy is both a requirement under the Irish Climate Act as well as a requirement under the EU Regulation on the Governance of the Energy Union and Climate Action. Ireland submitted its latest long term strategy to the EU in June 2024 (Government of Ireland, 2024c). An indicative pathway to reaching climate neutrality is set out in the long-term strategy and illustrated in Figure 11. The long term strategy also contains indicative pathways by sector including agriculture and LULUCF consistent with the overall pathway, while making clear that these indicative pathways do not pre-empt the establishment of SECs under the Climate Act in future carbon budget periods.

Figure 11. Ireland’s indicative GHG reduction pathway



Source: Government of Ireland, Long term climate strategy, 2024.

There is a notable divergence between the sectoral indicative pathways for agriculture and LULUCF in the long term strategy and current emission trajectories and projections from the EPA (Table 9). The strategy, which outlines Ireland’s approach to achieving climate neutrality by 2050, proposes a feasible pathway requiring almost a 50% reduction in agricultural emissions. It is envisaged that around 30 percentage points will be achieved through technical measures, while the remaining 20 percentage points would come from diversification of farm activities into forestry, tillage or organic farming. EPA projections reveal substantial gaps between this policy ambition and the projected outcomes under both existing and additional measures scenarios. The projection with existing measures even suggests agricultural emissions may actually increase in absolute terms by 2050 compared to 2018 baseline levels. The projected 1% reduction under WEM by 2030, increasing to only 18% under WAM, falls significantly short of the mandated 25% reduction target under agriculture’s SEC.

Table 9. Comparison of EPA agricultural projections to 2050 with Ireland’s Long Term Climate Strategy

Agriculture (1)	2018	2025	2030	2035	2040	2050
Feasible pathway to 2050	23	21	17.25	15	13	11
Projections WEM	23.2	23.2	23.1	23.3	23.6	24.1
Projections WAM	23.2	21.4	19.1	19.1	19.0	18.9
LULUCF (2)						
Feasible pathway to 2050	6	7	5	6	4	2
Projections WEM	4.2	6.8	7.8	9.4	8.5	7.6
Projections WAM	4.2	4.9	4.9	7.5	6.3	6.3

Notes: WEM With Existing Measures; WAM With Additional Measures

Sources: Ireland’s Long Term Climate Strategy, June 2024; EPA, Ireland’s GHG Emissions Projections 2023-2050, May 2024.

Note that the agriculture figures in both the long term strategy feasible pathway and the EPA projections do not reflect the recalculations in the agricultural inventory made in the EPA Provisional GHG Emissions 1990-2023, 2024. Also, the LULUCF figures in the Feasible Pathway do not reflect the recalculations for emissions from grasslands and wetlands included in the National Inventory Report 2024, while these recalculations are accounted for in the WEM and WAM projections.

The situation is further complicated by developments in the LULUCF sector, where similar divergences between targets and projections are evident. EPA projections indicate a potential 50% increase in LULUCF emissions under existing measures by 2050, with only a slightly smaller increase when accounting for additional measures. This misalignment between strategic planning and projected outcomes underscores the significant implementation challenges facing Ireland's agricultural and land use sectors in their transition to climate neutrality.

## 4.5 Consequences of underperformance

The consequences of failing to meet national and EU climate targets were spelled out by the previous Minister for the Environment, Climate and Communications Eamon Ryan in response to a Parliamentary Question in May 2024.<sup>8</sup> With respect to meeting the sectoral emissions ceilings, relevant Ministers are obliged to account for their performance before an Oireachtas Committee. In cases where Ministers fail to comply with the targets, they are required to present the corrective measures they intend to take. Ministers are also required to attend the Committee and provide responses to any recommendations made by the Committee within a three-month period. This 'comply or explain' approach aims to ensure heightened scrutiny and accountability.

With respect to failure to meet the limits set in a carbon budget, any excess emissions at the end of a 5-year carbon budget period will be carried forward, reducing the next period's carbon budget by the amount exceeded.

Ireland's legally binding targets under the EU's climate architecture for the period 2021-2030 relate to the Effort-Sharing Regulation (ESR) and the LULUCF Regulation. Under the ESR, in addition to Ireland's overall obligation to lower its covered emissions by 42% by 2030 relative to 2005, annual emission ceilings must also be observed. Several flexibility instruments are permitted (Section 3.1) including banking or borrowing from its annual emission allocations up to specified limits as well as the possibility of transfers between Member States. Ireland also has access to additional flexibilities to transfer allowances from the ETS or from the LULUCF sector under certain circumstances.

Control of Member States' compliance with their annual targets is carried out every 5 years. The ESR requires the Commission to carry out two compliance controls of Member States' GHG emissions inventories: in 2027 (to check annual compliance for the years 2021-2025) and in 2032 (for the years 2026-2030). This procedure ensures that the compliance check is synchronised with accounting and compliance under the LULUCF Regulation and allows for using any LULUCF credit for compliance with the non-ETS target. If a Member State does not comply after applying the flexibility instruments, a deduction is applied from its emission allocation of the following year equal to the excess emissions multiplied by an abatement factor of 1.08.

In addition to the compliance checks in 2027 and 2032, Member States' progress towards their 2030 targets are monitored every year and reported by the Commission in its annual climate action progress report. Should the progress report show that a Member State is not on track for a specific year during the compliance period, it will have to submit to the Commission a corrective action plan including the actions to be taken by the Member State to ensure compliance together with the timetable for implementation. The Commission may issue an opinion on the corrective action plan.

In the previous compliance period 2013-2020 under the EU's Effort Sharing Decision (ESD), Ireland fell short of meeting its cumulative commitment by 12.4 Mt CO<sub>2</sub>e (NTMA, 2023). The target was to reduce ESD emissions by 20% relative to 2005. However, only a 7% reduction was achieved. Ireland had to surrender carbon units to meet this gap. The compliance rules for meeting ESD deficits were different to those that apply to the ESR, and allowed the use of carbon credits (Certified Emission Reductions) purchased on the market for compliance. The National Treasury Management Agency's Carbon Fund acted on behalf of the State to acquire these credits. In 2021 and 2022, the NTMA surrendered 8,208,846 units valued at €94.5 million to meet Ireland's obligations under the ESD (NTMA, 2023). Ireland entered into a bilateral agreement with Slovakia to purchase the outstanding 4.15 million AEA units needed for compliance in March 2023 at a total cost of €2.9 million, or 70 cent per AEA unit.<sup>9</sup> The total cost of purchasing compliance for the 2013-2020 cycle was thus €97.4 million.

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<sup>8</sup> Wynne, V.-A., Question 112, Dail Eireann Debate 14 May 2024, <https://www.oireachtas.ie/en/debates/question/2024-05-14/112/>.

<sup>9</sup> Dail Debate 'Annual Emission Allocation Units Purchase Agreement: Motion', 28 March 2023, <https://www.oireachtas.ie/en/debates/debate/dail/2023-03-28/17/>.

The relatively low cost to purchase AEA units in 2023 reflected the fact that the EU in aggregate exceeded its ESD target reduction for 2013-2020 and thus surplus units were easily available. This is unlikely to be the case for the ESR period 2021-2030, according to an analysis of Member States National Energy and Climate Plans conducted by the environmental NGO Transport & Environment (T&E, 2024). The cost of purchasing AEA units in future will thus be much higher, if indeed surplus units are available at all.

The potential cost of underperforming in relation to Ireland's ESR targets is inevitably highly speculative at this stage. It will depend on the volume of the compliance gap and the price at which carbon credits can be purchased. Estimates made by the Department of Public Expenditure and Reform in 2023 assumed that credits would cost the same as the allowance price in the ETS (Walker et al., 2023). Based on the assumptions made in that paper, including EPA projections of emissions to 2030 under the WAM and WEM scenarios, the authors conclude that the cost of non-compliance could be between €3.5 and €8 billion. The report from T&E (2024) estimates that Ireland's compliance cost up to 2030 could amount to between €1.9 and €9.6 billion, depending on whether the cost of purchasing allowances was €45 or €260 per tonne. More recently, the Irish Fiscal Advisory Council noted that these estimates assume that Ireland follows through and successfully implements all of the planned additional measures. It views this as increasingly unlikely, and estimates that the potential compliance cost to the State could be as high as €20 billion. DPENDR will maintain ongoing monitoring and review of potential compliance costs associated with Ireland's EU climate and energy targets, including developing methodologies to appropriately apportion these costs across sectors with excess emissions (Government of Ireland, 2024a). Whether sums of this magnitude would not be better used at home to accelerate decarbonisation efforts is an obvious question to ask.

The LULUCF Regulation also sets a specific reduction target for 2030 as well as a separate budget for the years 2026 through 2029. The Commission will carry out a comprehensive review of compliance in 2027 (for the 2021-2025 period) and in 2032 (for the 2026-2030 period). If the Commission finds, in its annual assessment reports, that a Member State is not making sufficient progress towards meeting its targets, it can require that State to submit a corrective action plan. If a Member State does not comply with its budget allocation for the years 2026-2029, then an amount equal to the exceedance multiplied by a factor 1.08 will be added to its reported emissions in 2030. Any deficit accumulated by 2030 by each Member State should be taken into account when the Commission submits proposals concerning the post-2030 period.

## 5. Mitigation measures and policies in the agricultural sector

### 5.1 2023 Teagasc Marginal Abatement Cost Curve

Our understanding of the potential of technical mitigation measures to abate emissions and build carbon removals builds heavily on the work of Teagasc in developing successive iterations of its Marginal Abatement Cost Curve (MACC). The latest and most comprehensive version was published in 2023 (Lanigan, Hanrahan, and Richards 2023). The MACC's framework presents three activity scenarios for animal numbers and fertiliser use, coupled with two adoption pathways (Pathway 1, high adoption, and Pathway 2, very high adoption) for various mitigation measures. The scenarios relate to the projected level of activity in the years up to 2030. Three alternative Business-as-usual scenarios were generated using the FAPRI-Ireland model as potential baselines for the analysis, where the baselines exclude mitigation from additional measures. The scenarios produced (S1, S2 and S3) differ in terms of dairy and beef cow numbers, associated cattle progeny, land use, nitrogen fertiliser use and other inputs.

The analysis presented by Teagasc suggests that achieving the sector's target of a 25% reduction in emissions by 2030 is feasible, albeit contingent upon exceptionally high adoption rates of the proposed mitigation measures.

The 2023 MACC identifies 33 separate measures which are relevant to Irish agriculture and for which there is scientific data on the abatement potential and relative costs and benefits. These are divided into agricultural efficiency measures, absolute emissions reductions, land use mitigation strategies, and energy measures. The inclusion of agriculture-sourced bioenergy in the MACC demonstrates the sector's potential to contribute to broader decarbonisation efforts, particularly in energy production. As any savings generated in this way will be attributed to the energy sector in the national inventory accounts rather than contribute to the 25% sectoral emissions ceiling reduction target for agricultural emissions, they are not considered further in this paper. This should not be taken to overlook the important role that farmers can play in the transition to more renewable energies through the National Biomethane Strategy and greater solar uptake on farms.

The consolidated impact of adopting the full portfolio of mitigation measures under the two assumed adoption pathways is shown in Table 10. For agriculture, the very high adoption assumed under Pathway 2 allows the target reduction for agriculture in 2030 under its Sectoral Emission Ceiling of 17.25 Mt CO<sub>2</sub>e (see Table 7) to be met. However, while total emissions under Pathway 2 in the LULUCF sector would be slightly below the 2018 level, it is probable that this would still fall short of the LULUCF target of a reduction of 0.626 Mt CO<sub>2</sub>e below the 2016-2018 level.

**Table 10. Consolidated impact of adoption of mitigation measures under Pathways 1 (high adoption) and 2 (very high adoption) in Scenario 1 of the Teagasc MACC**

Pathway	Sector	GHG emissions Mt CO <sub>2</sub> e 2018 baseline	GHG emissions Mt CO <sub>2</sub> e 2030 BAU	GHG emissions Mt CO <sub>2</sub> e with assumed Pathway adoption	Cost range in 2030 € million
1	Agriculture	23	21.9	19.1	-422 to -219
2	Agriculture	23	21.9	17.1	-363 to -294
1	LULUCF	6.85	10.5	8.35	-111 to 305
2	LULUCF	6.85	10.5	6.42	284 to 279

Source: Teagasc MACC Table 6.1, Lanigan et al., 2023.

In aggregate, achieving the required reductions in agricultural emissions is cost-negative. That is, farmers could achieve the required reduction in emissions and also be financially better off. This begs the question why the relevant actions are not already being adopted when it would seem to be in the self-interest of farmers to adopt them. One answer is that there may be implicit management costs to an individual farmer to change the practices with which they are familiar. Farmers can also value other objectives than simply maximising their economic returns. Another answer is that the aggregate figure includes both cost-negative measures but also measures that would have a positive cost for a farmer to adopt them. The cost of these cost-positive measures is however outweighed by the potential savings from adopting the cost-negative measures.

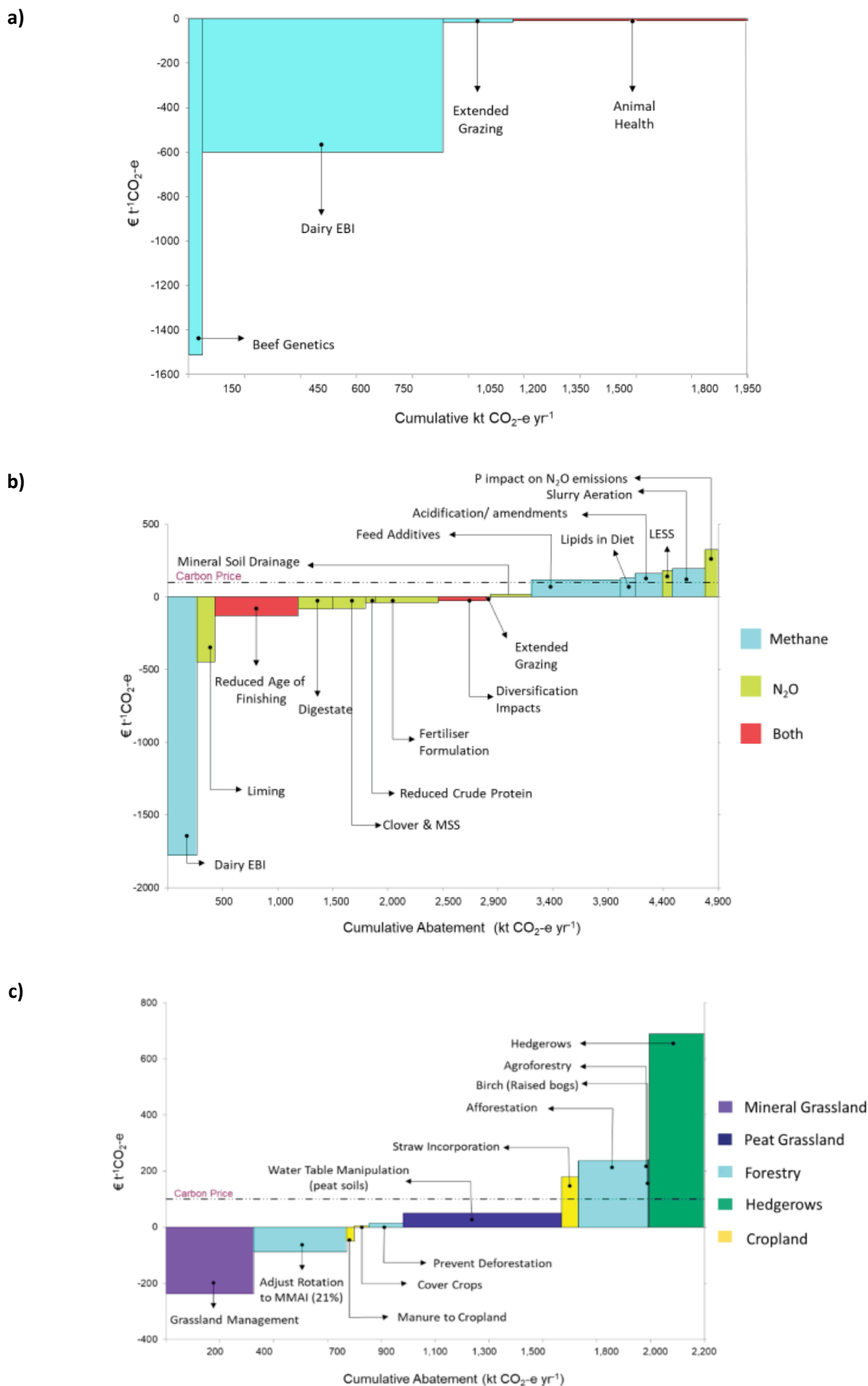
The distribution of cost-negative and cost-positive measures for three categories of mitigation measures is shown in Figure 12. Agricultural efficiency measures result in improved GHG efficiency and thus a lower emissions intensity of output but can also lead to a reduction in the absolute level of emissions. All these measures are cost-negative, with the greatest impact coming from improvements in animal health, followed by improvements in the dairy Economic Breeding Index (EBI). A potential offset is the rebound effect, where improvements in profitability due to efficiency improvements can lead to an increase in animal numbers, thus offsetting some of the potential gains from efficiency improvements alone.

Absolute mitigation measures are defined as those measures that impact on total activity (e.g. fertiliser amount) or on emission factors (GHG emissions associated with a given quantum of an activity). They include reducing the age at which beef cattle are finished, transitioning to protected urea and other optimised fertiliser formulations, improving the dairy EBI (which also contributes to absolute emission reductions as well as improved efficiency), as well as implementing feed additives to curtail methane emissions. Again, around 60% of the cumulative abatement in the period 2021-2030 is cost negative, while costs for some of the remaining options can be quite high. For example, Teagasc estimates that using feed additives to reduce methane emissions from cattle would hardly make economic sense even with a carbon price of €100/t CO<sub>2</sub>e.

Diversification options emerge as a key theme in the 2023 MACC, with measures such as organic farming, biomethane production, and increased forestry presented as viable strategies for emissions reduction in addition to technological strategies. These approaches offer potential alternative income streams for farmers. Diversification of farming activity is also seen as cost-negative but is still expected to contribute relatively little to overall cumulative abatement.

Within the LULUCF sector, measures such as improved water table management in peatlands, increased afforestation and enhanced hedgerow management offer alternative avenues for emissions reduction and carbon sequestration. Unlike for the agriculture sector, most of the technical mitigation options are costly. Indeed, afforestation which is seen as a key strategy for this sector to meet its targets is estimated to have a marginal abatement cost of around €200/t CO<sub>2</sub>e in 2030 under the high adoption Pathway 2.

Figure 12. Marginal abatement cost curves for (A) agricultural efficiency measures (B) agriculture measures and (C) LULUCF measures in 2030 under Scenario 1 and Pathway 2



Source: Teagasc MACC report, Lanigan et al., 2023.

The MACC highlights the considerable challenges inherent in achieving the required adoption rates. For instance, it proposes a 30% reduction in total nitrogen use, complete replacement of straight urea with protected urea, and a three-month reduction in the finishing age of beef cattle across the entire national herd. These will be ambitious targets to meet and will require additional incentives beyond what are in place at the present time. It will also be important that emission reductions resulting from any improvements that are made are fully captured in the national inventory.

## 5.2 Climate Action Plans

Ireland's Climate Action Plans (CAPs) are strategic frameworks published periodically that outline the measures the government will implement to meet its legally binding climate targets under national and EU frameworks.<sup>10</sup> These plans have evolved over time to reflect Ireland's growing climate ambition and its commitment to achieving substantial emissions reductions, including in agriculture.

The 2019 CAP was the first comprehensive plan, produced prior to the adoption of the amendment to the Irish Climate Act which incorporated the net zero target by 2050 into law. It adopted a target to reduce agricultural emissions by 10-15% between 2030 projected and targeted levels (from 21Mt CO<sub>2</sub>e to between 17.5-19 Mt CO<sub>2</sub>e). Subsequent plans, including the 2021, 2023, and 2024 CAPs, have progressively incorporated stricter targets, sectoral carbon budgets, and detailed pathways for implementation. One of the recommendations in the 2019 Plan was to develop a roadmap for the reduction in agricultural emissions which was subsequently published by the Department for Agriculture, Food and the Marine after extensive consultation as AgClimatise in December 2020 (DAFM 2020). AgClimatise put forward the following vision for the sector:

*By 2050, we want to develop a climate neutral food system compatible with the Paris temperature goals, whereby the climate impact of biogenic methane is reduced to zero and remaining agricultural emissions are balanced by removals through land use and a significant contribution to renewable energy.*

It included a list of 20 actions including related to renewable energy including some with quantitative targets (e.g. reducing chemical nitrogen fertiliser use to a maximum of 325,000 tonnes by 2030, an increase in the use of protected urea fertilisers to 65% of the total by 2030, genotype the entire national herd by 2030, an increase in the area under organic farming to 350,000 ha by 2030, and increasing afforestation levels to 8,000 ha per year). AgClimatise itself did not specify the emissions abatement to be achieved through the various measures, but these were based on a previous version of the Teagasc Marginal Abatement Cost Curve (MACC).

The 2021 CAP was the first Climate Action Plan to be aligned with the national goal of a 51% reduction in total emissions by 2030. It set an agriculture-specific target of 16-18 Mt CO<sub>2</sub>e reductions by 2030, equating to a 22-30% reduction in the sector's emissions from 2018 levels. Following the publication of the sectoral emissions ceilings, the 2023 and 2024 CAPs target a 25% reduction in agricultural emissions by 2030. The 2024 CAP also established a national target for the LULUCF sector aligning it with Ireland's target under the LULUCF Regulation. The ambition for this sector will now be a fixed reduction of 0.626 Mt CO<sub>2</sub>e by 2030 below a baseline set at the average of the 2016-2018 emissions.

The key measures to reduce agricultural emissions in CAP 2024 are illustrated in Table 11. The expected mitigation reductions in the two carbon budget periods are set out in Table 12. The Agriculture chapter was prepared shortly after Teagasc published its updated 2023 MACC, so some of the new measures identified in that report are not yet included. The total reduction for All Measures expected to be achieved cumulatively over the two carbon budgets is equivalent to the reduction required under agriculture's sectoral emissions ceiling in 2030 alone (Table 7). This underlines the magnitude of the implementation challenge ahead

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<sup>10</sup> Usually in agricultural policy discussions, the acronym CAP refers to the Common Agricultural Policy. In this section, CAP is used to refer to the successive Climate Action Plans.

Table 11. Summary of mitigation measures included in CAP 2024

Agricultural Emissions Reduction	Carbon Sequestration
<p>Gradual reduction in national bovine numbers, particularly suckler herd.</p> <p>Extended grazing season where soil conditions allow.</p> <p>Protected urea fertilisers to replace CAN.</p> <p>Multi-species swards with clover to reduce fertiliser needs.</p> <p>Improved soil fertility management and pH optimisation.</p> <p>Low emission slurry spreading technologies.</p>	<p>Increased afforestation rates to meet national targets.</p> <p>Adoption of agroforestry systems.</p> <p>Small-scale native woodland plantations.</p> <p>Enhanced hedgerow management and expansion.</p> <p>Rewetting of organic soils/peatlands.</p> <p>Improved grassland management for soil carbon.</p>
Enabling Measure	Co-Benefits
<p>National Land Use strategy.</p> <p>Improve knowledge exchange with farmers.</p> <p>Focus on just transition approaches.</p> <p>Review of existing incentives and schemes.</p> <p>Enhanced research into mitigation options.</p>	<p>Enhanced biodiversity.</p> <p>Improved water quality.</p> <p>Better air quality (reduced ammonia).</p> <p>Landscape preservation.</p> <p>Rural development opportunities.</p>

Source: Own compilation

Table 12. Key targets for agricultural mitigation measures in CAP 2024

Sector	2021 – 2025 MtCO <sub>2</sub> e	2026 – 2030 MtCO <sub>2</sub> e	Total MtCO <sub>2</sub> e (2021-2030)
Reducing chemical N use to a maximum of 300,000 tonnes	0.4-0.45	0.1-0.2	0.5-0.65
Increased adoption of inhibited urea	0.35-0.45	0.08-0.12	0.43-0.57
Earlier finishing of beef cattle (3 – 3.5 months reduced finishing age)	0.25	0.48	0.73
Reduce age at first calving of suckler beef cows	0.03	0.07	0.1
Improved animal breeding by focusing on low methane traits	0.0	0.3-0.5	0.3-0.8
Low emission animal feeding	0.2	0.4	0.6
Miscellaneous measures, including extended grazing and acidification, amendments, aeration of manures and slurries	0.2	0.3	0.5
<b>Total Core</b>	<b>1.43-1.58</b>	<b>1.73-2.07</b>	<b>3.16-3.85</b>
Addition of a slow-release pasture-based feed additive/methane inhibitor	0.0	0.6	0.6
Mobilise recommendations of the Food Vision sectoral groupings and support land use diversification options for livestock farmers, such as anaerobic digestion, forestry, and tillage	1.3	0.2	1.5
Organic farming (75k ha to 450k ha)	0.1	0.2	0.3
<b>Total Further Measures</b>	<b>1.4</b>	<b>1.0</b>	<b>2.4</b>
<b>All Measures</b>	<b>2.83-2.98</b>	<b>2.73-3.07</b>	<b>5.56-6.05</b>

Source: Government of Ireland, Climate Action Plan 2024.

CAP 2024 also includes the strategy to reduce net emissions in the LULUCF sector. To achieve the targeted sectoral abatement, the 2024 Plan includes ambitious goals for afforestation, aiming to establish and maintain an annual rate of 8,000 hectares. In the area of cropland management, the plan sets objectives to expand the area under cover crops to 75,000 hectares and increase straw incorporation to 85,000 hectares of tillage area by 2030. Grassland management strategies focus on enhancing sequestration through improved practices on 450,000 hectares of mineral grasslands and reducing management intensity on 80,000 hectares of drained organic soils. The plan also continues efforts in peatland rehabilitation, targeting an additional 30,000 hectares. Overall, CAP 2024 seeks the development of a national carbon farming framework, aiming to incentivise carbon sequestration practices on agricultural land.

As noted, not all the new measures identified in the Teagasc 2023 MACC have been incorporated into CAP 2024. The Plan envisages that the 33 measures set out in the 2023 MACC will be integrated into an updated AgClimatise roadmap through 2024/2025 following engagement with all stakeholders and subsequently turned into actions in future Climate Action Plans. There is a tension in CAP 2024 regarding the allocation of potential emissions abatement arising from

the new measures identified in the MACC. In the Agriculture chapter, the Plan notes that the Climate Act requires corrective action to be taken, given the gap between projected agricultural emissions and their 2030 target. It suggests that insights from the new Teagasc MACC will serve as a key tool for policymakers in identifying further options to reduce emissions in the agriculture sector.

A separate chapter in the Plan (Section 5.6) addresses how to identify measures that can contribute to eliminating the unallocated savings left unaddressed in the Sectoral Emission Plans (see Section 4.2 above). It proposes five key themes to address unallocated savings that could deliver up to 30 Mt CO<sub>2</sub>e during the second carbon budget period. One of the themes is implementation of sustainable food and agriculture, where among the suggested measures is incorporation of emissions reduction potential based on latest science, e.g., Teagasc MACC 2023. Any contribution from new measures in the MACC cannot be allocated both to reduce agricultural emissions to meet its existing sectoral emissions target in 2030 and allocated to reduce the unallocated savings to reach its target. The Plan notes that the relevant policy owners will set up task forces to validate potential emissions abatement as well as key actions to deliver these unallocated savings. This work is to be completed ahead of Climate Action Plan 2025, and well in advance of the second carbon budgetary period. There should be greater clarity whether higher ambition will be required from the agriculture sector in the coming CAP 2025.

### 5.3 Role of Ireland's CAP national Strategic Plan 2023-2027

The major funding mechanism to deliver on climate objectives in the Climate Action Plans is the Common Agricultural Policy (CAP).<sup>11</sup> This will deliver €9.9 billion to farmers over the five-year period 2023-2027. The most recent reform of the CAP at EU level in 2021 introduced a New Delivery Model (O.J. 2021). This gave Member States much greater flexibility in the use of the resources they receive under the CAP. The idea behind the New Delivery Model was to move away from a compliance-based approach to a performance-based approach in managing CAP resources. Instead of specifying in detail the actions that Member States and farmers had to follow to be eligible to receive CAP funding, the New Delivery Model requires Member States to adopt a strategic planning approach.

Based on a SWOT analysis and a needs assessment, Member States first identify their main priorities from a set of nine specific objectives and a cross-cutting objective set out in the basic CAP Regulation. They then select from a list of interventions set out in the basic Regulation and allocate resources to these interventions (again, within any ring-fencing specified in the basic Regulation) to best achieve their specific objectives. Member States establish performance indicators (e.g. the number of farmers enrolled in a scheme, or the number of hectares under a specific agricultural practice). The Commission then monitors the progress of Member States based on these performance indicators rather than trying to decide if the allocated funding has been spent in accordance with detailed rules.

One of the specific objectives in the basic CAP Regulation is Specific Objective 4 (SO4) “to contribute to climate change mitigation and adaptation, including by reducing greenhouse gas emissions and enhancing carbon sequestration, as well as to promote sustainable energy”. In Ireland’s national CAP Strategic Plan, this is further disaggregated into three SO4 sub-objectives: Obj4.N1 aims to reduce GHG emissions from agriculture, Obj4.N2 aims to improve the protection and management of existing carbon stores, including grasslands and peatlands, while Obj4.N3 aims to increase the carbon sequestration potential of Ireland’s forests and woodlands.

Ireland’s CAP Strategic Plan (CSP) was drawn up under the Climate Action Plan 2021 and its needs assessment referred to the ambition to reduce agricultural sector emissions by 5-7 Mt CO<sub>2</sub>e or by 22-30% in 2030 relative to 2005. Measures under the Strategic Plan are expected to facilitate a reduction of up to 1.3 Mt CO<sub>2</sub>e in agriculture’s emissions. The Plan notes that these will be complemented by other measures outside the Strategic Plan to achieve the overall target reduction of 5-7 Mt CO<sub>2</sub>e by 2030.

There is also a commitment to contribute towards the 4.8 Mt CO<sub>2</sub>e LULUCF emissions reduction target (this was based on a LULUCF target of 2-3 Mt CO<sub>2</sub>e in 2030 taking account of an expected upward revision of emissions in the national inventory in the 2021 Climate Action Plan). Agriculture is expected to deliver a contribution of approximately 2 Mt CO<sub>2</sub>e towards the achievement of this total by 2030. Of this 2 Mt contribution by 2030, the CSP is expected to deliver approximately 1.2 Mt CO<sub>2</sub>e over the 5-year programme from 2023-2027. Farmers are also expected to contribute

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<sup>11</sup> In this and subsequent sections, we revert to using CAP to refer to the Common Agricultural Policy.

to the renewable energy target. The interventions that contribute to these targets in the Strategic Plan include the eco-scheme, ACRES (Agri-Climate Rural Environment Scheme), organic farming scheme, protein scheme, straw incorporation scheme, Suckler Carbon Efficiency Programme, and the Capital Investment Scheme. These measures are also designed to contribute to improvements in biodiversity and water quality as well as GHG reduction targets, given the close synergies between these objectives.

## 5.4 Complementary public policies with climate impacts

**The Infrastructure, Climate and Nature Fund.** Government recently agreed to establish new mechanisms to save windfall corporation tax receipts in a way that mitigates future economic, demographic and environmental risks. Part of this approach is the establishment of a €14 billion Infrastructure, Climate and Nature Fund (ICNF), which will commence operation in 2026. The fund will receive annual payments of €2 billion from 2025 to 2030. The ICNF will support two goals. First, in the event of an economic downturn, the fund will be deployed to support the continued delivery of the National Development Plan. Second, assuming that the economy continues to perform well, up to €3.15 billion of the fund will be made available for the delivery of projects that demonstrate support for the achievement of climate, nature and water quality targets. With a cap of €3.15 billion for environmental project expenditure, this represents a significant financial commitment to support implementation of climate action measures, while also providing a fiscal buffer against potential economic challenges.

**Nature Restoration Law.** The Nature Restoration Law (NRL) was a landmark piece of EU environmental legislation passed in late 2024 (O.J., 2024). This law represents a significant milestone in the EU's wider approach to environmental protection and sustainable land management. The aim of the law is to assist in the sustained recovery of biodiverse and resilient ecosystems through the restoration of degraded ecosystems. The legislation sets a target that 20% of EU land and sea areas should be covered by restoration measures by 2030, and all ecosystems in need of restoration by 2050. The law has far-reaching implications for various sectors but one of its biggest impacts will be on the agriculture sector. At its core, the NRL sets binding targets for the restoration of degraded ecosystems across "terrestrial, marine, and urban areas". It requires Member States to develop comprehensive National Restoration Plans within two years of the law's enactment. The law's scope extends beyond mere conservation, focusing on active restoration measures to improve habitat quality and ecosystem recovery and functionality.

Setting this within the agricultural context, the NRL addresses several critical aspects. The law does not mandate changes in the use of agricultural land. Instead, it promotes voluntary participation in restoration activities, with Member States tasked with developing attractive incentives for farmers. This approach acknowledges the pivotal role of agricultural stakeholders in landscape management and biodiversity conservation. The law's emphasis on improving habitats for pollinators and other species crucial for agriculture underscores its potential to enhance long-term agricultural productivity. In promoting such practices, the aim is to be strategic in improving soil health, water quality, and pollinator populations. This focus on ecosystem health aligns with the growing recognition of the interdependence between agricultural productivity and environmental sustainability (Hering, 2023; Cliquet et al., 2024).

Furthermore, the NRL can be seen as a tool for climate change mitigation and adaptation. Within the agricultural sector, this translates into promoting farming practices that not only restore biodiversity but also contribute to carbon sequestration and enhance resilience to climatic extremes. The law's implementation is expected to catalyse the development of agroecological approaches and nature-friendly farming methods. By encouraging reduced pesticide use and improved habitat management, it may facilitate a transition towards more sustainable agricultural practices. The NRL does not preclude economic activity in restored areas. Rather, it seeks to promote agricultural practices that are compatible with restoration objectives. This approach aims to reconcile the dual imperatives of food production and environmental protection, potentially leading to innovative farming solutions.

**Water Framework Directive.** The Water Framework Directive, established by the EU in 2000 and implemented in Ireland in 2003, is a comprehensive framework for protecting all types of water bodies, including rivers, lakes, estuaries, coasts, and groundwater. This unique legislation takes a holistic approach by considering both the water bodies and their dependent wildlife habitats. It has operated in three cycles since 2009, with the current third cycle running until 2027. The directive's primary goals are to achieve good status for all waters, prevent deterioration, protect aquatic ecosystems, and promote sustainable water use through a process that involves characterisation, setting environmental objectives, implementing measures, monitoring, and then revision.

A key focus of the directive is the protection of high-status water bodies, also known as “blue dot catchments,” which represent Ireland’s most pristine waters. These water bodies are characterised by excellent water quality, natural morphology, and unique biodiversity, including species that are sensitive to pollution. There has been a concerning decline in these high-status waters over time, with less than half currently meeting their objectives. The main pressures affecting these waters include hydromorphological changes (such as channel straightening and damming), agricultural impacts, and other anthropogenic pressures. To address these challenges, initiatives like the Blue Dot Catchment Program and the Waters of Life project have been established to protect and restore these valuable water resources through local cooperation and targeted measures.

**The Nitrates Directive and derogation.** The EU Nitrates Directive (91/676/EEC) aims to protect water quality by preventing nitrates from agricultural sources from polluting ground and surface waters and by promoting the use of good farming practices. In Ireland, the Directive is implemented primarily through the Nitrates Action Programme (NAP), which sets specific measures for farmers to manage livestock manure and chemical fertilisers effectively. These include limits on nitrogen and phosphorus application, minimum storage requirements for livestock manure, and rules for when and how these fertilisers can be applied. Farmers are also required to observe closed periods during which the application of organic or chemical fertilisers is prohibited to prevent runoff during high-risk seasons.

To accommodate Ireland’s heavy reliance on pasture-based dairy and livestock farming, the industry has benefited from a derogation under the Directive. This derogation allows certain farmers, primarily dairy farmers, to operate at a higher organic nitrogen stocking rate—up to 250 kg per hectare, compared to the standard limit of 170 kg per hectare—provided they meet stricter environmental standards. These include mandatory nutrient management planning, regular soil testing, minimum slurry storage capacities, and adherence to specific grassland management practices. As such obligations increase operational costs, some dairy farmers maintain high stocking densities but opt to export surplus manure to other farms. This involves transporting manure to farms with lower stocking rates or those in need of additional nutrients for crop production. While this strategy helps to redistribute nutrients and stay within regulatory limits, it also incurs logistical and financial costs for transportation and compliance verification.

Ireland’s derogation has come under increasing scrutiny due to persistent water quality issues. Despite measures aimed at reducing agricultural pollution, many Irish rivers and waterways remain adversely affected by nitrates. The most recent EPA national monitoring report noted that nitrate concentrations remain too high in 2023 in 42% of river sites mainly in the South East and Midland and Eastern regions, and that there were no signs of improvement compared to 2022 (EPA 2024b). However, more recent data from the EPA based on more limited sampling suggest that nitrogen concentrations in waters nationally have reduced in the first half of 2024 relative to other years, and that they are at the lowest they have been since 2016 which is a positive trend (EPA, 2024a). The unfavourable status has led the European Commission to signal its intention to withdraw Ireland’s derogation unless significant progress is demonstrated. The derogation has already been modified starting 1 January, 2024. Specifically, the maximum allowable organic nitrogen (N) per hectare has decreased from 250 kg N/ha to 220 kg N/ha in certain areas with high nitrate pollution levels. This adjustment is part of the broader implementation of Ireland’s current derogation, which remains in effect until 1 January, 2026.

Losing the derogation would have substantial implications for Irish agriculture, particularly the dairy sector, as farmers would need to reduce herd sizes or invest significantly in alternative solutions to meet stricter nitrogen limits. The government position is that the derogation must be maintained (DAFM 2024) and this position is confirmed in the Programme for Government 2025 (Department of the Taoiseach, 2005). Programmes to improve water quality monitoring and farmer education include the Agricultural Sustainability Support and Advisory Programme (ASSAP) which works closely with farmers to implement practical changes on farms to improve water quality. Additional regulatory changes as well as financial support have been introduced in support. There are obvious interactions between maintaining the derogation and reducing emissions from livestock farming, another example of the tensions that need to be managed if progress is to be made towards climate targets.

**Just Transition policies.** A just transition is a framework and set of principles that ensures that the shift toward a climate-neutral economy is conducted in a fair and equitable manner, particularly focusing on regions and communities most affected by the move away from carbon-intensive industries. The European Union has institutionalised this concept through the Just Transition Fund (JTF), which provides financial and technical support to regions most affected by the transition to climate neutrality. However, a just transition is not merely about distributing funds. It is also about ensuring long-term regional competitiveness and social sustainability while meeting climate objectives. The JTF operates as a

flexible, territory-specific funding instrument that differs from other EU funds. The fund allocates money to regions based on specific indicators - 30% is based on carbon-intensive industry presence, 25% on coal mine closures, and additional allocations based on environmental factors.

As set up, the JTF is not intended to support rural communities affected by climate mitigation actions in the agricultural sector. The report of the Strategic Dialogue on the Future of Agriculture proposed the idea of a temporary Agri-food Just Transition Fund outside the CAP to facilitate the sector's sustainability transition although the idea remains rather hazy. On the one hand, for areas where significant land use restructuring may be required to meet sustainability goals, it recommends the implementation of territorial strategies supported by the Agri-food Just Transition Fund. On the other hand, it foresees that this Fund might provide one-off investment support (in the form of loans or grants) to farmers and other food system actors for their sustainability transition (Report of the Strategic Dialogue on the Future of Agriculture, 2024).

How to operationalise the concept of a just transition in climate action in Ireland has been the subject of extensive research by the National Economic and Social Council<sup>12</sup>, the Climate Change Advisory Council (see Dekker, 2020), and in the specific case of agriculture by the Nevin Economic Research Institute (see Murphy, 2022). The previous Minister for the Environment, Climate Change and Communications Eamon Ryan T.D. established a Just Transition Taskforce in 2023 chaired by the Just Transition Commissioner for the Midlands Kieran Mulvey which produced its report in May 2024 (Government of Ireland 2024). The report made recommendations on the role and structure of a statutory Just Transition Commission. In October 2024, the government approved the membership of the new Just Transition Commission.<sup>13</sup> This will be an important forum to listen to and articulate the views of members of society regarding the implementation of the measures needed to accelerate the decarbonisation and climate transition agenda.

## 5.5 Programme for Government 2025

The Programme for Government sets out the agreed policy measures to be pursued by the governing coalition for the next parliamentary period (Department of the Taoiseach, 2025). It commits to sustained action to tackle the climate crisis, recommitting to the 2030 and 2050 targets in the Climate Act and proposing to set ambitious targets to reduce greenhouse gas emissions by 2040. It also states it will continue to publish annual a Climate Action Plan, while placing a focus on a smaller number of strategic and impactful actions across all sectors, as well as publishing quarterly progress reports. It proposes to complete a review of greenhouse gas emissions on a consumption basis, as well as supporting the Just Transition Commission's work to listen to communities.

Under the heading 'Supporting a Sustainable Transition in Agriculture', the Programme acknowledges the special economic and social role of agriculture and the distinct characteristics of biogenic methane and pledges to support the progress made to date by farmers and industry in reducing emissions. This reference to the distinct characteristics of biogenic methane reflects the language in the Climate Act. For the first time, the government states its intention to advocate for the accounting of biogenic methane to be re-classified at EU and international level, a policy that has been adopted by New Zealand in its climate accounting. It will support the Irish agricultural sector so that it continues to a world leader in carbon-efficient food production. It commits to assisting farmers and the agricultural sector to reduce emissions by supporting the adoption of practical abatement measures, including providing diversification options for farmers to generate new or additional sources of income.

On specific agricultural issues, the Programme proposes to update and introduce a new food strategy to succeed Food Vision 2030, continuing the practice of renewing these strategies every five years. Strengthening farm incomes is made the absolute priority, with additional supports indicated for the various farming sectors, including increased supports for suckler farmers, increased supports for sheep farmers, increased support for the Dairy Beef scheme, while further investing in the tillage and horticultural sectors. Specifically, it promises to allocate funds from the Infrastructure, Climate and Nature Fund to the agricultural sector, although no figures are mentioned. It reiterates the commitment to seek to retain the nitrates derogation when it comes for renewal prior to 1 January 2026.

On LULUCF issues, the Programme states that it will continue to support the forestry sector and provide attractive

<sup>12</sup> The relevant NESCC publications on a just transition can be downloaded from this web page <https://www.nesc.ie/publications/addressing-employment-vulnerability-as-part-of-a-just-transition-in-ireland-2/>.

<sup>13</sup> See <https://www.gov.ie/en/press-release/f208b-government-approves-membership-of-new-just-transition-commission/>.

financial incentives to farmers to plant given the beneficial environmental impact. It promises to deliver an effective licensing system, recognising the need to remove any barriers to plant and fell trees within the current Forestry Programme. On the rewetting of peatlands, where there are now specific obligations under the EU's Nature Restoration Law, the Programme commits to ensuring that all measures will be completely voluntary for farmers with restoration actions taking place on State lands. It will ensure that rewetted and restored lands remain eligible for CAP payments and ensure dedicated funding streams for voluntary actions. It also proposes to introduce a National Framework for Carbon Farming to guide the development of a Carbon Farming Scheme to strengthen farm incomes.

## 5.6 Harnessing the power of supply chain initiatives

Irish agri-food companies are increasingly incentivised to lower their supply chain emissions due to evolving market demands and competitive pressures. The ability to manage and lower Scope 3 emissions has become a key marketing requirement, particularly for companies that need to disclose these emissions to meet buyer and consumer expectations.<sup>14</sup> This transparency is becoming a condition of sale in many markets. It can also become a competitive advantage, if sustainability-conscious consumers are prepared to pay a premium for products with a lower carbon footprint.

Many competitors, for example, companies like Arla and Fonterra, key players in the global dairy industry, have embraced sustainability initiatives, intensifying competitive pressures. Irish companies aiming to stay relevant in global markets will need to align with these industry leaders. Carbon footprint competition is becoming an important competitive issue, requiring firms to innovate and lead in emission reductions as part of their marketing strategy.<sup>15</sup>

This issue is underlined by the growing interest in carbon labelling on food products which is gaining traction across Europe through voluntary efforts by companies and discussions about government-mandated schemes. For example, Tönnies Group, a major German meat processor, has introduced carbon labelling on some of its products to highlight their environmental impact. Similarly, Nestlé and Unilever have piloted carbon footprint labels on selected products to demonstrate their sustainability credentials. Some governments, for example Denmark, are exploring mandatory carbon labelling.<sup>16</sup> This brief has previously highlighted (Section 3.3) the important role that new EU legislation (the 'Greenwashing Directive' and the Green Claims Directive) will have in regulating the use of climate claims in future, where a fundamental requirement will be that climate claims must be transparent, backed by evidence and verified by a third party auditor.

The Science Based Targets initiative (SBTi) further underscores the importance of setting ambitious climate goals. This global framework helps companies align their emissions targets with climate science, specifically the Paris Agreement's goals. In Ireland, the Low Carbon Pledge is a private sector initiative launched in 2018 by Business in the Community Ireland (BITCI), a national network for sustainability. Companies that sign the pledge commit to reducing their carbon footprint and setting science-based targets for decarbonisation, which mandates comprehensive accounting for Scope 1, 2, and 3 emissions. Over 70 Irish businesses are progressing toward embedding SBTs into their strategies. Several Irish food companies, such as Ornu, Dawn Meats, ABP Ireland, and Musgrave Group, have adopted these targets or pledged to do so, as part of Ireland's broader Low Carbon Pledge.

Also relevant here is the role of carbon credits generated by carbon farming practices. Especially in agri-food supply chains there will always be residual emissions that cannot be further reduced. Companies can use offsetting or insetting strategies to manage these residual emissions. Offsetting involves investing in external projects outside a company's supply chain, such as renewable energy initiatives or reforestation programs, to compensate for a company's emissions. The purchase of nature-based carbon credits for this purpose on the voluntary carbon market has been heavily criticised as media and academic scrutiny has shown many of the purchased credits to be worthless. In contrast, insetting focuses on emission reduction or carbon removal projects within a company's own value chain. For agri-food companies, this might include supporting regenerative agricultural practices, enhancing soil carbon sequestration, or improving manure management systems among their suppliers.

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<sup>14</sup> Scope 1 emissions are direct emissions from a company's owned or controlled sources, such as fuel combustion in company vehicles or on-site energy production. Scope 2 emissions are indirect emissions from the generation of purchased electricity, steam, heating, or cooling consumed by the company. Scope 3 emissions are all other indirect emissions occurring in the value chain, including emissions from suppliers, product use, and disposal. For agri-food companies, the main source of Scope 3 emissions are on-farm emissions from their farmer suppliers.

<sup>15</sup> The importance of climate footprint competition is forcefully made by Professor Frank Convery in his blog series 'UCD Earth Institute Climate policy for ruminant agriculture', <https://www.ucd.ie/earth/blog/climate-policy-agriculture-ireland-blog/>. See also Bord Bia's discussion of carbon footprints <https://www.bordbia.ie/industry/insights/global-sustainability-insights/environment-planet/carbon-footprint/>.

<sup>16</sup> Progress on the Danish scheme is reported on the 'Klimamærke' webpage of the Danish Ministry for Agriculture, Food and Fisheries <https://fvm.dk/arbejd-somraader/foedevarer/klimamaerke/>.

The European Commission is hoping that its carbon farming initiative will encourage private sector entities to purchase credits from farmers thus providing an additional source of finance for mitigation action. The Carbon Removals and Carbon Farming Regulation (Section 3.3) is intended to ensure that credits that become available are of high quality. Schemes such as the *Label Bas Carbone* in France are examples of such initiatives that may become more widespread in future.<sup>17</sup>

Bord Bia has identified sustainability as a core theme in its recently published ten year and three year strategies (Bord Bia 2022a). Its Origin Green initiative is its main programme to monitor and drive improvements in environmental sustainability and to demonstrate this to trade customers and consumers, both at home and abroad. Origin Green was launched in 2012 and now covers 61,000 farms and over 300 company members. More than 90% of total Irish food and drink exports now come from verified Origin Green member companies. At farm level, Bord Bia's Sustainable Quality Assurance schemes assess farming practices and record data to demonstrate the sustainability of Irish farming in a systematic way. On-farm audits are conducted by an independent auditor on every scheme member's farm at 18-month intervals. The 2023 update on Origin Green notes that 367,000 carbon footprints have been calculated to date (Bord Bia 2024).

Since the introduction of Origin Green farm members of the Sustainable Assurance Schemes have achieved a 8% average reduction in CO<sub>2</sub> per unit of beef since 2012 and a 9% average reduction in CO<sub>2</sub> per unit of milk since 2013. Bord Bia reports that Origin Green is an important selling point with trade buyers; in its Global Sustainability Survey, 48% of dairy buyers and 47% of meat buyers said it would encourage them to do business with Irish suppliers (Bord Bia 2021).

Bord Bia published its updated Origin Green 2022-2025 strategy *Powered by Partnership* in October 2022 which puts a greater emphasis on science-based targets, nature-based solutions and integrating circular approaches (Bord Bia 2022b). The Strategy acknowledges the targets set by government across a range of agri-environment indicators: a 25% reduction in absolute emissions by 2030 compared to 2018; a 5% reduction in ammonia emissions below 2005 levels by 2030; a 10% reduction in biogenic methane emissions by 2030 compared to a 2018 baseline; a more than 50% reduction in the use of chemical fertiliser by 2030; an ambition to have 10% of the farmed area prioritised for biodiversity by 2030; a 50% reduction in food waste by 2030; the goal to have all packaging reusable or recyclable by 2030; a target for 50,000 ha cultivated organically in 2022; and a commitment to reduce nutrient losses to water by 50% by 2030. To achieve these targets, Bord Bia is in the process of updating its Producer Standards to include strengthened water quality, biodiversity and soil health measures, to promote the implementation of the measures in the Teagasc Marginal Abatement Cost Curve to reduce emissions, and to develop training and guidance programmes that will be offered to farmers.

## 5.7 Demand side measures

Demand-side measures also have mitigation potential. Greater dietary shifts towards more plant-based foods and reductions in food waste could significantly decrease agricultural emissions while also providing health and economic co-benefits (Springmann et al. 2016). Demand-side measures do not play a role in the Irish agricultural emissions mitigation strategy given the strong export orientation of Irish agriculture (Section 2.1). Measures to reduce the demand for emissions-intensive foods within Ireland will have a very limited impact on the production of these commodities. If Irish consumers reduce their consumption of livestock products, Irish production will be switched to export markets given the high export propensity already for Irish production. Despite this structural context, it will be important to encourage and facilitate this shift in preferences among Irish consumers.

Some attention is paid to reducing food waste which can contribute to reducing territorial emissions in Ireland. In line with the EU target, there is an objective to reduce food waste by 50% by 2030. This will start with the measurement and monitoring of food waste on premises from 2024 used a standardised approach developed by the EPA. Also, it is planned that all new contract arrangements related to canteen or food services, including events and conferences, should include measures that are targeted at addressing food waste, with a specific focus on food waste prevention and food waste segregation.

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<sup>17</sup> Information on the French scheme is available on the website of the French Ministry for the Ecological Transition <https://www.france-carbon-agri.fr/>.

## 6. Future climate policy context

This brief has provided an overview of the complex climate architecture relevant to agriculture and land use emissions at both EU and national levels with its many interacting targets and has discussed performance to date against these targets. The urgency of the need to address the climate challenge means that these targets are not static. Both the EU and Ireland have committed to net zero emission targets by 2050 and, as that date approaches, the milestones and targets become ever more ambitious.

In this concluding section, we sketch some of the events and decisions taking place in 2025 that will shape the continuing evolution of both national and EU climate policy. One of the aims of this project is to contribute to shaping the Irish policy response to these initiatives as they arise. There is inevitable uncertainty around the timing and scope of these measures so there can be some slippage from the timings indicated here.

**Update of Irish carbon budgets.** The Irish Climate Act requires the updating of carbon budgets on a five-yearly cycle (Section 4.2). The Climate Change Advisory Council is charged with initiating the carbon budgeting process under the Act. It has submitted its proposal for the next cycle of carbon budgets covering the period 2026-2040 in December 2024 (CCAC 2024). This involved a slight modification of the provisional carbon budget for 2031-2035 (CB3) as well as a proposal for a provisional carbon budget for 2036-2040 (CB4). As the Council considered temperature neutrality pathways rather than constraining Ireland to meet net zero emissions in GWP<sub>100</sub> metrics, it recommended a small increase in the final proposal for CB3 of 9 Mt CO<sub>2</sub>e for a total cumulative budget of 160 Mt CO<sub>2</sub>e 2031-2035, reducing to 120 Mt CO<sub>2</sub>e for the CB4 period 2036-2040. These budgets imply a 57% reduction in emissions by 2035, and a 67% reduction in emissions by 2040, relative to 2018. It should be recalled that any exceedences from previous carbon budgets would be deducted from these values. This carbon budget proposal must now go through the process of government approval and passage through the Oireachtas before the government can start the process of setting sectoral emissions ceilings for the 2031-2035 period.

**Commission legislative proposal for the 2040 climate reduction target.** The Commission's legislative proposal for a 2040 emissions reduction target of 90% relative to 1990 is expected in the second quarter of 2025. The process of raising the 2030 target involving the publication of the 'Fit for 55' legislative package in July 2021 contained no fewer than 19 separate pieces of legislation including revisions of the ETS Regulation, Member State targets under the Effort Sharing Regulation and Member State targets under the LULUCF Regulation. One assumes that the legislative proposal for the 2040 target will also need to be similarly comprehensive. Any legislative proposal would have to pass through the scrutiny of the EU co-legislature where some pushback on the Commission proposal may be expected.

**Update of the EU's Nationally Determined Contribution 3.0.** The Paris Agreement lays down that countries should submit successive nationally determined contributions (NDCs) that they intend to achieve. Each country's NDC should represent a progression compared to the previous one and reflect its highest possible level of ambition. The third round of NDCs will be informed by the results of the first Global Stocktake completed at COP28 in Dubai in 2023 which indicated a significant gap between country commitments and pathways to meeting the Paris Agreement targets. The NDCs 3.0 should be forwarded to the UNFCCC by February 10 2025, some nine months before the COP30 meeting in Brazil, to allow for an understanding of their ambition, including the preparation of a synthesis report by the UNFCCC Secretariat. The NDCs 3.0 are ten-year strategies and should set reduction targets for 2035. Few countries have met the deadline, though they include both the US and the UK.<sup>18</sup>

This timing is awkward for the EU as there is as yet no political commitment (for example, at the European Council level) to the 90% reduction target by 2040 which would allow an indicative 2035 target to be derived. Poland, which holds the rotating EU Council Presidency in the first half of 2025 and has a Presidential election in May 2025, may be in no hurry to push for an EU agreement. It may thus have to wait until the Danish Presidency takes over in the second half of 2025 before the EU's NDC with a 2035 target is agreed.

**Report from the European Scientific Advisory Board on Climate Change on reducing EU agricultural emissions.** One of the open questions for the Commission's legislative proposal for the 2040 emissions target is whether there will be a specific proposal on reducing agricultural emissions. We previously noted that agriculture is now the only major sector not covered by an EU-wide regulatory regime with specific targets (Section 3.1). One important input into this debate will be the anticipated report from the European Scientific Advisory Board on Climate Change on reducing agricultural

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<sup>18</sup> Details available at <https://unfccc.int/ndc-3.0>.

emissions and climate resilience in agriculture which is expected in the second half of 2025. We must wait to see what this report will recommend, but the Chair of the Board, Professor Ottmar Edenhofer, is on record as saying that “that it would be “almost impossible” to achieve the European Commission’s proposed aim of cutting emissions by 90 per cent by 2040 without a levy on agricultural emissions”.<sup>19</sup> Both Commission President von der Leyen and Climate Commissioner Hoekstra have also expressed support for carbon pricing as an effective instrument to reduce emissions, but have not specifically supported its application to agricultural emissions.

**DG CLIMA consultancy study on AgETS design.** If some form of pricing of agricultural emissions were introduced, how would such a scheme work? The general assumption is that it would be based on a variant of an emissions trading scheme, as this is how emissions in all other sectors are regulated in the EU, hence the abbreviation AgETS standing for an agricultural emissions trading scheme. Some initial design options were sketched out in a study published by DG CLIMA in November 2023 (Trinomics, 2023). DG CLIMA are now pursuing a follow on study to investigate these design options in greater detail.<sup>20</sup> The results of this study are expected to be published in Q3 2025.

**Commission Vision Paper on the Future of Agriculture and Food.** This expected Communication is a response to the report of the Strategic Dialogue on the Future of Agriculture whose report was published in September 2024. Commission President von der Leyen promised in her Political Guidelines that the Commission would come forward with a response to that report within the first 100 days of its mandate. This Vision Paper will take the form of a White Paper that will set out the Commission’s thinking to guide the preparation of its legislative proposal for the CAP post 2027 later in 2025. The report of the Strategic Dialogue considered it premature to draw any definitive conclusions on an AgETS and called for further work by the Commission to analyse its consequences. The Vision Paper, expected in Q1 2025, may give the first indication of how the Commission intends to address this issue.

**Commission MFF proposal and accompanying legislative proposal for CAP post 2027.** The forthcoming MFF proposal will be the starting gun for long and difficult negotiations on the size of the EU budget and expenditure priorities in the next financial programming cycle 2028-2034. Of key interest for climate action and agriculture will be the financial allocation for the Common Agricultural Policy which will, to a great degree, influence the amount of public financing available to support climate action at farm level (Section 5.3). Equally important will be the Commission’s legislative proposal on the CAP itself and whether that may influence the incentives for Member States to allocate funds for climate action.

**Ireland’s coming EU Council Presidency.** Finally, all these initiatives will feed into the planning for Ireland’s forthcoming Presidency of the Council of the European Union from July to December 2026.

**Table 13. Summary of relevant climate policy developments in 2025**

Quarter	Initiative	Relevance
Q4 2024	Climate Change Advisory Council proposal for carbon budgets	<b>Will implicitly have significance for national agriculture and land use reduction targets post 2030</b>
Q1 2025	DG AGRI Vision Paper for the future of agriculture	<b>First indications of Commission thinking regarding CAP post 2027</b>
Q1 2025	Report on agricultural emissions from the European Scientific Advisory Board on Climate Change (ESABCC)	<b>Expected to recommend policy measures to accelerate the reduction in agricultural emissions across the EU</b>
Q1 2025	Agreement on the EU’s National Determined Contribution under the Paris Agreement with 2035 reduction target	<b>Likely to be delayed until second half of the year under Danish Presidency but essential before COP30 in November in Brazil</b>
Q2 2025	Commission legislative proposal and package for 90% 2040 reduction target	<b>Will include reference to treatment of agriculture and land use emissions</b>
Q3 2025	Publication of DG CLIMA consultancy study on design options for pricing agricultural emissions	<b>Together with the ESABCC report, it may promote debate on the feasibility of an AgETS in the EU</b>
Q3 2025	Publication of Commission’s MFF budget proposal with CAP allocation and accompanying CAP legislative proposal	<b>Will form basis for negotiations to determine the size of EU funding for the CAP in the period 2028-2034</b>

Source: Own compilation

<sup>19</sup> Hancock. A., ‘Farming must pay for its emissions, says EU chief climate scientist’, Financial Times 22 September 2024.

<sup>20</sup> Further information is provided in this presentation by Trinomics [https://climate.ec.europa.eu/document/download/f76a263a-69b4-4032-a604-e9cf-6caa3944\\_en?filename=policy\\_crpf\\_agrifood\\_ws\\_jeep\\_en.pdf](https://climate.ec.europa.eu/document/download/f76a263a-69b4-4032-a604-e9cf-6caa3944_en?filename=policy_crpf_agrifood_ws_jeep_en.pdf).

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