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you're after

AIB Agri Sustainability Guide

Sustainability is at the heart of our strategy.

At AIB we want to empower people to build a sustainable future. We are doing this by greening our own business and supporting our customers so that, together, we can be better protected against the impacts of climate change.

We will continue to be a catalyst for positive climate action in Ireland and beyond, providing sustainable finance, investments, and expert advice to drive progress across all sectors, including Agriculture.

To support our customers, we have developed a series of sector specific sustainability guides. These guides aim to provide practical tips and information which can be used by businesses to transition their operations to a more sustainable footing.

This series has been produced in partnership with Mabbett, a leading environmental consulting and engineering firm.

To view the full series of guides, please visit www.aib.ie/business

Contents

Section 1	
Introduction	1
Section 2	
Environmental Policy	3
2.1 Ireland's Climate Action and Low Carbon Development Act 2021	4
2.2 Food Vision 2030	5
Section 3	
The Importance of Agriculture from a Social and Economic Sustainability Standpoint	7
Section 4	
Teagasc Marginal Abatement Cost Curve	11
Section 5	
Sustainable Agricultural Technologies & Practices	17
5.1 Soil and Grassland Management Practices	17
5.2 Dairy Case Study	19
5.3 Fertiliser Application	20
5.4 Beef and Sheep Case Study	21
5.5 Animal Breeding	22
5.6 Feed and Feed Additives	23
5.7 On-farm Biodiversity	23
5.8 Water and Air Quality	24
5.9 Renewable Energy	25
5.10 Integrated Pest Management (IPM) and Pesticide Reduction:	30
5.11 Sustainability Case Study	31
5.12 Tillage Case Study	33
Section 6	
Diversification	35
6.1 Organic Farming	35
6.2 Forestry	36
Section 7	
Industry enablers and AIB supports	39
7.1 Industry Enablers	40
7.2 AIB Supports	41
Section 8	
Additional Resources	43
Appendix 1	44
Appendix 2	45



Section 1

Introduction

Agriculture is Ireland's oldest and largest indigenous industry, encompassing approximately 137,500 farms.

The Agriculture sector is undergoing a significant transition to deliver the reduction in greenhouse gas (GHG) emissions required, which will impact across Ireland's agriculture and food production systems.

The need for the Agri-food sector to deliver sustainability comes from a powerful combination of changing societal demands, consumer behaviour, political decisions, and the requirements of major trade customers for Irish food and drink.

In addition, there is an increased focus on our legal and social responsibilities to care for the environment for future generations, and an improved understanding of how fundamental a healthy environment is for producing healthy and nutritious food.

Ireland's Climate Action and Low Carbon Development Act 2021 aims to reduce agricultural emissions by 25% from a 2018 baseline by the year 2030, along with the long-term goal of achieving net-zero emissions from the agricultural sector by 2050.

The agricultural sector has been working to reduce GHG emissions. In 2024, agricultural GHG emissions fell by 1.7% (~0.4 Mt CO₂e), following a 4.6% (~1.01 Mt CO₂e) decrease in 2023 and a 0.7% reduction in 2022.

The responsibility placed on agriculture sectors to meet these targets poses both opportunities and challenges in adopting new sustainable farming and technological methods. There is interplay and co-dependency between the three pillars of Sustainability – Environmental, Social and Economic.

The economic sustainability of farmers and forest owners, with healthy environments, ecosystems and economies are integral to sustaining rural communities.

Given that Agriculture is a significant contributor to Ireland's GHG emissions (primarily methane from livestock), the purpose of this Agri Sustainability Guide is to provide the sector with a comprehensive framework to assist in reducing its GHG emissions while improving overall sustainability.

This AIB guide highlights the opportunity sustainable technology and improved management practices offers the agricultural sector in supporting long-term economic, rural and social sustainability in our communities.

AIB is proud to partner with a number of key industry initiatives including for example the Teagasc Signpost Programme, the Grass10 initiative and Carbery Group's 'Farm Zero C' project to bring best in class information to our customers. AIB's dedicated team of Agri advisors are also available to support customers on their sustainability journey.

AIB is committed to supporting innovation in Agriculture and the sector's ambition to decarbonise and meet its emission reduction targets by 2030. 'Sustainable Communities' is one of AIB's five strategic pillars and our Agri customers are at the heart of these communities.

This AIB guide outlines on farm practices and sustainability measures that can be adopted at farm level in addition to real life customer case studies highlighting sustainable actions being taken by farmers and food producers to support transition across the agricultural sector.



Section 2

Environmental Policy

Ireland's Climate Action and Low Carbon Development Act 2021 has set out a target to reduce economy-wide greenhouse gas emissions, across the economy, by 51% by 2030 from a 2018 baseline.

Ireland's Emissions Target & Climate Plans – What Farmers Need to Know

Ireland has set a target to reduce greenhouse gas emissions from 23 million tonnes (Mt) in 2018 to 17.25 Mt by 2030 for the Agriculture sector. This is part of a broader climate plan agreed internationally and at EU level.

Why Are We Doing This?

Ireland signed up to the Paris Agreement (2015) with 194 other countries to help limit global warming to below 2°C, ideally 1.5°C relative to pre-industrial era temperatures (the period before the widespread adoption of industrial processes that significantly

increased greenhouse gas emissions into the atmosphere c. 1850–1900). Under this deal, each country sets their own climate targets – called Nationally Determined Contributions (NDCs) – and updates them every five years to be more ambitious.

Ireland's Climate Action Plan

Ireland's plan is to cut national emissions by 51% by 2030 and hit net-zero by 2050. This is enshrined into law under the Climate Action and Low Carbon Development Act 2021. The most up-to-date version of Ireland's climate action plan is **Climate Action Plan 2025**, approved by government in April 2025. It is the third annual statutory update under the Climate Action and Low Carbon Development (Amendment) Act 2021 and the fifth overall. To get there:

- Emissions limits are set for each sector (including agriculture).
- We are now in Carbon Budget One from (2021–2025) with a national cap of 295 Mt CO₂e covering the 5 years, an average of 59 Mt of CO₂e per year.
- The goal was to cut emissions by an average of 4.8% per year in this period, it is looking unlikely that this target for the first carbon budget will be met by the end of 2025. The Environmental Protection Agency (EPA) has estimated that the first carbon budget (2021–2025) will be exceeded by 8–12 Mt CO₂e
- If we miss the targets, the shortfall will have to be included in the next 5-year carbon budget plan number two (2026–2030) making it increasingly challenging to meet the reduction targets the closer we get to 2030.

- While overall emissions are trending in the right direction it does highlight the need for all sectors of the economy to redouble their efforts to implement climate action plans that have been sectorally developed over the past four years.
- Agriculture has a detailed roadmap set out in its ambition to reach the 2030 targets and this guide seeks to set out the key technologies that are available to support the emission reduction target of 25%. Increased rates of adoption by farmers of the best available science and technologies will be essential to support the sectors decarbonisation.
- It will not suffice for the early farm adopters of new technologies to achieve the Emission Reduction Targets (ERTs) alone, it will require a whole of Agriculture sector and industry response. The cumulative effect of the whole sector making small incremental changes could, on the other hand, be the key to achieving the targeted ERTs.

The EPA is the statutory body tasked with collating all the data annually to produce Ireland's emissions profile across all sectors of the economy. Key agricultural emission reduction targets are set out in Ireland's Climate Action and Low Carbon Development Act 2021, to achieve a climate neutral food system by 2050.

2.1 Ireland's Climate Action and Low Carbon Development Act 2021

In line with EU legislative targets, which member states including Ireland signed up to, Ireland developed its own strategy to decarbonise its economy.

Agriculture Targets

1. Biogenic methane: Reduce biogenic methane by at least 10% by 2030 (from a 2018 level). This target may be adjusted depending on the industry's emerging national and international targets or scientific developments.

2. Nitrous Oxide: Reduce emissions associated with chemical fertiliser by more than 50% by 2030.

3. Water Quality: Reduce nutrient losses from Agriculture to water by 50% by 2030's.

4. Biodiversity: By 2030, it is anticipated that 10% of farmed land will be prioritised for biodiversity, spread across farms throughout the country.

5. Air Quality: Decrease Ammonia emissions by 5% compared to 2005 levels by 2030.

6. Forestry: Increase afforestation from existing levels to a minimum of 8,000 ha per annum and double the sustainable production of biomass from forestry to 2 million tonnes by 2035.

Under the Climate Action and Low Carbon Development Act 2021 Ireland is committed to reduce its greenhouse gas emissions by 51% by 2030 (relative to 2018 levels) and achieving net-zero emissions by 2050.

It aligns with legally binding carbon budgets and sectoral emissions ceilings approved and agreed by Government in April 2022. A carbon budget represents the total amount of emissions, which may be released during an agreed five-year period.

It is calculated on an economy wide basis and if there is any shortfall in meeting the reductions in the five-year period, the deficit must be made up in the next 5-year carbon budget. Ireland is currently in its first 5-year agreed carbon budget from 2021–2025.

The target set for the first carbon budget 2021–2025 across all sectors of the economy is 295 Mt CO₂e. This represents an average reduction in emissions of 4.8% per annum for the first budget period.

2.2 Food Vision 2030

Ireland's Food Vision 2030, a Department of Agriculture initiative, forms part of Agriculture's response to the Climate Act targets. The Food Vision is a strategic roadmap aimed at guiding the country's agri-food sector towards sustainable growth and resilience over the next decade.

Food Vision 2030 reflects Ireland's ambition to balance environmental, economic, and social priorities, aiming for a holistic and forward-thinking approach to food production and consumption.

The plan emphasises the following key points:

- 1 Sustainability and Climate Action
- 2 Economic Viability
- 3 Food Safety and Quality
- 4 Rural Development
- 5 Research and Innovation
- 6 Global Leadership



Further information: <https://www.gov.ie/en/department-of-agriculture-food-and-the-marine/policies/food-vision-2030-a-world-leader-in-sustainable-food-systems/>



Section 3

The Importance of Agriculture from a Social and Economic Sustainability Standpoint



Diarmuid Donnellan

Diarmuid, AIB's Head of Sustainability for Agri, Food, and Fisheries, highlights the importance of agriculture from both social and economic sustainability perspectives.

Rural Sustainability

Agriculture is deeply embedded in the fabric of rural Ireland, playing a vital role in both social and economic sustainability. The sector not only contributes to the economic stability of rural communities but also preserves cultural traditions, community cohesion, and a way of life that has existed for centuries.

Social Sustainability

Social sustainability refers to the ability of rural areas to sustain vibrant communities where people can live and work with a good quality of life. Agriculture in Ireland supports social sustainability in a number of ways:

- Farming is a cornerstone of Irish identity and cultural heritage, particularly in rural areas where its traditions, family farms, and agricultural practices are passed down through generations. Agriculture fosters a strong sense of community through shared experiences and collective activities like local Agricultural shows. Farming preserves the rural character, landscape, and way of life that defines many regions of Ireland.
- Agriculture ensures employment and population retention by providing an income for farmers and those involved in Agri-businesses. The sector supports ancillary businesses, including machinery services, veterinary practices, transport, Agri-merchants, accountants providing employment and services essential for sustaining rural communities.
- Farmers are often highly involved in community activities and volunteering, helping to sustain local sports clubs, be they hurling/camogie, football, soccer, athletics, rugby etc. These are all elements that support social cohesion in rural Ireland.

Economic Sustainability

From an economic sustainability perspective, agriculture contributes to rural areas by providing long-term economic viability, driving rural development, and supporting a robust agri-food sector.

- Agriculture supports rural economies by providing steady income for farmers and their families. This income supports other sectors of the rural economy through spending on goods, services, and local products.
- Ireland is a significant exporter of agricultural products, particularly dairy, beef, and lamb. The agri-food sector contributes approximately 7% to Ireland's GDP and supports thousands of jobs. By producing high-quality food for both domestic and international markets, agriculture helps sustain economic growth in rural areas.
- Many rural farms are diversifying into Agri-tourism, offering farm stays, educational tours, or food-related experiences that attract visitors, thus creating new revenue streams for rural communities.
- Farmers are increasingly turning to value-added products such as artisanal cheeses, organic vegetables, milk vending and premium meats. These products fetch higher prices and contribute to economic resilience by offering diversified income sources.
- As the demand for food grows, Ireland has the opportunity to expand agricultural production sustainably through technology and improved management practices supporting long-term economic sustainability. Sustainability practices, such as organic farming or carbon farming, can provide farmers with new income streams (e.g. through carbon credits) while also benefiting the environment.

The Importance of Generational Renewal

Generational renewal is critical for the future of agriculture in Ireland. Without new entrants into the sector, the aging farming population will struggle to maintain productivity, adopt new technologies, or meet the increasingly complex challenges of sustainable farming.

- Younger farmers are more likely to adopt new technologies, embrace sustainable farming practices, and drive innovation. They are also better equipped to engage in digital farming (precision agriculture, data-driven decision-making) and climate-smart technologies, which are crucial for meeting Ireland's emission reduction targets.
- Young farmers are more likely to diversify farm income, explore alternative farming practices like organic farming, and create new business models that contribute to the economic sustainability of the sector.
- Every sector of business across society needs generational renewal for an industry to survive and thrive. The object is not to pit the older generation against the younger generation but to acknowledge the importance of generational renewal across the Agri sector. The average age of Irish farmers in 2025 is c. 60 years, which will present a sustainability challenge for certain farm holdings in the future due to lack of successors.

Promoting Positive Succession in Farming

Ensuring successful generational renewal involves supporting young people to enter and stay in farming, encouraging knowledge transfer and facilitating smooth succession processes within farming families.

Why Succession Matters for Sustainability

- **Generational renewal** is key to the long-term economic, environmental, and social sustainability of Irish agriculture.
- **Positive succession** ensures farms remain vibrant, productive, and innovative, supporting rural communities and food security.
- **Proactive planning** helps farms navigate change while preserving family values, local heritage, and natural resources.

Five Principles for Positive Succession

1. Start Early — Open the Conversation

- » Begin succession talks well before retirement (ideally 5–10 years ahead)
- » Encourage family dialogue about future roles, ambitions, and vision for the farm
- » Engage external advisors (solicitors, accountants, agricultural consultants, financial advisors)

2. Promote Knowledge Transfer

- » Involve younger generations in decision-making and day-to-day management early
- » Encourage learning in modern sustainability practices (e.g. nutrient management, renewable energy, biodiversity)
- » Leverage training through Teagasc, agricultural colleges, and discussion groups

3. Financial Planning for a Smooth Transition

- » Develop a clear financial plan for succession:
 - › Farm viability
 - › Pension provision for retiring farmers
 - › Tax and inheritance considerations (Capital Acquisitions Tax, Agricultural Relief)
- » Engage with banks early to assess future investment or restructuring needs

4. Embed Sustainability in the Succession Plan

- » Successors should inherit not only the land, but also a sustainability mindset
- » Include:
 - › Nutrient management planning
 - › Water and soil protection practices
 - › Climate adaptation strategies
 - › Circular economy opportunities (on-farm energy, waste reduction)

5. Leverage Community & Professional Supports

- » Connect with:
 - › Succession clinics and peer groups (Teagasc, IFA, Macra na Feirme)
 - › Programmes for young farmers
 - › Financial partners committed to sustainable agriculture (AIB and others)

Key Takeaways

- Succession is a process — not an event
- Early planning reduces stress, conflict, and financial risk
- Embedding sustainability values ensures a farm fit for future generations
- Collaborative, supported transitions drive resilience in the sector

Useful Resources

- Teagasc Farm Succession & Inheritance Hub
- Macra na Feirme Land Mobility Service
- Irish Taxation Guidelines for Farm Transfers
- AIB Sustainable Agri Finance Solutions



Section 4

Teagasc Marginal Abatement Cost Curve

The Teagasc Marginal Abatement Cost Curve (MACC) is a tool used to understand how different strategies can reduce greenhouse gas (GHG) emissions in agriculture, specifically in Ireland.

It helps policymakers, farmers and other stakeholders make informed decisions about which actions will reduce emissions most effectively and efficiently. The MACC is a visual representation illustrating different options for reducing GHG emissions.

The MACC compares these options based on two main factors, cost and abatement potential, arranging these from the least to the most expensive. Therefore, allowing users to see which actions are most cost-effective and which might require more investment.

The Teagasc MACC is an essential tool for understanding the cost and potential impact of various emission-reducing strategies in Irish agriculture.

By using this tool, policymakers and farmers can prioritise actions that offer the most significant environmental benefits for the least financial cost, helping Ireland move toward a more sustainable agricultural system.

→ **Cost:** How much each action will cost (or save) per unit of emissions reduced (measured in € per tonne of CO₂ equivalent).

→ **Abatement Potential:** How much emissions reduction each action can achieve (measured in tonnes of CO₂ equivalent).

How Does the Teagasc MACC Work?

Each action or strategy to reduce GHG emissions is plotted on the curve, showing:

→ **Actions that save money:** These actions not only reduce emissions but also save farmers money in the long run (e.g. genetic improvements).

→ **Actions that have a cost:** Some strategies may reduce emissions but come with additional expenses for farmers (e.g., adopting new technology such as methane reducing feed additive).



Categories of Measures in the MACC

Teagasc breaks down the emission-reducing actions into several main categories:

→ **Improved Land and Nutrient Management:**

- » Efficient use of fertilisers (such as using less nitrogen-based fertilisers or using alternative types).
- » Better management of manure to reduce methane emissions.

→ **Livestock Management:**

- » Breeding efficient animals producing less methane.
- » Improving animal diets to lower methane emissions during digestion.

→ **Carbon Sequestration:**

- » Planting more trees or maintaining existing forests that absorb CO₂ from the atmosphere.
- » Enhancing soil management practices to store more carbon in the ground.

→ **Renewable Energy and Energy Efficiency:**

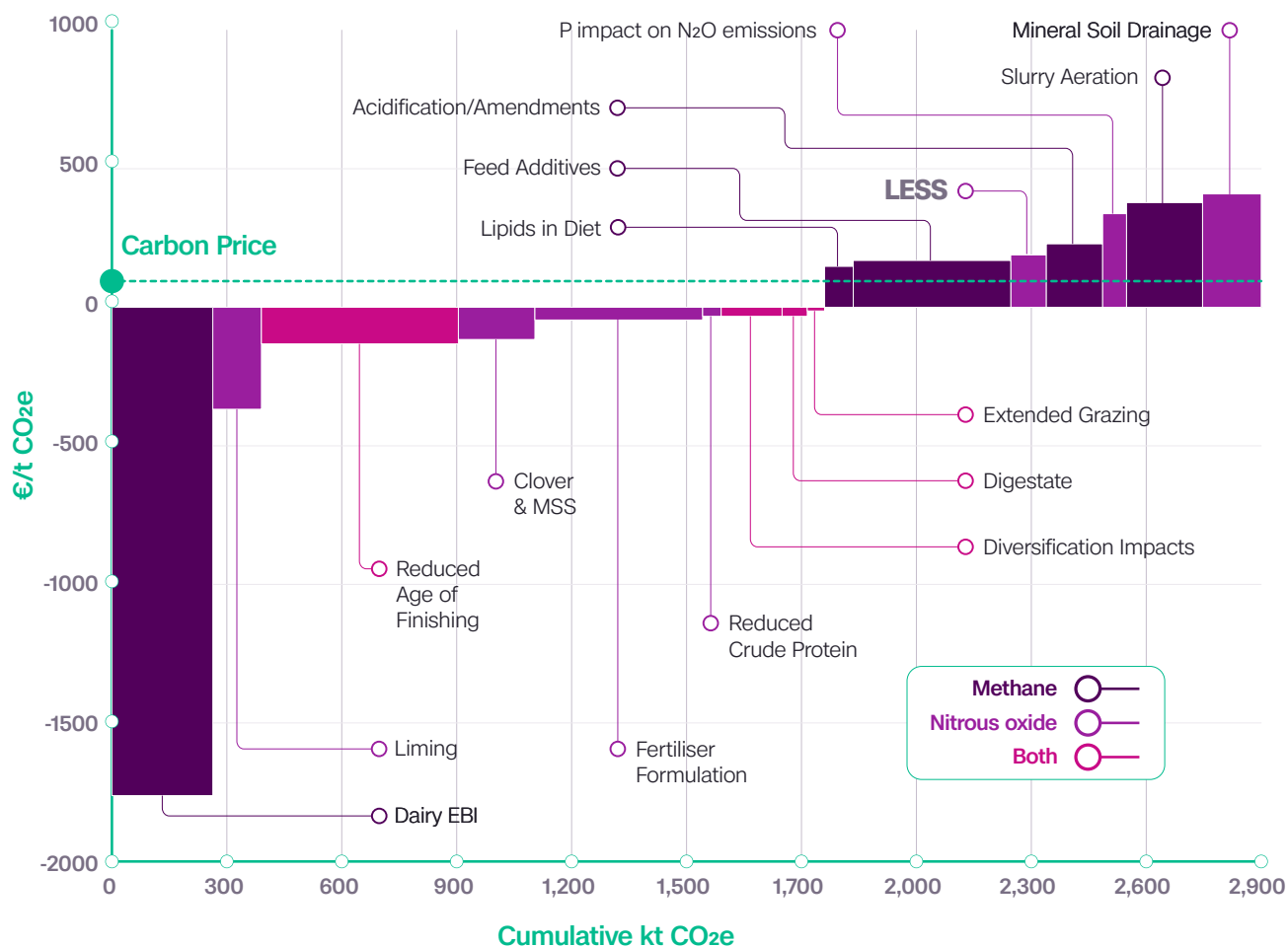
- » Using renewable energy sources, like solar panels or wind energy, on farms.
- » Implementing energy-saving practices to cut down on fossil fuel use.

Reading the Curve

On the Teagasc MACC:

→ The **x-axis (horizontal line)** from zero across represents the total amount of emissions that can be reduced, showing how much each measure contributes.

→ The **y-axis (vertical line)** shows the cost of each measure. If a bar goes below the zero line, it means the action saves money while reducing emissions. If it is above, the action has a cost associated with it.



Key Insights from the Teagasc MACC

→ Low-Cost/No-Cost Measures:

Some actions, such as optimising fertiliser use or improving grassland management, can save money and are effective at reducing emissions.

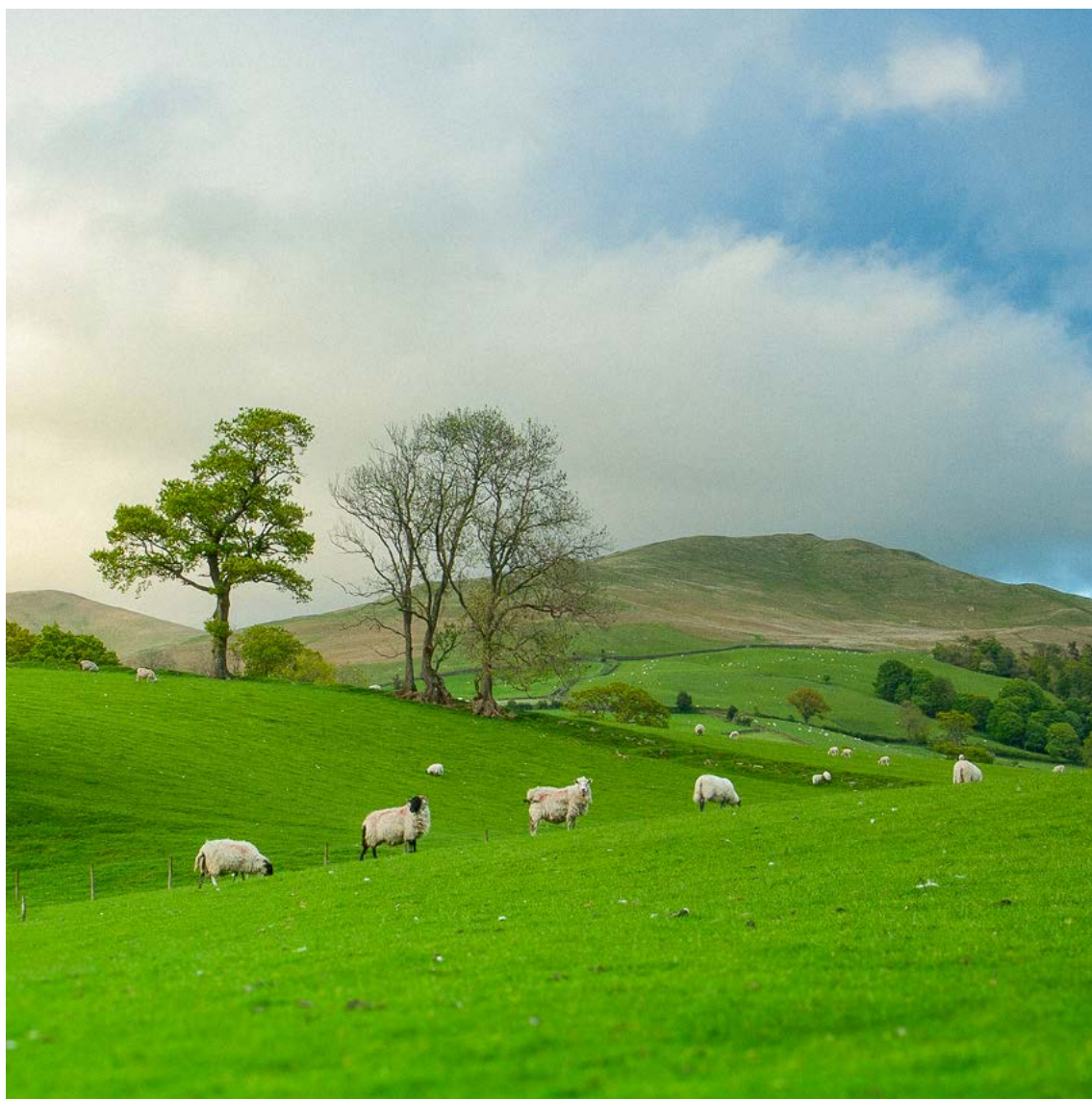
→ More Expensive Measures:

Other measures, like advanced livestock feed additives or specific carbon capture initiatives, may have higher costs but may be necessary to achieve more significant reductions.

→ **Priority Actions:** The MACC helps identify 'low-hanging fruit' or easy, cost-effective actions that farmers can adopt quickly.

Measures From the Teagasc MACC are included in the Climate Action Plan

The Climate Action Plan outlines several agricultural abatement measures applicable across various enterprises, including dairy, beef, sheep, tillage, and horticulture. These measures are designed to reduce GHG emissions, enhance sustainability, and improve the overall environmental performance of agricultural enterprises. Implementing these practices can contribute significantly to achieving national climate targets. A summary of these measures is outlined on the next page.



Measure	Description	
Improved Nutrient Management	→ Optimise fertiliser application to reduce nitrous oxide emissions, → Use of Protected Urea → Enhance soil health through incorporation of lime	Dairy, Beef, Sheep, Tillage
Low-Emission Slurry Spreading (LESS)	→ Utilise technologies like trailing shoe or dribble bar to minimise ammonia emissions during slurry application.	Dairy, Beef, Sheep
Incorporation of Clover & Multi-Species Swards	→ Introduce clover and multi species (chicory, plantain into pastures to reduce chemical nitrogen fertiliser use).	Dairy, Beef, Sheep
Extended Grazing Season	→ Increase the duration livestock graze outdoors to reduce housing-related emissions.	Dairy, Beef, Sheep
Improved Animal Breeding	→ Select for traits that enhance productivity and reduce emissions intensity. Dairy EBI index, Beef and Sheep Eurostar index.	Dairy, Beef, Sheep
Cover Cropping	→ Plant cover crops over winter periods to sequester carbon and improve soil health.	Tillage, Horticulture
Min-Tillage Practices	→ Implement minimum tillage practice to decrease soil disturbance and enhance carbon sequestration.	Tillage, Horticulture
Afforestation & Agro-forestry	→ Plant commercial forests to reduce CO₂ → Integrate tree planting into farming systems to sequester carbon.	Dairy, Beef, Sheep, Tillage
Energy Efficiency Measures	→ Adopt energy-efficient technologies and practices in farm operations, variable speed pumps etc.	All Enterprises
Renewable Energy Adoption	→ Install renewable energy systems, such as solar PV panels, to reduce reliance on fossil fuel sourced energy.	All Enterprises



Section 5

Sustainable Agricultural Technologies & Practices

A suite of measures, as outlined below, detail the sustainable technologies, practices and real case examples available to support the Agri-sector in its transition to decarbonisation and achieving the emission reduction target (ERT) of 25% by 2030.

5.1 Soil and Grassland Management Practices

Soil contains a lot of carbon as the broken down plants, which make up soil, took in carbon from the atmosphere when they were alive. In Ireland, particularly due to the colder climate, decomposition is slow. Therefore, soils store or 'sequester' carbon for a very long time. This carbon would return to the atmosphere as carbon dioxide (CO₂), the main greenhouse gas causing climate change, if not for soil sequestration.

Effective soil and grassland management, through proper pH maintenance, regular soil sampling and returning organic manures to the land enhances soil organic matter, which has the ability to sequester carbon from the atmosphere. Healthier soils with high organic content can lock in carbon and offset emissions from other sources.

Key Points on Soil Health and Fertility

Soil Fertility:

- Maintaining soil at a target pH of 6.3+ and Phosphorus (P) and Potassium (K) at Index 3 is crucial for reducing chemical Nitrogen (N) fertiliser use.
- Applying lime improves soil pH, releases up to 80 kg N/ha/year and boosts grass production.
- Soil sampling should be carried out every two years, followed by the development of a nutrient management plan to align inputs with crop demand and avoid waste of nutrients.

Lime Application:

- Many mineral soils in Ireland need lime to enhance fertility. The majority of Irish soils are acidic in nature. Soil sampling specifies the lime required per hectare to help improve soil pH and overall soil fertility.

Measures: Grassland Management

Grass Measurement and Management:

- Regular grass measurements, using tools such as plate meters or devices such as the Grasshopper, help monitor grass cover and guide decisions on chemical Nitrogen fertiliser use.
- Identifying areas of deficiency or surplus enables better management, including taking surplus grass for silage.

Pasture Management Tools:

- Technologies like Pasture Base Ireland allow farmers to diagnose issues (e.g., N, lime, P, K) and take corrective action.
- Training programmes like Grass10 promote improved grassland management. Refer to Section 7.2 AIB Supports for further detail.

Incorporating Red and White Clover:

- White clover in grazing swards can cut chemical N fertiliser use by up to 100 kg N/ha by fixing atmospheric N.
- Red clover in silage swards can reduce chemical N use by 150-200 kg N/ha, saving costs (e.g., €50/acre).

Grazing and Animal Diet:

- Increasing the share of grazed grass in animal diets enhances feed digestibility, improving productivity and lowering slaughter age, which reduces methane emissions.



5.2 Dairy Case Study



Farm Details

Land Farmed	43.6 ha of which 16.7 ha are leased
Cows	100
Grass Dry Matter Grown	13 t/ha
Milk Processor	Kerry
Cow Type	FRX
Herd EBI	€230

Teagasc Signpost Farmer

William farms on the banks of the river Brown Flesk in Currow, Co. Kerry. When William began the Signpost Programme back in 2021, the CO₂ footprint of the farm was 1.01 kg CO₂ per kg FPCM (Fat & Protein corrected milk). This has reduced to 0.87 kg CO₂ per kg FPCM, over 14% of an emission intensity reduction.

William sees this as a positive result, saying:

“If the environmental actions are supporting economic outcomes it's a win-win and it's also helping to reduce the CO₂ footprint of my milk and improve the overall sustainability of my business”.

Summary of key actions undertaken to improve sustainability and productivity:

- 1. Infrastructure and Grazing Management:** Invested significantly in farm roadways and grazing infrastructure, enabling maximum grass dry matter production and utilisation.
- 2. Efficient Livestock Management:** Sells all male calves at six weeks and contract-rears heifer replacements, maintaining a 20% replacement rate with a stocking rate just under 2.5 cows/ha. This stocking rate provides resilience against weather disruptions by building up buffer feed for winter or drought.
- 3. Milk Production Focus:** Aims to maximise milk solids from a grass-based system, with an average supplementary feed of 0.8–1.0 t per cow annually, adjusted based on weather conditions.
- 4. Herd EBI Improvement:** Focuses on increasing herd Economic Breeding Index (EBI), reducing CO₂ emissions with each improvement. Uses only AI for replacements, achieving a 6-week calving rate of 86%.
- 5. Environmental Practices:**
 - » **Soil Fertility Management:** Conducts annual soil sampling, targeting low-P and K areas with organic manures and maintaining optimal soil pH with lime applications to improve grass growth.
 - » **Low-Emission Slurry Spreading:** Uses low-emission equipment for slurry application to minimise nitrogen losses.
 - » **Clover Integration:** Introduced white clover in pastures to reduce chemical nitrogen reliance while managing the risk of bloat by monitoring cow intake, especially during lush growth periods.
- 6. Biodiversity Initiatives:** Planted over 600m of whitethorn hedging, increasing bird and pollinator presence on the farm.
- 7. Sustainable Nitrogen Use:** Switched to Protected Urea for chemical nitrogen, reducing Nitrous Oxide emissions by over 70%.
- 8. CO₂ Emission Reduction:** Since joining the Signpost Programme, William has reduced the farm's CO₂ footprint by over 14%, aligning environmental actions with economic benefits for enhanced farm sustainability.

5.3 Fertiliser Application

Nitrous oxide emissions (a greenhouse gas) arise from the application of chemical fertiliser. Nitrous Oxide emissions (N₂O) are the second largest source of GHG emissions from Irish Agriculture.

However, emission reduction efforts, undertaken by the agricultural sector, have already resulted in reducing agricultural GHG emissions, aligning with Ireland's long-term sustainability goals.

The adoption of low emission slurry spreading (LESS) has contributed to reducing nitrous oxide emissions and decreased chemical nitrogen use from 408,495 tonnes in 2018 to 280,569 tonnes in 2023 (a 31% reduction).

This equates to a reduction of 0.9 Mt CO₂e, or 35%, in fertiliser-related carbon emissions since 2018 — surpassing the 2030 target of 300,000 tonnes annually.



5.4 Beef and Sheep Case Study



Olivia Hynes

Jamestown, Four Roads,
Co. Roscommon.

Farm Details

Teagasc Signpost Farmer

Land Farmed	74.8 ha, of which 10.2 ha is rented
Stocking Rate	123 kg organic N/ha or 1.89 LU/ha
Suckler Cows	45
Ewes (mid-season lowland flock)	240
Cow Type	CHX, LMX & SIX
Beef Eurostar Index	€110

Olivia remarks:

“If you work hard and are open to new things, you will get out what you put in! As farmers, many things are out of our control but we can always strive to do better on the aspects we can control.”

With many plans to continue to reduce the farm emissions further, Olivia highlights the benefit of meeting like-minded people involved in the Future Beef and Signpost programmes who can learn from each other on ways to continue to improve long into the future.

Olivia's approach combines improved grazing, targeted soil and fertiliser practices, efficient breeding, and health protocols, supporting both farm productivity and environmental goals while fostering knowledge exchange with other farmers.

Summary of the key actions to improve the sustainability and productivity

- 1. Grassland Management:** Transitioned to a rotational grazing system with smaller paddocks (2-3 acres), enhancing grass quality and utilization, reducing concentrate feed, and increasing weight gain from grass alone. Plans to expand this infrastructure to additional farm areas.
- 2. Soil Fertility and Fertiliser Management:** Conducts soil tests every two years, applying lime to correct pH levels, with 100T applied in 2022 and plans for additional applications. Use of protected urea and Low Emission Slurry Spreading (LESS) to reduce emissions, with slurry targeted to lower-fertility paddocks and silage ground.
- 3. Genetic Selection and Herd Management:** A focus on breeding high genetic merit cows with a mix of bulls for optimal weanling and replacement stock. Reduction in the calving period and first-calving age for heifers to streamline management and establishment of a vaccination programme to improve herd health.
- 4. Flock Management:** Manages a lowland ewe flock with a target wean rate of 1.7 lambs per ewe, aiming to bring lambs to slaughter on a grass-only diet with no meal. Retains 70 replacements yearly, emphasising sustainable flock growth and health.
- 5. Emissions Reduction:** Achieved a 12.9% reduction in GHG emissions per kg of beef live weight from 2022 to 2024, with ongoing plans to further reduce emissions through participation in Future Beef and Signpost programmes.

5.5 Animal Breeding

Enteric Methane (CH₄), the type of methane derived from livestock, accounts for the largest proportion of agricultural emissions. Government initiatives supporting the reduction of methane include plans for national genotyping by 2030. National genotyping will improve traceability and support dairy and beef breeding programmes to reduce GHG emissions by identifying lower methane emitting animals.

Targets include increasing weight recording on beef farms from 30% to 70% to better monitor animal performance. Teagasc and ICBF found a 30% difference in daily methane emissions among similar beef cattle, highlighting genetic potential in lowering emissions. Implementing low-emissions breeding programmes is essential for permanent reductions in methane output from livestock systems.

Measures: Animal Breeding

Improved Breeding:

- Breeding programmes enhance carbon efficiency and reduce slaughter age, thereby decreasing GHG emissions.
- The Irish Cattle Breeding Federation (ICBF) Eurostar index aim to advance breeding practices.

Genetic Merit and Emissions Reduction:

- The Economic Breeding Index (EBI) in the dairy sector can significantly reduce carbon emissions by improving genetic merit.
- Teagasc research found the top 20% of methane-emitting animals emit 15% more methane compared to the lowest 20%, emphasising the importance of targeted breeding for lower emissions.

Efficient Animals:

- Breeding cattle for higher feed efficiency and higher Daily Live Weight Gain (DLWG) reduces slaughter age and GHG emissions.
- Enhancing the Replacement Index leads to more productive, efficient females with better fertility, producing fewer emissions and boosting profitability by about €60/animal for 5-star compared to 1-star animals.

Reducing Slaughter Age:

- Reducing slaughter age by one month can cut approximately 350 kg CO₂e per head. Lowering the slaughter age from 27 to 24 months could decrease methane emissions by 19 kg per animal.
- Research indicates cutting finishing age by 2–3 months could reduce emissions by 470–732 kt CO₂e per year by 2030.

Economic Breeding Index (EBI):

- The EBI can reduce methane emissions by 255 kt CO₂e annually by 2030 through improved fertility, shorter calving intervals, lower replacement rates, and enhanced milk yields.
- Use of sexed semen can increase dairy heifer numbers, reducing the number of male calves.
- Reducing the age of first calving boosts lifetime dairy cow performance. In 2017, 23% of heifers calved at 22–26 months, showing potential for improvement.

5.6 Feed and Feed Additives

The Department of Agriculture Food and Marine (DAFM) advise Ireland is too reliant on imported feed, particularly for livestock. Within the Climate Plan, the DAFM recommend the sector should increase the proportion of native grains and legumes incorporated in livestock rations, helping to minimise the amount of imported feed.

The tillage sector is pivotal in growing native grains and legumes for the livestock sector, positively benefiting the sustainability credentials of the Irish agri-food sector as less animal feed is transported from countries such as South America.

Measures: Feed Additives

→ **Feed Additives:** Industry research has found that a synthetic compound named 3-nitrooxypropanol (3-NOP) has the potential to inhibit enteric methane production from livestock by 20% to 30%. A research study conducted by Teagasc at their Grange farm in 2022 identified that the additive suppressed methane emissions by approximately 30% when incorporated in beef cattle's grass-silage-based diet⁽¹⁾.

Teagasc's research on dairy herds identified similar findings to the beef research study, highlighting that cows fed 1.8g of 3-NOP per day produced 117g/day less methane than cows not receiving the feed additive, equating to a 26% reduction in methane output per cow⁽²⁾. However, further research is required to guarantee the effectiveness of these additives over a prolonged period.

→ **Synthetic compounds:** Teagasc highlights that incorporating feed additives such as 3-NOP into the diets of cattle during grazing season remains a significant challenge.

There is a noticeable decrease in methane once the animal ingests the feed additive, however, getting consistent intake of additive at grass at regular intervals throughout the day is difficult. Additional research is required into feed additives to identify their potential to suppress methane and to establish at what level of incorporation within the animal's diet is the most efficient.

The government's agricultural strategy identifies that more support is required to research diet quality and the incorporation of feed additives before they are commercialised.

5.7 On-farm Biodiversity

Agriculture has a unique role in shaping Ireland's biodiversity landscape as 65% of Ireland's total land area is dedicated to agriculture, making it a critical sector for promoting biodiversity.

Biodiversity, the variety of life found in ecosystems, is essential for healthy and resilient agricultural systems, as it supports pollination, soil fertility, water regulation, and disease control.

The importance of biodiversity is increasingly gaining traction at a global level. The Irish Government has a goal to **'Mainstream biodiversity into decision-making across all sectors.'**

The Irish Agriculture sector is uniquely positioned to foster sustainability due to its grass-based production systems, strong research and advisory infrastructure, and a national commitment to climate and environmental targets while supporting and enhancing the protection of biodiversity.

Furthermore, consumers can be influenced by biodiversity, with 19% of Irish consumers saying that supporting ecosystems/biodiversity influences their grocery shopping (Source: Bord Bia: Biodiversity). Consider the following options for integrating biodiversity into a sustainability strategy for your farm.

(1) Feed additives; Tully Update (teagasc.ie)

(2) Feed additives; Dairy - Promising results from methane reducing feed additive in Irish winter-milk system - Teagasc | Agriculture and Food Development Authority

→ Trees and woodland planting	• Orchard planting (Native Irish trees & orchards – www.irishseedsavers.ie)
→ Hedgerow planting	• Riparian buffer zones / River fencing
→ Bird boxes and bat boxes	• Hedgerow fencing and nest boxes
→ Bee banks, beehives / honeybees	• Wildflower meadows
→ Ponds	• Peatland restoration

After selecting an area of focus, one approach is to conduct a baseline survey to track improvement levels of bee pollinators / bird species / wildflowers etc. to record the positive impact that small changes can make on the landscape.

The All-Ireland Pollinator Plan details clear actions that can provide significant progress on farm.

- Allow wildflowers to grow around the farm.
- Protect, enhance, and increase native flowering hedgerows such as whitethorn.
- Plant native trees in conjunction with hedgerows to enhance landscapes and shelters, improving biodiversity, sequestration and carbon storage.
- Establish nesting places for wild bees.
- Minimise artificial fertiliser use.
- Reduce pesticide inputs.

5.8 Water and Air Quality

Improving water and air quality is intrinsically linked to meeting Ireland's sustainability targets. Water is considered as the most critical resource for sustainable agricultural development. Agriculture is the largest land use in Ireland therefore, farmers and agriculture have a critical role to play in the careful management of applied nutrients to agricultural lands.

Both the amount of nutrients (Nitrogen and Phosphorous) applied to the land, whether it's in organic form or chemical fertiliser, and the timing of application have a significant impact on water quality. The challenge is to reduce the eutrophication of our waterways. Eutrophication is the process by which waterbodies are enriched with nutrients such as Nitrogen and Phosphorous, leading to the plentiful growth of plant life, which suck oxygen out of water ecosystems.

Teagasc, in association with industry have developed the Agricultural Sustainability Support and Advisory Programme (ASSAP) to support farmers with improving water quality. Agriculture is responsible for 99% of Ireland's Ammonia (NH₃) emissions into the atmosphere. Ammonia, an air pollutant, causes damage to our ecosystems in particular to special areas of conservation such as those designated under the European Network of Natura 2000.

Ammonia comes from the management of animal manures, housing, slurry storage and land spreading, as well as from grazing animals and spreading fertiliser. Ammonia is not a greenhouse gas, however it significantly reduces air quality and can contribute to greenhouse gas emissions. Under the EU habitat Directive we are obliged to protect these ecologically important ecosystems where ammonia can cause damage.

Measures: Water and Air Quality

- **Habitat:** The restoration of degraded river systems and efforts to restore functioning habitats on agricultural land should be incentivised where appropriate. Connecting rivers to their natural floodplains could form an integral part of a catchment-based integrated land-use plan that would benefit water quality, flood risk and biodiversity.
- **Reducing Ammonia:** Research from Teagasc has identified that using low-emission slurry spreading (LESS) equipment such as a dribble bar or trailing shoe will reduce the amount of ammonia being lost within the atmosphere, improving air quality as well as the incorporation of clover, extended grazing and the use of slurry additives.

→ **Agricultural Sustainability Support and Advisory Programme (ASSAP):** Water quality is a crucial issue within the industry and farmers require support. To help farmers improve water quality, a new “Agricultural Sustainability Support and Advisory Programme” (ASSAP) was set up. Teagasc committed 20 advisors whilst cooperating with agencies such as the Local Authorities Water Programme (LAWPRO).

Together, they aim to provide farmers with tailored water quality advice in 190 priority areas for action (PAAs) identified in the Ireland’s River Basin Management Plan (RBMP), which will play a crucial part in the national efforts to improve water quality. Easy measures include reducing the impact of agricultural systems through improved nutrient management application and storage and eliminating effluent seepage from agricultural land and farmyards.

5.9 Renewable Energy

Generating renewable electricity on farms can help farmers diversify their incomes and increase the sustainability of the farm through decarbonising Ireland’s energy systems.

According to the Climate Action Plan, energy systems targets require that by 2030, 80% of electricity be generated from renewable sources.

While the reduction in CO₂ emissions from the farm is captured under the energy vertical for national reporting by the EPA, it does not form part of the 25% emission reduction target for Agriculture.

The use of solar PV does reduce the carbon footprint of each individual farm as farmers are displacing imported energy from fossil fuels with renewable energy created on their own farm holding.

Measures: Renewable Energy

Solar Photovoltaic (PV) Systems

- **Benefits:** Installing solar PV on farm buildings can generate renewable electricity and reduce reliance on the national grid, lowering energy costs and enhancing energy security.
- **Costs:** Up to 60% of installation, costs are covered by the Targeted Agricultural Modernization Scheme (TAMS) and the payback period can be 2-4 years.

Wind Turbines

- **Benefits:** Wind turbines generate large amounts of renewable electricity, but installation costs are high. Farmers often rent land to energy developers, receiving an annual revenue per turbine.
- **Costs:** According to Teagasc, an 800kW wind turbine can cost up to €2 million, with grid connection costing more than €1 million.

Anaerobic Digestion (AD) and Biomethane

- **Benefits:** AD uses grass, slurry, and manure to produce biomethane, which can be used for electricity and fuel. It stabilizes farm income, reduces emissions, and provides digestate as a bio-fertiliser.
- **Costs:** High investment costs can potentially be mitigated through co-operative models.

Heat Recovery Units

- **Benefits:** Dairy farms can recover heat from cooling milk to heat water, cutting water-heating costs by 40-50%.
- **Costs:** A system for a typical 150-cow herd costs c. €6,500 and grants are available through TAMS.

TAMS III - Solar Capital Investment Scheme (SCIS)

For most farmers considering solar energy, the main grant option is the Solar Capital Investment Scheme (SCIS), which forms part of TAMS III (Targeted Agricultural Modernisation Scheme) operated by the Department of Agriculture Food & the Marine.

This is specifically designed for farmers and is currently the most generous and widely used solar grant for agricultural enterprises. Under SCIS, farmers can claim grant aid of up to 60% of the cost of installing solar PV systems — including panels and battery storage.

The maximum grant payable is €90,000 per farm. This means that larger installations up to 62 kilowatt-peak (kWp) can be fully eligible. This grant is particularly useful because it is ring-fenced within TAMS III — meaning it does not impact your eligibility for other TAMS schemes (for example, animal housing or slurry storage grants).

If you have already applied under TAMS for other capital development projects, you can still apply for the solar scheme.

Farm dwellings can also be included in the installation, provided the farmhouse and the farm buildings are connected to the same ESB meter — this is a significant benefit for farmers who want to offset both household and farm electricity costs.

Applications must be submitted through the Department of Agriculture's online system at Agfood.ie. Importantly, you must be a registered farmer with a minimum level of economic activity (minimum €2,000 investment in eligible items) to qualify. The AIB Agri Team are available to assist customers with any queries in relation to AIB support for customers investing in renewable energy.

Broader benefits of Solar PV

- Lifetime of system: 25–30 years
- Hedge against rising electricity prices — long-term protection
- Reduces carbon footprint — helps meet sustainability targets
- Increases farm resilience and mitigates energy price volatility

SEAI Supports for Wind Energy

Although solar PV is currently the dominant renewable energy technology on Irish farms (due to simplicity, cost and ease of planning), small and medium-scale wind energy is also supported — albeit in more indirect ways.

There is no direct “grant” for installing wind turbines under SEAI at present. However, the following supports are available:

- Farmers can avail of Accelerated Capital Allowances, which allow them to offset the cost of wind energy investments against tax more rapidly.
- VAT refunds can also be claimed on wind turbine installation costs where they are used for agricultural production.
- Planning guidelines and grid connection advice are also supported by SEAI and ESB Networks.

For farms with suitable wind resources (higher, exposed sites), wind turbines remain an option, especially for large dairy or pig units where energy demand is continuous.

Support Scheme for Renewable Heat (SSRH)

This is a lesser known but very valuable scheme, particularly for certain types of farming sectors that use heat (poultry, pigs, horticulture, drying grain or biomass).

The **SSRH** provides operational aid (that is payment for each kWh of renewable heat used) rather than an upfront capital grant. It supports:

- Biomass boilers
- Biogas boilers
- Renewable district heating

Farmers in sectors such as poultry and mushroom production — which require large amounts of heat — can achieve substantial savings and even income through SSRH, as they are paid for the heat they generate.

The scheme is open to agricultural applicants and provides ongoing payments over 15 years. It is particularly attractive for grain drying, poultry housing, mushroom tunnels, and even for greenhouses in horticulture.

Solar PV Case Study⁽³⁾

A detailed case example a detailed case example of solar PV on an Irish dairy farm that Teagasc have developed, with costings, grant supports, savings, and payback period — based on current Irish market conditions⁽⁴⁾.

This case study examines the financial and operational implications for a dairy farmer considering the installation of a solar PV system. The farm in question had an annual electricity usage cost of approximately €15,925, equating to around 45,500 kWh of electricity at an average cost of 35 cents per kWh.

The electricity usage was distributed as follows: 70% during the day and 30% at night. Key electricity-consuming equipment included the bulk tank (52%), hot water systems (22%), vacuum pump (19%), and lighting (6%).

Based on a thorough farm survey, the recommendation was to install a 30kW solar PV system with 15kWh battery storage and a water heating system.

Farm Profile

Type:	→ Dairy farm
Herd size:	→ 160 cows
Milking system:	→ Modern 20-unit parlour
Energy use:	→ Bulk milk tank (cooling) → Hot water heating (for plant washdown & in-parlour use) → Milking machine & vacuum pumps → General lighting, pumps, workshop use
Annual electricity consumption:	→ ~45,500 kWh/year
ESB tariff:	→ ~€0.35 per kWh (average cost usage, 70% day rate and 30%-night rate)

Solar PV System Size

Size proposed:	→ 30 kWp solar panels + 15Kw battery (occupy 180 sq metres of roof space)
Annual solar generation:	→ Approx. 27,000 kWh/year equal to 59% of the annual usage of the farm. ($27,000/45,500 = 59\%$) → Typical performance: 900 kWh per kWp/year in Irish conditions
Battery Storage:	→ With the aid of battery storage and a water heating diverter, the farmer could utilise 65% of this electricity on-site, yielding significant savings
% Self-consumed:	→ ~65% (rest exported to grid) → Dairy farms typically have good daytime energy profile that matches solar output well (milking times morning & afternoon)

(3) <https://www.teagasc.ie/news--events/daily/environment/everything-farmers-need-to-know-about-putting-solar-panels-on-sheds.php>

(4) Teagasc | Agriculture and Food Development Authority.



Costs

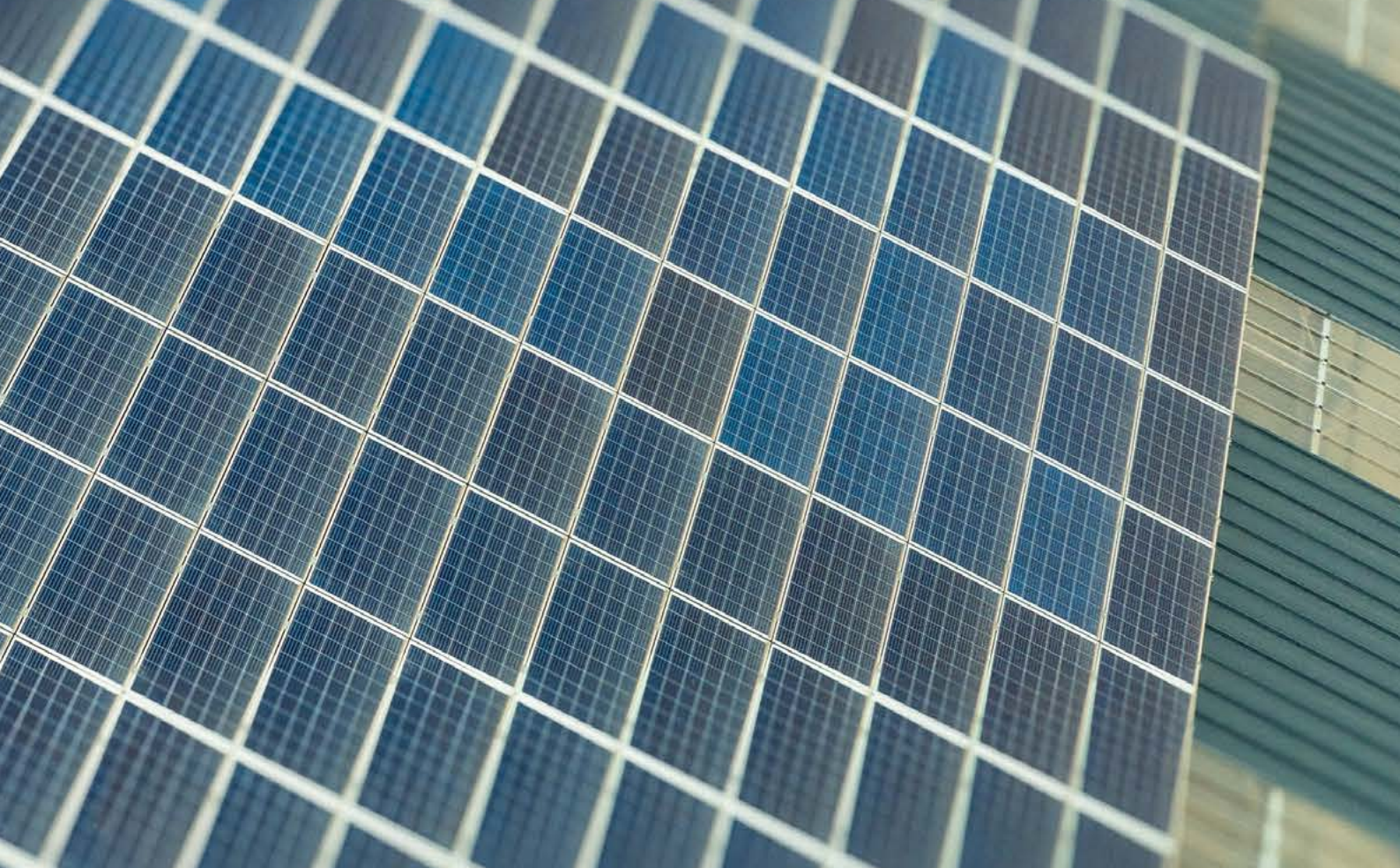
System cost → ~€64,276, including VAT @13.5%
(installed, including inverter):

However, after reclaiming VAT (€8,677) and applying a 60% grant (€33,359) on the cost before VAT of €55,599, the final net cost to the farmer would be approximately €22,240.

Eligible grant (TAMS III Solar Capital Investment Scheme SCIS): → 60% of €55,599 = €33,359 grant
→ Net cost to farmer after grant: €22,240 + VAT

Annual Savings

Self-consumed electricity:	65% of 27,000 kWh = 17,550 kWh
Direct saving:	17,550 kWh x €0.35 = €6,142.5/year
Exported to grid:	~9,450 kWh
Feed-in tariff:	~€0.16 per kWh (varies slightly by energy provider)
Export revenue:	9,450 kWh x €0.16 = €1,512/year
Total annual benefit:	→ €6,142.5 (savings) + €1,512 (export) = €7,654.5/year



Payback Calculation

Net cost to farmer:	~€22,240
Annual return:	€7,654.5/year
Simple payback:	$\text{€}22,240 \div \text{€}7,654.5 = \text{~}2.9 \text{ years}$

Considerations

- Battery storage is optional — adds cost but can increase % of self-consumption
- Grid connection application must be made in advance (NC6 form to ESB Networks)
- Export tariff subject to market rates
- For Irish dairy farms, solar PV is now an extremely attractive investment:
- Increases farm resilience and mitigates energy price volatility

Key Learnings

There is a strong package of grant supports for farmers looking to invest in renewable energy. The TAMS III Solar capital investment scheme (**SCIS**) is the cornerstone for farm solar — with 60% grant funding and an upper investment cap of €90,000, that means max grant of €54,000. This scheme is supporting large scale adoption of solar PV across Irish farms.

In short, there is an excellent opportunity for farmers to improve energy efficiency, reduce input costs and diversify income — and with electricity prices remaining volatile, many farmers are seeing renewable energy as a core part of their business sustainability strategy for the future.

5.10 Integrated Pest Management (IPM) and Pesticide Reduction:

Sustainable Practices in Pest and Resource Management enhances both environmental sustainability and operational efficiency in tillage and horticulture. The objective is to reduce environmental impact through farm-to-fork pesticide targets and IPM.

Tillage crops like barley, wheat, oats and oilseed rape benefit from integrated pest management (IPM) through improved soil health and disease control.

Key practices include:

- **Crop rotation:** Breaks up pest and disease cycles.
- **Soil health management:** Cover crops and minimum tillage encourage beneficial soil microbes and take up of any excess nutrients in the soil.
- **Resistant varieties:** Choosing crop strains with built-in resistance to disease.
- **Field monitoring:** Regular crop inspection to guide management actions.

Ireland through its action plan for sustainable use of pesticides aims to:

- Promote non-chemical alternatives
- Reduce risks and impacts of pesticide use on human health and the environment
- Improve training and awareness among growers.

IPM – Integrated pest management in Horticulture.

Horticultural crops like fruit, vegetables and herbs are vulnerable to a variety of pests and diseases. IPM helps to manage them with minimal environmental impact.

Common IPM practices in horticulture:

- **Crop rotation:** Reduces pest build-up in the soil
- **Physical barriers:** Netting to protect crops
- **Biological control:** Releasing natural enemies like ladybirds to eat aphids such as greenflies
- **Monitoring traps:** Use of sticky traps to detect infestations early
- **Selective spraying:** Only using pesticides when necessary and choosing low toxicity options.

4-Step IPM Approach:

Step 1: Prevention & Suppression – Use diverse strategies to minimise pest risks.

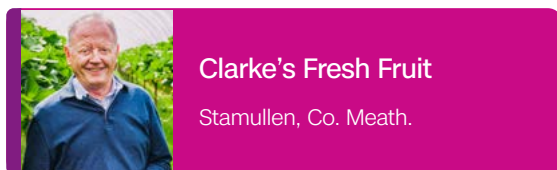
Step 2: Monitoring – Regular crop inspections and weather tracking.

Step 3: Decision Making – Choose pest management strategies based on past outcomes, prioritising non-chemical methods when possible.

Step 4: Evaluation – Assess success or failure.



5.11 Sustainability Case Study



Farm Details

Location	Stamullen, Co. Meath
Sector	Soft Fruit Horticulture
Established	1960
Certifications	Origin Green Gold Bord Bia Global GAP SHAS

Company Overview

Clarke's Fresh Fruit is an award-winning, family-owned Irish company and one of Ireland's leading soft fruit growers. Founded in 1960 by Pat Clarke, the company produces high-quality strawberries, raspberries, and blackberries, supplying approximately 20% of the Irish market. With a focus on consistent quality, innovation, and sustainability, Clarke's has become a recognised leader in the sector, combining traditional horticultural expertise with cutting-edge environmental practices.

Recognised Environmental Commitment

Clarke's commitment to sustainable farming is reflected in their achievement of the Origin Green Gold standard, in addition to Bord Bia's Global GAP and SHAS accreditations. These independently verified schemes showcase their dedication to responsible production, food safety, and environmental stewardship.

Sustainability Innovations & Impact

Decarbonising Heat with Biomass

Clarke's have invested in a 1.2MW biomass heating system, which uses on-site agricultural waste as fuel. This system:

- Provides heat to over 3 hectares of polytunnels
- Eliminates the need for fossil fuels for heating and hot water in staff accommodation (136 beds) and amenities
- Is four times more efficient than conventional greenhouse systems
- Extends the growing season, enhances crop yield and reduces the need for imported fruit

Renewable Energy and Resource Circularity

- 200kW of solar PV panels reduce electricity reliance and support their transition to cleaner energy
- A Harp Renewables Biodigester converts food and organic waste from staff areas into a dry, nutrient-rich biofertiliser in just 24 hours – reducing waste volume by up to 85%
- Heat recovery systems capture excess heat from refrigeration equipment and reuse it to provide hot water for the accommodation facilities

Sustainable Packaging & Biodiversity

- 90% of fruit is packed in heat-seal film to reduce plastic waste
- 10% packaged in compostable punnets
- Planted 3,000 native trees and installed a 3-metre-high mesh-lined hedge structure, which reduces cutting requirements and enhances biodiversity and habitat development

Precision Farming & Energy Efficiency

Precision Irrigation and Fertigation

Clarke's operate a computer-controlled fertigation system that delivers water and nutrients exactly where and when needed, minimising waste and promoting plant health. The result is a 90% reduction in water and nutrient losses.

Advanced Energy Monitoring

In partnership with John Fletcher Electrical and NuLumenTek, Clarke's implemented an energy monitoring platform that provides real-time visibility into energy use across the farm. This data-driven approach helps:

- Identify inefficiencies
- Implement corrective actions
- Improve energy performance

Low-Impact Crop Protection

The business has adopted low-impact Integrated Pest Management (IPM) strategies:

- Pesticides are used only when essential, following comprehensive crop assessments
- Biological controls such as beneficial insects and nematodes are prioritised
- Every polytunnel contains bumblebee hives, enhancing natural pollination and crop performance

Employee Welfare & Community Engagement

Clarke's employ a core team of 80 staff year-round, rising to 170 staff during peak harvest, with a retention rate of over 85%—a testament to their strong focus on worker wellbeing:

- High-quality on-site accommodation: private rooms, shared kitchens, daily laundry
- Access to amenities such as a gym, games room, and community activities
- Productivity incentive schemes reward team performance

Community Impact

- Ongoing support for local schools, sports clubs, and charities
- Regular educational tours and farm visits
- Collaboration with Redwood Disability Care and Dundalk Rehab Care, providing experiential learning and confidence-building for individuals with additional needs

Supply Chain Reliability & Market Recognition

Clarke's control their supply chain through its own refrigerated fleet, ensuring:

- Timely, fresh delivery of produce
- Full traceability and quality assurance

Their fruit features in:

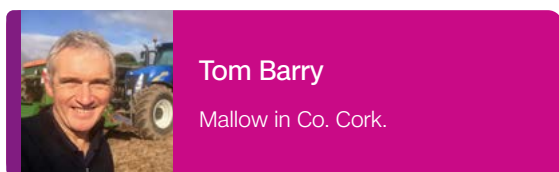
- All major Irish retail multiples
- The 'Simply Better' range in Dunnes Stores (exclusive supplier)
- High-profile customers including Áras an Uachtaráin and Neven Maguire's MacNean House

Key Takeaways

Clarke's Fresh Fruit is a model for sustainable, high-performing horticulture—demonstrating how practical investments in renewable energy, precision farming, biodiversity, and staff wellbeing can drive both business success and environmental benefit.

Their integrated approach to sustainability underpins their strong market reputation and supply chain resilience.

5.12 Tillage Case Study



Tom Barry

Mallow in Co. Cork.

Farm Details

Teagasc Signpost Farmer

Land Farmed	280 ha Tillage Farm
Crops Grown	Winter (W) Wheat / W.Barley / W.Beans / W.Rye/ W.Oats / Spring Barley
Method of Crop Establishment	Plough and Min -Tillage
Crops Sold Green / Dry	Stored and sold as dried grain
Pest Control	Use Integrated Pest Management
Fertiliser Used	Organic and Chemical fertiliser

Tom is a firm believer in adopting new technologies and the latest best practice advice. Tom is not afraid to make changes, is passionate about tillage farming and recognises the important role it plays in the food chain. In addition to the grain that is stored in the yard, Tom also grows two and half hectares of wild bird cover, providing a food source for small birds over the winter period. Through these practices, Tom sustains a low-carbon, high-yield tillage enterprise, contributing to soil health and biodiversity while reducing chemical inputs.

Summary of key actions in managing his sustainable tillage farm:

- 1. Soil Fertility Management:** Annually soil samples each field and develops a nutrient management plan, achieving optimal pH levels (6.2 or better for over 95% of fields), which supports crop growth and minimise chemical inputs.
- 2. Crop Rotation Strategy:** Maintains a structured rotation with crops like winter beans, wheat, barley, rye, oats, and spring barley, maximising mineral nitrogen availability and achieving high yields, with over 5 tonnes/acre for winter wheat following beans.
- 3. Organic Manure Application:** Imports cattle and pig slurry, applying it to winter crops in spring, promoting tillering and reducing chemical nitrogen use from 200 to 130 units per acre while sustaining high yields. This approach also reduces the use of chemical phosphorus by over 50%.
- 4. Flexible Tillage Methods:** Uses both ploughing and minimum tillage based on soil and crop needs. Directly drills winter beans, eliminating the need for herbicides and reducing input costs.
- 5. Integrated Pest Management:** Tom regularly monitors crops himself to assess disease and reduce herbicide use, noting that in his experience higher organic matter in soils lowers disease pressure and weed incidence.
- 6. Biodiversity Initiatives:** Tom has planted over 20% of his farm with native woodland and created wild bird cover, supporting wildlife, including pollinators, birds, and other animals, and establishing a natural pond.
- 7. Carbon Footprint Reduction:** Tom achieves a greenhouse gas emission rate of 1.44 t CO₂e/ha (well below the national average of 2.5 t CO₂e/ha), supported by efficient nitrogen use, high soil fertility, and organic manure integration.



Section 6

Diversification

An essential component in Ireland's strategy to create a sustainable agricultural sector is to support the growth of organic farming and the forestry sectors, and in order to encourage these, financial incentives have been introduced. We examine each of these elements below.

6.1 Organic Farming

Organic farming is an essential component in Ireland's strategy to create a sustainable agricultural sector, growing substantially over the previous five years.

This type of farming emphasises the use of natural processes and inputs, not permitting chemical fertilisers, pesticides, or genetically modified organisms (GMOs). Instead, organic farmers employ crop rotation, composting, and biological pest control to maintain soil fertility and ecological balance.

According to data from the Department of Agriculture, Food and the Marine, the number of certified organic farms has increased to over 5,000.

This figure represents 5% of Ireland's Utilisable Agricultural Area and is half-way to the 2030 target of 10%. Government Initiatives such as the Organic Farming Scheme provide financial incentives to encourage farmers to transition to organic methods.

These policies aim to increase the percentage of farmland dedicated to organic production to 10% by 2030, making it a cornerstone of sustainable agriculture.

Environmental Benefits:

- **Soil Health:** By using natural fertilisers such as slurry and farmyard manure, organic farming promotes the development of healthy soils, which have better water retention and are less prone to erosion.
- **Biodiversity:** Organic farms are more likely to support diverse ecosystems. Hedgerows, cover crops, and reduced chemical use contribute to a richer habitat for wildlife.
- **Eliminate Chemical Dependency:** Organic practices eliminate chemical nitrogen-based fertilisers from the food production process. These are significant sources of nitrous oxide emissions. Organic methods such as natural composting processes and use of organic manures reduce the carbon footprint associated with livestock and arable farming.
- **Carbon Sequestration:** Organic farming enhances soil organic matter, which has the ability to sequester carbon from the atmosphere. Healthier soils with high organic content can lock in carbon and offset emissions from other sources.
- **Livestock Management:** Although livestock farming inherently produces methane, organic livestock practices, such as rotational grazing reduces the stocking rate intensity of animals.

Organic Farming Scheme Payment Rates

Enterprise	Year 1-2 in Conversion		Year 3-5 fully converted to organic	
	Area <= 70ha	Area >70ha	Area<= 70ha	Area >70ha
Drystock	€300/ha	€60/ha	€250/ha	€30/ha
Tillage	€320/ha	€60/ha	€270/ha	€30/ha
Dairy	€350/ha	€60/ha	€300/ha	€30/ha
Horticulture	€800/ha	€60/ha	€600/ha	€30/ha
Participation Payment	Annual payment of €1,400 to cover administrative costs (€2,000 in the first year of conversion)			

Challenges and Future Prospects

Despite its benefits, organic farming faces challenges such as lower yields compared to conventional farming and higher labour costs. Addressing these issues through research, innovation, and education will be key

to scaling organic practices sustainably. Continued investment in organic infrastructure and market development is necessary to expand the organic sector's contribution to Ireland's emission reduction targets.

6.2 Forestry

Ireland has a current forest cover of 11% in contrast to the EU average of 38%. The target is to increase Ireland's forest cover to 18% by 2027.

Ireland aims to increase the national planting targets to 8,000 ha/yr. from the current level of 1,651 hectares in 2023, which was a 27% reduction from the 2,273 hectares afforested in 2022.

The new Department of Agriculture afforestation scheme from 2023–2027 represents the strategy, which underpins Ireland's new Forestry Programme. Healthy forests play a vital role in sequestering carbon, delivering long-term benefits for climate change by becoming a carbon sink (store of carbon).

They also act to increase biodiversity, wood production, economic development and sustainable communities in rural Ireland.

Preventing deforestation at the rate of 752 ha per year has the potential to reduce total agricultural emissions by 140 kt CO₂e per year by 2030.⁽⁵⁾ Ireland's forestry program, the afforestation scheme 2023–2027, aims to increase forest cover whilst also delivering ecosystem services with enhanced environmental and climate benefits.

The new forestry program is broken down by 12 forest types with varying levels of grant aid and funding depending on the species mix. There has been an increase in the farmer rate of premium and the term of the premium payment has extended to 20 years versus 15 years under the previous program.

There is a minimum 20% broadleaf requirement for all conifer forest types. There are 12 different forest types to choose from, the forest type that is most suitable for each farm is site specific.

(5) Environment - The key focus areas MACC 2023 - Teagasc | Agriculture and Food Development Authority

Fixed Grant Rates under the 2023-2027 Afforestation Programme

Forest Type (FT)	Forest Type	Grant / ha	Annual Premium / ha	Duration of premium for farmers	Duration of Premium for non-farmers
FT1	Native forests	€6,744	€1,103	20	15
FT2	Forests for Water	€6,744	€1,142	20	15
FT3	Forests on Public Lands	€10,544	€1,103	n/a	15
FT4	NeighbourWoods	€10,200	€1,142	20	15
FT5	Emergent Forest	€2,500	€350	20	15
FT6	Broadleaf, mainly Oak and Beech	€6,744	€1,037	20	15
FT7	Diverse Broadleaf	€4,314	€973	20	15
FT8	Agro-forestry	€8,555	€975	10	10
FT9	Seed Orchards	€10,000	€1,142	20	15
FT10	Continuous Cover Forestry	€5,421	€912	20	15
FT11	Mixed high forests: Diverse Conifer, 20% Broadleaves	€4,452	€863	20	15
FT12	Mixed High Forests with mainly spruce, 20% broadleaves	€3,858	€746	20	15

* Additional payment of €1,000 per ha will be paid to landowner on completion of planting

† Grant includes Trails, Seats & Signage Facilities payment

* Grant includes Facilities payment

Agro-forestry

Agro-forestry, forest type 8 (FT8) is relatively new to Ireland in terms of the types of forests that can be grant aided under the new Afforestation Scheme 2023-2027. Agro-forestry is the integration of trees with either arable crops or livestock on the same land. Silvopastoral Agro-forestry is the integration of trees and livestock and Silvoarable is the integration of trees and crops.

The combination of trees with animals or crops enhances grass growth, biodiversity, water quality, provides additional shelter for livestock, promotes positive animal welfare, and improves soil health.

In the context of climate change, trees have an increased importance on our landscape to support carbon capture. With the state setting an ambitious target of 18% forest cover by 2027, Agro-forestry will be a catalyst to increase farmer participation in additional tree planting across the country.

As with all afforestation schemes, the switch to agro-forestry is a permanent land use change.



Section 7

Industry enablers and AIB supports

1 Key Measures and Progress:

- **Fertiliser Management:** Reduction in Nitrogen Fertiliser Use: A significant decrease of 18% in chemical fertiliser use was observed in 2023.
- **Protected Urea Adoption:** Efforts are underway to replace traditional fertilisers with protected urea to further reduce N₂O emissions, there is a recommendation by the Agricultural Water Quality working group to ban sales of unprotected urea from Autumn 2025. Greater adoption of these technologies across enterprises are essential to abate Ireland's GHG emissions from agriculture.

2 Livestock Management:

- **Dairy Herds:** Dairy cow numbers have fallen by 1.8% in the 12 months to September 2024, following significant growth in dairy cow numbers post milk quota abolition.
- **Beef and Sheep Herds:** There was an overall decrease in livestock numbers nationally, contributing to the overall reduction in emissions

3 Manure Management:

- **Low Emission Slurry Spreading (LESS):** The adoption of LESS technology is progressing, the Department of Agriculture are aiming for a 90% adoption rate by 2027.
- **Organic Farming:** According to data from the Department of Agriculture, Food and the Marine, the number of certified organic farms has increased to over 5,000.
- **Expansion:** Plans are in place to increase the area under organic production to 350,000 hectares by 2030, there has been a threefold increase in the number of organic farmers in Ireland over the last 4 years. The number of organic farmers today represent 5% of Ireland's utilisable Agricultural land area under organic production, which is well on track to meet the 2030 target of 10%.

Challenges and Outlook:

In summary, Ireland's agricultural sector has made commendable progress in reducing GHG emissions through various initiatives.

However, continued commitment and adoption of sustainable practices are essential to meet the ambitious targets set for 2030.

- **Emission Reduction Targets:** While the 1.7% reduction in 2024, 4.8% reduction in 2023 and 0.7% reduction in 2022 is a positive step, achieving the 25% reduction target by 2030 will require sustained and enhanced efforts across all mitigation measures.
- **Policy Implementation:** Continuous support and effective implementation of policies outlined in the 'Ag Climatise' roadmap are crucial for meeting future targets.

7.1 Industry Enablers

The Irish agricultural sector benefits from a robust support system aimed at promoting sustainable practices and reducing GHG emissions. The Agri Industry has a cohesive and detailed roadmap developed to help the sector decarbonise. This involves collaboration between government agencies, research institutions,

dairy, beef, sheep processors, and farming organisations. Through a combination of government policies, research efforts, and targeted sustainability programmes by dairy and beef processors, the industry is making strides toward a more environmentally friendly future.

Key Enablers:

- **Government and Policy Support:** The Irish government, through its climate action plans and policies, provides frameworks and funding for sustainable practices. Initiatives like the Climate Action Plan set national targets and guide the agricultural sector toward carbon neutrality.
- **Research and Innovation:** Institutions such as Teagasc (the Agriculture and Food Development Authority) play a crucial role by conducting research on sustainable farming practices, efficient nutrient management, and emission reduction technologies. This research supports evidence-based strategies that help farmers adopt low-carbon approaches.
- **Dairy and Beef Processors:** These processors have taken active steps to incentivise sustainability among farmers. They have introduced various programmes that promote environmentally friendly practices. For example:
 - » **Dairy Processors:** There are a number of dairy processors that have begun to incentivise their milk suppliers by introducing sustainability programmes and bonus payments, each programme is individual to each processor but all of which seek to reward farmers for carrying out positive environmental actions on their farm to increase farm bio-diversity and reduce their carbon footprint.
 - » **Beef Processors:** There are a number of beef processors that have launched initiatives that encourage sustainable farming.
- **Incentivised Sustainability Programmes:**
 - » **Origin Green:** This national food sustainability programme covers all agricultural sectors and is instrumental in ensuring that dairy and beef producers adhere to sustainability criteria. It provides benchmarks for energy use, carbon emissions, water conservation, and biodiversity enhancement.
 - » **Farm Advisory Services:** Dairy and beef processors often offer carbon footprint assessments and sustainability advisory services. These tools help farmers track and optimise their practices, contributing to lower emissions.
 - » **Financial Incentives and Premiums:** Some processors provide financial rewards or premiums for farmers who meet specific sustainability standards, such as reduced nitrous oxide emissions through use of protected urea and soil sampling to improve soil fertility to support reduction in chemical N use.

7.2 AIB Supports

Through varied partnerships and funding avenues, AIB demonstrates a holistic approach to sustainability in the agriculture sector.

It not only provides financial support but also partners in research, innovation, and on-the-ground initiatives that enable Irish farmers to adopt climate-resilient practices and contribute to national environmental goals.

Signpost Programme

- In partnership with Teagasc, AIB supports the Signpost Programme, a national initiative dedicated to climate action in farming. This programme offers Irish farmers access to knowledge and resources to reduce greenhouse gas emissions, enhance biodiversity, improve water quality, and sequester carbon.
- Through workshops, expert consultations, and farm assessments, Signpost supports farmers to monitor their environmental impact and transition to climate-friendly farming practices, addressing Ireland's agricultural emissions challenge.

Grass10 Programme

- The Grass10 Programme, supported by AIB, is a Teagasc-led initiative aimed at improving grassland management on Irish farms. The programme's goal is for farmers to grow and utilize 10 tonnes of grass per hectare over ten grazing rotations each year.
- By optimising grass production, Grass10 reduces the need for imported animal feed, which has a higher environmental footprint. It also promotes well-managed grasslands that act as carbon sinks, contributing to both farm productivity and carbon reduction.

AIB Ag Tech Nova UCD Innovation Partnership

- AIB collaborates with NovaUCD (University College Dublin's innovation hub) to foster advancements in AgTech. This partnership supports start-ups and researchers developing cutting-edge agricultural technology solutions aimed at enhancing sustainability and productivity in agriculture.
- By focusing on areas like precision agriculture, soil health monitoring, and automation, this partnership encourages technology-driven solutions that reduce environmental impact while optimising resources, enabling farmers to operate more sustainably.

Ireland's National Pollinator Plan

- AIB supports the National Pollinator Plan, an initiative focused on protecting Ireland's pollinators, essential for crop and plant biodiversity. This plan aims to increase the habitats for pollinators on farms, creating pollinator-friendly spaces and preserving the natural ecosystems that support agricultural productivity.
- Through this support, AIB helps encourage biodiversity on farms, fostering natural pollination processes that are crucial for sustainable crop production and soil health. AIB also has its own Apiary to support bio-diversity with over 200,000 bees.

Carbery Farm Zero C Project

- Exclusive Financial Partner to the Carbery Farm Zero C Project.
- AIB is the exclusive financial partner of the Carbery Farm Zero C Project, a sustainability initiative focused on achieving carbon neutrality on Irish dairy farms. This project involves assessing farm practices and implementing low-carbon strategies to help dairy farms reduce their greenhouse gas emissions.
- By supporting this initiative, AIB enables dairy farmers to transition to sustainable practices that contribute to Ireland's overall goal of carbon neutrality, positioning the dairy sector as a model for sustainable agriculture.



Section 8

Additional Resources

- **AIB Green Living Business Hub** contains support and guidance to become more sustainable <https://aib.ie/green-business>
- **Teagasc Signpost Programme** <https://www.teagasc.ie/environment/climate-change--air-quality/signpost-programme/>
- **Department of Agriculture, Food and the Marine** <https://www.gov.ie/en/organisation/department-of-agriculture-food-and-the-marine/>
- **Coillte Forestry Services** www.coillte.ie
- **The Environmental Protection Agency (EPA)** advises on and regulate many waste management topics and are an excellent source for compliance and good practice advice and publications. <https://www.epa.ie/publications/>
- **Origin Green** is Ireland's pioneering agrifood and drink sustainability programme, supporting food and drink manufacturers to set a sustainability strategy and achieve measurable sustainability improvements more effectively <https://www.origingreen.ie>
- **Government Climate Toolkit for Business**. The toolkit provides a clear and accessible starting point for any business, signposting them to useful climate action resources. <https://www.climate toolkit4business.gov.ie/>
- Images below on https://aib.ie/content/dam/frontdoor/AIB_Sustainability_Infographic_V5_b_.pdf



Appendix 1

Status of Ireland's Sustainability Targets

Ireland's Agricultural sector has been actively working to reduce greenhouse gas (GHG) emissions in line with Ireland's Climate Action Plan under the 2021 Act, which aims for a 25% reduction by 2030.

In 2024, Agriculture GHG emissions decreased by 1.7%, following a 4.6% in 2023 and 0.7% in 2022. The most significant drivers for the decreased emissions have been decreased synthetic fertiliser use and a reduction in overall livestock numbers.

The primary sources of emissions in agriculture are:

- **Methane (CH₄):** Mainly from enteric fermentation in livestock, accounting for about 63% of agricultural emissions.
- **Nitrous Oxide (N₂O):** Primarily from fertiliser application and manure management, contributing around 18.3%.
- **Carbon Dioxide (CO₂):** From fuel combustion and liming activities, making up the remainder.

Type of Activity	Description and associated emissions	Share of Emissions (2023)
Enteric Fermentation	Fermentation that takes place in the digestive systems of ruminant animals such as cattle and sheep resulting in direct emissions of the greenhouse gas methane.	63.1%
Agricultural Soils	Activities that lead to the direct and indirect emissions of nitrous oxide related to agricultural production, including application of synthetic fertilisers, animal wastes and other organic fertilisers, biological nitrogen fixation by crops, cultivation of organic soils, and mineralisation of crop residues.	18.4%
Manure Management	Methane and nitrous oxide greenhouse gases are produced during the management, storage and spreading of animal manure. Emissions from manure management vary significantly between the types of management system used.	11.9%
Fuel combustion (Agriculture/Forestry/Fishing)	Emissions of carbon dioxide from fuel combustion in agriculture and forestry sectors.	4.0%
Liming	Soil pH plays a key role in soil fertility. The application of limestone to correct soil acidity results in emissions of carbon dioxide	2.2%
Urea application	The addition of urea-containing fertilisers to soils results in emissions of carbon dioxide that was fixed during the industrial production process.	0.7%

Further information: <https://www.epa.ie/our-services/monitoring--assessment/climate-change/ghg/agriculture/>

Appendix 2

This jargon buster is designed to clarify the critical terms related to sustainability in agriculture. Whether you're a farmer, researcher, or consumer, understanding these concepts is key to supporting and driving the transition to more sustainable and climate-friendly agricultural systems.

Agricultural Sustainability Jargon Buster

In agriculture, sustainability terms can sometimes be confusing. Here's a comprehensive guide to help you understand some of the key jargon often used in discussions on sustainable farming and environmental stewardship.

1. Net Zero

Definition:	Achieving a balance between the greenhouse gases emitted into the atmosphere and those removed or offset.
In Agriculture:	For agriculture to reach net zero, the sector needs to minimise emissions from activities like livestock production, fertiliser use, and machinery, while enhancing carbon capture through natural processes (e.g. growing trees, maintaining healthy soils). Using renewable energy, and improving animal diets all contribute to lowering emissions.
Why it Matters:	Agriculture contributes significantly to global greenhouse gas (GHG) emissions, particularly methane (from livestock) and nitrous oxide (from fertilisers). Striving for net zero means not only reducing emissions but also increasing carbon sinks (areas that absorb more carbon than they release).

2. Soil Sequestration

Definition:	The process of capturing and storing atmospheric carbon dioxide in the soil.
In Agriculture:	Healthy soils, rich in organic matter, can act as carbon sinks. Practices such as cover cropping, minimum tillage, and agroforestry enhance soil's ability to absorb and retain carbon. As plants grow, they absorb CO ₂ from the atmosphere through photosynthesis, which gets stored in the soil when plant roots and other organic matter break down.
Why it Matters:	Soil sequestration can mitigate climate change by reducing the amount of CO ₂ in the atmosphere, while also improving soil health, increasing biodiversity, and enhancing water retention, making soils more resilient to drought and erosion.

3. Carbon Neutral

Definition:	A state where the carbon emissions produced by a process or organisation are offset by carbon reductions or removals elsewhere, resulting in a net-zero carbon footprint.
In Agriculture:	A farm or agribusiness that is carbon neutral offsets the carbon it emits through various mechanisms. These can include investing in renewable energy, planting trees, or using soil sequestration. The goal is to achieve a balance where the net emissions are zero, meaning the farm emits as much carbon as it removes from the atmosphere.
Why it Matters:	Carbon neutrality is critical for reducing the overall GHGs contributing to global warming. For agriculture, achieving carbon neutrality is often a stepping stone toward greater sustainability goals like net zero.

4. Regenerative Agriculture

Definition:	A farming approach focused on regenerating and revitalising soil health, biodiversity, and the ecosystem, often through practices that increase carbon sequestration.
In Agriculture:	Regenerative farming includes methods like crop rotation, cover cropping, agroforestry, minimum tillage farming, and composting. It seeks to restore soil health, improve water cycles, and increase biodiversity. These practices not only improve the productivity of farms but also enhance their ability to sequester carbon in soils and plants.
Why it Matters:	Regenerative agriculture helps build resilient ecosystems, enhances biodiversity, improves water and nutrient cycles, and contributes to carbon sequestration, reducing the overall environmental footprint of farming.

5. Sustainable Intensification

Definition:	Increasing agricultural yields without increasing environmental impacts.
In Agriculture:	This approach involves using advanced techniques and technologies to improve productivity per unit of land while reducing the need for additional land, water, and energy. Precision agriculture, improved crop varieties, and better management of inputs (e.g., water and fertiliser) are key components.
Why it Matters:	With a growing global population, there is pressure to produce more food. Sustainable intensification seeks to meet this demand without expanding farmland into natural ecosystems, thus helping to conserve biodiversity and reduce GHG emissions.

6. Biodiversity

Definition:	The variety of life in a particular habitat or ecosystem, including all plants, animals, fungi, and microorganisms.
In Agriculture:	Agricultural biodiversity refers to the variety of crops, livestock, and other organisms that contribute to farming systems. A diverse system can include different plant species (polyculture), a range of livestock breeds, and even beneficial insects.
Why it Matters:	Greater biodiversity makes ecosystems more resilient to stresses such as pests, diseases, and extreme weather. It also promotes healthy soil and water cycles and can enhance carbon sequestration, making farms more sustainable.

7. Agroforestry

Definition:	The integration of trees and shrubs into crop and livestock systems.
In Agriculture:	Agroforestry practices might include windbreaks, silvopasture (integrating trees into grazing systems), or alley cropping (planting rows of trees between crops). These systems provide multiple benefits such as improving soil health, increasing biodiversity, sequestering carbon, and providing habitat for wildlife.
Why it Matters:	Agroforestry is a powerful tool for climate resilience. Trees capture and store carbon, protect crops and livestock from extreme weather, improve soil fertility, and support a wide range of ecosystem services.

8. Carbon Footprint

Definition:	The total amount of greenhouse gases (GHGs) produced directly and indirectly by a person, organisation, or activity.
In Agriculture:	A farm's carbon footprint includes emissions from livestock, machinery, fertiliser, and any associated energy use. Reducing this footprint involves improving efficiency, reducing inputs, and capturing carbon through practices like soil sequestration or tree planting.
Why it Matters:	Understanding the carbon footprint helps farmers identify areas where they can cut emissions and adopt more sustainable practices. Reducing a farm's carbon footprint is essential for combating climate change.

9. Conservation Agriculture

Definition:	A set of farming practices that protect and enhance soil health, typically by minimising soil disturbance, maintaining a permanent soil cover, and rotating crops.
In Agriculture:	Conservation agriculture involves reducing or eliminating tillage (ploughing), keeping the soil covered with cover crops or crop residues, and diversifying crops through rotation. This not only enhances soil organic matter and fertility but also helps with carbon sequestration.
Why it Matters:	By reducing soil erosion, improving water retention, and enhancing soil health, conservation agriculture can help mitigate climate change and make farming systems more resilient to environmental stresses.

10. Circular Agriculture

Definition:	A farming system where resources are used, reused, and recycled in closed loops, minimising waste and maximising efficiency.
In Agriculture:	Circular agriculture focuses on reducing inputs like water and fertiliser and reusing resources such as crop residues or animal manure. It also promotes integrated systems where waste from one part of the farm (e.g., animal manure) is used as input for another e.g. fertilising the crop.
Why it Matters:	Circular agriculture promotes sustainable resource use, reduces waste, lowers the environmental impact, and can contribute to lower GHG emissions, thus enhancing farm sustainability.

11. Carbon Markets

Definition:	Platforms where carbon credits are traded. These credits represent reductions or removals of GHGs, allowing companies or individuals to offset their emissions.
In Agriculture:	Farmers can participate in carbon markets by adopting practices that sequester carbon, such as regenerative agriculture or agroforestry. For every ton of carbon dioxide equivalent (CO ₂ e) they sequester, they can earn a carbon credit, which they can sell to other businesses looking to offset their emissions.
Why it Matters:	Carbon markets offer farmers an additional income stream while incentivising the adoption of climate-friendly practices that reduce global GHG levels.

12. Greenhouse Gas Emissions (GHGs)

Definition:	Gases like carbon dioxide (CO ₂), methane (CH ₄), and nitrous oxide N ₂ O) that trap heat in the atmosphere, contributing to global warming.
In Agriculture:	Agriculture contributes significantly to GHG emissions, particularly through methane from livestock (especially cattle), nitrous oxide from fertiliser use, and CO ₂ from machinery and deforestation.
Why it Matters:	Reducing GHG emissions is critical to slowing global warming. By managing emissions from livestock, fertilisers, and fuel use, and by enhancing carbon capture through practices like reforestation and soil sequestration, agriculture can become a part of the solution.

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