

2021 Bioeconomy Fellowship Programme

Dr Graham O'Neill

## Table of Contents

### Contents

Executive summary.....	3
Educational offerings .....	4
1.1 University courses.....	4
1.2 Private / 3rd party vendors .....	7
1.3 EU projects.....	9
Industry and the Bioeconomy .....	14
2.1 Industry engagement and feedback.....	14
2.2 Auditing and benchmarking.....	16
Bioeconomy network .....	18
3.1 Bioeconomy network in Ireland.....	18
3.2 European Bioeconomy Education.....	22
Opportunities for the School of Food Science & Environmental Health, Convене and TU Dublin. ...	26
4.1 Educational opportunities .....	26

## Executive summary

The following report provides an insight into (i) existing educational offerings in the area of the bioeconomy in Ireland and Europe (ii) enterprises perspective on the needs of the Irish food and bioeconomy sector with regards to education and training on the bioeconomy (iii) overview of the Irish bioeconomy sector and (iv) educational opportunities for TU Dublin.

In the 7 months between applying for the fellowship and completing it, there are two new MSc and one new BSc programmes, showing the increased response by European Universities to meet the skills needs of the Bioeconomy. While the number of Universities offering Bioeconomy education is low across Europe, there are significantly more courses related to sustainability, furthermore, there is a considerable number of third party consultants offering training and consulting services related to sustainability, indicating there is a demand for this knowledge. This trend is reflected in the feedback from enterprise, where knowledge of the bioeconomy is limited, yet sustainability is a high priority area for businesses in the short and medium term. On this basis, industry orientated programmes should focus on teaching applied sustainability and teaching the bioeconomy as a knowledge area and skill set that enables businesses to be both sustainable and profitable. The approach of interlinking sustainability and the bioeconomy is supported by DAFM.

The report provides an overview of the bioeconomy industry in Ireland and all of the companies that produce biomass and/or biobased products. The report details the 400+ companies involved in the bioeconomy, this can serve as a valuable tool in recruiting industry based learners to programmes. Engagement with people across academic and industry as part of the fellowship has highlighted the need for bioeconomy education to reach beyond the sciences and encompass business, legal and finance professions as well as wider society, who are vital to the success of the bioeconomy through the purchasing of biobased products. On this basis, the report identifies a number of bioeconomy education opportunities for the School that focus on different types of learners.

## Educational offerings

### 1.1 University courses

In addition to courses being available, the European Bioeconomy University was created in recent years. The participating universities include: University of Bologna (Italy), University of Eastern Finland (Finland), University of Hohenheim (Germany), AgroParisTech - Paris Institute of Technology for Life, Food and Environmental Sciences (France), University of Natural Resources and Life Sciences, Vienna (Austria) and Wageningen University and Research (Netherlands).

The consortium was created on the initiative of the University of Hohenheim (Germany) and aims to make the European economy more resource-efficient, sustainable, competitive and based on a circular perspective

### **Postgraduate Education – existing offerings**

- Postgraduate Diploma in Bioeconomy with Business (MTU Ireland)
   
<https://www.ittralee.ie/en/InformationAbout/Courses/ParttimeStudy/PostgraduateDiplomainBioeconomywithBusiness/>
  
- Master Programme in Resource Recovery - Biotechnology and Bioeconomy (Boras, Sweden)
   
<https://www.hb.se/en/international-student/program/programmes/master-programme-in-resource-recovery---biotechnology-and-bioeconomy/>
  
- Master Programme in Resource Recovery - Polymer Materials for the Circular Economy (Boras, Sweden)
   
<https://www.hb.se/en/international-student/program/programmes/master-programme-in-resource-recovery---polymer-materials-for-the-circular-economy/>
  
- Management of Bioeconomy, Innovation and Governance MSc (Edinburgh, Scotland)
   
<https://www.ed.ac.uk/studying/postgraduate/degrees/index.php?r=site/view&edition=2022&id=769#:~:text=Programme%20description&text=The%20Masters%20in%20Management%20of,in%20the%20growing%20global%20bioeconomy.>

- Bioeconomy (Master's), (Hohenheim, Germany) <https://www.uni-hohenheim.de/en/bioeconomy-masters>
- Bioeconomy – BSc and M.Sc. Technological University of Munich(Germany) <https://www.tum.de/studium/studienangebot/detail/bioeconomy-master-of-science-msc>
- MSc in Bioeconomy: Biotechnology and Law (Greece) <https://www.ihu.gr/ucips/postgraduate-programmes/bioeconomy>
- Bachelor of Science in Forest Bioeconomy Sciences and Technology (BSc), University of British Columbia, Canada <https://forestry.ubc.ca/programs/undergraduate/forest-bioeconomy-sciences-technology/>
- Bio-inspired Innovation programme (MSc in Biosciences), Utrecht University, Netherlands <https://www.uu.nl/masters/en/bio-inspired-innovation#:~:text=The%20Master's%20programme%20Bio%20Inspired,and%20bio%20inspired%20research%20%26%20innovations.>
- The University of Eastern Finland offer a series of Bioeconomy related courses, not on the topic of the bioeconomy but programmes on sustainable forestry, environmental policy & law, environmental biology, tourism and marketing. <https://www.uef.fi/en/bioeconomy#b6c2a493>

## Programmes for Professionals

### *Programmes (EdX/ Wageningen)*

- MicroMasters Economics and Policies for a Circular Bio-Economy <https://www.edx.org/micromasters/wageningenx-economics-and-policies-for-a-circular-bio-economy>
- MicroMasters Business and Operations for a Circular Bio-Economy <https://www.wur.nl/en/show/MicroMasters-Business-and-Operations-for-a-Circular-Bio-Economy-2.htm>

### *Courses*

- From Fossil Resources to Biomass: A Chemistry Perspective  
<https://www.edx.org/course/from-fossil-resources-to-biomass-a-chemistry-persp>
- From Fossil Resources to Biomass: A Business and Economics Perspective  
<https://www.edx.org/course/from-fossil-resources-to-biomass-a-business-and-ec>
- Economics and Policies in a Biobased Economy <https://www.mooc-list.com/course/economics-and-policies-biobased-economy-edx>
- Capstone Economics and Policies for a Circular Bio-Economy  
<https://www.edx.org/course/capstone-economics-policies-for-a-circular-economy>
- Capstone Business and Operations for a Circular Bio-Economy  
<https://www.edx.org/course/capstone-business-and-operations-for-a-circular-ec>
- Biorefinery: From Biomass to Building Blocks of Biobased Products  
<https://www.wur.nl/en/show/Biorefinery-From-Biomass-to-Building-Blocks-of-Biobased-Products-2.htm>
- Bioeconomy: How Renewable Resources Can Help the Future of Our Planet (FutureLearn)  
<https://www.futurelearn.com/courses/what-could-a-biobased-economy-mean-for-the-future-health-of-our-planet->

### *Self taught / Videos / Resources*

- Bioeconomy: how renewable resources can help the future of our planet (York University, UK) <https://www.york.ac.uk/study/moocs/bioeconomy/>
- Biobased Products for a Sustainable (Bio)economy <https://www.edx.org/course/biobased-products-for-a-sustainable-bioeconomy> and <https://online-learning.tudelft.nl/courses/biobased-products-for-a-sustainable-bio-economy/>
- Introduction to Sustainable Bioeconomy (Future learn) ([Link here](#))
- Circular economy (3 minutes – LinkedIn Learning)
- Boosting Bioeconomy Knowledge in Schools (European Schoolnet Academy)  
<https://www.mooc-list.com/course/boosting-bioeconomy-knowledge-schools-european-schoolnet-academy>

## 1.2 Private / 3rd party vendors

### **Private education and training providers**

Green Institute

<https://www.greeninstitute.ie/> and linked to <http://foster.ie/>

Offer sustainability training and ISO courses. Services also include preparing technical reports, trade body management, animal by-product (ABP) regulatory compliance, research, training and certification.

Clear Stream Solutions

<https://clearstreamsolutions.ie/>

Sustainability consulting firm offering expertise in (i) sustainability reporting (ii) supply chain (iii) carbon management (iv) software

Sustainability Works

[www.sustainabilityworks.ie](http://www.sustainabilityworks.ie)

Sustainability consulting firm offering expertise in (i) Strategy (ii) Business Case (iii) Policy (iv) Mentoring (v) Sustainable Finance (vi) Reporting (vii) Training (viii) Stakeholder (ix) Engagement (x) Communications

Blue Planet Consulting

<http://www.blueplanetconsulting.co.uk>

English website but their owner has worked for Musgraves in sustainability in Ireland for 20 years, set up Blue Planet consulting to help businesses with their sustainability strategy.

SGS consulting

<https://www.sgs.ie/en-gb/sustainability>

Environment (Carbon, Energy, Soil, Water), Facilities & Production, Management & Compliance, Economic sustainability, Sustainability Reporting, Social Sustainability.

Anthesis Group

<https://www.anthesisgroup.com/>

Strategy & Governance, Supply Chain & Operations, Sustainable Products & Services, Brand & Communication, Education & Culture, Transactions & Finance.

Ernst & Young

[https://www.ey.com/en\\_ie/climate-change-sustainability-services](https://www.ey.com/en_ie/climate-change-sustainability-services)

(i) Sustainability and supply chain advisory (ii) Nonfinancial reporting advisory and assurance (iii) Outcomes measurement (iv) Environment, health and safety services (v) Climate change and energy

Deloitte

<https://www2.deloitte.com/ie/en/pages/sustainability/topics/sustainability.html>

Climate & Sustainability, Sustainable Finance, Climate Change & Decarbonisation, ESG Reporting & Assurance, Circular Economy, Corporate Responsible & Sustainability.

Eco Quest

<https://ecoquest.ie/services/>

Environmental Impact Assessment (ii) Environmental Management Plans (iii) Environmental Consulting (iv) Sustainability Reporting (v) Greenhouse Gas Assessments

Davy

<https://www.davy.ie/capital-markets/corporate-group/horizons>

Carbon Footprint, Energy Management, Biodiversity and Deforestation, Circular & Resources and Waste, Green Procurement, Responsible Sourcing, Sustainable Supply Chain, Sustainability Roadmap.



## 1.3 EU projects

There are approximately 18 EU funded projects where Bioeconomy education has been funded. The programmes vary in their audience with many developing training opportunities for the bioeconomy industry and some targeting the general population. Interestingly, the Bioswitch projects highlights the value of the EU bioeconomy at €2.3 trillion and employing 8.2% of the EU workforce, yet the educational offering to this sector is relatively small.



The overall objective of this Strategic Partnership is to inspire and train a new generation of (bio-based economy) students and help accelerating the transition towards a bio-based economy via education of future professionals. New innovative educational approaches can inspire students, professionals and entrepreneurs to become more active in the bio-based society. The focus of the Strategic Partnership, ABBEE, is on developing, transferring and implementing innovative practices in the field of bio-based economy and to exchange experiences at a European level.

### Knowledge triangle between research, education and industry

With this project, a knowledge triangle is formed between research, education and industry of key-role stakeholders in Europe in which they work together to improve education and facilitate innovation in the area of the bio-based economy. The full partners in the ABBEE project will form the inner circle, developing, transferring and implementing innovative practices. The outer circle comprises more universities and companies, who will be able to benefit (freely) from the results and experiences. By doing so, they enhance EU's competitive position in the field of bio-based economy and prepare students for their future in a bio-based economy.

### Approach

This Strategic Partnership aims at the following results:

1. Develop new forms of blended learning modules on 4 topics by a university. The modules will be available as a course in a regular program within the university and as an online module.
2. An online platform (website) to support the activity 1 and give insight in the existing MSc-programmes (and minors).

Contacts: Gerlinde van Vlietere; gerlinde.vanvlietere@wur.nl



### Objective

Approximately one third of all food produced globally is wasted every year throughout the whole value chain from farmers to consumers. To extract the significant amounts of valuable compounds contained in these wastes, AgriMax will combine affordable and flexible processing technologies (ultrasound assisted and solvent extraction, filtration, thermal and enzymatic treatments) for the valorization of side streams from the horticultural culture and food processing industry to be used in a cooperative approach by local stakeholders.

Through the selection of case-scenarios previously developed to a pilot scale by the participating RTOs and their industrial transfer in new applications as food additives, packaging and agricultural materials among others, the project will disclose the holistic potential of four new agro-value chains (residues and by products from the culture and processing of tomato, cereals, olives, potato). Any by-product generated along the production cycle will be valorized in a cascade manner to reach over 40% of high value use of the waste. This will lead to additional production of active ingredients in lower concentration, but also fibres, biogas and fertilizers from the left biomass (the latter with the aim of being used in closed loop in the culture of the crops used in the project to prevent soil impoverishing). An LCA and LCC will also study the best approach to minimize the environmental impact of the new value chains without jeopardizing the cost effectiveness of the operations. The pilot multi-feedstock bio-refinery processes will be validated in two demonstration sites in Spain and Italy. Societal, ethical, safety, techno-feasibility and regulatory aspects will be studied. Last but not least, a business model and platform for communication between the potential raw materials suppliers will be set up to maximize the use of the cooperative treatment plants throughout the year.

Contacts: Albert Torres; albert.torres@iris.cat

## AllThings.Bio PRO

### The context

Europe's economy depends on oil and gas for energy and chemistry for all kinds of daily life products, but the use of fossil resources harms the environment and our climate. The **bioeconomy** offers a way out by providing industrial and consumer products made of **biomass** and waste.

This is a crucial moment for involving society in the transition to a more circular economy. Since all individuals, whether as citizens or consumers, will be affected, they should be able to play a role when shaping it. On the other hand, it goes without saying that the **bio-based** industry needs the input of citizens and consumers, to make sure that the products developed are in tune with consumers' requirements and expectations.

In Allthings.bioPRO we are going to put all emphasis on getting citizens involved in the bioeconomy and making their voices heard. We will focus on issues and products, which connect with the daily life of citizens and consumers. Possible themes are the creation of growth and jobs, sustainable and circular use of resources or the societal dimension of the bio-based industry in Europe but also outside Europe where the biomass products might impact societies in other countries. The personal viewpoint of a consumer considers quality, functionality and the costs of products but does also care about sustainable production and the environmental impact of daily life products.

In Allthings.bioPRO we will use **serious gaming** to channel citizens' voices to the bio-based industries. The aim is to develop a serious game within a co-creation and co-design process involving both citizens and experts. To ensure focus, we already decided on the subject of the serious game but we will leave the final creation of its content to the engagement process.

Allthings.bioPRO will also make use of mobile phones as one means to collect citizen-derived data. By developing a **mobile application**, which is directly related to bio-based products, the project will create data, which can be exploited by bio-based industry stakeholders and can provide important insights to policy. Assuming that the bioeconomy is about the transition from a fossil-based economy to a sustainable bio-based economy we will start from the usual product case, which is often made from fossil-based materials. We will develop a mobile app to show citizens alternatives for the same kind of product, which are partly or fully made of bio-based materials.

# BeUBio

BeUBio – targeting youth in the Baltic Sea Region for the SDG:s and Bioeconomy

This platform was designed to collect stories of young people whose business ideas, jobs and other activities lead the way towards a different and more sustainable economic path. With a variety of different examples, young people from across the Baltic Sea Region, inspire new ways of making business while having a positive impact to the environment and society. The overall aim is to build a community of like-minded people, by sharing our stories and inspiring each other.

This initiative comes from the BeUBio project, a collaboration between different partners across the Baltic Sea Region pushing for youth participation in the transition to a bio-based economy, and create synergies with other actors and initiatives addressing the SDGs.

**Contacts:**

**Swedish Board of Agriculture:**

Fredric Nilsson, Fredric.nilsson@jordbruksverket.se  
Hans-Olof Sölgren, Hans-Olof.Stalgran@jordbruksverket.se

**Nordic Council of Ministers Lithuania:**

Helen Nilsson, helen@norden.lt  
Lina Janusauskaite, lina@norden.lt

**Client:** The Swedish Institute



Despite significant economic investment and dedicated research in the bio-based domain, public awareness of the potential benefits of bio-based products and applications is still relatively low.

The need to raise awareness of this potential and promote the benefits of these products and applications is clear. We also need to provide the means for anyone with an interest in this domain to be able to follow ongoing developments in the industry and from research.

The Bioways Project objectives are to:

- understand the characteristics and potential of bio-based products and applications;
- to enhance the visibility of bio-based products and applications;
- to encourage discussion about the potential of the bio-based economy for society and contribute to awareness of it and its promotion;
- to increase awareness and knowledge of how bio-based products are used and the overall interest of young students in the bio-based economy at large.

Contacts: Iakovos Deliogianis: deliogianis@qipian.gr



## Overall Objective of the Project:

The main objective of the project was to establish a new technology platform by strengthening cooperation between research organizations and key economic stakeholders to accelerate the development of pilot technology in the field of advanced biopolymers. The project has made a positive contribution to the specific objectives of the cross-border cooperation program, namely through the mentioned technological platform, which paves the way for innovative business initiatives and encourages the necessary exchange of knowledge, technology and innovation

## Project summary:

Global aquaculture and shellfish production currently produces over 10 million tonnes of biomass per year, generating a considerable amount of waste in the form of shells and exoskeletons. These abundant yet under-utilised renewable biomasses have enormous potential for the production of advanced materials (biopolymers), and fall within the scope of the Key Enabling Technologies and the key areas of the Smart Specialisation Strategies identified by the "New Materials, Green Chemistry and Health" program.

Numerous research institutes and companies are actively involved in various biopolymer product development stages; however, the synergies and technology transfer dynamics between them are still insufficient.

To overcome these obstacles, the BioApp project developed a new supra-regional technology platform and combined the complementary knowledge and skills of partners, with a vision to promote solutions, development and applicability of commercially interesting highly innovative biopolymers and biomaterials.

Through a regional cooperation effort involving complementary and interdisciplinary partners, ranging from the academic world (UNITS), to public and private research institutes (COBIK, KI), start-ups (BIOPOLife) and medium-sized companies (ACIES BIO), the project provided an integrated solution that uses natural resources to produce materials designed to improve people's quality of life. All project partners benefit from the developed pilot technology for technology transfer, social and eco-innovation and strengthen links and synergies between companies, research and development centres and in the field of higher education. This trans-regional platform facilitates the integration of new stakeholders through the development of the technology and the commercialisation of the relative product, according to the "economy of closed material cycles" principle, as regards the new business models for a circular economy.



## Preparing the creation of Bio-Based Education Centres to meet industry needs and boost the contribution of the bioeconomy to societal challenges

Unlocking the full potential of the bioeconomy and its value chains requires a systematic and collaborative perspective for the development of new skills, educational approaches and organisational solutions to provide education and training services.

The aim of the BIOBEC project is to develop a holistic framework for multi-level Bio-Based Education Centers (BBEC) flexible enough to answer the present and future needs of the industry and of the surrounding ecosystem at local, regional, national and/or international levels.

The project will design 6 BBEC pilots assuring a wide geographical coverage in Europe and addressing different topics linked to the variety of value chains and institutional contexts (vocational to university level, primary producers, processors, SMEs to MNCs).

BIOBEC will clarify the needs of the different regional ecosystems and will provide detailed design, economic and financial assessment, governance plans for the educational training centres, as well as plans for life-long-learning programmes. It will also develop collaborative tools to maximize the synergies between them at the European and international level.

The project will mobilise a network of 19 partners, which are leaders in Bioeconomy Education from different perspectives (ranging from academia to industry) together with a wide network of Implementation and Replication Working Groups and local stakeholders based in the EU. This network will pave the way for implementation and replication of the BBEC, in order to boost the contribution of the education sector for the development of the bioeconomy.

### Contacts:

Davide Vlaggi: [davide.vlaggi@unibo.it](mailto:davide.vlaggi@unibo.it)



BIOBRIDGES is a 24 months action aiming at boosting the marketability of bio-based products – BBPs by establishing close cooperation and partnership between bio-based industries – BBI, brand owners and consumers' representatives. The ultimate goal is to stimulate and support the active engagement of and interaction among all stakeholders (including local communities and local authorities) and improve market acceptance of BBPs. BIOBRIDGES will design and implement replicable methodologies, procedures and good practices supporting multi-stakeholders' interaction, leading to new cross-sector partnerships.

Main activities will be:

- Identify the cooperation challenges among consumers, brand owners and BBI
- Create a sustainable multi-stakeholder community involving consumer representatives, BBI and brand owners from different bio-based economy clusters and stimulate dialogue and cooperation
- Following a co-creation approach, increase consumers' and brand owners' awareness, confidence and trust on the benefits of BBPs compared to the fossil-based counterparts
- Support the establishment of at least 2 new cross-cutting interconnections in bio-based economy clusters and define replicable procedures and good practices leading to the establishment of new cross-sector partnerships and business opportunities
- Stimulate the multi-stakeholder discussion toward pre-and co-normative research, new standardisation/labelling and emerging co-creation models (B2B and B2C)

At the end of the project, at least 2 new cross-sector interconnections in bio-based economy cluster will be established, while the foundations for the creation of new ones based on the arguments, best practices and recommendations deriving from the project will be formed.

The BIOBRIDGES consortium merges a variety of complementary expertise, aiming to build a consistent multi-actor approach integrating 9 partners already involve in other projects like B10WAYS, BIOVoices and BIOSTEP.

Contacts: Alexandre Almeida: [alexandre@bioba.pt](mailto:alexandre@bioba.pt)



The Bioeconomy Awareness and Discourse Project (BioCannDo) aimed to raise awareness and acceptance of the broad public towards the bioeconomy and bio-based products through a strategic, stakeholder-driven information campaign and education.

Convincing people that the bio-based economy offers something desirable, with new products, functionalities and applications for their daily life, that provide answers to societal concerns (e.g. climate change), requires neutral and science-based information. BioCannDo presented such information in a way that is easy to understand for the broader public. It provided various means for feedback, interaction and encouraged engagement in a discourse on common questions and concerns.

Collaborating with bio-based stakeholder networks and communities at EU, regional and national level, BioCannDo provided information, educational materials and key communication messages through such channels as a community of related projects and educational partners and an Infohub which combines different means of online communication (i.e. social media, blogs, videos, journalistic articles).

BioCannDo built on the legacy of previous projects (i.e. by using their networks, or social media accounts), existing material developed by them and collected, connected, aggregated and reformulated content from different actors and resources. It generated new content addressing the most urgent gaps in information and education. Such dual approach helps to maximise synergies and increase impact of both existing and new material.

The developed content and key communication messages was assessed and tested by stakeholders and target users through focus groups and a market survey. Findings were used in feedback loops to adapt the content and messages.

Contacts:

Martin Behrens, Fachagentur Nachwachsende Rohstoffe e.V. (FNRR): [m.behrens@fnr.de](mailto:m.behrens@fnr.de)

John Vos, BTG Biomass Technology Group BV: [vos@btgworld.com](mailto:vos@btgworld.com)



The overall objective of BioEcon is to develop, extend and fully unlock the research potential of IUNG in accordance with the new global strategies trends and changes in national needs through the creation of an excellent international and interdisciplinary department on bio-economy and systems analysis. The knowledge, experience, developed tools, research programme and collaborations will allow the Institute to maintain the new unit in the Institute also after the completion of the ERA Chairs project, it will operate in close cooperation with the rest of the departments of the Institute, with main purpose being regional development in line with knowledge-based bio-economy. This structural change in IUNG is a response to an identified need and potential on the national level and will receive the support of public authorities, industry and other research structures.

Contacts: Magdalena Borzęcka: mborzecka@iung.pulawy.pl



Europe's bioeconomy strategy addresses the production of renewable biological resources and their conversion into vital products and bioenergy. The industry is leading in innovative and sustainable solutions, but SMEs face challenges as regards investments. To address this issue, the EU-funded MPowerBIO will create an online platform with digital tools for evaluating and training skills, enabling SME readiness for investment. It will hold 10 train-the-trainer sessions for 90 European bioeconomy clusters. The aim is to improve capacity to support SMEs in the high-quality preparation process of presenting their projects to investors. The best SMEs will be selected to compete in two final events. In addition, 72 ready-for-investment SMEs will be selected and rewarded during the European Bioeconomy Venture Forum.

Contacts: Britt Sandvad (coordinator) Food & Bio Cluster Denmark: bs@foodbiocluster.dk



Grenzeloos Biobased Onderwijs (Boundless Biobased Education) works on the development of demand-driven biobased education programs at secondary, higher and university level and on better training and research facilities for education and business.

Contacts: Bas Koebrugge: b.koebrugge@avans.nl



With a turnover value of €2.3 trillion and accounting for 8.2% of the European Union's workforce, the bioeconomy is a central element to the success of the economy overall, and brand owners delivering bio-based products and bio-based packaging are one of the main drivers to boost it. However, brand owners are often reluctant to invest in taking a bio-based approach due to perceived risks and uncertainties, and to a lack of adequate support from the innovation ecosystems. BIOSWITCH aims to encourage and support them to switch to bio-based approaches by hosting a set of communication actions and events that will allow shaping solutions to mitigate brand owners' perceived risks. Furthermore, the project will develop a toolbox that will allow to assess the brands' bio-based maturity level and assist their owners in the transition journey. The project will focus on four regions that will serve as model demonstrators: Andalusia (Spain), Denmark, Finland, and Flanders (Belgium).

Contacts: Anna Tenhunen (Project Coordinator CLIC Innovation Ltd): [anna.tenhunen@clicinnovation.fi](mailto:anna.tenhunen@clicinnovation.fi)  
Ana Martinez (Sustainable Innovations (SIE) and BIOSWITCH Dissemination and Communication Manager): [anamartinez@sustainableinnovations.eu](mailto:anamartinez@sustainableinnovations.eu)

Project contact: [info@bioswitch.eu](mailto:info@bioswitch.eu)



The main objective of this project was to establish open and informed dialogues, co-created by European citizens, the civil society, bioeconomy innovation networks, local research centers, business and industry stakeholders and various levels of government including the European Commission. For that BLOOM established five regional hubs (communities of practice) that allowed for an iterative process involving different stakeholders through various cycles of value development, enabling cross-fertilization and idea generation through shared knowledge and experiences. The interactions aimed to (a) raise awareness and knowledge on bioeconomy by enabling open and informed dialogue throughout the bioeconomy innovation processes (b) build up and strengthen a bioeconomy community, (c) gain a common understanding of the concept, providing reliable insights into bioeconomies, its practices, benefits and implications (d) foster learning and education. With that, the project supported the reduction of existing barriers towards a bioeconomy and stimulated bioeconomy activities at the regional and EU level.

The webpage will stay active until December 2025 providing for example guidelines on co-creation and engagement, a quiz on bioeconomy, several videos and pod-casts and the BLOOM school box which entails learning scenarios for STEM classes (primary and secondary level education) in 6 different languages, co-created and tested by teachers and questions frequently raised at outreach activities are listed and answered. Check it out: <https://bloom-bioeconomy.eu>

Contacts: Maria Schrammel: [schrammel@zsi.at](mailto:schrammel@zsi.at)  
Judith Feichtinger: [feichtinger@zsi.at](mailto:feichtinger@zsi.at)



**An integrated package of activities for sustainable production and consumption**

Production and consumption drive the economy, Global challenges like climate change, land and ecosystem degradation, coupled with a growing population, force us to seek new, sustainable ways of life that respect the ecological boundaries of our planet. The EU-funded Transition2BIO project is proposing an integrated package of activities addressing a wide range of stakeholders (demand side, supply side, multipliers and supportive environment). It will valorise and exploit sectoral communication tools and activities, raise public awareness of bioeconomy and contribute to the transition towards more sustainable production through engagement and education activities. The project is also funding the activities of the European Bioeconomy Network, an alliance of more than 80 projects and initiatives promoting bioeconomy.

Contacts: Chiara Pocaterra: pocaterra@apre.it



URBIOFIN project: Demonstration of an integrated innovative biorefinery for the transformation of Municipal Solid Waste (MSW) into new BioBased products

Due to the rapid growth of population, municipal solid waste (MSW) has contributed significantly to the total amount of waste generated by our society. Today in Europe, each habitant generates, in average, 0.5 tonnes of MSW per year, increasing at an annual rate of 10%. Around 40-50% of it correspond to organic waste. This organic fraction mainly contains carbohydrates, proteins and lipids, which are all useful raw material that can be converted to valuable products. Its valorisation will help to solve environmental pollution but also contributes to the transition from a linear to a renewable circular economy. Digestion and composting have contributed to the reduction of the biodegradable fraction of MSW sent to landfill. The low economical value of compost and biogas is limiting the sustainable implementation of separate sourcing systems since increasing citizen environmental (waste) taxes is then needed to tackle important logistic costs. New biobased products can help to improve waste treatment environmental and socioeconomical sustainability.

The aim of URBIOFIN project is to demonstrate the techno-economic and environmental viability of the conversion at semi-industrial scale (10 T/d) of the organic fraction of MSW (OFMSW) into: Chemical building blocks (bioethanol, volatile fatty acids, biogas), biopolymers (polyhydroxyalkanoate and biocomposites) or additives (microalgae hydrolysed for biofertilisers). By using the biorefinery concept applied to MSW (urban biorefinery), URBIOFIN will exploit the OFMSW as feedstock to produce different valuable marketable products for different markets: agriculture, cosmetics. URBIOFIN will offer a new feasible and more sustainable scenario alternative to the current treatment of the OFMSW.

Contacts: Project Coordinator Ms Caterina Coll, caterina@perseobiotech.com



Talent4BBI, the first industry led PhD MSCA programme is being led by BiOrbic, the Bioeconomy SFI Research Centre located in University College Dublin (UCD). Talent4BBI brings together 10 industry and 7 academic partners across 8 Member States and 1 Associated Country with the aim of training a cohort of 11 highly skilled industry-ready ESRs equipped to lead the future of the European bio-based industry sector. The programme provides a unique opportunity for Early-Stage Researchers (ESRs) to develop key skills, competencies and experience required by the bio-based industries through a targeted programme for future bioeconomy leaders. During the 60-month programme duration, the 11 ESRs will undertake PhDs of 48 months cohosted by industry and academia. The ESRs will be recruited and co-hosted by a consortium of 16 partners across 8 Member States and 1 Associated Country (7 universities and 9 leading bio-based industries) with a wealth of collective experience in training talented mobile researchers. 3 additional industry partners will also contribute their expertise to the PhD training programme.

The programme structure offers a unique opportunity for graduates to thrive in an industrial and academic research setting and enhance the ESR career opportunities in line with the MSCA COFUND work programme objectives.

Talent4BBI's selection process will be guided by principles of openness, transparency, merit, impartiality, and equality for the ESRs. Talent4BBI will impact the European Research Area through developing a uniquely qualified and career-driven talent pool, driving effective cooperation between industry and academia, and boosting the development of bio-based industries.

**Contacts:**

Prof. Kevin O'Connor - Programme coordinator  
Cathy Quinn - Programme manager

email: Talent4bbi@biorbic.com



UrBIOfuture's main goal is to bring Europe to the forefront of the bio-based industry, a sector in full growth that requires a high number of experts in its workforce. However, one of the challenges for its development is the educational gap between the professional profiles demanded by the sector and the existing educational offer. To bridge this gap is one of the main purposes of UrBIOfuture, which started on May 1st with the goal of boosting careers, new educational programmes and research activities. Since then, this initiative carried out research to map European educational programmes involving bio-based activities and to identify the skills mismatch between them and the bioindustry needs. In addition, it involved stakeholders from the education sector, academia and industry, it organised a series of events, and it elaborated a set of materials, all with the aim of setting the path for the industry to attract qualified talent.

Contacts: info@urbiofuture.eu and Ana Martinez: anamartinez@sustainableinnovations.eu

## Industry and the Bioeconomy

### 2.1 Industry engagement and feedback

Over 20 companies were interviewed as part of the fellowship, these predominantly include food companies (sole trader, small, medium and multinational). The feedback from the Bioeconomy sector specifically will be captured as part of a TU Dublin-DAFM workshop due to occur in March 2022.

Contributing companies;



Overarching feedback.

#### General

- Sustainability and not the bioeconomy should be the focus of an educational offering. Sustainability is one of the top priorities for food companies (Brexit and Covid-19) in the next 18 months, however, few companies have heard of the bioeconomy. The educational offering needs to teach companies that the bioeconomy is the vehicle to deliver a sustainable business.
- There is no shortage of literature on sustainability as a topic. However, there is very little information/guidance on how companies transition to becoming a more sustainable business. There is a demand for “applied sustainability” education.
- Sustainability will take the same route as safety in time, it will become part of every employees role in an organisation. Educational offerings need to reflect this, less people with deep expertise and all employees being sustainability literate.
- Responsibility for sustainability needs to span all functions of a business, if it is the responsibility of a small few then the organisation will never have a sustainability culture or action plan to becoming sustainable.

- Large companies appear to have priorities in the areas of (i) environment (ii) packaging (iii) emissions.
- Some companies have sustainability strategies that also include KPI's, the KPI's are at board level and have not filtered down to all staff.
- Companies have varying levels of “sustainability efforts”, some have measured carbon footprint of their value chain, some reclaim heat, some use anaerobic digesters. It appears that there are sustainability efforts being made in larger businesses (supported by investment), but a coherent sustainability strategy is not in action from top to bottom of any business, based on observations.
- “Water is a sleeping giant”. It is rarely part of the conversation, but one business thinks its only a matter of time.
- “No basic training on sustainability in practice being offered to employees”. Its not an unwillingness to support upskilling or MSc programmes by companies, but basic courses don't exist.
- Education sector needs to be able to pivot at a much greater pace than it is currently able to in order to meet the needs of industry.
- HEI, Solas, Skillnet all advising the bioeconomy forum group.
- Small businesses, simply don't know where to start with sustainability. Hard to commit to becoming more sustainable when you don't know how. Have not given sustainability education any consideration.
- Small businesses - training would need to be short and online. Never considered partnering with TU Dublin to advance their business (or another University).
- TU Dublin should focus on its strengths, the strengths of the School and the profile of businesses in its area when designing sector based educational offerings.

### Opportunities

- A lot of companies offer internal training on topic such as GDPR, however, most companies do not appear to offer basic sustainability training.
- 6-10 week courses in sustainability would be valuable to businesses, need to be customised to the sector. Needs to span different functions and increase sustainability literacy; Auditing, Benchmarking, Packaging, Regulation
- Skillnet operate courses on sustainability but there is space for a more focused approach.
- Areas of interest: Overarching circularity and how to become more circular, biorefining, waste reduction, packaging materials.

- Training/education needs to start at the top and make its way to the shop floor, directors, senior managers, managers, staff. All need appropriate training and all need KPI's for sustainability.
- “There is limited evidence that current sustainability plans are joined up from boardroom to shop floor in most food businesses. Instead, there are targets developed as part of a response to show green credentials. The lack of a coherent plan means most companies will fail to make meaningful change” – There is an educational opportunity in sustainability strategy. Source: Food company director.
- Opportunity: Design thinking and facilitated design sprints to help companies tackle sustainability challenges.
- Nestle have requested one company provide a sustainability strategy, Nestle have indicated that they will accept less competitive pricing in exchange for good sustainability credentials.
- Training needs to focus on management first, topics should include sustainability literacy, climate literacy, carbon credits, offsetting and scope 1,2 and 3.

### Challenges

- “Just transition” sounds easy, but is too difficult in practice.
- Three legs of sustainability are “lost in translation”.
- Marine sector unlikely to enrol in courses at any significant level, majority of jobs don't require sustainability knowledge.

## 2.2 Auditing and benchmarking

Engagement with small companies has shown that there are increasing demands from the supermarkets with regard to sustainability credentials. Furthermore, the person responsible for completing the audits is the same person who does general audits, CSR (person is overstretched). Larger companies have indicated that customers such as Nestle expect to see sustainability strategies and meaningful progress. There could be potential for training programmes in this area.

Furthermore, there is an increasing number of metrics associated with sustainability. One of the more prominent is the by the World Benchmarking Alliance. Interestingly, they have 350 companies signed up, many of which are the worlds largest food producers. An educational offering that aligns with improving sustainability literacy and technical knowledge aligned to the areas marked in the benchmarking tool could be of interest to industry.

<https://www.worldbenchmarkingalliance.org/publication/food-agriculture/>





Fig. 1. World benchmarking alliance food sector sustainability benchmark areas.

Table 1: Ranking of 350 Agrifood companies on their sustainability performance by WBA.

Food and Agriculture Benchmark		Ranking	Companies	Methodology	About	
	Total score out of 100	Governance and strategy out of 10	Environment out of 30	Nutrition out of 30	Social Inclusion out of 30	
<b>Score &gt; 40</b> 34 companies						
1	Unilever	71.7	10.0	20.5	17.5	23.7
2	Nestlé	68.5	7.5	20.0	18.8	22.2
3	Danone	63.6	8.3	22.5	16.3	16.5
4	OCP	56.8	7.5	18.8	15.0	15.6
5	Anheuser-Busch InBev	55.2	6.7	20.4	13.5	14.7
6	PepsiCo	54.5	9.2	18.4	10.0	16.9

<https://www.worldbenchmarkingalliance.org/publication/food-agriculture/rankings/>

## Bioeconomy network

### 3.1 Bioeconomy network in Ireland

The following four maps show the Irish Bioeconomy Industry by (i) sector (ii) business model (iii) biomass feedstock type and (iv) biomass product. A list of the 400+ companies can be found below the maps and represents a good target market for Bioeconomy education targeting lifelong learners in the Bioeconomy industry. EU biorefinery outlook to 2030 can be found here <https://op.europa.eu/en/publication-detail/-/publication/7223cd2e-bf5b-11eb-a925-01aa75ed71a1>

Industry Sectors

- 📍 Food Processing
- 📍 Breweries
- 📍 Academia
- 📍 Agri-Health
- 📍 Forestry
- 📍 Distillery
- 📍 Waste to Energy
- 📍 Wholesale
- 📍 Energy
- 📍 Agri-Tech
- 📍 Agri-Food
- 📍 Dairy
- 📍 Seafood
- 📍 Horticulture
- 📍 Waste To Energy














Business Model

- 📍 Conversion
- 📍 Facilitator
- 📍 Primary Producer
- 📍 Distributor
- 📍 RPO












### Biomass feedstock

-  No Feedstock
-  Grain
-  Land Animals
-  Fruit/Veg
-  Municipal Solid Wastes
-  Marine Animals
-  Wood Biomass
-  Other Plants
-  Marine Plants
-  Plastic
-  No Feedstock



### Biomass Products

-  Food & Beverage
-  Consulting/Service
-  No Product
-  Biochemicals/Biomaterials
-  Biofuel
-  Animal Nutrition & Health
-  Wood
-  Consulting/Service
-  Point 566



2 Acres Brewery	Biomass Energy Northern Ireland	Clonakilty Distillery Ltd	Drinagh Co-op Drinagh Branch	Good Herdsmen Ltd
5 Lamps Brewery	Bioplastech Ireland	ClonBio Group	Drover Foods	Goodness Grains
9 White Deer Brewery	BiOrbic	CMP mushrooms	Dublin City University	Granville Ecopark Ltd
ABO Wind Ireland	Biorefinery Research Implementation & Development Ltd	Codd Mushrooms	Dublin City Gin Company Ltd	Grassland Agro
ABP Food Group Ltd. Northern Ireland	Birds Eye Ireland Limited	Coilte	Dunbia Ireland Northern Ireland	Green Belt Limited
Achill Island Sea Salt	Black Donkey Brewery	College Proteins Limited	Duncrue Food Processors Ltd	Green Biofuels Ireland Ltd
Achill Oysters	Blacks Brewery	Comex McKinnon Ltd	Dundalk Institute of Technology	Green Circle EU Northern Ireland
Acom Renewables	Blath na Mara	Commercial Forestry Services Limited	Dungarvan Brewing Company	Greenfield Foods
ABC Economy Ireland	Blenders	Community Reuse Network Ireland	Ecoplastic	Green Isle Foods (Naas) Limited
Glanbia AgriChemWhey Project Site	Bord Bia - Irish Food Board Dublin	Compsey Creamery	Edlong Europe Ltd.	Greencore Northern Ireland
Agri-Food & Biosciences Institute (AFBI)	Bord Bia - Jascaigh Mhara (BIM)	Confirm Ireland	Eight Degrees Brewing Company	Green Gas AD Plant
Agrihealth Laboratory Services	Bord na Mona Ireland	Comemara Seaweed Company	Eiravato Ireland	Greentech Plastic LTD
AgriSearch NI	Boundary Brewing Cooperative Ltd.	Comemara Seafoods	Eirecomposite	Greenville Energy
AI Services (Northern Ireland) Ltd	Boynes Brewhouse	Conroy Forestry Management	EmeRi Nutrition	Grove Turkeys
Algaran Seaweed	Boyne Valley Group	Coole Swan Ireland	Energia Ireland	Guinness
All in All Ingredients	Bradley Tree Services	Cooley Distillery Ireland	Energy, Power and Intelligent Control (EPIC) Northern Ireland	H J Nolan (Dublin) Ltd
Alltech Ireland	Bradmount Foods	Cooley Oysters Ltd	Enerpower	Harp Renewables
Amber Research Center	Brandon Bioscience	Coolrain Sawmills Ltd	ENVA Northern Ireland	Harvest Distilling & Brewing Ltd
Andrews Flour Mills	Breffni Mushrooms	Co-Operative Animal Health Ltd (CAHL)	EnvEcon Limited	Hawthorne Forest Products Ltd
Andrew Ingredients Northern Ireland	Breizon Limited	Corcoran Ireland	Enviroeye Engineering Ltd	Heaney Farmhouse Brewery
Animal Health Ireland	Bremans Bread	Country Crest	Environmental Products and Services Northern Ireland	Hegan Biomass
Annaghs Poultry Farm	Brett Brothers Limited	Dublin Waste to Energy - (Covanta Plant)	Epicom	Heiken Ireland
APC Microbiome	Broughganmonn Farm	CP Ingredients Ltd	Erin Grove Preserves	Hemp Federation Ireland (Ireland)
Arbor Forest Management Ltd	Bru Brewery	Crossogue Preserves	Euro Farms Foods Ltd	Hercules Brewing Company
Amagh Cider Company	Bryden Centre Northern Ireland	Crowley Carbon	Evolved Energy Research	Hexafly
Arthur Mallon Foods	Bullhouse Brew Co Ltd	Cully & Sully Ireland	Fane Valley Ireland	Hibemia Distillers Ltd.
Anamara Teoranta	Bulmers Limited	CyberColloids Ltd	Farmageddon Brewing Co.	Hinch Distillery Co.
Ashbourne Meat Processors Limited	The Burren Smokehouse	Cybercolors Ltd	Famflo Ltd (Ireland)	Hope Craft Brewery
Athlone Institute of Technology	Butler Manufacturing Service	Dairy Concepts IRL	FARMVIEW DAIRIES	Horticulture Connected
Atlantic Fish Ltd	Butlers Chocolates Ireland	Dairy Council for Northern Ireland	Femroy Woodland Nurseries Ltd.	Horticulture Forum NI
Atlantic Dawn	BWG Foods Ireland	Dairygold Co Operative Society Limited	Finnebrogue	Hughes Northern Ireland
Avocet Ireland	Charles Vial (Fish Merchant) Limited	Dairy Industry Ireland	Finnegans Farm	Hultamaki Ltd Northern Ireland
Aurivo Co-operative Society Ltd.	C&C Group	Dairymaster Ireland	Finsa Forest Products Limited	HydraSure Ireland
Avondale Foods (Craigavon) Ltd	C&J Meats	Dairy Processing Technology Centre (DPTC)	Flahavan's	IGWT Poultry services
Axe Forestry Ltd	C.R. Wymn Ltd.	DALE Farm Northern Ireland	FMC Ireland	Indaver Waste-to-Energy
Balcas Timber Ltd	C2 Energy Ltd	Dalys Seafoods Limited Ireland	Follain	IndWoods Ltd
Ballon Meats	CAFRE	Dalzell Landscape Company	Food Drink Ireland	Inishmacsaint Brewing Company
Ballykeefe Distillery	Carr & Sons Seafood Ltd.	Danone Nutrition Ireland	Food for Health Ireland	Innotech Centre South West College
Ballykilcavan Brewery	Carroll's of Tullamore	Dansko Foods Limited	Food Safety Authority	Imperative Energy Ireland
Ballymaloe Foods	Carapacis N.I.	Dawn Farms Ireland	FoodCloud	Institute of Technology Carlow
Ballymooney Foods / Wild Irish Game	Carbery Group Limited	Dawn Pork & Bacon	Forest Measurement Ireland	Institute of Technology Sligo
Ballymore Farm Pet Foods Ltd	Carlingford Brewing Company	deDANU Ireland	Forestry Services Ltd.	Institute of Technology Tralee
Bandon Co-op Retail Centre	Carlingford Oyster company	Demetra Ireland	FOYLE FOOD GROUP Ireland	Ion Distillery
Bantry Bay Seafoods	Carlow Brewing Company	Demy's Ireland	Franciscan Well Brewery & Brewpub	IPM Potato Group Limited
Barclay Chemicals Manufacturing Limited	Cashel Farmhouse Cheesemakers	Department of Agriculture, Environment and Rural Affairs	Future Renewables	Irish Bioenergy Association
Barr an Uisce	Castletownbere Fishermans Co Operative Society Limited	Department of Agriculture, Food and Marine	Galway Bay Brewery	Ireland Craft Beers
Bary Group	CEINI Ltd	Devenish Nutrition Limited Northern Ireland	Galway Gin Co Ltd	Irish Biofuels
Bawnua Foods NI Ltd	Celignis Biomass Analysis Laboratory	Dew Valley Foods Limited	Gannon Eco	Irish Brewers Association
Beekon Batches Ireland	Celtic Bioenergy	Dingle Distillery	Garryhinch Mushrooms	Irish Co-operative Organisation Society
Beer Hut Brewing Co.	Centre for Advanced and Sustainable Energy	Diversitic Northern Ireland	Gem Pack Foods Ltd	Irish Country Meats
Begleys Distribution	Chanelle Group	Divilly's Ltd	Glanbia Ireland	Irish Distillers Ltd
Beotomics Ireland	Cherry Plastics Northern Ireland	Dolmen Design & Innovation	Glendalough Irish Whiskey Limited	Irish fish canners
BHSL Hydro	Chestnut Animal Feeds Limited	Donegal Brewing Company	Glenisk	Irish National Centre for the Circular Econ
Bia Ganbreise Teo	Chia Bia Ireland	Donnelly Fruit & Veg	Glenmar Shellfish Ltd	Irish Pride Bakeries Ltd. Ireland
Bimeda Ireland	Circular Economy Network NI	Dovea Genetics Ltd	Glenmon Brothers Ireland	Irish Yogurts Ltd.
BioAtlantis Ltd.	City Analysts	Down2Earth Materials	Glens of Antrim Craft Ale & Beers	Island Seafoods Ltd
BioBased Insulation Ireland	Clarke's Fresh Fruit	DP Energy	GMT	J. Grennan & Sons Ireland
Biocconnect Ireland	Cleapower Ltd	Dragon Brand Group Northern Ireland	Goldcrop Ltd	Johnston Mooney & O'Brien
Biofuture Ltd Ireland	Clearsky Brewing Co.	Draynes Farm	Golden Bake Ltd	JF McKenna Ltd
Bio-Marine Ingredients Ireland	Clonakilty	Drenagh Sawmills Ltd	Good Fish Processing	JFK Disposables

Jones McGirr  
JW Sweetman  
K&K Produce  
Keelings Farm Shop  
Keoghs LLP Ireland  
Kepak Group Head Office  
Kerriagans Butcher  
Kerry Group Northern Ireland  
KeiAda Phannachem Ireland Dublin  
Kettle Irish Foods  
Kieman Milling  
Kilbeggan Organic Foods  
Kildare Chilling Company  
Killarney Brewing Company  
Killowen Distillery  
Killybegs Seafoods Limited  
Kilmegan Cider  
Kinahans Ireland Whiskey Limited  
Kinnegar Brewing  
Kinsale Bay Food Company  
Kish Fish Co  
Lacada Brewery Ltd  
Lakeland Dairies Ltd Republic of Ireland  
Lamex Food Group Limited Northern Ireland  
Laois Sawmills  
Leinster Pellets Limited  
Lero Ireland  
Letterkenny Institute of Technology  
Liffey Meats  
Liffey Mills  
Lily O'Brien's Chocolate  
Limerick Institute of Technology  
Linden Food Group  
Lough Gill Brewery  
Lough Ree Distillery  
Listoke Distillery  
LSM Engineering  
Lynas Foodservices  
Mabbett Ireland  
MagGrow  
Mainstream Renewable Power Ltd  
Malting Company of Ireland Limited  
Carton Brothers & Manor Farm  
MaREI Centre  
Mars Ireland  
Masonite Ltd  
McCambridge Limited Ireland Dublin  
McColgans Quality Foods Ltd  
McCracken Real Ale  
Meade Potato Company  
Megazyme Ltd  
Mescan brewery  
Metalman Brewing Company  
mBio  
Mileeven Fine Foods  
Monaghan Biosciences  
Monaghan Mushrooms Ireland  
Moorepark Technology  
Moume Dew Distillery  
Moy Park Northern Ireland

Mowi Ireland  
Murray Timber Group  
Musgrave group Republic of Ireland  
National Biodiversity Data Centre (NBDC)  
National Chemical Co. Ltd.  
National University of Ireland Galway  
Natural World Products  
Nature's Best Limited  
Naringtech (Ireland)  
Nestle (Ireland) Limited  
Newbaze  
NI Farn Forestry  
NI Grain Trade Association  
None-So-Hardy (Forestry) Ltd.  
Norfish Limited  
Normandy Ireland Exports Limited  
North Cork Co-Operative Creamery Limited  
Northbound Brewery Ltd.  
Northern and Western Regional Assembly  
Northern Ireland Food and Drink Association  
Northern Ireland Hemp Association  
Northern Ireland Plastics Ltd.  
Northern Ireland Polymer Association  
Northern Ireland Renewables Industry Group (NIRIG) Ireland  
Nurge Limited  
Nuritas  
Nutramara  
Nutribio  
NVP Energy Limited  
Oakleaf Forestry  
OCAE Consultants Limited  
Ocean Harvest Technology Ltd  
O'Donnells Crisps  
O'Hanlon Herbs  
Oilean Glas Teoranta  
Old Bushmills Distillery Co.  
Oliver Carty  
O'Neill's Dry Cure Bacon Co  
Oriental Marine Extracts  
Ormonde Organics  
Orma Co-operative Limited Ireland  
Pallas Foods Ireland  
Páirc na Mara  
Pearson NI Ltd  
PepsiCo Ireland  
Pokertree Brewing Company  
Porterhouse Brewing Company Ireland  
Portmagee Distilling and Brewing Company Ltd Ireland  
Positive Farmers Ireland  
Powerscourt Distillery  
Premier Green Energy  
Premier Woodlands Ltd  
Premiere Poultry Ltd Northern Ireland  
Provita Eurotech Ltd  
Purefiber Ireland  
Pure Marine Gen Ltd  
Queen's University Belfast  
R & S Biomass Equipment  
Rademon Estate Distillery  
Rangeland Foods

Rascals Brewing Company  
Rebel City Distillery  
Re-Gen Waste  
Reilly Mushrooms  
Renewable Engine Ireland (North)  
Resourceful Organics Northern Ireland  
Rich Sauces Ltd  
Riverridge  
RJ Woodland Services  
Roland Forestry Ltd  
Rosderra Irish Meats Group Limited  
Roundwood Timber Ltd  
Royal Oak Distillery Ltd  
RTD Crawford Ltd  
Rye River Brewing  
Sam Dennigan and Company Wholesale Ireland  
Samco Agricultural Manufacturing Ltd.  
SAP Nurseries  
Sauce Master Ltd  
Scottish Woodlands Ltd Northern Ireland  
Scott's Irish  
SDS Energy  
Seascope NI Lobster Hatchery & Marine Research Centre  
Shabra Plastics & Packaging  
Shannon Applied Biotechnology Centre Ireland  
SilverHill Duck  
Slane Distillery  
Slaney Foods International  
Sliabh Liag Distillers  
Smartply Europe Ltd  
Smithwicks  
Smart food Ireland  
Sofimar Limited  
Solar 21 Ireland Dublin  
Spoonful Botanical  
SSE Electricity Northern Ireland  
Stapleton's Bakery  
Strathroy Dairy Ltd  
Stream Bioenergy  
Supernode Ireland  
Surefire Wood  
Sustainable Energy Authority of Ireland (SEAI)  
Sustainable Food Systems (SFS) Ireland  
Sustainable Nation  
Sustainable Insulation products Ltd Ireland  
Sws Forestry Services Ltd  
T.E Laboratories  
Target Fertilisers  
Tayto Ireland  
Teagasc Ireland  
Technological Higher Education Association (THEA)  
Teeling Whiskey Distillery  
Tempted Cider  
Terra NutriTECH  
Terra Spirits & Liqueurs Ireland  
The Boatyard Distillery  
The Circa Group Europe Limited  
The Copeland Distillery  
The Echlinville Distillery  
The Forestry Company Ireland

The Happy Pear: Recipes for Happiness  
The Irish South & West Fish Producers Organisation Limited  
The Landscape Company Northern Ireland  
THE QUIET MAN IRISH WHISKEY CO. LTD.  
The Soil Man  
Three County Energy Agency  
This Is Seaweed Ltd Ireland  
Tipperary Co-Operative Creamery Limited  
Tipperary County Council  
Total Produce Republic of Ireland Dublin  
Treaty City Brewing  
Treescapes NI  
Trifol Resources Ireland  
Tristan Kinnear  
Trinity College Dublin  
Tyndall National Institute  
Tyrone Energy Ltd  
Ulster University UK  
Údarás na Gaeltachta  
University College Cork  
University College Dublin  
University of Limerick  
Urban Biomass Ltd  
Valeo Foods Group Ireland  
Veon Limited Ireland  
Virginia Health Food Ltd  
Walled City Brewery  
Walsh Whiskey  
WD Meats  
West Cork Brewing Company  
West Cork Distillers Limited Ireland  
West Kerry Brewery  
Westland Horticulture  
When We Are Giants  
White Gypsy Brewery  
White Hag Brewery  
WHITEWATER BREWING CO Northern Ireland  
Wicklow Wolf Brewery  
Wild Atlantic Distillery  
Wild Irish Seaweed  
Willowbrook farmfoods  
Wilsons Country  
Woodco Renewable Energy Ltd  
Woodland Managers Limited  
Woodfab Timber Ltd  
Waste & Resources Action Programme NI  
YellowBelly Beer  
WEW Engineering  
Ashleigh Environmental Ireland  
Agri Aware  
Almac Group  
ApisProtect



### 3.2 European Bioeconomy Education

A co-create event co-hosted by the European community of Practice for Bioeconomy Education, ICA and the European Bioeconomy network brought together over 30 experts from Industry and academia and discuss the bioeconomy educational needs of (i) primary school students (ii) secondary/third level students and (iii) industry based learners. The outputs from each will be useful in the future design of programmes, courses or outreach events targeting the different sectors.

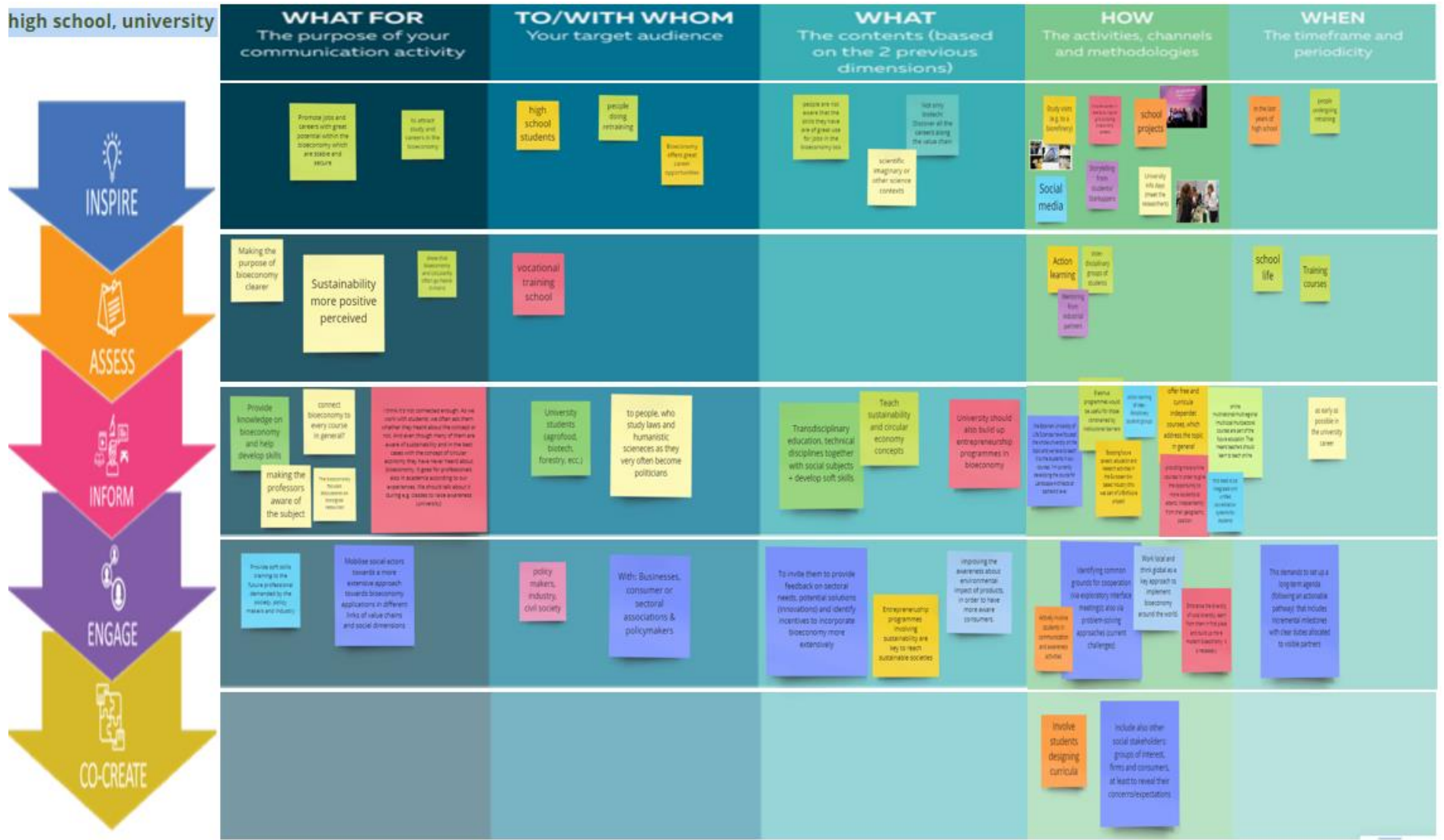
In relation to the Industry based learns, which is most relevant to the current body of work, the group highlighted the need for bioeconomy education for all sectors/ professions and should not be limited to the bioeconomy sector as this will limit the advice available and the growth opportunities. There is limited understanding of the role of the bioeconomy in delivering a sustainable economy, this needs to change through education of all cohorts of society. Society needs to become more aware of biobased products in order to support/ provide a market for biobased products.

Elementary and High Schools



WHAT FOR The purpose of your communication activity	TO/WITH WHOM Your target audience	WHAT The contents (based on the 2 previous dimensions)	HOW The activities, channels and methodologies	WHEN The timeframe and periodicity
<p>Growth citizens of tomorrow</p> <p>attract students to bio studies</p> <p>future workforce</p> <p>when should the key info information go out and monitor it in the same way as marketing?</p> <p>raise awareness</p>	<p>Primary schools students</p> <p>Students in general</p> <p>Families</p> <p>SMEs</p> <p>primary sector</p> <p>with whom: teachers</p> <p>Museums</p> <p>youth organisations/charities/organisations/summer schools/young scientists/STEM activities</p>	<p>what is the bio-economy?</p> <p>bio-based alternatives</p> <p>what are the bio-based products?</p> <p>from waste to resource</p> <p>Ed in the medium term</p>	<p>Hand-on</p> <p>to-based products exhibition</p> <p>books, games, videos</p> <p>legos/kit/STEM activities</p> <p>Success stories</p> <p>access to experts</p>	<p>starting of the activities</p> <p>that will be a model to see in the workshop</p> <p>other schools/colleges/universities</p>
<p>To train the educators</p> <p>To create awareness about bio-economy</p> <p>To create skills and impact</p>	<p>value chains at the local level</p> <p>Ministry of Instruction</p>	<p>focus the need of the target audience (primary school)</p> <p>making the communication easier and engaging (lower science and high knowledge)</p> <p>which understands the barriers for the multipliers to transfer the knowledge to their targets</p>	<p>offer the activities to the audience of high schools</p> <p>for secondary education (science, arts, methodology) depending on industry (see the link below)</p> <p>Start from local level</p> <p>long-term learning</p>	<p>Start from local level</p>
<p>Train the future generation</p> <p>address the role of the upcoming industrial model</p> <p>to increase the level of awareness and understanding of the bio-economy</p>	<p>Multippliers</p> <p>specific/the values chains</p> <p>accelerators / business incubators</p> <p>secondary sector (SMEs)</p>	<p>how this can be done</p> <p>the companies and financial sources</p> <p>concrete benefits (not only green savings)</p> <p>network of experts</p>	<p>offer the activities to the audience of high schools</p> <p>offer the activities to the audience of high schools</p> <p>offer the activities to the audience of high schools</p> <p>offer the activities to the audience of high schools</p>	<p>offer the activities to the audience of high schools</p>
<p>To create alliances</p> <p>support collaboration / create the feeling of ownership</p> <p>LEAP project</p>	<p>teachers to build info materials</p> <p>LEAP project</p> <p>companies</p> <p>local authorities</p>	<p>you can be part of the transition</p> <p>Case studies</p>	<p>offer the activities to the audience of high schools</p> <p>offer the activities to the audience of high schools</p> <p>offer the activities to the audience of high schools</p>	<p>offer the activities to the audience of high schools</p>
<p>Assess the level of maturity of the country</p> <p>support young generation to be active</p>	<p>companies</p> <p>local authorities</p>	<p>Case studies</p>	<p>offer the activities to the audience of high schools</p> <p>offer the activities to the audience of high schools</p> <p>offer the activities to the audience of high schools</p>	<p>offer the activities to the audience of high schools</p>

high school, university





**industry**



WHAT FOR The purpose of your communication activity	TO/WITH WHOM Your target audience	WHAT The contents (based on the 2 previous dimensions)	HOW The activities, channels and methodologies	WHEN The timeframe and periodicity
<ul style="list-style-type: none"> <li>inspire entrepreneurs, startups, entrepreneurs</li> <li>to create interest and awareness</li> <li>promote rethinking</li> </ul>	<ul style="list-style-type: none"> <li>regional authorities</li> <li>general audience</li> <li>cluster of ideas, case study showcases</li> <li>policy makers</li> </ul>	<ul style="list-style-type: none"> <li>secondary offers opportunities to create business</li> <li>clear definition of bioeconomy</li> <li>inspire people and establish the bioeconomy as an energy</li> </ul>	<ul style="list-style-type: none"> <li>workshops, seminars, round tables</li> <li>on national level, pilot cities</li> <li>BioART Gallery</li> <li>bio-based products exhibition</li> </ul>	<ul style="list-style-type: none"> <li>now</li> </ul>
<ul style="list-style-type: none"> <li>define needs, create specific knowledge, needs of users</li> <li>to collect all the voices</li> </ul>	<ul style="list-style-type: none"> <li>Knowledge production universities</li> </ul>		<ul style="list-style-type: none"> <li>create visibility about these things, so we can be necessary to engagement</li> </ul>	
	<ul style="list-style-type: none"> <li>industrial cluster</li> <li>Policy makers</li> <li>Finance</li> </ul>	<ul style="list-style-type: none"> <li>Government has to do the first step to:</li> <li>Education</li> <li>Regulation are important to allow investors to invest in Bioeconomy</li> <li>Education is a must in bioeconomy, we need to inform about the role of bioeconomy in bioeconomy</li> <li>educate and show the potential</li> </ul>	<ul style="list-style-type: none"> <li>Government has to do the first step to:</li> <li>Education</li> <li>Regulation are important to allow investors to invest in Bioeconomy</li> <li>need to education to help the leadership in Europe</li> <li>beginning to do pilot cities and monitor of the work progress</li> <li>Financing the message about bio-based products in the market</li> <li>bio-based products exhibition</li> <li>workshops, seminars, round tables</li> </ul>	
		<ul style="list-style-type: none"> <li>where bioeconomy leads sustainability goals</li> </ul>	<ul style="list-style-type: none"> <li>We have to work with these people, they are motivated but we need to change their practice, highlight the bioeconomy facts</li> </ul>	

## Opportunities for the School of Food Science & Environmental Health, Convене and TU Dublin.

### 4.1 Educational opportunities

The success of the Bioeconomy is not dependent on the training of several hundred scientists / bioprocess engineers but on a society where citizens choose to buy biobased products, business people have the knowledge to run a biobased enterprise, solicitors and financial advisors can accurately advise biobased businesses and engineers can build with biobased materials. The School of Food Science and Environmental Health can train the scientists / bioprocess engineers required to produce biobased products, but it can also play a role in the wider education of society. Outlined below are a number of educational opportunities that could allow the School to teach both deep and broad knowledge of the bioeconomy to undergraduates, industry based learners, returning to education learners and the general population.

#### 1. BSc in Biotechnology, Bioprocessing and Bioeconomy.



The success of the bioeconomy is dependent on the workforce having a broad skillset and flexibility with regards to the ability to adapt to new and evolving challenges that span the sciences, engineering, agriculture/environment and policy (Bioeconomy Forum). Engagement with UCD indicated that their undergraduate programmes in biosystems engineering were difficult to fill to capacity with students showing a strong preference for traditional engineering fields, however, their courses have proven very popular (nationally and internationally) at postgraduate level. On this basis, a BSc in bioprocessing and bioeconomy alone could be a challenge to fill.

There are 11 courses in the CAO with a Biotechnology offering in the title and 20 appear when the search term “biotechnology” is used. The biotechnology courses span level 7 and level 8 and cover general biotechnology, pharmaceutical biotechnology and medicinal biotechnology with limited offering in the area of food or the bioeconomy.

A level 8 programme in “Biotechnology, Bioprocessing and Bioeconomy” would align with the demand for biotechnology courses but differentiate itself from existing programmes by focusing on the food, bioeconomy and biomaterials fields. Furthermore, such a programme would span the core sciences, engineering and food/agriculture leading to the development of graduates that can work in a dynamic field such as the bioeconomy.

## Search Results for "biotechnology".

(Links to HEI web pages are provided where supplied)

[AL730](#) Biotechnology - Level 7  
[AL838](#) Biotechnology - Level 8  
[DC180](#) Biological Sciences General Entry (Undenominated Entry) - Level 8  
[DC181](#) Biotechnology - Level 8  
[DK781](#) Science - Bioscience - Level 7  
[DK783](#) Science - Pharmaceutical Science - Level 7  
[DK883](#) Science (Award options) - Level 8  
[GY304](#) Biotechnology - Level 8  
[LC362](#) Biotechnology and Biopharmaceutical Sciences [Limerick] - Level 8  
[LM068](#) Food Science and Health - Level 8  
[MH202](#) Biotechnology - Level 8  
[MT775](#) Applied Biosciences (Degree Award Options) [Cork] - Level 7  
[MT782](#) Applied Physics and Instrumentation [Cork] - Level 7  
[MT873](#) Pharmaceutical Biotechnology [Cork] - Level 8  
[SG449](#) Medical Biotechnology - Level 8  
[TU751](#) Biosciences [City Centre] - Level 7  
[TU854](#) Science (General Entry) [City Centre] - Level 8  
[WD002](#) Science (options) - Level 8   
[WD177](#) Science (Mol. Biology with Biopharm., Food Science with Business, Pharm.) - Level 7   
[WD205](#) Molecular Biology with Biopharmaceutical Science - Level 7

## Search Results for "bioprocess".

(Links to HEI web pages are provided where supplied)

[DC180](#) Biological Sciences General Entry (Undenominated Entry) - Level 8  
[DC181](#) Biotechnology - Level 8  
[DN150](#) Engineering (Common Entry) - Level 8  
[MT775](#) Applied Biosciences (Degree Award Options) [Cork] - Level 7

## Search Results for "bioeconomy".

(Links to HEI web pages are provided where supplied)

[DK781](#) Science - Bioscience - Level 7  
[DK783](#) Science - Pharmaceutical Science - Level 7  
[DK883](#) Science (Award options) - Level 8  
[WD076](#) Forestry - Level 7

### 2. PG Dip / MSc in Food Business Management and Sustainability (Strategy)

Engagement with food companies has shown limited knowledge of the bioeconomy in small and medium enterprises while large food companies vary from some knowledge to expert. However, all companies expressed a need/desire for more knowledge on sustainability, specifically applied sustainability. Many companies indicated that they want to be more sustainable but simply don't know what a sustainable version of their business looks like. Feedback suggests education that helps businesses put sustainability into action would be popular. In discussing the big areas of concern, companies indicated (i) Brexit (ii) Covid-19 and (iii) Sustainability as the big items of importance to their business in the present and near future. Areas of interest would include sustainability in action, sustainability benchmarking and sustainability auditing.

A collaboration with the School of Business that teaches the technical side of sustainability and the bioeconomy as a vehicle to delivery sustainability would be appealing. At present, sustainability is seen as being a cost to be paid (but a necessary one), few businesses have embraced the idea/ approach of being more profitable through a sustainable business model, the bioeconomy can help achieve this. An example of this would be Monaghan mushrooms who's biosciences department makes a significant number of products from mushroom waste.

### 3. Short applied training courses.

Feedback from DAFM and the Bioeconomy forum has indicated a skills shortage in the biorefining of biomass into high value products. At the time of writing an event co-hosted by

DAFM and TU Dublin will meet with Bioeconomy forum members (March 2022) to understand the specific skills needed. It is envisaged that short courses using the bioeconomy training lab would be the best approach to addressing the skills shortages.

#### 4. Springboard – T skills

A transversal skills application has been submitted to Springboard, lead by Norah Cussen, the application includes one module on the Bioeconomy that will teach the bioeconomy through an entrepreneur lens, helping to teach students how to identify business opportunities in the bioeconomy.

#### 5. General public – Tech sector

Dublin has a strong tech sector (Google, Facebook, LinkedIn, Microsoft), they tend to be strong for staff training/upskilling, and they tend to have a lot of young employees (20-35 years) amongst whom sustainability is a subject of interest. Speaking with Google, they cover 66% of the cost of a programme related to a persons role and 33% of a course not related to a persons role (personal interest). Where there is a strong interest in a course, Google often look to bring the provider in, while they lose accreditation it is significantly cheaper for google, and the staff still get the knowledge.

Negotiating at this level, TU Dublin could offer a 1 day course on "Sustainability, climate and the latest advances", and we could "sell/recruit" 500-1000 places in one go and offer the course 10-20 times across the year (small enough that people can ask questions). A course like this could include a session on the bioeconomy and biobased products as well as providing an insight into the latest research in areas like food and climate research and sustainability.

#### 6. University wide elective

At the recent University staff meeting “Introducing the UMT”, one of the initiatives announced was the role out of a University wide module on sustainability. A similar module on the Bioeconomy could be valuable to Business, Engineering, Humanities and Science students.