TEAGASC CLIMATE CENTRE

Teagasc Climate Centre Strategic Research and Innovation Agenda

Teagasc
Agriculture and Food Development Authority

Contents

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Executive summary

The Irish agriculture and land-use sectors face significant challenges to reduce greenhouse gas (GHG) emissions, enhance carbon sinks and halt and reverse biodiversity decline as highlighted in the 2024 Climate Action Plan[1], the Nature Restoration Law[2] and the Food Vision 2030 strategy[3].

The creation of the virtual Teagasc Climate Centre will greatly facilitate the Irish agriculture and land-use sectors in meeting these challenges. The Climate Centre builds and expands on the existing research infrastructure and human capital across the organisation, working with national and international organisations and institutions to create an effective, trusted partnership.

The Climate Centre provides independent robust science and technological solutions to deliver a climate-neutral and biodiversity rich agri-food sector by 2050. Additionally, the Centre strives to be a world class National Centre for Agri-food Climate and Biodiversity Research that enhances Ireland's reputation as a global leader in this area.

The Centre will also address Ireland's wider environmental objectives to reduce ammonia emissions, improve water quality and soil health. The Climate Centre has expanded and integrated Teagasc's research capacity across six pillars: reduce methane emissions, reduce nitrogen emissions, increase carbon capture, enhance biodiversity, increase diversification and enhance adaptation, and has three cross cutting themes: circular food systems, supporting policy and the Signpost Programme.

The Research Pillars encompass the focus areas of the Signpost Programme, which provides Knowledge Transfer to increase adoption of mitigation measures at farm level.

The Centre has six key objectives:

1 **Produce high quality research and innovation in the area of climate change and biodiversity to support the Irish agriculture sector to meet its commitments**

2 **Provide a central independent focal point in Ireland for the co-ordination and dissemination of agricultural climate change research and innovation**

3 **Inform policy makers, advisors, industry and farmers about existing and emerging technologies, which are underpinned by robust science, that facilitate greater responsiveness to a changing climate**

4 **Enhance Ireland's international reputation as a leader in sustainable agriculture research and innovation**

5 **Collaborate with national and international institutes in the area of climate change and biodiversity research and innovation**

6 **Build research infrastructure and human capital that will support the agricultural sector meet the national climate and biodiversity commitments.**

Through collaboration and investment in research infrastructure, the Centre will help Ireland meet its national climate and biodiversity commitments.

1 2024 Climate Action Plan
2 EU Nature Restoration Law
3 Food Vision 2030

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TEAGASC CLIMATE CENTRE

Introduction

Challenges facing the Irish agri-food sector

The greatest challenge facing the world today is addressing the looming climate and biodiversity crises, while also achieving food security for a growing population.

Each of the last four decades has been warmer than any previous decade since 1850 and the last two decades have included 18 of the warmest years on record. Climate models indicate that without urgent action, global warming is likely to be more than 2°C above pre-industrial levels by 2060, and could even be as much as 5°C above pre-industrial levels by the end of the century. The world population is projected to increase to 9.7 billion people by 2050; the impact of climate change will increasingly put pressure on food security over the next few decades.

There are over 130,000 farmers in Ireland and the sector directly employs over 170,000 people and accounts for 6.4% of national employment. The agri-food sector is one of Ireland's largest industries with exports worth €18.1 billion in 2023 (DAFM, 2024)[4] and over 90% of Irish beef, sheep meat, and dairy products are exported annually. The Irish agriculture and land-use sector faces considerable challenges to significantly reduce GHG emissions and enhance carbon sinks by 2030 and to achieve climate neutrality by 2050.

Teagasc views sustainability as consisting of economic, social and environmental dimensions, and strives to improve the sustainability of Irish agriculture in a holistic manner, across these three dimensions.

The development of agriculture over many centuries in Ireland has greatly influenced the Irish landscape and biodiversity. Much of the appearance, character and biodiversity of the landscape, is a result of farming activities and the interactions between these activities and the environment.

A synergistic relationship between biodiversity and agriculture is possible. In recent decades, however, intensification and expansion of agricultural practices have been reported to contribute to the loss of biodiversity in Ireland and worldwide. In 2019, the Irish government declared a "National Climate and Biodiversity Emergency" highlighting that these two elements are intrinsically linked.

Multiple agricultural and environmental policies now recognise this threat and have identified halting and reversing biodiversity decline as a key objective. The EU highlighted the need for urgent action to ensure biodiversity in Europe will be on a path to recovery by 2030. Some of the actions identified are enshrined in EU policies and EU laws:

- 10% of farmland area is to be targeted for high diversity features (EU Farm to Fork Strategy[5]);
- 30% of designated habitats and species will reach favourable conservation status and restoration of 90% of designated areas in need of restoration by 2050 (EU Nature Restoration Law[2]).

Additionally, national and international policies (e.g. Climate Action Plan, Water Framework Directive, Nitrates Action Plan, and Common Agricultural Policy Strategic Plans) recognise the critical role of biodiversity in nature-based solutions, delivering multiple ecosystem services (including carbon storage/ sequestration, water quality, flood mitigation etc).

2 EU Nature Restoration Law
4 Annual Review and Outlook for Agriculture, Food and the Marine 2024
5 EU Farm to Fork Strategy

These challenges provide opportunities for Irish agriculture to lead the way in creating innovative solutions that reduce GHG emissions, enhance biodiversity, and make Irish farms more viable, resilient and sustainable. The Teagasc Climate Action Strategy, launched in December 2022, provides a road map towards achieving Irish agriculture's sectoral targets, without impacting on the competitiveness of the Irish agri-food sector. The Climate Action Strategy has three pillars:

1. AgNav: Digital Sustainability Platform
2. The Signpost Advisory Programme
3. The Teagasc Climate Centre

AgNav is a new digital platform that generates a robust whole farm sustainability assessment including "counting" of carbon emissions and removals. The Signpost Advisory Programme provides enhanced advisory and training for farmers to select and implement climate and sustainability actions that are appropriate and impactful on their farms, and is supported by AgNav and a network of Signpost demonstration farms. These initiatives allow each individual farmer to quantify and understand their current baseline carbon emissions and sequestration profile, and prioritise actions to reduce emissions and enhance removals. The Teagasc Climate Centre will accelerate the development of new technologies by coordinating and accelerating research and innovation programme across Teagasc, as well with other institutes, both national and internationally.

Climate Centre Scope and Structure

The Climate Centre Mission is to advance climate and biodiversity solutions and deploy cutting-edge technologies to lead a thriving agriculture sector towards biodiverse and climate-neutral farming by 2050 while while supporting economic, social and environmental sustainability.

The Climate Centre integrates and expands capabilities, knowledge and expertise from both within Teagasc (Research, Education and Advisory) and from other national and international research organisations. The Centre will increase the efficient use of resources, reduce operating costs and allow greater collaboration both within and outside of Teagasc. The Centre's function, through its own leadership and support structure, is to develop, co-ordinate and disseminate research and innovations related to climate and biodiversity. The Centre will be a globally recognised leader, serving as a key resource for policy makers and stakeholders, and a central hub for both national and international collaboration. The Centre's resources have been greatly enhanced through the appointment of 25 new scientists and the building of the new National Agricultural Sustainability Research and Innovation Centre at Teagasc Johnstown Castle Research Centre.

The Climate Centre's research is built around six core pillars:

1. Reducing Methane Emissions
2. Reducing Nitrogen Emissions
3. Increasing Carbon Capture
4. Enhance Biodiversity
5. Increase Diversification
6. Enhance Adaptation

These pillars are supported by three cross-cutting themes that integrate across all areas:

7. Circular Food Systems
8. Supporting Policy
9. Signpost Programme.

Climate Centre Research Infrastructure

The Climate Centre is supported by critical physical research infrastructure. A wide range of research facilities are available from farm systems to pilot scale studies and are supported by a wide range of analytical laboratories across Teagasc.

The Climate Centre research facilities include:

1. **The new National Agricultural Sustainability Research and Innovation Centre** which houses the environmental research laboratories.
2. **Methane**: a large number of Green Feeds to quantify enteric methane across the dairy, beef and sheep programmes. Respiration chambers will be commissioned in the new Centre for Sustainable Animal and Grassland Research.
3. **Manure methane:** a farm scale pilot biogas anaerobic digester and pilot manure storage facility.
4. **Carbon:** The National Agricultural Soil Carbon Observatory (28 carbon towers across Ireland, the densest network in the EU) to quantify soil carbon sequestration and emissions.
5. **Nitrogen:** the National Soil Greenhouse Gas Test Platform for the quantification of nitrous oxide and ammonia.
6. **The National Farm Survey and sustainability assessment** for the ongoing assessment of sustainability across Irish farm enterprises.
7. **Bioprocess Innovation Suite** for bioprocess development, optimisation and scale up to support circular bioeconomy research.
8. **Teagasc Sequencing Centre:** a wide range of DNA sequencing platforms including Ion Proton, Ion PGM, Illumina MiSeq, Illumina NextSeq and Oxford Nanopore MinION, to sequence the microbiome from a range of environments including food, gut and soil.

Core Pillars and Cross-Cutting Themes

- Reducing Methane Emissions
- Enhance Biodiversity
- Reducing Nitrogen Emissions
- Increase Diversification
- Increasing Carbon Capture
- Enhance Adaptation

- Circular Food Systems
- Supporting Policy
- Signpost Programme

Reduce Methane Emissions

Methane (CH_4) is a by-product of digestion in all ruminant species. It is produced by members of the rumen microbiome called methanogens during digestion of plant fibres in the rumen ("enteric methane"). Methane is also released from animal manure stored in tanks. In 2022, enteric CH_4 and manure CH_4 accounted for 65% and 9.3% of Irish agricultural GHG emissions, respectively (EPA, 2024)[6]. Globally, CH_4 is the second most important greenhouse gas with a global warming potential 28 times greater than carbon dioxide (CO_2) and a lifespan of approximately 12 years.

Priority Research Questions

- What are the emission factors and drivers of enteric methane emissions from dairy, beef and sheep under Irish pastoral conditions?
- What is the impact of genetics, feed additives and supplements, grazing management and novel measures on enteric methane output?
- How do management practices to reduce the age of finishing of prime beef cattle impact on enteric methane emissions and meat quality?
- How can manure management/processing strategies and manure additives reduce manure methane emissions?
- Can the rumen microbiome be manipulated to reduce enteric methane emissions?

Anticipated Research Outcomes

- Refined national methane emission factors to reduce inventory uncertainty.
- Enhancing national ruminant breeding indexes to improve efficiency, reduce emissions, and assess the potential for directly breeding livestock with lower methane emissions.
- Development of measures to improve live weights on farm, in turn supporting reduced age of finishing to reduce methane emissions.
- Development of grassland/grazing management systems to reduce methane emissions.
- Quantification of the methane reduction efficacy of feed additives and supplements and novel measures in animals managed under grassland systems.
- Enhancement of manure management technologies, including manure additives, to reduce methane emissions from manure storage.

6 Ireland's National Inventory Report 2024

Reduce Nitrogen Emissions

Nitrogen (N) fertiliser is a key nutrient that drives agricultural production. Some nitrogen in fertiliser is lost to the environment directly as a greenhouse gas in the form of nitrous oxide (N_2O). Indirect sources of N_2O also come from nitrate (NO_3) leaching and ammonia (NH_3) volatilisation. N_2O is a powerful GHG with a global warming potential 265 times greater than carbon dioxide (CO_2) and has a lifespan of 100 years. In 2022, N_2O accounted for 22% of agricultural GHG emissions in Ireland (EPA, 2024)[6].

Priority Research Questions

- Can precision N application, novel fertilisers and grazing management strategies reduce N_2O emissions and increase N use efficiency?
- What is the effect of soil type, land-use, management practice, sward type and weather on N_2O emissions?
- What is the interaction between soil nutrient status (i.e. soil index) and soil pH on N_2O emissions and N use efficiency?
- What is the impact of feeding diets with less crude protein in bovine and pig production systems on N use efficiency and N_2O emissions?
- What is the genetic variability in N use efficiency in grazing livestock and its impact on N_2O emissions?

Anticipated Research Outcomes

- Establishment of low nitrogen farming systems.
- Refinement of N_2O emission factors for fertiliser and a range of excreta across a range of soil types and land use/management systems.
- Refinement of NH_3 emission factors for housing and manure storage and mitigation options to reduce emissions.
- Improved data collection relating to N fertiliser use, excretion, manure storage and land-spreading.
- Development of a Tier 3 model for quantification of N_2O emissions and nitrate leaching across a range of soil types, land-uses and management practices.

6 Ireland's National Inventory Report 2024

Increase Carbon Capture

Carbon dioxide (CO_2) is the most important GHG in the Earth's atmosphere. Global atmospheric CO_2 concentrations reached 422 parts per million (ppm) in 2024 and have been increasing at an average rate of 2.3 ppm per year since 2009. Currently it is estimated that approximately two-thirds of the total increase in atmospheric CO_2 is derived from fossil fuel combustion. The majority of the remaining one third is due to land-use change - conversion of natural vegetation to managed land - and a small amount is due to the use of lime on agricultural soils. In 2022, agricultural CO_2 accounted for 3.3% of Irish agricultural GHG emissions. The LULUCF sector is a net source of 3.98 $MTCO_2e$. Wetlands were the largest source of 3.8 $MTCO_2$, followed by emissions from agricultural grasslands of 2.48 $MTCO_2e$, while forestry was a sink of 2.44 $MTCO_2e$ (EPA, 2024)[6].

Priority Research Questions

- What are the baseline carbon emissions and sequestration fluxes from mineral, organo-mineral and peat soils?
- What is the impact of forestry and forestry management on biomass and soil carbon fluxes?
- What is the impact of grassland, tillage and on farm tree management practices on farm carbon fluxes and balances?
- How does water table management influence soil carbon emissions from agricultural and rough-grazed peat soils?
- What are the best agricultural and LULUCF models to quantify carbon fluxes and sequestration for inventory development and to support carbon farming?

Anticipated Research Outcomes

- Establishment of baseline carbon emission and sequestration fluxes from agricultural soils.
- Development of models that allow carbon sequestration to be measured/estimated at a field/farm level across Ireland.
- Improved mapping of soil types, land management, land-use, peat soil areas and improve activity data for soil emissions and sequestration.
- Inclusion of carbon sequestration and carbon emission from soils in AgNav to support carbon farming.
- Reduced inventory uncertainty through refined national CO_2 emission factors associated with lime and fertilisers.

6 Ireland's National Inventory Report 2024

Enhance Biodiversity

Halting and reversing the decline in biodiversity is a key objective across multiple agricultural and environmental policies. Market reputation for sustainability of agri- food products will become increasingly reliant on achieving sufficient progress towards improving biodiversity. This pillar focuses on identifying strategies to halt the decline in farmland biodiversity, identification and evaluation of measures to enhance farmland biodiversity and the delivery of multiple ecosystem services. Biodiversity plays a critical complementary role in nature-based solutions for a diverse range of topics including climate, water, carbon management and flood mitigation. Research is needed to improve the quantification of habitat quantity and quality across agricultural systems and to provide baselines for future assessment of biodiversity trends in non-designated areas.

Priority Research Questions

- How can KPIs and digital tools be used to aid farm-scale assessments of biodiversity that include farmland wildlife?
- How can the environmental effectiveness and economic efficiency of management plans for High Nature Value farming and forestry systems (including upland areas) be improved?
- What is the relationship between habitat diversity and quality and ecosystem function within agricultural systems?
- What measures can improve biodiversity within existing low nature value forests?
- What are the best indicators to evaluate the current biological health of Irish soils?

Anticipated Research Outcomes

- Enhanced biodiversity in agricultural systems across a gradient of intensities and enterprises.
- Biodiversity assessments included in the National Farm Survey to give representative information on quantity and quality of farmland habitats over time.
- Establishment of a national soil biodiversity baseline and soil health indicators to support the implementation of the EU Soil Health Regulation.
- New digital technologies developed to assess the quantity and quality of biodiversity at farm level.

Increase Diversification

Diversification aims to develop alternative land uses and rural businesses that offer viable economic returns that have lower emissions than traditional ruminant-based agricultural systems. Research is needed to support the implementation of the national Bioeconomy Action Plan 2023-2025[7] and support the EU Bioeconomy strategy[8]. Opportunities include organic farming, which is a lower input and intensity system with the potential for increased product prices with potential across all sectors of agriculture. Alternative non-ruminant enterprises include horticulture which can generate high revenues from a relatively small land base, or tillage and forestry which have lower revenues per unit area but the potential to utilise a larger land base. There are also a number of alternative markets that could be exploited by a range of existing farm enterprises such as bio-methane or industrial feedstock production. Increasing the national forestry cover through the implementation of the Forestry Programme is needed to both offset GHG emissions, store carbon and support the timber sector[9].

Priority Research Questions

- What are the opportunities for Irish farming arising from the circular bioeconomy?
- How can bioenergy and energy diversification be incorporated at farm level?
- What is the role of horticulture in diversification of food systems and how can output values be increased?
- How can technologies such as manure processing, biosolids, biorefining, biomethane, alternative crops and integrated farm systems be used to increase circularity in agri-food systems?
- How can forest systems be adapted to improve adoption and be resilient to future climate change?

Anticipated Research Outcomes

- Increased organic farming systems.
- Growth in the annual rate of afforestation.
- Improved technologies for sustainable bio-methane production by anaerobic digestion of slurry and grass.
- Increased land devoted to tillage crops and alternative proteins and opportunities for horticulture identified and promoted.
- Development of valorisation pathways for food waste streams for food and feed production.

7 National Bioeconomy Action Plan
8 EU Bioeconomy Strategy
9 Forestry Programme 2023-2027 (Department of Agriculture, Food and the Marine, 2023)

Enhance Adaptation

Over the past decade national focus has been on the mitigation of greenhouse gas emissions rather than adaption to the impact of climate change. The National Adaptation Framework (NAF)[10] outlines a whole of government and society approach to climate adaptation in Ireland. Climate change will increasingly impact on agricultural production primarily due to projected increased rainfall in spring and autumn impacting and reduced rainfall in the summer. Wet spring and autumn periods can result in poor trafficability impacting on grazing of grasslands, sowing and harvesting of crops. Droughts in summer due to reduced rainfall can reduce the yield of grassland and crops, leading to feed shortages for animals and increasing the potential for pest and diseases outbreaks. There is a growing need to adapt our agricultural systems to increase the resilience of the Irish agriculture and food sector to the impact of climate change. We will also need to consider adaptation of our systems in light of the impact of climate change on global food production and security.

Priority Research Questions

- How will climate change impact the sustainability of Irish crop and grass-based production systems?
- What novel or existing systems and management practices are more resilient to the effects of predicted climate change?
- Will individual or successional weather events lead to system tipping points and if so, how are Irish agricultural systems prepared?
- What traits and markers can be identified for crops, grass, clover and mixed species forages for increased climate, disease and pest resistance?
- How will the prevalence and characteristics of pests and disease change with climate change?

Anticipated Research Outcomes

- Identify climate adapted crop and forage varieties suitable for future Irish climate conditions.
- Development of NFS production models to assess the effect of climate change on farm profitability.
- Identify changes required to improve economic and environmental sustainability under a range of climate scenarios.
- International collaborations with regions of similar climate and compare modelling data with Irish drought and rainfall simulations.
- Early measures developed for Irish agricultural systems in preparation for extreme weather events.

10 National Adaptation Framework


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Buckwhea

Circular Food System

A circular food system approach, as outlined in the National Bioeconomy Plan, Food Vision 2030 and the EU's Bioeconomy Strategy, encompasses primary production, food processing, packaging and shelf life to ensure a safe, healthy and sustainable food supply. The global demand for food is expected to continue to grow with an increasing global population, stimulating new approaches to produce food sustainably with reduced environmental impact. Diversification is a crucial component of innovation in this area, and plant-based alternatives fall into this category, including manufacturing new ingredients and upcycling by-product streams. This is in addition to optimising existing animal-based production and processing systems while maintaining the highest quality and safety standards. This theme focuses on generating safe and nutritious foods through diversification, valorisation, and the promotion of circular use of food resources by reducing waste and improving nutrition with reduced environmental impact.

Priority Research Questions

- What is the role of plant and marine-based protein in future foods and ingredients?
- What are the safety, quality and nutritional standards of "climate-friendly" foods and packaging?
- How can fermentation, bioprocessing and separation techniques be applied to reduce food waste, maximise food resources and build a sustainable circular food system?
- How can the nutritional and energy densities of foods be compared to the environmental impact of their production, including nutritional, water and energy inputs?
- What are the impacts of GHG mitigation technologies on food quality and food safety?

Anticipated Research Outcomes

- Valorisation of plant and marine resources to formulate plant-based and hybrid food products.
- Reduction of food waste by developing by-product stream conversion tools through biotransformation.
- New methods in sustainable food processing: fermentation, up-cycling, valorisation and fractionation of food resources, as well as optimisation of production efficiency.
- Development of a microbial biobank for sustainable production and processing, supported by bioinformatics, sequencing and metabolite profiling.
- Development of nutritional profiles of foods per environmental footprint.
- Evaluation of eco-friendly, recyclable, compostable or biodegradable packaging.

Supporting Policy

Teagasc has contributed significantly to the policy debate on mitigation strategies for GHG emissions, mainly through the development of the Marginal Abatement Cost Curve (MACC)[11]. Teagasc has, under the terms of an MOU with the EPA, provided the EPA inventory team with medium term projections of agricultural activity on an annual basis. Teagasc will continue to provide these projections as currently agreed. Climate research has also contributed to inventory improvement through quantification of emission factors and improved activity data collection. Teagasc will provide analysis of the impact of agricultural and environmental policy on agricultural activity levels and these will continue to underpin future MACC assessments developed to reflect innovations in technology and farm practices. The pillar will also provide independent scientific support for biodiversity policy development.

Priority Research Questions

- What will future projection models of agricultural activity look like?
- How can integrated digital tools support decision making in sustainable farming?
- What are the metrics associated with climate change and biodiversity assessment and how are they being developed and integrated?
- How can integrated land-use and agriculture model(s) facilitate the analysis of scenarios to enhance biodiversity and achieve climate neutrality 2050?
- Can the national GHG inventory be further refined to include new mitigation measures and Irish specific data?

Anticipated Research Outcomes

- Support policy through further Marginal Abatement Cost Curve development to reflect new technology discovery.
- Development of life cycle assessment models for all farming enterprises.
- Development of tools for the assessment and monitoring of biodiversity on farms.
- Improved national GHG inventory.
- Improved projections of future agricultural activity.

11 Marginal Abatement Cost Curve (Teagasc, 2023)

Signpost Programme

The Signpost Programme is a multi-annual, knowledge transfer campaign to lead climate action by all Irish farmers. It will achieve this through its leadership of the network of Signpost Farmers and the Signpost Advisory Programme, including the nurturing of effective collaborations with industry partners. The Programme will also support the development and testing of AgNav (the digital sustainability toolkit), climate and biodiversity education development with Teagasc education colleagues, and, in the future, the development of an advisory strategy for carbon farming. It will facilitate communications between the Centre and Teagasc advisors and teachers, and the wider AKIS, including the clear and consistent communication of how climate mitigation and adaptation actions can reduce GHG emissions and increase the sustainability of Irish farming. Finally, it will act as a conduit for feedback to the Centre from advisors, AKIS actors and farmers.

Priority Research Questions

- What are the research proven climate mitigation and climate adaptation practices for use on Irish farms?
- How can research-proven climate and biodiversity solutions be integrated at farm level?
- What are the barriers to the uptake of climate and biodiversity solutions on farm?
- How can a co-creation/ Living Labs approach between the Climate Centre, farmers and relevant AKIS actors support practice adoption and innovation at farm level?
- How can the research to practice gap be bridged? Specifically, how can researchers and specialists collaborate to build advisor and teacher capacity to influence farmers and students?

Anticipated Research Outcomes

- A current, prioritised and research proven list of climate mitigation and adaptation measures for Irish farms.
- Integration and demonstration of new technologies to reduce GHG emissions, build resilience and enhance biodiversity on farm.
- Identification of solutions, incentives and advisory messages and approaches to reduce barriers and accelerate uptake.
- Shared experiences of the Signpost demonstration farmers through various communication channels, thereby increasing the uptake of research-proven climate solutions by all farmers.
- Capacity building of advisors, eachers and wider AKIS, to enable enhanced climate action support for farmers and students.

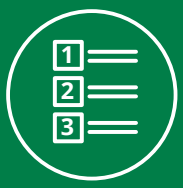
Collaboration

Teagasc has a strong record of collaboration with research organisations and Higher Education Institutes in Ireland, Europe and globally. Much of this collaboration is driven by Walsh Scholars and competitively funded research projects. In Ireland, the majority of research into future climate change impacts is divided between MU, UCC, UCD and TCD and Teagasc has active collaborations with all of these organisations.

At the European level, since 2018, Teagasc has collaborated with 902 organisations across 52 countries as part of Horizon 2020/Horizon Europe funded projects. The organisations with the greatest number of collaborations are INRAE (FR), WUR (NL), Aarhus University (DK), ILVO (BE), IDELE (FR) and LUKE (FI). All of these organisations share Teagasc's commitment to addressing the current climate change challenge and we expect that they will be active collaborators with the Climate Centre.

In addition, Teagasc has a long history of collaboration with partners in New Zealand. In recent years, much of this has been funded by both Teagasc and DAFM through a multi-lateral initiative on GHG monitoring and mitigation (FACCE ERA-GAS). The Climate Centre will deepen collaborative linkages with key national and international research organisations.

Delivery of the SRIA



Strategic Research Priorities: The Centre has precisely identified and prioritised thematic research gaps across its core pillars. These priorities will shape internal Teagasc research funding for new projects and Walsh Scholarships. The Centre will foster interdisciplinary collaboration with universities, research institutions, and industry partners to tackle complex and interconnected climate and biodiversity challenges. The Centre will seek to secure sustainable funding from diverse sources such as government grants, private investments and international research funds to support the Centre's long-term research and innovation activities.

Stakeholder engagement: The Centre will engage directly with farmers, agribusinesses, and industry groups to ensure that research is practical and meets the needs of end-users. The Signpost Programme will be central to the delivery of training, advice and knowledge sharing and will support farmers and stakeholders in developing farm specific climate plans for implementing climate-smart solutions. The formation of public-private partnerships with the agri-food sector will promote the co-development and commercialisation of climate-smart technologies and practices.

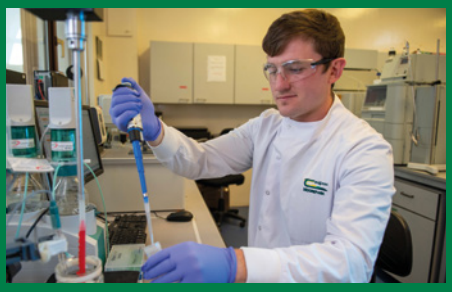
Informing Policy: The Centre will establish clear communication channels with policymakers to ensure that its research informs and shapes biodiversity and climate-related policies, regulations and incentives. This will include membership of Climate Centre researchers in national and international policy and stakeholder working groups.

Communication: The Centre will use various channels (e.g. reports, webinars, social media, podcasts, advisory notes, newsletters) to share peer reviewed published research findings, policy reports, success stories and best practices with both national/international agricultural stakeholders and the general public. The Centre will function as a hub for climate and biodiversity research, supporting capacity building of advisors and other AKIS actors.

Evaluation: Monitoring, Evaluation, and Impact Assessment of the Climate Centre will be used to assess the impact of research and innovation activities on the climate and biodiversity goals. The Centre will regularly report on progress towards strategic goals, ensuring transparency and accountability in the Centre's activities.

How will the Climate Centre deliver impact?

The Teagasc Climate Centre will deliver impact using a multifaceted approach that integrates research excellence, stakeholder engagement and practical implementation. These will enable the Teagasc Climate Centre to effectively translate its research into tangible impacts, fostering sustainable agricultural practices and contributing significantly to climate change mitigation and adaptation efforts.



Research Excellence: The Centre focuses on the development and testing of innovative technologies, solutions and practices that have practical application on Irish farms, underpinned by robust science. Project collaborations with national and international partners will increase the expertise, resources and breadth of the research programme. Scientific outputs will include peer-reviewed publications, contributions to national and international reports and hosting of scientific conferences.

Engaged Stakeholders: A co-design approach with farmers, agribusiness and industry stakeholders will ensure that research priorities will continue to align with stakeholder needs. In collaboration with the Signpost Programme, the Centre will support the on-farm adoption of innovative climate and biodiversity smart practices. Commercialisation and licensing of smart technologies will ensure they reach the market and benefit end-users.

Influencing Policy: Research findings will be translated into actionable measures to contribute to the development of policy and incentives to achieve climate and biodiversity goals at national and international levels. Robust scientific evidence will contribute to national inventory refinement and mitigation measures, thereby bridging the gap between scientific innovation and practical application.

Enhanced Reputation: Research excellence, combined with effective communication and engagement strategies, will enhance Ireland's reputation as a global leader in sustainable agriculture and food systems. Impacts will include the recruitment of talent and the development of international connections.

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