DPTC DAIRY PROCESSING TECHNOLOGY CENTRE

TECHNOLOGY CENTRE SUPPORTED BY ENTERPRISE IRELAND

DPTC PRESENTS:

CIRCULAR DAIRY SUMMIT 2024

HARNESSING OPPORTUNITIES FOR A SUSTAINABLE FUTURE

24 OCTOBER | THE OSPREY HOTEL, NAAS

AGENDA

DPTC DAIRY PROCESSING TECHNOLOGY CENTRE
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09:30

Welcome from the Chair
Ivan Yates - Broadcaster and Former Minister for Agriculture

Ministerial Address
Martin Heydon - Minister of State at the Department of Agriculture, Food & the Marine

Opening Remarks from Host
Dr Anne Marie Henihan - Centre Director, DPTC

10:00 – 10:30

Advancing the Circular Bioeconomy: Innovations and Future Directions in Dairy Processing - Research Showcase

10:30 – 10:50

Innovative Flagships: Pioneering Solutions for Dairy in the Circular Bioeconomy

10:50 – 11:20

Panel Discussion
Future Innovation Requirements to Support the Irish Dairy Achieve Sustainability and Circular Goals

11:20 – 11:50

Coffee, Exhibition Area and Networking

11:50 – 12:20

Road Map for the Future Decarbonising Ireland: Learning from Northern Ireland's Anaerobic Digestion Journey

12:20 – 13:20

Panel Discussion
Unlocking Potential: Policy Support for the Dairy Sector in the Circular Economy

13:20 – 14:15

Lunch

14:20 – 15:30

Panel Discussion
Navigating Opportunities and Challenges in the Circular Bioeconomy for Dairy Farmers and Processors

15:30 – 16:20

Panel Discussion
Shaping the Future: Market Design for a Circular Dairy Economy

16:20 – 16:30

Closing Speech and Summit End

DPTC DAIRY PROCESSING TECHNOLOGY CENTRE
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WELCOME FROM THE CHAIR

Ivan Yates

Broadcaster and Former Minister for Agriculture

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MINISTERIAL ADDRESS

Minister Martin Heydon

Minister of State at the Department of Agriculture, Food and the Marine

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OPENING REMARKS FROM THE HOST

Dr Anne Marie Henihan
DPTC Centre Director

SESSION 1

Advancing the Circular Bioeconomy - Innovations and Future Directions in Dairy Processing

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Professor Vincent O'Flaherty
University of Galway

James Gaffey
CircBio

Assoc. Professor David Styles
University of Galway

RESEARCH SHOWCASE

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Circular Bioeconomy Research in the Dairy Processing Technology Centre

Vincent O'Flaherty

Innovation in *Irish Dairy* Processing

Pathway to Impact

- Industry needs clearly set out:– sludges, effluents, compliance risks
- Strong teams, good interaction and collaboration
- The development of strong collaborative ethos, trust and communication has accelerated progress and pathway to impact

TRL 7 Demonstration

Energy and Water: Energy, odour and water-efficient processing systems. Water recovery and re-use

Nutrient Removal and Recovery: from concentrated streams = new fertiliser products

Valorisation of side streams: to bio-economy feedstocks, raw materials or products, e.g. volatile fatty acids

Valorisation of Sludge to Biogas/Biomethane: displace fossil sources of energy and fertiliser

Co-development: pathways linked with associate members and stakeholder network

Project impacts: Scalable solutions

Site-based process model, best practice guidelines for water and energy based on community of practice model

99%+ Phosphorus and 80% Nitrogen recovered upstream

Valuable platform chemicals potential food/feed ingredients produced at high-efficiency - volatile fatty acids

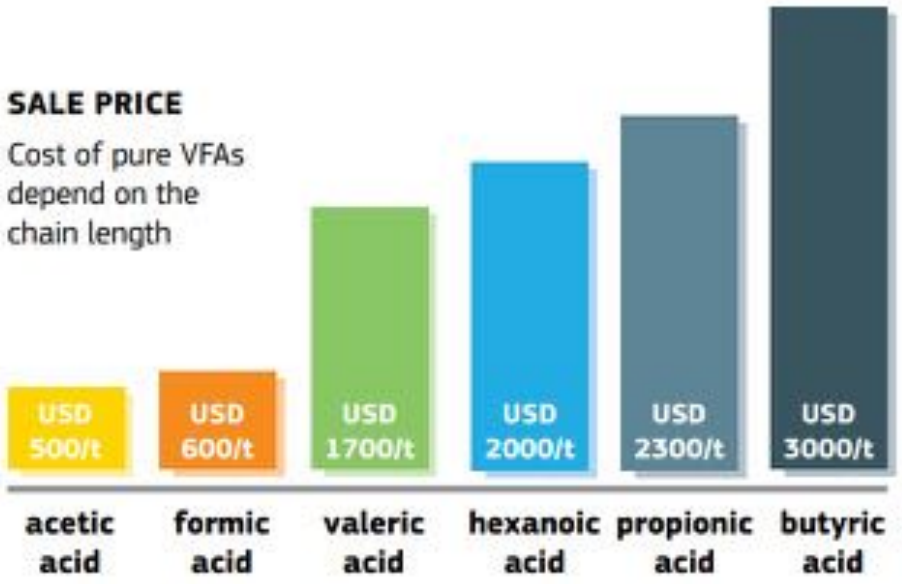
Pre-treatment to unlock 2X energy (as biomethane) during AD of effluent concentrates and sludges

Hydrothermal carbonization provides nutrient-rich material meeting EU Fertilizing Product Regulations

Reduce COD by 90% in concentrated streams - lower effluent costs, less sludge and pressure on infrastructure

Compliance - target individual partner opportunities

Volatile Fatty Acid (VFA) recovery: a bioeconomic opportunity



EU commission expected VFA market value: US$26.7bn by 2031

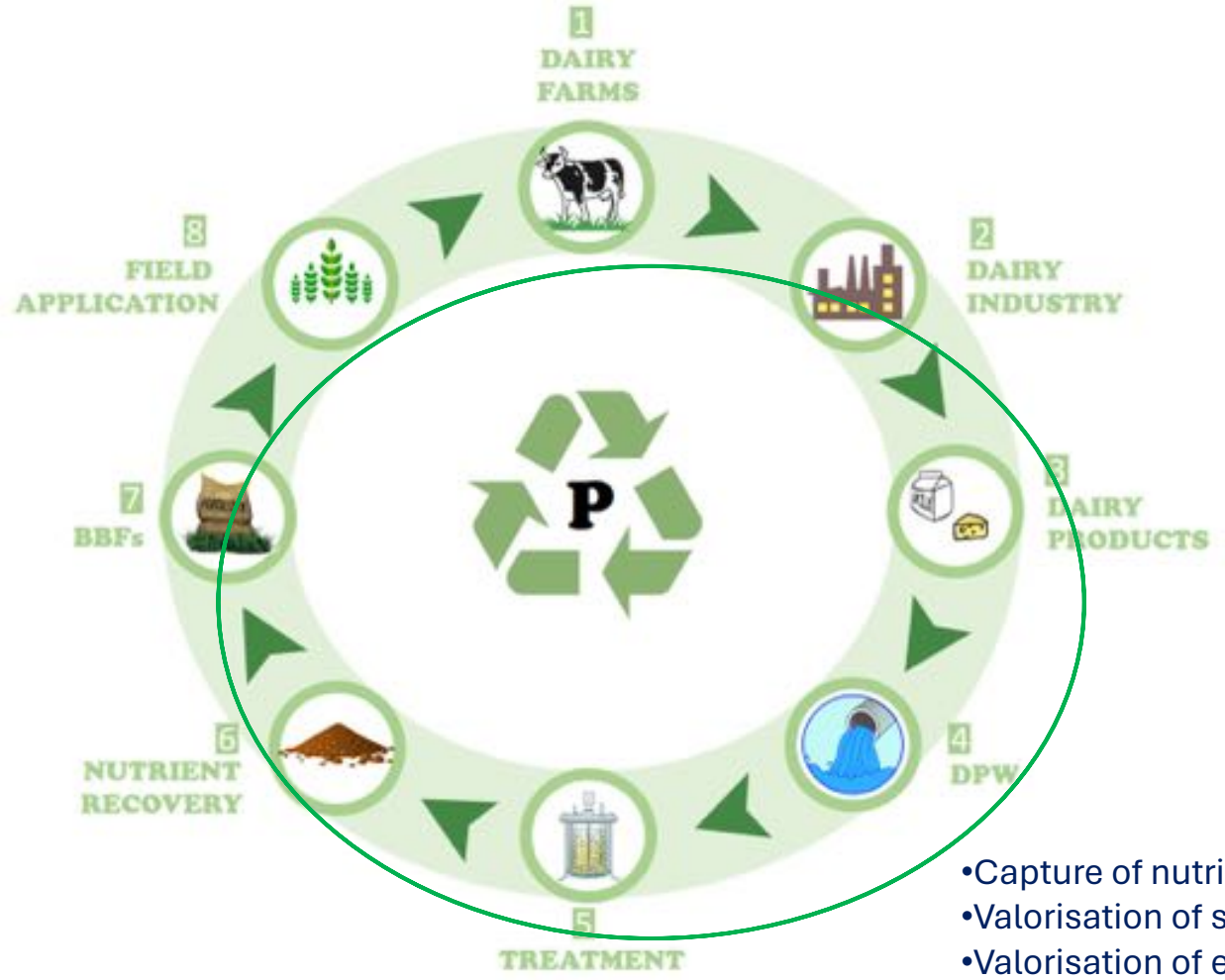
- ✓ The production of bio-based VFAs would provide a potential route for valorisation of dairy side streams
- ✓ Improve sustainability in dairy industries and contribute to circular economy and sustainable development goals

- ✓ VFA platform accelerates the transition from traditional production to the concept of biorefineries

Innovation in *Irish Dairy* Processing

Sectoral impact

- Robust, long-term, regulatory compliance
- Cost-benefits through by-product valorisation
- Optimised energy efficient processing to reduce cost, carbon and energy footprints
- Transform effluent and sludges from cost burden to a valuable resource
- Quality of recovered products unique in a bioeconomy context
- **Need to integrate into wider bioeconomy initiatives**



- Capture of nutrients
- Valorisation of side streams
- Valorisation of effluent concentrates

Innovation in *Irish Dairy* Processing

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Circular Bioeconomy Research in the Dairy Processing Technology Centre

Vincent O'Flaherty

Innovation in *Irish Dairy* Processing

MTU
Ollscoil Teicneolaíochta na Mumhan
Munster Technological University

Farm Zero C & the role of Green Biorefinery in a sustainable dairy model

James Gaffey

24.10.2024

CIRCBIO research group

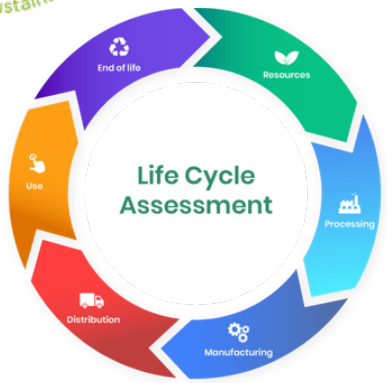
biorbic

www.mtu.ie

Farm Zero C

Building a climate neutral dairy farm

Farm Zero C - Key Focus Areas



Life Cycle Assessment

Animal Emissions

Breeding and Animal Health

Soil and Grassland

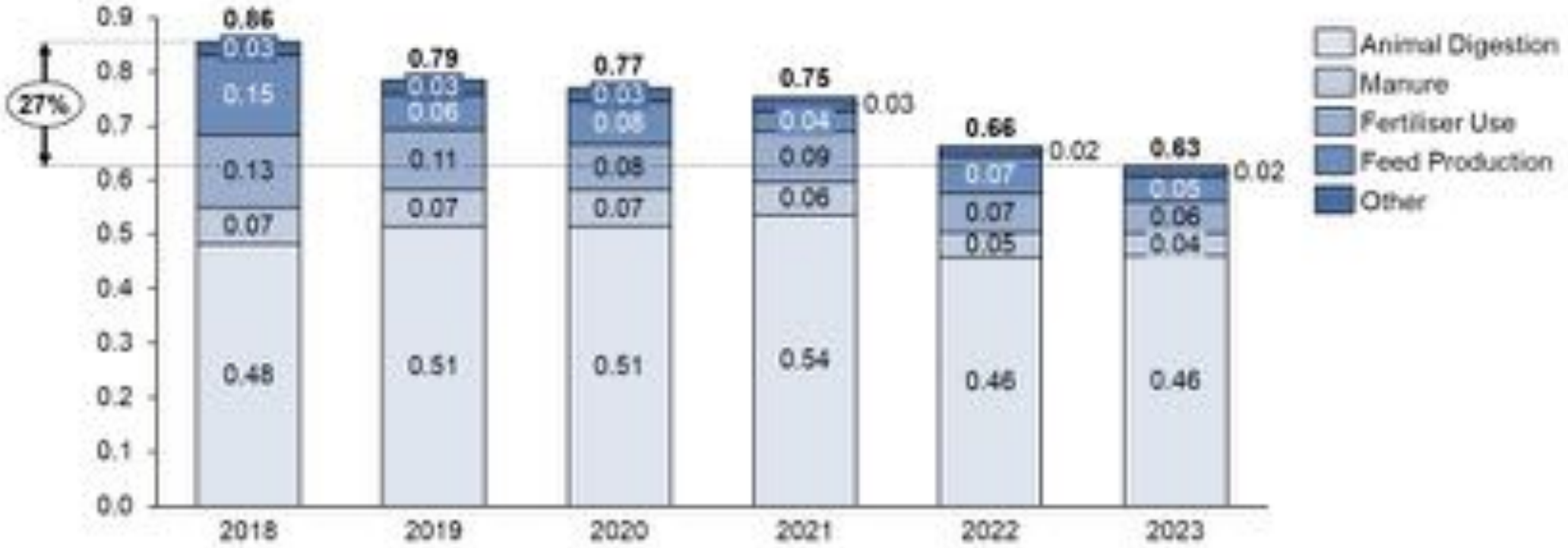
Renewable Energy

Green Biorefinery and Anaerobic Digestion

Biodiversity and Natural Capital Accounting

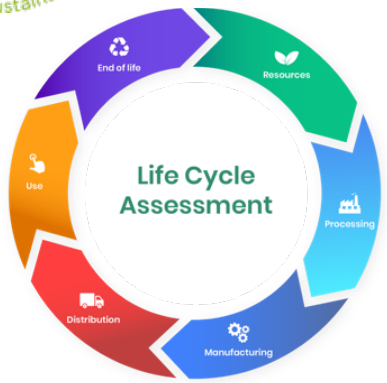
Water and Air Quality

Farm Zero C – LCA findings



Vergara et al. 2024

Farm Zero C - Key Focus Areas



Life Cycle Assessment

Animal Emissions

Breeding and Animal Health

Soil and Grassland

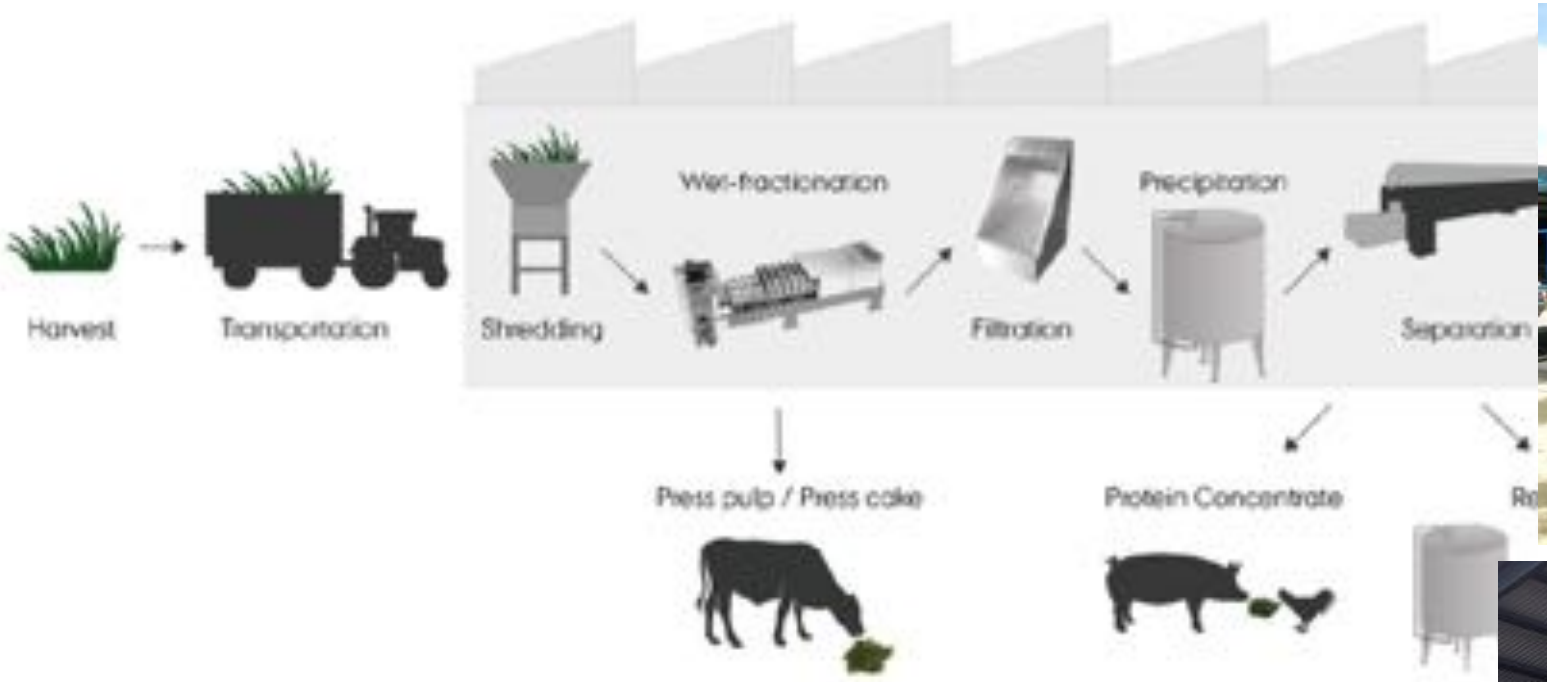
Renewable Energy

Green Biorefinery and Anaerobic Digestion

Biodiversity and Natural Capital Accounting

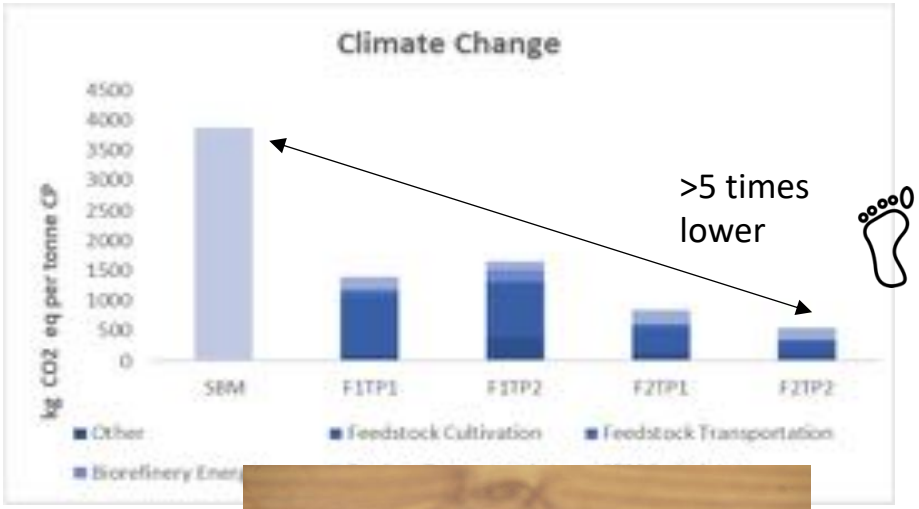
Water and Air Quality

What is green biorefinery?



Our research findings

- Biorefinery pulp appears to successfully replace grass silage in dairy diets *(Serra et al., (2023), Costigan et al., (2024))*
- Extracted protein concentrate has replaced 50% of soybean meal in pig diets *(Ravindran et al., (2021), Gaffey et al., (2023))*
- Grass-based FOS showed comparable performance to on-the-market prebiotics *(Menon et al., (2024))*
- *Brown juice residues shows good potential to produce biogas/biomethane – for use within process* *(Ravindran et al., (2022))*



TRL advancement to pilot & demo scale

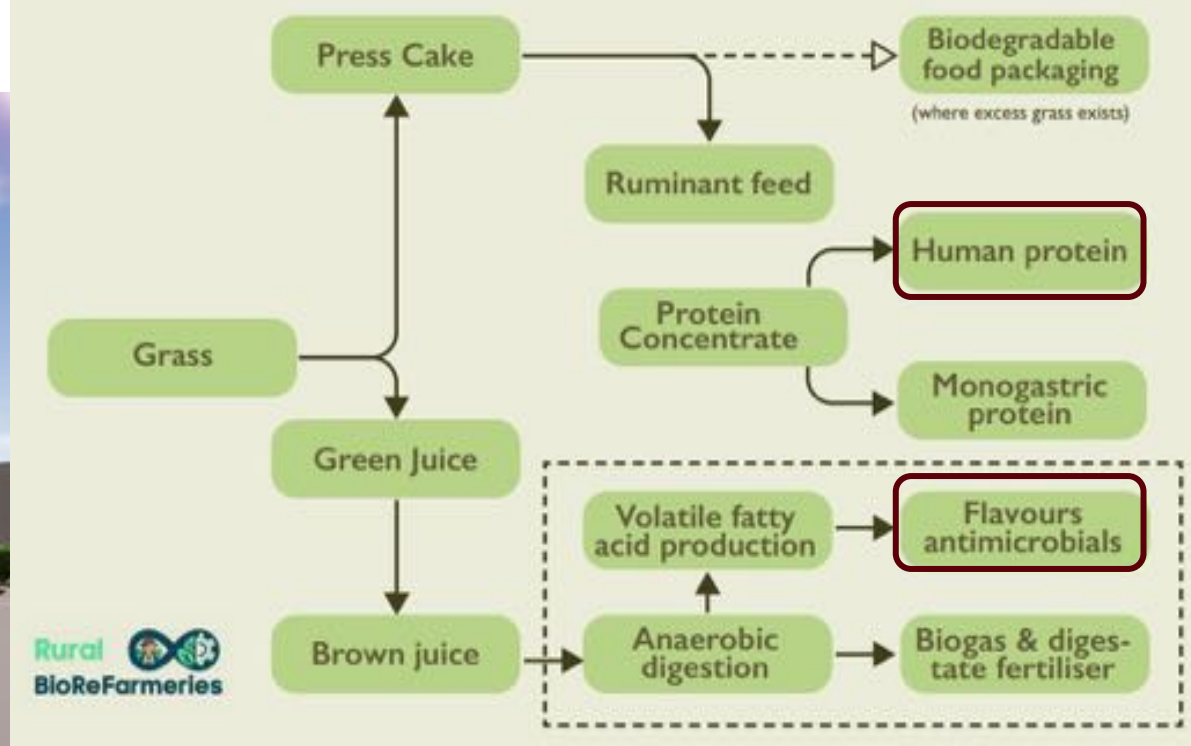
gov.ie Departments Consultations Publica

Press release

Ministers McConalogue and Heydon announce €3 million for integrated anaerobic digestion and green biorefining demonstration initiative

MTU to lead €9m farm-based biorefinery demonstration

Aisling O'Brien
May 17, 2024 8:00 am



THE FUTURE IS GREEN

Thank you!

The Future is now!

MTU
Oilscoil Teicneolaíochta na Mumhan
Munster Technological University

Thank You!

For more information, please email james.gaffey@mtu.ie

James Gaffey

24.10.2024

CIRCBIO research group

www.mtu.ie

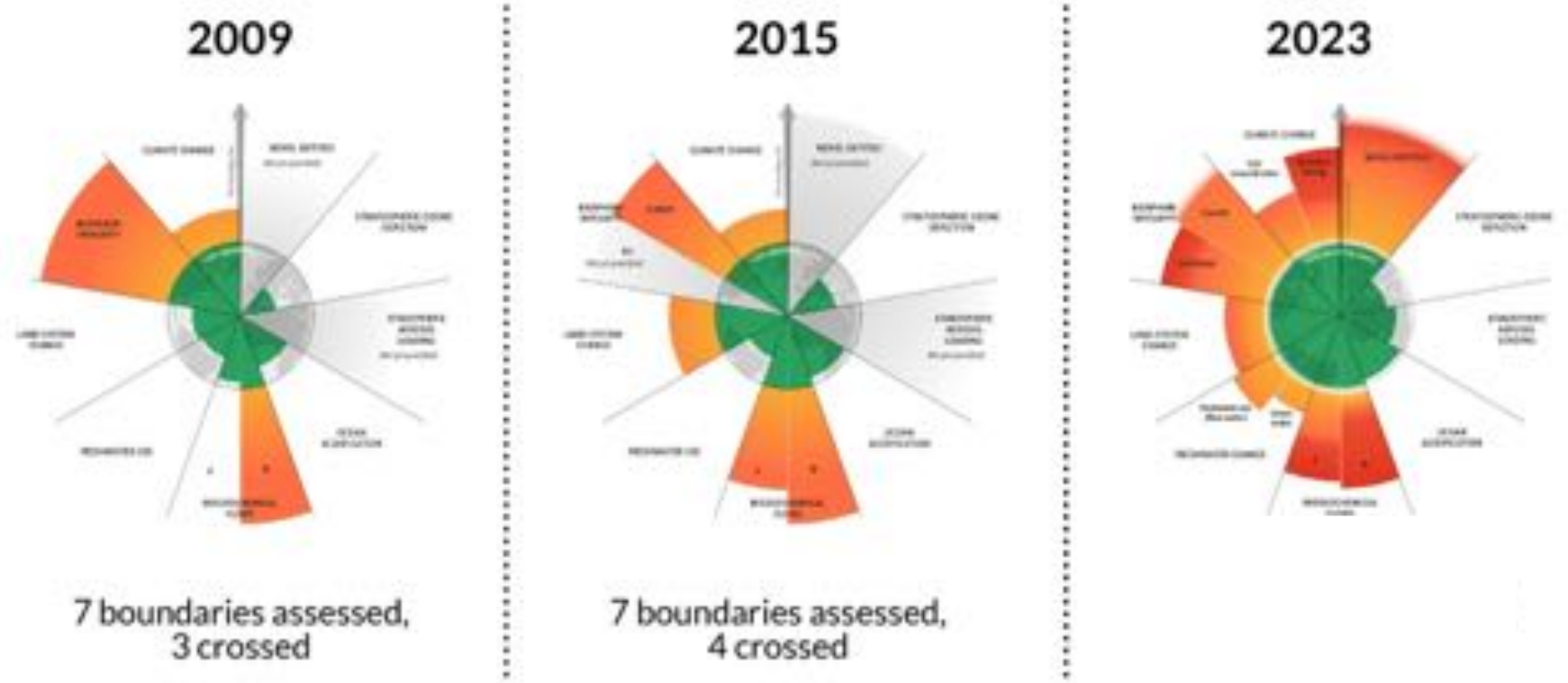
Visioning sustainable and resilient dairy exports

David Styles, University of Galway

Why vision?

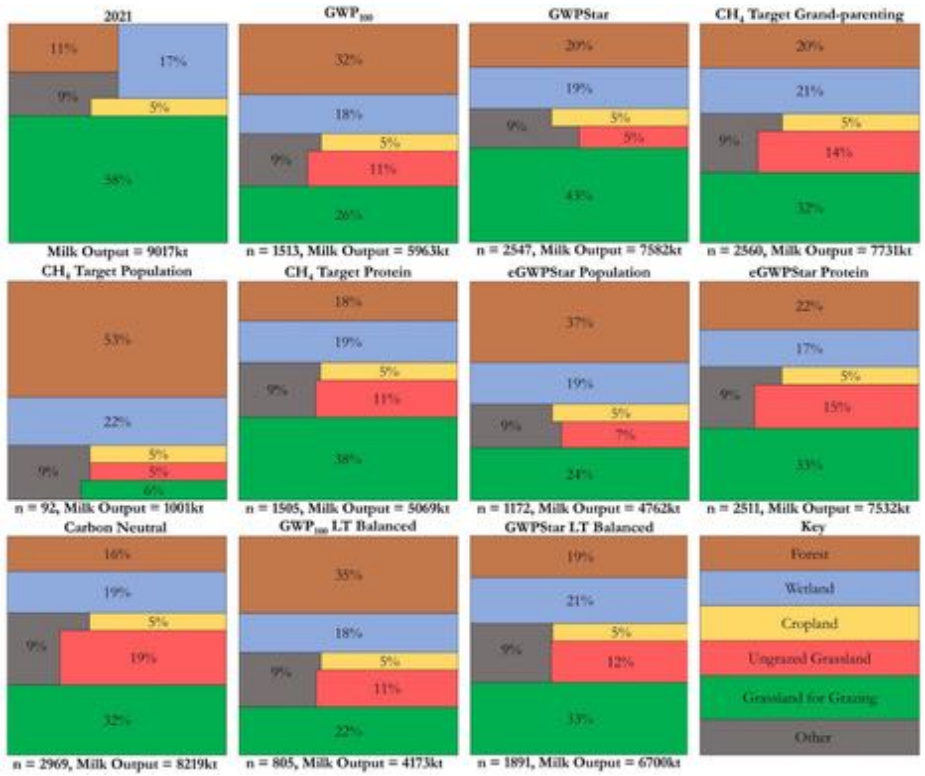
- Resilience relates to diversity and redundancy (≠efficiency)
- Sustainability is absolute (e.g. “Net Zero”)
- How much of which systems fit together in a sustainable & resilient future?

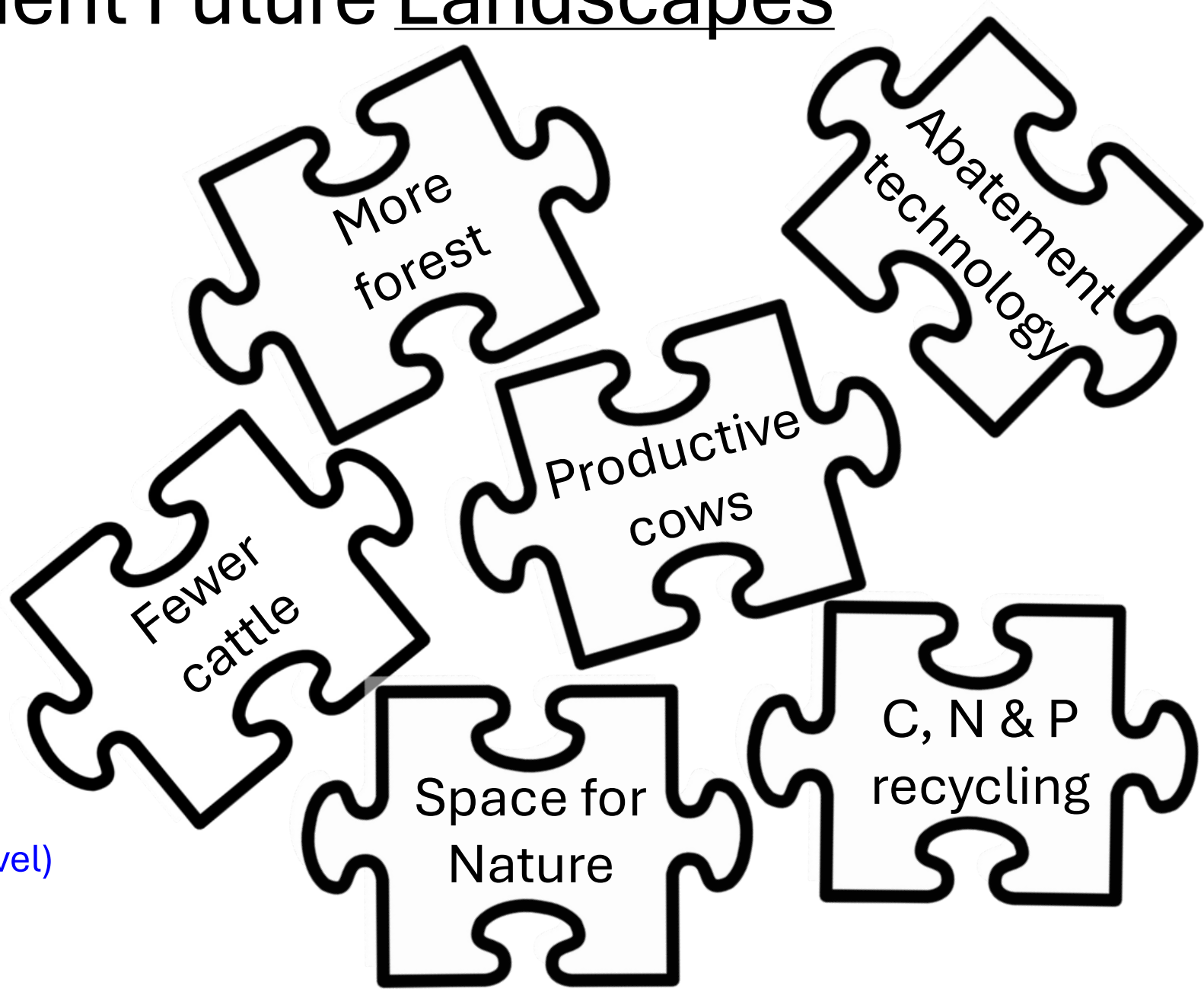
We need to move beyond footprints!



Based on Richardson et al. 2023, Steffen et al. 2015, and Rockström et al. 2009)

Sustainable & Resilient Future Landscapes

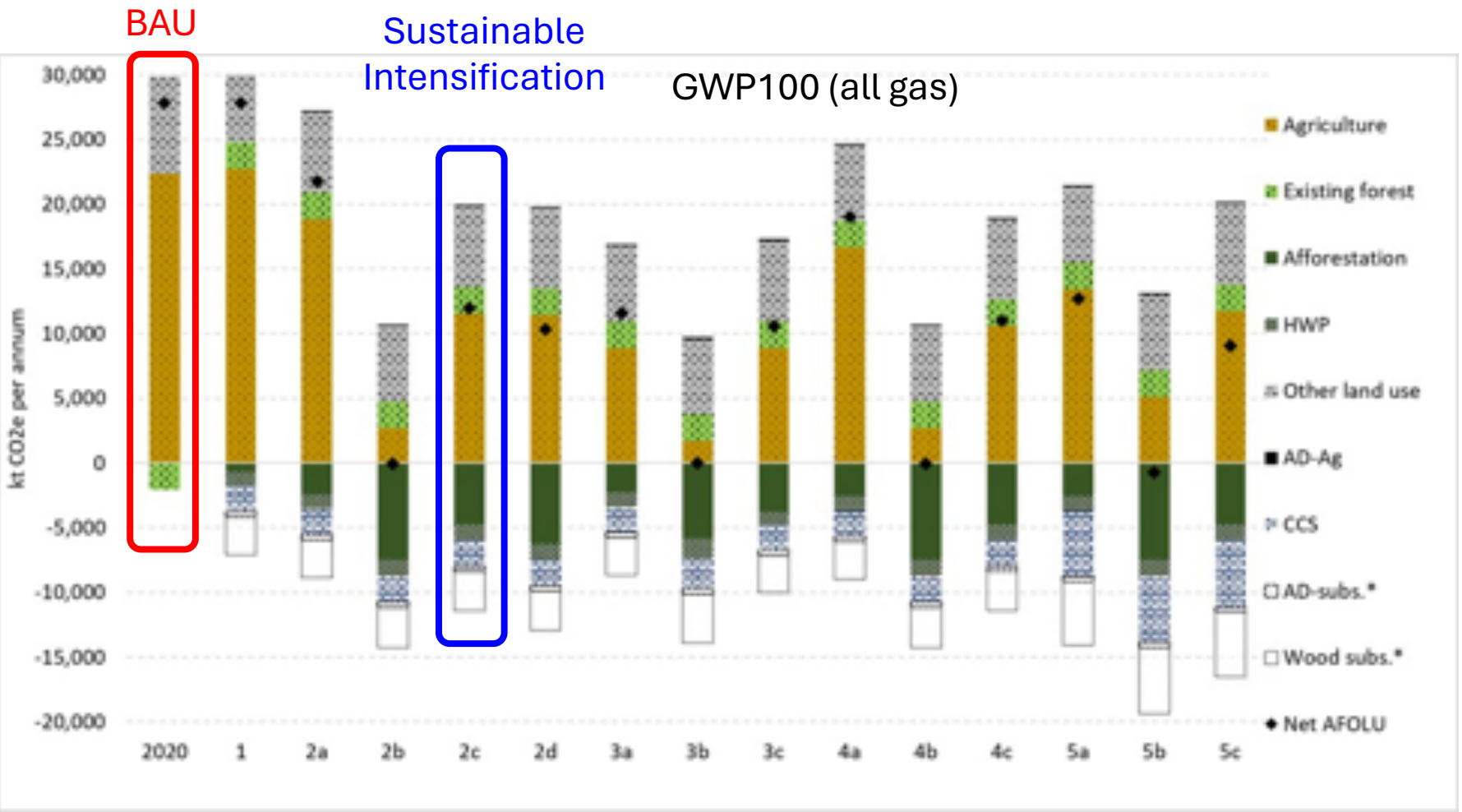




Multiple targets, various scales

- Efficient value chains & farms
- Climate neutrality (national, global level)
- Water quality (catchment level)
- Biodiversity (farm & landscape level)

Sc	Milk protein	Beef & sheep protein	Pig & poultry protein	Crop protein	Grass protein	Bioenergy	Wood	Grassland	Accounted land*	Available land	Concentrate feed	GWP100	GWP100 ex CH4	Ammonia	N to water	P to water
	kt	kt	kt	kt	kt	TWh	M m^3	kha	kha	kha	kt	kt	kt	kt	kt	Kt
BAU	346	176	132	0	0	14.9	6.6	3,977	4,167	0	4541	27,840	7,515	111	149	6.05
SI	393	115	132	0	0	14.5	6.4	2,210	2,784	**1,216**	3788	11,978	**-346**	**73**	**99**	**4.34**



- Afforestation: 16 kha/yr
- 90% peat bog restoration; 50% organic soil rewetting
- **1.6 M dairy cows (+28% milk per cow)**
- **160 k suckler-beef**
- **640 kt protein (no reduction)**
- c.14.5 TWh bioenergy
- 1.2 M ha spared (for Nature and/or bioeconomy)

Anaerobic digestion an enabling technology…IF…

- Reduce manure management emissions… (IF deployed in regions that can maintain animals within climate constraints)

- Efficient nutrient recycling…
- Comply with Nitrates Directive limits… (IF digestate managed as (pellet) biofertiliser)

- Mitigate energy emissions… (IF grass-clover feedstock, fugitive emissions controlled, efficient displacement)
- Contribute to negative emissions… (IF biomethane combusted in facilities with CCS)

SESSION 2

Pioneering Solutions for Dairy in the Circular Bioeconomy

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Stephen Napier
Irish Bioeconomy Foundation

Stewart Gee
Ireland Land Agri-Food Deep Demonstration

INNOVATIVE FLAGSHIPS

Irish Bioeconomy Foundation (IBF)

... Growing the Irish Bioeconomy Together...

National Bioeconomy Campus
(former Lisheen Mine)
Killoran, Lisheen (Moyne)
Tipperary E41 R622, IE

Enterprise Ireland

‘What is the Circular Bioeconomy?’ Book

Discover the Power of the Circular Bioeconomy

In a world facing pressing environmental challenges, the bioeconomy emerges as a vital pathway towards sustainability. This book offers a comprehensive introduction to the concept, exploring how biological resources can be harnessed to drive economic growth while preserving our planet's health.

"This book aims to be a guide, shedding light on the untapped potential of the bioeconomy a potential that holds the promise of a harmonious coexistence between humanity and our planet"
Jennifer Holmgren

ISBN 978-1-3999-9960-0

What is the Circular Bioeconomy

What is the Circular Bioeconomy

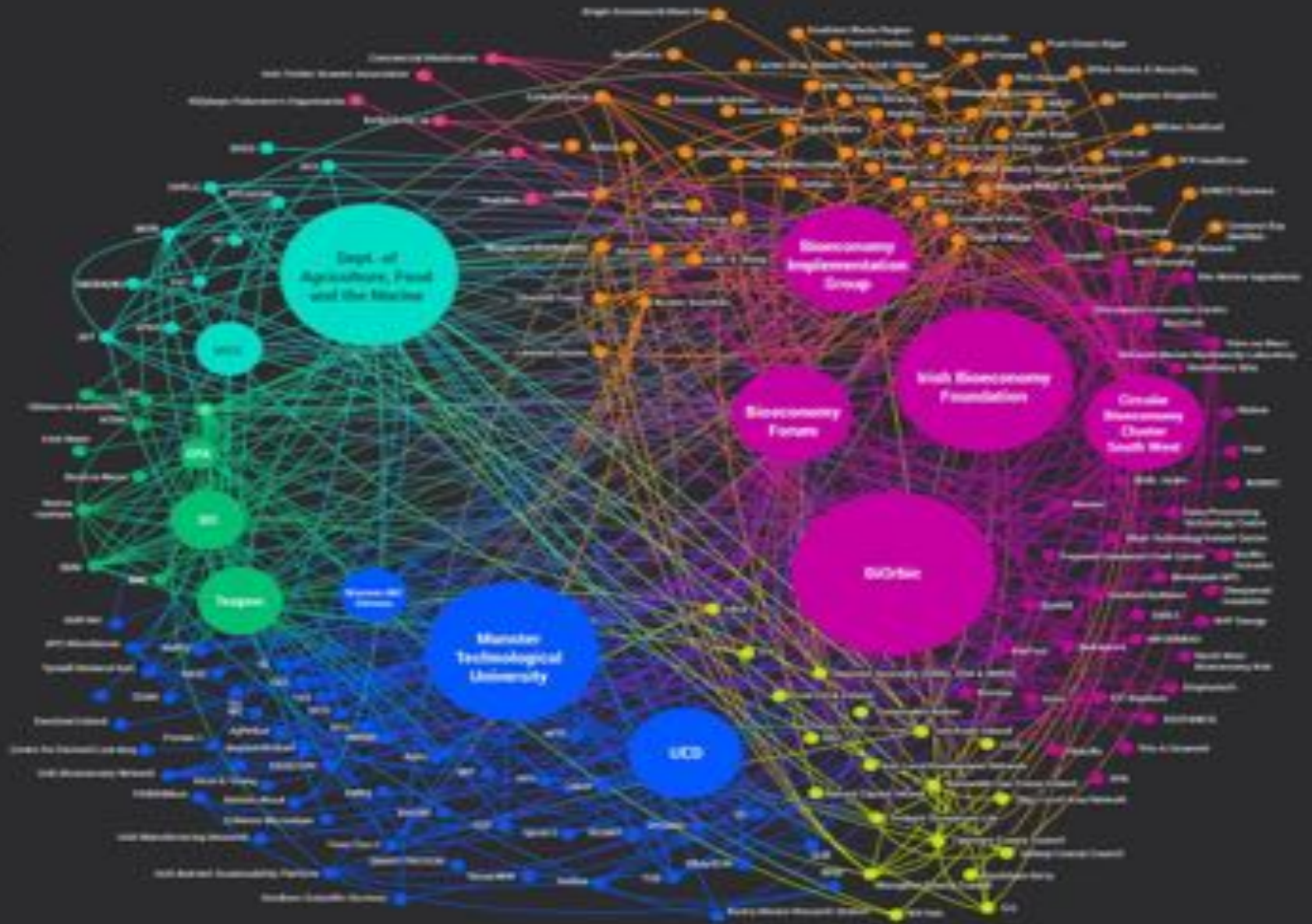
Mario Bonaccorso

Foreword
Jennifer Holmgren
Introduction
Irish Bioeconomy Foundation

The bioeconomy can transform society and help to mitigate and adapt to climate change as well as reverse biodiversity loss.
-Kevin O'Connor

Ireland's Bioeconomy

Network Analysis Diagram | July 2022



Sectors

- Government Department
- State/Semi-State Agency
- Academia and Research
- Primary Producer
- Business Moving into Bioeconomy
- New Bioeconomy Development
- Local Authority or Representative Body

- **National Bioeconomy Campus -**

VEDANTA ZINC INTERNATIONAL – ‘Among the world’s finest examples of environmentally sensitive mine closure and rehabilitation.’

Rialtas na hÉireann
Government of Ireland

Arna chomhchistiú ag an Aontas Eorpach

Co-funded by the European Union

Tionól Réigiúnach an Oirthir agus Lár Tíre
Eastern and Midland Regional Assembly

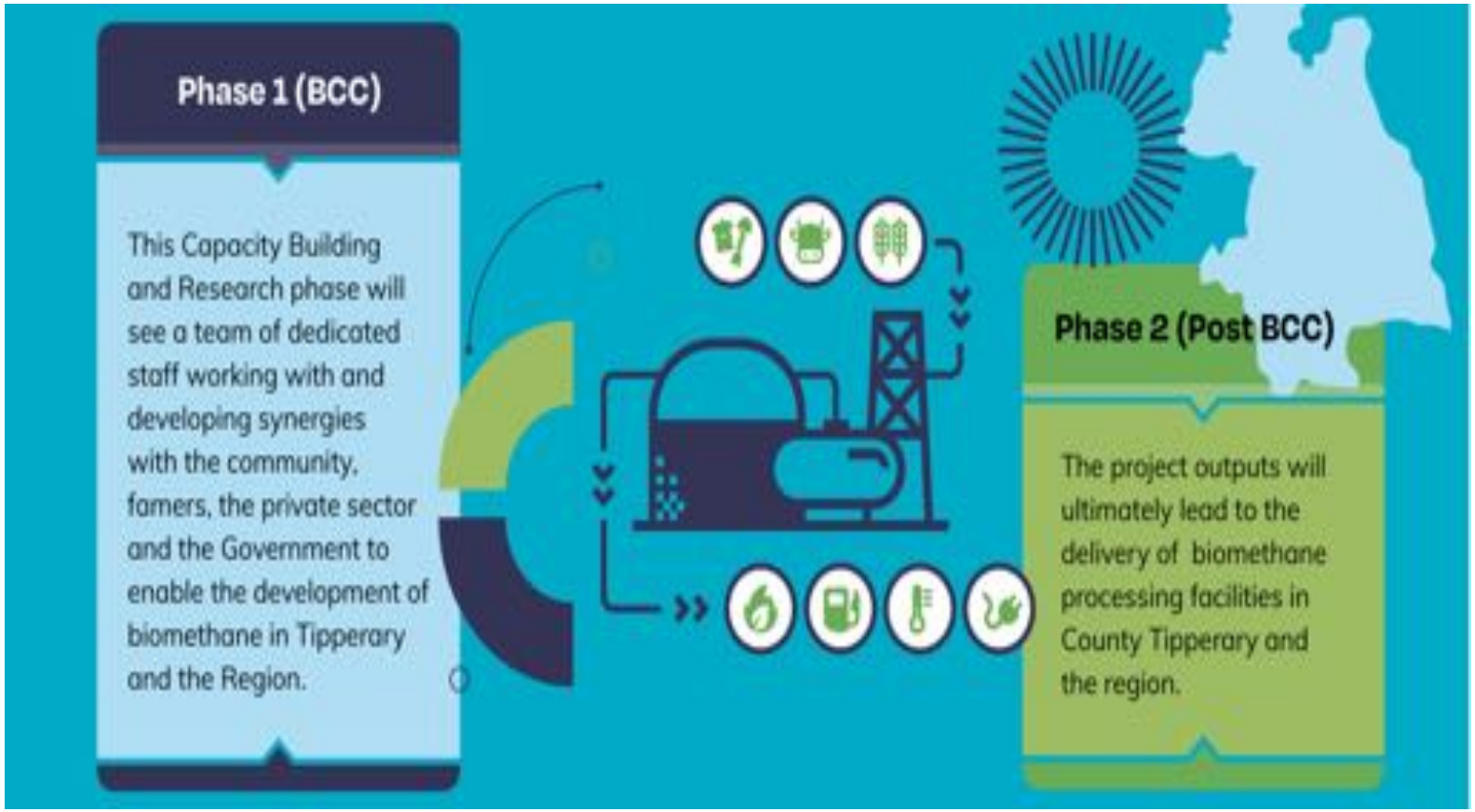
"The BioScaleUp project is co-funded by the Government of Ireland and the European Union through the EU Just Transition Fund Programme 2021-2027."

Biomethane for Carbon and Community

Comhairle Contae Thiobraid Árann
Tipperary County Council

TUS

TIPPERARY energy AGENCY



Rialtas na hÉireann
Government of Ireland

Arna chomhchistiú ag an Aontas Eorpach
Co-funded by the European Union

Tionól Reigiúnach Oirthir agus Lár-Tíre
Eastern and Midland Regional Assembly

pobal
government supporting communities

Deep Demonstration

Sustainable food systems in Ireland

Co-funded by the European Union

An Roinn Talmhaíochta, Bia agus Mara
Department of Agriculture, Food and the Marine

Deep Demonstration partnership of climate-resilient food systems in Ireland

EIT Climate-KIC & Department of Agriculture, Food and the Marine

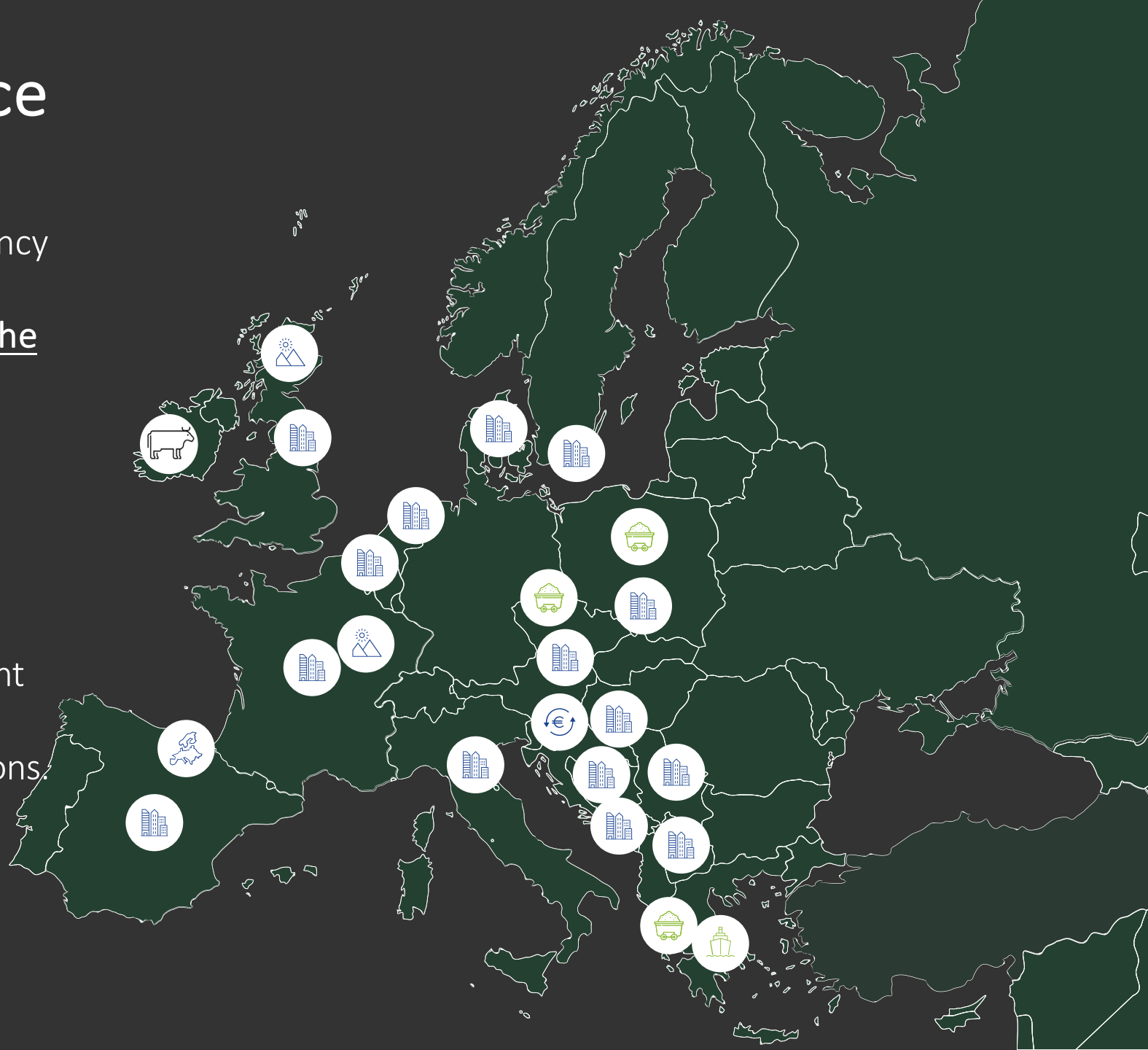
climate-kic.org/SustainableFoodIreland | @ClimateKIC | Climate-KIC

Climate KIC at a glance

- Europe’s leading climate innovation agency and community supporting countries, regions, cities and industries to **bridge the gap** between climate commitments and reality.

Systems Approach

- Achieving large-scale impact requires a different approach: **systems thinking**, joint programming, joint funding and blended finance to catalyse whole system transitions.



An integrated approach

Systems Innovation:

- Identify the dots that need connecting
- Amplify existing
- Ensure multiple perspectives
- Co-create **a portfolio** of interconnected initiatives

Four key components

- Innovation Scanning
  - Policy
  - Technology
- Capability building
- Financial resources
- Learn by doing

Energy

Health and wellbeing

Transport / Logistics

Space for nature

Community

Economic Return

Jobs

Raw Materials

Food

Skills

Water

Resilience

Building materials

Policy

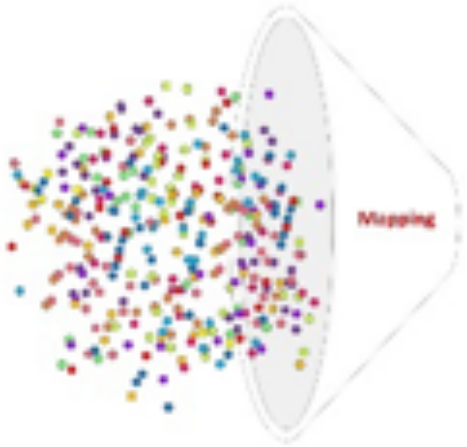
Innovation

The Deep Demonstration Portfolio

Deep Demonstration
Sustainable food systems in Ireland

Climate-KIC
Co-funded by the European Union

275 project ideas



7 interconnected flagship areas, of which **4** have been prioritised

- FLAGSHIP 1 | **Vision 2050: re-imagine Ireland's land and agri-food system** | ACTIVE
- FLAGSHIP 2 | **Foster innovation and investment in new value chains to diversify the sector**
- FLAGSHIP 3 | **Promote circular bioeconomy models in regions and multiple value chains** | ACTIVE
- FLAGSHIP 4 | **Diversify incomes through a carbon farming and nature credit framework** | ACTIVE
- FLAGSHIP 5 | **Produce and certify climate-neutral beef**
- FLAGSHIP 6 | **Accelerate emission reduction and sustainability in dairy farms** | ACTIVE
- FLAGSHIP 7 | **Grow and diversify the tillage sector**

Long term focus: 2050

More strategic

Regional and sector level

Shorter term focus: 2030

More practical

Value chain level

Dairy Flagship

Deep Demonstration

Sustainable food systems in Ireland

Climate-KIC

Co-funded by the European Union

- Narrative shift needed
  - A common, long term vision for a holistically sustainable, future fit dairy system in Ireland.
- Key Outcomes
  - Medium and long term implications of delivering sustainable dairy on processors, farmers and policy makers are understood.
  - Cross value chain collaborations are identifying and resolving barriers to achieving sustainable dairy.
  - All stakeholders are committed to scaling this new normal for sustainable dairy.

Bioeconomy Flagship

Deep Demonstration

Sustainable food systems in Ireland

Climate-KIC

Co-funded by the European Union

- Partnership with ICOS and AtkinsRealis
- Next Step: Feasibility/Priming Study on developing a network of biorefineries across Ireland.
  - Biomethane & green biorefineries
  - Shared services
  - Technical, financial, raw material resources
  - Ownership models
- Strategic and coordinated national approach to ensure value is shared.

Deep Demonstration

Sustainable food systems in Ireland

Climate-KIC

Co-funded by the European Union

An Roinn Talmhaíochta, Bia agus Mara
Department of Agriculture, Food and the Marine

Thank you!

Contact us for more information and follow us for updates:

climate-kic.org/SustainableFoodIreland | @ClimateKIC | Climate-KIC

Future Innovation Requirements to Support the Irish Dairy Sector Achieve Sustainability and Circular Goals

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Professor Vincent O'Flaherty
University of Galway

Stephen Napier
Irish Bioeconomy Foundation

James Gaffey
CircBio

Stewart Gee
Ireland Land Agri-Food Deep Demonstration

Assoc. Professor David Styles
University of Galway

FUTURE INNOVATION

COFFEE: 11:20 – 11:50

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CLIMEACTION
CLIMATE ACTION SOLUTIONS FOR ALL

Renewable Gas Forum Ireland

BORD BIA
IRISH FOOD BOARD

Enterprise Ireland

Irish Bioeconomy Foundation
Growing Ireland's Bioeconomy Together

Tirlán

RDS

Agriland

O'Dowd Biofuel
BIOMETHANE | LNG | CNG | HVO | SAF
WWW.ODOWDBIOFUEL.COM

SESSION 3

Unlocking Potential: Policy Support for the Dairy Sector in the Circular Bioeconomy

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Conor Mulvihill, Chair
Dairy Industry Ireland

Dr Keristena Grewan
Ornua

Matthew Halpin
Department for Food, Agriculture and the Marine

PJ McCarthy
Renewable Gas Forum Ireland

Professor JJ Leahy
University of Limerick

POLICY SUPPORT

LUNCH: 13:20 – 14:15

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SESSION 4

Navigating Opportunities and Challenges in the Circular Bioeconomy for Dairy Farmers and Processors

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Conor Ryan, Chair
Arrabawn Co-op

Ciara Beausang
Teagasc

Brugha Duffy
Farmer, Co. Meath

John Brosnan
ICOS

Paul Murphy
Climeaction

Karina Pierce
University College Dublin

OPPORTUNITIES & CHALLENGES

SESSION 5

Shaping the Future: Market Innovations for a Circular Dairy Economy

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Dr John Garvey, Chair
Kemmy Business School

Fiona McAteer
LeBruin Private

Lucy Ryan
Bank of Ireland

Fiona McCabe
Enterprise Ireland

Ian Marshall
Queen's University Belfast

David Kennedy
Bord Bia

MARKET DESIGN

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CLOSING REMARKS FROM THE HOST

Dr Anne Marie Henihan
DPTC Centre Director

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ACKNOWLEDGEMENTS

We would extend our heartfelt thanks to our chair, Ivan Yates, and to all of our speakers and panellists for their invaluable contributions today.

Our gratitude also goes to the members of DPTC and all stakeholders who participated in our surveys and workshops.

Special thanks to the team who brought the stakeholder analysis report to fruition.

We look forward to continuing our collaboration with you in the future.

ACKNOWLEDGEMENTS

DPTC
DAIRY PROCESSING
TECHNOLOGY CENTRE

OUR INDUSTRY MEMBERS

dairygold
Golden Valleys, Growing Naturally

KERRY

Lakeland DAIRIES

TIPPERARY
COOPERATIVE

Arrabawn

CARBERY

Tirlán

OUR ACADEMIC MEMBERS

UNIVERSITY OF LIMERICK
OLLSCOIL LUIMNIGH

University College Dublin
Ireland's Global University

Trinity College Dublin
The University of Dublin

teagasc

Ollscoil na Gaillimhe
University of Galway

UCC
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

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SUPPORTED BY ENTERPRISE IRELAND

ACKNOWLEDGEMENTS

OUR ASSOCIATE MEMBERS

UNISON PROCESS SOLUTIONS

CEM

PSE

Innopharma technology

ad bio

FITZ SCIENTIFIC MONITORING & TESTING

OptaHaul

KaizenPLM

OUR COLLABORATORS

BORD BIA

Renewable Gas Forum Ireland

VistaMilk

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DPTC 2024
Annual Conference

Researchers Driving the Future of Dairy Processing

November 12

Osprey Hotel • Naas