Teagasc Climate Action Strategy
2022 - 2030

Supporting Farmers for Climate Action

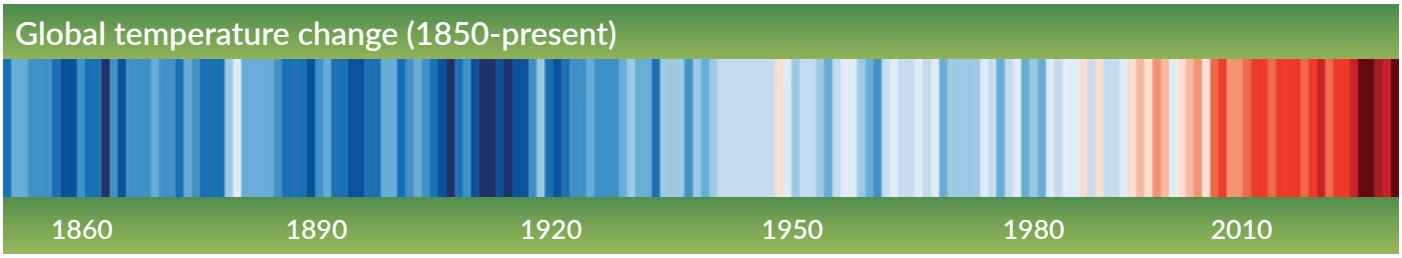
teagasc
Agriculture and Food Development Authority

30 Eddy Covariance (EC) towers are being used to quantify real-time greenhouse gas fluxes and meteorological variables.

Contents

Summary

Global temperatures have increased by more than 1°C since pre-industrial times. Scientists warn that without increases in both ambition and action, warming will exceed 2°C by the end of the century, possibly by a considerable margin. These changes have the potential to have a devastating impact on the world's environment and food security.



Urgent action is needed in all countries and sectors including agriculture to reduce emissions, increase carbon removals/sequestration and prepare to adapt to the changing climate. The world also faces food and nutrition, energy, and biodiversity crises, and our actions must deal with all these challenges in a co-ordinated manner. Agriculture must therefore maintain/increase food production, reduce emissions, increase sequestration, improve biodiversity and contribute to energy security, whilst also ensuring economic and social sustainability.

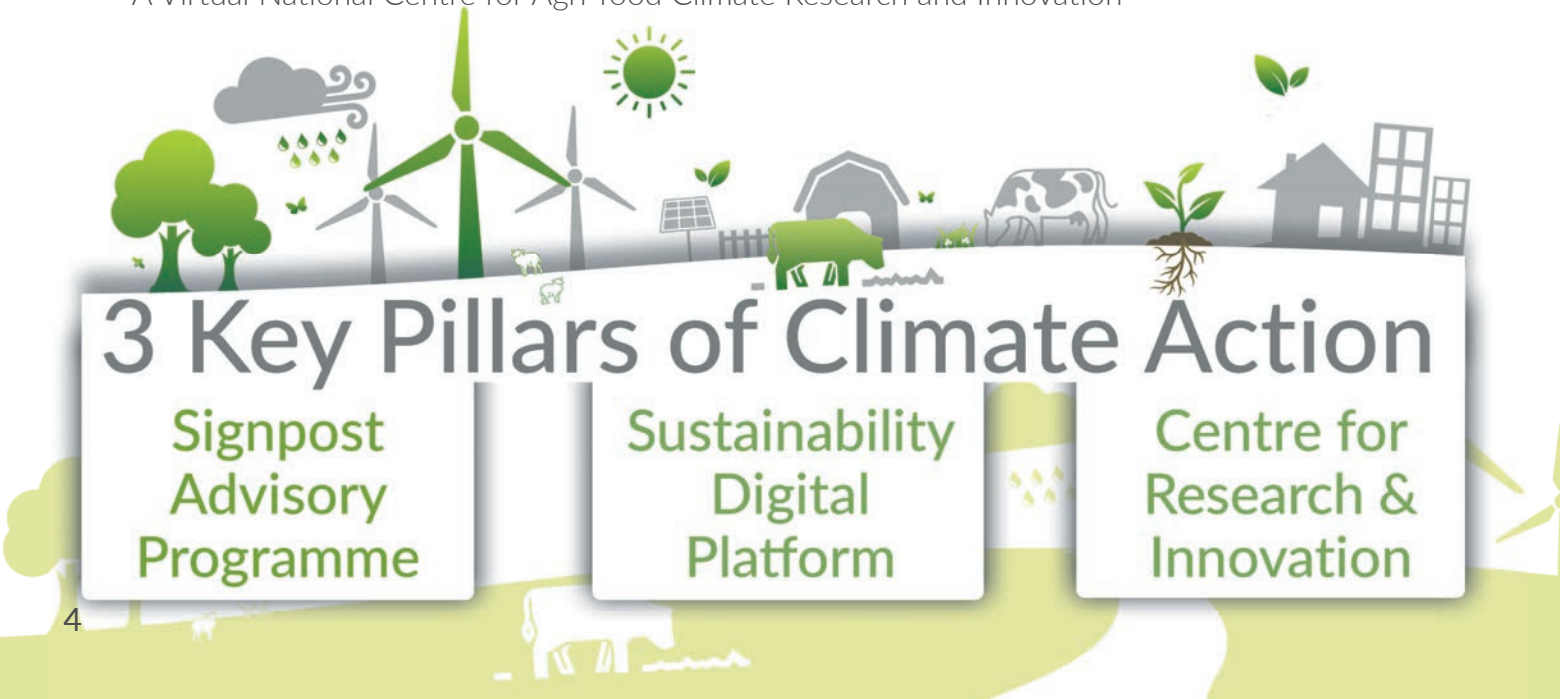
This Climate Action Strategy focuses on climate, but the actions will contribute to sustainability on a much wider level.

The Irish Government set a target of a 25% reduction in greenhouse gas emissions by 2030 (5.75 Mt CO_2eq) for the agriculture sector. As part of its Climate Action Strategy, Teagasc has set out a road map on how this can be achieved without impacting on the competitiveness of the agri-food sector.

To achieve this, Teagasc is significantly increasing its resources devoted to climate related research and knowledge transfer.

The three key pillars of the new Climate Action Strategy are:

- A Signpost Advisory Programme
- A Sustainability Digital Platform
- A Virtual National Centre for Agri-food Climate Research and Innovation



Signpost Advisory Programme

The Signpost Advisory Programme is a new service which Teagasc aims to make available to all farmers, to allow them to know their current emissions and sequestration, to make a plan to improve, help them with the implementation of the plan, and track progress.

A team of 30 advisors will commence the programme in 2023 and Teagasc plans to increase this significantly in subsequent years, as well as supplementing the in-house team with outsourced resources.

Sustainability Digital Platform

The Sustainability Digital Platform is a major digital resource to allow farmers 'count' carbon emissions and sequestration on their farm, and its decision support capability allows advisors work with farmers to develop tailored sustainability plans and track progress.

This platform is being developed in collaboration with the ICBF and Bord Bia, and it will be central to the Signpost Advisory Programme.

National Centre for Agri-Food Climate Research and Innovation

The virtual National Centre for Agri-food Climate Research and Innovation will accelerate the development of new technologies by co-ordinating and accelerating research and innovation programmes across Teagasc, as well as with other institutes, both in Ireland and internationally. Twenty four new scientific staff will be added to the centre in the current phase of recruitment, and additional staff, facilities and equipment are planned.

The changes that will happen on farms over the next decade constitute a major transformation of the Irish agri-food production system. Teagasc is committed to playing its role alongside farmers, industry and government.

The overall aim of the Teagasc Climate Action Strategy is to empower farm families to adopt new technologies and production systems that will allow agriculture to reduce its greenhouse gas emissions by 25% by 2030 while maintaining farm profitability.

3 Key Pillars of Climate Action

Signpost Advisory Programme

Available to all farmers

Enhanced advisory & training support

"Know my Number - Make my Plan" *supported by the* Sustainability Digital Platform

Engage with 50,000 farmers by 2030

Sustainability Digital Platform

New Secure Online platform

Facilitating Whole Farm sustainability assessment

Farmer & Advisor Understand emissions profile

National Centre for Agri-food Climate Research & Innovation

New Virtual Centre

Accelerate & co-ordinate Climate Research & Innovation Programmes

Providing leadership, nationally & internationally

The Teagasc Climate Action Strategy

To support farmers and the industry to respond to the challenge, Teagasc is significantly increasing its resources, in terms of funding and staff, devoted to climate related research and knowledge transfer. The strategy is built around three key pillars:

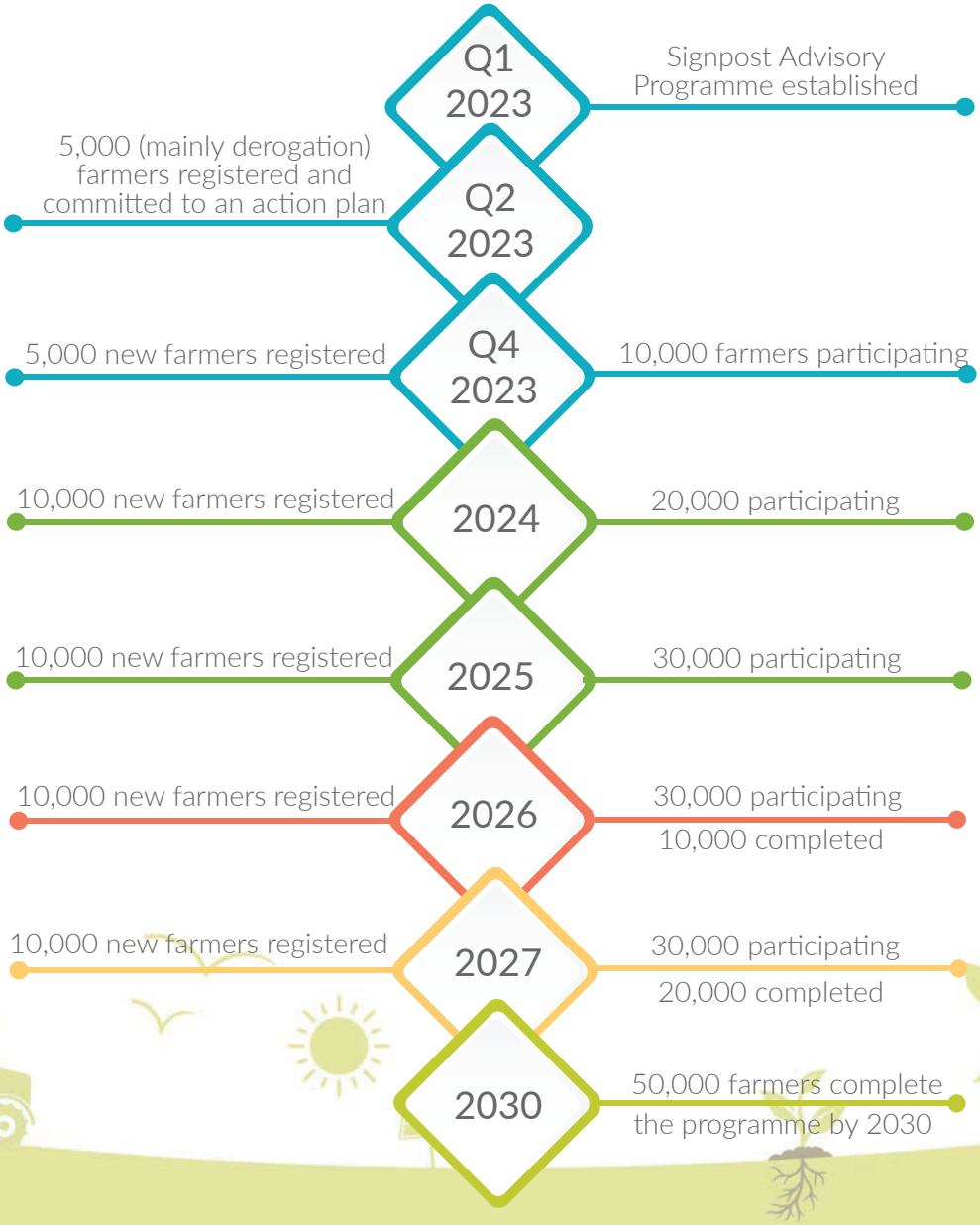
1. Signpost Advisory Programme

Teagasc are setting up a new, targeted advisory programme to support climate and sustainability actions on farms. This new public good programme will be available to all farmers. It will build on the network of Signpost Demonstration Farms by providing enhanced advisory and training support to farmers to commit to, select and implement climate and sustainability actions that will be appropriate and impactful on their farms. Participating farmers will be given the opportunity to commit to taking action for their farms.

A "Know My Number – Make My Plan" component of the programme, supported by the Sustainability Digital Platform, will allow farmers to see and understand their carbon emissions and sequestration profile as a baseline on which to act. A team of 30 advisors will commence the programme in 2023.

With advisory support, farmers will make a plan to improve by adopting positive changes and technologies, and advisors will help them with the implementation of the plan, and tracking of progress. This will also create trust and build capacity for supporting the adoption of new technologies as they emerge. The ambition of the programme is to engage with 50,000 farmers between now and 2030.

Milestones for the Signpost Advisory Programme

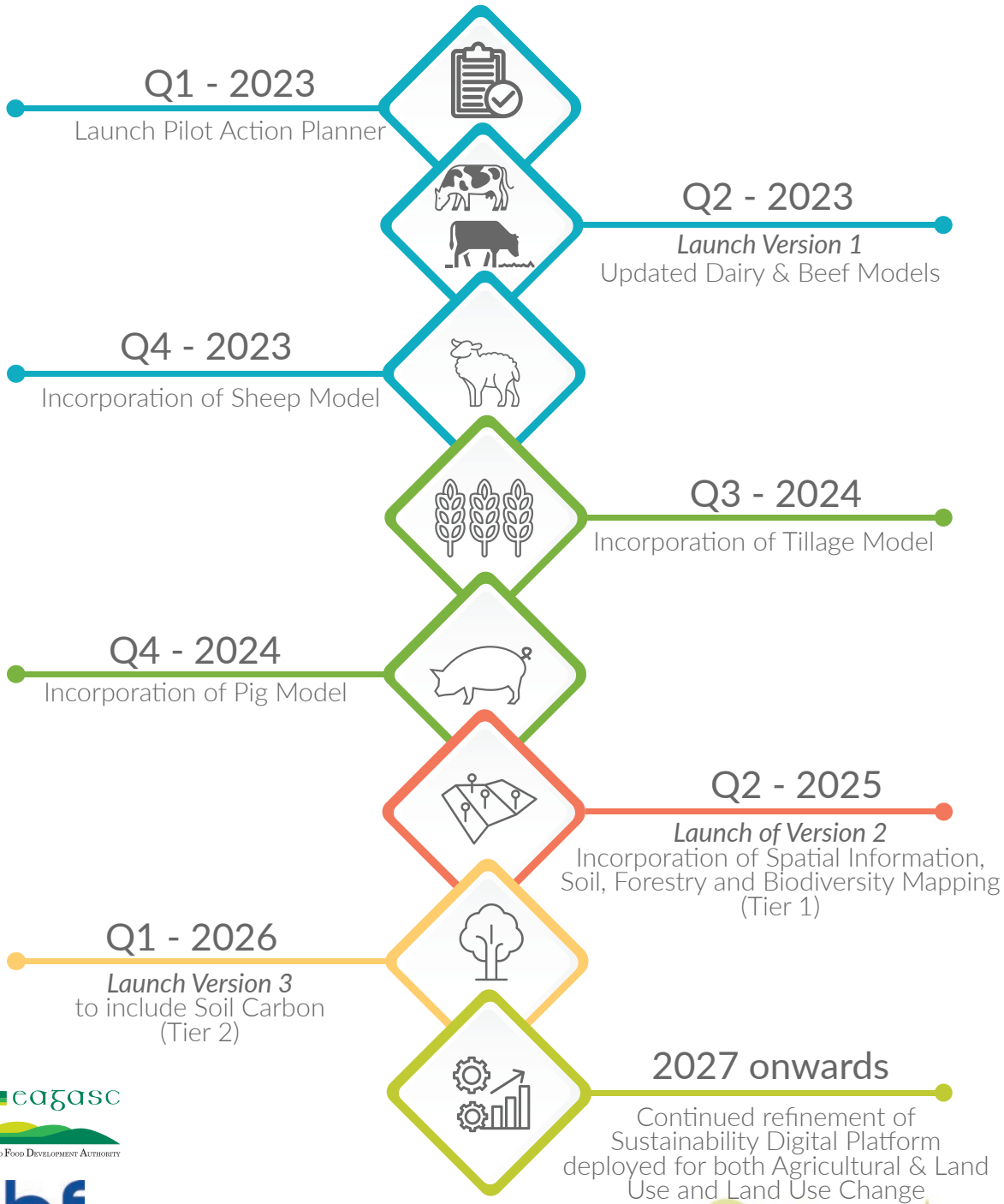


2. Sustainability Digital Platform

Supported by the Department of Agriculture, Food and the Marine (DAFM), Teagasc in co-operation with the Irish Cattle Breeding Federation (ICBF) and Bord Bia is building a new digital platform to facilitate a robust whole farm sustainability assessment and "counting" of carbon emissions and removals.

This platform will support the new Signpost Advisory Programme and allow each farmer, and their advisor, to understand their current emissions and removals profiles. The real time data analysis will help plan, explore opportunities and prioritise actions to reduce emissions and enhance removals.

Milestones for the Sustainability Digital Platform to 2030



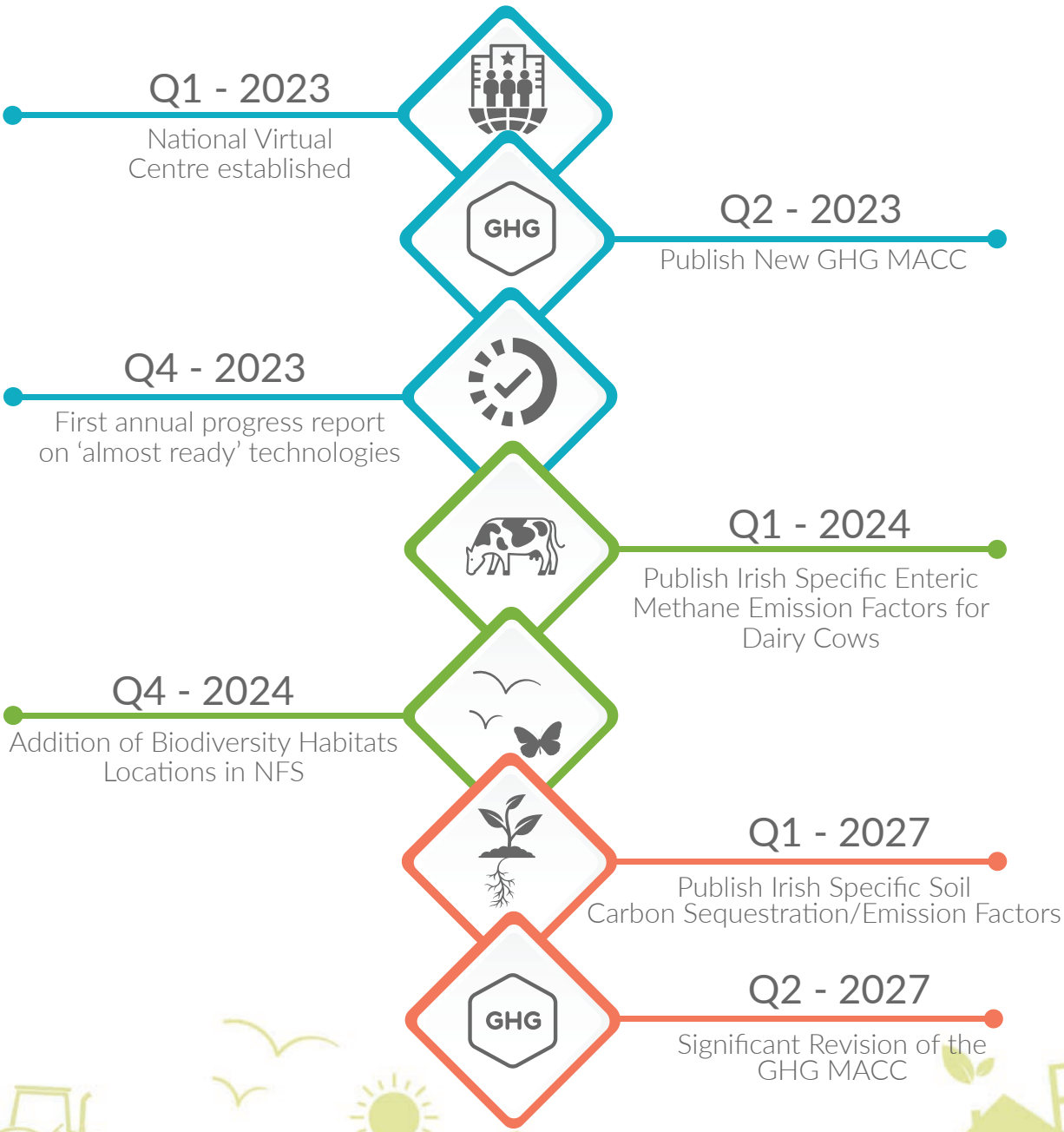
3. National Centre for Agri-Food Climate Research and Innovation

Teagasc is establishing a new virtual National Centre for Agri-Food Climate Research and Innovation to co-ordinate climate research and innovation and to accelerate efforts to bring "almost ready" and "early stage" technologies to deployment stage. This will facilitate the Irish agriculture sector to meet its commitments in reducing greenhouse gas emissions. Twenty four new scientific staff will join the virtual centre.

This National Centre will build on existing research infrastructure and human capital, working with national and international organisations and institutions to create an effective, trusted partnership. It will provide independent robust scientific and technological solutions to lead the agri-food sector towards climate-neutrality by 2050.

Additionally, it will strive to be a world class agri-food climate science centre that will enhance Ireland's reputation as a global leader in this area. It will also address Ireland's wider environmental objectives to improve water quality, reduce ammonia emissions and improve biodiversity.

Milestones for the National Centre for Agri-Food R&I to 2030



The Urgent Actions

The climate challenge requires a whole of sector co-ordinated response to move the industry forward. Teagasc, through its MACC curve, has set out how the agriculture and food system can evolve over the short and medium term to meet its climate obligations.

To support the need for early and decisive action at farm level, Teagasc plans to accelerate its research, advisory and education activity in the following areas:

Nitrogen - Immediate actions include:

Greater use of red and white clover in grazing systems, improved soil fertility/health, reduce crude protein in both bovine and pig diets, develop precision grazing technologies and fertiliser technologies.

Methane - Immediate actions include:

The generation of specific enteric methane emission factors for Irish grass-based systems; evaluation of feed additives and inhibitors; earlier slaughter of prime beef cattle; breeding lower enteric emitting animals; reducing methane emissions from slurry.

Carbon - Immediate actions include:

The generation of Irish specific emission factors related to soil type, land use and management; increased afforestation and the impact of afforestation on soil carbon fluxes, evaluate the influence of hedgerow and hedgerow management on soil carbon fluxes; increasing the use of cover crops in tillage; evaluate the influence of water table management/rewetting of organic soils on soil carbon emissions.

Biodiversity - Immediate actions include:

Enhancing biodiversity in all farming systems; include an assessment of biodiversity in the National Farm Survey; developing effective farm scale biodiversity indicators supported by use of digital technologies; improve the biodiversity management plans for High Nature Value farming and forestry systems.

Diversification - Immediate actions include:

Increased activity in organic farming, horticulture and forestry as well as anaerobic digestion for bio-methane production.

Adaptation - Immediate actions include:

The production and management of resilient grasses and forages for the future Irish grass-based production systems; new crops and cropping systems; new pest and weed control.

Circular Food System - Immediate actions include:

Reducing food waste, eco-friendly packaging and alternative protein sources.

Policy - Immediate actions include:

Regularly updating the MACC, in collaboration with the EPA providing science-based Irish specific emission factors in the national inventory, and contributing science based policy advice on climate change, agriculture and land use at a national and international level.

The Climate Challenge

Ireland has set out its commitment to reduce overall greenhouse gas (GHG) emissions by 51% by 2030 and achieve climate neutrality by 2050.

This meets Ireland's commitment to the Paris Agreement to keep temperature rise to 1.5°C and is in line with EU policy, and it is supported in law by the 2021 Climate Action and Low Carbon Development (Amendment) Act. The sectoral emissions targets set by Government in 2022 are outlined below in Table 1.

The target for "Agriculture" is a 25% reduction (5.75 Mt CO_2eq). The setting of a national target for "Land Use" has been deferred to allow new scientific knowledge emerge, but is expected to be within the 37%-58% range set out in the 2021 Climate Action Plan.

Table 1: Overall targets and trajectory for sectoral emissions reduction (Sectoral Emissions Ceililngs 2022 and NCAP 2021)

Sector	2018	2020
Ireland - all sectors	68 Mt CO_2eq	33 Mt CO_2eq (51% reduction)
Agriculture	23 Mt (35% of total) CO_2eq	17.25 Mt CO_2eq (25% reduction)
Land Use	4.8 Mt (7% of total) CO_2eq	2 – 3 Mt CO_2eq (37%-58% reduction)

Delivering the reduction in GHG emissions required to meet the new targets for Agriculture will require a significant transformation in Ireland's agriculture and food production system. Ensuring that Irish farmers and food producers are environmentally, socially and economically sustainable throughout the period of transformation and beyond will be critical.

Supporting farmers in this transformation of the Irish agri-food production system will require significant additional research, advisory and education resources and a whole of industry effort across the Agricultural Knowledge Innovation System (AKIS).

20 GreenFeed machines are being used to measure methane emissions from livestock. They also have the capability to measure hydrogen and CO_2 emissions.

The Road Map for Agriculture

Teagasc has set out opportunities to reduce GHG emissions in three phases (Figure 1). In Phase I, initial implementation of the technical measures in the current Marginal Abatement Cost Curve (MACC) for Agriculture, 2019 can bring the sector about one third of the way to the 2030 target, almost-ready technologies (Phase II) and early stage technologies (Phase III) are required for the remaining two thirds.

While the pathway shown below is linear, it is unlikely that this will be the case in reality as, for example, not all of the Phase I measures will be implemented on farm at an early stage, while some of the Phase II and Phase III measures may emerge more quickly or slowly than currently anticipated.

The updated Teagasc GHG MACC, to be published in 2023, will give a more accurate assessment of the scale and timeline of the mitigation options available to Irish agriculture. The National Climate Action Plan 2023 will provide clarity of policy actions that will support the decarbonisation of Irish agriculture, and it will be informed by the reports of the Food Vision Dairy and Food Vision Beef and Sheep Groups.

In addition, the science behind how methane contributes to global warming is constantly evolving. For example, changing the metric for assessing its contribution from the current GWP100 to GWP* would be very significant in the assessment of the impact of methane. GWP100, accounts for methane emissions evenly across a 100 year time-horizon, while GWP* reflects methane existence as a short-lived gas that causes warming for about a 12 year period. This means that using GWP* in a herd with stable methane emissions will show a much lower warming effect coming from livestock. While the concept of GWP* is discussed in the IPCC's AR6, it is not yet used in the international accounting system for greenhouse gas emissions.

Figure 1: Roadmap for Agriculture to 2030, Teagasc MACC, 2019

The Road Map for Land Use

The challenges and opportunities facing Agriculture and Land Use are intertwined. It is likely that future policy will be structured to optimise the combination of land and agricultural activities to shift agri-food production and land use towards climate neutrality.

There is a lot of uncertainty about sequestration by agricultural land and especially emissions from drained peat grasslands, as well as the future levels of afforestation. The National Agricultural Soil Carbon Observatory has been established to reduce this uncertainty. Also, the current effectiveness of drains in peat grasslands is unclear, but at this point, it is likely that some land use change (for example water table management/rewetting of some drained peat soils and increased biomass and woodland production using agricultural land) will be required. Forestry will play a crucial role in the journey to climate neutrality. The announcement of a new Forestry Programme with significant increased grants proposed is important.

Significant work will be required to understand and plan future optimal land use strategies.

Time for Action

The industry is now moving from the stage of setting targets and developing plans through the Food Vision Dairy and Beef and Sheep Groups, to implementation. The challenge for Teagasc is clear. New technologies will be required to reach the 25% reduction target, so research into promising new technologies must be accelerated.

THE TIME IS NOW

Farmers must be provided with additional direct advisory and education support to increase adoption of the technologies that are currently available and proven, and the new technologies that will emerge from ongoing research. This will need to be supported by informative decision support tools and reliable data sets.

Teagasc is a key actor in this space, and this strategy sets out how it will maximise the contribution of its research, advisory and education programmes to achieving the national targets. Actions will need to be delivered in a closely co-ordinated way with industry and government. Early action will be key to the delivery of the national targets as we move towards 2030.

The Opportunity

The vision for a new Sustainable Irish Food System, as set out in Food Vision 2030, provides the framework for the development of the sector over the next decade as it aims to balance economic, social and environmental sustainability under a holistic Food Systems approach.

Within the rural economy, agriculture and food production will continue to be the anchor point for rural based enterprise, producing high quality food, including organic food, with minimal impact on the environment.

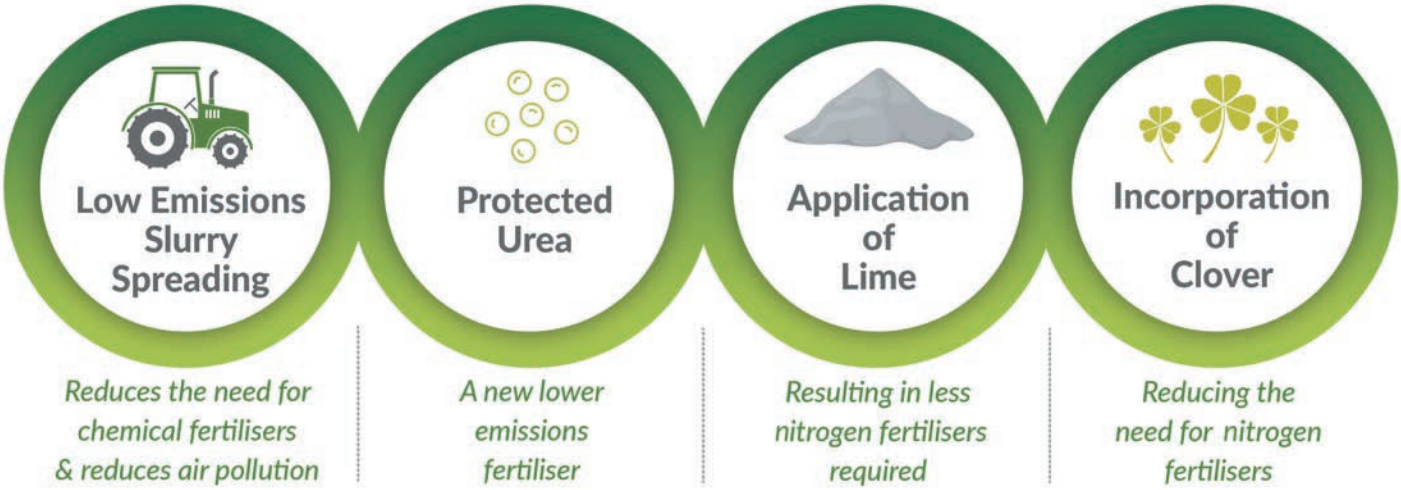
Alternative agricultural land uses will also emerge, as will markets for managing and storing carbon. Ireland's comparative advantage in the production of grass will continue to underpin the sustainable production of meat and dairy products, but will also supply feed stocks for the production of bioenergy and other new food and non-food products from the Irish circular bio-economy.

Farmers and Industry are taking Action

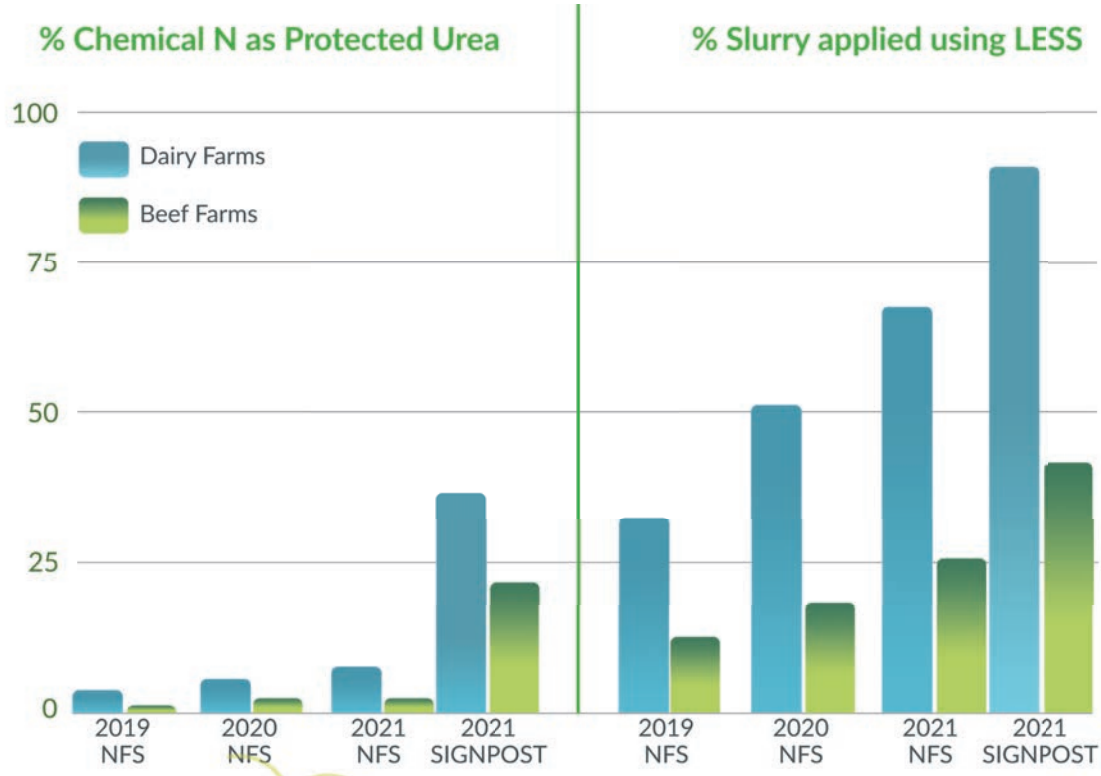
Farmers and industry stakeholders are committed to meeting the challenge of improving the environmental sustainability of Irish agriculture and reducing agricultural and land use GHG emissions, and are being guided and supported by Teagasc in the development of new climate friendly systems of farming and food production.

While overall 2021 agricultural GHG emissions are similar to 2018 emissions, there are encouraging signs in the Teagasc National Farm Survey Sustainability Report of increasing uptake of the technologies that will reduce emissions.

The report shows that more farmers are increasing their use of:



Adoption rates of these technologies are higher across the Signpost Demonstration Farms.



These findings illustrate the capacity for practice change and innovation by Irish farmers that will be central to the development of a Sustainable Irish Food System.

Keeping up the Good Work

Signpost Demonstration Farm Programme

The Teagasc Signpost Programme, Farmers for Climate Action, involves a national network of demonstration farms and provides the majority of Irish farmers with relevant, real world farms which are sustainably achieving GHG emission reductions.

120 Farmers

Signpost Demonstration Farmers

Demonstration farmers have been identified for all of the main farming enterprises, including dairy, suckler beef, dairy calf to beef, sheep, tillage, pigs and poultry.

The network of 120 demonstration farmers will play two critical roles:

- They will be amongst the first to adopt climate mitigation and adaptation technologies, supported by their Teagasc Advisors
- They will be central to farmer-to-farmer learning, sharing their experiences with other farmers through farm walks, events, articles, videos, media etc.

In addition, their success in reducing GHG emissions can help to build trust from the wider public in relation to the pathway towards the 2030 targets that the agriculture sector is on.

The Signpost Programme is currently supported by over sixty partner and supporting organisations, and provides a national anchor point for networking and training for the many actors across the Irish Agricultural Knowledge and Innovation System (AKIS).

Partners

consisting of farmers, industry, state bodies, farm organisations & media

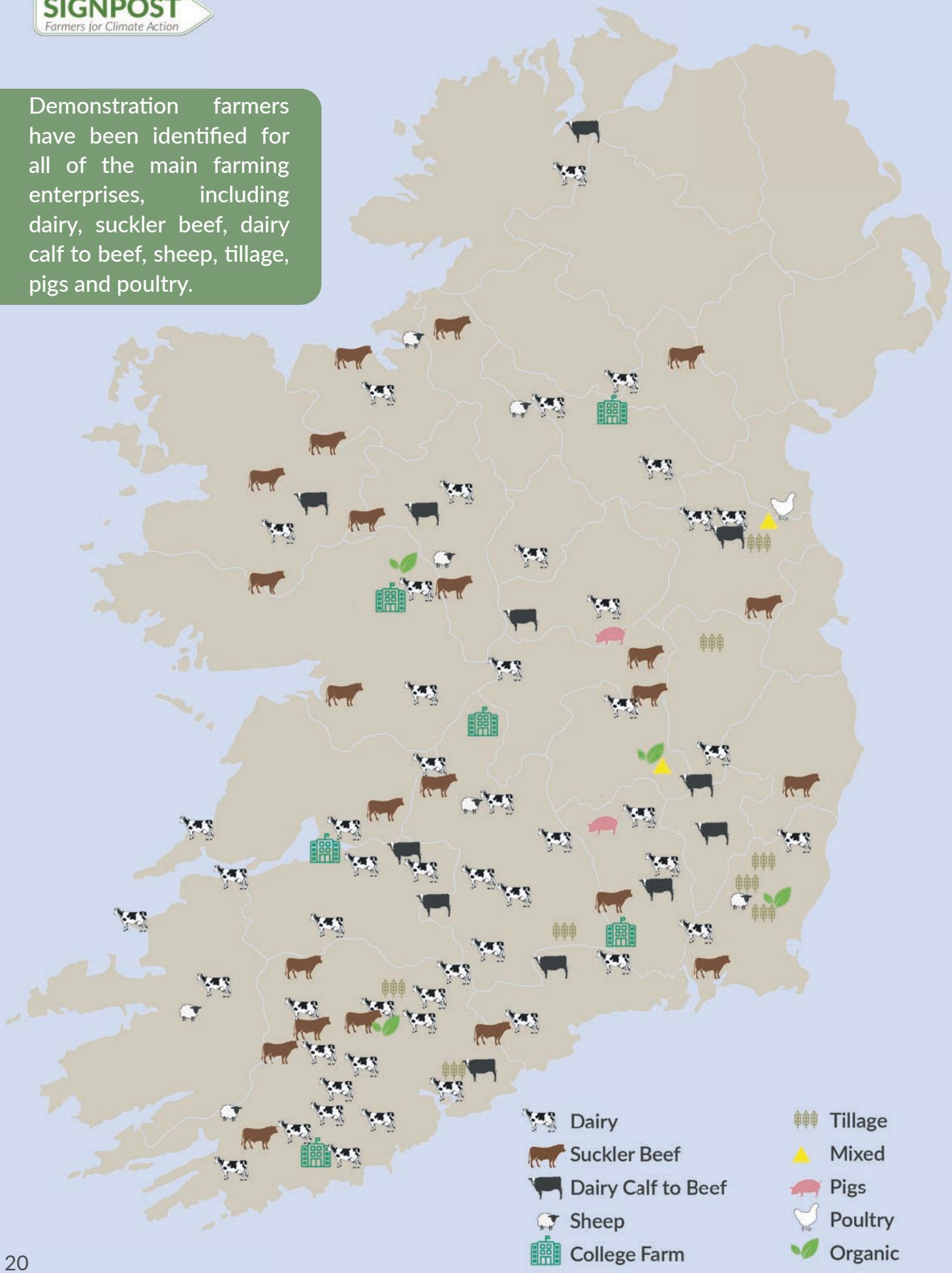
The Signpost Programme can act as a bridge between our knowledge creators (researchers), and the knowledge users (advisors, teachers, and farmers). Engagement with the Signpost Farmers can provide opportunities for the Signpost Team to translate research into practice, and bridge the gap between research and application.

A Rumen Simulation System (RUSITEC) is used in a laboratory to assess the methane reducing potential of feed additives such as oils, plant extracts, seaweeds, seaweed extracts and halides.

A key focus will be on ensuring the provision of consistent information and advice to farmers. This is extremely important in ensuring early adoption of new climate friendly technologies such as new fertilisers and feed additives.

Signpost Demonstration Farm Locations

Demonstration farmers have been identified for all of the main farming enterprises, including dairy, suckler beef, dairy calf to beef, sheep, tillage, pigs and poultry.



SIGNPOST
Farmers for Climate Action

The Signpost Programme is a collaborative partnership of farmers, industry and state agencies, working together for climate action.

Partners

Teagasc Agriculture and Food Development Authority
abp
Acorn Independent Merchant Group
Arrabawn Together we grow
Ashbourne Meat Processors Est. 1985
APHA
Aurivo
Bandon co-op
Barryroe Co-operative Limited
Belview Eggs
Callan Co-op
Carbery
Centenary Thurles Co-operative Society Ltd
Corteva agriscience
dairygold
Dawn Meats
Diageo
Drinagh
Drombane Feeds
Drummonds Feed, Seeds & Grain Merchants
Euro Farm Foods Beef Processors
Federation of Agrochemical Retail Merchants FARM
Foyle Food Group
glanbia ireland
Heineken
Irish Distillers Pernod Ricard
Irish Farmers Journal
Kepak
Kerry
Kildare Chilling
Lakeland Dairies
Liffey Mills
Lisavaird Co-op
Liffey Meats
Moy Valley Meats
MSD Animal Health
Munster Bovine Collectively Improving Farm Life
North Cork Creameries
Slaney Foods
Tullamore D.E.W. Irish Whiskey
Tipperary Cooperative
volac

Government, State Agencies and Sponsors

An Roinn Talmhaíochta, Bia agus Mara Department of Agriculture, Food and the Marine
Bord Bia Irish Food Board
AIB
Bank of Ireland
Devenish
ahi Animal Health Ireland
icbf
National Dairy Council
Irish Examiner Farming
Farming Independent
IFM

Supporters

ICMSA
ICSA Irish Cattle and Sheep Farmers' Association
icos Irish Cooperative Organisation Society
IFA
Irish Grain Growers
Irish Natura & Hill Farmers Association
macra Your club, your people
Dairy Sustainability Ireland
Dairy Industry Ireland Ibec
Drinks Ireland Ibec
Meat Industry Ireland Ibec
Tillage Industry Ireland

Strong collaboration with key stakeholders in the agri-food sector will be crucial to the success of the Teagasc Climate Action Strategy.

Collaboration

Teagasc collaborates with a diverse range of stakeholders nationally, including farmers, milk and meat processors, government departments and agencies, higher education institutes, agricultural consultants (ACA) and relevant Science Foundation Ireland (SFI) and Enterprise Ireland (EI) funded centres such as VistaMilk, Meat Technology Ireland, BiOrbic and APC Microbiome Ireland.

Internationally, Teagasc will build on the already strong collaboration in place as part of Horizon 2020/ Horizon Europe funded projects with organisations such INRAE (FR), WUR (NL), Aarhus University (DK), ILVO (BE), IDELE (FR), LUKE (FI) and AFBI (NI).

All of these organisations share Teagasc's commitment to addressing the current climate change challenge. Teagasc has a long history of collaboration with international partners and continues to increase its efforts to collaborate with similar institutions in developing countries around climate action and food security to support the work of DAFM and DFA.

Hedgerows enhance biodiversity in all farming systems. Effective farm scale biodiversity indicators are being developed.

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Agriculture and Food Development Authority