# BIOECONOMY IMPLEMENTATION GROUP

## First Progress Report

Prepared by the Department of Communication, Climate Action & Environment and the Department of Agriculture, Food and the Marine on behalf of the Bioeconomy Implementation Group

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# 1 Introduction

# 1. Introduction

Following extensive engagement and consultation, the Government published the **National Policy Statement on the Bioeconomy**[1] in March 2018. This delivered on commitments given in the Action Plan for Jobs and the Action Plan for Rural Development and built on actions programmed under the national Agri-Food Strategy Food Wise 2025 including the completion of the **BioÉire**[2] project.

The policy statement outlined the Government's ambition to be a global leader in the bioeconomy. It set out a policy framework (see appendix I) to underpin the successful development of the bioeconomy in Ireland. It also established the **Bioeconomy Implementation Group** co-chaired by the Department of Communications, Climate Action & Environment and the Department of Agriculture, Food and the Marine. The implementation group, consisting of eleven Departments and eight agencies, met for the first time in May 2018 and has met on four further occasions in July, October and November 2018 and in May 2019. The Bioeconomy Implementation Group was mandated to advance actions and challenges identified to further develop the bioeconomy in Ireland and to submit its first progress report to Government within a year of being established.

The Government has already demonstrated its commitment to the bioeconomy more broadly through investment: by **Science Foundation Ireland** in the BEACON Bioeconomy Research Centre and other Research Centres focused on agri-digitalisation, bioenergy and the microbiome; and by **Enterprise Ireland** in the National Bioeconomy Campus in Lisheen, Co. Tipperary, other innovation clusters including the Marine Innovation Park, Páirc na Mara in Connemara, the BioConnect Innovation Centre in Co. Monaghan and Technology Centres focused on meat, dairy processing and food for health. The **Department of Agriculture, Food and the Marine, Teagasc,** the **Marine Institute, Bord Iascaigh Mhara** and **Coillte** also continue to provide focus on identifying, prioritising and supporting the development of regional assets, actors and (cross)-sectoral value chains in the bioeconomy. The **Department of Communications, Climate Action & Environment,** and the **EPA** and **SEAI** also provide focus on alignment of bioeconomy, circular economy, energy, environment and climate action including addressing regulatory requirements.

[1] https://www.gov.ie/en/news/3d585e-national-policy-statement-on-the-bioeconomy/

[2] https://www.teagasc.ie/publications/2017/BioÉire-results-launch.php

# 2 The Bioeconomy

# 2. The Bioeconomy

The bioeconomy, as described in the updated EU bioeconomy strategy[3], covers all sectors and systems that rely on **biological resources** (animals, plants, micro-organisms and derived biomass, including organic waste), their functions and principles. It includes and interlinks: land and marine ecosystems and the services they provide; all primary production sectors that use and produce biological resources (agriculture, forestry, fisheries and aquaculture); and all economic and industrial sectors that use biological resources and processes to produce food, feed, bio-based products, energy and services.

The bioeconomy currently is one of the EU's largest and most important sectors with an annual turnover of around €2 trillion and employing around 18 million people[4]. However, the European bioeconomy needs to have **sustainability** and **circularity** at its heart to address limited global resource availability and societal challenges like climate change, land and ecosystem degradation, coupled with a growing demand for food, feed, biobased materials and energy. This is forcing countries, industries and people to seek new ways of producing and consuming.

Renewing and strengthening the industrial base through adoption, scaling up and commercialisation of small, pilot and large-scale biorefineries has the potential to lead to the creation of high quality green jobs in rural, coastal and urban areas. This can be achieved through developing sustainable biobased products, value chains and business models using resources from agriculture, forestry, and marine, biowaste including wastewater and novel bio-resources for biorefining purposes. Bioeconomy development will have a high focus on: the development of carbon neutral land use; providing for modernised primary production incorporating digitalisation and circularity; furthering the protection of the environment and regenerating and restoring healthy ecosystems and enhancing biodiversity; and also the development of urban circular bioeconomy activities.

Pertinently, the recent EU Commission call for a climate-neutral Europe by 2050 highlighted that the systemic adoption of a circular bioeconomy approach at governmental, agri-food and industrial level provides the opportunity to address the multifaceted challenges posed by climate change and land use[5] [6]. It also highlights that the bioeconomy will contribute to addressing the **Paris Agreement** commitments and to the national achievement of the **UN Sustainable Development Goals**[7] in particular by linking competitive and innovative biorefining industrial activity, territorial assets and actors to restoring ecosystems, including the oceans through the production and responsible consumption of biodegradable and biobased products replacing energy intensive and fossil based materials.

[3] https://ec.europa.eu/research/bioeconomy/pdf/ec_bioeconomy_strategy_2018.pdf

[4] https://ec.europa.eu/knowledge4policy/bioeconomy_en

[5] https://ec.europa.eu/clima/policies/strategies/2050_en

[6] https://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetailDoc&id=38914&no=1

[7] https://ec.europa.eu/commission/sites/beta-political/files/rp_sustainable_europe_30-01_en_web.pdf?mc_cid=158570ca94&mc_eid=c2404eafa3&mc_cid=0ab69a57cd&mc_eid=c2404eafa3

# 3 How does bioeconomy policy fit with wider Government policy?

# 3. How does bioeconomy policy fit with wider Government policy?

Since the launch of the National Policy Statement, developing the bioeconomy has become a key objective in a number of whole of Government policies including Project Ireland 2040, Future Jobs Ireland and the Government Climate Action Plan to Tackle Climate Breakdown. It has also become an objective in the latest development of national Research Programmes, the Draft National Energy & Climate Plan, the Regional Spatial and Economic Strategies and will feature in the upcoming development of the 2030 Agri-Food strategy and the Common Agricultural Policy.

**Project Ireland 2040** through the National Planning Framework recognises that the transition to a circular economy and bioeconomy – where natural capital is regenerated, the generation of waste is minimised and materials and resources are maintained in the economy for as long as possible and biodegradable and biobased products replacing energy intensive and fossil based materials - could provide an essential contribution to developing a sustainable, low carbon, resource efficient and competitive economy.

The **Government Climate Action Plan to Tackle Climate Breakdown** also recognises the importance of the contribution of the bioeconomy to carbon neutrality and the role of the circular economy to the decarbonisation of our economy. It articulates an aim to promote and support the role of the bioeconomy more widely and in developing an overarching Circular Economy Action Plan for Ireland that will maintain natural capital and reframe national waste policy, targets and interventions.

The central aim of **Future Jobs Ireland** is positioning Ireland for the future and ensuring our enterprise and jobs focus creates quality jobs that will be resilient to accelerating technological change and disruption. Future Jobs Ireland recognises the potential of the bioeconomy as it cuts across a range of sectors where Ireland has a well-established enterprise base including agriculture, forestry, marine, waste management and biopharmaceuticals. Developments, such as those by the company Nuritas are key examples of bioeconomy development. Currently, Nuritas is being actively facilitated by Government through supports, networks and infrastructure and through availing of supports and opportunities being offered by the European Union.

**Table 1: Nuritas, exemplar of bioeconomy industrial development**

| |
|---|
| **Nuritas[8] combine artificial intelligence and genomics to discover and unlock natural bioactive peptides with extraordinary health benefits and are viewed as an exemplar in the bioeconomy in interlinking the biological, physical and digital worlds providing high quality employment whilst addressing societal challenges**. It is likely this type of scientific and technological development will extend in the future to also address animal, plant and environmental health. Nuritas has been supported by the Irish Government via Enterprise Ireland and has secured over €2million in funding from the EU Commission research and innovation funds. Nuritas has also recently received €30million in financing from the EIB and is the first Irish biotechnology firm to benefit from the EIB's dedicated European Growth Finance Facility. The opportunity to further increase and accelerate development of bioinformatics and artificial intelligence to improve global health, animal, plant and environmental care through discovery and unlocking natural bioactive peptides with benefits from agri-food and biobased sources presents very important industrial regeneration opportunities. |

The table below sets out further recent examples of industries and projects at the cutting edge of this circular bioeconomy transition in Ireland.

**Table 2: Recent regional bioeconomy developments in Ireland**

| | |
|---|---|
| **Tipperary**<br><br>Glanbia<br><br>€32 million EU research & innovation funded project | The AgriChemWhey project led by Glanbia is building a first-of-a kind, industrial-scale bio-refinery which will take by-products from the dairy processing industry and convert them into cost competitive, sustainable lactic acid. This lactic acid can in turn be used to make value-added bio-based products for growing global markets, including biodegradable plastics, bio-based fertilizer and other minerals. |
| **Tipperary**<br><br>Irish Bioeconomy Foundation (IBF)<br><br>€5 million REDF funded pilot biorefining facility | The Irish Bioeconomy Foundation (IBF) building on the success of a European Model Demonstration Region award for sustainable chemicals production have been awarded €5 million Regional Economic Development funding from Enterprise Ireland to develop a pilot scale facility at the National Bioeconomy Campus, Lisheen for scaling bioeconomy technologies in alliance with industry and research producing organisations. |
| **Monaghan**<br><br>Monaghan Mushrooms<br><br>Monaghan County Council, BioMarine Ingredients, SilverHill Foods, Lakeland Dairies<br><br>€5 million REDF funded | Development of the Bioconnect Innovation Centre in Monaghan, which will work with agri-food producers within the region to grow and develop new biobased products. The Centre will create a space for a consortium of the agri-food sector to use biotechnology services, networking and brainstorming to solve problems facing the companies in a non-competitive environment. |
| **Dublin**<br><br>BEACON SFI Bioeconomy Research Centre<br><br>€17.8 million | Science Foundation Ireland (SFI) have funded the €17.8 million Bioeconomy Research Centre (BEACON) who are performing fundamental and applied research in collaboration with industries. The Centre is hosted by UCD in collaboration with TCD, NUIG, UL, and Teagasc. |

[8] https://www.nuritas.com/

| | |
|---|---|
| **Monaghan**<br><br>BioMarine Ingredients<br><br>€5-10 million private investment | Through private investment BioMarine Ingredients have developed a first-of-a kind, pilot-scale marine biorefinery which will take non-food chain pelagic species and through their advanced hydrolyzing process, convert raw material of moderate commercial value into cost competitive, proteins, oil and calcium. |
| **Cork**<br><br>Carbery, Barryroe Co-Operative, Farmers<br><br>€1 million EIP-AGRI CAP RDP Co-Fund | The Biorefinery Glas project will demonstrate an integrated and mobile multi product small-scale biorefinery which optimises the use of grass by separating it into a spectrum of co-products for ruminants, non-ruminants and for the food chain which will also improve resource efficiency. Through Biorefinery Glas, farmers will demonstrate new business models, using an automated and lowcost biorefinery, which integrates well within traditional beef and dairy farming and could be replicated across Ireland, addressing fodder and emissions challenges whilst adding value. |
| **Meath**<br><br>Devenish Nutrition<br><br>€118 million EIB investment | Agri technology company Devenish Nutrition has secured €118 million in long-term funding to enable its research, development and growth plans.<br><br>The EIB investment is the largest ever support for agri-business in Ireland by the EIB. The EIB loan will enable Devenish to develop a purpose-built Global Innovation Centre in Dowth, County Meath, from where it will develop and showcase its 'One Health – from Soil to Society' research, development and innovation programme and fund innovation related capital projects and research into optimised circular biobased products including on animal nutrition, food innovation, health and sustainability |
| **Galway**<br><br>Udárás na nGaeltachta, Páirc Na Mara<br>€2 million REDF funded project | Development of the market-focused Marine Innovation and Development Centre will provide enterprise and incubation space for marine enterprises including on bioeconomy. Through collaboration with regional stakeholders and the higher education institutes, the project will provide specialist training and business development supports, targeting the creation of 200 jobs. |

# 4 Progression of the leading bioeconomy value chain propositions

# 4. Progression of the leading bioeconomy value chain propositions

The move to develop a competitive and sustainable and circular bioeconomy to improve and innovate the way we produce and consume food, products and materials, create jobs and build modern biobased industries within healthy ecosystems will radically change sectors of the economy and present new opportunities for industry. **Science, technology and innovation will play a key role in this system transition.**

The Bioeconomy Implementation Group was tasked with taking the appropriate steps to establish the conditions required for the commercial viability of the bioeconomy including valorisation of the BioÉire[9] and other bioeconomy value chains. Upon review (see appendix II), fifteen out of the eighteen BioÉire value chains have had scientific and technological development undertaken in Irish or EU funded research and innovation activities involving Irish participants[10]. In addition, other value chains not identified by the BioÉire participants have also been advanced either through Irish or EU funded research and innovation activities[11] including projects at demonstration and pre-commercial large scale level. Overall, this means there is a significant opportunity for Irish Industry to build on scientific and technological developments through undertaking demonstration level projects or to benefit from knowledge transfer and cross-licensing opportunities.

Domestically, further bioeconomy funding opportunities are now being provided through the relevant national research funders (e.g. DAFM, EPA, SEAI and SFI) and the possibility to seek funding through the four National Development Plan Funds is being discussed with the relevant fund managers. The funds can play a leading role in scaling up and demonstrating industrial activity and developing a pipeline of activities to lead to participation in EU funding including the Biobased Industries Joint Undertaking[12], LIFE funding[13] and the EIB Circular Bioeconomy Thematic Investment Platform[14]. It needs to be ensured that national innovation funding opportunities provide **appropriate opportunities** and set out suitable **standard requirements** and **key performance indicators** to drive fitting bioeconomy developments and this is one of the matters that the bioeconomy implementation group will address with the relevant Project Ireland 2040 fund managers. Additionally, a Bioeconomy Forum will also be established in Q3 2019 to liaise with relevant industry bodies and other stakeholders on bioeconomy development (see appendix III).

[9] https://www.sciencedirect.com/science/article/pii/S0959652617327051?via%3Dihub

[10] https://www.bbi-europe.eu/projects?field_project_year_tid=All&field_project_country_target_id=All&field_project_category_tid=All&field_project_classification_tid=All&field_projects_strategic_tid=All&combine=ireland&=Search

[11] https://www.bbi-europe.eu/projects

[12] https://www.bbi-europe.eu/about/about-bbi

[13] https://www.dccae.gov.ie/en-ie/environment/topics/life-programme/Pages/default.aspx

[14] https://www.errin.eu/sites/default/files/20180529_Advisory_Presentation_Brussels_1.pdf

DAFM & SEAI have co-funded two projects examining key bioeconomy principles of circularity & cascading use in real-time. Agri Bio Circular Economy[15] and BioCircle [16] are assessing value chain development and valorisation case studies, socio-economic impact & market based opportunities based on sustainable regional biomass and through engagement with key industry, regional and rural stakeholders in Tipperary & Monaghan.

Additionally, ongoing developments in relation to the **Common Agricultural Policy (CAP)** and **European Maritime and Fisheries Fund (EMFF)** has already identified bioeconomy as a specific objective to address the overall aim to further improve the sustainable development of farming, food and rural, maritime and fisheries areas. The implementation group is providing early-stage feedback to the CAP and EMFF negotiations so that bioeconomy is in scope with regards to potential measures applicable for provision of co-funding opportunities. Similar feedback will be provided with regards to the **Structural Fund** negotiations. These activities will seek to ensure that a range of co-funding possibilities including for technological demonstration, cross-sectoral collaboration, advisory services and knowledge transfer activities will be available to allow for the demonstration of biorefining technological developments by Irish Industry. The implementation group will also provide feedback in due course to the future development of the national Agri-Food Strategy and Forestry Programme to ensure that bioeconomy will be identified as an area for consideration.

The Bioeconomy Implementation Group has also undertaken discussions with the EIB and the NTMA with regards to the potential role of patient public finance in the development of the Irish bioeconomy and is also currently engaged in discussions with private finance groups. These matters are at an early stage and activities will be initially presented to the bioeconomy consultative group for discussion.

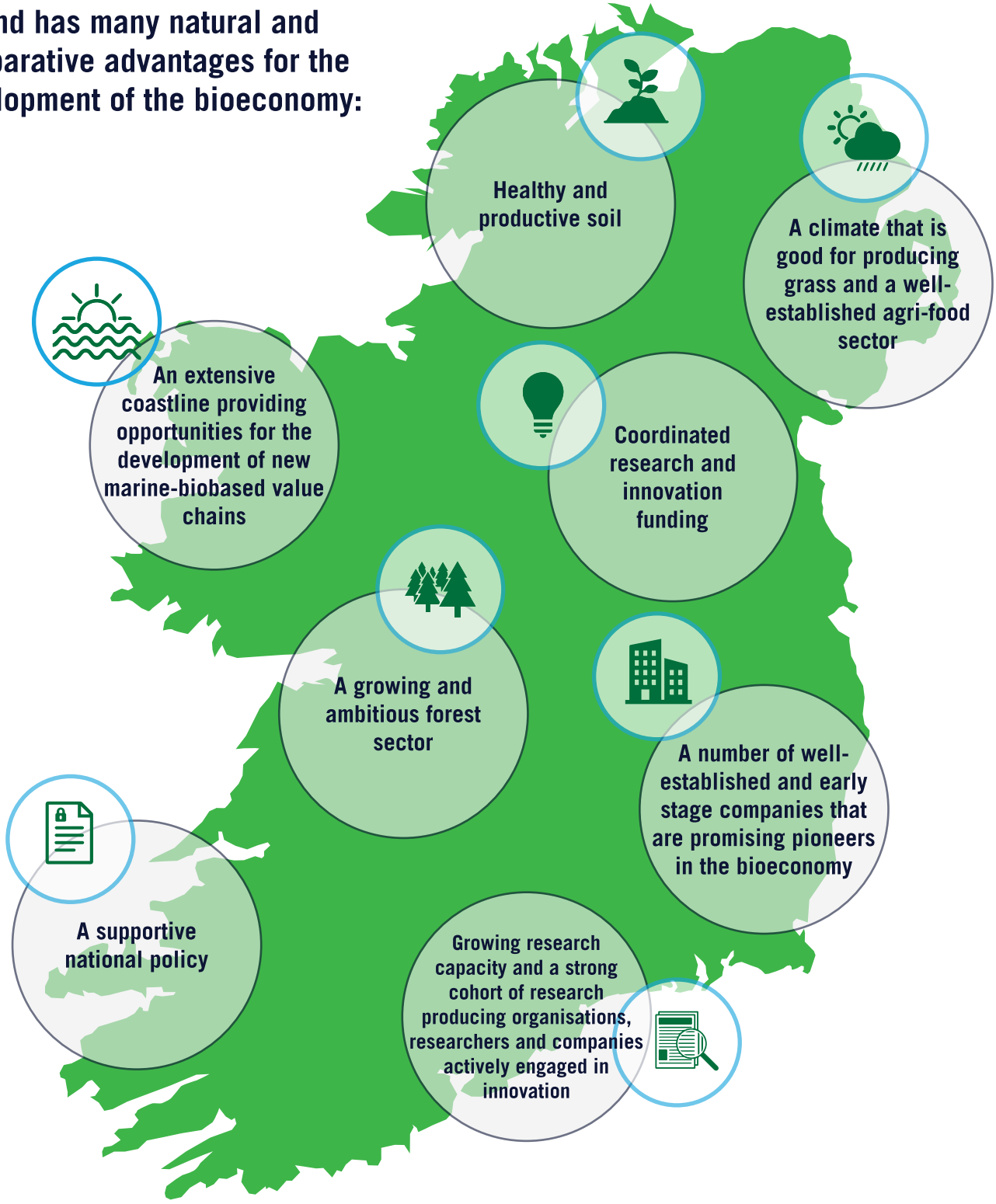
For the future, the development and acceleration of a sustainable and circular bioeconomy for Ireland will require **increased engagement** by all actors in the national and EU innovation system, **increased coherence** across the innovation system itself and also the further development of the **bioeconomy policy framework** to aid the creation and shaping of market development for biobased products. A relevant consideration, at this point, for the national innovation system is whether optimisation of the present innovation system will be sufficient or whether further changes to aid the development of integrated and resource efficient value chains at primary and processing sectors should be considered or proposed to improve sustainability and competiveness. To address this matters, the **Department of Business, Enterprise and Innovation** have produced a report[17] that advances the perspective set out in the Refresh of Research Prioritisation 2018-2023, Innovation 2020 and Enterprise 2025 by identifying how the bioeconomy and circular economy will have a transformative impact on Ireland's enterprise base and the importance for Ireland in identifying and pursuing specific opportunities in which Irish enterprises can capture global value from these transitions. This report has been brought to the Bioeconomy Implementation Group for an initial round of discussion.

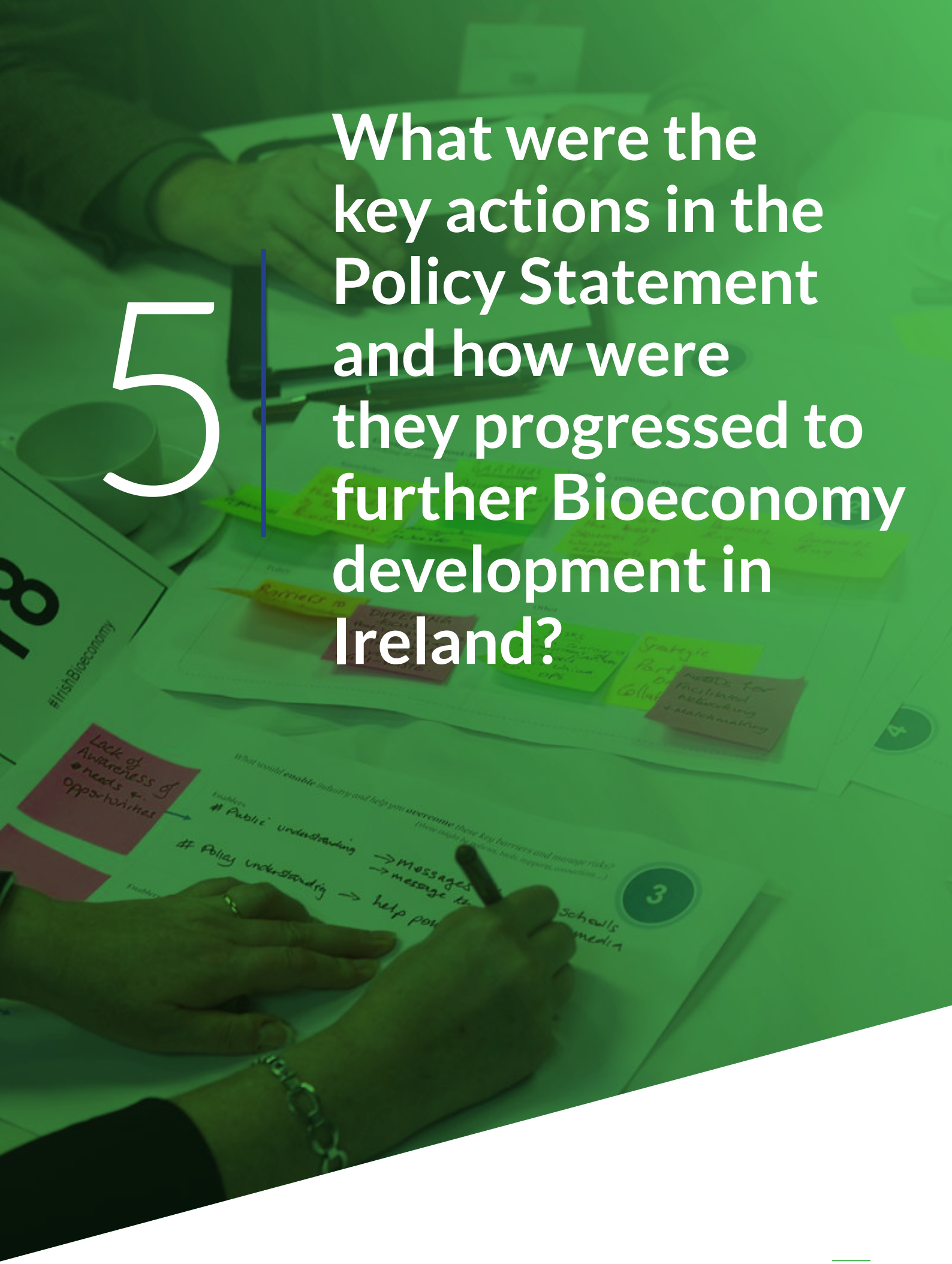
[15] https://www.abceconomy.ie

[16] https://www.seai.ie/resources/seai-research/research-projects/details/enhancing-and-assessing-the-impact-of-novel-circular-economy-sectors-in-the-bioeconomy

[17] https://dbei.gov.ie/en/Publications/Realising-the-opportunities-for-enterprise-bioeconomy-circular-economy-Ireland.html

## Ireland has many natural and comparative advantages for the development of the bioeconomy:






# 5 What were the key actions in the Policy Statement and how were they progressed to further Bioeconomy development in Ireland?

# 5. What were the key actions in the Policy Statement and how were they progressed to further Bioeconomy development in Ireland?

The Government established the Bioeconomy Implementation Group to advance the **seven key actions** identified in the policy statement on the bioeconomy. The National Policy Statement also outlined major challenges in expanding the Irish bioeconomy including: maintaining natural capital; promoting knowledge transfer and advice and cross-sectoral collaboration; accessing funding available at national and EU level, harnessing innovation accelerators and the leveraging of greater public and private investment and risk finance; fortifying market development supports and stimulating market demand of promising bio-based products, business models and value chains and growing relevant markets for them; and strengthening engagement to ensure that there is greater coherence between the many sectors of the bioeconomy. The implementation group has provided consistent attention to addressing the actions, challenges and to implementing the bioeconomy framework and developing the bioeconomy pillars through undertaking direct actions and leveraging public and private sector organisations engagement in activities to develop the bioeconomy in Ireland such as the following:

## 1. Ensure that there is coherence between all sectoral strategies which impact on the bioeconomy in Ireland.

- Departments & Agencies have provided feedback regarding sectoral coherence and an approach leveraging the resources of the Beacon Bioeconomy Research Centre is being used for preparation of a sectoral coherence report which will be completed by Q4 2019.
- The implementation group secretariat has provided briefing to raise awareness on bioeconomy developments at numerous events including e.g. Forestry, Beef and Waste Forums; and workshops including on developing a marine biorepository[18].
- Inputs have been provided to: Government Climate Action Plan to Tackle Climate Breakdown; strategic initiatives such as Future Jobs Ireland, Bioenergy Strategy, Regional Spatial Economic Strategies and respective Agency strategic planning including by Science Foundation Ireland and Teagasc; and funding programme preparation including to relevant national research funders, Project Ireland 2040 funding, the Common Agricultural Policy and the EMFF.
- A Teagasc representative has started a secondment in the Bioeconomy Strategy Unit of DG Research and Innovation and will, as appropriate, provide real-time updates on available EU bioeconomy development opportunities.
- Engagement in the agenda-setting activities for the next EU Research and Innovation funding framework to ensure the proposed solutions and funding are in tandem with the Irish, EU and global agendas.

[18] https://www.marine.ie/Home/site-area/news-events/news/marine-institute-hosts-successful-biodiscovery-workshop-galway

2. **Establish a network comprised of representatives of commercial entities operating within the bioeconomy and relevant public bodies to inform the future development of the bioeconomy - this network may make additional recommendations to be followed up; (This could also include the sharing of best practice regarding applications for BBIJU, SC-2 and H2020 funding).**
   - → Established the Bioeconomy Implementation Group consisting of eleven departments and eight agencies and held four meetings with the group in 2018.
   - → Established a public-private outreach network with an ongoing registration and information portal www.irishbioeconomy.ie for stakeholders. This network is under the custodianship of the BEACON Bioeconomy Research Centre and the Irish Bioeconomy Foundation with the implementation group playing a steering role.
   - → Coordinated a Biobased Industries Joint Undertaking Information Day in UCC in May 2018 and in Limerick in May 2019 with partners Marine Institute, InterTrade Ireland and Department of Environment, Agriculture and Rural Affairs, Northern Ireland to provide information on EU bioeconomy funding opportunities.
   - → Coordinated the Bioeconomy Ireland Day 2018 information & networking event with 250+ attendees at the National Bioeconomy Campus in Lisheen in October 2018 to highlight bioeconomy activity and national and EU supports.

3. **Encourage the translation of research into real world applications through promoting collaboration between research institutions (academia) and industry - through the use of pilots/demonstrations at the model demonstrator facilities (Lisheen site, the Marine Research Cluster in Connemara).**
   - → DAFM & SEAI co-funded two projects that are assessing the available biomass, value chain development, valorisation & market based opportunities and socio-economic impact through engagement with key regional and rural stakeholders in Tipperary & Monaghan including examining key principles of circularity & cascading use in real-time.
   - → DAFM co-funded Biorefinery Glas[19], through the CAP measure EIP-AGRI, which is one of the first bioeconomy initiatives in Europe which looks at moving farmers further up the bioeconomy value-chain; becoming bio-processors, rather than simply suppliers of low-cost biomass in co-operation with Dairy Processors, Co-operatives and Research Performing Organisations.
   - → Engaged with the NTMA, EIB and private investors to examine national and EU financing options and opportunities.
   - → Ensured bioeconomy is in scope in current national research (DAFM, EPA, and SEAI) and innovation (Project 2040 – DTIF) funding calls.
   - → Promoted and supported engagement in the LIFE EU co-funding opportunity.
   - → On-going contact with the bioeconomy related innovation clusters based in Lisheen, Connemara and Monaghan with regular meetings ongoing with the BEACON Bioeconomy Research Centre and the Irish Bioeconomy Foundation.

[19] https://ec.europa.eu/eip/agriculture/en/find-connect/projects/biorefinery-glas-small-scale-farmer-led-green

- Supported the Department of Business, Enterprise and Innovation mapping and analysis report of Circular Economy & Bioeconomy enterprise opportunities.
- Benchmarked the implementation groups approach for bioeconomy policy development against OECD key messages for systems innovation. [20]

### 4. Assess the current legislative definition of waste and recommend whether a redesignation is necessary for residual waste flows to be successfully managed for use in the bioeconomy.

- Established a technical working group on biological residual flows. Identified that the present waste licensing provision is that each licensing application to the EPA is dealt with on a case by case basis. Depending on the complexity of the licence application, other agencies and departments may need to be involved. If the substance or object does not have an EU end of waste determination then the industry concerned may request that the EPA make the determination. In some cases, it makes sense for industry to come together and seek an Irish decision for a particular waste stream identified. There is no roadmap for a streamlined process at present. The approach being taken is to map out current actions for managing residual waste flows for use in the bioeconomy. A proposal for a systematic approach for management of residual waste flows for use in the bioeconomy will be prepared by Q4 2019.
- Alignment with the EPA funded project that is developing national End-of-Waste standards for quality compost and digestate [21].
- Exploring the role of cities/regional towns in becoming circular bioeconomy hubs[22] including the possible use of municipal solid biowaste and wastewater for recovery of bioresources.

### 5. Ensure greater sectoral coherence within the bioeconomy through the development of risk assessment and management protocols regarding the use of by-products which encourages the piloting of opportunities.

- Identified a quality protocol co-produced by an Irish company BHSL funded by Defra, the Welsh Government (WG) and the Northern Ireland Environment Agency (NIEA) as a business resource efficiency activity. It sets out the end of waste criteria for the production and use of poultry litter ash from the combustion of poultry litter, feathers and straw.
- The technical group on biological residual flows has also explored alignment and engagement with the EPA funded innovation project 'An Irish Nutrient Platform to Underpin Sustainable Development' with the aim to examine selected case studies for development of risk assessment and management protocols regarding the use of by-products which will encourage and accelerate scaling up of valorisation.

[20] https://innovationpolicyplatform.org/system-innovation-oecd-project

[21] http://www.cre.ie/web/members-news/epa-research-to-develop-national-end-of-waste-standards-for-quality-compost-and-digestate/

[22] https://www.ellenmacarthurfoundation.org/publications/urban-biocyles

### 6. Progress the leading value chain propositions identified in the Bio-Éire project by establishing the conditions required for their commercial viability and how these might be fulfilled.

- Research & Innovation projects and project results are available for fifteen out of the eighteen value chains identified in the BioÉire project (see appendix IV). Further funding opportunities related to BioÉire value chains (VC) and other higher value chains are available at present through national and EU funding opportunities indicating significant supports for technology push for biorefining.
- The DAFM research call 2019 has offered the following research funding opportunities that may underpin and further support bioeconomy development if projects are funded: Proteins and other bioactive ingredients from crops and their side streams and residues; Development of agri-food and bioeconomy districts; Agri-Food, Bioeconomy & Carbon Neutral Growth to 2050 – Foresight Analysis; Assess innovative bio-based fertilisers and plant protection products to increase the sustainability of Irish agriculture; Wood Value Chains / Building with wood; Novel Bioeconomy Knowledge Transfer & Exchange Platform; and Novel packaging solutions and safety requirements.
- Demand side tasks have been identified in Future Jobs Ireland that will address green public procurement and identify opportunities for certification, standards and labels that will further develop supports for market pull/push for bio-based products.

### 7. Examine how greater primary producer, public and consumer awareness of the bioeconomy and its products could be built up - through knowledge transfer, advisory, sustainable business models, public procurement, consumer awareness campaigns and product labelling initiatives etc.

- Teagasc have established their internal Bioeconomy Working Group with a renewed focus to develop appropriate research, education, knowledge transfer and advisory services for bioeconomy value chain development.
- The bioeconomy implementation group is liaising with the BEACON Bioeconomy Research Centre's public engagement programme to leverage initiatives for the promotion of the bioeconomy and its products including on consumer awareness.
- Developed with Science & Technology in Action and Monaghan Mushrooms a second-level bioeconomy teaching resource[23] for distribution to all Irish secondary school science teachers.
- Leveraged funding through the Sustainability SkillNet Programme[24] for a Bioeconomy Training Network in alignment with Sustainable Nation Ireland.
- Leveraged development of an MSc in Circular Bioeconomy with Biobased Business in alignment with IT Tralee, UCD and Teagasc that will be funded through the Springboard + programme.
- Engaged through the Department of Education & Skills and the Higher Education Authority with the Vice Presidents of Teaching & Learning on further development of the third level curriculum to account for bioeconomy developments.

[23] http://sta.ie/lesson/what-is-the-bioeconomy

[24] https://www.sustainablenation.ie/sustainability-skillnet/

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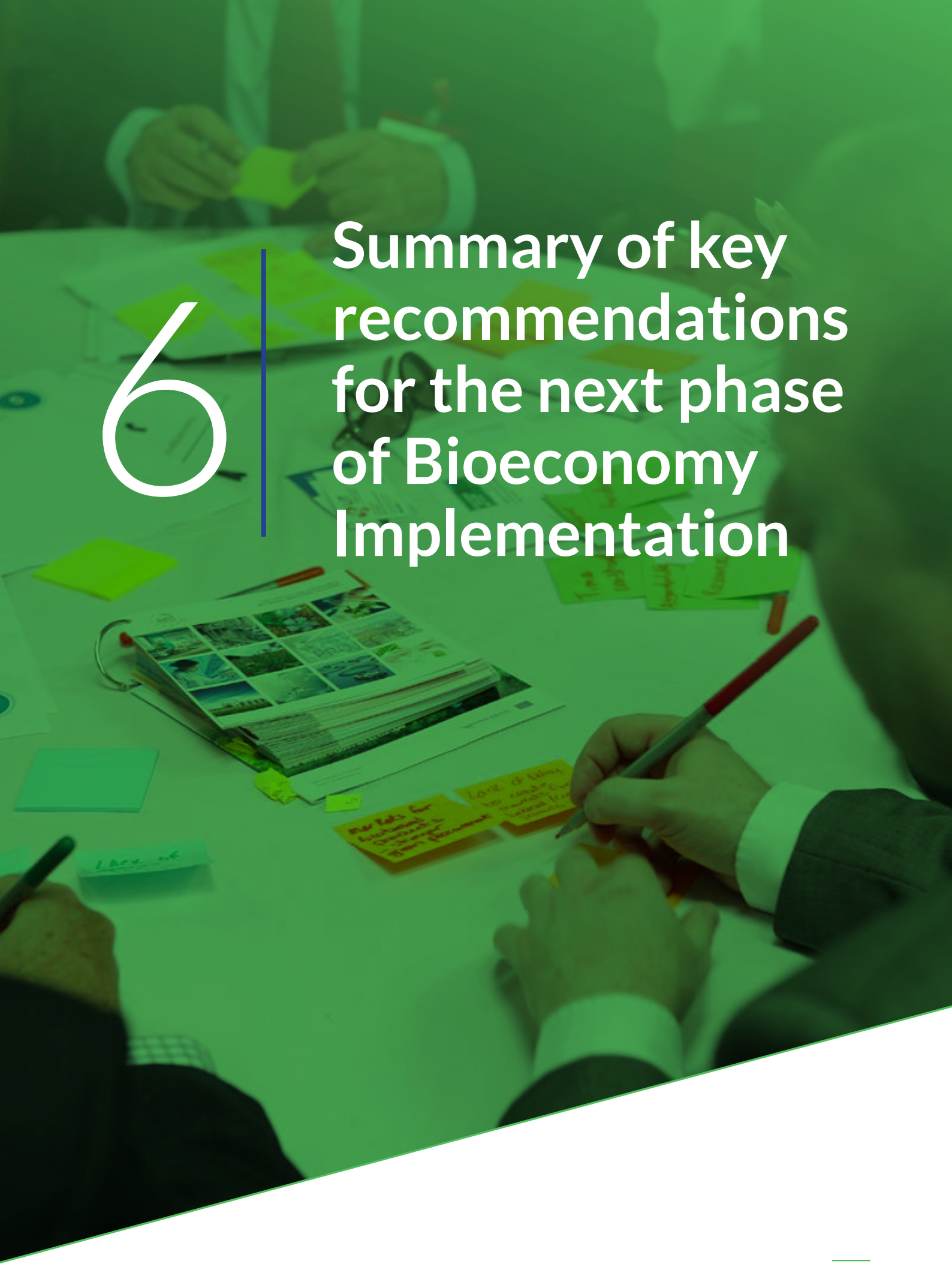

# 6 Summary of key recommendations for the next phase of Bioeconomy Implementation

# 6. Summary of key recommendations for the next phase of Bioeconomy Implementation

The recommendations in this report dovetail with the actions identified in the National Planning Framework[25] and Project Ireland 2040, Future Jobs Ireland[26], the Regional Spatial & Economic Strategies[27], the Climate Action Plan to Tackle Climate Breakdown including the development of an overarching Circular Economy Action Plan for Ireland. The recommendations also align with ongoing developments for the next Agri-Food strategy, Forestry Programme and in relation to Horizon Europe, LIFE, the Common Agricultural Policy, Structural Funds and the European Maritime and Fisheries Fund. Recommendations from the Implementation Group in line with these key Government and EU policies to be undertaken alongside completion of the policy statement actions and challenges to further develop the bioeconomy in Ireland include:

| Recommendation | Government policy alignment |
|---|---|
| Undertake an awareness campaign to encourage take-up of bioeconomy funding opportunities for bioeconomy value chain development and commercialisation including: the national research programmes, the four Project Ireland 2040 National Development Plan Funds and under the Horizon 2020, LIFE co-funds and the InvestEU Programme; specific interventions for consideration under CAP, EMFF, Structural; and (public)-private investment funds. | Future Jobs Ireland – 2019 recommendation |
| Further support, engage and leverage the activities of the BEACON Bioeconomy Research Centre, the Bioeconomy Network, the Irish Bioeconomy Foundation and other innovation clusters including the Marine Innovation Park and the BioConnect Innovation Centre. | National Policy Statement on the Bioeconomy |
| Support the Regional Assemblies to undertake bioeconomy feasibility to identify areas of potential growth in the regions to inform national development plan investment in line with the national transition objective to a low carbon and circular economy. | Climate Action Plan to Tackle Climate Breakdown |
| Complete the sectoral coherence report and provide supporting briefing and guidance to integrate and mainstream bioeconomy policy considerations. | National Policy Statement on the Bioeconomy<br><br>Agri-Food strategy, Forestry Programme, CAP, EMFF, Circular Economy Action Plan, Waste Review. |
| Promote and support Irish participation in the implementation of the EU Bioeconomy Strategy to increase awareness and take-up of opportunities that will address the following: strengthening and scaling-up the bio-based sectors, unlocking investments and markets; deploying local bioeconomies rapidly across Europe; and understanding the ecological boundaries of the bioeconomy. | National Policy Statement on the Bioeconomy |

[25] https://assets.gov.ie/7338/31f2c0e4ba744fd290206ac0da35f747.pdf

[26] https://dbei.gov.ie/en/Publications/Publication-files/Future-Jobs-Ireland-2019.pdf

[27] Regional Assemblies (SRA, NWRA and EMRA) - Draft Regional Economic & Spatial Strategies

| Recommendation | Government policy alignment |
|---|---|
| Identify and commence delivery of measures to address the key regulatory barriers to development of the bioeconomy, including exploring opportunities to establish "End of Waste" criteria for certain bio-wastes. | Future Jobs Ireland – 2019 recommendation |
| Publish a feasibility study on the establishment of National Marine Biomaterials Repository and, following this, scope out and secure funding. | Future Jobs Ireland – 2019 recommendation |
| Identify opportunities for use of certification, standards and labels to support market development for bio-based products. | Future Jobs Ireland – 2019 recommendation |
| Develop understanding of the socio-economic value of ecosystems and biodiversity and how management of ecosystem services could be incentivised, integrating regenerative and agro-ecological practices into primary production and turning organic waste, residues and food discards into valuable and safe bio-based products and helping farmers, foresters and fishermen to diversify their revenue sources and better manage market risks, all while achieving the goals of the Circular Economy. | National Research Programmes |
| Engage with stakeholders to seek the development of second-level, vocational and higher education curricula, including the involvement of social partners and the development of entrepreneurship programmes to contribute to the need for new education, training and skills to address social and technical needs for bioeconomy development. | National Policy Statement on the Bioeconomy |
| Scope the development of a Bioeconomy Innovation Platform to examine the provision of specialised bioeconomy business support services with the aim to combine regulatory, technological and non-technological services with the aim to accelerate the deployment and diffusion of bioeconomy pathways and technologies and interconnect sectors, value chains and people. | Future Jobs Ireland – 2019 recommendation |
| Explore the development of standard requirements and key performance indicators for national bioeconomy implementation to ensure national funding and financing is used in an appropriate and desirable manner in alignment with scientific and technical requirements including the addressing of challenges and the achievement of the guiding principles of the bioeconomy as set out in the national policy statement. | Project Ireland 2040 Funds |

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# 7 Conclusion

# 7. Conclusion

The report highlights significant progress since May 2018 in addressing the challenges and actions identified in the bioeconomy policy statement. Building on the success and impetus of the Bioeconomy Implementation Group, an Action Plan for the period 2019-2020 (appendix IV) with identified leads, co-leads and key consultative stakeholders is provided.

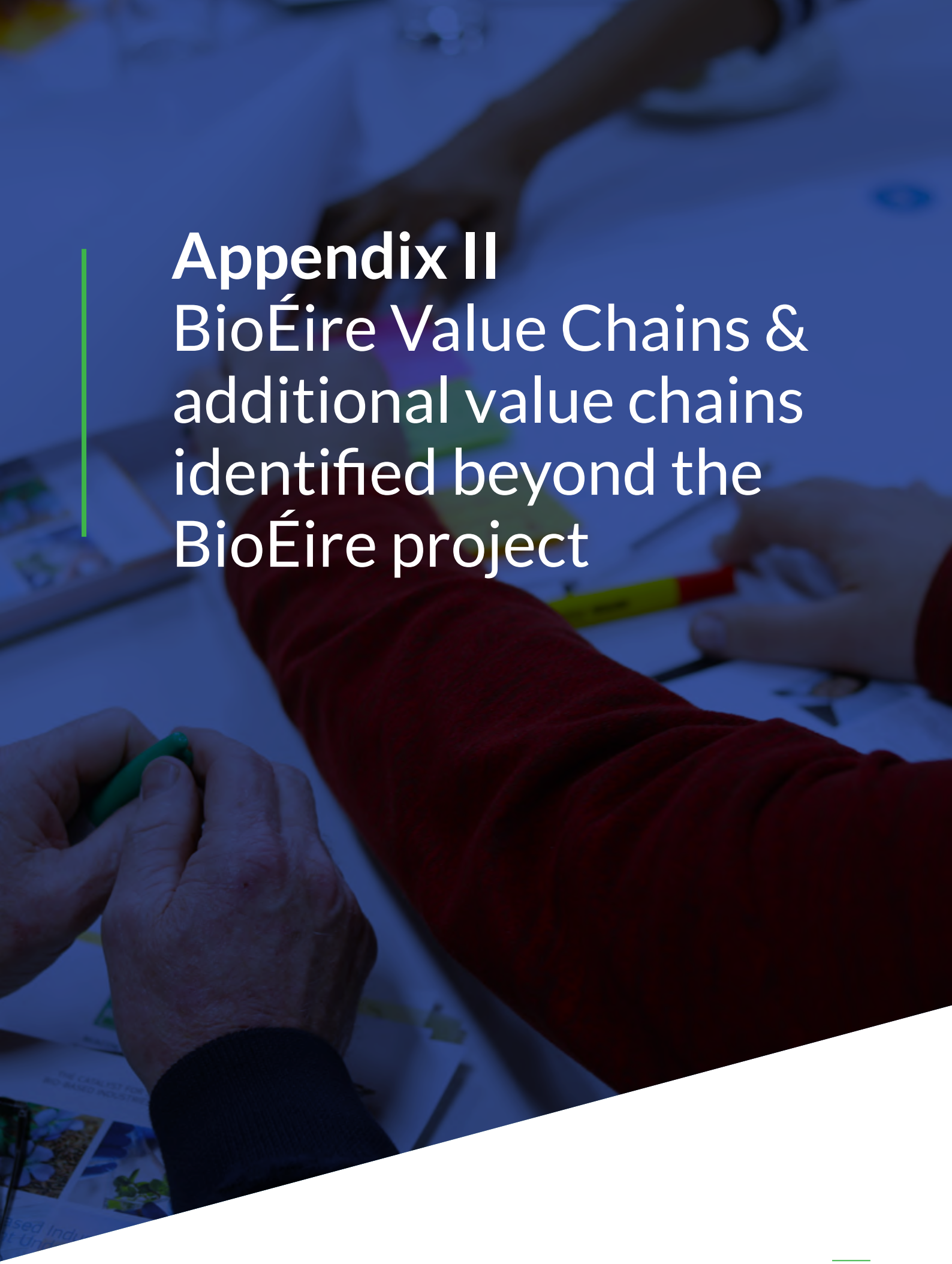
The Bioeconomy Implementation Group and the Bioeconomy Forum will form the **implementation consultative infrastructure** in this time period. Bioeconomy implementation will also feed into the implementation of Project Ireland 2040, Future Jobs Ireland, the Climate Action Plan to Tackle Climate Breakdown and the next Agri-Food strategy so as to **integrate with long-term strategic planning and investment horizons with suitable timescales for a systems transition approach.**

The actions, recommendations and action plan have a focus on addressing the NPS actions and on aligning actors, territories and value chains. To ensure the effective delivery of the vision, principles and strategic objectives of the national policy statement, the bioeconomy forum will review and the Bioeconomy Implementation Group will report regularly on the progress of the Action Plan and is committed to adapting or discontinuing activities that do not contribute to the objectives of the NPS in a satisfactory manner.

# Appendix I
# Policy Framework

# Appendix I – Policy Framework

| | |
|---|---|
| **Vision** | The Government's vision for the bioeconomy is to grow Ireland's ambition to be a global leader for the bioeconomy through a coordinated approach that harnesses Ireland's natural resources and competitive advantage and that fully exploits the opportunities available while monitoring and avoiding unintended consequences. An important objective of the bioeconomy is to move Ireland beyond simply a target compliance and carbon mitigation focus to integrating sustainable economic development into our economic model as we transition to a low carbon and circular economy. There is increasing recognition at a European level of the potential benefits for economies and societies of adopting a circular economy that maintains the utility and value of products, components and materials in the economy for as long as possible. The bioeconomy has a close relationship with the circular economy and represents an area where Ireland has some crucial advantages. The bioeconomy should promote circularity through solutions and innovations that reuse and recycle materials, maximising resource efficiency through the use of unavoidable wastes and environmental sustainability. |
| **Guiding Principles** | 1. **Sustainability Principle** - Environmental sustainability is an integral, core principle of the bioeconomy and products developed must be sustainable. Feasibility assessments should include environmental and social feasibility. The amount of biomaterial extracted should not have a negative impact on our biological resources; it should not exceed the capacity of the environment to replenish itself; and should cause no lasting damage to an environment. This should be regarded from a holistic view, which takes all biomass into account, including that in the soil. Activity in the bioeconomy should not degrade resilience or biodiversity in the ecosystem.<br>2. **Cascading Principle** - whereby higher value applications are preferentially derived from biological resources (e.g. food, bio-based materials and chemicals) prior to their use in energy and fuel generation which will allow us to derive the maximum value from our bio-resources.<br>3. **Precautionary Principle** - is a risk management approach to prevent policies or actions causing harm to the public or the environment. Innovation in the bioeconomy will depend on the sensible application of this principle and it should be informed by the latest scientific information and consensus.<br>4. **Food First Principle** - gives priority to food and nutrition security by improving the availability of and access to a safe and healthy food supply for citizens. |
| **Strategic Policy Objectives** | 1. **Sustainable economy and society** - Growing the bioeconomy can put Ireland's economy on a more sustainable footing by encouraging the efficient use and re-use of resources and materials to a much greater extent than hitherto.<br>2. **Decarbonisation of the economy** - the bioeconomy can play a part in lowering greenhouse gas emissions through, for example, the development of innovative practices and processes that can improve the efficiency in agriculture and forestry production systems. Bioprocessing and bio-refining can replace high embedded carbon products such as concrete, steel, plastics and chemicals with biobased alternatives and produce new products.<br>3. **Jobs and Competitiveness** - the bioeconomy can foster employment as many of the inputs for the bioeconomy are sourced nationally, so its development has a greater impact compared to other areas of the economy that are more reliant on imports. In this context, it is worth noting that as the agri-food and marine sector faces considerable uncertainties due to the prospect of Brexit, growing the bioeconomy represents an opportunity for this sector to diversify and reduce the risks confronting it.<br>4. **Regional Prosperity** - one of the advantages of the bioeconomy is that many of the businesses rooted in it are located in rural and coastal areas. Helping the bioeconomy to grow can assist in halting rural decline. |



# Appendix II
# BioÉire Value Chains & additional value chains identified beyond the BioÉire project

# Appendix II – BioÉire Value Chains & additional value chains identified beyond the BioÉire project

| BioÉire Value Chain | Description | Activities & information available in the BioÉire Value Chain area |
|---|---|---|
| Value Chain 1 | **Use of first generation sugar-yielding feedstock (e.g. high quality sugar beet) for biochemical production using existing and/or novel technology** | • Teagasc funded projects on extraction of Protocathecuic Acid and Sinapinic Acid from oilseed rape and assessment of their potential as functional food ingredients for improved health benefit in the Irish populace.<br>• Funding opportunity on Proteins and other bioactive ingredients from crops and their side streams and residues offered in the DAFM 2019 research call. |
| Value Chain 2 | **Use of second generation sugar-yielding feedstock (e.g. straw or grass) for biochemical production using existing and/or novel technology** | • Biorefinery Glas is one of the first bioeconomy initiatives in Europe which looks at moving farmers further up the bioeconomy value-chain; becoming bio-processors, rather than simply suppliers of low-cost biomass. The project will demonstrate an integrated and mobile multi-product biorefinery which optimises the use of grass by separating it into a spectrum of co-products which improve value and resource efficiency. |
| Value Chain 3 | **Use of dairy processing side streams as a feedstock for new food products using existing and/or novel technology (e.g. beyond whey)** | • The AgriChemWhey project led by Glanbia is building a first-of-a kind, industrial-scale bio-refinery which will take by-products from the dairy processing industry and convert them into cost competitive, sustainable lactic acid. This lactic acid can in turn be used to make value-added bio-based products for growing global markets, including biodegradable plastics, bio-based fertiliser and other minerals. |
| Value Chain 4 | **Use of meat processing side streams as a feedstock for new food products using existing and/or novel technology** | • DAFM funded and completed projects ReValue Protein and BioOpps projects - http://revalueprotein.com/ - explore opportunities to obtain additional value from low, neutral or negative value meat processing streams. Protein recovery can enhance the economic performance and improve the environmental impact of the meat industry through the generation of high value protein-rich functional co-products. |
| Value Chain 5 | **Use of horticultural by-products as a feedstock for biomaterials using existing and/or novel technology** | • The BIOrescue project aims to demonstrate a resource-efficient biorefinery concept for mushroom compost that will allow its transformation into valuable bio-based products such as bio-pesticides, biodegradable nano-carriers for drugs or fertiliser encapsulation and bio-based horticultural fertilisers.<br>• The FungusChain project extracts value from the agricultural offcuts of commercial mushroom farming. |

| BioÉire Value Chain | Description | Activities & information available in the BioÉire Value Chain area |
|---|---|---|
| Value Chain 6 | **Use of marine discard as a feedstock for animal feed using existing and/or novel technology** | • The NutraMara project focussed on three main marine sources: (i) fish processing waste streams or rest raw materials, (ii) underutilised species of fish and seaweed including macro and microalgae, and (iii) the development of value-added products from aquaculture—both finfish and shellfish.<br>• EMFF funded – PAW project (Teagasc) - Pet aging and wellness: Utilisation of fish processing by-products for the development of dog nutritive and health ingredients with a focus on pet aging and heart health<br>• EMFF funded – BBPP (Teagasc) - By-product, biostimulant and petfood products: Profiling and reduction of by-products generated from salmon, whitefish and pelagic processing and development of feed and biostimulant products. |
| Value Chain 7 | **Extraction of protein and bioactives from marine discard as a feedstock for functional food applications using existing and/or novel technology** | • The NutraMara project focussed on three main marine sources: (i) fish processing waste streams or rest raw materials, (ii) underutilised species of fish and seaweed including macro and microalgae, and (iii) the development of value-added products from aquaculture—both finfish and shellfish.<br>• EMFF funded – BRAVO / BRAVO 2 (Teagasc) - Development of scalable processes for the recovery of blood-water derived ingredients from pelagic processing operations.<br>• BIM funded – FISHBOWEL - Development of working prototypes for optimal production of clean-label gelatine and collagen proteins and hydrolysate ingredients from the underutilised fish species Boarfish and Blue whiting.<br>• BIM funded – Salmon Viscera (Teagasc) - Generation of salmon viscera concentrates using molecular weight cut off filtration and dialysis methodologies. |
| Value Chain 8 | **Extraction of protein, minerals and chitin from marine sources as a feedstock for biochemical production using existing and/or novel technology** | • The NutraMara project focussed on three main marine sources: (i) fish processing waste streams or rest raw materials, (ii) underutilised species of fish and seaweed including macro and microalgae, and (iii) the development of value-added products from aquaculture—both finfish and shellfish.<br>• The DTIF funded HYDRO-fish project will combine targeted nutraceuticals and traceability technology for a smarter and sustainable Irish fish aquaculture industry.<br>• InterReg funded – IDEA (Teagasc) - Implementation and development of economic, viable and algae-based value chains in North Western Europe.<br>• EMFF funded – Mussels (Teagasc) - Mussel products: Identification of potential commercial extracts/products from mussels contaminated with naturally occurring biotoxins (DSP and AZA)<br>• Teagasc funded – BioAlgae - Bio-refinery of marine macro and microalgae: Exploiting dairy process platform technologies for enrichment of proteins and value added components.<br>• Teagasc funded – BioProtein - Protein quality: Digestibility, bioaccessibility and bioavailability. |
| Value Chain 9 | **Use of marine discard as a feedstock for cosmetics using existing and/or novel technology** | • The NutraMara project focussed on three main marine sources: (i) fish processing waste streams or rest raw materials, (ii) underutilised species of fish and seaweed including macro and microalgae, and (iii) the development of value-added products from aquaculture—both finfish and shellfish. |

| BioÉire Value Chain | Description | Activities & information available in the BioÉire Value Chain area |
|---|---|---|
| Value Chain 10 | **Use of forestry resources (particularly thinnings and brash) as a feedstock for decentralised heat generation using existing and/or novel technology** | • This SEAI funded project investigates and validates the pilot scale production of solid wood fuel products (briquettes & pellets) from forest thinning's. The project also intends to evaluate the economic and supply chain feasibility of converting a large volume of waste thinning's into a valuable renewable fuel.<br>• Feasibility study explored the potential a biomass-fired district heating system in Portlaoise using a local supply of wood chip.<br>• District Heating in Ireland: Best Practice. |
| Value Chain 11 | **Use of forestry resources as a feedstock for new biomaterials (beyond timber and paper production) using existing and/or novel technology** | • Not addressed by Irish researchers or Irish funded projects.<br>• Funding opportunity on Wood Value Chains offered in the DAFM 2019 research call. |
| Value Chain 12 | **Use of forestry resources as a feedstock for biochemicals using existing and/or novel technology** | • Not addressed by Irish researchers or Irish funded projects.<br>• Funding opportunity on Wood Value Chains offered in the DAFM 2019 research call. |
| Value Chain 13 | **Use of paper, cardboard and pulp ink side streams as a feedstock for biomaterials using existing and/or novel technology** | • The LIBRE project (UL) establishing a new value chain for lignin by utilising low commercial value material to produce CF which will in turn be processed into carbon fibre reinforced polymers (CFRP). Development of new bio-based composite materials utilising lignin from the pulp and paper industry blended with biopolymers as a precursor. |
| Value Chain 14 | **Use of agricultural waste and by-products (e.g. silage and slurry) as a supplement for bioenergy production using existing and/or novel technology** | • DCCAE funded €8 million GRAZE project through the Climate Action Fund.<br>• Production of Advanced Gaseous Biomethane transport fuel in an integrated circular bioenergy system (AGB) (EPA Ref. 2018-RE-MS-13). Start date: 29/03/2019 for three years - This project will evaluate a future integrated bioenergy system, including the concepts of cascading bioenergy and circular bioeconomy. The system will produce advanced gaseous transport biomethane from a wide array of second and third generation biomass (such as grass silage, food waste, and seaweed). Proposed outcomes include (1) systems integration and optimisation for biogas production and upgrading to advanced green gas, and (2) sustainability validation of advanced biofuel production.<br>• SLURRES PILOT will demonstrate a pyrolysis-based slurry-to-bioenergy system. It will advance current technology by (a) engineering a novel mechanical filtration process to de-water slurry solids, deploying technology that decouples filtration pressure from material movement and introducing a biomass filtration aid shown to separate slurry solids from liquors at efficiencies that justify transport for energy recovery. |
| Value Chain 15 | **Use of food residues and waste for bioenergy production using existing and/or novel technology** | • The AgriMax project develops agri and food waste valorisation co-ops based on flexible multi-feedstocks biorefinery processing technologies for new high added value applications. |
| Value Chain 16 | **Use of recovered vegetable oil as a feedstock for biofuels using existing and/or novel technology** | • This is an ongoing commercial activity. Not addressed by Irish researchers or Irish funded projects. |

| BioÉire Value Chain | Description | Activities & information available in the BioÉire Value Chain area |
|---|---|---|
| Value Chain 17 | **Use of seaweed for food, healthcare, cosmetic and energy applications using existing and/or novel technology** | • The NutraMara project focussed on three main marine sources: (i) fish processing waste streams or rest raw materials, (ii) underutilised species of fish and seaweed including macro and microalgae, and (iii) the development of value-added products from aquaculture—both finfish and shellfish.<br>• The SpiralG project demonstrates the production of phycocyanin from the spirulina arthrospira sp. including the sourcing, extraction and co-valorisation of the whole algae in the frame of an industrial biorefinery concept.<br>• The DTIF funded project for optimised commercial-scale cultivation of protein-rich biomass from Palmaria palmata for the generation of health enhancing plant based proteinaceous ingredients. |
| Value Chain 18 | **Use of food waste for food applications using existing and/or novel technology** | • Food loss reduction/minimisation - EIP AGRI focus group - Reducing food loss on the farm - Which new on-farm practices and technologies can limit food loss?<br>• Food waste reuse/recycle: Food Cloud redistributes surplus food in the UK and Ireland.<br>• Food Waste Valorisation: The RefuCoat project will seek to demonstrate the potential and economic opportunity offered by the use of bio-based polymers, including PHA from food by-products and other commercial bio-polymers. |
| Other Value chains | **Municipal Solid Waste** | • The Valorisation Alternatives to Landfill for Organic Residues (EPA Ref. 2018-RE-MS-15) project will fully diagnose the recovery options for municipal residual waste and validate their use by measuring potential benefits and environmental risks. Options that will be investigated include the transformation to high quality compost, biogas and biofuel.<br>• The PERCAL project will use Municipal Solid Waste (MSW) as a feedstock for developing intermediate chemical products, producing high yield with high purity, making it attractive for industry. These will be complementary to the bioethanol (existing PERSEO Bioethanol® technology), thus creating a cascade of valorisation from the MSW components.<br>• The UrbioFin project will demonstrate an integrated innovative biorefinery for the transformation of Municipal Solid Waste (MSW) into new biobased products. |
| Other Value chains | **Liquid Biofuels from non-food waste** | • The SEAI funded project for Technology Commercialisation of Lignocellulosic Waste to Liquid Transportation Fuels by Acid Hydrolysis.<br>• Microalgae derived biofuels, known as the 3rd generation biofuels, have been deemed as the most promising biofuels. This project aims at development of novel technologies for selecting and cultivating highly productive auto-floating microalgae for large scale algal biofuel production, in conjunction with digestate purification and CO2 bio-fixation. |
| Regional approaches | **ABC Economy (UCD, BEACON, Cré, Tipperary County Council and Monaghan County Council) will develop sustainable value chains based on the bio-resources available regionally - www.abceconomy.ie** | • The project will characterise available biomass in each region and assess the potential of valorisation processes for biobased product and energy production in a circular economy context. Key stakeholders (primary producer, processors, waste management companies etc.) will be engaged with to identify important resources, constraints to valorisation, and potential opportunities. |

| BioÉire Value Chain | Description | Activities & information available in the BioÉire Value Chain area |
|---|---|---|
| Regulatory Approaches | BioCircle (NUIG, Teagasc, BEACON) will assess the impact of circular bioeconomy approaches on biobased sectors and examine issues in relation to scale-up of identified opportunities – | • The project will undertake different case studies undertaking horizon scanning exercises with industry stakeholders to identify market opportunities and a value chain map will be developed to define potential routes to market and assess the potential gains across value chains. A qualitative exercise will be undertaken with technical and commercial experts to assess barriers to scale-up. An Innovation System Approach, mapping the Knowledge and Innovation System from Lab to Market, including innovation support and training required to facilitate scale-up will be undertaken. |
| Regulatory Approaches | To develop a national End-of-Waste Standards for Quality Compost and Digestate (EPA Ref. 2018-RE-DS-10). Start date: 01/02/2019 for one year. | • It is proposed to conduct a desktop evaluation of compost and digestate quality results from existing compost and AD plants. This will be followed by a technical appraisal of published compost and digestate quality standards from different EU countries. At the end of this process making reference to known quality of Irish compost and digestate, a draft standard for digestate will be developed and to update the current compost standard developed in the previous EPA-funded project. Approaches taken by other European Countries on the implementation of End-of-Waste Criteria will be examined and an appropriate approach for Ireland to take will be recommended.<br>• This research by Cré, the Composting and Anaerobic Digestion Association of Ireland, aims to research and develop anaerobic digestion technical guidelines for local authority planners.<br>• The project addresses town planning implications associated with the development of bioenergy developments |
| Digitalisation approaches | Development of ICT Tools in Efficient Biomass Supply Chains for Sustainable Chemical Production | • The main aim of the ICT-BIOCHAIN project is to identify ways to use ICT effectively to increase the efficiency of biomass supply chains for the bio-based industry. The project will also produce a feedstock-specific database of best practice and new opportunities for digitisation to improve the efficiency of biomass supply chains within South East Ireland Model Demonstrator Region for biobased chemical production. |
| Technological Developments | Unique Refinery Approach to Valorise European Lignocellulosics | • The Unravel project aims to develop advanced pre-treatment, separation and conversion technologies for complex lignocellulosic biomass. The technology relies on pre-extraction, fractionation using low-temperature acetone and subsequent downstream processing to isolate and convert the lignocellulosic constituents into high-value applications. This will produce usable lignin fragments and monomeric sugars from the cellulose along with a hemicellulose fraction suitable for biochemical conversions. |
| Business Models | ReBioGen - Development of policy and community based business model using residual biomass | • The project aims to develop a viable business model supporting the mobilisation and exploitation of Ireland's agri-food, marine, forestry and municipal waste residues for recovery of renewable energy. |

# Appendix III
# Consultative Groups

# Appendix III - Consultative Groups

As mandated in the national bioeconomy policy statement the implementation group will establish a forum and network to liaise with relevant industry bodies within the bioeconomy.

### Bioeconomy Implementation Group

Terms of Reference have been agreed by the implementation group members.

List of Bioeconomy Implementation Group Members: Department /Agency

- Co-chairs
  - Department of Agriculture, Food and the Marine
  - Department of Communications, Climate Action & Environment
- Members
  - Taoiseach
  - Business, Enterprise & Innovation
  - Housing, Planning & Local Government
  - Transport, Tourism & Sport
  - Rural & Community Development
  - Culture, Heritage & the Gaeltacht
  - Finance
  - Public Expenditure & Reform
  - Education & Skills
  - Teagasc
  - Marine Institute
  - EPA
  - Enterprise Ireland
  - Science Foundation Ireland
  - Sustainable Energy Authority of Ireland
  - Bord Iascaigh Mhara
  - National Economic and Social Council

### Bioeconomy Network

- A bioeconomy public-private network was launched at the Bioeconomy Ireland Day 2018 in Lisheen.
- In addition, the implementation group has coordinated with the BEACON Bioeconomy Research Centre and the Irish Bioeconomy Foundation to develop a comprehensive stakeholder network contact list including the civil service, public sector, industry, research and innovation, civil society and relevant stakeholders in Northern Ireland.
- The network will be further developed and fostered by the Beacon Research Centre and Irish Bioeconomy Foundation who will maintain custodianship of the network while the Government will play a steering role.
- The role of the network is as follows:
  - Communication & Awareness Raising
  - Highlight information and events

### Bioeconomy Forum

- A Bioeconomy Forum will be established in Q3 2019.
- This Forum will be a round table discussion to examine the bioeconomy sector in the light of prevailing opportunities and challenges.
  - The forum will form a bioeconomy panel to provide advice and guidance on the policy framework needed for future development of the Bioeconomy.
  - The membership would consist of high level actors within the bioeconomy including the National Bioeconomy Coordinator. It is proposed that the Bioeconomy Implementation Group and the custodians of the Bioeconomy Network would be able to put forward a certain number of nominations.
- Key activities would include:
  - Examine how greater primary producer awareness of the bioeconomy and its products could be built up.
  - Strengthening the development of promising bio-based products and growing the relevant markets for them with specific focus on;
    - Identifying opportunities for use of certification, standards and labels to support market development for bio-based products.
  - Examining whether optimisation of the present innovation system will be sufficient or whether further changes should be considered or proposed to improve sustainability and competiveness of the biobased system with specific focus on:
    - Monitoring the access to funding and finance available at national and EU level as well as provision of private investment and financing.
  - Addressing matters as raised by the Bioeconomy Ireland Day workshop
    - Discontinue activities that do not contribute to the objectives of the NPS in a satisfactory manner

# Appendix IV
# Bioeconomy integration with wider Government policy

# Appendix IV: Bioeconomy integration with wider Government policy

## 1. National Planning Framework – Circular Bioeconomy

While rural and coastal areas have the potential for, and will develop, many types of economic activities, those activities associated with the bioeconomy such as development of new bio-refining technologies represent a competitive advantage. The bioeconomy comprises "the production of renewable biological resources - such as crops, forests, fish, animals, and micro-organisms and the conversion of these resources and waste stream residues, by-products or municipal solid waste into value added products, such as food, feed, bio-based products and bioenergy" (European Commission, 2012). The transition to a more circular economy and bioeconomy, where the value of bio-based products, materials and resources is maintained in the economy for as long as possible, and the generation of waste minimised, will provide an essential contribution to our national goal of developing a sustainable, low carbon, resource efficient and competitive economy.

## 2. Climate Action Plan to Tackle Climate Breakdown

| Action Number | | Timeline | Responsible Body |
|---|---|---|---|
| Promoting Diversification of Land Use, Part of Gradual Transition | | | |
| 117 | National Bioeconomy Implementation Group to examine sectoral coherence, network and awareness raising, research and innovation and the circular bioeconomy potential of harnessing the value from side-streams from both agriculture and forestry | 2019-2020 | DAFM, DCCAE, Bioeconomy Implementation Group, Bioeconomy Forum |
| 124 | Support Regional Assemblies to identify areas of potential growth in the bioeconomy | 2019-2020 | DAFM, DCCAE, Bioeconomy Implementation Group, Bioeconomy Forum |

## 3. Future Jobs Ireland - Ambition 5.3: Leverage enterprise strengths and innovative capacity to be a global leader in the circular and bioeconomy - 2019 Deliverables

- Develop the bioeconomy by
  - Identifying and addressing the key regulatory barriers to development of the bioeconomy, including the definition of waste, and commence delivery of measures to address these.
  - Undertaking awareness campaign to encourage take-up of bioeconomy funding opportunities, including European, private funding and the Project Ireland 2040 Funds.
- Develop Ireland s national bioeconomy infrastructure to promote the bioeconomy including the Marine Innovation Park at Páirc na Mara and the National Bioeconomy Campus at Lisheen.
- Scope the development of a Bioeconomy Innovation Platform to provide specialised Bioeconomy business support services.
- Publish a feasibility study on the establishment of National Marine Biomaterials Repository and, following this, scope out the funding for it.

## 4. Regional Spatial and Economic Strategies:

a. Draft Southern Regional Spatial and Economic Strategy (Draft RSES)

i. RPO 55: National Policy Statement on Bioeconomy: It is an objective to support the National Policy Statement on Bioeconomy (2018) and the exploration of opportunities in the circular resource efficient economy including undertaking a bioeconomy feasibility study for the Region to identify areas of potential growth to inform investment in line with the national transition objective to a low carbon climate resilient and circular economy.

b. Draft Northern & Western Regional Spatial and Economic Strategy (Draft RSES)

i. RPO 53: It is an objective to support the National Policy Statement on Bioeconomy (2018) and the exploration of opportunities in the circular resource efficient economy including undertaking a bioeconomy feasibility study for the Region. This feasibility study will aim to identify (and map) areas of potential growth to inform the National Transition Agenda, enabling a low carbon climate resilient nation.

ii. RPO 54: To support the potential creation of appropriately scaled local multi - feedstock bio-refining hubs across the Region as well as potential creation of bio-districts/clusters.

iii. RPO 55: To support the future proofing of infrastructure planning to allow for the potential upgrading of existing industrial sites to bio-refining plants while also supporting the use of bio/renewable energy for production of bio-based products

c. Draft Eastern & Midlands Regional Spatial and Economic Strategy - Draft RSES

i. RPO 7.33: EMRA supports the National Policy Statement on Bioeconomy (2018) and supports the exploration of opportunities in the circular resource-efficient economy including undertaking a bioeconomy feasibility study for the Region to identify the area of potential growth in the Region to inform investment in line with the national transition objective to a low carbon climate resilient economy.

How can Ireland's Public-Private Bioeconomy Network help you?
Cluster the post-its...
Any emerging themes?
What would enable industry and help you overcome these key barriers and manage risks?
Enablers
Technology
MARKET
MARKET
SAFE
Knowledge
Access.
FIRST
STEP
Complexity
- Policy

# Appendix V
# Action Plan 2019-2020

# Appendix V - Action Plan 2019-2020

| | NPS Key Actions | Actions 2019 | Actions 2020 | Lead/ Lead co-ordinator | Stakeholders |
|---|---|---|---|---|---|
| 1. | Ensure that there is coherence between all sectoral strategies which impact on the bioeconomy in Ireland. | 1.1 Develop with the Beacon SFI Bioeconomy Centre an approach on Sectoral Coherence<br>1.2 Undertake briefing events to deal with areas such as awareness raising, provision of guidance and to assist policy coherence & integration<br>1.3 Coordinate on an ongoing basis with the BEACON Bioeconomy Research Centre to develop the evidence base for consideration of the bioeconomy policy framework<br>1.4 Integrate Bioeconomy Implementation Group, Action Plan & Forum to align with relevant Climate Action, Future Jobs, Project Ireland 2040 and Agri-Food Strategy reporting<br>1.5 Engage in activities to increase funding and finance to aid bioeconomy development and capable bioeconomy companies to validate, scale and demonstrate technologies | 1.6 Liaise with the EU Commission on the EU-wide, internationally coherent monitoring system to track the progress towards a sustainable, circular bioeconomy in Europe and to underpin related policy areas. | DCCAE | Bioeconomy Implementation Group<br><br>Bioeconomy Forum<br><br>BEACON Bioeconomy Research Centre |
| 2. | Establish a network comprised of representatives of commercial entities operating within the bioeconomy and relevant public bodies to inform the future development of the bioeconomy - this network may make additional recommendations to be followed up; (This could also include the sharing of best practice regarding applications for BBIJU, SC-2 and H2020 funding). | 2.1 Develop with the Beacon SFI Bioeconomy Centre and the Irish Bioeconomy Foundation engagement related actions for the bioeconomy public-private network and the management and operation of the www.irishbioeconomy.ie website<br>2.2 Establish the Bioeconomy Forum<br>2.3 Host event to launch the Bioeconomy Report & Action Plan | | DAFM | BEACON Bioeconomy Research Centre<br>Irish Bioeconomy Foundation<br>DCCAE<br>D/Taoiseach |

| | NPS Key Actions | Actions 2019 | Actions 2020 | Lead/ Lead co-ordinator | Stakeholders |
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| 3. | Encourage the translation of research into real world applications through promoting collaboration between research institutions (academia) and industry - through the use of pilots/demonstrations at the model demonstrator facilities (Lisheen site, the Marine Research Cluster in Connemara). | 3.1 Undertake an awareness campaign to encourage take-up of bioeconomy funding opportunities for bioeconomy value chain development and commercialisation exploiting synergies with national and EU funds and instruments and public and private finance<br><br>3.2 Examine the DBEI mapping and analysis report of Circular Economy & Bioeconomy enterprise opportunities and use this as the basis to assess if current policy options in relation to innovation & enterprise policy instruments are suitable or sufficient to address the public sector role in the development of systemic and cross-cutting bioeconomy approaches, business models and new value chains<br><br>3.3 Publish a feasibility study on the establishment of National Marine Biomaterials Repository and, following this, scope out and secure funding. | 3.4 Support Regional Assemblies to undertake bioeconomy feasibility to identify areas of potential growth in the regions<br><br>3.5 Provide research opportunity for foresight analysis to examine Bioeconomy & Low Carbon Growth Opportunities<br><br>3.6 Leverage the development and implementation of a national green public procurement policy (GPP) under Future Jobs Ireland<br><br>3.7 Leverage promotion existing certification, standards and labels and assessing the need for developing new ones for bio-based products and in relation to Environmental Product Declaration under Future Jobs Ireland | DCCAE | Bioeconomy Implementation Group<br><br>Bioeconomy Forum |
| 4. | Assess the current legislative definition of waste and recommend whether a redesignation is necessary for residual waste flows to be successfully managed for use in the bioeconomy. | 4.1 Identify the key regulatory barriers to development of the bioeconomy, including the definition of waste, explore opportunities to establish "End of Waste" criteria for certain bio-wastes and commence delivery of measures to address these barriers. | | DCCAE | Bioeconomy Implementation Group<br><br>Bioeconomy Forum |

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| 5. | Ensure greater sectoral coherence within the bioeconomy through the development of risk assessment and management protocols regarding the use of by-products which encourages the piloting of opportunities. | 5.1 Align with EPA funded projects on selected case studies to examine development of risk assessment and management protocols regarding the use of by-products | 5.2 Pilot and mainstream protocols regarding use of by-products | DCCAE | Bioeconomy Implementation Group<br><br>Bioeconomy Forum |
| 6. | Progress the leading value chain propositions identified in the Bio-Eire project by establishing the conditions required for their commercial viability and how these might be fulfilled. | 6.1 Develop a value chain approach to link biobased actors, value chains and also territories<br><br>6.2 Programme research and knowledge transfer activities to support and promote all types of technical and social innovation and practices for sustainable food and farming systems, forestry and bio-based production | 6.3. Scope out Bioeconomy Innovation Platform that will combine the value chain approach with the BEACON Knowledge Hub to develop a specialised bioeconomy business support service<br><br>6.4 Explore the development of standard requirements and key performance indicators to ensure national funding and financing is used in an appropriate and desirable manner. | DAFM | Bioeconomy Implementation Group<br><br>Bioeconomy Forum |
| 7. | Examine how greater primary producer, public and consumer awareness of the bioeconomy and its products could be built up - through knowledge transfer, advisory, sustainable business models, public procurement, consumer awareness campaigns and product labelling initiatives etc. | 7.1 Use the Citizen Science Initiative and RTE Brainstorm to enable public debate and put forward new perspectives on how bioeconomy can help address a broad range of issues<br><br>7.2 Engage with Vice Presidents for Teaching & Learning to request feedback on how bioeconomy knowledge based on research could be integrated into the third level under graduate and post-graduate curricular activities<br><br>7.3 Develop understanding of primary producer, consumer and citizen perspectives of the bioeconomy | 7.4 Piloting of vocational and higher education curricula, the involvement of social partners and the development of entrepreneurship programmes to contribute to the need for new education and skills<br><br>7.5 Implementation of BEACON education and public engagement programme. | DAFM/ DES | Bioeconomy Implementation Group<br><br>Bioeconomy Forum<br><br>BEACON Bioeconomy Research Centre |

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