



DAVY

Supporting Ireland's Sustainable Food & Farming Transition



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davy.ie/horizons



Foreword

Ireland has started the transition to a green economy. Bank of Ireland Group plays a key role in supporting a green and just transition that is fair and brings business along on the journey. We recognise the scale of the challenge and the important role banks play given their position in the economy.

We understand the complexity involved for all sectors of the economy to transition, in particular those subject to reduction targets under Ireland's Climate Action Plan like agriculture. This publication focuses on **sustainable food and farming** to support our

customers, from farmers, agri-business and retailers, plc to SME, across the food value chain to navigate this transition. Its aim is to support awareness raising on the challenges, opportunities, solutions, and investment needed for the sustainable food and farming transition underway. Practical case examples demonstrate how farmers and businesses are already putting sustainability into practice and how Bank of Ireland can provide support.

→ For further information on Bank of Ireland's Responsible and Sustainable Business programme <https://businessbanking.bankofireland.com/credit/business-loans/growth-and-sustainability-loan-scheme-gsls/>

About Davy Horizons

Davy Horizons is the sustainability consultancy within Davy Group, offering world-class expertise in sustainability services across strategy, implementation, policy and reporting. They work with business, government, and not-for-profits across all sectors of the economy and are subject matter experts across Environmental, Social and Governance (ESG) issues. Operating as a trusted adviser the team support organisations to implement bespoke sustainability solutions to drive long-term success. Davy Horizons are thought leaders on sustainability, publishing insights and running events on key sustainability and ESG trends drawing on an extensive international network of experts.

DAVY

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Glossary

Abbreviation Definition

ACRES	Agri-Climate Rural Environment Scheme	LULUCF	Land Use, Land-Use Change and Forestry
AFOLU	Agriculture, Forestry, and other Land use	MACC	Marginal Abatement Cost Curve
AD	Anaerobic Digestion	NBAP	National Biodiversity Action Plan
BOI	Bank of Ireland	NPWS	National Parks and Wildlife Service
CAN	Calcium Ammonia Nitrate	NCI	Natural Capital Ireland
CAP	Common Agricultural Policy	NUE	Nitrogen Use Efficiency
CBD	Convention on Biological Diversity	OPS	Organic Farming Scheme
CO ₂ e	Carbon Dioxide equivalent	PBAF	Partnership Biodiversity Accounting Financials
CSRD	Corporate Sustainability Reporting Directive	PLCs	Public Limited Company
DAFM	Department of Agriculture, Food and the Marine	PV	Photo Voltaic
DECC	Department of the Environment, Climate and Communications	SBTi	Science Based Targets Initiative
EBI	Economic Breeding Index	SMEs	Small and Medium-Sized Enterprises
EPA	Environmental Protection Agency	SLL	Sustainability Linked Loans
EU	European Union	SEAI	Sustainable Energy Authority Ireland
ESG	Environmental, Social and Governance	SFS	Sustainable Food Systems
FLAG	Forests Land and Agriculture	TNFD	Taskforce on Nature-related Financial Disclosures
GBF	Global Biodiversity Framework	TAMS	Targeted Agricultural Modernisation Scheme
GHG	Greenhouse Gases	TNFD	Taskforce on Nature-related Financial Disclosures
GNI	Gross National Income	UNPRB	The United Nations Principles for Responsible Banking
HVO	Hydrogenated Vegetable Oil		
IPCC	Intergovernmental Panel on Climate Change		
ISEA	Irish Solar Energy Association		
KPI	Key Performance Indicators		
LED	Light Emitting Diode		
LESS	Low Emission Slurry Spending		



“At Bank of Ireland, we understand the challenges and opportunities the transition to a more sustainable agrifood system entails.

Eoin Lowry

Head of Agri Business, Bank of Ireland

Executive Summary

Challenges and Opportunities

To achieve Ireland's sustainability goals requires a significant transition in how we farm and use our land to manage environment, societal and economic ambitions. This can be a daunting proposition for all actors across the food value chain – from farmers to retailers of all sizes plc to SMEs. The business case to manage the environmental footprint of food from farm to fork, and demonstrate credible action, is growing, driven by regulation, customer, shareholder, and lender demands. This is a complex landscape with multiple policies and market incentives which are not yet fully aligned.

Solutions and Investment

Science and policy show the most cost-effective solutions to meeting sustainable food and farming goals. On climate change, to meet Ireland's Climate Action Plan GHG emissions reduction target of 25% by 2030 for agriculture, requires action, not just on farms, but also in the bioenergy and land sectors. This will also support the required biodiversity and water quality benefits.

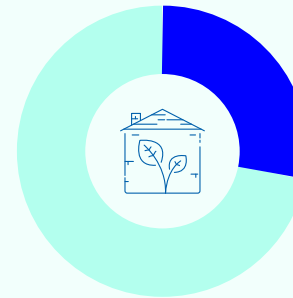
The actions needed and contribution across these three sectors to reach the 25% reduction Climate Action Plan target by 2030 are:



Agriculture at

64%

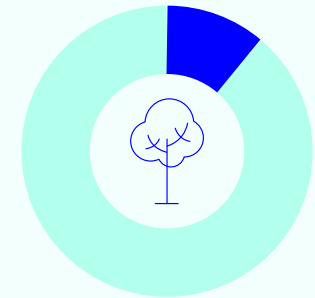
of the sector target requires multiple on farm measures to reduce nitrous oxide from fertilisers, methane from livestock and diversification activities.



Bioenergy at

26%

of the target requires converting farm waste and feedstock into bio-methane and decarbonising the sector.



Land at

10%

of the target requires carbon sequestration on land, peat and afforestation¹.

1 MACC 2023: An Updated Analysis of the Greenhouse Gas Abatement Potential of the Irish Agriculture and Land-Use Sectors between 2021 and 2030 Prepared by Teagasc Climate Centre Gary J. Lanigan, Kevin Hanrahan & Karl G. Richards (eds. MACC-2023.pdf (teagasc.ie)

In addition to on-farm actions being fully implemented, the development of a bioenergy sector and delivery of carbon sequestration on land are key to achieving the target by 2030. In particular the development of a bioenergy sector of scale with the correct infrastructure, investment and incentives is crucial.

The investment needed by the agriculture sector to achieve all these measures is estimated at a total of €3.2 billion¹ to €4.3 billion² (during 2021 – 2030). €1.7 billion is expected to come from public funds and €2.6 billion from private. Many of the solutions proposed have implications for operational costs, but many also offer efficiencies and new income streams.

Looking at the bioenergy sector, the development of an indigenous biomethane industry converting farm waste and feedstock to energy is not only key to success, but also a significant private investment opportunity. The investment for this is estimated at €1.6 billion assuming a community scale industry across co-operatives and farms². This would not only reduce GHG emissions, but also provide economic opportunities for rural communities.

In addition, the shift to sustainable food and farming offers investment and innovation opportunities in enhanced food and livestock production techniques, “green” synthetic fertilisers, agronomy advisory and digital technologies, and low-emission food products.

Financing the transition

The goal and opportunity for Ireland is to become a world leader in sustainable food systems, as part of Ireland's 2030 Food Vision policy³. At BOI we believe this transition can and will happen. It will be turbulent and navigating the risks and opportunities ahead is where banks can support. As the leading lender to Ireland's agricultural sector, BOI has over €4 billion in loans across the agri-food value chain. 82,000 farmers bank with BOI – many for generations and Bank of Ireland captured 55% of new lending to farmers in 2023. Financial products like EnviroFlex sustainability-linked loans incentivise and reward farmers who are taking action to reduce the environmental footprint of their farms including lowering Greenhouse Gas (GHG) emissions and enhancing environmental protection.

In addition to providing sustainable finance supports, BOI recognises the need to grow awareness on key issues to support practical action for customers.

With that in mind our ambition for this guidance publication is to share the status on the challenges, opportunities, policy, solutions, and investment needed illustrated with leadership case examples from stakeholders and businesses in the agrifood sector which are already showing the way.

- 1 MACC 2023: An Updated Analysis of the Greenhouse Gas Abatement Potential of the Irish Agriculture and Land-Use Sectors between 2021 and 2030 Prepared by Teagasc Climate Centre Gary J. Lanigan, Kevin Hanrahan & Karl G. Richards (eds. MACC-2023.pdf (teagasc.ie))
- 2 Investing in Tomorrow: Shaping a Net-Zero Future (davy.ie)
- 3 gov – Food Vision 2030 – A World Leader in Sustainable Food Systems (www.gov.ie)



“The investment needed by the agriculture sector to achieve all these measures is estimated at a total of €3.2 billion¹ to €4.3 billion² (during 2021 – 2030).”



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Challenges & Opportunities

The challenges and opportunities the sustainable food and farming transition brings are shaped by the environmental impacts of the sector across the value chain from “farm to fork”, policy drivers, solutions, and their economic viability. This chapter summarises this landscape and implications for farmers and agri-business.

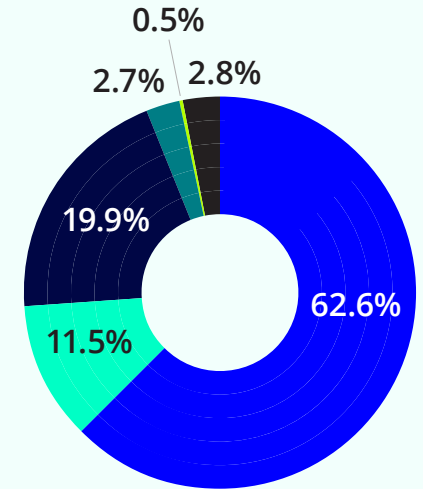
2.1 Environmental Impacts and Trends

The main environmental impacts that can occur from food production across the value chain are GHG emissions which contribute to climate change, biodiversity loss and water pollution. Pressures to provide clear traceability and improvement across these issues are growing trends from regulators, customers, lenders and insurers. The key impacts and trends are illustrated and outlined in this section.

Climate Change

GHG emissions from agriculture are the largest contributor to Ireland's GHG emissions at 38.4%⁴. Ireland has a large agriculture sector relative to other sectors. It is Ireland's oldest and largest indigenous exporting sector with agri-food accounting for 4.3% of Ireland's economy (total Gross Value Add), circa 9% of total merchandising exports with food and drink exports worth €16.3 billion in 2023⁵ and GNI 6.7%⁶. Dairy produce followed by meat products make up the largest segments of agri-food exports.

Ireland Agriculture Sector GHG Emissions Percentage by Source, 2022. (Source Agriculture | Environmental Protection Agency (epa.ie))



- Enteric fermentation
- Manure management
- Agricultural soils
- Liming
- Urea application
- Fuel combustion

Environmental impacts in food and farming

- GHG emissions (Scope 1-3) causing climate change
- Water consumption & pollution
- Biodiversity
- Other commodity food products causing deforestation
- Traceability in Supply Chains – Farm to Fork
- Ecolabels
- Reporting



There are almost 165,000 people employed in the agricultural sector with Irelands 135,000 farms being an integral part of Irish economy, society and rural communities⁷.

The GHG emissions sources are illustrated and are mainly due to methane from livestock and nitrous oxide from fertiliser^{9 10 11}.

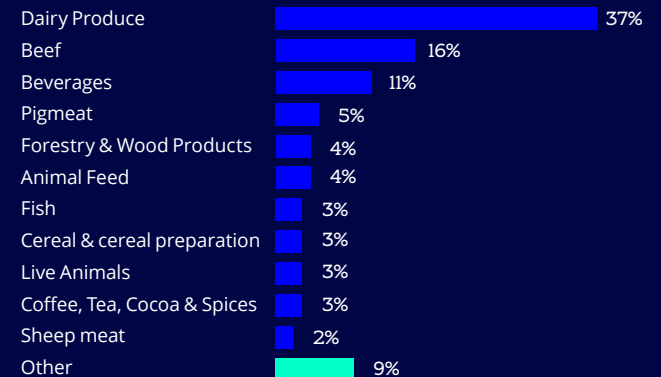
- Methane (CH₄) – 70% from animals and slurry management.
- Nitrous oxide (N₂O) – 30% from nitrogen fertiliser and manure.

Farmers and the sector have been making progress in recent years. Recent GHG emissions trends for agriculture show GHG emissions decreased 1.2% in 2022 mainly due to a decrease in nitrogen fertiliser use (-14.0%). To meet the Climate Action Plan 25% agriculture sector reduction target by 2030, a significant increase in activities is required.

Agriculture and land can also remove carbon from the atmosphere by carbon sequestration in agricultural soils, forestry, grasslands, and peat. This is an important opportunity for Ireland with its strong agricultural focus and could achieve circa 10% of the agriculture sector target¹².



Agri Food Exports Per Category (2022)
(Source Daffm, 2023⁸)



4 EPA Ireland, June 2023, Agriculture | Environmental Protection Agency (epa.ie)

5 Bord Bia Export Performance and Prospects Report 2023 – 2024

6 Fact Sheet on Irish Agriculture, August 2023, <https://assets.gov.ie/268151/30229379-b87f-4df3-8980-9051a7eef84c.pdf>

7 Fact Sheet on Irish Agriculture, August 2023, <https://assets.gov.ie/268151/30229379-b87f-4df3-8980-9051a7eef84c.pdf>

8 Dept of Agriculture, Food and Marine, Irish Agriculture Fact Sheet 2023, 268151_30229379-b87f-4df3-8980-9051a7eef84c.pdf

9 EEA greenhouse gases — data viewer — European Environment Agency (europa.eu)

10 Irish farmers pressured to cull up to 200,000 cows to meet climate goals (ft.com)

11 2022 Report of food vision dairy group on measures to mitigate greenhouse gas emissions from the dairy sector – DAFM

12 EPA Ireland, Provisional 1990-2022 GHG Inventory data (updated July 2023) and the EPA's latest 2022-2030 projections estimates (updated June 2023), Agriculture | Environmental Protection Agency (epa.ie)

Biodiversity

When not managed correctly, intensive agricultural production may impact soil and ecosystems and causes biodiversity loss.

Water

It is known that agriculture sector is one contributor to a decline in water quality in Ireland's water bodies, alongside urban wastewater discharges¹³. The main on-farm contributors are nutrient run off from land along with excess use of nutrients such as nitrates and phosphate^{14 15}.

Deforestation and Traceability for commodity products

For Irish agri-businesses producing or using commodity products like palm oil, cocoa or soya preventing deforestation causing climate change and biodiversity loss is a growing priority^{16 17}. Proving traceability across international supply chains on this and other sustainability issues are requirements from customers and regulators.

13 Water quality and agriculture | Environmental Protection Agency (epa.ie)

14 Ireland's 4th National Biodiversity Action Plan – Draft for public consultation, DECC

15 Unacceptably high pollution in Irish rivers and lakes due to human activities, says EPA – The Irish Times

Ecolabels and Reporting

Providing data on the environmental impacts and credentials of food production across the value chain (Farm to fork) is a growing trend in response to regulatory, consumer, shareholder, and lender sustainability requirements. Meeting food eco labels benchmarks and avoiding greenwash are important to maintain access to markets for farmers and agri-businesses. Food retailers and producers are increasingly requesting carbon footprint (across Scope 1-3) and other environmental and social impact data from their upstream suppliers including farmers. For GHG emissions, the majority of GHG emissions can reside in the supply chain of food (Scope 3 emissions), so the pressure on food producers to manage this is increasing¹⁸. Bord Bia Origin Green is carbon footprinting Irish farms as part of its farm sustainability survey to improve data on these hotspots¹⁹.

Data showing traceability across the food value chain on GHG emissions, pollution,

16 The combined agriculture and land emissions (LULUCF) account for 45% in Ireland's GHG inventory <https://www.gov.ie/pdf/?file=https://assets.gov.ie/271185/56688bf2-060a-4610-9e93-f4e83f4bb658.pdf#page=null>

17 EPA Ireland, Provisional 1990-2022 GHG Inventory data (updated July 2023) and the EPA's latest 2022-2030 projections estimates (updated June 2023), Agriculture | Environmental Protection Agency (epa.ie)

Country of Origin, avoiding deforestation, and more is required to meet increasingly stringent regulations for corporate sustainability reporting and for consumer eco labels. In particular, the European Union (EU) Corporate Sustainability Reporting Directive (CSRD) mandating annual sustainability reporting will impact many large and Small and Medium Sized farm and agri-businesses as it phases in from 2024 – 2029.

In addition to customers and regulators, financial institutions and investors to the agriculture and food sector also have regulatory drivers to manage climate and nature risks embedded in their lending or insurance. The lower the environmental footprint of the business, the lower the risk leading to improved access and lower cost of capital. With the growing severity and frequency of climate change-related weather events and flooding these are key business case drivers for the sector to support meaningful action that manages these risks into the future.

18 Poore, J., & Nemecek, T. (2018). Reducing food's environmental impacts through producers and consumers. *Science*, 360(6392), 987-992, <https://science.sciencemag.org/content/360/6392/987>

19 Bord Bia – <https://www.origingreen.ie/globalassets/bb-progress-report-2023-002.pdf>

2.2 Policy Landscape

To ensure the attainment of ambitious sustainability targets at both the EU and national levels, a variety of new policies and regulations aimed at facilitating a just transition will affect the agrifood supply chain, impacting stakeholders such as farmers, processors, and retailers. An overview of the key EU and Irish policies shaping the solutions for sustainable food systems is outlined in this section.



EU Biodiversity Strategy for 2030

Aims to improve biodiversity and protect ecosystems in Europe by 2030 and build society's resilience to the impacts of climate change, forest fires, food insecurity and disease.

The strategy contains specific commitments and actions to be delivered by 2030.

2.2.1 EU Policy

In the EU, the EU Green Deal, EU Fit for 55 climate change policy, Farm to Fork strategy, and regulations on the sustainable use of fertilisers, nature restoration, deforestation and green claims all underpin a sustainability transition. A core concept in these policies is the overall ambition of ensuring a “just transition” to a climate-neutral economy. This means that it happens in a fair way, leaving no one behind.

The EU Green Deal outlines Europe's strategy for responding to climate change. The objective is to achieve net zero GHG emissions in the

EU by 2050. To reach this, in the near term, the EU has a legally binding target to reduce GHG emissions by 55% by 2030 to limit global warming to 1.5°Celsius in line with the international Paris Agreement on Climate Change. A key part of the Green Deal strategy is reorienting capital towards environmentally sustainable activities.

The EU Farm to Fork strategy provides a framework to get there for the food and land sectors. As illustrated, it aims to redesign EU food systems that have a neutral or positive environmental impact, help to mitigate climate change, adapt to its impacts, reverse biodiversity loss, ensure food security, nutrition and allow fair economic returns and livelihoods for all actors, in particular for primary producers.

The Common Agricultural Policy (CAP) Reform aligns with the EU Green Deal and Farm to Fork strategies²⁰. The CAP Strategic Plan 2023-2027 is a performance and results-based approach built around these and wider policy targets which frame each EU countries' CAP Strategic Plans. Ireland's CAP Strategic Plan supports the production of world-class, safe, and sustainable food which supports achievement

of environmental and climate objectives and aims to improve socio-economic conditions in rural areas.²¹

CAP payments are directly linked to environmental and social objectives and are divided into two pillars – Pillar 1 covers direct and market agri-environmental supports, and Pillar 2 for rural development including protecting the environment and mitigating climate change.²²

In addition to Climate Change, food and land related policies, EU biodiversity and deforestation laws support wider sustainability improvements. These include EU Biodiversity Strategy for 2030²³, EU Nature Restoration Law²⁴, and EU Regulation on Deforestation-free products coming into EU markets²⁵. Short summaries are outlined.

20 EU Common Agricultural Policy Reform Key reforms in the new CAP – European Commission (europa.eu)

21 Ireland CAP Strategic Plan 2023-2027 Ireland – European Commission (europa.eu)

22 Irish Government.gov – CAP Explained (www.gov.ie)

23 Biodiversity strategy for 2030 (europa.eu)

24 The EU #NatureRestoration Law (europa.eu)

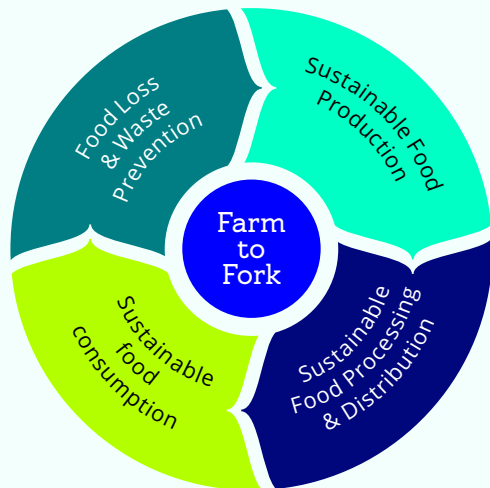
25 Regulation on deforestation-free products (europa.eu)



EU Regulation on Deforestation-free products
Aims to reduce deforestation in the EU, and in the supply chains of products sold on the EU market. For food commodities, its main focus is on products with high amounts of palm oil, soy, beef, palm oil, cocoa, coffee, and chocolate.



EU Nature Restoration Law
Part of the EU Biodiversity Strategy, it mandates recovery actions on 20% of the EU's land and seas by 2030 with the aim of restoring damage by 2050.

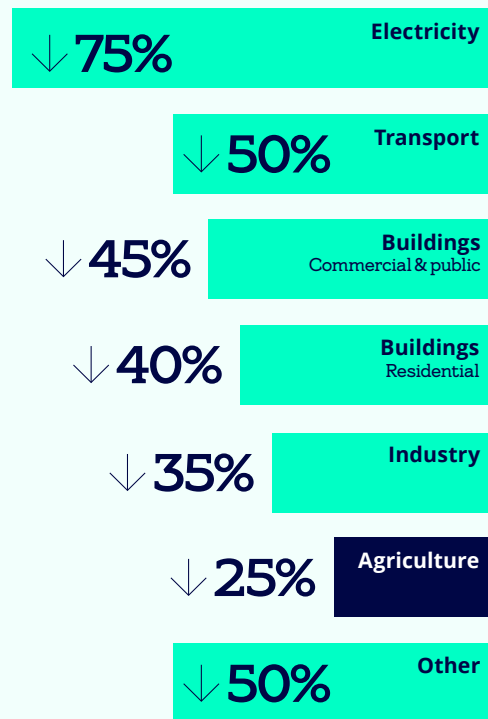


2.2.2. Irish policy

Aligned to the EU Green Deal Ireland has set legally binding GHG reduction targets in the Climate Action and Low Carbon Development Act 2021²⁹. Ireland aims to reduce GHG emissions by 51% by 2030 compared to 2018 levels and achieve net zero emissions no later than 2050. Legally binding carbon budgets and sectoral emissions ceilings approved by government in 2022 define each sector's contribution to achieve this. Ireland's Climate Action Plan 2024 aligns with these sectoral ceilings. For Irish agriculture, a 25% reduction in GHG emissions (5.75 Mt CO₂e) must be achieved by 2030³⁰.

A series of Irish policies and law provide the framework for agriculture to reduce GHG emissions, improve water quality and biodiversity. Beyond the Climate Action Plan, these include Ag Climatise³¹, Nitrates Directive and Nitrates Action Programme 2022-2025³², Food Vision 2030³³ and Bioeconomy Policy and Action Plan³⁴. Short summaries outline their aims.

Ireland Sectoral Emission Targets – Agriculture Reduction in GHG emissions by 2030



■ 2030 ceiling:

29 Government of Ireland, gov – Climate Action and Low Carbon Development (Amendment) Bill 2021 (www.gov.ie)
30 Government of Ireland, Climate Action Plan 2024 <https://www.gov.ie/en/publication/67104-climate-action-plan/>
31 gov.ie – Ag Climatise – A Roadmap towards Climate Neutrality (www.gov.ie)

32 <https://www.gov.ie/en/publication/b87ad-nitrates-directive/>
33 <https://www.gov.ie/en/publication/c73a3-food-vision-2030-a-world-leader-in-sustainable-food-systems/>
34 gov.ie – Bioeconomy Policy (www.gov.ie) gov – Food Vision 2030 – A World Leader in Sustainable Food Systems (www.gov.ie)



National Biodiversity Action Plan (NBAP 2023 – 2030)

As part of Ireland's global biodiversity commitments under the United Nations Convention on Biological Diversity (UN CBD) and the Global Biodiversity Framework (GBF), Ireland's 4th National Biodiversity Action Plan (NBAP 2023-2030) targets biodiversity improvements in agriculture, forests and land sectors. As part of this, Ireland has recently introduced the Agri-Climate Rural Environment Scheme (ACRES) the €1.5 billion, farmer-scheme to help address biodiversity decline while delivering income support for up to 50,000 farm families in Ireland.



Nitrates Directive and Nitrates Action Programme 2022-2025

Ireland's fifth nitrates action programme is running to 2025, to implement measures under the EU Nitrates Directive. This aims to prevent pollution of surface and ground waters from agricultural sources and to protect and improve water quality.





Ireland's Climate Action Plan 2024

Sets out the roadmap to meet Ireland's climate targets to halve emissions by 2030 and reach net zero no later than 2050.



Ag Climatise Roadmap

Department of Agriculture, Food, and the Marine (DAFM) roadmap for the food and agriculture sector identifying the actions needed on climate change and by when.



Bioeconomy Policy and Action Plan³⁶

This underpins the approach to reducing GHG emissions from converting farm, feedstock and biomass waste products for reuse as energy through bio-methane plants. This supports energy provision from these sources and contributes to energy sector targets as well. A Biomethane Strategy is pending which is expected to set out the ambition for the sector and an indication of the likely supports over and above the Renewable Heat Obligation (RHO) already announced by the Department of Environment, Climate and Communications (DECC) due by 2024³⁷.

³⁵ gov.ie – Bioeconomy Policy (www.gov.ie)

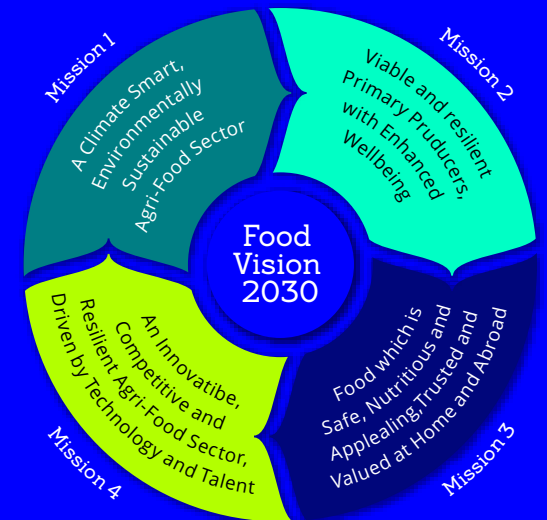
³⁶ gov.ie – Bioeconomy Policy (www.gov.ie)

³⁷ gov.ie – Government agrees to the introduction of an obligation on the heat sector by 2024 (www.gov.ie)

Food Vision 2030³⁵

Ireland's ten-year strategy for the agri-food sector aims for Ireland to become a world leader in Sustainable Food Systems by 2030. The strategy to achieve this consists of 22 goals, grouped into four high-level ambitions:

1. A climate-smart, environmentally sustainable agri-food sector.
2. Viable and resilient primary producers with enhanced well-being.
3. Food, which is safe, nutritious and appealing, trusted and valued at home and abroad.
4. An innovative, competitive, and resilient agri-food sector, driven by technology and talent.



2.3 Solutions and Opportunities

For Ireland, the most cost-effective pathway to reduce GHG emissions is defined in the Teagasc Marginal Abatement Cost Curve (MACC) 2023³⁸. A Marginal Abatement Cost Curve (MACC) shows the reduction potential of GHG mitigation measures to support stakeholders in making informed decisions about how to allocate resources. To achieve the agriculture sector target of 25% by 2030 the key solutions and percentage reductions they are estimated to achieve are included in this section³⁹. These cover solutions across agriculture from emissions reductions, as well as the land for carbon sequestration and bioenergy sectors. This is important to note, as on farm solutions alone only account for an estimated 64% of the 25% reduction target. A bioenergy sector at scale is needed for an estimated 26% of the target and carbon sequestration on land for 10%.

38 WRI (2019). Creating a Sustainable Food Future. World Resources Institute https://research.wri.org/sites/default/files/2019-07/WRR_Food_Full_Report_0.pdf

39 Forest, Land and Agriculture Science Based Target Setting Guidance, SBTiFLAGGuidance.pdf (sciencebasedtargets.org)

40 95% CAN replacement and 100% replacement of straight urea required for reducing nitrous oxide emissions from fertiliser use on land is required under the Teagasc MACC.

Agriculture at

64%

of the sector target requires multiple on farm measures to reduce nitrous oxide from fertilisers, methane from livestock and diversification activities.

Most reductions are expected to come from agriculture mitigation measures especially to reduce methane from livestock and nitrous oxide in fertiliser use. These include solutions available now for example:

- **Fertilisers** – Replacing Calcium Ammonium Nitrate (CAN) with protected urea to reduce nitrate oxide emissions⁴⁰, low emission slurry spreading, increased soil fertility and replacing chemical nitrogen with biological fixed legume nitrogen such as clover and multi species swards.
- **Livestock** – Reducing age at slaughter and using feed additives in indoor feeding systems.
- **Diversification in farming practice** – Shifts to Organic farming (eliminating synthetic chemical inputs), regenerative agriculture techniques, increased tillage and forestry or biomethane feedstock production. These also have the potential to aid in herd stabilisation further contributing to agricultural reduction targets.
- **Decarbonisation on farms** – Introducing renewable energy sources like solar, biomethane from farm waste, and wood biomass.
- **Diversification in activities** – Shifts to add activities like rural tourism alongside farming.

Technologies that require further research are also needed and include the use of feed additives at pasture, breeding lower-methane-emitting animals, and the use of slurry additives.



Bioenergy at

26%

of the target requires converting farm waste and feedstock into bio-methane and decarbonising the sector.

Converting farm waste, wood biomass and feedstock into biomethane for energy use brings an estimated 26% and can contribute significantly to the wider decarbonisation of the Irish energy sector.

Land at

10%

of the target requires carbon sequestration on land, peat and afforestation.

Carbon sequestration on land, peat and afforestation with increased hedgerows, vegetation and native, Irish tree species will store carbon giving an estimated 10% reduction.



Enhanced advisory, research and innovation supports will be key to help guide farmers and landowners to enable these solutions. Several initiatives are providing these supports including Teagasc Signpost Programme⁴¹, Irish Farmers Association (IFA) SmartFarming⁴², Bord Bia Origin Green⁴³ and Sustainable Energy Authority of Ireland (SEAI) farm energy advisory and grants⁴⁴. Continuing research and development of emission mitigation technologies remains a priority. Innovation in production systems, agriculture technology and genetics hold enormous potential in enabling sustainable food systems and accelerating the transition quicker. At the policy level, several high-level Working Groups have been established through DAFM to address and overcome existing challenges and provide solutions.



41 Climate Action – Teagasc | Agriculture and Food Development Authority

42 Irish Farm Association & Environmental Protection Agency, SmartFarming | Improve Your Farm Returns with Better Resource Management

43 Origin Green

44 Farmer Grants (seai.ie)

In addition to these core solutions, reducing food waste and emerging markets for plant-based proteins will bring GHG emissions reductions. The status on these is outlined below.

Reducing GHG emissions from food waste

- Food waste contributes 8-10% of global GHG emissions, significant volumes of waste and depletes resources⁴⁵. Ireland generates 750,000 tonnes of food waste each year. Households (29%), manufacturers and processors (29%), and restaurants and food service operators (25%) are the most significant sources with primary producers responsible for 7%.⁴⁶ Ireland's National Food Waste Prevention Roadmap 2023-2025⁴⁷ sets out the actions to deliver on Ireland's commitment to reduce food waste by 50% by 2030; a commitment aligned with the Climate Action Plan and Food Vision 2030.

Organic, plant and protein alternatives

The consumer market for certified Organic food and plant-based proteins is growing opportunities for Irish farmers and agri businesses.

- Supporting growth in certified Organic food products is part of EU and Irish sustainable food policies^{48,49}. A recent Bord Bia survey found that 88% of all Irish shoppers buy Organic food and drink with vegetables and eggs being the largest categories.⁵⁰ Since DAFM announced the introduction of enhanced payment rates for Organic through the Organic Farming Scheme (OFS) in 2022⁵¹, farmer participation in the scheme has doubled from 2,000 in 2022, to 4,000 in 2023⁵². 90% of farmers participating in the scheme are in the beef and sheep sectors. However, scale and consistency of supply are current obstacles limiting Irish-grown Organic produce, as well as market premium erosion.

With the Organic market valued at €28 billion in Europe, Ireland's international high quality food positioning presents a strong platform to market Organic products internationally⁵³.

- Consumer demand for plant-based protein alternatives is a growth market worth €5.8 billion/annum in the EU and €17 billion globally.⁵⁴ Teagasc sees Irish farmers as well positioned to tap into this developing market and are partners in the DAFM-funded U-PROTEIN (Unlocking Protein Resource Opportunities to Evolve Ireland's Nutrition) project. This is an important Irish research initiative aimed at the transfer of technologies used in dairy protein processing to crops⁵⁵.

Case examples from Irish organisations that illustrate many of the solution areas identified are in section 5.

45 <https://www.unep.org/resources/report/unep-food-waste-index-report-2021>

46 <https://www.epa.ie/our-services/monitoring-assessment/waste/national-waste-statistics/food/>

47 gov – National Food Waste Prevention Roadmap 2023-2025 (www.gov.ie)

48 Organic action plan (europa.eu)

49 <https://cdn.ifac.ie/f/122463/x/348179beb3/10852-ifac-irish-farm-report-2023-6.pdf>

50 Momentum in the Organic Sector (bordbia.ie)

51 <https://www.gov.ie/en/press-release/163a9-minister-hackett-announces-enhanced-rates-for-organic-farmers-effective-from-january-1st-2023/>

52 Momentum in the Organic Sector (bordbia.ie)

53 Developing organics – challenges and opportunities (bordbia.ie)

54 Market insights on European plant-based sales 2020-2022 – GFI Europe

55 Crops – Higher value from protein crops – Teagasc | Agriculture and Food Development Authority



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A photograph of two farmers standing in a golden field of harvested crops, looking out over a landscape with rolling hills and a cloudy sky. The image is partially obscured by the large blue text 'Funding the Transition' on the right side.

Funding the Transition

3.1 Investment Required

For Ireland, to meet the Climate Action Plan agriculture 25% GHG emissions reduction target by 2030 an investment of an estimated **€4 billion** across public and private funds is required⁵⁶. To implement the main reduction opportunities aligned to the Teagasc MACC across agriculture, land and bioenergy – the cumulative cost (2021 – 2023) is estimated at **€3.2 billion**⁵⁷. Davy Decarbonisation Corporate Finance analysis estimates this is higher at **€4.3 billion** or €0.6 billion/annum (2% GNI) if Organic farming and community scale bioenergy versus farm scale is factored in. This is an incremental investment of €0.3 billion/annum or 0.1% of Gross National Income.

A breakdown of the estimated cost of achieving the 25% GHG emissions reduction required across agriculture, land and bioenergy is illustrated.

Cost to achieve Irelands 25% agriculture sector target (2021-2030)

Solutions	Percentage Reduction 2021-2030	Cumulative costs ¹ (€ million) 2021-2030
Agriculture <i>Mitigation and efficiency measures on farm</i>	64%	1,486
Land <i>Measures that reduce emissions and enhance removals including forestry, hedgerows, peatlands</i>	10%	1,000 – 1,083
Bioenergy <i>Fossil fuel CO₂e offsets from bioenergy or energy-saving measures in agriculture and land sectors including energy efficiency & biomethane plants</i>	26%	1,262 – 1,600
TOTAL		3,200 – 4,300

Assumptions:

1. Baseline emissions in 2018 = 23MtCO₂e. 25% reduction = 5.7. MtCO₂e, Emissions in 2023 = 17.25 MtCO₂e
2. GHG emissions reductions shown are from the: Teagasc MACC 2023. These are based on:
 - A high adoption of measures being achieved and represent the maximum technically feasible adoption rate (so called Pathway 2, Scenario 3 in the MACC resulting in a reduction total of 203.2 MT CO₂e
 - Highest cumulative costs 2021-2030 only are shown.
 - For sensitivity purposes, total cost-effective measures were defined at three different carbon prices – those measures costed at or below €100, €150 and €250 per tonne CO₂e abated.
3. Davy Decarbonisation Corporate Finance analysis Investing in Tomorrow: Shaping a Net Zero Future costs assume:
 - Organic Farming based on Climate Action Plan targeted €375/and €300/ha subsidy for the first two years and €250/ha thereafter giving a total cost of circa €700m over

the seven years to 2030. It is unclear how much of this may be provided by the Common Agricultural Policy or the Irish government.

- Bio-Energy – The Teagasc 2030 target of 5.7TWh of biomethane equates to 650MW of capacity. Spread over 250 plants this implies an average plant size of 2.6MW which is farm-scale. The Davy analysis is for an average plant size of 5-10MW reflecting community-based schemes. Industry sources indicate a cost of €2.5m/ MW – well above the current rate assumed by Teagasc implying a total investment requirement of €1.6 billion.

56 Government of Ireland, Climate Action Plan 2024 [https://www.gov.ie/en/publication/67104-climate-action-plan/Irelands-National-Development-Plan-2021-2023,200358_a36dd274-736c-4d04-8879-b158e8b95029\(2\).pdf](https://www.gov.ie/en/publication/67104-climate-action-plan/Irelands-National-Development-Plan-2021-2023,200358_a36dd274-736c-4d04-8879-b158e8b95029(2).pdf)
MACC 2023: An Updated Analysis of the Greenhouse Gas Abatement Potential of the Irish Agriculture and Land-Use Sectors between 2021 and 2030 Prepared by Teagasc Climate Centre Gary J. Lanigan, Kevin Hanrahan & Karl G.

Richards (eds. MACC-2023.pdf (teagasc.ie)
Davy, Nov 2023 Investing in Tomorrow: Saping a Net-Zero Future (davy.ie)
Ireland Bioeconomy Action Plan, 19 October 2023, gov.ie – Ministers McConalogue and Ryan publish first national Bioeconomy Action Plan (www.gov.ie)
57 MACC 2023: An Updated Analysis of the Greenhouse Gas Abatement Potential of the Irish Agriculture and Land-Use Sectors between 2021 and 2030 Prepared by Teagasc Climate Centre Gary J. Lanigan, Kevin Hanrahan & Karl G. Richards (eds. MACC-2023.pdf (teagasc.ie)

3.1 Investment Required continued

Public funding through subsidies and grants will fund the sector for some of these measures, with some already in place such as those under the Targeted Agriculture Modernisation Scheme (TAMS III) like the Low Emission Slurry Spreading (LESS) equipment scheme⁵⁸. Under the Common Agricultural Policy, Ireland is set to receive EU funding of almost €7.5 billion over the 2023-2027 period. Funding post 2027 is in negotiation and with EU expansion could see less funds to go around. 25% of direct Common Agricultural Policy funding now is ringfenced for environmental schemes requiring farmers to demonstrate environmental benefit to receive payments. Ireland has also increased public investment in agriculture with €2.14 billion of Ireland's annual budget in 2023, allocated to The Department of Agriculture, Food and the Marine. Of this, €500 million was specifically allocated to fund agri-environmental actions across multiple schemes and initiatives.

Many of the measures required relate to ongoing operational costs, as distinct from capital expenditure suited to upgrading required infrastructure. For example, key operational costs at farm level include manure management, changing fertilisers, feed

additives and on-farm decarbonisation. As one example, feed additives are estimated to cost €87/head/year for cows⁵⁹. Some agricultural abatement measures in theory look cost negative. The bulk of cost savings is associated with two measures – Dairy Economic Breeding Index and reduced age of finishing. If these two measures are excluded from the total, cumulative costs for agriculture would range from €256 million to €730 million (2021-2030)⁶⁰.

To meet the targets and objectives of the Climate Action Plan, the private sector must also be directed towards financing activities that contribute towards the government's sectoral emissions ceiling and away from financing investments that are inconsistent. Davy's Decarbonisation Corporate Finance team identify a total €4.3 billion investment is likely to be required comprising public funding of €1.7 billion, and private sector investment of €2.6 billion. The breakdown is illustrated with estimated funds suited to come from debt and equity funds.

Opportunity investment areas suited to private Capital Expenditure (CapEx) include Anaerobic Digestion (AD) plants for

bio-methane. AD plants to produce bio-methane are a key infrastructure investment requirement with an estimated 250 AD plants needed for the measures required. Teagasc estimates the cost is €6 million per plant assuming farm scale at 2.6 MW. This will take farm waste, wood biomass and grown feedstock and convert it into energy contributing a renewable source suitable to replace natural gas and compatible with existing gas infrastructure. The Government ambition is 5.7 TWh of biomethane by 2030.

This would deliver 1.5 MtCO₂e per annum and cumulatively over the 2021 to 2030 period could displace 4.1 million tonnes CO₂e⁶². In total, bioenergy could contribute to over 10% of the combined energy sector's targets⁶³.

The Davy analysis assumes community scale AD plants with average capacity of 5-10 MW could be deployed for example at Co-operative level. There are three plants of this size in Ireland at present. Industry sources indicate a cost of €2.5million per MW which implies a €1.6 billion CapEx requirement.

Investment Estimated for Agriculture sector Energy Transition⁶¹

Davy Estimate					Incremental Investment					
Total €billion	Public €billion	Private €billion	Debt €billion	Equity €billion	Per Annum 24-30 €billion	%GNI* %	GFCF23 €billion	%GNI* %	Incremental Investment €billion	%GNI* %
€4.3	€1.7	€2.6	€2.3	€0.3	€0.6	0.2%	€1.3	0.5%	€0.3	0.1%

58 gov.ie – TAMS 3 (www.gov.ie)

59 MACC 2023: An Updated Analysis of the Greenhouse Gas Abatement Potential of the Irish Agriculture and Land-Use Sectors between 2021 and 2030 Prepared by Teagasc Climate Centre Gary J. Lanigan, Kevin Hanrahan & Karl G. Richards (eds. MACC-2023.pdf (teagasc.ie))

60 MACC 2023: An Updated Analysis of the Greenhouse Gas Abatement Potential of the Irish Agriculture and Land-Use Sectors between 2021 and 2030 Prepared by Teagasc Climate Centre Gary J. Lanigan, Kevin Hanrahan & Karl G. Richards (eds. MACC-2023.pdf (teagasc.ie))

61 Davy, Nov 2023 Investing in Tomorrow: Shaping a Net-Zero Future (davy.ie)

62 MACC 2023: An Updated Analysis of the Greenhouse Gas Abatement Potential of the Irish Agriculture and Land-Use Sectors between 2021 and 2030 Prepared by Teagasc Climate Centre Gary J. Lanigan, Kevin Hanrahan & Karl G. Richards (eds. MACC-2023.pdf (teagasc.ie))

63 The marginal cost of biomethane is highly dependent on both feedstock cost and the unit price of g

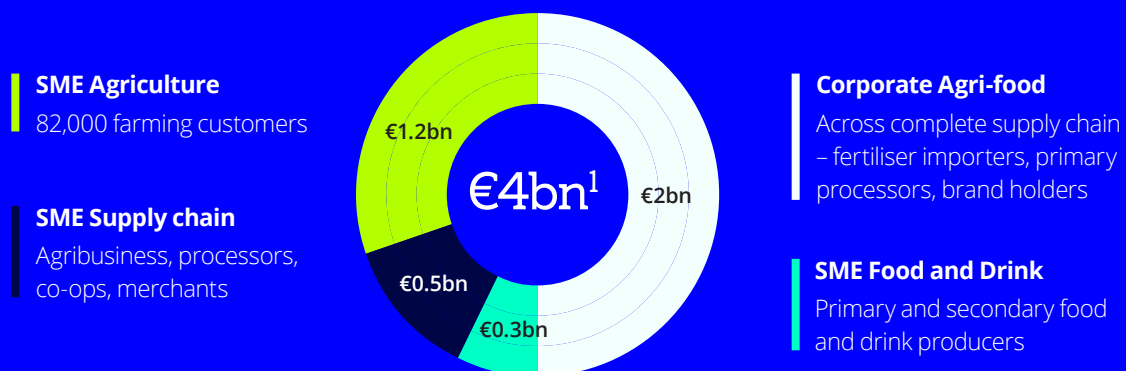
3.2 How Bank of Ireland is financing the green transition

BOI is driving innovation and supporting farmers to become more sustainable, by providing relevant and flexible financing solutions the industry and farmers. Providing sustainable finance is a key pillar in Bank of Ireland's Five-Point Climate Action Plan which outlines the key role they play in facilitating Ireland and the UK's green transition to a low-carbon economy and their efforts to reduce their impact on the environment. BOI has sustainability-related finance targets to €15 billion by 2025 and €30 billion by 2030. The sustainable finance portfolio of products is designed to support the food, farming, and agri-business customers to take practical and innovative actions aligned with science and policy.

BOI AGRI FOOD LENDING AT A GLANCE

BOI has over €4billion (c.5% of Group's Credit Exposure) invested across the agrifood supply chain with over €1.2billion of this at farm level. 82,000 farmers bank with BOI – many for generations. BOI has a market share of outstanding lending of 44% in 2023.

Leading Lender to Ireland's Agri-Food Sector



Despite outstanding debt levels on farms at the lowest level in 25 years, BOI has grown its lending to Irish agriculture by 20% since 2020. BOI continues to capture the majority (>50%) of new lending to Irish farmers, meaning that every second farmer who takes out a new loan today, is doing so with BOI. This underlines the Bank's ongoing focus on supporting Irish farmers, strong commitment to the sector and appetite to finance it.

BOI provides over 8,000 new loans to farmers every year with an average loan size of €40,000. BOI aims to have a diversified agribook of lending – supporting all farming systems across dairy, beef, sheep, pigs and poultry to tillage, horticulture, bloodstock and forestry. Bank of Ireland is also supporting farmers to diversify their income streams, be that rural tourism, energy production or food processing activities. BOI remains confident and comfortable in the long-term viability and sustainability of the agriculture sector.

3.3 Sustainable Agri Finance

Financial supports aim to fund the green transition aligned to science and policy underpinned by the Teagasc MACC 2023 and include:

- Sustainable farming supports to reduce GHG emissions such as use of protected urea and multispecies swards.
- Investment in on-farm infrastructure such as solar panels, low-emission slurry spreading equipment and additional storage.
- Irish native forestry to support carbon sequestration, biodiversity and water quality improvements.

The Enviroflex Sustainability Linked Loan (SLL) sustainable agri finance mechanism launched in November 2023 rewards annual reductions in GHG emissions with discounted finance. The Woodland Nature Credit supports afforestation on land. Case examples for the Enviroflex SLL and Woodland Nature Credit illustrate the approach.

Bank of Ireland Sustainable Agri Finance

BOI have a tiered approach to sustainable agri finance as illustrated.



3.3 Sustainable Agri Finance continued

CASE EXAMPLE:

Enviroflex – supporting the agriculture sector with sustainability-linked loans



What is Enviroflex?

Enviroflex is a SLL that rewards farmers through discounted finance who are taking actions to improve the environmental sustainability of their farms. Enviroflex is underpinned by Bord Bia's Origin Green Sustainability Programme and the Teagasc MACC which sets out proven, science-based actions that farmers can take to reduce on-farm GHG emissions. Enviroflex is holistic with a broad focus on GHG emissions reduction, along with improvement in water quality, biodiversity and animal welfare. Enviroflex will lead the transition to and acceleration of more sustainable farming practices by providing financial support to build on existing achievements and grow the knowledge of and engagement with sustainable farming practices.

BOI is partnering with the agri-food industry to deliver Enviroflex. In November 2023, BOI launched Enviroflex to farmers of Kerry Dairy Ireland who are participants of its 'Evolve Sustainability Programme,' and are carrying out environmental sustainability measures on their farms. It will be rolled out to all farmers and other primary processors throughout 2024.

Under the scheme, loans are available to support farmers invest in a range of purposes such as sustainable farm development, renewable energy projects, enhanced sustainability measures e.g., forestry/tree planting and biodiversity projects.

Benefits:

- Enviroflex supports the national ambition to reduce sector emissions by 25% by 2030 and is aligned to the MACC and Ag Climatise.
- Enviroflex will reward farmers through discounted finance for taking on proven sustainable actions and to improving the environmental sustainability of their farm.
- Businesses including banks and primary processors must measure the environmental impact of their activities aligned to data for regulatory disclosures.



Launched in

2023



Discounted Finance for farmers taking on proven sustainable actions

3.3 Sustainable Agri Finance continued

CASE EXAMPLE:

Woodland Nature Credit



With the land sector and afforestation being a key solution for sustainable agriculture to sequester carbon, improve water quality and biodiversity – supports to fund growth in native, Irish trees in the right locations are key. Aligned to the Climate Action Plan an increase in forest cover from the current 11% (amongst the lowest in the EU) to 18% is the objective by 2050.

The Nature Trust set up by Coillte in 2022 and BOI originated the Woodland Nature Credits product to provide funding to corporations to fund Irish woodlands and obtain a biodiversity offset.

BOI are participating in a range of natural capital best practice initiative including the Taskforce for Nature-Related Financial Disclosures (TNFD) Forum, the Partnership of Biodiversity Accounting Financials (PBAF) and

the UN Principles for Responsible Banking (UNPRB) Nature Target Setting working group. BOI has taken an innovative position by joining these global leadership initiatives to understand the risks and opportunities for business and banking on nature. With the growth in weather related flooding, pests, disease, and crop impacts, investing in nature and biodiversity is investing in economic resilience. Losing the benefits of healthy ecosystems could cause a decline in global GDP of US\$2.7 trillion (€2.45 trillion) annually by 2030⁶⁴. Seeing these risks. BOI was the first Irish bank to securitise ecosystem services through the creation of a nature-based solution.

In the first funding round following the launch in 2021, AXA Ireland financed the planting of 200 hectares equating to 600,000 native trees with €2 million funds. The second round in

2022 was on an even larger scale where Aviva Insurance provided €5 million funding for the planting of 400,000 hectares (or 1.2 million new native trees).

The scheme allows companies to fund large-scale afforestation in Ireland and record the environmental and social benefits of the new woodlands as part of their sustainability reporting requirements. This has been designed in line with criteria developed for afforestation projects under the EU Taxonomy and to meet the upcoming EU Corporate Sustainability Reporting Directive which will be an auditable requirement for corporates. The scheme is also assured by an independent assurance provider and advised by an independent scientific panel.

64 UNDP From Cacophony to Harmony: From cacophony to harmony | United Nations Development Programme (undp.org)



7 million euro
financing



1.8 million
native trees planted

3.4 Sustainable finance support

In addition to providing sustainable finance, BOI supports the transition to sustainable agri-business through collaboration on policy and leadership initiatives. This includes:

- **Stakeholder engagement to understand the challenges and opportunities:** BOI continuously engage with stakeholders and policy makers (DAFM, Teagasc, farm organisations and the EPA) to understand and monitor the implications of policy and regulatory changes.
- **Guiding and shaping policy:** Advocating on behalf of its 82,000 farming customers to shape policy. BOI has representation on the Department of Agriculture's Consultative Climate Action Group to guide the development and evolution of the agri-food sector in mitigating and adapting to climate change in order to meet national and EU targets and commitments.
- **Collaborating with industry to drive change:** BOI has partnered with Teagasc on the Signpost Programme, which aims to support farmers on adopting measures to reduce the environmental footprint on their farms.

Within the BOI business, internal supports for sustainable finance include:

- **Investing in our agri expertise:** BOI continues to invest in a dedicated agri team of lenders who conduct more than 1000 farm visits every year to ensure the bank understands the needs and challenges facing farmers.
- **Reviewing BOI agri sector appetite:** BOI has identified and mapped environmental risks facing the agri sector including transition risks, physical risk, regulatory risk (known and unknown), weather pattern risk to ensure BOI appetite is appropriate and fit for purpose.
- **Establishing a Sustainable Finance Framework & Agriculture Scorecard:** BOI has defined sustainable finance for the agricultural sector to align with our commitment to the UN Principles of Responsible Banking that supports positive environmental and/or social purposes and contribute to achieving the goals of the Paris Agreement and the UN Sustainable Development Goals.
- **Commencing ESG screening on new lending:** BOI has started to consider and incorporate environmental KPIs of farms into our lending process. For example, stocking rates, slurry storage quantities etc. These have always been a good indicator of financial performance and will remain strong indicators of long-term farm sustainability (environmental and financial).
- **Piloting with data technology companies:** BOI is partnering with technology companies to measure and report natural capital assets at scale such as soil health and soil carbon to demonstrate verified environmental performance and support action at farm level.





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To highlight good practice already underway this section includes a series of case examples from Irish organisations taking a leadership position.

Leadership Case Examples

Case Study

Reducing Nitrous Oxide in fertilisers

Origin Enterprises – Improving Nitrogen Use Efficiency in Fertiliser

Reducing the amount of nitrous oxide released when fertilisers are applied to crops on land reduces GHG emissions. This is done by improving the Nitrogen Use Efficiency (NUE) of the fertiliser. NUE is the quantity of nutrient recovered by a crop relative to the nutrients supplied from soil, applied fertilisers, manures and ultimately how much is recovered in the end product. Efficient use of nitrogen is essential to achieving maximum crop growth and achieving a greater return on each kg of fertiliser a farmer invests in. NUE can be improved at farm level, but also at formulation and product development stage. Origin Enterprises plc is an international Agronomy-Services group, providing specialist advice, inputs and digital solutions to promote sustainable land use. The Group has leading market positions in Ireland, the United Kingdom, Brazil, Poland and Romania.

Origin's ordinary shares are listed on the Euronext Growth (Dublin) market of Euronext

Dublin and the AIM market of the London Stock Exchange. The Origin Enterprises plc case study illustrates what the company is doing to improve NUE.

Nitrogen fertiliser has played a crucial role in producing high yielding crops for over a century. Fertilisers, however, have the greatest impact on GHG emissions from arable cropping. Improving the efficacy of the nitrogen applied to crops, is one of the simplest ways of reducing a farm's impact on climate change.

As a leader in nutrient management, Origin is addressing the inefficient use of nitrogen at farm level, by providing a complete suite of agronomic advice and solutions on-farm including, nutrients, crop protection products and digital tools. Origin has developed science-led, innovative products and services which improve soil fertility, nutrient use efficiency and crop productivity. These technologies enhance nutrient efficiency and decrease environmental losses such as

leaching, enabling a better use of nutrients, and reducing the impact on the environment.

As part of Origin Enterprises plc climate change strategy, it has GHG emissions reduction targets validated to the Science Based Targets initiative (SBTi). These are a 32.5% reduction in Scope 3 emissions by 2032 from a 2019 base, and net zero emissions by 2050. This includes a target to increase the NUE of crops by 20% by 2030, using improved crop nutrition products, including enhanced efficiency fertiliser, and precision agriculture tools.

Origin continues to invest in pioneering research and development, as well as technical innovation, including BioSolutions, to enhance soil nutrient management. These efforts aim to support crop growth, improve nutrient uptake and use efficiency, encourage soil biodiversity, and optimise crop productivity.



Read more online:
[Fertile Future – Origin Fertilisers](#)

Case Study

Sustainable Retail

For the food retailer there are multiple sustainability priorities. These include ensuring sustainable food and packaging to meet increasingly stringent eco label and regulatory requirements, energy efficient stores, distribution, and low emissions transport. Musgrave has been focusing on this for many years and is now a showcase for Irish sustainable retail. A leadership example showing sustainability best practice at the retail level and value chain requirements is illustrated in the Musgraves case example.

Musgrave Group – Growing Sustainably Every Day

Musgrave's Sustainability Strategy, 'Growing Sustainably Every Day', is about creating a positive legacy for future generations. Musgrave have a strong track record of leading positive behaviour change and this strategy tackles the areas where they can have the most impact with each of the stakeholders in their value chain.

With the impact of climate change being felt globally, Musgrave knows that they have a responsibility to act now to improve their own business as well as the food system globally. They have committed to becoming net zero in their own operations by 2040 and their value chain by 2050. To support this ambition, they have developed a number of targets that align with the Science Based Targets initiative and to a 1.5 °C degree warming scenario. Musgrave's route to decarbonisation, captured in their field to fork approach in Growing Sustainably Every Day, spans the entire value chain.

In Musgrave's own operations they have invested in solar PV for stores, warehouses, and depots, in energy-efficient LED lighting systems and by installing doors on their refrigeration units. The Musgrave Sustainability Fund, launched in June 2022, is providing €25 million to support retailers reduce their carbon emissions and has already resulted in SuperValu and Centra stores reducing their carbon emissions by an estimated 9%.

In transport, Musgrave are shifting to greater use of hydrogenated vegetable oil (HVO) across their fleet of trucks and aim to have 50% of the entire fleet operating on this alternative fuel by 2030 which would lead to up to a 90% reduction in greenhouse gas emissions compared to diesel.

Musgrave's scope 3 footprint represents >95% of their total carbon footprint and they are working in partnership with suppliers to develop, implement, and, where possible, work together on plans that will lead to emissions reduction.

Musgrave knows that they play an important role in supporting their customers and making sustainability more accessible across product ranges, promotions and campaigns. Musgrave's retail partners are at the heart of the communities they serve, putting them in a unique position to support local projects and causes, for example engaging communities locally, through Tidy Towns, to affect change in ways that matter to them.



Read more online:
[Sustainability – Musgrave Group](#)

Case Study

Breeding for low methane emitting livestock

Breeding and feed are key measures for reducing methane in beef and dairy herds. This is an area of focus for Teagasc, as the Irish agency for research, advisory and education in agriculture, horticulture, food and rural development. This Teagasc and partners case study demonstrates how breeding and genetics can be used to reduce GHG emissions in practice.

Teagasc – Breeding for lower methane emitting cattle and sheep

Partners: VistaMilk, Irish Cattle Breeding federation, Sheep Ireland, Breeding companies

Animal breeding is a technology well proven across species to deliver long-lasting and cumulative gains across generations for a range of different traits concurrently. Because it requires no change to farm management, it boasts a very high adoption rate and no extra adoption costs to farmers.

The benefits accruing from breeding programs, stack on top of those achieved through non-breeding strategies.

Breeding for reduced methane favours animals that produce both less methane per day and in growing animals that produce methane for fewer days (i.e., younger age at slaughter). Ireland was the first country to publicly release estimates on the expected daily methane emissions of growing beef cattle based on their DNA profile. Such estimates of genetic merit are also available for sheep with research well advanced in dairy cows.

These types of breeding programs can deliver approximately 1% improvement year-on-year. Assuming this 1% improvement annually in daily methane emissions in dairy, beef and sheep, the ruminant population is expected to emit over 2 million tonnes less CO₂e by 2050. Gains through breeding for traits like age at slaughter will further accelerate the reduction in emissions for the sector.

As these gains will be achieved within the framework of national breeding indexes, all animals will be ranked on a single value reflecting the three legs of the sustainable food system – economic sustainability, social sustainability, and environmental sustainability. These gains in breeding are additional to gains achieved through other non-breeding strategies to support GHG emissions reductions in livestock.



Read more online:
<https://www.gov.ie/en/press-release/6b09c-ministers-mcconalogue-and-heydon-announce-scientific-breakthrough-in-reducing-methane-emissions/>



Case Study

Bio Energy (Anaerobic Digestion)

As outlined in sections 2 and 3, the development of a biomethane industry in Ireland to convert farm waste and feedstock into energy can contribute 10% of the agriculture 25% GHG reduction target and aligns with policy climate and bio economy policies. Anaerobic Digestion (AD) is the identified largest contributor to the target and will help to decarbonise the gas grid and contribute to the decarbonisation of other sectors.

In AD plants, materials such as animal slurry, biomass, forage (silage, grass, straw and other crops), food waste and commercial biodegradable materials are processed, releasing biogas which can be upgraded to biomethane. The residual material called digestate can be used as a fertiliser which can replace chemical-based versions and contributes to reducing Nitrous Oxide emissions. This has a benefit for farmers as

well as energy users as it reduces the impact of farm waste and produces digestate that can be used in place of slurry and often has a higher fertiliser value than slurry.

An indigenous biomethane industry would not only support the reduction of emissions of the agricultural sector, but it would also provide significant opportunities for rural communities. For farmers it provides alternative land uses and income opportunities. It can also significantly enhance security of energy supply as it is a competitive replacement for natural gas. Denmark is a good example where policy, market incentives and infrastructure support have scaled biomethane production over recent years to develop a modern infrastructure of AD plants today. Approximately one-third of animal slurry produced in Denmark is used in AD plants for biomethane production with

plans to double this to two-thirds in the next five years. Denmark's national biomethane development plan supported their growth in biomethane production. Key learnings from their approach which Ireland can consider include:

- Development of the infrastructure and inter connection between local farm or Co-operative production and consumption.
- Mindset shift to treat agricultural waste suited to AD as a valuable resource, not a waste.
- Regulation and subsidies to drive implementation, however, the increased price of natural gas could make biomethane more competition with less need for subsidies than Denmark would have needed.

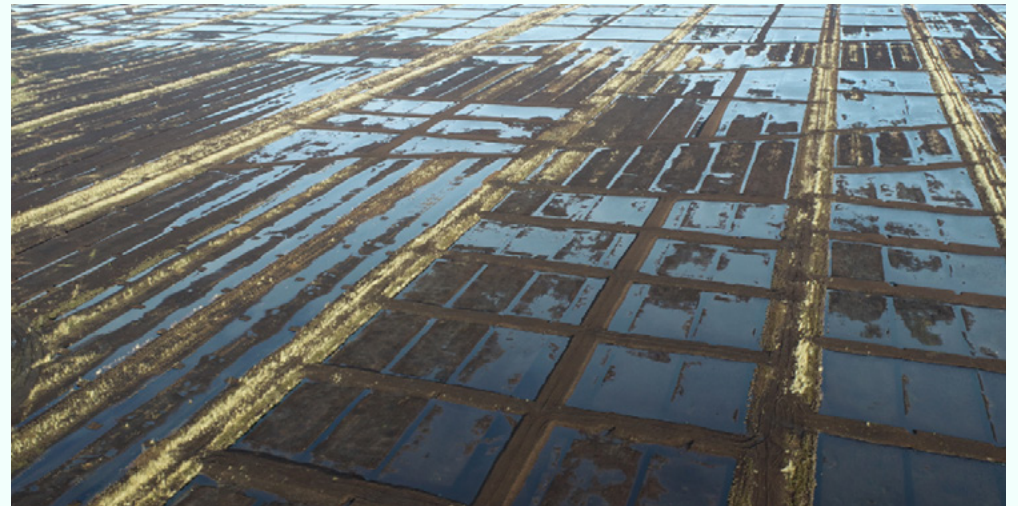


Carbon sequestration and biodiversity benefits on land

The role of carbon sequestration on land is growing in importance with the urgency of climate change and presents an opportunity for Ireland. Over 55% of the EU's climate mitigation potential is estimated to be in agricultural soils and manure management. Cropland, grassland, wetlands and forests can sequester and store carbon. Practices including grassland management, use of cover crops, straw incorporation, and addition of manure to cropland enhance carbon levels in agricultural soils. Carbon stores can be protected by restoring peatlands, preventing deforestation, converting arable to grassland and afforesting lands.

Peatlands are the most important terrestrial ecosystem when it comes to carbon sequestration. Ireland proportionally supports one of the greatest peatland areas in Europe. Healthy peatlands are a key solution to fighting climate change, but when drained and degraded they become a source of emissions. Ireland has targets to rewet and rehabilitate its peatlands for climate change and biodiversity benefits. As part of this 7.5% of drained agricultural peatlands are to be rewet by 2030. Two case examples illustrate this opportunity:

- The Bord na Mona case shows their approach to restoring peatlands in Ireland and its commercial viability.
- The National Parks and Wildlife is running projects with farmers and landowners to build engagement on peat restoration. The EU LIFE funded Wild Atlantic Nature case shows blanket bog restoration.



Bord na Móna

Case Study

Bord na Mona: Peatlands Rehabilitation – delivering Win-Win-Win Outcomes

Partners: DECC and NPWS

In 1946 Bord na Móna was established for the 'development, in the national interest, of the production, distribution and supply of turf in the State'. In the three quarters of a century that has passed, society has recognised the climate impact of burning fossil fuels, however perennial issues surrounding energy security remain, as well as 'new' concerns related to biodiversity loss are also now to the fore.

A landbank of over 80,000 ha is the company's primary asset and following Bord na Móna's decision to fully cease peat extraction in 2020, the company developed a strategy that sought to optimise sustainable opportunities on its peatlands. At its core this strategy focused on the development of renewable energy assets, peatlands rehabilitation & restoration, and biodiversity gain – the so-called 'win-win-win' scenario.

While financiers and investors understand the economics, benefits and opportunities associated with renewable energy and the locking-in and potential sequestering of carbon via peatlands rehabilitation, projects that deliver biodiversity gains are still in their infancy. However, Bord na Móna has a proven track record in sustainable and nascent innovation having developed Ireland's first commercial windfarm over 30 years ago, and in 2023 receiving consent for the State's first green hydrogen plant. The company is now working on biodiversity projects which complement its renewable energy pipeline and associated peatlands rehabilitation, as well as on structures that would allow third party corporates contribute and participate in these initiatives.

The Bord na Móna rehabilitation and restoration initiatives on approximately 33,000 ha of Bord na Móna peatlands previously used for industrial peat extraction in 2021 are delivering climate action and quantifiable biodiversity gain. These measures have rehabilitated or restored c.15,000 ha of peatland to date. Whilst the primary focus of the scheme is climate action including the accommodation of renewable generation

assets, biodiversity is a core target domain. Results to date indicate that most rehabilitated bogs are on a positive trajectory towards increasing biodiversity post rehabilitation. Impacts such as the managed increase of water table height now facilitate larger numbers of winter wildfowl with populations at some rehabilitated bogs approaching internationally important numbers including species listed on Annex I of the Habitats Directive.

The reduction in land cover from largely bare peat to a mosaic of emergent wetland habitats now supports increasing numbers of bird species overall. Monitoring as part of this scheme has now identified 81 species of breeding birds for instance of which 42% are either 'Red' or 'Amber' listed in Ireland i.e., are of high conservation concern. Improvements in the quality of habitats available facilitate a wider range of bird species of conservation concern notably 'wetland' species such as breeding waders. A breeding pair of Common Crane (*Grus grus*) have recolonised a cutaway Bord na Móna peatland in 2019 and have now attempted to breed for 5 consecutive years with successful fledging recorded in both 2022 and 2023 – the first successful breeding

of this species in Ireland in over 300 years. Additionally, in 2023 there were separate sightings of pairs of Common Crane in Offaly and Tipperary. The latter sites comprise Bord na Móna cutaway bogs, which were formerly used to extract peat for energy production but have since been rewetted in recent years under different rehabilitation initiatives. Further peatland rehabilitation by Bord na Móna will improve habitat availability for this and other species into the future as well as delivering on Natural Capital which will benefit not only biodiversity but also the communities linked to the Bord na Móna landbank.

All biodiversity monitoring (target domains include Birds, Habitats, Pollinators) is aligned with national Best Practice in the Irish context and/or where relevant the international context. Biodiversity gains are derived using established metrics based on standardised survey methodologies employed for breeding birds in Ireland and the UK.

Relatively speaking these initiatives are still in their early stages of development and delivery, and Bord na Móna is open and looks forward to working with partners in further advancing these 'win-win-win' initiatives.



Case Study

LIFE IP

Wild Atlantic Nature – Results-based approaches to nature conservation

Partners: Multi-actor approach with 10 partners coordinated by National Parks & Wildlife Service

LIFE IP Wild Atlantic Nature is a nine-year environmental project (2021-2029) working with farmers, landowners, local communities, state agencies and others with the common objective of protecting and restoring Special Area of Conservation network of blanket bog habitat. The projects' flagship Results-Based agri-environment Payment Scheme (RBPS) was implemented in 2021-2022 to develop capacity among participating farmers, farm advisors, policy makers and scientists for delivering improved ecosystem services – including water quality, biodiversity and climate regulation – in a way that works for landowners and the environment. Results-based approaches

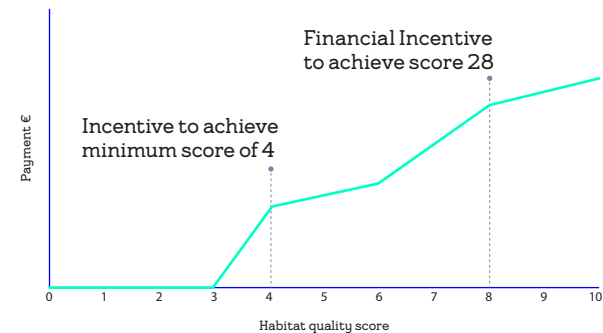
Results-based approach

Payments are linked to nature quality of your farm.



Higher nature quality =
Higher Payment level

Each plot is scored out of 10 using a scorecard that captures high and low quality habitat which reflect past and current management.



directly link farmer payments to the ecological condition of their land, thereby rewarding good environmental management and incentivising improvement on lower scoring lands. In a hybrid model, such as Wild Atlantic Nature RBPS, financial and technical supports are available to farmers who wish to undertake actions to improve ecological condition.

840 participating farmers, covering 65,000 ha of high-nature value farmland, were paid a total of €3 million in the Wild Atlantic Nature RBPS. The learnings from the pilot informed the development of the Department of

Agriculture ACRES CP programme, which is currently delivered for 20,000 farmers in the Common Agricultural Policy Strategic Plan for Ireland (2023-2027).

The results-based model has been subsequently used by LIFE IP Wild Atlantic Nature and associated partners as an implementation mechanism for identifying threats and pressures on land use, and subsequent planning and delivery of conservation measures. An expanding series of demonstration sites and locally led conservation projects are delivering improved public services, rural employment, and increased capacity for nature restoration.



Read more online:
www.wildatlanticnature.ie



Case Study

Strong Roots

Changing diets and consumer demand

Surveys show consumers are claiming to be more mindful of the environmental impact of food choices, with a particular focus on reducing carbon footprint. A 2021 Bord Bia Dietary survey of 18000 people across 9 markets showed 27% of respondents claimed that they are willing to pay more for sustainable food. The figures for Irish respondents, with 65%, were even higher than the global average when it came to the desire to reduce carbon footprint through food choices.

One growth segment of this market is plant-based foods which is forecast to be worth \$162 billion by 2030. Research published in 2023 by the National Dairy Council in Ireland, found that 84% of Irish consumers claimed

that they had taken steps towards eating a “more sustainable diet”, and 4% claimed to eat a vegan diet. Strong Roots is an Irish SME which is capitalising on the growing plant-based market. Their case study shows their approach and how they certified as a “B Corp” – a designation that a business is meeting high standards of verified performance, accountability, and transparency.

Strong Roots – The market for sustainable food products

Strong Roots was founded with sustainability woven right through its DNA, with social and environmental responsibilities reflected formally in their governing documents and throughout the entire business structure.

Strong Roots’ latest research shows that while health is a dominating factor as to why people purchase plant-based products, 45% of people do so because of environmental concerns.

Another external study confirmed that close to half of food shoppers always or nearly always consider environmental impacts when making purchasing decisions.

Becoming one of the first Irish B Corps was a natural fit for Strong Roots – companies that certify as B Corps are responsible, transparent, innovative and above all, committed to balancing purpose with profit. This is not an empty accolade – Strong Roots are expected to improve social and environmental performance year on year.

In terms of innovation, this is reflected in the decision to display the climate footprint of each product, along with the B Corp logo, front and centre of all packaging. This holds the company accountable publicly, and challenges bigger brands to do the same.

The appeal of healthy, conscientious plant-based food isn’t limited to the consumer – Strong Roots was recently acquired by McCain Foods which is facilitating them to become a truly global brand.

The trend when it comes to responsibility and transparency is only going in one direction, and Strong Roots is proud to be at its forefront.



“When I started the company in 2015, having identified a demand for tasty, nutritious and planet-friendly food, I knew from day one that being plant-based would be one of our guiding principles. Consumer demand trends have proven that instinct to be right time and again in the years that followed”,

Sam Dennigan

founder and CEO.



Read more online:
strongroots.com



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Conclusions³⁴

5.1 Status

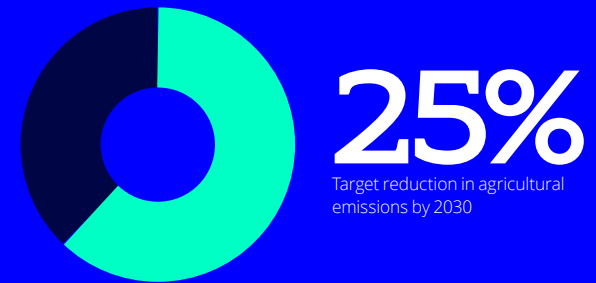
The state of play is that the business case drivers for sustainable food and farming from government, customers, lenders, shareholders, and society are strong and growing, bringing both challenges and opportunities. This impacts all actors in the food value chain – farmers, producers, and retailers. Progress is being made, but not fast enough to meet the ambitious targets by 2030. A complex array of sometimes inconsistent policy and incentives frame this landscape covering sustainable food, climate change, biodiversity, water quality and bioenergy.

Many of the solutions are known. The most cost-effective solutions for achieving the agriculture sectors required target of a 25% reduction in GHG emissions by 2030 this include the following, which also bring the required biodiversity and water quality improvements:

- **Agriculture** – Multiple measures on farm as illustrated can achieve 64% of target if fully implemented. 50% of the target can be achieved from a few measures – growing use of protected urea fertilisers, low emission slurry spreading, feed additives and diversification activities on farm.
- **Bioenergy** – Development of a biomethane industry to support an emergent bioenergy industry in Ireland can achieve 26% of the target.
- **Land** – Growing carbon sequestration on land through grassland and manure management, use of cover crops, restoring peatlands and afforestation can secure 10% of the target.⁶⁵

Target GHG Mitigation Measures for Agriculture

(Source: Teagasc⁶⁶)



20%

Reduction in chemical Nitrogen use

90%

of slurry spread by low-emission slurry spreading

70%

of suckler herds weight recording

23MtCO₂e

Baseline agricultural emissions (2018)

3 month

reduction in age at slaughter

5 fold

Increase in land area under organic farming

65%

of CAN replaced by protected urea

90%

of dairy herds milk recordings

1.6Twh

Biomethane injected into gas grid

Diversification

Carbon Farming

⁶⁵ Teagasc MACC 2023: An Updated Analysis of the Greenhouse Gas Abatement Potential of the Irish Agriculture and Land-Use Sectors between 2021 and 2030 Prepared by Teagasc Climate Centre Gary J. Lanigan, Kevin Hanrahan & Karl G. Richards (eds. MACC-2023.pdf (teagasc.ie)

⁶⁶ Understanding greenhouse gas emissions on Farms – Teagasc | Agriculture and Food Development Authority

5.2 Investment

To achieve the 25% reduction target requires an investment estimated at between €3.2 billion⁶⁷ to €4.3 billion⁶⁸ during 2021 – 2030. €1.7 billion of this is expected to come from public funds and €2.6 billion from private investment.

The main capital investment opportunity suited to private investment is the development of a biomethane industry converting farm waste and feedstock to energy consistent with Ireland's Food Vision, Climate Change and Bioeconomy policies. The capital investment required for this is estimated at circa €1.6 billion⁶⁹ with community scale investment across co-operatives and farmers a particular opportunity. This approach has been used successfully in Denmark which has a more mature biomethane industry compared to Ireland. An Irish indigenous biomethane industry would not only reduce emissions from agriculture but also provide economic opportunities for rural communities. Other opportunity areas include decarbonisation on farm, renewable energy microgeneration and forestry. All of these can provide additional income streams for farmers but still require infrastructure improvements like grid connectivity to enable them.

67 Teagasc MACC 2023: An Updated Analysis of the Greenhouse Gas Abatement Potential of the Irish Agriculture and Land-Use Sectors between 2021 and 2030 Prepared by Teagasc Climate Centre Gary J. Langan, Kevin Hanrahan & Karl G. Richards (eds. MACC-2023.pdf (teagasc.ie)

68 Investing in Tomorrow: Shaping a Net-Zero Future (davy.ie)

69 Investing in Tomorrow: Shaping a Net-Zero Future (davy.ie)



1.7 billion euro

from public funds



2.6 billion euro

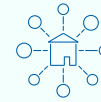
from private investment

5.3 Recommendations

BOI recognises the challenges and opportunities farmers and agri-business face and the need for finance and advisory supports tailored to the solutions science and policy advocate. BOI as the leading lender to Ireland's agri-business sector is already leading on this with its sustainable finance products. Representing 20% of BOI SME/business banking lending, BOI has over €4 billion in loans across the agrifood value chain and over €1.2 billion at the farm level. This is supplemented by a dedicated sustainability and agri team to support customers through advisory, lending and collaboration.

BOI's commitment to supporting the sector is evidenced by its portfolio of products designed to support food, farming and agri-business customers take practical and innovative actions. Products include novel sustainability-linked loan offerings like Enviroflex to encourage a farm to reduce annual GHG emissions through sustainability action and lower cost finance. Under the scheme, loans are available to support farmers in allocating capital for a range of purposes such as sustainable farm development, renewable energy projects and enhanced sustainability measures such as forestry/tree planting and biodiversity projects.

In addition to these supports, the following are recommended as key to support a just and successful sustainable food and farming transition:



Joined up approach



Bioenergy fast track



Scale of Investment required



Investor confidence



Incentives



Awareness raising and capacity supports



Private sector finance

5.3 Recommendations continued

Joined up approach



Given the complexity and urgency of the transition underway, consistent policies and incentives are needed to implement the solutions required. While there are many EU and Irish policies and initiatives, additional consistency and clarity on the practical implementation of EU and Irish policies and initiatives would be appreciated by the sector. This is particularly important given the scale of the transition required, tight 2030 target timelines and their coverage of not just the agriculture sector, but bioenergy and land as well.

Create investor confidence



Clarity on policy, solutions and the investment required will support private investors directing capital to the required solutions and enable scaling quicker.

Bioenergy fast track



Given a scaled up biomethane industry is key to achieving circa 26% of the total agriculture 25% reduction target by 2030 and an opportunity for private sector investment, this requires a fast-track approach. Coordinated climate, energy and bioeconomy policies and implementation of the Bioeconomy Action Plan to develop the required infrastructure is needed.

Reward those taking action



Sustainability performance improvement should be rewarded and incentivised economically by the policy frameworks aligned to the solutions required.

Scale of Investment required



The investment required to achieve the 25% agriculture sector GHG reduction target by 2030 is significant. Our analysis estimates this is higher at €4.3 billion⁷⁰ (2021 – 2030), than government estimates at €3.2 billion⁷¹ if community scale bioenergy and on-farm scale is factored in. If there is a short fall or need for private investment which suits the bioenergy opportunity engaging relevant stakeholders on planning for this is key.

Awareness raising and capacity supports



Supporting farms on the business case for solutions to decarbonise food production, improve biodiversity, water quality and enhance income is essential to supporting action.

Supportive banks



For financing the transition in the private sector, banks and capital providers can support agri-business and farmers move faster by funding science-based sustainability improvements aligned with policy. On this issue BOI is proud to be showing the way.

BOI maintains its strong interest in lending to the farming and agri-business sector in Ireland and remains optimistic about its future. The bank is committed to supporting the sector and is confident that its overall lending policies, credit policy, and risk assessment approach are suitable for addressing the challenges it is facing. BOI believes in supporting the sustainable food and farming transition. As the oldest and largest Irish bank lending to farmers and agri-business, BOI is dedicated to supporting the sector achieve a low emission and nature positive future.

⁷⁰ Investing in Tomorrow: Shaping a Net-Zero Future (davy.ie)

⁷¹ Teagasc MACC 2023: An Updated Analysis of the Greenhouse Gas Abatement Potential of the Irish Agriculture and Land-Use Sectors between 2021 and 2030 Prepared by Teagasc Climate Centre Gary J. Lanigan, Kevin Hanrahan & Karl G. Richards (eds. MACC-2023.pdf (teagasc.ie)



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