

Discussion document for the preparation of a National Policy Statement on the Bioeconomy

Introduction

Developing Ireland's bioeconomy provides opportunities to advance a number of key Government priorities for smart and sustainable growth. These include the sustainable and efficient use of renewable biological resources to contribute to Ireland's transition to a low-carbon economy and the potential for indigenous and inclusive innovation, industrial development, growth and employment, especially in rural areas. Investment in the bioeconomy will also help Ireland meet its national, EU and wider international commitments to environmental protection and sustainable development. Opportunities are also provided through new EU funding platforms for innovation in the bioeconomy, currently under consideration. There are numerous strategies (see appendix annex 1) within sectors that seek to promote aspects of the bioeconomy but the question arises as to whether an overarching policy framework that offers a national perspective on the development of the bioeconomy would help to drive developments in this area.

The opportunities are recognised in the [Action Plan for Jobs](#) and the [Action Plan for Rural Development](#) which committed the Department of the Taoiseach, in consultation with relevant sectoral departments, to assess the potential and conditions necessary for the strategic development of Ireland's bio-economy. An Interdepartmental Group, chaired by the Department of the Taoiseach, was established and includes participation by the Department of Agriculture, Food and the Marine, the Department of Communications, Climate Action and Environment, the Department of Enterprise and Innovation, the Department of Community and Rural Affairs, the Department of Transport, Tourism and Sport and the Department of Education and Skills, was established. An initial scoping exercise was conducted with Departments and reporting agencies to gather information on current State-supported activities and potential opportunities in the area (the findings of this scoping exercise are summarised in annex 2).

A Department of the Taoiseach and Teagasc hosted workshop in February involved wider engagement on the development of the bioeconomy. The workshop brought together key stakeholders including representatives from Departments, Agencies, Industry, Academia and Representative Bodies from a wide range of sectors. The outcome of the workshop was

presented to the Interdepartmental Group and has informed the development of this discussion document. Key points from the workshop include the need for: deeper integration and supports; cooperation between sectors; prioritising areas where Ireland is at an advantage; strategic assessment of supply and demand for products and materials; ensuring Ireland has the technology to be world leaders; a "top down" approach and State coordination; collaboration within the research industry to fast track actions on ideas; demonstrating the profitability of key areas of the bioeconomy; social inclusion and rural development (see the presentation on outcomes of the workshop in annex 3).

This discussion document examines the issues to be addressed in the development of a national policy statement. Interested parties are invited to contribute to the discussion. Responses to the public consultation will be published. Following public consultation a draft national policy statement will be prepared for presentation to Government.

1. What is the bioeconomy?

There are many definitions of the bioeconomy concept which in turn influence the language used and sectors and disciplines engaged. In broad terms the bioeconomy is perceived to comprise those parts of the economy that use renewable biological resources from land and sea to produce food, feed, biomaterials, chemicals, pulp and paper, energy and fuels. Biological resources include crops, forests, fish, animals and their by-products, micro-organisms and also industrial feedstock resources such as municipal solid waste and wastewater.

The FungusChain project is an example of a bioeconomy project to valorise mushroom offcuts to obtain high value products. The project is a public-private partnership involving the EU Bio-based Industries Joint Undertaking and a number of companies, including in Ireland. The project processes mushroom offcuts into bio-based functional additives and biopolymers using a cascading approach to separate the valuable components. It also seeks to demonstrate industrial viability by building a new bio-refinery and modifying current manufacturing lines. The bio-molecules and building blocks isolated from the mushroom wastes are used in food supplements, plastic products and industrial film products such as bags and gloves.

The bioeconomy has strong innovation potential due to its application of wide range of sciences (life sciences, agronomy, ecology, food science and social sciences), enabling and

industrial technologies (biotechnology, nanotechnology, information and communication technologies and engineering), and local knowledge.

The European Commission's definition focuses on the objectives of a bio-based economy, namely:

- address food security and promote sustainable production of renewable resources from land, fisheries and aquaculture and their conversion into food, feed, fibre, bio-based products and bio-energy;
- manage natural resource scarcity;
- reduce the dependence on fossil fuel resources;
- mitigate and adapt to climate change;
- transform manufacturing and grow new jobs and industries.



Does the broad definition outlined above adequately encompass the opportunities presented by the bioeconomy?

2. Benefits of the bioeconomy

The opportunities presented by the bioeconomy are recognised in the Action Plan for Jobs and the Action Plan for Rural Development. They include:

- Reducing carbon emissions and ensuring more efficient resource and land-use, to support the transition to a low-carbon economy and sustainable primary production;
- Indigenous economic development, exports and job creation, including in rural areas;
- Promotion of an indigenous sector in a post-Brexit environment;
- Reducing our dependency on natural resources and imported materials;
- Leveraging the skills and process in existing research and technology sectors;
- Developing our skills base and creating high-skilled engineering and science jobs;
- Contributing to global food security through the avoidance of competition between food and non-food use of bio-mass.

The bio-economy also provides considerable return on investment. In 2012, the European Commission [estimated](#) that Europe's bioeconomy has €2 trillion in annual turnover, employs 22 million and that each euro invested generates up to ten euros of added value.

3. What is the bioeconomy in Ireland?

Ireland has numerous renewable biological resources with the potential for the creation of high value products. These include agricultural products and by-products, food residues and processing side streams, forestry and forestry by-products, municipal and industrial waste, waste water and marine and marine by-product resources. Our largest indigenous industry, the agri-food sector, provides significant co-processing streams in the food and beverage industries. In terms of marine resources, Ireland has rich resources in one of the largest sea beds in Europe ([10 times our landmass](#)). Ireland, given its pharmaceutical, information technology and research and development capabilities, should seek to achieve competitive advantage by advancing bioeconomic activity.

The scoping exercise conducted by the Interdepartmental Group captured current State-backed activities and potential opportunities in this area. Responses were received from the Department of Jobs, Enterprise and Innovation (including IDA, Enterprise Ireland and Science Foundation Ireland), the Department of Communications, Climate Action and the Environment (including EPA), the Department of Transport, Tourism and Sport and the Department of Agriculture, Food and the Marine (including Teagasc, Coillte, Marine Institute and Bord Iascaigh Mhara Fisheries). Departments highlighted a total of 83 existing or anticipated measures covering research, applied science and engineering projects, policy initiatives, awareness programmes and infrastructural investments. The primary focus of measures was on rural development, the valorisation of marine discard and agricultural waste and the production of bio-energy from biomass/biogas. Key funding is directly from the exchequer and the Horizon 2020 programme, Science Foundation Ireland and the Environmental Protection Agency.

Over the past two years, the Department of Agriculture, Food and the Marine funded BioÉire project, led by Teagasc, has focused on identifying and prioritising interlinking value chains in the bioeconomy. The connections between value chains and how they impact each other was analysed. The BioÉire results were presented at the Teagasc Research Centre on 20 March 2017 and to the Interdepartmental Group on 28 March 2017. The value chains identified the need in the short and medium term to focus on the exploitation of agricultural, marine and forestry resources through the valorisation of waste streams and the production of biomaterials, biochemicals and bio-energy. Value chains with significant short term potential were identified as the use of dairy side streams for new food products and the use of

agricultural waste for bio-energy production. Other promising value chains identified include the use of: horticultural by-products for feedstock for biomaterials; marine discard for animal feed; extracted protein/bioactives from marine discard for functional food applications; forestry resources in decentralised heat generation; recovered vegetable oil for biofuels; sugar-yielding feedstock for production of biochemicals; and seaweed for nutrition, healthcare, cosmetic and energy applications.

The BioÉire project emphasised the use of the cascading principle whereby higher value applications are preferentially derived from biological resources (eg. food, biochemicals, biomaterials) prior to their use in energy generation. The BioÉire project also highlighted a number of concerns in the bioeconomy, namely the issues of: sufficient scale, international competition, economic/technological feasibility, market availability, consumer acceptance, legislation/regulation impediments, environmental sustainability, the prevalence of robust supply chains, industry fragmentation and competition with food production. A link is included here to the [BioÉire findings](#).

Other studies also offer useful starting points, such as the [ReNew InterReg Project](#) (bringing together researchers, public authorities, and businesses in North-West Europe to explore new ways to extract valuable resources from household and industrial waste), the [Marine Biotechnology Taskforce Report](#) and the [Donegal Case Study](#). At a Europe-wide level, the [Strategic Research Agenda of the Biobased Industries Consortium](#) provides a useful benchmark.



How can a high-level policy statement on the bioeconomy assist in progressing the development of the priority value chains identified?

4. What existing strategies shape the Irish bioeconomy?

In recent years a number of sector focussed strategies relating to the bioeconomy have been developed and published. These sectors include agriculture and food, forestry, marine, waste, energy and the Green and Circular Economies (list included below in annex 1).

5. Approach at European level

Launched and adopted in February 2012, [Europe's bioeconomy strategy](#) addresses the production of renewable biological resources and their conversion into food, feed, biomaterials, bio-chemicals energy and fuels. Under the lead of Directorate-General (DG) Research and Innovation, the strategy was co-signed by several other Commission directorates namely DG Agriculture and Rural Development, DG Environment, DG Maritime Affairs, and DG Industry and Entrepreneurship. The Department of Agriculture, Food and the Marine is the lead Irish department in relation to the strategy.

The main purpose of the EU Strategy is to streamline existing policy approaches in this area. It is structured around three pillars, namely (i) investment in research, innovation and skills, (ii) development of markets and competitiveness and (iii) reinforced policy coordination and stakeholder engagement. The strategy identified opportunities to drive tangible improvements in Europe's social, economic and environmental welfare. It is currently being assessed, with a view to the preparation of Council Conclusions early in 2018. Key European programmes that support the bioeconomy include Horizon 2020 and in particular Societal Challenge 2, the Biobased Industries Joint Undertaking and the European Innovative Partnerships funding for rural development.

Under [Horizon 2020](#) the [Biobased Industries Joint Undertaking](#) (BBI JU) is a public private partnership between the EU and the Bio-based Industries Consortium. The objective of the BBI JU is to implement a programme of research actions to assess the availability of renewable biological resources and innovation activities including piloting, demonstration and flagship and the development of new bio-refining technologies to sustainably transform these resources into bio-based products, materials and fuels.

In June 2017, the European Investment Bank published a [study](#) reviewing the access-to-finance conditions for Bio-based Industries and the Blue Economy and proposed potential solutions (including a supportive regulatory framework, increased awareness of funding opportunities, the development of a risk-sharing financial instrument and greater information sharing between stakeholders) to catalyse investment. The [European Investment Fund](#) aims to de-risk investment in the bioeconomy and support high level innovation in the space.

A growing number of European and other countries recognise the importance of the bioeconomy. Denmark, Finland, Germany, Italy and the Netherlands are among the Member States to have developed national strategies.

The Circular Economy

The bioeconomy is frequently identified as the biological element of the circular economy. In December 2015 the Commission adopted an ambitious [Circular Economy Package](#) including legislative proposals on waste with recycling and landfill reduction targets, and a detailed Action Plan of measures to undertake by the end of its mandate, 2019. The Circular Economy Package aims to boost competitiveness, foster sustainable economic growth and generate new jobs by helping businesses and consumers to make the transition to a stronger and more circular economy where resources are used in a more sustainable way.

The proposed actions seek to contribute to "closing the loop" of product lifecycles through greater recycling and re-use, and bring benefits for both the environment and the economy. The plans will extract the maximum value and use from all raw materials, products and waste, fostering energy savings and reducing greenhouse gas emissions. The proposals cover the full lifecycle from production to consumption, repair and remanufacturing, waste management, investment and secondary raw materials that are fed back into the economy.

The EU Circular Economy Package in relation to bio-based material, such as wood, crops or fibres which can be used for a wide range of products and energy uses, addresses how, apart from providing an alternative to fossil-based products, bio-based materials are also renewable, biodegradable and compostable. At the same time, using biological resources requires attention to their lifecycle, environmental impacts and sustainable sourcing. In the circular economy package, a cascading use of renewable resources is encouraged together with its innovative potential for new materials, chemicals and processes. To address this the Commission is promoting an efficient use of bio-based resources through a series of measures, such as guidance and dissemination of best practices of the cascading use of biomass and support to innovation in the bioeconomy.



What lessons can Ireland take from the European approach, including to the Circular Economy?

Role of a national policy statement

6. Objective

There are numerous strategies within sectors that seek to promote aspects of the bioeconomy, but an overarching policy framework has the potential to offer a holistic national perspective on the development of the bioeconomy. The bioeconomy does not fall under the responsibility of a single department or agency. A high-level national policy statement would provide a clear political commitment, vision and framework within which to guide the development of the bioeconomy, to best capitalise on opportunities across multiple sectors and disciplines. It should establish Ireland's ambition to be a global leader for the bioeconomy, through a strategic orientation that harnesses Ireland's natural resources and competitive advantages. It should be based on a clear identification of local and global societal challenges and on a sound evidence base.

The development of such a statement should forge consensus on the direction of the Irish bioeconomy. It should complement existing sectoral strategies and be a statement of the Government's intent to pursue a coordinated strategic approach that fully exploits the opportunities available and monitors and avoids unintended consequences. It should examine and establish guiding principles tailored to an Irish context and bring forward proposed structures for strategic coordination and implementation.

There are risks in not developing a national position. These include: a lack of coordination and direction; disintegration and failure to pursue inter-sector opportunities; the risk of developments only being governed by markets and technologies; the risk of negative competition between food supply and biomass production; and the risk of over-exploitation and loss of biodiversity. It is worth recalling the cross-sector nature of the priority value chains to emerge from the BioÉire project, as referred to in Section 3.



Given the cross-sector nature of the bioeconomy, how can a national policy statement best support development?

7. Establish common principles

Common and fundamental principles should guide the development of the bioeconomy in a sustainable and efficient manner. Established international principles include food first, the

precautionary principle and a cascading approach to the extraction of value from biomass and reuse of materials. A key principle underpinning the making available of waste for energy is to ensure that material which could be reused or recycled is not fed into the waste hierarchy and that waste generation is not encouraged in order to feed energy recovery processes.

Environmental sustainability is an integral, core principle of the bioeconomy and products developed must be sustainable. Sustainability cannot however be assumed. Feasibility assessments should include environmental and social feasibility. The national commitment to environmental protection and sustainable development will be critical in the development of a national policy statement.



Can we identify a common set of principles, including in particular the application of the cascading principle, which will assist in the development of both the bioeconomy and circular economy?

8. Identify the actions needed to pursue opportunities

The national policy statement provides an opportunity to identify a framework of actions at sector level to support the development of the bioeconomy. These might include reviewing the State's approach to waste, to ensure barriers to the development of the bioeconomy are identified and addressed. It could also look at the State's ability to influence 'market pull factors', including the potential role of public procurement.

The national policy statement might also address potential roles for the State in establishing synergies and complementarities within the bioeconomy and circular economy and between sectors. It should encourage shared learning and collaboration and recognise the importance of developing cross-sectoral clusters in research and industry. A mapping exercise that compares and cross-references the various sectoral strategies might identify shared interests, priorities and gaps across sectors.

Issues that surfaced in the BioEire project include the definition of waste and regulatory issues. Examples considered in the BioEire project may aid the consultation process. The National Economic and Social Council (NESC) report ['Moving Towards the Circular Economy in Ireland'](#) illustrates many of the same principles highlighted by the BioEire project including the critical importance of regulation (most importantly regulation regarding

the definition of waste), the fact that many companies in Ireland are already active in the circular and bioeconomies, and that the circular economy involves firms across multiple sectors.

Regulatory matters explored by the Department of Agriculture, Food and the Marine with industry in relation to use of animal by-products for further valorisation as opposed to being considered as waste highlight the type of regulatory challenges and efforts made to overcome regulatory barriers. For example, it may need to be considered if there are regulatory issues in relation to processing and extraction technologies or in relation to processing effluent. In addition, land and sea use and change will need to be considered carefully to ensure protected areas, high nature value areas and the provision of multi-functional use of productive agricultural, sea and forest areas are maintained as required under regulatory regimes.

Work is ongoing to develop a suitable initiative on food waste. Initiatives with [Bord Bia's Origin Green programme](#) are planned to tackle food waste in the production sector. There is scope to consider biorefining as an option in relation to unavoidable food waste.

Coordination at regional and local levels will be critical to the development of the bioeconomy. The national policy statement might consider frameworks for engagement with local authorities to promote bioeconomy developments and influence local economic planning and development and the local action plans for jobs. For example, Tipperary County Council successfully brought together stakeholders from universities, industry and Government, to be designated a European model demonstrator region for the bioeconomy. It is one of six such regions receiving support from the European Commission to show the way towards sustainable chemical production in Europe by taking advantage of domestically available feedstock such as biomass or waste.



How can a national policy statement support local and regional cooperation around the use of renewable biological resources?



How can waste policy, including an examination of the definition of waste, best support developments in the bio and wider circular economy?

Ireland has a very strong cluster of global leaders in the pharmaceutical industry in manufacturing, process development and high-value services. An exemplary regulatory compliance record, strong government support for research and development and zero defect biopharmaceutical manufacturing excellence have driven this recent wave of investment in new Biotechnology facilities. Co-creation processes with the necessary multi-actor teams to identify opportunities could be established. This engagement of the biobased stakeholders and the biopharmaceutical industry with the knowledge and innovation systems may spur activity.

In addition, there are numerous market pull levers that could be considered to stimulate market demand for bioeconomy products. These could include targets, public procurement (for example [Green Tenders](#) is a Government Action Plan to assist public authorities plan and implement green public procurement best-practice), labelling and increased public awareness. Consumers and citizens need to be consulted and informed as regards a bioeconomy. Consumer demand will ultimately determine the success of biobased products. Information should examine benefits, behaviour, jobs and educational opportunities. Additionally, business to customer needs could be explored through coherent market development strategies carried out at all levels of the system from the transnational down to the local level.

This is not an exhaustive list of potential actions. It is hoped that others will emerge through public consultation and in the development and implementation of the national policy statement.



How can we stimulate market demand for bioeconomy products? What is in it for the consumer?

9. Support and monitor progress

The national policy statement should also set out the structural framework to oversee sectoral implementation and guide the long-term development of the Bioeconomy. It should also point to a framework for implementation at sectoral level developed through the Action Plan on Rural Development.



What is the most appropriate mechanism to coordinate development and monitor progress?

10. Next steps

This discussion document has been published on the web site of the Department of the Taoiseach.

Interested parties are invited to provide submissions by e-mail or post to the Department of the Taoiseach by **Friday, 15 September 2017**, at the latest.

E-mail address: bioeconomy@taoiseach.gov.ie

Postal address:

Bioeconomy Consultation,
Department of the Taoiseach,
Government Buildings,
Upper Merrion Street,
Dublin 2,
D02 R583

Submissions are subject to Freedom of Information legislation and will be published.

Department of the Taoiseach

27 July 2017

Summary of Questions

This public consultation is intended to provide an opportunity for input into the creation of a national policy statement on the bioeconomy in Ireland. The intention is to provide an overarching policy framework that offers a national perspective and drives developments. Questions are posed below to stimulate the discussion around the bioeconomy. Please note that all relevant submissions and comments submitted to the Department of the Taoiseach for this consultation will be placed on the Department's website.

- 1. Does the broad definition outlined adequately encompass the opportunities presented by the bioeconomy?*
- 2. How can a high-level policy statement on the bioeconomy assist in progressing the development of the priority value chains identified?*
- 3. What lessons can Ireland take from the European approach, including to the Circular Economy?*
- 4. Given the cross-sector nature of the bioeconomy, how can a national policy statement best support development?*
- 5. Can we identify a common set of principles, including in particular the application of the cascading principle, which will assist in the development of both the bioeconomy and circular economy?*
- 6. How can a national policy statement support local and regional cooperation around the use of renewable biological resources?*
- 7. How can waste policy, including an examination of the definition of waste, best support developments in the bio and wider circular economy?*
- 8. How can we stimulate market demand for bioeconomy products? What is in it for the consumer?*
- 9. What is the most appropriate mechanism to coordinate development and monitor progress?*
- 10. Are there any other issues to be addressed through a national policy statement?*

Annex 1: Sector strategies relating to the bioeconomy

- [7th EU Environment Action Programme](#)
- [A Resource Opportunity: Waste Management in Ireland \(2012\)](#)
- [Access-to-finance conditions for Investments in Bio-Based Industries and the Blue Economy](#) (June 2017)
- [Agriculture and bioeconomy: Unlocking production potential in a sustainable and resource-efficient way](#) – EIB (June 2017)
- [Climate Action at a National level](#)
- [Coillte Sustainability Report](#) (2013)
- [Crè Guide to Composting and Anaerobic Digestion](#) - 2017
- [Draft Bioenergy Plan](#)
- [FoodWise 2025](#)
- [Forestry State Aid Programme](#) 2014-2020
- Forests, products and People, Ireland's Forest Policy – [A Renewed Vision](#) – Department of Agriculture, Food and the Marine (June 2013)
- Government Green Policy Statement – [Delivering our Green Potential](#)
- [Green Procurement Guidance for the Public Sector](#) – EPA 2014
- [Harvesting Our Ocean Wealth](#) - An Integrated Marine Plan for Ireland
- [Innovation and Excellence Pharma Chemical Ireland Strategic Plan](#) (2009)
- [Ireland's National Renewable Energy Action Plan \(NREAP\)](#)
- [Irish Rural Development Plan](#) 2014-2020
- [Irish Seafood Programme](#) 2014-2020
- [National Clean Air Strategy](#)
- National Treasury Management Agency: [Ireland Strategic Investment Fund Investment Strategy](#) (2015)

- [Ocean Energy in Ireland](#) (2005)
- [Offshore Renewable Energy Development Plan 2014](#)
- Origin Green [Working with Nature Sustainability Charter](#) (2014)
- Our Sustainable Future: [A Framework for Sustainable Development for Ireland](#) - 2012
- [Renewable Energy Target 2020](#)
- [Teagasc Technology Foresight 2035](#)
- [The Next Production Revolution](#): Implications for Governments and Business – Chapter 3: Bioproduction and the bioeconomy - OECD Report (May 2017)
- [Transport & Biofuels](#)
- [United Nations “Transforming our world: the 2030 Agenda for Sustainable Development”](#)

- **Annex 2:**

Bio-economy Scoping Exercise

Relevant policies and initiatives coming under the: Department of Jobs, Enterprise and Innovation (including IDA, EI and SFI); Department of Communications, Climate Action and the Environment (including EPA); Department of Transport, Tourism and Sport; Department of Agriculture, Food and the Marine (including Teagasc, Coillte, Marine Institute and Bord Iascaigh Mhara Fisheries)

1. Department of Jobs, Enterprise and Innovation

IDA	<ul style="list-style-type: none"> • Red Biotech Manufacturing incentivised with IDA Supports (Grants include: Capital, Employment, R&D & Training)
Enterprise Ireland	<ul style="list-style-type: none"> • Biomass Cluster • Smart Grid Cluster • Rushlight Awards • Marine Cluster • Agriforvalor
Science Foundation Ireland	<ul style="list-style-type: none"> • Research Centres • Investigators Programme • Research Professorship

2. Department of Communications, Climate Action and the Environment

DCCAE	<ul style="list-style-type: none"> • National Waste Policy • “tccb RESOURCE” Research Programme • Biofuels Obligation Scheme (BOS) • REFIT (Renewable Energy Feed-In Tariff) Schemes • Renewable Heat Incentive • Renewable Electricity Support Scheme • Energy Research, Development and Demonstration (RD&D) operated by Sustainable Energy Authority of
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	<p>Ireland (SEAI)</p> <ul style="list-style-type: none"> • Bioenergy Plan
<p>Environmental Protection Agency</p>	<ul style="list-style-type: none"> • The role of incentivisation in the development of biomethane production, using anaerobic digestion (AD). • Phosphorus from wastewater: Novel technologies for advanced treatment and re-use • Heavy-metal recovery from industrial waste with Biosorbent Mesoporous materials (BioMes) • Biodegradable Ionic Liquids • Potential for Negative Emissions Technology in Ireland • Feasibility study assessing use of diatoms as bio-indicators and potential decontaminants of polymeric nanomaterials • Novel Eco-sensitive Wastewater Treatment Recovering dairy Industry Effluent NuTrientS (NEWTRIENTS) • Fungal biofilm as a novel biocatalyst for production of important pharmaceutical compounds • Valorisation of composted organic fines and sewage sludge using pyrolysis. “OF-PYR” • Thermodynamic modelling of energy recovery options from digestate at waste water treatment plants • Agrichar : Reduction of pollutants and nutrient loss in slurry and silage in cattle farming • Improved Treatment of Distillery Wastes • Incorporation of Ecosystem Services values in the Integrated Management of Irish Freshwater Resources – ESManage • Stopping Antibiotic Resistance Evolution in the Environment (StARE) • Valuing the significant ecosystem services provided by Irish coastal, marine and estuarine habitats

	<ul style="list-style-type: none"> • POLLIVAL: assessing market and non-market values of pollination services in Ireland • Reducing Commercial Food Waste in Ireland
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3. Department of Transport, Tourism and Sport

DTTAS	<ul style="list-style-type: none"> • Green Public Transport Fund
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4. Department of Agriculture, Food and the Marine

<p>DAFM</p> <p>(Including Teagasc, Coillte, Marine Institute and Bord Iascaigh Mhara)</p>	<ul style="list-style-type: none"> • FoodWise 2025 • National and EU Research & Innovation Programmes, measures and grant schemes for Food, Forestry & Primary Production • Irish Rural Development Programme • Irish Seafood Programme • Forests, Products and People - Ireland's Forest Policy - a renewed vision • State aid funding (100%) Forestry Programme for the period 2014 – 2020 • DAFM Climate Change & Bioenergy Division (CCBPD) • DAFM Meat & Milk Policy Division • Biodiversity • BioÉire: a bioeconomy for Ireland – strategic opportunities for Ireland and support frameworks (DAFM) • CommBebiz – Communicating and Bridging Bioeconomy Research to Business (H2020) • ReValueProtein – valorising supply streams (DAFM) • BioOpps – valorising meat co-processing supply streams (DAFM)
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	<ul style="list-style-type: none"> • Energy crop research – developing biomass production systems • Adding value to marine co-processing streams • CASA: development of bioeconomy research agenda (SCAR coordination and support action, H2020) • Agroforvalor (H2020)–identifying new value chains and developing pilot hub sites • Sustainable production of next generation biofuels from waste streams (Waste2fuel) • ForestOwn – influencing supply of forestry biomass by private forest owners • Grass 10T- increasing potential feedstock supplies • Ongoing Forestry Advisory Service (increasing quantity and quality of forestry feedstock) • Proposed forestry promotion campaign to support expansion of forestry • Grange Biogas Plant • Biomass CHP • Harnessing Our Ocean Wealth – Ireland’s Integrated Maritime Policy • European Maritime & Fisheries Fund - Blue Growth and Marine Spatial Planning Scheme • Marine Development Team • Policy Innovation and Research Support (PIRS) – Marine Research Measure • Fisheries Ecosystems Advisory Services (FEAS) – Stock Assessment • European Maritime and Fisheries Fund - Fisheries Ecosystems Advisory Services (FEAS) – Natura and Environmental legislation compliance programme • Marine Environment and Food Safety Services (MEFS) – Shellfish Monitoring Programme
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	<ul style="list-style-type: none"> • Marine Environment and Food Safety Services (MEFS) – National Residues monitoring and Contaminants in seafood programme • Coillte leading a COFORD working group on forestry and the bio-economy • Projects funded under Sustainable Fisheries Scheme which is a funding programme under the Euorepan Maritime and Fisheries Fund • Pelagic: - <ul style="list-style-type: none"> ➤ Capturing additional value from blood water waste streams in pelagic processing facilities ➤ Clean-label techno-functional ingredients from pelagic fish species • Developing a centre for the broader Maritime area (seafood, marine tourism, offshore/renewables) • BIM’s Processing and Business Development Schemes provide funding support to industry for capital investment, scaling, market development and progressing innovation • Crab Waste / By Product • Anaerobic Digestion • Food Hereos Interreg NWE Project • Biobase Industries Joint Undertaking Public Private Partnerships (BBI) • Horizon 2020 • EU Commission DG Environnement Eco- Innovation Award • EU Commission DG GROW award
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- **Annex 3: Presentation on outcomes of the workshop included overleaf.**

Facilitator's Summary of Workshop on Enabling Ireland's Bioeconomy

Teagasc in collaboration with the
Department of the Taoiseach

Design Thinking Workshop on
Enabling Ireland's Bioeconomy



INTRODUCTION

Teagasc in collaboration with the **Department of the Taoiseach** convened a design thinking workshop on future opportunities for the **Irish bioeconomy** in February 2017.

To set the context, presentations were given by: **George Burke**, Department of the Taoiseach, **Prof Kevin O'Connor**, UCD Earth Institute, **Dr Maeve Henchion**, Teagasc and **Dr Laura Devaney**, BioÉire on bioeconomy visions, understandings and inspirations.

The workshop was attended by **58 participants** invited by Teagasc from diverse research, policy, and industry sectors. The workshop was facilitated by an MCO team led by Eve-Anne Cullinan, and this is the facilitator's summary of **conversations shared on the day and synthesis of worksheets completed by participants** who worked in teams. Voluntary table hosts kindly shared key points with the full group, also captured herein as ideas for action.

The purpose of this **Summary of Workshop** is to share with all participants the insights and views expressed on the day, and to inform future consultation.

**Introduction -
George Burke
Department of the
Taoiseach**

Need for a "Bio-economy" definition appropriate in the Irish context

Inter-Departmental group established to enable future opportunities

Potential scope for alignment of existing funding streams?

Sustainable Economy, Bio-Economy, and Circular Economy – are we talking about the same thing?

Strategic fit with low carbon transition and rural development policy contexts

MCO Connected Thought. Channel Action.

3

Presentations

Prof Kevin O'Connor, UCD Earth Institute
A European Perspective

Dr Maeve Henchion, Teagasc
*An Irish bioeconomy definition:
academic and international perspectives*

Dr Laura Devaney, BioÉire
*Bioeconomy visions, understandings
and inspirations*

Note: Copy of presentations also issued to participants



Workshop Process.

58 Participants
from diverse
sectors

Positive and
proactive
engagement

Conversations
shared and
synthesis of
findings



Thank You Volunteer Table Hosts!

Wayne Anderson
Patrick Barrett
Laura Devaney
Phil Hemmingway
Maeve Henchion
Declan Troy



WHY?

Unlocking an opportunity

Co-create a shared vision and a collaborative approach to creating the right conditions for a **successful Irish bioeconomy**, unlocking potential opportunities across diverse sectors including agriculture, food, forestry, marine, and energy.



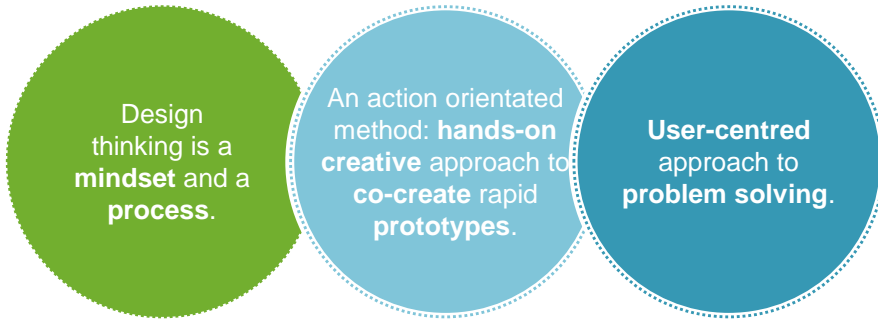
WHO?

Stakeholders from industry, agencies and research including:



HOW?

Using a design thinking approach ...



WHAT?

Capturing the key message

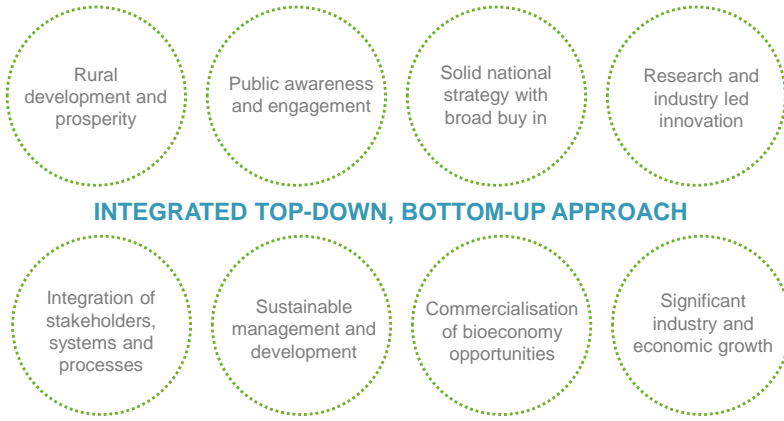
Diverse perspectives, common themes

The bioeconomy represents a significant opportunity for **economic growth** and improved **sustainability**, but there is a need for **leadership**, **coordination**, and evidence-based solutions for some **market and policy barriers** identified.



BIG PICTURE?

Visualising future success



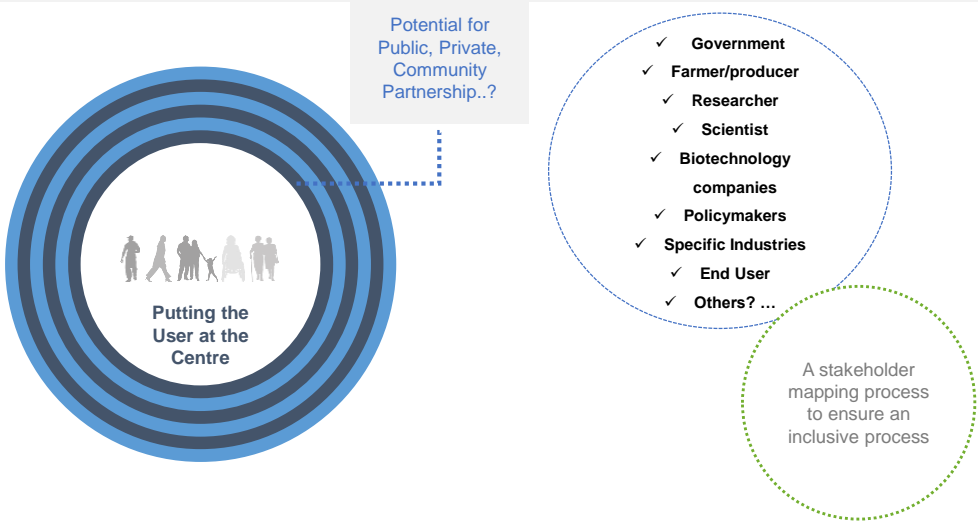
KEY CHALLENGES?

How to create the right conditions for the success envisioned from a **user centred** perspective



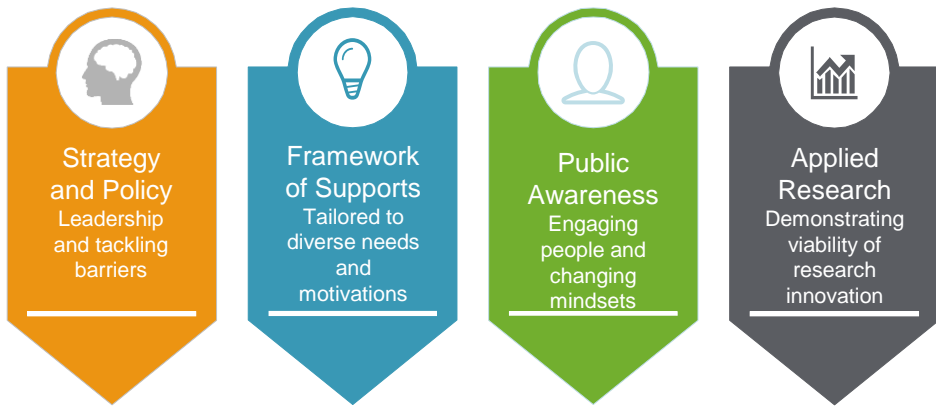
Understanding some user centred and value-chain opportunities.

Stakeholders identified by participants who can potentially provide input to all scenarios across the 6 challenges ... from diverse sectors



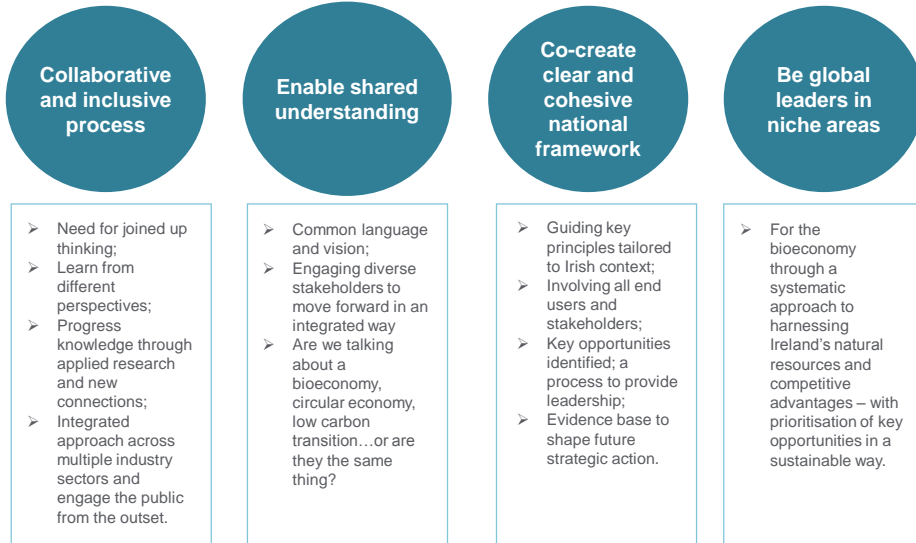
WHAT'S NEXT?

To enable the success envisioned

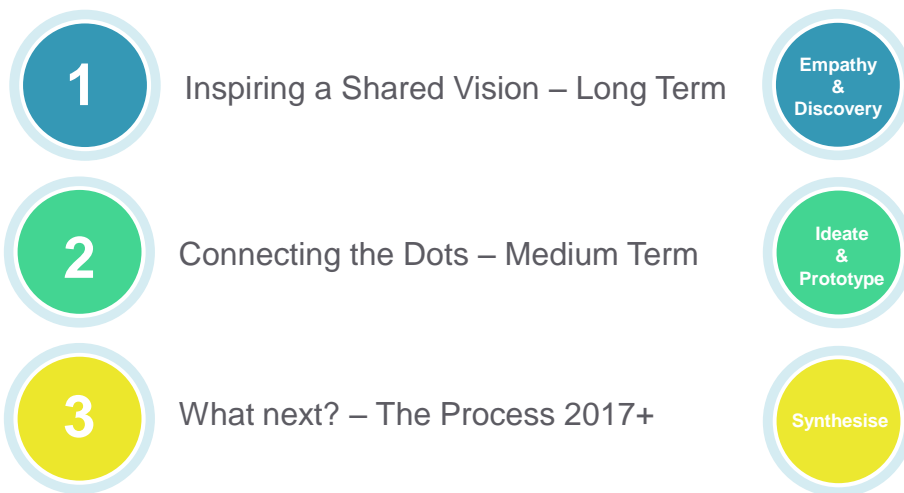


Addressing the shared challenges

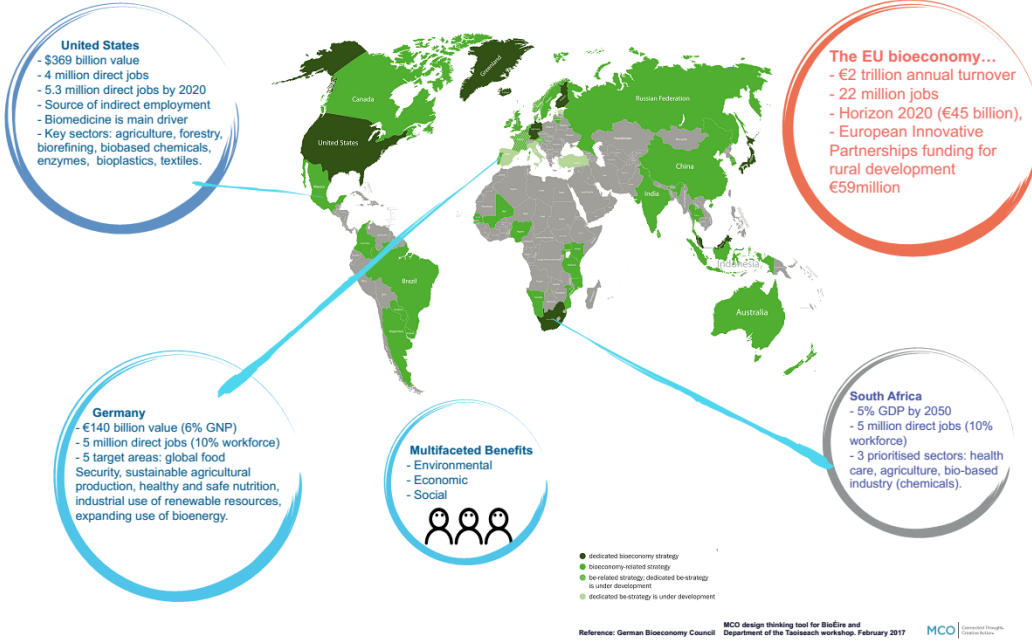
Snapshot of Key Messages for Action



Workshop Flow



The Big Picture : Ireland At The Forefront ... ?

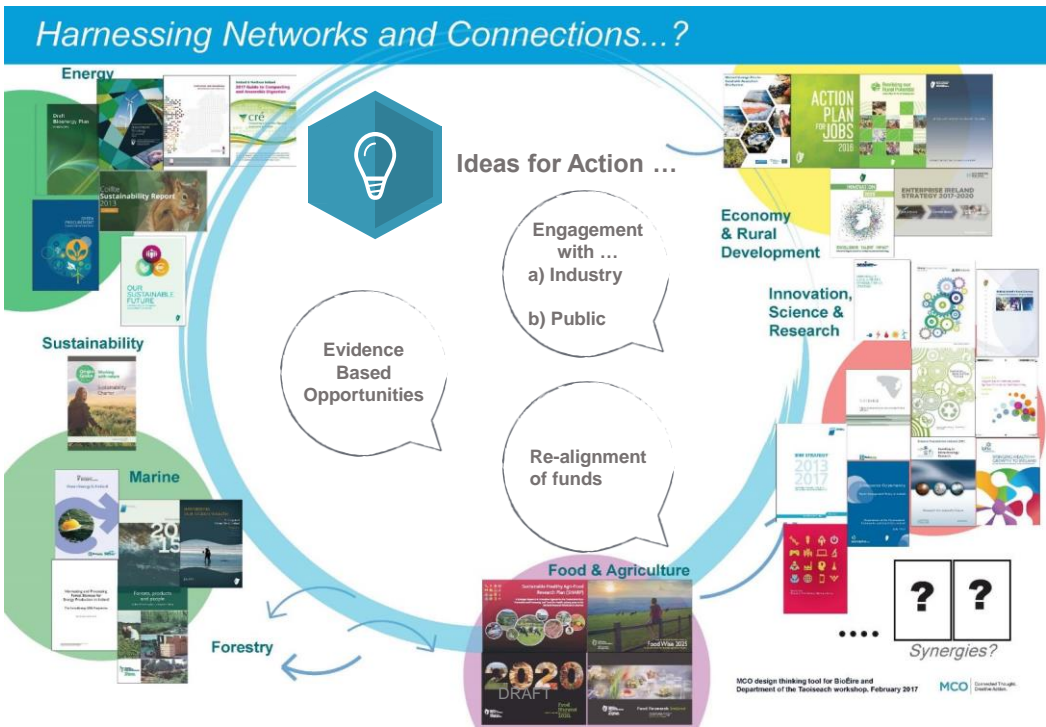
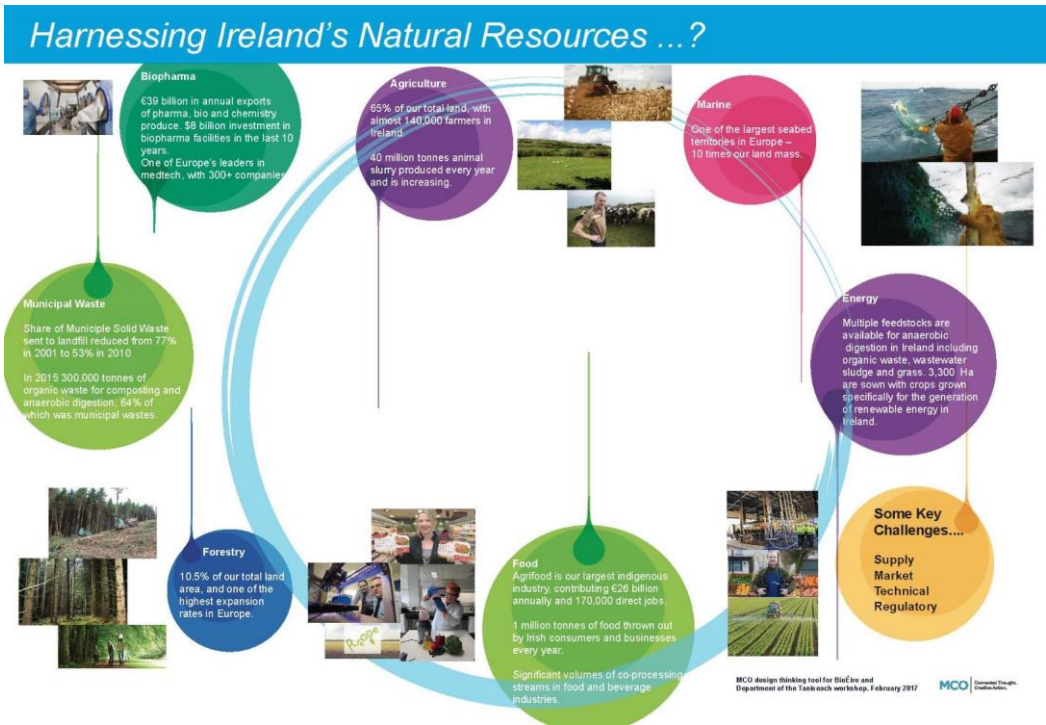


Common Opportunities and Motivations?



Common language ...

Wordle of the most frequent words or phrases from points on team worksheets



RAPID PROTOTYPE ACTIONS

How to create the right conditions for the success envisioned from a **user centred** perspective



Understanding some user centred and value-chain opportunities.

**Persona:
CONSUMER**

CHALLENGE 5: "I'm interested in sustainability and living in harmony with our natural resources. I see new bio-based products on the shelves. This interests me because I hear they're better for our environment. It looks like some bio-based products may be more expensive and I am a bit concerned that some food products may also derive from waste origins. I would be worried about the health risks and want to be sure before I buy."

What does the consumer need to make this happen?

- **Active role in the process of understanding the bioeconomy** – shaping the communication and two-way dialogue with the consumer as part of the system
- **Standardisation and transparency of information to enable decision making** – regarding products, processing, and environmental impact.
- **Products** need to be accessible and affordable
- **Provenance** of local products evident
- Diversity of offer that communicates linkages to local economic benefits

What existing supports can be harnessed? *Synergies? Gaps? Barriers?*

- Link with **sustainability**
- Data analytics to be integrated with supports
- **Support:** Embed into community development networks
- **Synergy:** Existing labelling schemes standards – e.g. Origin Green
- **Synergy:** Education systems – green schools (bioeconomy and circular economy)
- **Gap:** lack of critical mass
- **Gap:** Redirection of support/finance/ investment
- Review existing green procurement policy

Who needs to connect to create the right conditions to unlock potential?

- **Consumer groups**
- **Consumers and producers**
- **Suppliers – producers – regulators**
- **Multi-disciplinary** collaboration - bringing in designers, innovators, and entrepreneurs to create products.
- **Industrial symbiosis** and circular economy
- Mindful of how it is framed – proactive in engaging with the media

What are the ideas for action?

- Forming an **integrated policy framework** – cross sector coherence
- Looking at **how we define waste** – working on residue being perceived as a by-product, not waste.
- **Leverage EU monies** – consolidating and integrating in order to overcome fragmentation.
- Develop brands
- **Embed circularity** through the bioeconomy
- Developing alternative new routes to market
- Stronger enforcement of existing legislation

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Image source: Pinterest (2017)

22

**Persona:
LARGE
INDUSTRY
CEO**

CHALLENGE 2: "I'm a CEO of a large multi-national company interested in developing a bio-refining plant in the south west. I want to connect with a reliable supply chain and secure capital investment for bio-based products and services."

**Ideate
&
Prototype**

What does the CEO need to make this happen?

- A **supportive regulatory environment**
- Access to a reliable and viable **supply chain**
- National and local **buy-in: public and political engagement** early on and at a sufficient scale
- **Enabling infrastructural environment** - logistics support
- **Capital** - grant aid & low cost financing
- Viable business case
- **Technical expertise** and workforce

**What existing supports can be harnessed?
Synergies? Gaps? Barriers?**

- **Synergy:** knowledge institutions (research)
- Construction of plant to unlock synergy with engineering fields
- **Synergy:** high-tech industries which have shared experience in operating outside of Ireland – provide the basis for a network
- **Synergy:** with smaller, demonstrator projects
- **Gap:** market knowledge
- **Barrier:** Low cost investment funding
- **Barrier:** Insufficient state-aid
- **Infrastructural planning process**

Who needs to connect to create the right conditions to unlock potential?

- An initial link with the **government** – how can the state support attracting highly skilled workers for this industry
- Connect with **consumers** – ensuring demand
- **Diverse industries** – facilitating synergies
- **Research Institutes** – to ensure a solid knowledge base
- **Farmers** – to develop a connection with the local community and supply chain

What are the ideas for action?

- Developing a national **strategy**
- Assess whether **infrastructure** in the areas is enabling
- Public-private **partnerships**
- Early **engagement** and identification of possible issues and lessons learned from lack of acceptance on previous initiatives

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Creative Action.

DRAFT

Image source: Pinterest (2017)

23

**Persona:
ENTREPRENEUR**

CHALLENGE 4: "I'm a CEO of an SME with an innovative product that uses the waste from brewing industry residues. I'm struggling with securing all the necessary licences as the definitions for use and recovery of waste are a barrier. I'm worried that I will miss out on this opportunity. I have a major investor looking for assurance that I meet all regulations and have a reliable supply chain."

**Ideate
&
Prototype**

What does the entrepreneur need to make this happen?

- **Awareness** - defining problem
- **Access** - to a favourable regulatory regime
- Expert/technical **advice and guidance**
- **Reliable supply chain** – strength of the process, the customer base, and the impact on the environment
- **Subject matter expertise** from state agencies

**What existing supports can be harnessed?
Synergies? Gaps? Barriers?**

- **Support:** Agencies and LEOs (Local Enterprise Offices), EI (Enterprise Ireland)
- **Open regulators** - regulatory science research
- **Academic** professionals and research

Who needs to connect to create the right conditions to unlock potential?

- **Connection** between company, EI/LEO, and research bodies.
- Údarás na Gaeltachta
- Rural development support agencies

What are the ideas for action?

- **Strengthening collaboration** – at both local and national scale
- **Identifying supports and incentives** - addressing regulatory barriers and incentivising innovation
- **Research capability and expertise** – non-partisan and independent

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Creative Action.

DRAFT

Image source: Pinterest (2017)

24



**Persona:
FARMER**

CHALLENGE 1: "I'm an Irish farmer. I heard recently that my grass could be used to make bio-chemicals which could be an income opportunity for me."

What does the farmer need to make this happen?

- **Advice and knowledge** - regarding technology, the business opportunity, and how to develop business models
- **Connect** - collaborate with other local producers (co-operatives)
- The ability to **effectively assess** the viability of the opportunity - potential increase in **value, risk, environmental impact**

What existing supports can be harnessed? *Synergies? Gaps? Barriers?*

- **Synergy:** Marine research model serves as a good example regarding TRLs (Technology Readiness Level)
- **Gap:** Building a business case
- **Barrier:** Lack of a facility to demonstrate beyond lab scale
- **Support:** Agencies – through Teagasc, IFA, KT groups, also assessing the opportunity through co-operatives

Who needs to connect to create the right conditions to unlock potential?

- **Pharmaceutical companies and farmers** – two-way contract that is ethically oriented and takes advantage of circular opportunities regarding waste and emissions
- **Farmers and producer groups** in order to achieve a critical mass
- Existing networks such as co-operatives
- **Professional advisors** and capital providers
- **Teagasc and pharmaceutical companies**


What are the ideas for action?

- Building of a **pilot plant** - to prove viability of the opportunity
- Establishing a **bioeconomy opportunities register** – match making
- **Communicating the bioeconomy** and raising **awareness** as it being a means of diversification, opportunity, and a source of risk mitigation


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Image source: Pinterest (2017)

25



**Persona:
RESEARCHER**

CHALLENGE 3: "I'm a researcher leading an applied research project with a global company based in Ireland. We have identified potential value from marine discard. I want to ensure the opportunity for industrial extraction doesn't lead to over-exploitation of marine resources."

What does the researcher need to make this happen?

- **Money** – Flexibility in funding to include feasibility
- **Connections** – buy in from industry to support sustainability aspect
- **Understanding** of options/availability
- **Assurance** – regarding systems in place and the rules in which Ireland operates
- **Multidisciplinary approach**, life cycle assessment integrated with the business case

What existing supports can be harnessed? *Synergies? Gaps? Barriers?*

- **Support:** European Maritime and Fisheries Fund
- Benefits of tax credits of Research & Development
- **Synergy:** Identifying **existing best practice** internationally
- **Gap:** Integrated strategy to deal with **problems regarding discard** (to design net, policy etc.)
- **Access supports** to further research
- **Barrier:** short-term contracts and projects means lack of continuity in expertise

Who needs to connect to create the right conditions to unlock potential?

- Big ask for researcher so it needs a **multi-disciplinary approach** – Environmentalists, Economists, social scientists, policy, technologists, industry
- **Support agencies** – for advice
- **National funders**
- **Policy makers**

What are the ideas for action?

- From market side – **collaboration** with the synthetic equivalent
- Need for **overarching management** to avoid over-exploitation and to avoid the tragedy of the commons
- **Focussed conversation** around objectives and drivers
- A defined bioeconomy agenda for Ireland that is inclusive with a governance and delivery mechanism



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Image source: Pinterest (2017)

26

Persona:
BUSINESS ADVISOR OF A SUPPORT AGENCY

CHALLENGE 6: "I'm responsible for the north west and interested in enabling the circular economy and bioeconomy agenda. I see the opportunity in my area for optimising underutilised biomass and I've also heard about other opportunities that sound a bit far-fetched but have given a lot of money to local economies from things like native weeds. I'm not sure what is best for our region, environmentally and economically. I'm presenting the bioeconomy at a key event and want to make sure I can provide a clear picture."

Ideate & Prototype

What does the BUSINESS ADVISOR need to make this happen?

- Understanding of **drivers**
- Facts and figures on the **resource availability**
- An understanding and appreciation of the biomass and technology push
- An **understanding** of the market pulls and requirements while also being aware of relevant incentives/subsidies
- Market study and niche areas identified
- Cross sectoral networks
- **Knowledge transfer**

What existing supports can be harnessed? Synergies? Gaps? Barriers?

- **Synergy:** Producer – processor alliances
- Regional networks
- The availability of other feedstock sources and prices – to serve as a comparisons
- **Lessons learned** from innovative initiatives in other regions
- BioÉire plus a roadmap

Who needs to connect to create the right conditions to unlock potential?

- Collaboration local, regional, national to promote **entrepreneurial environment**
- Biomass producer/owner
- Processors
- Market development advisors
- Logistics
- Specialists – agronomy, fisheries managers, and scientists
- Potential business customers
- **Leading edge** regional enterprises

What are the ideas for action?

- **Business case** and partnerships
- Grant aid and links to other entities that have used biomass opportunities elsewhere
- Industry experts to workshop ideas and create linkages
- Connect regional actors to identify **baseline** and explore options
- Identifying marketing strategy and **end user acceptance**

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Image source: Pinterest (2017)

27

Brainstorming success – most people identified a need for a joined up approach supported by an enabling policy framework

COMMON THEMES FOR SUCCESS:
 DEMONSTRATED POLICY COMMITMENT
 • STRONG GREEN PROCUREMENT
 • PRICE

1. STRATEGY FOR IRELAND

- Considering Ireland's position in the broader context (EU & world leadership)
- An industry/academic/government strategy based on prioritisation of scalable markets
- Green procurement
- Social Inclusion and Rural Development
- Where to invest in Science & Technology

2. INTEGRATION

- Deeper integration on all fronts – a systematic approach
- Cross collaboration, networking, and joined up thinking
- Collaboration at an EU and International scale
- Stability in the supply chain
- Moving up the value chain
- Break down research and industry silos

3. FRAMEWORK AND GOVERNANCE STRUCTURE

- Holistic government approach
- Policy commitment across all agencies
- Standards and legislation co-ordination to unlock barriers
- Decision making enablers - potential role for an umbrella brand

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Image source: Pinterest (2017)

28

Creating the conditions for an integrated systems approach across industry R&D and engaging the public were also cited by Teams

COMMON THEMES FOR SUCCESS:
 DEMONSTRATED POLICY COMMITMENT
 STRONG GREEN PROCUREMENT POLICY

COMMERCIALISATION

- Sustainable economic growth
- De-risking financial investment
- Demonstrating value add and the ability to scale up
- Commercialising research
- Financial de-risking of innovation
- Awareness and education for industry sectors
- Attracting and training people with required skills

INNOVATION, RESEARCH, AND DEVELOPMENT

- Collaboration between industry and academic research
- Transforming “waste” using technology
- Industry driven R&D
- Identifying key value chains
- Breaking down silos
- Demonstration projects and proof of concept
- Access to finance

PUBLIC AWARENESS

- Public awareness and involvement
- Transparency of, and access to, information
- Changing mind-sets around “waste”
- Identify what we are good at already and play to our strengths
- Timeliness of public engagement and lessons learnt in community influence and acceptance

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Image source: Pinterest (2017)

29

A Snapshot of Visualising Success!

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30

Thank You.



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