Rialtas na hÉireann
Government of Ireland

# Draft Bioeconomy Strategy 2026-2030

## BioScale 2030: Advancing a Sustainable Bioeconomy for Ireland

**2026**

Prepared by the Department of Climate, Energy and the Environment, and the Department of Agriculture, Food and the Marine

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# Table of Contents


Minister's Foreword ..... 3

Executive Summary ..... 4

The Bioeconomy Opportunity ..... 5

Why the Bioeconomy matters for Ireland ..... 5

From Local to Global Developments ..... 8

Challenges to Developing the Bioeconomy in Ireland ..... 10

Strategic Framework for Irelands Bioeconomy ..... 12

Vision ..... 12

Mission Statement ..... 12

Guiding Principles ..... 12

Strategic Objectives ..... 13

Delivering the Strategic Framework for Ireland's Bioeconomy ..... 14

Meeting our Strategic Objectives ..... 15

1. Scaling Infrastructure, Technology and Investment ..... 15

2. Strengthening Market Demand and Development ..... 19

3. Leveraging Innovation, Knowledge and Skills ..... 22

4. Bioeconomy as a tool for Climate Action and Circularity ..... 25

5. Governance, Cooperation and Partnerships ..... 31

Supporting our Key Sectors ..... 36

A. Agri-Bioeconomy and Circular Nutrients ..... 36

B. Biobased Construction using Forest and Crop Biomass ..... 39

C. Blue Bioeconomy ..... 43

D. Biomanufacturing and Biobased Materials for Industry ..... 46

E. Circular Bioeconomy: Food and Other Organic Wastes ..... 49

Delivery and Implementation ..... 52

Implementing the National Bioeconomy Strategy ..... 52

Monitoring, Measuring and Reporting ..... 53

Annex I: National Bioeconomy Action Plan 2026 – 2030 [SAMPLE] ..... 55

# Minister’s Foreword

To be completed post public consultation.

# Executive Summary

To be completed post public consultation.

# The Bioeconomy Opportunity

Ireland's bioeconomy can be a cornerstone of how we sustainably develop a low-carbon, competitive and resilient economy. A thriving bioeconomy can turn Ireland's strengths — our land and aquatic biological resources, research and demonstration capability and enterprise base — into high-value, circular biobased products and services that reduce our reliance on fossil fuels and non-sustainable materials. It can help sustain and grow regional, rural and coastal livelihoods, strengthen national resource security and EU strategic autonomy. The bioeconomy can contribute materially to priorities such as competitiveness, emissions reduction, cleaner water, better nutrient management, reduced pollution, reduced fossil imports, supply chain risks and biodiversity recovery.

In this Strategy, the bioeconomy means the activities that use biological resources[1] to deliver sustainable, nature-positive value through products, services, science and technology. It spans primary production (agriculture, forestry, fisheries and aquaculture) and management (outputs, waste), to transform biomass through processing, biomanufacturing and biotechnology for food and feed, health, energy, industry, materials, construction and ecosystem services. This aligns with the EU Bioeconomy Strategy[2] and reflects its cross-sectoral nature of the bioeconomy as a driver of innovation, sustainability and bio-industrial transformation.

## Why the Bioeconomy matters for Ireland

Across Europe, the bioeconomy is increasingly recognised as a driver of green growth, competitiveness and strategic autonomy, reducing reliance on imported fossil-based materials and strengthening resilient supply chains for food, materials, and energy.

Ireland starts from a strong position: a globally recognised agri-food sector, a growing forestry base, extensive marine assets producing significant blue biomass resources, and a strong base of skilled and resilient farmers, foresters, aquaculturists and fishers. Recent research from MDPI shows that there are substantial volumes of biomass available in Ireland, with the country generating 49 million tonnes of solid biomass and over 58 billion cubic metres of liquid

1 Biological resources include genetic resources, primary and secondary biomass (including by-products, residues and unavoidable biowaste), and biogenic carbon captured and utilised through innovative approaches.

2 Available online at Bioeconomy Strategy - Environment - European Commission. The bioeconomy is defined at an EU level as the activities that deliver sustainable solutions based on biological resources to create added value. These include products, services, science and technologies benefiting sectors ranging from agriculture, forestry, fisheries and aquaculture to value chains based on biomass processing, biomanufacturing and biotechnologies such as in food, health, energy, industry, ecosystem and other services

biobased feedstocks.[3] These include both primary and secondary resources such as residues, by products and organic wastes. When adjusted for population,[4] Ireland's biomass resources equate to approximately 20 cubic meters per person.

In 2023, the bioeconomy contributed €863 billion to the European Union economy (EU27), providing over 17 million jobs.[5] Employment growth has been significant in sectors of the bioeconomy, such as the production of biobased electricity and liquid biofuels. In Ireland, it is estimated that the bioeconomy has contributed €24 billion to the economy in 2023 through the biomass producing and converting sectors, employing over 200,000 people.[6] The value add per person in these sectors is estimated at €118,000, significantly higher than the EU average of €51,000.

In Ireland,[7] agri-food exports reached a record €19 billion in 2024, equal to 8.6% of merchandise goods exports. The sector employs 169,300 people as a main occupation across over 133,000 farms, 2,000 fishing vessels or aquaculture sites, and over 2,000 food processing and production businesses. It is underpinned by 4.6m hectares of agricultural land and over 808,000 hectares of forestry.

Ireland's seabed territory is much greater than our land mass.[8] In 2024 the ocean economy in Ireland had a turnover of €8.39 billion, contributing €3.53 billion in Gross Value Added (GVA) to Ireland's economy, and supporting just over 49,000 jobs.[9] The marine sectors contributing to the blue bioeconomy include "Seaweed (wild), Marine Biotechnology and Bioproducts", "Marine Aquaculture", "Seafood Processing", and "Sea Fisheries". Collectively these sectors contribute 15% of the total ocean economy turnover.

Ireland's strong biological resource base presents opportunities to strengthen the sustainability, competitiveness and resilience of key sectors, particularly agriculture, forestry, the marine economy and emerging bio-industrial activities. Many businesses in these sectors operate on relatively tight margins while facing increasing environmental and climate obligations. At the same time, significant volumes of residues, organic by-products and processing side streams remain under-utilised or are managed at relatively low economic

3 Quantifying and Mapping Biomass Resources in Ireland: A Holistic Assessment of Primary and Secondary Feedstocks | MDPI

4 Population estimate of 5.46 million, from Central Statistics Office data available at Population and Migration Estimates, April 2025 - Central Statistics Office

5 See statistics on jobs and wealth in the bioeconomy for EU27 and Ireland at Jobs and wealth in the EU bioeconomy

6 Ibid.

7 Department of Agriculture, Food and the Marine (2025) Annual Review and Outlook for Agriculture, Food and the Marine 2024-2025

8 Importance of Ireland's marine resource | Marine Institute

9 Marine Institute and University of Galway (2025) Ireland's Ocean Economy Update

value. The development of Ireland's bioeconomy can help convert these resources into higher-value products including new sources of food and feed, biobased chemicals, biomaterials, and bioenergy. In doing so, the bioeconomy can create new value chains that diversify farm, rural, coastal and regional incomes, support indigenous enterprise development and contribute to decarbonisation, defossilisation and Ireland's wider industry, climate and environmental targets, while strengthening competitiveness, energy and resource security.

The efficient and sustainable management of our resources will be pivotal to the development of a secure bioeconomy. The sustainability of these resources relies on a climate and nature-positive approach to land and marine use. By creating value from sustainably managed biomass, residues and ecosystem services, new bioeconomy value chains can incentivise farming and land management practices that enhance biodiversity, soil health and water quality while reducing nutrient losses. Through better utilisation of grass, manure, crop residues and other biological resources, the bioeconomy can support circular nutrient use and regenerative practices, helping to reduce nutrient losses affecting water quality while aligning climate mitigation with biodiversity protection and the long-term resilience of Ireland's agricultural landscapes.

The bioeconomy also has important links with Ireland's emerging life sciences and industrial biotechnology agenda. Technologies such as advanced fermentation, bioprocessing and biomanufacturing can support the conversion of biological resources into higher-value ingredients, materials, chemicals, health-related products and industrial inputs.

**Bioeconomy in Action: Farm Zero C – Integrated Bioeconomy Approach in Practice**

Farm Zero C,[10] led by Carbery Group and BiOrbic Research Ireland Centre for Bioeconomy[11] in partnership with Teagasc and research institutions, is demonstrating how a commercial dairy farm can transition towards climate neutrality while maintaining productive agriculture.

Based at Shinagh Farm in West Cork, the project applies an integrated systems approach combining improved grassland management, circular nutrient use, biodiversity enhancement and renewable energy solutions. It also explores the valorisation[12] of grass,

10 Home - Farm Zero C

11 BiOrbic Research Ireland Centre for Bioeconomy

12 Valorisation is the act of assigning, enhancing, or maintaining the economic value of something

manure and other agricultural biomass through technologies such as green biorefining and anaerobic digestion.

Farm Zero C including the Anaerobic Digestion (AD) – Green Biorefinery Demonstration facility illustrates how integrated bioeconomy approaches, which optimise the use of biological resources within the farming system, can reduce emissions, enhance biodiversity and create new value streams for farm businesses while supporting Ireland's competitiveness, climate and sustainability goals.

## From Local to Global Developments

The development of Ireland's bioeconomy takes place within an evolving national, regional, European and international policy landscape.

At the national level, Ireland's bioeconomy policy framework is anchored by the National Policy Statement on the Bioeconomy (2018) and the Bioeconomy Action Plan 2023–2025. These set out a coordinated approach to developing this cross-cutting meta sector across governance, research and innovation, enterprise development, climate and circular economy objectives, and knowledge and skills. Bioeconomy development also intersects with several wider national policy frameworks including Food Vision 2030, the Climate Action Plan, the Circular Economy Strategy, Project Ireland 2040, White Paper on Enterprise, and Our Rural Future, all of which recognise the role of sustainable biological resources in supporting economic development, emissions reduction and rural, coastal and regional resilience.

Across Ireland, several initiatives already demonstrate how bioeconomy approaches can create value from biological resources while supporting climate action, biodiversity, enterprise and rural development. At the same time, Ireland hosts a growing ecosystem of universities, research centres,[13] innovation infrastructure, and enterprise supports[14] relevant to biomanufacturing and biorefining, fermentation and biotechnology.

13 For example, the Research Ireland supported BiOrbic Research Ireland Centre for Bioeconomy

14 For example, the Just Transition Fund and the Shared Island Fund

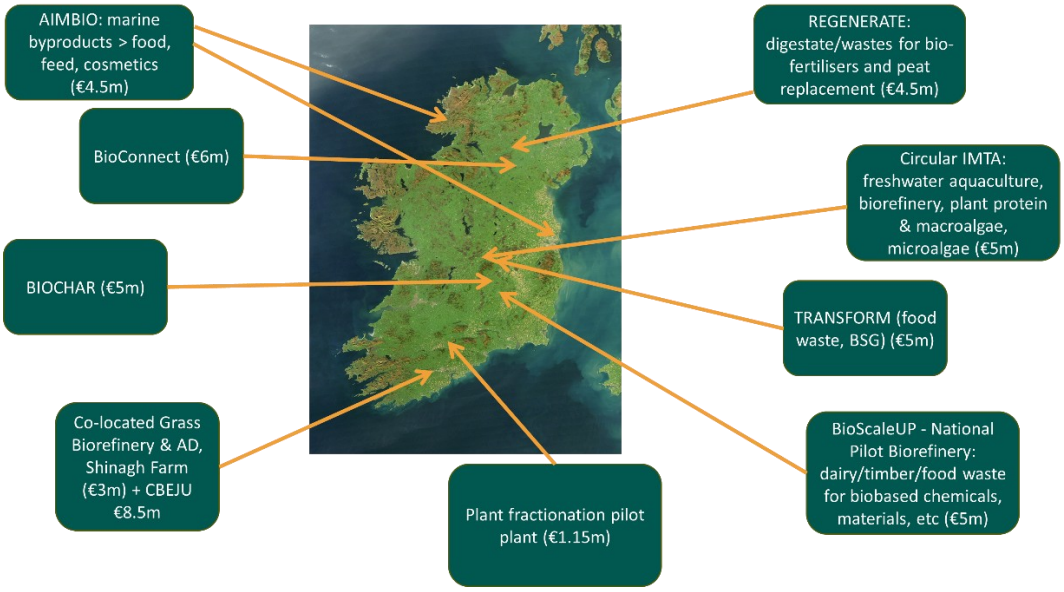


*Figure 1: Investment in innovation in the bioeconomy in Ireland*

At the local and regional level, policy instruments are increasingly important for translating national ambition into place-based implementation. The three Regional Spatial and Economic Strategies (RSESs) link spatial planning with enterprise, climate and natural resource priorities and include objectives related to rural diversification and sustainable resource use. Local Authority Climate Action Plans (LACAPs), adopted by all 31 local authorities, also provide important delivery mechanisms. These plans include actions related to circular economy initiatives, organic waste management, biomethane development, nature-based solutions and other bioeconomy-related activities.[15] Regional initiatives and projects are also emerging that aim to strengthen coordination, develop regional innovation ecosystems and support community-led bioeconomy initiatives. This regional and local dimension will be particularly important in ensuring that national bioeconomy ambitions are translated into practical delivery pathways aligned with local resources, enterprise opportunities and community priorities.

At the European level, the strategic importance of the bioeconomy is well established. In November 2025, the European Commission published an updated EU Bioeconomy Strategy, which emphasises competitiveness, resilience and sustainability. The Strategy highlights priorities including improving the efficiency and circular use of biological resources, scaling markets for biobased products and materials, ensuring sustainable biomass supply, accelerating innovation and demonstration activities, and strengthening Europe's global leadership in the bioeconomy. The EU bioeconomy policy framework is also closely linked with wider policy initiatives including the competitiveness compass, climate and energy

15 Industry-Sectoral-Report.pdf.aspx

legislation, the circular economy agenda, the Common Agricultural Policy, the EU Vision for Agriculture and Food and the European Ocean Pact. For Ireland, this evolving EU context provides both strategic direction and practical opportunities, including access to policy alignment, funding instruments, research partnerships and emerging markets for sustainable biobased products.

At the international level, interest in the bioeconomy has accelerated as countries seek solutions for climate mitigation, biodiversity protection, sustainable food systems and resilient supply chains. Organisations such as the Food and Agriculture Organization (FAO) promote sustainable and circular bioeconomy approaches as a means of transforming agrifood systems and reducing waste and pollution. The G20 Bioeconomy Initiative has also adopted high-level principles[16] to guide the development of sustainable bioeconomies globally. The Bioeconomy Challenge,[17] launched at COP30, aims to turn the G20 High-Level Principles[18] into concrete actionable strategic activities.

International platforms such as the International Bioeconomy Forum and the Global Bioeconomy Summit support cooperation, knowledge exchange and the development of shared approaches to sustainable biomass use and biobased innovation.

This broader policy context provides an important framework for Ireland's national strategy and helps align domestic bioeconomy development with wider European and global priorities. Within this evolving context, Ireland's National Strategy provides an enhanced strategic framework to build on local and national strengths and align Ireland's bioeconomy development with these European and international policy priorities.

## Challenges to Developing the Bioeconomy in Ireland

Despite the significant opportunities outlined above, the development of Ireland's bioeconomy faces several structural, technological and market challenges that must be addressed to unlock its full potential. While progress has been made through national policy initiatives, research programmes and demonstration projects, the transition from research and pilot activities to widespread commercial deployment remains complex. These challenges include financing and investment, the development of sustainable biomass supply chains, market demand for biobased products, regulatory and policy coordination, skills development and the need for stronger integration across sectors and regions. Addressing these barriers will be

16 G20 reaches consensus and establishes High-Level principles on Bioeconomy

17 Bioeconomy Challenge: Global Strategies for a Sustainable Future

18 2024-09-11-high-level_principles_on_bioeconomy-final_version.pdf

essential to enable the bioeconomy to scale and deliver economic, environmental and societal benefits at national, regional and local levels.

Overcoming these challenges will require coordinated policy action, targeted investment and stronger collaboration across government, industry, research organisations and regional stakeholders. It will also require a clearer focus on the conditions needed to move from innovation and demonstration activity to wider deployment, market development, investment and implementation at scale. The following section sets out the Strategic Framework for developing and scaling Ireland's Bioeconomy to 2030. It defines the vision, mission, guiding principles and strategic objectives that will guide Ireland's approach to scaling sustainable bioeconomy value chains and unlocking the opportunities identified in this chapter.

# Strategic Framework for Irelands Bioeconomy

The Strategic Framework provides the foundation for the objectives of growing sustainable and circular bioeconomy value chains, supporting innovation and industrial deployment, ensuring responsible use of biological resources, and strengthening Irelands competitiveness within the European and global bioeconomy.

## Vision

By 2030, Ireland's bioeconomy is a core driver of economic prosperity, climate action, and rural regeneration. It is characterised by the sustainable and circular use of biological resources, innovative high-value industries, and thriving local communities.

## Mission Statement

The vision will be achieved by scaling demonstration and commercialisation of biobased innovations, investing in skills and infrastructure, aligning policy and regulation, embedding nature-positive principles, and engaging the public to ensure inclusive and place-based transformation.

## Guiding Principles

The development of Ireland's bioeconomy will be translated from its vision and mission into coordinated action by alignment with key guiding principles.

- **Sustainability and Circularity:** Bioeconomy activities must operate within environmental limits, safeguarding biodiversity, ecosystems and natural resources. The extraction and use of biomass should remain within the capacity of nature to regenerate and should support climate, water and soil protection.
- **Efficient and Cascading Use of Biomass:** Biological resources should be used efficiently and in ways that maximise their sustainable value. The cascading approach prioritises food and feed security, prevention of waste, reuse and higher-value material uses where feasible, while recognising appropriate roles for bioenergy, biomethane and biofuels where these support circularity, energy security and climate objectives and comply with sustainability criteria.
- **Food First:** Food and feed production remain priorities for biomass use. Bioeconomy development must support the availability of safe, nutritious, and sustainable food supplies while balancing other uses of biological resources.

- **Place-Based Local and Regional Development**: The bioeconomy should support regional and local economic development by mobilising locally available biomass resources and strengthening collaboration and cooperation through value chains, networks, clusters, partnerships and innovation ecosystems. This requires strong leadership and buy-in from industry stakeholders right across a bioeconomy value chain, from primary producers through to processors and final purchasers of biobased products and services.
- **Whole-of-government Coherence and Responsible Innovation:** Bioeconomy development requires coordinated policy across sectors including climate, enterprise, agriculture, forestry, marine, waste, construction, skills, procurement and innovation. Decision-making should support responsible innovation, consider sensible application of the precautionary principle and be guided by the best scientific evidence and consensus.

## Strategic Objectives

The overall mission of BioScale 2030 is to enable the scaling up of Ireland's bioeconomy. To achieve this, five key objectives must be met:

1. Scale Ireland's bioeconomy infrastructure, technology and investment
2. Strengthen the market demand for bio-based products
3. Leverage Ireland's innovation, knowledge and skills
4. Acknowledge the bioeconomy as a tool for climate action and circularity
5. Improve our governance, cooperation and partnership approach

These objectives will deliver an enabling framework as demonstrated by targeted actions in the sectors identified as key for Ireland in BioScale 2030:

A. Agri-Bioeconomy and Circular Nutrients
B. Biobased Construction using Forest and Crop Biomass
C. Blue Bioeconomy
D. Biomanufacturing and Biobased Materials for Industry
E. Circular Bioeconomy: Food and Other Organic Wastes

# Delivering the Strategic Framework for Ireland's Bioeconomy

# Meeting our Strategic Objectives

## 1. Scaling Infrastructure, Technology and Investment

Ireland's globally recognised agri-food sector and bioresource availability provide a strategic opportunity to develop sustainable biomass value chains for biomanufacturing and wider biobased industrial development. To achieve these opportunities, actions are required to facilitate:

- **Sustainable and efficient biomass value chains:** aim to de-risk investment by improving access to information on biomass availability, sustainability assurance, cascading use, and resilient feedstock supply chains across land and sea.
- **Scale-up technologies and infrastructure:** accelerate the transition from research and development to pre-commercial and commercial ready levels (also known as Technology Readiness Levels (TRL) 5-8),[19] with shared infrastructure and targeted programmes, including agri-bioeconomy and blue bioeconomy pathways.
- **Investment for biobased innovation:** close the "valleys of death"[20] through project preparation, blended finance, co-investment, and market-linked funding models.
- **Enabling regulatory framework:** reduce time-to-market with a regulatory hub, regulators-innovators working group, and targeted regulatory sandboxes.

### 1.1 Sustainable and Efficient Biomass Value Chains

The bioeconomy relies on biobased feedstock availability, quality and price stability, which are influenced by geography, seasonality, logistics and competing uses (e.g., food and feed, energy, materials). These dynamics can create uncertainty and price volatility which in turn increase investment risk and reduce competitiveness. Ireland can reduce these risks, and strengthen competitiveness and sustainability outcomes, by applying a cascading use approach and building sectoral and cross-sectoral regional biomass value chains that prioritise higher-value applications. This should aim to improve resource efficiency and support circularity through the optimised use of primary biological resources and greater use of unavoidable residues, wastes and side streams from agriculture, forestry, industry and urban systems, and the marine sector.

19 For an explanation on TRLs, please see the Horizon Europe Guide Notes on TRL Self-Assessment at trl-assessment-tool-guide-final.pdf

20 See page 5 of the new EU Bioeconomy Strategy for further information on the "valleys of death" in relation to the bioeconomy

**ACTION 1.1.1:** Establish national cascading-use guidance and a decision framework to prioritise higher value uses while protecting food and energy security and environmental sustainability.

**ACTION 1.1.2:** Develop standardised templates for biomass supply and off-take contracting (e.g. quality specifications, sustainability declarations, multi-year terms and price-indexing) to reduce transaction costs and improve bankability.

### 1.2 Scaling-Up Technologies and Infrastructure

Ireland has developed strong research capability and capacity in the bioeconomy. In addition, it has also rolled out pilot-scale up, testing and demonstration infrastructure.

Scaling biobased technologies and products such as anaerobic digestion and biomethane[21] is already recognised as necessary to meet national energy targets. However, the output from anaerobic digestion does not stop at just biomethane and energy. Additional outputs, such as liquid and solid digestate, provide opportunities for bio-industrial development through biorefinery, advanced fermentation, and biogenic carbon capture and utilisation. Scaling up these technologies must be carried out in coherence with energy development and broader decarbonisation goals of Ireland's industry. Coordinated sequencing across infrastructure, regulation, skills and market development can help overcome the obstacles that span financing, regulatory requirements, planning procedures, and community acceptance.

**ACTION 1.2.1:** Seek to maximise the utilisation of the pilot scale biorefinery infrastructure established in recent years through DAFM, Just Transition and Shared Island funding. This includes ensuring access to these facilities by a broad range of companies, adding more funded projects to these sites, and installing additional equipment where necessary and feasible.

**ACTION 1.2.2:** Incorporate best available technologies to support the cascading use of biomass as per Article 3(3) of the Renewable Energy Directive (RED III) as a condition for the receipt of funding for the development of anaerobic digestion and other facilities designed to achieve the goals of the National Biomethane Strategy while ensuring compliance with the Renewable Energy Directive.

**Action 1.2.3:** Continue to support research and innovation in the bioeconomy through public research funders to ensure a continued pipeline of innovation opportunities that can be scaled up

21 national-biomethane-strategy.pdf

**ACTION 1.2.4:** Implement a national pilot-to-demonstration programme with a target to develop funding pathways to enable pilot-to-demo initiatives (transitioning from R&D to pilot/demonstration) and biorefinery hub pathways (moving from demonstration to first commercial/scale), to validate technologies and business models, and as applicable promote industrial symbiosis (e.g. by-products, materials, heat, nutrients) and regional clusters.

### 1.3 Investment for Biobased Innovation

Ireland faces investment barriers common to emerging biobased industries across the EU and globally, particularly in addressing the two "valleys of death": (i) transitioning from research and development to pilot and demonstration, and (ii) moving from demonstration to commercial scale. Addressing these barriers will require coordinated national and EU-aligned instruments covering project development support, blended finance, co-investment, and clear investment signals from policy and markets.

**ACTION 1.3.1:** Position Ireland to participate in the EU Important Projects of Common European Interest (IPCEI) on Biotechnology[22] by coordinating national engagement, identifying funding sources, developing a project pipeline, and investing in shared bioeconomy infrastructure and value chains.

**ACTION 1.3.2:** Engage with Multi-Lateral Development Banks (MDBs) to reflect bioeconomy priorities in multilateral climate finance discussions, and to contribute to international knowledge-sharing on financial instruments that mobilise private capital for innovative biobased sectors.

**ACTION 1.3.3:** Position Ireland to actively participate in the European Bioeconomy Investment Deployment Group by establishing a national coordination approach to identify, prepare and advance a pipeline of Irish bioeconomy projects to investment readiness and to support access to Irish and EU level blended financing and finance risk sharing approaches.

**Action 1.3.4:** Avail of, and maximise Irish drawdown, from bioeconomy relevant funding opportunities that will arise from the European Competitiveness Framework that will be part of the EU Multiannual Financial Framework 2028-2034, particularly under the proposed policy window for 'Health, Biotech, Agriculture and Bioeconomy'.

**Action 1.3.5**: Assess the potential for a tax-based support for innovation in the bioeconomy sector to assist enterprises scaling up from research and development to commercialisation.

22 Joint European Forum for Important Projects of Common European Interest backs three new biotechnology projects to strengthen European competitiveness - Internal Market, Industry, Entrepreneurship and SMEs

**Action 1.3.6:** Avail of the Enterprise Ireland Start-up Accelerator and the EU Scaleup Fund[23] to develop and scale bioeconomy enterprises.

**Action 1.3.7**: Encourage more proactive engagement by the Irish bioeconomy sector with national and international venture capital funds and philanthropic investors.

### 1.4 Enabling Regulatory Framework

Regulatory complexity and fragmented pathways can slow biobased innovation and investment. Due to delays bringing innovations to market, a predictable regulatory system is needed that links innovators to competent authorities, clarifies classification, licensing and permitting, and enables test-and-learn approaches (including regulatory sandboxes) for defined innovation areas such as biomanufacturing, fermentation and biobased construction products. The proposed Bioeconomy Technology Centre under Objective 1.2 can provide guidance to relevant Government Departments on regulatory barriers faced by their clients.

**ACTION 1.4.1:** The BDG secretariat will encourage Irish membership of the Bioeconomy Regulators and Innovators forum.

23 https://eic.ec.europa.eu/eic-fund/scaleup-europe-fund_en

## 2. Strengthening Market Demand and Development

The EU bioeconomy strategy acknowledges the difficulties that biobased materials face when entering a market, including cost competition with fossil-based alternatives and weak or low market demand. The same is true for Ireland, with the complication of some biobased materials classified as a waste product, requiring a separate process for reclassification to a resource that can take time and money to achieve. Actions in the Second Whole of Government Circular Economy Strategy seek to address this classification challenge. In order to address the issue of weak or low market demand, this strategy aims to use the tools available to strengthen market demand and development.

### 2.1 Standards

To build trust and acceptance of biobased products and materials, there is a need to establish standards and proof of performance. The National Standards Authority of Ireland (NSAI) has established a Technical Committee (TC) on the bioeconomy (NSAI/TC 169),[24] to involve and update stakeholders on developments in standards at Irish, EU and international level that effect the bioeconomy.

**ACTION 2.1.1:** NSAI/TC 169 on Bioeconomy to determine priority sectors and products where standards are needed, identify existing standards that can be applied or adapted to Ireland, and produce guidance to assist companies looking to have their biobased products certified to such a standard. Additional stakeholders, for example, those working in public procurement, are encouraged to be involved in the NSAI Technical Committee.

### 2.2 Business Forum

There are many routes to market for businesses of all sizes in Ireland and the EU. The Irish Bioeconomy Foundation[25] provides a number of services to help bioeconomy companies, including the National Biorefinery Pilot Plant, promotion and outreach. This strategy aims to build on existing platforms such as the Irish Bioeconomy Foundation and the annual All Island Bioeconomy Summit,[26] by creating a forum to bring together companies producing biobased products and materials with retail and other outlets.

This forum should align with the EU bioeconomy strategy plans to support voluntary industrial alliances and become a member of the proposed “Biobased Europe Alliance”.

24 NSAI launch new committee for bioeconomy | NSAI

25 Home - Irish Bioeconomy Foundation

26 Home - All Island Bioeconomy Summit, Ireland

**ACTION 2.2.1:** Engage with the Irish Bioeconomy Foundation, All Island Bioeconomy Summit, IBEC, and Enterprise Ireland to develop an annual forum to bring together companies working within the bioeconomy with retailers and other businesses, to support the scaling up of availability of biobased products and materials on Irish and EU markets.

**ACTION 2.2.2:** Facilitate the inclusion of Irish bio-industrial alliances in the proposed EU Biobased Europe Alliance.

**ACTION 2.2.3:** Ireland's Local Enterprise Offices to incorporate the bioeconomy into advice and guidance and provide statistical reporting on the level of interest in bioeconomy thematic areas to support the ongoing monitoring and reporting on bioeconomy development in Ireland.

### 2.3 Public Buyers

Public procurement in Ireland accounts for around 10-12% of the country's annual Gross Domestic Product (GDP),[27] and the potential for green public procurement is highlighted in Ireland's updated Buying Greener: Green Public Procurement Strategy and Action Plan 2024-2027.[28] The updated Buying Greener document includes an action calling for biobased options to be covered under national Green Public Procurement (GPP) criteria.

The EU bioeconomy strategy notes the role that public procurement can play and seeks to use the revision of the procurement directives to improve green public procurement of biobased solutions.

This strategy also acknowledges the need to provide support to public decision-makers and buyers looking for alternatives to fossil-fuel based goods and services. There are two main approaches to public procurement where such support can be provided – the purchase of standard goods and services that cover the vast majority of government expenditure, and the procurement of innovation. For the former, it is important to ensure that biobased alternatives can meet the demands and standards of the providers of public services. The needs of public buyers should therefore be considered by NSAI/TC 169[29] when determining the priority sectors for biobased products and materials, and existing Environmental Protection Agency (EPA) GPP criteria that support the bioeconomy should be promoted. For the latter, the procurement of innovation applies when there are no current solutions available on the market and is covered in more detail with links to relevant advice in Buying Greener.

27 Green Public Procurement Strategy and Action Plan 2024-2027

28 buying-greener-green-public-procurement-strategy-and-action-plan-2024-2027.pdf

29 National Standards Authority of Ireland Technical Committee number 169

For any public purchasing decision, the principles of Green Public Procurement (GPP) should apply, in particular the consideration of environmental sustainability when assessing the need, and the use of minimum sustainability or environmental criteria. For both of these, Life Cycle Assessment can be a useful tool, and can help a public buyer to make value for money decisions that consider the full impact of the solutions they are purchasing.[30] A similar approach to incorporating the cost of carbon in public procurement decisions[31] could help to boost fossil-fuel based alternatives. This is already happening in the construction sector, with Whole Life-Cycle Greenhouse Gas Emissions Assessment a requirement for building projects under the EU Energy Performance of Buildings Directive,[32] from 2027 onwards.[33]

**ACTION 2.3.1:** Promote existing national GPP criteria that can support the bioeconomy and identify and address the gaps for criteria based on the priority sectors of the NSAI/TC 169.

**ACTION 2.3.2:** Establish a community of public buyers looking to purchase biobased solutions, using the EU Public Buyers Community Forum,[34] to enable partnerships, joint procurement, cross-border procurement and shared learning for public authorities in Ireland and the EU.

**ACTION 2.3.3:** Identify priority sectors for the incorporation of carbon accounting as a purchasing tool to boost biobased products and materials over their fossil-fuel based alternatives.

### 2.4 Awareness Campaign

An awareness and understanding of the benefits and limitations of the bioeconomy is important to help better inform public, private, and individual consumers when they're making their purchasing choices. It can also help to address any concerns around infrastructure development and showcase how such infrastructure can bring energy and jobs to urban, rural and coastal areas.

An awareness campaign covering 2026 to 2030 must be grounded in facts, while highlighting the benefits of a nature-positive, climate-positive approach to using our biological resources that can reduce our dependency on fossil fuels. It should build on the communications work already achieved under the Bioeconomy Action Plan 2023 – 2025, the annual Bioeconomy

30 For example, the End of Life Vehicles Directive requires public procurers to consider the whole life cost of vehicles including their emissions, when making purchasing decisions

31 For example, the InterReg funded De-Carb Pro project is currently investigating how to decarbonise public procurement DeCarb Pro - South East Energy Agency

32 Energy Performance of Buildings Directive

33 REDUCING EMBODIED CARBON IN CEMENT AND CONCRETE THROUGH PUBLIC PROCUREMENT, available through Government approves public procurement guidance to promote the reduction of embodied carbon in construction

34 Homepage | Public Buyers Community

Ireland Week, and the All-Island Bioeconomy Summit, and build on existing government fora agencies and networks. Case studies of the bioeconomy in action, particularly those that highlight the benefits to communities, need to be front and centre. Key messages should address consumers to prompt decisions at their points of purchase, whether these are public buyers, private citizens, or private companies.

**ACTION 2.4.1:** Develop a nationwide multi-media campaign to address key messages about the bioeconomy, drive consumer demand for biobased products, raising awareness of the sector, and boosting participation and civil society ownership of Bioeconomy Ireland Week.

**ACTION 2.4.2:** Develop a detailed, data-driven portrait of consumer groups for targeted awareness campaigns on the benefits of biobased products and materials.

**ACTION 2.4.3:** Support the development of citizen-led initiatives, for example under Local Authority Climate Action Plans and Decarbonisation Zones, to boost the sustainable use of Ireland's biological resources.

## 3. Leveraging Innovation, Knowledge and Skills

Ireland's bioeconomy will only scale if it can build and retain a workforce with bioeconomy relevant technical, regulatory, commercial and system skills. Knowledge created in research and demonstration settings needs to be rapidly translated into practice across farms, forests, fisheries and aquaculture, processing and biomanufacturing, construction and public services. The EU Bioeconomy Strategy explicitly encourages Member States and regions to promote bioeconomy-related education, training, re-skilling and up-skilling and Ireland's Bioeconomy Action Plan 2023–2025 and its Knowledge & Skills Pillar has already started to address this need.

Building on this foundation, this enabling policy area focuses on how to ensure developments in skills, knowledge and innovation systems are aligned with development, market creation and investment pipelines. This will be delivered through five connected strands linking education, skills, innovation and deployment across the bioeconomy:

1) A bioeconomy learning pathway from school to workforce
2) Aligning Further and Higher Education to bioeconomy labour market needs
3) Upskilling for SMEs, Primary Producers and the Public Sector

### 3.1 Bioeconomy Learning Pathway: from School to Workforce

Embedding bioeconomy literacy early builds long-term capability for the transition to a circular, low-carbon and nature-positive economy. Delivery should be anchored in national curriculum reform and Education for Sustainable Development, while providing practical, locally relevant learning experiences.

Implementation will leverage existing research and education initiatives (including BiOrbic, Circular Bioeconomy Education Centre (CBEC) as supportive projects) and the Bioeconomy Education and Sustainability Teachers Network to scale teacher Continuous Professional Development (CPD), classroom-ready materials and school-to-community linkages, with Bioeconomy Ireland Week used as an annual national activation moment.

**ACTION 3.1.1:** Establish a Bioeconomy Skills and Innovation Delivery Platform under the Bioeconomy Development Group (BDG)[35] to coordinate skills development, research and innovation and advisory systems with national bioeconomy deployment priorities.

**ACTION 3.1.2:** Establish a Bioeconomy Skills and Talent approach within national skills governance frameworks (Department of Education, Department of Further and Higher Education, Research, Innovation and Science (DFHERIS) and the Higher Education Authority (HEA) enterprise skills and future skills structures) aligned with the Green Skills Strategy.

**ACTION 3.1.3:** Deliver a bioeconomy learning pathway from school to workforce by embedding bioeconomy literacy in primary and post-primary curricula and scaling teacher CPD and classroom resources through CBEC and the Bioeconomy Education and Sustainability Teachers Network, using Bioeconomy Ireland Week as an annual activation moment.

### 3.2 Align Further and Higher Education to Bioeconomy Labour-market Needs

Bioeconomy development requires a further and higher education offering that produces the technicians, operators, scientists, engineers, advisors and business professionals needed for biomanufacturing, biorefining, sustainable biobased materials, agri- and blue bioeconomy and circular nutrient systems.

**ACTION 3.2.1:** Commission a national bioeconomy “skills needs assessment” through the Expert Group on Future Skills Needs and including representation/support from the Regional Skills Fora.

35 References to the Bioeconomy Development Group (BDG) relate to the proposed successor of the Bioeconomy Implementation and Development Group (BIDG), please see action 5.1.1

**ACTION 3.2.2:** Implement a coordinated Further Education & Training and Higher Education programme mapping and curriculum renewal programme (HEA, HEIs and ETBs) aligned with key bioeconomy sectors.

**ACTION 3.2.3:** Expand micro-credentials, apprenticeships, graduate conversion and enterprise-linked learning pathways (including Higher Education initiatives Springboard+ and Micro-credentials learner fee subsidy) to scale bioeconomy skills.

### 3.3 Upskilling for SMEs, Primary Producers and the Public Sector

This strand will build on Teagasc and private advisory and knowledge transfer services, BIM capability programmes, Skillnet Ireland industry networks, Research Ireland and Local Authority training (including climate action training). This will include aligning with the Green Skills Strategy and Implementation Plan so that bioeconomy competences become mainstream green productivity skills.

**ACTION 3.3.1:** Establish employer-led bioeconomy upskilling opportunities for SMEs and the wider workforce through the Education Training Boards (ETBs), Skillnet Ireland and enterprise agencies, focused on deployment relevant skills including bioprocessing and fermentation, biobased materials, circular resource management and sustainability measurement.

**ACTION 3.3.2:** Strengthen Teagasc and BIM advisory capacity through targeted training, updated toolkits to facilitate bioeconomy deployment through value chain development, biomass supply systems and contracting models and engagement in regional clustering and cooperation.

**ACTION 3.3.3:** Strengthen awareness of bioeconomy skills development and upskilling opportunities through the Regional Skills Fora and enhance local authority capability (including climate action training) to support permitting, procurement and place-based bioeconomy hubs.

# 4. Bioeconomy as a tool for Climate Action and Circularity

A recent report from the Irish Bioeconomy Forum on Bioeconomy and Climate Action[36] notes that the bioeconomy can play a central role in Ireland's transition to a low-carbon and resource-efficient economy, and delivery on this strategy can realise this potential.

Ireland's climate strategy is ambitious, but the bioeconomy is not yet fully recognised as a core part of delivering the 2030 and 2050 greenhouse has emission targets. By embedding bioeconomy pathways into the Climate Action Plan, Ireland can capture the emissions reductions, sequestration, and substitution potential of biobased solutions across multiple sectors. This will require the continued integration of bioeconomy climate mitigation solutions, such as recognising the role of the bioeconomy in developing carbon markets, and energy from biofuels, in National and Local Climate Action Plans.

In addition to climate action, waste generation remains high in Ireland at 14 million tonnes produced each year. Ireland generates a diverse and significant volume of biowaste across multiple sectors, including agriculture, wastewater treatment, forestry, fisheries, and municipal systems, with large quantities of municipal solid waste incinerated. Ireland is committed to a prevention approach to waste management. However, where such waste is not preventable, the reuse and recycling of materials are the next steps. The Second Whole of Government Circular Economy Strategy[37] recognises the importance of a circular bioeconomy to support the reuse and recycling of biological resources, whether as a standalone sector, or using biological resources in sectors such as construction and textiles.

## 4.1 Bioeconomy as a Climate Solution

To fully integrate the bioeconomy into Ireland's package of climate solutions, it is important to be able to quantify the potential emissions reductions of bioeconomy pathways. Marginal Abatement Cost Curves have been used in Ireland's agriculture sector,[38] and research by the EPA due in late 2026 aims to build on this and "quantify mitigation associated with a range of new measures that reduce $N_2O$ emissions, enhance carbon sinks via land-use and displace fossil fuel emissions via closed farm nutrient loops using enhanced production of bio-based products."[39]

Marginal Abatement Cost Curves (MACC) are graphs that plot the cost of abatement measures against the emissions reductions of a technology. Climate abatement costs are the

36 This will be published at Irish Bioeconomy Forum 2.0 (2024 to 2025)

37 https://assets.gov.ie/static/documents/7484ab1d/Circular-Economy_Strategy-2026-2028-en.pdf

38 Marginal Abatement Cost Curve 2023 - Teagasc | Agriculture and Food Development Authority

39 Read more at Research Data Table Dev | Environmental Protection Agency

costs incurred to eliminate or avoid one additional ton of greenhouse gas (GHG) emissions, measured in $CO_2$ equivalent ($CO_2e$). It can be a useful visualisation of the benefit of having a price for carbon to making bio-based technologies more competitive against their fossil equivalents. For example, a 2022 report from Denmark on "The Potential of Bio-Solutions" showed that a global carbon price at €250 per ton of $CO_2e$ would make bio solutions immediately more competitive with fossil equivalents:[40]

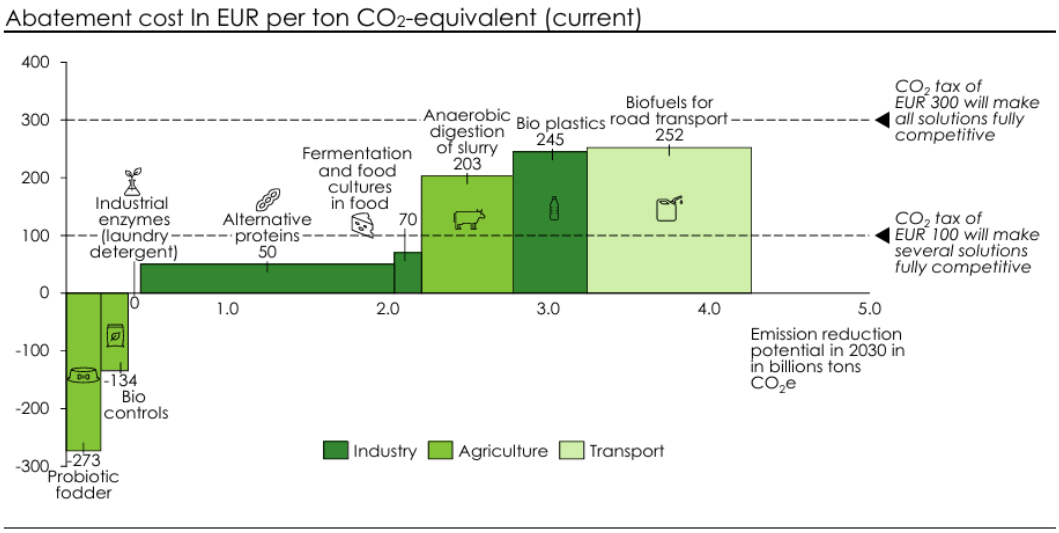


*Figure 2: MACC for Selected Bio Solutions, source: Copenhagen Economics (2022) The Potentials of Bio Solutions: Climate and sustainability potentials, barriers to growth, and Danish strongholds*

**ACTION 4.1.1:** Determine a MACC for biobased solutions in Ireland, with an early focus on sectors struggling to reduce emissions, for example, the transport and construction sectors.

**ACTION 4.1.2:** Further integrate the bioeconomy into national and local climate policies and investigate the potential for identifying the bioeconomy within Ireland's national emissions inventory.

**Building Resilience in the Bioeconomy**

For a sustainable bioeconomy, Ireland will need resilient supply chains. With a significant portion of our biomass coming from land and water-based ecosystems, a sustainable bioeconomy will rely on agriculture and marine sectors which are resilient and can adapt to protect themselves against the locked-in impacts of climate change.

40 See section 2.2.4 in The-potentials-of-biosolutions_final_20SEP2022.pdf

**ACTION 4.1.3:** Research the links between the bioeconomy and climate adaptation, with the bioeconomy as both a tool for adaptation, and a system requiring futureproofing against the inevitable impacts of climate change.

**Carbon Removals Framework**

The Carbon Removal Certification Framework Regulation (CRCF)[41] came into force in 2024. This Regulation creates a mechanism for certifying carbon removals and sets out principles to which these must adhere in order to be certified, with the objective of delivering higher levels of integrity in the voluntary carbon market. The regulation provides for various carbon removal activities, with the possibility for an indefinite number of methodologies, to be defined through delegated acts. At present, there are three methodologies completed, covering:

- Direct Air Capture
- Bioenergy Carbon Capture and Storage (BECCS)
- Biochar

With four others under development, including:

- Peatland Rewetting
- Afforestation
- Agriculture (mineral soils and agroforestry)
- Harvested Wood Products

Through the framework, participants in certified carbon removal schemes can generate a revenue stream from the sale of certified removals. This can potentially unlock new sources of private sector finance for climate actions linked to the development of bioeconomy sectors involving novel uses of land or biomass. These schemes can also create an alternative income stream linked to sustainable land use activities or, in the case of biochar, BECCS and harvested wood products, the use of harvested biomass for carbon storage.

Whilst some carbon farming and carbon credit schemes exist in Ireland, notably the Peatland Standard developed by Peatland Finance Ireland, the market is still at an early stage. The

41 Regulation (EU) 2024/3012 of the European Parliament and of the Council of 27 November 2024 establishing a Union certification framework for permanent carbon removals, carbon farming and carbon storage in products, available at Regulation - EU - 2024/3012 - EN - EUR-Lex

existence of the CRCF as a voluntary standard offers an opportunity to support the further development of this sector and to support wider bioeconomy actions.

**ACTION 4.1.4:** Conduct a programme of stakeholder engagement on carbon removals with stakeholders across the bioeconomy, such as scheme developers, landowners/managers, carbon removal operators, technical service providers, buyers and investors, with the objectives of developing online guidance and resources, and establishing a community of practice or informal network of bioeconomy carbon removal stakeholders.

**ACTION 4.1.5:** Support Irish schemes to achieve certification under the CRCF, and support CRCF-aligned carbon removal projects to seek funding from EU buyers' club.

**Bioenergy and Biofuels**

Biomass can be converted into energy through the production of biofuels, bioliquids, and biomass fuels. Technologies such as anaerobic digestion, can produce outputs including biomethane, which in turn can be used for the provision of energy. The National Biomethane Strategy[42] sets out how Ireland will achieve a commitment to deliver up to 5.7 TWh of indigenously produced biomethane by 2030.

Biofuels, including advanced biofuels produced from EU-listed feedstocks, are liquid fuels for transport which can be blended with petrol and diesel and used in road and rail transport, as well as marine and aviation.

The role of these fuels is particularly important in providing a phased transition pathway as they can act as intermediary solutions through the late 2020s and 2030s, alongside emerging technologies such as hydrogen internal combustion engines ($H_2$ ICE). Over time, as renewable electricity generation expands and grid infrastructure is strengthened, these solutions can be gradually complemented and replaced by zero-emission technologies such as battery electric and hydrogen fuel cell vehicles. This staged approach avoids a gap between current fossil dependency and future zero-emission systems.

The bioeconomy therefore has significant potential to support transitional measures for transport decarbonisation in Ireland, particularly in hard-to-abate sectors such as heavy-duty vehicles (HDVs), rail, aviation and maritime. These sectors are constrained by energy density requirements, long asset lifetimes, and slower infrastructure rollout, meaning that full electrification or hydrogen fuel cell deployment will take decades to achieve at scale. In this context, biomass-derived fuels offer a more readily available and practical pathway to reduce emissions while longer-term zero-emission solutions are developed.

42 national-biomethane-strategy.pdf

**Emissions Trading and the Bioeconomy**

Emissions from biomass were originally specifically excluded from the EU Emissions Trading System 1 (ETS 1), providing an incentive for reductions in greenhouse gas emissions by using biomass. This includes disregarding emissions from biomass when calculating whether an installation's emissions meet the threshold for inclusion in ETS. However, for an ETS operator to claim zero rating of emissions from a bioliquid, biogas or solid biomass, the operator will have to supply proof of sustainability and GHG savings. Biomass is encompassed by the Emissions Trading System 2 (ETS 2) *except* where it meets RED II sustainability criteria and greenhouse gas emissions reduction criteria. As outlined by the EPA,[43] solid biomass (e.g. wood-based fuels) is currently excluded from ETS 2.[44]

Since 2023, the exclusion of biomass for the purposes of reporting emissions has been subject to certain criteria, as detailed under Directive (EU) 2018/2001[45] (Renewable Energy Directive (RED) II), *Article 29,* Sustainability and greenhouse gas emissions saving criteria for biofuels, bioliquids and biomass fuels. Support for the use of biomass in the production of energy is further restricted under Directive (EU) 2023/2413[46] (Renewable Energy Directive (RED) III) which links such support to the principle of cascading use of biomass. Under the Directive, the cascading use of biomass is connected to the waste hierarchy. The message on the use of biomass for emissions trading and energy production can be understood as a supporting feature of a circular bioeconomy. This can be supported on a national level through earlier actions of this strategy.

### 4.2 Circular Bioeconomy and Biowaste Valorisation

Finding value in our biowaste is a key enabling element of Ireland's circular bioeconomy, offering a practical pathway to reduce emissions, recover nutrients, and create new biobased value chains from organic residues. Ireland generates a diverse and significant volume of biowaste across multiple sectors, including agriculture, wastewater treatment, forestry, fisheries, and municipal waste systems. Despite increasing awareness of its value, the majority of biowaste is still underutilised, with large quantities of municipal solid waste ending up being incinerated or landfilled.[47]

43 https://www.epa.ie/our-services/licensing/climate-change/eu-emissions-trading-system-/eu-emissions-trading-system-2-ets2/#d.en.126506

44 For further information on biomass in ETS2, check out Monitoring & Reporting Regulation - General guidance for ETS2 regulated entities and EPA presentation

45 Directive (EU) 2018/2001

46 Directive - EU - 2023/2413 - EN - RED III - EUR-Lex

47 Municipal Waste Statistics for Ireland | Environmental Protection Agency

The Biowaste Valorisation Roadmap provides directions to shift from traditional waste management toward resource recovery, aligning with the principles set out in the National Policy Statement on the Bioeconomy[48] and the Bioeconomy Action Plan 2023–2025.[49] Targets and actions on the reuse of biobased materials including biowastes are considered in the Second Whole of Government Circular Economy Strategy, ensuring alignment across policies.

The roadmap identifies key valorisation pathways, including land application, anaerobic digestion, composting, biorefineries, biochar production, nutrient recovery, and biotechnological processes. It highlights their role in contributing to climate mitigation, soil health, renewable energy, and rural and coastal economic development. It emphasises the need for sufficient and regionally appropriate infrastructure, improved biowaste capture and quality, and market development for biobased products. A strong focus is placed on applying the cascade principle, ensuring that biowaste is used first for higher-value products before energy recovery or land application.

**ACTION 4.2.1:** Leverage the outputs of the EnableBIO[50] research project including the regulatory roadmap to review policy and regulatory alignment for biowaste valorisation, infrastructure and technologies.

**ACTION 4.2.2:** Support the delivery of biowaste actions set out in the Second Whole of Government Circular Economy Strategy.

### 4.3 Sustainable Development of the Bioeconomy

The bioeconomy relies on biological resources, whether this is primary biomass, a by-product, or a biowaste. While the overall statistics on Ireland's production of biomass is high, the evolving use of this resource requires careful management.

#### Natural Capital Accounting

Natural Capital Accounting (NCA) is a framework for systematically measuring and valuing nature as an asset, in the same way we account for financial or physical capital.[51] It records the stocks of natural resources, such as soils, water, and forests, and the flows of benefits they provide including food, clean air, climate regulation and recreation (or 'ecosystem services'). By integrating this information into an accounting structure, NCA makes the value of ecosystems visible, highlighting both the benefits they deliver and the costs associated with

48 National Policy Statement on the Bioeconomy 2018

49 Bioeconomy Action Plan 2023 - 2025

50 Enable-BIO

51 For more information on NCA, please see Ecosystem, Environmental, and Natural Capital Accounting Information Note on Ecosystem Accounting - Central Statistics Office

their degradation. Whilst natural capital accounting is a specific technical framework (with an internationally recognised standard, SEEA-EA), 'natural capital approaches' is a term used to refer more generally to the use of the natural capital concept in decision-making.

**ACTION 4.3.1:** Build on the progress under the Bioeconomy Action Plan 2023 – 2025, the work of the National Biodiversity Action Plan, and the work of the Central Statistics Office to integrate natural capital accounting into bioeconomy reporting.

**Planetary and Societal Boundaries**

The development of the bioeconomy should be in line with the concept of sustainable development, taking into consideration the natural planetary boundaries as well as societal boundaries, to ensure the development meets the needs of present generations without compromising the needs of future generations.[52] This more holistic view of development and growth is reflected in the reporting on the country's well-being through the Well-Being Framework for Ireland.[53] [54]

For the bioeconomy, ongoing and active measurement and monitoring will be key to ensuring sustainability, with this covered later in this strategy under Delivery and Implementation. It will also require a framework within which measurements and indicators can have a meaningful impact on development decisions. There are several methodologies that have the potential to provide this framework, for example, the concept of Doughnut Economics[55] looks at economic growth within planetary and societal boundaries, opening the door to including more holistic metrics on development.

**ACTION 4.3.2:** Review the outcome of EPA research on the potential application of economic theories, such as Doughnut Economics, as an over-arching framework for monitoring Ireland's bioeconomy development.

## 5. Governance, Cooperation and Partnerships

This Strategy will require a step-change in delivery governance, reflecting the EU Bioeconomy Strategy's emphasis on "joining forces" across Member States, regions, municipalities, primary producers (farmers, foresters, fishers), industry, investors and civil society.

52 Sustainability | United Nations

53 A Well-being Framework for Ireland: Understanding life in Ireland

54 Well-being Information Hub - Central Statistics Office

55 Raworth, K (2012) A Safe and Just Space for Humanity: Can we live within the doughnut? Oxfam, available online at A Safe and Just Space for Humanity: Can we live within the doughnut?

Building on Ireland's existing approach to governance, cooperation and partnership,[56] the Strategy will establish a multi-level governance system with clear roles, structured stakeholder engagement, stronger industry involvement, enhanced EU positioning, and a coherent international engagement approach, including COP processes, G20-aligned initiatives and UN FAO bioeconomy activities. The strategy recognises that scale-up will require primary producers, cooperatives, SMEs, large industry, Foreign Direct Investment, investors, buyers and enterprise agencies to play a greater role than in earlier research phases.

### 5.1 National Governance and Delivery Architecture

The objective is to strengthen whole-of-government coordination, integration, policy coherence and implementation capability.

The interdepartmental and interagency Bioeconomy Implementation and Development Group (BIDG) co-led by the Department of Climate, Energy and the Environment and the Department of Agriculture, Food and the Marine currently monitors the delivery of the national bioeconomy action plan and identifies new measures to support future phases as the bioeconomy scales-up. To support the transition from policy development to scaling up implementation, the BIDG will need to evolve a strengthened delivery focused governance structure.

**ACTION 5.1.1:** Upgrade the Bioeconomy Implementation and Development Group to an Interdepartmental and interagency Bioeconomy Development Group (BDG). The upgraded BDG should also include agencies supporting the local and regional authorities and receive regular feedback from the bioeconomy key sectors. The Department of Enterprise, Tourism and Employment, and its agencies, will have an elevated role within the Bioeconomy Development Group, providing the enterprise, industry, competitiveness and innovation perspective to bioeconomy implementation. The Group will report to the Cabinet Committee on Environment and Climate Action via the Circular Economy Strategy Oversight Group as detailed in the Second Whole of Government Circular Economy Strategy. The new BDG should also report annually to the Cabinet Sub-Committee for Cabinet Committee on Economy and Investment which oversees economic growth, employment, and investment strategies.

**ACTION 5.1.2:** Insert a Bioeconomy chapter into Ireland's National Regional Partnership Plan (NRPP) and National Energy and Climate Plan (NECP) updates, covering the use of biomass, pathways for biomethane and digestate, biobased materials key sectors and procurement, and market readiness for carbon removals and nature credits. Establish alignment between

56 See Bioeconomy Implementation and Development Group (BIDG), the Governance & Awareness pillar of the Bioeconomy Action Plan 2023–2025, the Irish Bioeconomy Stakeholder Forum, and the Irish Bioeconomy Network (including its running of Bioeconomy Ireland Week)

the Strategy dashboard, NRPP targets, and NECP measures so reporting is consistent and auditable.

### 5.2 Multi-level governance with Regional Assemblies, Local Authorities & Cities

Recognising their key role in the bioeconomy, the strategy aims to make regions, local authorities, municipalities and cities at the centre of bioeconomy delivery, in line with the EU bioeconomy strategy's emphasis on place-based value chains and municipal actions and local innovation ecosystems.

**ACTION 5.2.1:** Local Authorities to assign 'Bioeconomy Leads', with a focus on identifying locally available biobased resources, identifying areas for procurement pilot projects, and providing guidance on planning and permits.

**ACTION 5.2.2:** Embed Bioeconomy Ireland Week as a regional activity, with each Regional Assembly and Local Authority aligning with local universities and education bodies hosting an annual cluster of events, linked to demonstrators and procurement showcases.

### 5.3 Community Buy-in

Scaling bioeconomy infrastructure and value chains requires strong and durable community acceptance, particularly where projects are perceived to affect land use, traffic and logistics, visual amenity, odour and noise, or other environmental risk. Evidence and experience indicate stronger support is possible where communities have early buy-in, and primary producers participate through cooperative ownership,[57] capturing of value locally and transparent benefit-sharing, including for infrastructure such as biorefinery hubs.

**ACTION 5.3.1:** Develop a voluntary social and community value framework for bioeconomy projects, with a commitment from developers to include the local community from the early concept stage. This framework could encourage cooperative ownership options for primary producers, and/or municipal partnerships for local bioresource valorisation. It should provide a standardised approach for community engagement, including outlining the benefits and benefit-sharing opportunities.

### 5.4 Regional Bioeconomy Clusters

The development of Ireland's bioeconomy will require, where applicable, the integration of multiple sectors within specific geographic areas where biological resources, infrastructure, research capability and enterprise activity can be connected. Ireland has already begun exploring place-based bioeconomy approaches through local authority supported bioeconomy

57 See research carried out under the CABBBIE research project and Bioeconomy & Rural Development Donegal

activity, regional innovation initiatives such as in Tipperary, Donegal and Monaghan, research networks such as the Circular Bioeconomy Cluster and collaborative pilot projects.

**ACTION 5.4.1:** Develop clusters around regional biomass resources, industrial infrastructure and research centres, supporting piloting and demonstration projects, biorefineries and collaborative innovation activities and enable the place-based implementation of Key Sectors 1-5.

### 5.5 Ireland in the EU: Bioeconomy Partnerships and Programmes

The strategy aims to put Ireland in a structured "two-way" engagement position with EU institutions, Member States and platforms, ensuring Irish stakeholders can access EU bioeconomy initiatives, alliances, and funding initiatives. The EU bioeconomy strategy provides opportunities for Irish bioeconomy stakeholders at all levels of governance, including:

- Participation in EU bioeconomy dialogues and expert groups on the implementation of the EU bioeconomy strategy, and mobilisation of various existing platforms
- The establishment of a European Bioeconomy Regulators and Innovator's Forum
- The European Bioeconomy Investment Deployment Group
- Collaboration on harmonised standards including under the Construction Products Regulation
- Improved access to finance for start-ups and scale-ups via the Scale-up Europe Fund and European Innovation Council (EIC) instruments
- Engagement with the Circular Bioeconomy Europe Joint Undertaking and its evolving programme focus including on primary producers and investment
- Participation in a Bioeconomy Investment Deployment Group, to mobilise public and private investment

Effective engagement with these initiatives will support Irish stakeholders in accessing funding, shaping standards, accelerating innovation and positioning Ireland within emerging European bioeconomy value chains.

**ACTION 5.5.1:** The BDG secretariat will encourage Irish engagement with planned and existing EU platforms and initiatives and put in place measures to ensure reporting on the impact of this engagement to the BDG. Examples of planned and existing initiatives include the EU Member States Dialogues on Bioeconomy, the European Bioeconomy Investment Deployment Group, the EU Bioeconomy Stakeholder Network, and the EIC Trusted Investors Network.

### 5.6 Global Engagement

Building on its hosting of the Global Bioeconomy Summit in October 2026, Ireland can play an active role in shaping the development of a sustainable global bioeconomy including through engagement in international governance, standards development, trade and market development.

Ireland's international engagement on a global level should align with, and support, the EU direction on global bioeconomy, as set out in the EU bioeconomy strategy. Key platforms for engagement include the United Nations Food and Agriculture Organisation (UNFAO) and the G20 Bioeconomy Initiative, and wider international processes focused on climate, biodiversity and sustainable development.

**ACTION 5.6.1:** Strengthen Irelands participation in international bioeconomy initiatives, including the Bioeconomy Challenge and the UNFAO BEST Partnership, by partaking in relevant working groups, encouraging other Irish stakeholders to take part, and through the establishment of international partnerships.

# Supporting our Key Sectors

Delivering on the strategic objectives of this strategy requires focused development across key sectors where Ireland has strong potential to expand sustainable biobased activity. These sectors reflect Ireland's biological resource strengths, existing industrial capabilities, research expertise and emerging innovation opportunities.

This section identifies the strategic opportunities, development pathways, key challenges and enabling conditions through which the key sectors can develop.

## A. Agri-Bioeconomy and Circular Nutrients

**Strategic Opportunity**

The focus is on the development of new agri-bioeconomy and circular nutrient value chains linked to Irelands agri-food system. It relates to how agricultural biomass, residues and by-products can be used more productively to produce higher-value products including proteins, fibres, biobased materials, bioenergy and biobased fertilisers.

Ireland has a strong foundation for development of the agri-bioeconomy. This can be seen in important early developments in this area through research initiatives for cereal, protein and oil crops, pilot green biorefinery and AD projects, growing interest in circular nutrient systems including biobased fertilizers and emerging biomethane infrastructure programmes.

**Bioeconomy in Action: REGENERATE**

The **REGENERATE**[58] project is developing an all-island circular bioeconomy model that recovers nitrogen and phosphorus from agricultural residues, livestock manures and food-processing wastes. Using anaerobic digestion and biorefinery technologies, the project will extract and recycle nutrients to produce sustainable fertilisers and peat-replacement growing media while supporting soil health and reducing reliance on imported inputs.

The benefits of this project include:

- reducing reliance on synthetic inputs
- support soil function and resource efficiency
- enable circular value chains by using agricultural and processing by-products
- reduce import dependency for key agricultural inputs and
- provide practical and adaptable options for farms of different scales.

58 Home - Regenerate

**Development Pathway**

The development of this sector is likely to progress through the scaling of circular nutrient systems, green biorefineries and increased plant-based fractionation and anaerobic digestion and biomethane infrastructure, alongside improved valorisation of agricultural crops, residues and co-products. Pilot and demonstration projects will play an important role in moving activity from research and innovation towards wider commercial deployment. Building on Ireland's strong agricultural resource base and existing policy drivers in biomethane and nutrient management, there is significant potential to expand small-scale on-farm anaerobic digestion. This approach can help decarbonise agriculture and rural energy, utilise farm wastes for both energy and fertiliser, and support circular nutrient management. Pilot and demonstration projects will be key in moving activity from research and innovation towards wider commercial deployment. Recognising digestate as a valuable circular fertiliser including through adoption of the Renewable Nitrogen from Manure (ReNure) and reinforcing its use with dedicated research and advisory services will further strengthen this sector. This sector is likely to offer some of the earliest opportunities for scalable bioeconomy deployment, including in:

- green biorefining of grass and forage
- crop fractionation, including barley, oats, faba beans, oilseed rape and other crops
- biomethane, anaerobic digestion and digestate and biogenic $CO_2$ valorisation
- circular nutrient recovery and biobased fertilisers
- agricultural and forestry residue valorisation for biochar
- wool scouring / fibre use feasibility
- horticulture crop and side streams valorisation and peat-alternative growing media
- producer participation models, including cooperatives, CAP tools or EIP-type approaches.

**Bioeconomy in Action: BIOCHAR**

The BIOCHAR Project[59] is a pilot and demonstration project led by the University of Limerick. It converts agricultural by-products and organic residues from Ireland's Midlands into biochar.The project is co-funded by the Government of Ireland and the EU through the EU Just Transition Fund. It will test biochar uses in soil health, water treatment, peat-free

59 https://biocharjtf.com

| |
|---|
| horticulture, emissions reduction and construction. The project supports circular use of biomass while creating scalable rural economic and environmental opportunities. It is a strong example of bioeconomy innovation delivering climate, agriculture, water and regional development benefits. |

**Key challenges**

Despite this potential, a number of challenges need to be addressed to enable the development of agri-bioeconomy value chains. These include the need to strengthen biomass supply chains, scale processing infrastructure, strengthen markets for plant proteins, fibres and starches, circular fertilisers and biobased products, support farmer and industry engagement in emerging value chains and ensure regulatory frameworks, investment conditions and market development support.

**Key Sector Targeted Actions**

| | |
|---|---|
| A1 | Encourage industry to utilise the network of pilot-scale testing and demonstration facilities relevant to agri biomass, including BIOCHAR, Transform, BioScaleUp, and others |
| A2 | Develop standardised supply and aggregation models to facilitate the mobilisation of agricultural biomass for biomethane production, green biorefineries and other biobased processing activities. |
| A3 | Determine pathways to investment for infrastructure for green biorefinery and nutrient recovery systems to enable the scaling of agri-bioeconomy pathways. |
| A4 | Explore opportunities for the creation of producer groups under the next Common Agriculture Policy 2028-2034 |
| A5 | Promote public procurement and market development initiatives that encourage the uptake of sustainable biobased agricultural products |
| A6 | Strengthen advisory services and knowledge transfer systems to support farmer participation and co-innovation in shaping emerging bioeconomy value chains. |
| A7 | Develop targeted education and skills initiatives related to circular agriculture and biobased processing technologies. |
| A8 | Support the development of circular nutrient systems that reduce nutrient losses while enabling the sustainable reuse of organic resources. |

| | |
|---|---|
| A9 | Promote agricultural bioeconomy practices that contribute to improved soil health, biodiversity and water quality outcomes. |
| A10 | Strengthen coordination between agriculture, climate, energy, enterprise and research policy to support the development of agri-bioeconomy value chains. |
| A11 | Support the development of multi-actor partnerships connecting farmers, processors, research organisations and public bodies to advance circular agri-bioeconomy projects. |

## B. Biobased Construction using Forest and Crop Biomass

### Strategic Opportunity

The built environment "comprises everything people live in and around, such as housing, commercial buildings, transport, infrastructure and public spaces. It also encompasses urban design and land-use planning, as well as the interplay between physical structures, social dynamics and nature" (Second Whole of Government Circular Economy Strategy).[60] This sector contributes 39% of global energy-related $CO_2$ emissions.[61] In Ireland, this contribution is 37%[62] of CO2 emissions, with concrete accounting for up to half of construction materials related emissions and the residential sector contributing 45% of annual built environment emissions.[63] The construction and demolition sector also produces nearly 9 million tonnes of waste each year.[64] It is difficult to determine how much of this waste is biobased, as current reporting combines waste types. For example, 81% of all construction waste is comprised of soil and stones,[65] but it is not clear what percentage of that is soil alone. The recovery rate of waste material is very high, as backfill, though there are applications with the EPA under national by-product and end of waste criteria to reclassify materials. It is worth noting that trends in the construction sector show an increase in the cost of building and construction materials of 32% from Q1 2021 to Q1 2024.[66]

60 Department of Climate, Energy and the Environment (2026) Second Whole of Government Circular Economy Strategy, available at Circular-Economy_Strategy-2026-2028-en.pdf

61 World Green Building Council (2022) Bringing embodied carbon upfront Coordinated action for the building and construction sector to tackle embodied carbon, available at WorldGBC_Bringing_Embodied_Carbon_Upfront.pdf

62 Irish Green Building Council (2022) Whole Life Carbon in Construction and the Built Environment in Ireland available at WLC-UCD-IGBC_30.09.22_V4.0_MidRes

63 Ibid.

64 Construction & Demolition Waste Statistics for Ireland | Environmental Protection Agency

65 Data downloadable from Construction & Demolition Waste Statistics for Ireland | Environmental Protection Agency

66 Department of Public Expenditure, NDP Delivery and Reform (2024) Project Ireland 2040 Build 2024 Construction Sector Performance and Capacity, available at build-2024.pdf

Ireland's forestry and crop systems can support the development of renewable biological materials for construction and retrofit, including timber, engineered wood, natural fibres, insulation, panels and other biobased products.[67] The use of biobased materials, such as timber,[68] straw and hemp, has been identified as potential alternative construction and retrofit materials to reduce emissions and increase embodied carbon.[6970]This can contribute to lower-carbon construction and energy demand, carbon storage in long-lived products and buildings, circular material use, diversification of material supply chains and regional new value chains connecting primary producers, processors, manufacturers, designers and the construction sector. Additionally, the waste generated from biobased construction materials can also be reused through upcycling, further reducing emissions.[71]

**Bioeconomy in action: Biobased Built Environment**

The bioeconomy can provide a solution to some issues in the built environment sector.[72] The use of biobased materials, such as timber,[73] straw and hemp, has been identified as potential alternative construction and retrofit materials to reduce emissions and increase embodied carbon.[74] [75]

In the Netherlands, the Government has provided funding support to the organisation Building Balance, to help deliver biobased homes that meet their housing needs, within their carbon budget.[76] By encouraging the use of biobased materials in the built environment, the project has also provided a diverse income stream for farmers.

67 See the Council of the European Union Recommendation on the New European Bauhaus online at https://data.consilium.europa.eu/doc/document/ST-9128-2026-INIT/en/pdf

68 For more information, see the Timber in Construction Steering Group

69 World Green Building Council (2022) Bringing embodied carbon upfront Coordinated action for the building and construction sector to tackle embodied carbon, available at WorldGBC_Bringing_Embodied_Carbon_Upfront.pdf

70 Irish Green Building Council (2022) BUILDING A ZERO CARBON IRELAND A Roadmap to decarbonise Ireland's Built Environment across its Whole Life Cycle Building-Zero-Carbon-Ireland.pdf

71 Combining the circular economy and biobased materials for alternative waste wood applications for the construction industry | Engineering, Construction and Architectural Management | Emerald Publishing

72 See the Council of the European Union Recommendation on the New European Bauhaus online at https://data.consilium.europa.eu/doc/document/ST-9128-2026-INIT/en/pdf

73 For more information, see the Timber in Construction Steering Group

74 World Green Building Council (2022) Bringing embodied carbon upfront Coordinated action for the building and construction sector to tackle embodied carbon, available at WorldGBC_Bringing_Embodied_Carbon_Upfront.pdf

75 Irish Green Building Council (2022) BUILDING A ZERO CARBON IRELAND A Roadmap to decarbonise Ireland's Built Environment across its Whole Life Cycle Building-Zero-Carbon-Ireland.pdf

76 Further information on the Netherland's biobased building project Building Balance available at buildingbalance.eu

In France, the Environmental Regulation RE2020 encourages the use of biobased materials in the construction of buildings, with an investment of €100 million over the years 2022 to 2026 for such materials.[77] The new Regulation mandates the use of Life Cycle Analysis that can positively encourage biobased materials as resulting calculations can show as negative emissions.[78] The use of such materials can also contribute to jobs, with wood processing companies providing 13,000 jobs in Eastern France alone.[79]

Kore Retrofit is an Irish partner of the EU Interreg funded Circular Reno project, helping to develop biobased supply chains in Ireland for building and retrofit materials. This could address the issue of the rising costs of construction, as while the cost of construction materials has increased significantly in recent years, the cost of rough timber has decreased by 7% in the same period.[80]

**Development Pathway**

Ireland's forestry and crop systems provide important renewable biological resources that can support the development of sustainable fibre, timber, construction materials and biobased products. Forestry and crop biomass have the potential to contribute to low-carbon construction while supporting climate mitigation through carbon storage and substitution of fossil-based materials. Ireland has made progress through increased policy attention to timber and biobased material use in construction, supporting crop diversification and expanding products from forestry residues and crop biomass, creating new value chains across forestry, construction, and manufacturing.

With over 4.7 million cubic meters of roundwood harvested annually, including from public and private forests, best EU practices prioritise using forestry residues and low-grade wood for combined heat and power (CHP) and district heating, following the cascading use principle. Supporting CHP and district heating projects, aligning biomass support schemes with

77 Further information on France's Environmental Regulation RE2020 available at Environmental Regulation 2020 - RE2020

78 Example of wood biomass used shows negative emissions in the updated Guide on RE2020 from the Ministère Chargé du Logement at Microsoft Word - 2025_05_09_guideRE2020 VF2.docx

79 Biobased construction Biobased materials - Invest in Eastern France

80 Department of Public Expenditure, NDP Delivery and Reform (2024) Project Ireland 2040 Build 2024 Construction Sector Performance and Capacity, available at build-2024.pdf

cascading use, investing in infrastructure to mobilise private forestry biomass, and setting clear renewable heat targets for solid biomass will be important.

Challenges remain in ensuring materials meet climate resilience standards, which include:

- The need for the materials to meet standards to ensure they will be resilient in the Irish climate, both present and future
- The pace of standards development and decisions on by-products and end-of-waste
- The skills for using these materials, from growing crops to architecture and design, and building with biological resources
- Establishing stable supply chains and partnerships between growers, builders, and project owners

**Key Sector Targeted Actions**

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|---|---|
| B1 | Industry to utilise the pilot scale testing and demonstration facilities that now exist, including BioScaleUp. |
| B2 | Develop a timber knowledge development and innovation facility with strong links to the timber engineering research group |
| B3 | Produce standardised templates for biomass supply and use between primary producers, the construction industry, and building suppliers. |
| B4 | Implement the recommendations of the final report from the interdepartmental and industry Timber in Construction Steering Group |
| B5 | Identify where the main opportunities arise for Ireland to lead and contribute to European standards development and effective adoption pathways. Potentially, this may include, for example, for biobased construction materials for timber, hemp, straw, miscanthus, and mycelium. |
| B6 | Identify a public building to be used as a pilot to showcase innovation in bio-based building technologies. |
| B7 | Incorporate the use of biobased building materials in training for construction and engineering via Springboard funded programmes and in consultation with Engineers Ireland |
| B8 | Incorporate growing crops for construction materials as part of agricultural training |

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| B9 | Conduct a study on how bio-based construction materials can support carbon storage. |
| B10 | Establish a partnership between the agriculture, forestry, and construction sectors |
| B11 | Connect this partnership with biorefinery facilities on a regional cluster basis. |

## C. Blue Bioeconomy

**Strategic Opportunity**

The Blue Bioeconomy is an economy based on using biological resources from water such as fish, algae (macro and micro), mussels, starfish, sea cucumbers, lobster and bacteria to make products or services. These can include food, medicine, nutritional supplements, cosmetics and chemicals. A sustainable blue bioeconomy can drive innovation and job growth, while protecting marine resources and environments.

**Bioeconomy in Action: Circular AIMBIO**

**AIMBIO** is an all-island marine bioeconomy project led by Teagasc Ashtown. It will turn seaweed, seafood side-streams and other aquatic biomass into higher-value bio-based products. The project is supported by Shared Island funding, with DAFM and DAERA involvement. Partners include Teagasc, AFBI, ATU, TCD, TUS, Indigo Rock, Islander Kelp and BeoBio. AIMBIO will demonstrate marine biorefinery technologies across integrated sites in Ireland. It supports the circular blue bioeconomy by reducing waste, creating new coastal value chains and helping scale bio-based innovation.

In addition to our marine and ocean resources, Ireland's aquaculture includes wetted peatlands, and other inland water courses. Ireland's peatlands are among our most valuable natural assets, covering 21% of the country and storing 75% of all soil organic carbon. Paludiculture is the productive land use of wet and rewetted peatlands that can provide sustainable biomass for biobased industries such as bioplastics and natural fibres, biobased construction materials, and bioactive compounds.

**Bioeconomy in Action: Blue Bioeconomy Scoping Report**

Bord Iascaigh Mhara, in partnership with Donegal County Council, has launched a new report assessing the potential of Ireland's blue bioeconomy. The **Blue Bioeconomy Scoping Report** examines industry needs, supports, and international best practice,

identifying a clear set of priority actions required to unlock growth in this emerging sector. A key outcome is the creation of a North-West Blue Bioeconomy steering group to guide implementation, strengthen collaboration and ensure industry input. This marks a significant step towards aligning supports for seafood sector companies, with the aim of maximising value from marine biomass.

**Development Pathways**

There is huge potential for Ireland to be a blue bioeconomy frontrunner at an EU level. This potential is being explored and supported by projects at a national level such as the All-Island Marine Biobased Refineries for Circular Blue-Bioeconomy (AIMBIO),[81] and Circular-IMTA Demo.[82] At an EU level, projects such as Palus Demos[83] and resources such as the InvestEU Blue Economy blended finance instrument[84] provide further evidence of the support available. Given the scale and diversity of Ireland's aquatic resources, their strong potential to drive sustainable economic growth, and the need to safeguard them for future generations, the blue bioeconomy is a key sector within Ireland's first bioeconomy strategy.

For Ireland to grow a sustainable blue bioeconomy, there needs to be a focus on

- Building on existing research and knowledge in this sector, to create a shared knowledge economy
- Exploring the potential for Ireland's blue bioeconomy to contribute to climate change mitigation and adaptation and the protection of our country's biodiversity
- Raising awareness of what a sustainable and circular blue bioeconomy means for Ireland
- Developing skills and training to support a sustainable and circular blue bioeconomy.

**Bioeconomy in Action: Circular IMTA-DEMO**

The **Circular IMTA-DEMO**[85] project is piloting a peatland-based integrated multi-trophic aquaculture system at Mount Lucas, Co. Offaly. The project uses fish-culture waste streams

81 AIMBio – My WordPress Blog Funded by DAFM through the Department of the Taoiseach's All Island Fund

82 CIRCULAR_IMTA_DEMO Project - TUS co-funded by the Government of Ireland and the European Union through the EU Just Transition Fund Programme 2021-2027

83 Palus Demos Funded by the EU under Horizon Europe, Ireland is a partner though the University of Galway

84 For further information, please see BlueInvest - Oceans and fisheries - European Commission

85 https://circular-imta-demo.ie/en/

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| as biofertilizers to cultivate fish, macroalgae and duckweed, which are then processed into new feed and food ingredients within a circular aquaculture model. |

**Key Sector Targeted Actions**

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| C1 | Encourage Industry to make use of the pilot scale testing and demonstration facilities now available, including AIMBIO and Circular-IMTA |
| C2 | Support the establishment of a blue bioeconomy funding mechanism in Ireland for the development of sustainable blue value chains and business models. |
| C3 | Link the blue bioeconomy into existing tourism campaigns, highlighting products and services available from indigenous producers. |
| C4 | Link the blue bioeconomy into domestic and export market development opportunities. |
| C5 | Catalogue the Intellectual Property outputs from blue bioeconomy related research, noting the different TRLs to marine and other aquatic pipelines for innovation. Use this information to identify gaps for the assignment of research funding and assisting companies seeking to licence IP for innovation. |
| C6 | Develop a Blue Bioeconomy Graduate Placement or Fellowship Scheme linking BIM, seafood businesses and research partners, and work with education providers to identify future skills for marine bioprocessing, aquatech, circular economy and biobased product development. |
| C7 | Communicate the potential for attractive skilled and well-paid regional opportunities within the emerging blue bioeconomy and ensure various schemes or programmes provide ease of access and placement. |
| C8 | Research Ireland's aquatic habitats for carbon sequestration and nature credit potential, e.g. through ocean biodiversity programmes, and paludiculture in wetlands |
| C9 | Map availability of marine resources, including co-products and under-utilised resources from wild capture and aquaculture, to establish regional valorisation opportunities |
| C10 | Look to the North-West Blue Bioeconomy steering group, the AIMBIO and the Circular IMTA projects as prototype blue bioeconomy clusters for a best practice guide on developing regional clusters and partnerships. |

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|---|---|
| C11 | Expand the BDG and the IBF to incorporate stakeholders from Ireland's blue bioeconomy. |
| C12 | Establish a dedicated Blue Bioeconomy Team within a sectoral agency to support companies diversifying into the blue bioeconomy, to enable inter-agency collaboration, RPO alignment, and foster national growth and development in this area, to lead and aid other aforementioned targeted actions. |

## D. Biomanufacturing and Biobased Materials for Industry

**Strategic Opportunity**

Ireland has strong capabilities in biotechnology, life sciences and advanced manufacturing. These capabilities create opportunities to develop globally competitive biobased industries including biobased chemicals, materials, fibres, polymers and specialised ingredients. This sector provides an opportunity to link Ireland's strengths in biotechnology and industrial innovation with emerging global demand for sustainable materials and chemicals. Additionally, there is significant potential to develop niche biobased products including pharmaceuticals, functional foods, and cosmetics - high-value markets that align well with Ireland's expertise.

**Bioeconomy in Action: National Biorefinery Pilot Plant, Lisheen, County Tipperary**

The National Bioeconomy Pilot Plant, located at the National Bioeconomy Campus in Lisheen, County Tipperary, provides a key piece of infrastructure supporting the development of Ireland's bioeconomy. Developed through collaboration between the Irish Bioeconomy Foundation, Tipperary County Council, research organisations and industry partners, the facility enables the demonstration and scale-up of biorefinery, biotechnology activities including advanced fermentation, anaerobic digestion and biomanufacturing technologies.

The pilot plant allows researchers and companies to test and validate technologies that convert biological resources and industrial side streams, such as agricultural residues, food processing by-products and forestry biomass, into higher-value biobased products including chemicals, materials, ingredients and renewable energy.

As part of the wider National Bioeconomy Campus, the facility supports a national platform for biobased innovation, supporting enterprise development, regional economic transition and the scale-up of Ireland's bio-industrial capabilities. It also illustrates the importance of

shared scale-up infrastructure in helping to bridge the gap between research, pilot activity and commercial deployment.

To capitalise on these opportunities, the strategy will support smaller-scale biorefineries tailored to high-value product streams, fostering innovation in biobased materials and ingredients.

**Bioeconomy in Action: Carbery**

Based in Ballineen, West Cork, **Carbery** is an Irish bio-based manufacturing company producing dairy, nutrition and taste ingredients. Its activities show how agricultural biomass can be processed into higher-value proteins, ingredients and fermentation-enabled products.

Carbery also valorises whey permeate from dairy processing into bioethanol, supporting circular use of processing side-streams. Further circularity is demonstrated through anaerobic digestion, biomethane production and nutrient-rich organic fertiliser use by local farmers. Its innovation activities include hydrolysis, enzymology, peptide profiling, bioactivity screening and fermented protein development.

Through initiatives such as FutureProof and Farm Zero C, Carbery links industrial bioprocessing with farm-level sustainability and emissions reduction alongside its agri-food biomanufacturing model which delivers significant added value, circularity and regional impact.

**Development Pathway**

Development in this sector will involve scaling industrial biotechnology and fermentation technologies, supporting pilot and demonstration facilities and strengthening links between research, enterprise and manufacturing. Ireland's growing industrial biotechnology capability may also complement wider national ambitions in areas such as life sciences and advanced manufacturing.

**Key challenges**

These include scaling pilot and demonstration capacity, connecting biomass supply chains with industrial biotechnology facilities and ensuring competitive investment conditions for biobased manufacturing.

**Key Sector Targeted Actions**

| | |
|---|---|
| D1 | Develop an Irish IBISBA/FEDERI access pathway to support industrial biotechnology, biomanufacturing and biobased materials scale-up. This should map relevant Irish facilities and expertise, identify national contact points, promote access to European bioprocessing and biorefinery infrastructure, and support Irish researchers, start-ups, SMEs and industry to engage in European collaboration, demonstration and scale-up opportunities. |
| D2 | Encourage Industry to make use of the pilot scale testing and demonstration facilities that now exist and which include equipment related to biotechnology and biomanufacturing |
| D3 | Strengthen linkages between biomass supply chains and industrial biomanufacturing facilities to enable the conversion of biological resources into high-value materials and chemicals. |
| D4 | Support infrastructure development that enables the scaling of biobased manufacturing and bioprocessing technologies. |
| D5 | Support market development for biobased industrial products including biobased chemicals, materials, fibres and polymers. |
| D6 | Promote the development of standards and certification frameworks that support the uptake of sustainable biobased industrial materials. |
| D7 | Encourage the integration of biobased materials within industrial supply chains and manufacturing systems. |
| D8 | Support research and innovation programmes focused on industrial biotechnology, fermentation technologies and biobased material development. |
| D9 | Strengthen collaboration between industry, research organisations and higher education institutions to support the scaling of biomanufacturing capabilities. |
| D10 | Develop and promote targeted education and skills initiatives to support the growth of industrial biotechnology and biobased manufacturing sectors. |
| D11 | Support the development of biobased industrial products that contribute to climate mitigation through the substitution of fossil-based materials. |
| D12 | Promote sustainability assessment and life-cycle analysis approaches to ensure the environmental integrity of emerging biobased products. |

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| D13 | Strengthen coordination between enterprise, research and bioeconomy policy to support the development of industrial biomanufacturing in Ireland. |
| D14 | Support the development of collaborative partnerships connecting industrial biotechnology companies, research organisations and enterprise agencies. |

## E. Circular Bioeconomy: Food and Other Organic Wastes

### Strategic Opportunity

Household, urban and industrial systems generate significant organic resources including food waste, wastewater residues and other organic materials.[86] These resources can support circular bioeconomy pathways including renewable energy production, nutrient recovery and biobased materials. Developing circular organics systems can contribute to climate mitigation, resource efficiency and improved waste management outcomes.[87] Progress has already been made through improved organic waste collection systems, the development of anaerobic digestion projects and increasing policy attention to circular economy approaches, e.g. the Second Whole of Government Circular Economy Strategy, and the National Food Waste Prevention Roadmap.[88]

### Bioeconomy in Action: TRANSFORM

The EU Just Transition Fund-supported TRANSFORM project,[89] coordinated by UCD, is demonstrating how agri-food by-products and waste can be converted into functional food and feed ingredients. Awarded €5 million under the Bioeconomy Demonstration Initiative, the project illustrates how Ireland can connect food-sector residues, processing technologies and enterprise partners to create new circular bioeconomy value chains. TRANSFORM can support regional diversification, sustainable production and reduced waste while strengthening Ireland's capability in biobased ingredients.

### Development Pathway

Development will involve improving the capture and quality of organic waste streams, expanding biorefinery, anaerobic digestion and biomethane production, and strengthening nutrient recovery systems. Linking the urban bioeconomy to climate action can provide a

86 EPA Food Waste Statistics for Ireland, 2023 data; EPA Municipal Waste Statistics for Ireland, 2023 data

87 Zimmerman et al for the Rediscovery Centre (2025) Ireland's Urban Bioeconomy – Opportunities for Climate Action (FTP-2024-07) EPA Research Evidence Synthesis Report, available online at Evidence-Synthesis-Report_8.pdf

88 National Food Waste Prevention Roadmap 2023-2025

89 TRANSFORM project awarded €5 million in funding through the EU - UCD School of Agriculture and Food Science

development pathway through Local Authority Decarbonisation Zones,[90] focusing, for example, on food, organic waste, construction and natural capital.

**Key challenges**

These include improving the quality and consistency of organic waste streams, expanding processing infrastructure and strengthening markets for recovered nutrients and biobased products. Another key challenge will be in growing the level of awareness of the bioeconomy and its relevance to urban areas.

**Key Sector Targeted Actions**

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|---|---|
| E1 | Support the development of infrastructure for the collection, processing and valorisation of organic waste streams including food waste, wastewater residues and other organic resources. |
| E2 | Improve the quality and traceability of organic waste streams including wastewater to support higher-value bioeconomy applications. |
| E3 | Support market development for circular products derived from organic resources including biomethane, biobased fertilisers and other recovered materials. |
| E4 | Promote the use of circular organic resources within agriculture, energy systems and industrial processes. |
| E5 | Support research and innovation programmes focused on circular organics systems, waste valorisation technologies and nutrient recovery. |
| E6 | Strengthen skills development across waste management, bioenergy and resource recovery sectors. |
| E7 | Promote collaboration between research organisations, local authorities and industry to support innovation in circular organics systems. |
| E8 | Support circular organics systems that contribute to reduced greenhouse gas emissions and improved resource efficiency. |
| E9 | Ensure that the development of organic resource value chains supports environmental protection and aligns with circular economy objectives. |

90 Zimmerman et al for the Rediscovery Centre (2025) Ireland's Urban Bioeconomy – Opportunities for Climate Action (FTP-2024-07) EPA Research Evidence Synthesis Report, available online at Evidence-Synthesis-Report_8.pdf

| | |
|---|---|
| E10 | Strengthen coordination between waste management, energy, agriculture and circular economy policy (including by-product and end-of-waste) to support the development of circular organics systems. |
| E11 | Support collaboration between local authorities, industry and research organisations to develop integrated circular bioeconomy solutions. |

# Delivery and Implementation

Effective implementation of the actions outlined in this strategy will require coordinated engagement across Government Departments, State agencies, industry stakeholders, research organisations and regional actors. As the focus of the Strategy is on scaling up, industry (including for example the co-operatives, farmers/fishers/foresters, food, fibre and construction companies) and enterprise support agencies will have a considerably bigger role to play than heretofore.

## Implementing the National Bioeconomy Strategy

Implementation will be delivered through a coordinated framework combining priority enabling policy areas, sectoral development pathways and a strengthened governance structure led by the BDG.

Implementation will proceed on a phased basis. An initial phase is likely to focus on strengthening cross-cutting enabling conditions, including project pipeline development, scale-up supports, regulatory coordination, engagement with EU Commission bioeconomy initiatives, evidence systems and early progress in the most deployment-ready sectoral areas. Subsequent phases can then build on this foundation to broaden sectoral implementation and deepen interdepartmental ownership.

This will be accomplished by delivering the key actions set out in the Strategy, detailed in Annex 1, and through alignment with relevant national policies and programmes including Enterprise Policy such as the Industrial Decarbonisation Roadmap, National Life Science Strategy, Agriculture policy, Climate Action Plans, and circular economy measures.

The BDG will play a central role in coordinating delivery across departments, agencies and regional stakeholders, ensuring coherence between policy development and implementation.

**Reporting and accountability**

Reporting on the National Bioeconomy Strategy will come under the responsibility of the BDG. Progress on the implementation of the strategy will be reported at mid-term and at the end of the strategy period, (i.e. 2028 and post 2030).

To support effective delivery, a structured reporting cycle will be established, with BDG members providing regular updates on the status of actions to the BDG secretariat on an agreed schedule. These reports will assess progress against strategic objectives, enabling actions and sectoral development, and will support adaptive management of the Strategy over time. The reports will be published online.

## Monitoring, Measuring and Reporting

The bioeconomy strategy for Ireland will be monitored for both the development of the bioeconomy and the implementation of the strategy itself. This dual approach will ensure that progress is measured not only in terms of policy delivery but also in terms of real-world impact.

A monitoring partnership will be established ("Bioeconomy Statistics and Evidence Partnership") under the BDG that will include:

- Key data providers, such as the Central Statistics Office, Teagasc, the EPA, the SEAI, Bord Iascaigh Mhara and the Marine Institute at a minimum; and
- Key research projects and centres, such as INFORMBIO, BIOVALUE and EPA research on Doughnut Economics as a framework for bioeconomy development, along with relevant activities in the BiOrbic Research Ireland Bioeconomy Centre.

This partnership will support the development of a robust evidence base for decision-making and ensure alignment with European monitoring frameworks. It will establish a set of indicators to measure the development of the Irish bioeconomy, that can assist in the decision-making processes for the continued sustainable development of the sector.

Indicators should be aligned with EU and Global frameworks where possible and support consistent, transparent and comparable reporting.

**National Biomass Flow account**

It is important for stakeholders to be able to access information on biomass availability, biomass flows, and the potential competing uses for this biomass. Improved transparency in biomass data will support investment decisions, policy development and sustainable resource management. This will ensure alignment with EU commitments on transparency, modelling, risk analysis and the use of Copernicus data, among other sources.

A National Biomass Flow Account will be established as an important strategy tool for improving transparency, supporting investment potential and informing decisions on the most sustainable us of Ireland's biological resources. It will build on the biomass inventory established by BIM and research projects such as INFORMBIO. This account should provide a comprehensive and regularly updated overview of biomass supply, use and regional availability, including both land and marine resources. This should include production, imports, exports, processing, end uses, residues/secondary streams and points of risk. This could be expanded to include innovation opportunities, TRL levels and regional availability related to each biomass stream to support investment and planning.

The Bioeconomy Statistics and Evidence Partnership will be responsible for maintaining and updating the data, with the BDG publishing any reports.

Together, these delivery, monitoring and reporting mechanisms will provide a structured and transparent framework for implementing the Strategy, supporting evidence-based decision-making and continuous improvement. They will ensure that Ireland's bioeconomy development is measurable, accountable and aligned with national, European and international objectives, enabling the Strategy to adapt over time in response to emerging opportunities, challenges and technological developments.

# Annex I: National Bioeconomy Action Plan 2026 – 2030 [SAMPLE]

To support the implementation of the enabling policy framework outlined above, this strategy identifies a set of targeted actions to be delivered over the period 2026–2030. These actions are designed to strengthen the conditions required for bioeconomy development in Ireland, including fostering innovation, supporting industry development, improving coordination across Government and enhancing knowledge and skills.

Table 1: List of actions to be delivered through the National Bioeconomy Strategy ***Sample provided for publication purposes***

| # | Action | Timeline | Stakeholders | Strategic Objective | Key Performance Indicators |
|---|---|---|---|---|---|
| **Scaling Infrastructure, Technology and Investment** | | | | | |
| **ACTION 1.1.1:** | Establish national cascading-use guidance and a decision framework to prioritise higher value uses while protecting food and energy security and environmental sustainability | | | | |
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| **Strengthening Market Demand and Development** | | | | | |

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| **ACTION 2.1.1:** | NSAI/TC 169 on Bioeconomy to determine priority sectors and products where standards are needed, identify existing standards that can be applied or adapted to Ireland, and produce guidance to assist companies looking to have their biobased products certified to such a standard. Additional stakeholders, for example, those working in public procurement, are encouraged to be involved in the NSAI Technical Committee. | | | | |
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| **Leveraging Innovation, Knowledge and Skills** | | | | | |
| **ACTION 3.1.1:** | Establish a Bioeconomy Skills and Innovation Delivery Platform under the Bioeconomy Development Group (BDG) to coordinate skills development, research and innovation and advisory systems with national bioeconomy deployment priorities. | | | | |

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| **Bioeconomy as a tool for Climate Action and Circularity** | | | | | |
| **ACTION 4.1.1:** | Determine a MACC for biobased solutions in Ireland, with an early focus on sectors struggling to reduce emissions, for example, the transport and construction sectors. | | | | |
| | | | | | |
| **Governance, Cooperation and Partnerships** | | | | | |
| **ACTION 5.1.1:** | Upgrade the Bioeconomy Implementation and Development Group to an Interdepartmental and interagency Bioeconomy Development Group (BDG). | | | | |
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| **Key Sector A** | | | | | |
| A1 | Encourage industry to utilise the network of pilot-scale testing and demonstration facilities relevant to agri biomass, including BIOCHAR, Transform, BioScaleUp, and others | | | | |
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| **Key Sector B** | | | | | |
| B2 | Develop a timber knowledge development and innovation facility with strong links to the timber engineering research group | | | | |
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| **Key Sector C** | | | | | |

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| C3 | Link the blue bioeconomy into existing tourism campaigns, highlighting products and services available from indigenous producers. | | | | |
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| **Key Sector D** | | | | | |
| D8 | Support research and innovation programmes focused on industrial biotechnology, fermentation technologies and biobased material development. | | | | |
| | | | | | |
| **Key Sector E** | | | | | |
| E10 | Strengthen coordination between waste management, energy, agriculture and circular economy policy (including by-product and end-of-waste) to support the development of circular organics systems. | | | | |

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| **Monitoring, Measuring and Reporting** | | | | | |
| | Establish a set of indicators to measure the development of the Irish bioeconomy, that can assist in the decision-making processes for the continued sustainable development of the sector. | | | | |