An Roinn Gnó,
Fiontar agus Nuálaíochta
Department of Business,
Enterprise and Innovation

Realising the opportunities for enterprise in the bioeconomy and circular economy in Ireland

Executive Overview

This paper advances the perspective set out in the Refresh of Research Prioritisation, Innovation 2020, Enterprise 2025 and Future jobs Ireland by identifying how the bioeconomy and circular economy will 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. It identifies the catalytic role of lead disruptive innovators and the need for policy to identify and support the emergence of a critical mass of lead innovators in niche areas of comparative advantage for Ireland.

Understanding the Bioeconomy and the Circular Economy

The Bioeconomy and the Circular Economy are both terms that have gained increased attention in recent years. Both are promoted as providing potential solutions to issues ranging from climate change, to pollution, to economic and regional development. Both terms also elude a single definition that conveys ready understanding. The European Commission, for example, describes a bioeconomy as involving "the production of renewable biological resources and the conversion of these resources and waste streams into value added products, such as food, feed, bio-based products and bioenergy." A common definition of the circular economy is that "a fully circular economy requires a systemic and transformative approach to production and consumption that effectively designs out waste and keeps materials and resulting products in use for as long as possible."

Underlying these definitions, however, lies a complex range of actors, processes, technologies, types of innovation, enterprises and economic sectors. This report aims to grapple with this underlying complexity and present a clear and comprehensible picture of what the bioeconomy and the circular economy actually are. The paper will show, for example, that the term bioeconomy covers very diverse activities, from agri-food actors engaged in biotechnology aimed at increasing the efficiency of food production, to biochemists and chemical engineers developing biorefineries to convert biomass into high value chemicals, to enterprises seeking to find alternative fuels such as wood chips and biogas to replace fossil fuels.

Based on a sound understanding of what the bioeconomy and circular economy actually are, this paper sets out a clear strategic approach for the Department of Business, Enterprise and Innovation to follow to ensure that Ireland engages actively, when appropriate, and responds effectively, when appropriate, to these embryonic but rapidly developing areas of the emerging new economy. In doing so, the paper aims to ensure that DBEI, working with its partners across government, supports the realisation of the potential enterprise opportunities that are becoming ever more apparent as global developments in these areas gather pace.

Introduction

This paper aims to ensure that the Department of Business, Enterprise and Innovation's response to issues arising from the transition to a low carbon circular economy and bioeconomy is informed by a clear evidence-based understanding of the potential enterprise opportunities. The report has been developed in the context of policy developments within DBEI, including the Refresh of Research Prioritisation, Innovation 2020 and Enterprise 2025, and Future Jobs Ireland 2019.

The *Refresh of Research Priority Areas 2018-2023* identifies six themes with which the majority of competitively awarded public investment in research will be aligned. A number of these are of direct relevance to the bioeconomy and circular economy, including the priority themes 'Food', 'Manufacturing and Materials', and 'Energy, Climate Action and Sustainability'. This latter theme was introduced in 2018 as an outcome of the refresh process in response to a marked increase in importance of the challenges of climate change and sustainability over recent years, as evidenced by significant policy developments at national and international level.

Ireland's national innovation strategy *Innovation 2020* highlights the need for innovation to help address the grand challenges of our time, including climate change, resource depletion, environmental degradation, and pollution. The challenges informing *Innovation 2020* are therefore the same as those driving the development of both the bioeconomy and the circular economy in Ireland. *Innovation 2020* acknowledges the need for enterprises to innovate both to find solutions to these challenges, while at the same time seizing on the opportunities that such disruptive innovation presents.

This message is reinforced in *Enterprise 2025 Renewed* which sets out the challenges and opportunities presented to enterprise in Ireland due to a rapidly changing global environment. It sets out Ireland's enterprise strategy as one in which we aim to sustain what we have in the immediate term; transform our enterprise base for longer-term resilience; and build on our strengths to be successful in international trade while managing potential vulnerabilities. The development of the circular economy and the bioeconomy in Ireland have the potential to be important drivers in the renewal of Ireland's enterprise base. , as envisaged in *Enterprise 2025 Renewed*.

Future Jobs Ireland 2019 contains the ambition to leverage Ireland's natural resources, enterprise strengths and innovative capacity to be a global leader in the circular and bioeconomy. It includes actions related to overcoming regulatory barriers, raising awareness, developing infrastructure and scoping of biomass resources and business support services.

The current report has also been developed in the context of the government's *National Mitigation Plan* and, in particular, a recommendation by the National Competitiveness Council to undertake an assessment from an enterprise perspective of the *National Mitigation Plan* to

evaluate green economy opportunities, as well as potential negative impacts on the enterprise sector.

Global Market Opportunities in the Bioeconomy and Circular Economy

In 2018 the Government published the first *National Policy Statement on the Bioeconomy* which highlights the potential of the bioeconomy in promoting the more efficient use of renewable resources while supporting economic development and employment in rural Ireland. At the same time, there is increasing recognition of the potential benefits for economies and societies of moving away from a 'make-use-dispose' model of production and consumption towards adopting a circular economy, in which we keep resources in use for as long as possible.

The diversity and scale of the potential opportunities for enterprises in Ireland from the transition to a bioeconomy and a circular economy can be gauged from the market opportunities identified as part of the *Refresh of Research Prioritisation* in 2017. The following broad global market opportunities relevant to the bioeconomy and circular economy were identified:

- The **Nutraceuticals and Functional Foods** market consists of food and nutrition supplements, specialty nutrients and infant formula. The market has a current estimated value of US$190.7 billion, and is estimated to have a value of US$279 billion by 2021
- The **biotechnology** market opportunity has a high degree of exports from Ireland, with an estimated value of €22.72 billion at the current time
- The **Biorefining and Bioconversion** market consists of various forms of agricultural and forest biorefining, including feedstock, products and segment (energy, chemicals, botanicals and fuels). The global Biorefining and Bioconversion market was estimated to be worth US$659 billion in 2016
- **Low Carbon Construction** consists of residential, commercial and industrial buildings designed to release little or no carbon over their lifetimes, and their associated materials and services. The Global Green Construction (GGC) market is a significant component of the Low Carbon Construction market and had an estimated value of US$216.8 billion in 2016, estimated to reach $453.1 billion by 2022.

The challenge for Ireland is to identify both specific areas in which enterprises can potentially establish a global presence, and the pathways for realising those opportunities.

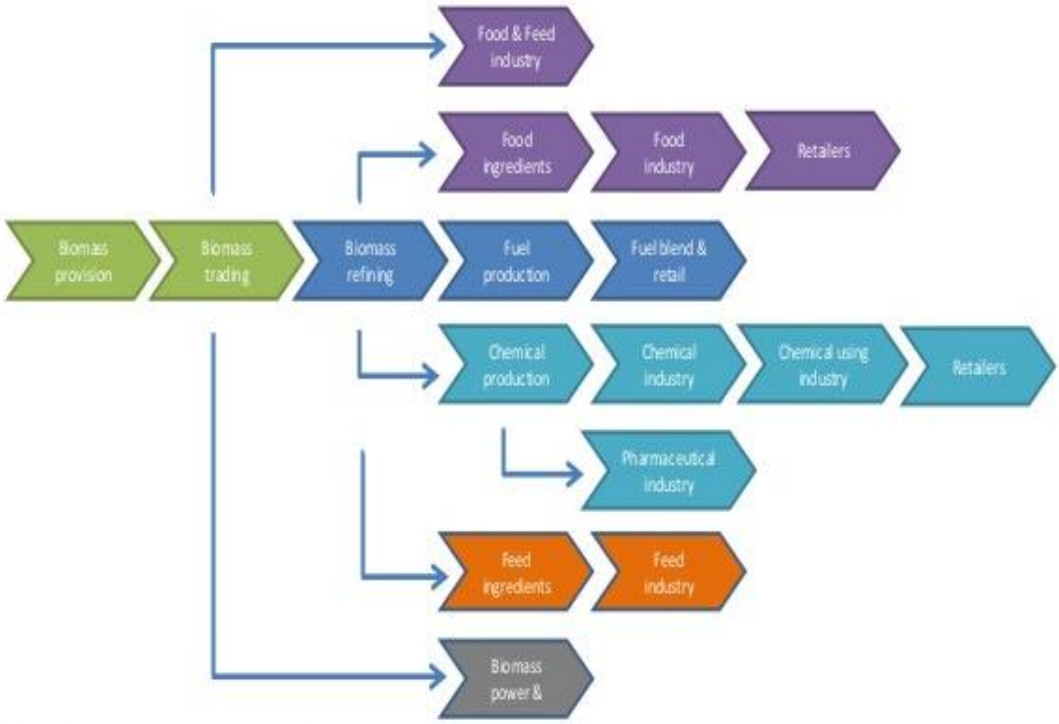
Policy Drivers at National and International Level

The Bioeconomy

The importance of the bioeconomy is increasingly recognised nationally and internationally. The European Union bioeconomy strategy, published in 2012, has amongst its principal goals to assist in climate change adaptation and the creation of jobs. It is estimated that the direct research funding associated with the strategy under Horizon 2020 could help generate 130,000 additional jobs and €45 billion in added value by 2025. The EU's Strategy update in October 2018 includes a €100 million Circular Bioeconomy Thematic Investment Platform to bring bio-based innovations closer to the market and de-risk private investments in sustainable solutions and facilitate the development of new sustainable bio-refineries across Europe. The update proposes an action plan to strengthen and scale up the bio-based sectors, unlock investments and markets, deploy local bioeconomies rapidly across the whole of Europe, and understand the ecological boundaries of the bioeconomy.

A schematic overview of the diversity of value chains in the bioeconomy is given below:[1]

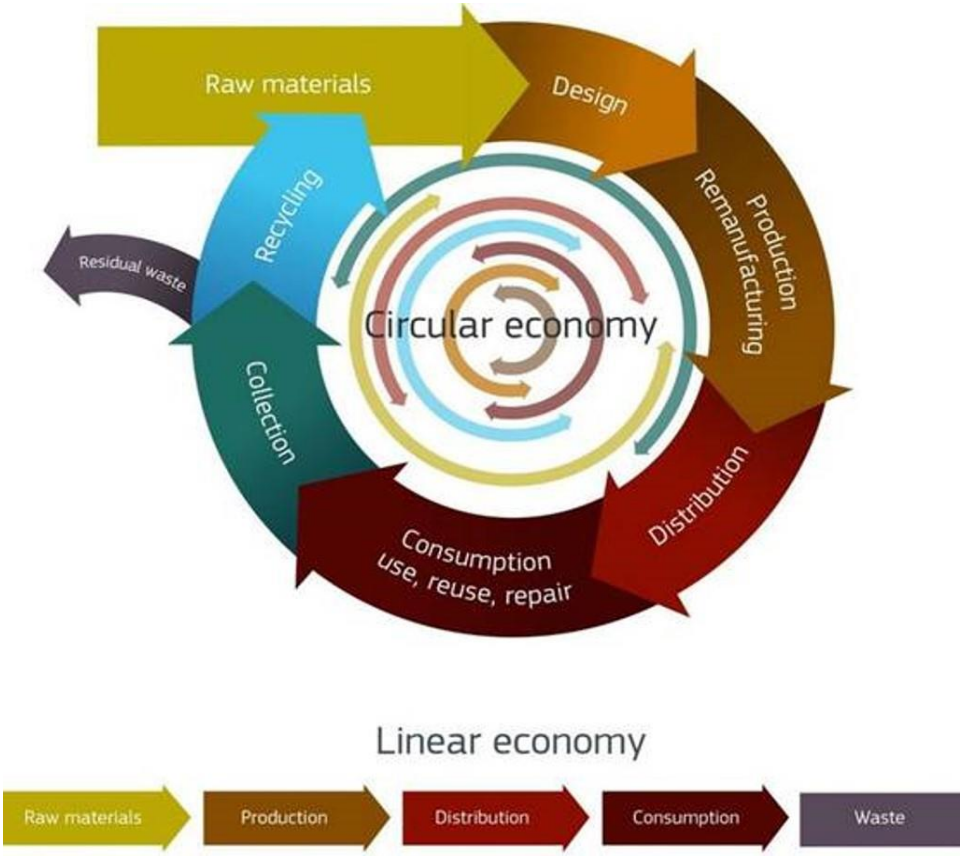
N.B. Bottom box in figure should read 'Biomass power & heat'.



Circular Economy

The circular economy has also become a policy priority of the European Commission in recent years. The EU Circular Economy Package is at an advanced stage, following the publication of the European Commission's plan *Closing the Loop: An EU Action Plan for the Circular Economy*. This plan contains 54 measures covering a range of areas concerning consumption and production processes and products across priority sectors including plastics, food waste, critical raw materials, biomass and bio-based products, and construction and demolition. It includes financial incentives for research and innovative policy measures using structural funds (€5.5bn) and Horizon 2020 (€650mn). This is combined with a suite of regulatory and legislative actions aimed at changes to product design, production processes, waste management, consumption, and procurement.

A schematic overview of the principles underpinning the circular economy is given below:



Policy Interventions

A number of interventions have also been introduced at a national level to support the development of the bioeconomy and the circular economy in Ireland. The Government is providing €4.6 million in financial support through Enterprise Ireland's Regional Economic Development Fund for the establishment of a bioeconomy innovation and piloting facility at Lisheen, Co. Tipperary. The facility will enable industry, entrepreneurs and researchers to scale technologies that convert Ireland's biomass to products of high value for use in a wide variety of sectors including food ingredients, feed ingredients, pharmaceuticals, natural chemicals, biodegradable plastics and more.

Majority funding of €14.2 million has also been provided by government through Science Foundation Ireland for the Beacon Bioeconomy Research Centre which will explore how to convert biomass resources and the residues produced during food production into higher value products. MaREI, the marine and renewable energy research, development and innovation Centre, is also supported by Science Foundation Ireland. The MaREI Centre conducts

fundamental scientific research relating to marine and renewable energy applications, including bioenergy, and enables the development and testing of technology through to the construction of demonstration systems. The instigation of the Disruptive Technologies Innovation Fund, able to support large scale demonstration and commercialisation of disruptive technologies to address societal challenges, represents another important policy tool for potential use in supporting lead innovators in the bioeconomy.

Over the past several years, the Department of Agriculture, Food and the Marine has also funded a number of collaborative academic-led bioeconomy related research projects. The Bio-Éire research project, led by Teagasc, for example, focused on identifying and prioritising interlinking cross- sectoral value chains in the bioeconomy. This project identified value chains with significant short-term potential.[2]

[2] https://www.teagasc.ie/media/website/publications/2017/Combined-BioEire-Results-Report_DevaneyHenchion.pdf

Sectors of Relevance to Bioeconomy and Circular Economy

This paper identifies potential opportunities for enterprise across the following sectors in the bioeconomy and circular economy in Ireland:

FOOD, FORESTRY AND MARINE

Ireland has an established enterprise base in agri-food, forestry and marine. Enterprise Ireland has an active client base and future opportunities have been identified in *Innovation 2020* and *Foodwise 2025*. These sectors will play a foundational role in the bioeconomy as a producer of the biomass that will underpin the other components of the bioeconomy. The challenge for actors in these sectors is to recognise biomass as an additional potential revenue stream, and for primary producers to become part of bioeconomy value chains.

BIOMATERIALS AND BIOCHEMICALS

The biomaterials and biochemicals component of the bioeconomy is the area with the greatest potential for high value products and exports. This part of the bioeconomy, which involves the biorefining of biomass into a diverse range of chemicals and materials, is still very much in a nascent stage in Ireland. The small number of companies active in this area are generally lead innovators who are innovating in multiple areas including developing technology, establishing value chains, and sourcing global markets.

BIOENERGY AND BIOFUELS

The membership of the Irish Bioenergy Association, with around 140 members ranging from state owned companies to SMEs, illustrates the current enterprise base in bioenergy in Ireland. The challenges for many companies in this area include sourcing sustainable and reliable biomass and establishing value chains from biomass sourcing to market. Future scenarios show that Ireland's biofuels and bioenergy sectors may need to grow significantly in the future to meet Ireland's sustainable energy needs.

MECHANICAL CIRCULAR ECONOMY

The circular economy will impact on enterprises across the economy, from micro-enterprises to SMEs to large multinational firms. It encompasses a wide range of firm practices regarding the usage of materials, manufacturing processes, packaging, waste management, water management, product design, recovery and reuse of materials, and consumer behaviour. Opportunities are arising for innovative firms able to provide technology and services solutions based on circular economy principles.

From an international perspective, Ireland enjoys some important comparative advantages in relation to the bioeconomy. Ireland has a significant agricultural footprint with about two thirds of its land devoted to agricultural use. Agri-food is the largest indigenous business and accounts for 5.7% of our GDP. Approximately 10.7% of Ireland is under forests which produce 3.2 million cubic metres of material each year. Afforestation is forecast to increase production to 8 million cubic metres by 2035. Ireland has one of the largest seabed territories in Europe, at around 10 times its landmass, with a reservoir of biomass. In 2016, Ireland's ocean economy had a turnover of €5.7 billion with a direct economic value of €1.8 billion or approximately 0.9% of GDP[3].

Ireland has also an established bio-pharmaceutical sector, with most of the world's largest bio-pharmaceutical companies having a presence here, producing €39bn in exports. Although current enterprise activity in the bioeconomy is being driven mainly by the potential of Ireland's nature resources, rather than by the structure of Ireland's existing enterprise base, there may be potential for increased alignment between the biopharma sector and current and future bioeconomy actors.

With 80% of the agri-food sector based in rural Ireland, there is also potential for the bioeconomy and circular economy to boost employment in regions. *The Action Plan for Rural Development 2017* underlines how the bioeconomy can contribute to decarbonisation, sustainable growth and job creation in the agricultural, industrial and technological sectors in rural areas.

The NESC report *Moving Towards the Circular Economy in Ireland*, the most comprehensive study of the Circular Economy in Ireland to date, points to the potential for job growth and enterprise development.[4] One Irish study estimates that new jobs could be created through recycling materials such as plastics, paper, glass and WEEE, with a potential added GDP value of €1.65bn. Such jobs would range from low to high-skilled, from sorting recyclables to eco-design, and could be an important stimulus for employment, including in rural areas and areas of economic and social deprivation.

Productivity and the Bioeconomy and Circular Economy

Productivity gains lie at the heart of the bioeconomy and the circular economy. The enhancement of the productivity of agricultural systems, including emerging technologies such as biotechnology, precision farming, and eco-agriculture will be required in order to meet growing demand from agricultural systems without drastically increasing their environmental

[3] Ireland's Ocean Economy, Socio-Economic Marine Research Unit (SEMRU) at NUI Galway, 2017
[4] Moving Towards the Circular Economy in Ireland, National Economic and Social Council, October 2017

footprint. The biorefining of high value products from biomass, such as biochemicals and biomaterials, also marks the creation of new high productivity activities within the economy.

While conventional productivity gains are achieved by raising labour productivity or through the adoption of technology, when it comes to the circular economy, the issue of improving resource productivity is central. The growth of resource productivity through circular economy practices generates primary-resource benefits. It is estimated that Europe could grow resource productivity through circular economy practices by up to 3 percent annually, which would generate a primary-resource benefit of as much as €0.6 trillion per year by 2030.[5]

Examples of Leading Companies in the Bioeconomy and Circular Economy

The table below sets out current examples of industries and projects at the cutting edge of the circular and bioeconomy transitions in Ireland. These examples, highlighted in the First Progress Report of the Bioeconomy Implementation Group[6], illustrate the range of companies currently engaged in the bioeconomy, particularly in the area of biorefining.

Glanbia	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.
Bioconnect Innovation Centre	The Bioconnect Innovation Centre in Monaghan 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, including Monaghan Mushrooms, BioMarine Ingredients, SilverHill Foods and Lakeland Dairies, to use networking and brainstorming to solve problems facing the companies in a non-competitive environment.
BioMarine Ingredients	Through private investment, BioMarine Ingredients have developed a first-of-a kind, pilot-scale marine biorefinery which will take non-food chain species and through their advanced

[5] https://www.ids.ac.uk/opinions/what-is-the-link-between-productivity-circular-economy-and-the-sdgs/

[6] First Progress Report of the Bioeconomy Implementation Group, Government of Ireland, 2019

	hydrolysing process, convert raw material of moderate commercial value into cost competitive, proteins, oil and calcium.
Carbery, Ballyroe Co-Operative, Farmers	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 which improve value and resource efficiency. Through Biorefinery Glas, farmers will demonstrate new business models, using an automated and low-cost biorefinery model, which integrates well within traditional beef and dairy farming and could be replicated across Ireland, addressing fodder and emissions challenges while adding value.
Devenish Nutrition	Agri technology company Devenish Nutrition has secured €118 million in long-term funding to enable its research, development and growth plans. 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.

Summary of Key High-Level Messages

The following key high-level messages emerge from this report and provide the context for identifying Ireland's strategic approach to realising enterprise opportunities in the bioeconomy and circular economy.

The transitions to a bioeconomy and circular economy are occurring on a global scale…

The transitions to a bioeconomy and circular economy are being pursued in countries around the world in response to the challenges of climate change, pollution and unsustainable production and consumption. These transitions will be necessary to meet the goals of the Paris Climate Agreement and the Sustainable Development Goals. Countries are seeking to transition to a bioeconomy and circular economy both as a means to support the modernisation and strengthening of their industrial base, based on the creation of new value chains and greener, more cost-effective industrial processes, and to create more sustainable economies. The policy drivers and trends driving the bioeconomy and circular economy mean that these transitions are likely to continue and accelerate in the coming years.

The transitions both globally and in Ireland are still at a very early stage….

The bioeconomy and circular economy present a range of potential opportunities for firms, ranging from micro-enterprises to SMEs to large firms. These potential opportunities span the economy, from food, forestry and marine, to biomaterials and biochemicals, to bioenergy and biofuels. State-owned and semi-state companies as well as social enterprises are also engaging with the opportunities presented. It is clear, however, that many of these opportunities remain unrealised, and even undiscovered, as yet, largely because of the current embryonic stage of the bioeconomy and circular economy.

The transitions to the bioeconomy and circular economy will impact on enterprises right across the economy…

The analysis in this report shows the transitions to a bioeconomy and circular economy will impact on firms right across the economy and that companies can be grouped into three broad categories:

- A broad swathe of firms who are innovating in order to comply with regulation and standards with respect to the bioeconomy and circular economy;
- A smaller cohort of innovative firms who are providing technology and services solutions to help other firms comply with regulation and reduce costs; and
- Lead innovators who are developing or adopting leading edge technologies and services solutions based on bioeconomy technologies and circular economy principles.

While it is important to support a range of firms, disruptive lead innovators will play a key role in realising enterprise opportunities for Ireland…

Lead innovators play a major role in transforming value chains when they adopt new technologies and practices. In doing so, they can induce suppliers and customers to innovate in ways which can have a significant impact in terms of the development of the bioeconomy and circular economy as a whole. The fact that the bioeconomy is at an early stage of development is reflected in the fact that a diverse range of lead innovators globally are currently engaged in a search process to identify how to extract higher value products from existing products and wastes streams. This search process is capital intensive, high risk, and requires a supportive innovation ecosystem capable of enabling lead innovators to bridge the 'valley of death' from research to market.

In Ireland, a small number of lead innovators are well advanced on this search process and are already bringing products to market. This small cohort of lead innovators, however, is just the advance edge of a much larger cohort of firms that could diversify their product portfolio to potentially produce products of even greater value than they currently produce.

These transitions will be far reaching and will disrupt Ireland's current enterprise base while opening a range of new possibilities…

The transitions to a bioeconomy and circular economy are of significant importance in the longer term because they will disrupt (i) the primary producers and processors in agri-food and marine which form Ireland's largest indigenous sector, and (ii) will potentially disrupt major multinational sectors in Ireland, such as the pharmaceutical sector which has already begun to transition towards bio-based neutraceuticals.

Proposed Policy Approach

This paper will inform DBEI's ongoing approach to policy with regard to the bioeconomy and circular economy in the following ways.

BIOECONOMY POLICY

1. Informing the Bioeconomy Implementation Group

The paper will form a central part of DBEI's input to the ongoing implementation of the National Policy Statement on the Bioeconomy.

Given the complexity of the bioeconomy and circular economy, a cross-government response is needed. The High-Level Bioeconomy Implementation Group (BIG), established following the publication of the National Policy Statement on the Bioeconomy by the Department of an Taoiseach in March 2018, has been tasked with addressing this complexity and advancing the key systemic and strategic actions in the policy statement. DBEI is playing an active role on BIG and this engagement should continue to ensure enterprise opportunities are realised.

The paper will be submitted to the Bioeconomy Implementation Group and inform that group's strategy in the following ways:

a. Catalysing disruptive lead innovators

A strategic approach to the development of the bioeconomy and circular economy in Ireland is needed to assist a critical mass of lead innovators to emerge, based on the identification and exploitation of niche areas appropriate to our enterprise base, science base and natural resource base, in which Ireland can capture global value and which can become a major export sector for Ireland.

Challenges faced by lead innovators include the fact that many of the technologies upon which the bioeconomy is based are still at an early stage of development and require large capital investments, and that the adoption of bioeconomy technologies and circular economy practices require fundamental changes in firm behaviours, including the possible restructuring of value chains. These changes can be costly in terms of time and money and can be challenging, particularly for SMEs.

A whole-of-government policy response to support lead innovators is therefore needed and should be progressed by DBEI and its agencies. The Bioeconomy Implementation Group is the appropriate forum for this to occur.

b. An increased focus on adoption and diffusion of existing technologies

Ireland appears to be behind comparison countries with regard to the adoption of existing technologies in both the bioeconomy and the circular economy. An increased focus on the adoption and diffusion of existing technologies and practices could further accelerate the development of the bioeconomy and circular economy here.

c. Furthering DBEI's role in effective cross-government implementation of National Statement on Bioeconomy

Specific actions in this regard include:

- A review of coherence of strategies and policy instruments, currently being carried out by BIG across government, will highlight areas where additional future action may be needed to support firms and advance the development of the bioeconomy.
- The networking and awareness activities of BIG should crucially include firms engaged in the bioeconomy across all the components described in this report. These networking activities will act as a source of knowledge for additional actions which may arise to support firms engage with opportunities in the bioeconomy and circular economy as they arise.
- Progressing priority value chains is a central action for progressing the development of the bioeconomy. The innovation supports of DBEI and its agencies will be of crucial importance here, along with funding from other Departments and agencies, as well as EU funding. The Disruptive Technologies Fund may also play a role in this regard.
- Enterprise Ireland, Science Foundation Ireland and IDA Ireland have key roles to play in progressing the bioeconomy and circular economy, in particular in translating research to application. DBEI and its agencies will work in partnership with the other members of BIG to identify specific coordinated or joint initiatives needed.
- BIG is working to overcome legislative barriers which impact on the use of waste for higher value uses. DBEI will input to this work as appropriate.

2. Inform ongoing support for innovation in the Bioeconomy

- The bioconomy is included in Research Prioritisation under a number of priority themes including 'Energy, Climate Action and Sustainability' and 'Food'. DBEI and its agencies will continue to support research and innovation in the bioeconomy through competitive funding under Research Prioritisation.

3. Informing Broader Enterprise Policy

- This paper will be circulated widely within DBEI and to its agencies to inform policy development in relevant areas including *Innovation 2020* (Innovation and Investment Division), Climate Action (ESCED), CSR (Indigenous Enterprise).

CIRCULAR ECONOMY POLICY

1. Inform ongoing support for innovation in the Circular Economy

The circular economy is included as a priority theme in Research Prioritisation under 'Energy, Climate Action and Sustainability' and, in particular, under the priority area 'Sustainable Living'. It is also relevant across other research prioritisation areas. DBEI and its agencies will continue to support research and innovation in the circular economy through competitive funding under Research Prioritisation.

2. Inform development of Circular Economy policy at national level

The Department of Communications, Climate Action and Environment has lead responsibility for the circular economy. This paper will be submitted to DCCAE as an input to inform national policy development in this area. It will also inform DBEI's policy responses to ongoing developments in the circular economy as the need arises.

3. Raising Enterprise Awareness

The paper will be provided to the Enterprise Initiatives Unit where it will be used to help create awareness of the circular economy among members of the Corporate Social Responsibility Stakeholder Forum.

4. Enterprise Opportunities in the Circular Economy

The bioeconomy is already an active area of research, policy and enterprise engagement in Ireland. The circular economy, by comparison, is still at an earlier stage of development. This report has viewed the circular economy from an enterprise opportunities perspective. While opportunities for lead innovators to gain first mover advantage may arise over time, export opportunities currently appear to be more limited than the opportunities within the bioeconomy. Indeed, the adoption of circular economy principles will raise cost issues for many businesses. To quantify the impacts on enterprise a separate study would be required.

Conclusion

This paper provides a clear description of the bioeconomy and circular economy and describes the diversity of actors, technologies, types of innovation, enterprises and economic sectors engaged in these important areas of the emerging new economy. It shows that, while developments in these areas are still nascent, both in Ireland and at a global level, the transitions to a bioeconomy and circular economy are occurring on a global scale and do present opportunities for enterprises in Ireland. Moreover, the scale of these opportunities is set to grow as global developments gather pace. The paper sets out a policy approach for the Department of Business, Enterprise and Innovation aimed at ensuring that Ireland supports the realisation of these growing enterprise opportunities. In particular, it highlights DBEI's role in supporting lead, disruptive innovators in the biochemicals sector of the bioeconomy, where the largest opportunity for export driven growth currently resides. It also stresses the importance of polices for the diffusion of existing technologies and practices. This policy approach aims to ensure that DBEI plays a lead role in the realisation of enterprise opportunities, as well as working collaboratively with partners across government through the Bioeconomy Implementation Group, in supporting the wider transition to the bioeconomy and circular economy in Ireland.