REGARD

Regional Strategies for Collaborative Anaerobic Digestion & Biorefinery Development in Ireland

seai SUSTAINABLE ENERGY AUTHORITY OF IRELAND

UCC Coláiste na hOllscoile Corcaigh University College Cork, Ireland

REGARD Kick-Off Meeting Agenda

30/09/2026

Introduction / Tour de table	All	10.00 – 10.05
REGARD project overview	Prof. V. Andreoni	10.05 – 10.10
WP1 – Literature Review	Dr. T. Bradfield	10.10 – 10.15
WP2 – Socio-Economic Analysis of Cooperative Models	N. C. Buckley	10.15 – 10.20
WP3 – Co-ownership models through multi-actor approaches	Dr. B. Power	10.20 – 10.25
WP4 - Barriers and enablers of co-operative and co-ownership models	D. Raju	10.25 – 10.30
WP5 - Scenario-based AD-biorefinery in Ireland	Dr. A. Bose/ E. Moraiti	10.30 – 10.35
WP6 - Develop a pilot feasibility study for a co-owned AD-biorefinery	Prof. V. Andreoni	10.35 – 10.45
WP7 – Dissemination and Communication	Prof. V. Andreoni	10.45 – 10.50
Discussion and Next Steps	All	10.50 – 11.00

REGARD

Project overview (August 2026 – July 2030) **Principal Investigator: Prof. V. Andreoni**

PARTNERS:

CUBS/UCC

Prof. Valeria Andreoni

Dr. Bernadette Power

Dr. Tracy Bradfield

Dr. John Eakins

Prof. Olive McCarthy

Dr. Eimear McGeown

UCC/MaREI

Prof. Jerry Murphy

Dr. Archisman Bose

Dr. Richard O'Shea

Dr. David Wall

PhD Students

Niamh Catherine Buckley

Della Raju

Eleftheria Moraiti

ICOS

John Brosnan

COLLABORATORS:

Dr. Fiona Thorne (Teagasc); Ms. Deirdre de Bhailis (Dingle Hub); Mr. Sean Finan (irBEA)

REGARD

Project overview (August 2026 – July 2030) - 4 years **Principal Investigator: Prof. V. Andreoni**

SCOPE:

REGARD:
Regional Strategies for Collaborative Anaerobic Digestion and Biorefinery Development in Ireland

- The Climate Action Plan and National Biomethane Strategy aim to produce **5.7 TWh of biomethane by 2030**
- **Major infrastructure gap:** Ireland is currently producing around **75 GWh annually**
- **Scale-up required:** An estimated **140–200 additional anaerobic digestion (AD) plants** may be needed to meet the 2030 target
- **REGARD's purpose:** The project aims to develop **region-specific, collaborative AD and biorefinery models** targeted to local conditions
- **Key approach:** REGARD will explore **co-operative and co-ownership structures**, barriers and opportunities
- **Expected impact:** These models are intended to **reduce investment barriers**, encourage greater stakeholder participation, and support the **wider deployment of AD infrastructure**.

REGARD

Project overview (August 2026 – July 2023) **Principal Investigator: Prof. V. Andreoni**

WP:

WP1 - Conduct a **comprehensive literature** review and data analysis to consolidate knowledge on AD and biorefinery systems in Ireland

WP2 - Assess **regional socio-economic** conditions of **co-operative models**, evaluating financial feasibility, public acceptance, and economic impacts

WP3 - Develop and test **regionall**y relevant **co-ownership** and **multi-actor models**, such as co operatives and municipal partnerships

WP4 - Identify **barriers and enablers** (e.g. regulatory, institutional, financial, and cultural) of co operative and co-ownership models and propose practical interventions

WP5 - Contribute to AD planning by developing **regional** and **scenario-based analysis** that explore potential scalable strategies under varying policy, economic and infrastructure conditions

WP6 - Develop a **pilot feasibility study** for a co-owned AD-biorefinery

WP7 - Promote engagement and **knowledge sharing** with policymakers and stakeholders

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WP1 – Literature review, existing data and knowledge consolidation (M1–M12)

WP leader: Dr. T. Bradfield

SCOPE:

Main objective: Establish a robust evidence and data foundation to understand the current anaerobic digestion (AD) landscape in Ireland and identify key knowledge gaps to inform the subsequent work packages.

Specific tasks:

- Review academic, industry, and policy literature on AD biorefineries, circular bioeconomy, rural energy systems, and regional resilience.
- Examine international best practices in AD, decentralised energy production, and waste-to-energy systems.
- Compile and analyse existing data on organic waste streams, agricultural production, industrial by-products, and AD infrastructure.
- Map and categorise potential feedstock sources by region.
- Leverage data, models, and expertise from the CABBBIE and EXPAND projects.
- Identify gaps in feedstock mapping, waste generation statistics, stakeholder data, and energy infrastructure.
- Define priorities for further data collection and modelling in subsequent WPs.

CONTRIBUTORS:

Prof. Andreoni; Dr. Power; Dr Wall; Dr. O'Shea; Dr. Bose; PhD1, PhD2; PhD3

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WP1 – Literature review, existing data and knowledge consolidation (M1–M12) WP leader: Dr. T. Bradfield

MILESTONES	
WP1 – M1	Completed literature review and data report
WP1 – M2	Completed an annotate database with data, sources and list of gaps and research needs

DELIVERABLES	
WP1 - D1:	A literature and data synthesis report
WP1 - D2:	Annotated database

DATA REQUIRED	
WP1 – Dataset 1	Organic waste and feedstock data
WP1 – Dataset 2	Data from CABBBIE and EXPAND
WP1 - Dataset 3	AD infrastructure data
WP1 - Dataset 4	Socio-economic and regional context data

CONTRIBUTIONS to other WPS

WP1 builds a solid analytical foundation for the project and identifies gaps in knowledge for data collection in the other WPs

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WP2 – Socio-economic analysis of co-operative model for AD systems in Ireland (M6–M48) **WP leader: Prof. V. Andreoni**

SCOPE:

Main objective: Investigate the potential of co-operative AD models in Ireland and assess the socio-economic feasibility, acceptability and regional impacts.

Specific tasks:

- Analyse case studies of co-operative models from Ireland and internationally.
- Examine the socio-economic dynamics of existing co-operative models through interviews and the use of storytelling approaches with key stakeholders.
- Host stakeholder workshops to discuss challenges, opportunities, and potential strategies for fostering co-operative AD models.
- Assess the financial viability of co-operative AD models through cost-benefit analysis.
- Conduct surveys and focus groups to evaluate social acceptability of co-operative AD models.
- Assess the potential social and economic contribution of co-operative AD models to rural and disadvantaged communities.
- Identify key socio-economic benefits, challenges, and enabling conditions for the development and implementation of co-operative AD models across Irish regions.

CONTRIBUTORS:

Prof. McCarthy; Dr. Eakins; Dr. Bradfield; Dr. McGeown; N.C. Buckley

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WP2 – Socio-economic analysis of co-operative model for AD systems in Ireland (M6–M48) — WP leader: Prof. V. Andreoni

MILESTONES	
WP2 – M1	Completed case studies analysis (M18)
WP2 – M2	Completed workshops with stakeholders (M30)
WP2 – M3	Completed interviews with stakeholders (M36)
WP2 – M4	Completed socio-economic analysis (M42)

DELIVERABLES	
WP2 - D1:	Journal paper on: Co-operative models for AD in Ireland: socio-economic potential and regional impacts
WP2 - D2:	Practical guidelines for stakeholder engagement and co-operative formation, with policy recommendations for inclusive, equitable AD systems
WP2 – D3:	Journal paper on: Social acceptability and stakeholder dynamics in community-based AD initiatives

DATA REQUIRED	
WP2 – Dataset 1	International cases from other jurisdictions
WP2 – Dataset 2	Qualitative dataset from interviews
WP2 - Dataset 3	National survey of key stakeholders on preferences for model

CONTRIBUTIONS to other WPS

WP4: Identification of barriers, enablers, and strategies for co-operative AD business models.

WP6: Best practices and socio-economic insights to inform co-operative formation.

WP7: Contributes to policy recommendations and dissemination through findings.

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WP3 – Co-ownership models through multi-actor approaches to establish and operate AD plants and AD-biorefinery facilities in Ireland

WP leader: Dr. B. Power

SCOPE:

Main objective: Analyze Co-ownership models through multi-actor approaches to establish and operate AD plants and AD-biorefinery facilities in Ireland

Specific tasks:

- Use web scraping, desk research, and stakeholder interviews to examine international examples from AD and related sectors.
- Conduct interviews with key stakeholders on roles, financing, adoption strategies, and risk mitigation.
- Host workshops to facilitate stakeholder dialogue on challenges, opportunities, and strategies for advancing multi-actor AD models.
- Perform a business ecosystem analysis of value co-creation through start-ups, agroparks, and institutional networks.
- Conduct a cost benefit analysis of multi-actor AD systems, covering costs and potential returns.
- Assess social acceptability, equity and inclusion through surveys and focus groups, leveraging EXPAND and CABBBIE data.

CONTRIBUTORS:

Prof. Andreoni; Prof. McCarthy; Dr. Eakins; Dr. McGeown; D. Raju

WP3 – Co-ownership models through multi-actor approaches to establish and operate AD plants and AD-biorefinery facilities in Ireland

MILESTONES	
WP3 – M1	Completed case study analysis
WP3 – M2	Completed workshops with stakeholders
WP3 – M3	Completed interviews with stakeholders
WP3 – M4	Completed socio-economic analysis

DELIVERABLES	
WP3 - D1:	Journal paper on: Alternative business ecosystem solutions
WP3 - D2:	Roadmap for co-ownership models and multi-actor approaches to operate AD plants and AD-biorefinery facilities in Ireland
WP3 - D3:	Journal paper on: Alternative co-ownership, governance and financing models

DATA REQUIRED	
WP3 – Dataset 1	International cases from other jurisdictions
WP3 – Dataset 2	Qualitative dataset from interviews
WP3 - Dataset 3	National survey of key stakeholders on preferences for model

Contributions to other WPs

WP4 will integrate these findings to examine how collaborative approaches can be successfully implemented in diverse regional contexts. The pilot in WP6 will also be designed using best practices roadmap for co-ownership governance identified in this work package.

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WP4: Barriers and enablers of co-operative and co-ownership models to establish and operate AD plants and AD-biorefinery facilities in Ireland

WP leader: Dr. Power

SCOPE:

Main objective: To map the barriers and enablers of co-operative solutions, alternative co-ownership models and wider business ecosystem solutions, by actor.

Specific tasks:

- Review literature and policy to identify barriers and enablers affecting co-operative, co-ownership and business models for AD in Ireland.
- Interview actors across scales to capture regulatory, infrastructural, resource and strategic, and knowledge and perceptual barriers.
- Host multi-stakeholder workshops to encourage dialogue and build trust among those involved in AD and AD-biorefinery development.
- Run focus groups using cognitive mapping, scenario planning and backcasting to uncover deeper insights and hidden enablers.
- Survey stakeholders to identify key challenges and perceptions of potential enablers (policy, finance, legal and regulatory).
- Consolidate findings into a barrier and enabler map by actor, identifying ways to reduce fragmentation and coordination costs and to scale co-operative initiatives.

CONTRIBUTORS:

Prof. Andreoni; Prof. McCarthy; Dr. McGeown, D. Raju, N.C. Buckley

WP4: Barriers and enablers of co-operative and co-ownership models to establish and operate AD plants and AD-biorefinery facilities in Ireland

MILESTONES	
WP4 – M1	Completed research on AD barriers and enablers
WP4 – M2	Completed workshops with stakeholders
WP4 – M3	Completed focus groups with stakeholders
WP4 – M4	Completed stakeholder survey

DELIVERABLES	
WP4 - D1:	Journal paper on: Barriers and enablers to co-operative AD models in Ireland: a multi-actor perspective
WP4 - D2:	Policy roadmap to mitigate challenges and reinforce strengths in multi-actor collaboration and co-ownership models
WP4 - D3:	Journal paper on: Scaling AD and AD-biorefinery systems: insights into stakeholder collaboration

DATA REQUIRED	
WP4 – Dataset 1	Dataset from workshops and focus groups
WP4 – Dataset 2	Stakeholder survey

Contributions to other WPs

WP4's barrier and enabler mapping will feed the scenarios and regional analysis in WP5.

WP4's best-practice roadmap for co-ownership governance will guide the design of the WP6 pilot, and its policy roadmap (WP4-D2) will be a core output of the dissemination and policy engagement in WP7.

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WP5 – Scenario-based AD-biorefinery in Ireland (M6–M48) **WP leader: Dr. Archisman Bose**

SCOPE:

Main objective: Develop and evaluate future scenarios for anaerobic digestion (AD) and AD-biorefinery deployment in Ireland using GIS and spatial analysis, identifying region-specific opportunities, infrastructure needs and stakeholder pathways.

Specific tasks:

- Scenario development: 3–4 plausible AD deployment scenarios built on policy, carbon pricing, technology, climate impacts and stakeholder cooperation.
- GIS-based spatial modelling: map feedstock sources, infrastructure, energy and material demand and candidate AD locations, using land use, livestock, crops, food industry sites, waste sources and energy networks.
- Regional potential mapping: quantify feedstock availability by macro-region under each scenario and identify high-potential deployment clusters.
- Infrastructure and synergy assessment: co-location with dairy processors, waste facilities and other existing infrastructure, and synergies with industry and community energy projects.
- Planning tools and policy guidance: scenario-based maps and decision-support tools for policymakers, planners and investors, with region-specific interventions to support AD expansion.

This overview: how WP5 builds on what Ireland has already done, in five minutes.

CONTRIBUTORS:

Dr. Bose (WP lead); Dr. Wall; Dr. O'Shea; Prof. Murphy

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WP5 – Scenario-based AD-biorefinery in Ireland (M6–M48)

WP leader: Dr. Archisman Bose

MILESTONES

WP5 – M1	3–4 future scenarios for AD development completed (Month 12)
WP5 – M2	3–4 candidate AD-biorefinery models for implementation in Ireland (Month 12)
WP5 – M3	GIS-based spatial models developed (Month 30)
WP5 – M4	Regional AD potential maps and planning tools to support policy (Month 42)

DELIVERABLES

WP5 – D1	Journal paper: scenario analysis of AD development (Month 24)
WP5 – D2	Journal paper: spatial assessment of AD potential in Ireland (Month 36)
WP5 – D3	Journal paper: synergies and co-location opportunities for AD in the circular economy, a regional perspective (Month 42)
WP5 – D4	Decision-support process and tools (Month 48)
WP5 – D5	Policy support document on regional planning guidance for AD in Ireland (Month 48)

DATA REQUIRED

WP5 – Dataset 1	GIS layers
WP5 – Dataset 2	Data from WP1
WP5 – Dataset 3	Energy and economic data

CONTRIBUTIONS to other WPs

WP3: a geography for the co-ownership structures: where in Ireland each one works, by region.

WP6: the regional evidence layer for the pilot, with candidate regions and the proposed validation regions (West Cork, South Kerry).

WP7: scenario-based maps, the decision-support tools (D4) and the policy support document on regional planning (D5).

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WP5 – Scenario-based AD-biorefinery in Ireland (M6–M48) **WP leader: Dr. Archisman Bose**

Scalability:

Farm Scale → Community Scale → Regional Hub → Integrated Biorefinery Network

Conventional AD produces energy.

AD-biorefineries simultaneously produce biomethane, biofertilisers, food, feed and high-value bio-products through valorisation of digestate and biogenic CO_2.

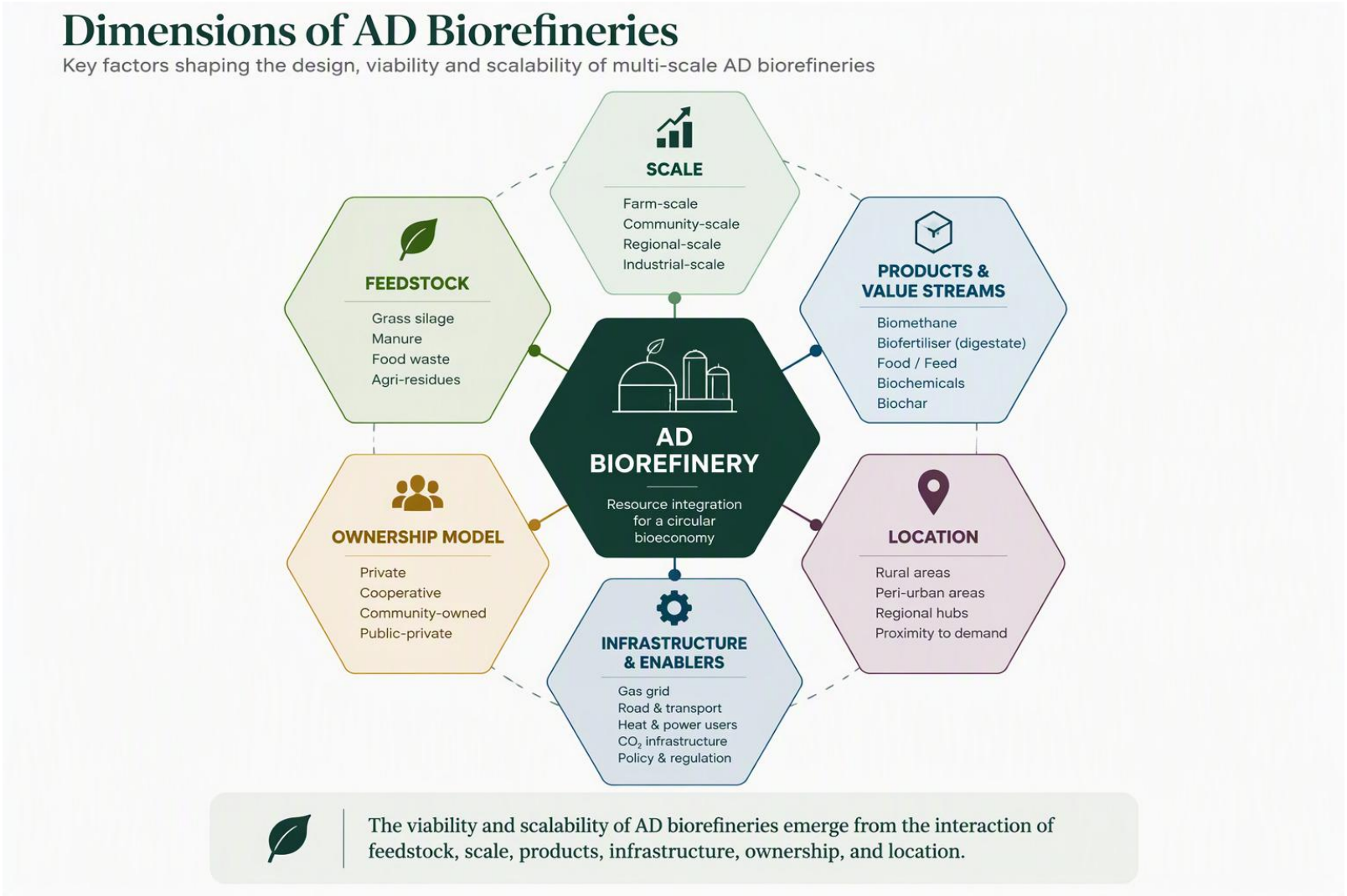
Scale	Challenge	Opportunity
Farm	Economics	Farmer ownership
Community	Feedstock aggregation	Local value
Regional	Logistics	Larger markets
National	Network coordination	Deep decarbonisation

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WP5 – Scenario-based AD-biorefinery in Ireland (M6–M48)

WP leader: Dr. Archisman Bose

DIMENSIONS:



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WP5 – Scenario-based AD-biorefinery in Ireland (M6–M48)

WP leader: Dr. Archisman Bose

PRIOR WORK:

Three pillars of work already exist, while none of them meet.

Resource and foresight	**InformBio** County-level bioresource database, 221 feedstocks, 2050 backcast	**SEAI Bioenergy Map** Published national GIS layers	**EPA National Land Cover** Land classification and habitat	**CSO Census of Agriculture** Farm and livestock data by Electoral Division
Spatial method for AD	**O'Shea, Wall, Murphy 2016** The founding Irish resource-location paper	**EcoAD (MaREI)** ED-level QGIS, 2.5 to 25 km buffers, route optimisation	**6 GNI regional studies** Cavan/Monaghan, S. Kerry, Sligo, W. Cork, Duhallow, Dingle	**FLEET (Teagasc) · BioEInsights** Location-allocation on farm survey data; GIS siting
Ownership and governance	**ICOS governance report 2026** Co-operative structures for Irish biomethane	**Comhar BIA (ICOS)** A live co-owned AD-biorefinery with Arrabawn-Tipperary	**CABBBIE** Ownership is 22% of AD social acceptance	**Dingle AD study, ch. 7** Ten-phase community-owned AD roadmap

Demonstration projects: Farm Zero C at Shinagh, now running an AD and green-biorefinery plant · Rural BioReFarmeries, its EU network · the Biomethane Development Office and its farmer calculator (project ran to June 2026) · Dingle Peninsula 2030 (closed December 2023)

BUILDS ON:

How WP5 leverages previous projects

Initiative	What WP5 takes	What WP5 adds
EcoAD (MaREI)	The Irish AD spatial method: Electoral Division mapping, 2.5 to 25 km buffers, vehicle routing for virtual pipelines	Carries it from logistics to ownership, and from a static map to scenarios
Six GNI regional studies	Six worked regions covering feedstock, siting and economics	One method across all six. Their own siting models use 4, 3 and 9 weighted factors, so results do not compare
FLEET (Teagasc)	Farm-level economics and GIS location-allocation built on the National Farm Survey	Adds the ownership structure the transport model assumes away
CABBBIE	Social acceptance of AD: ownership structure carries 22% of the weighting, second only to plant characteristics	Turns acceptance factors into map layers
EXPAND	AD by-product value chains: digestate, biogenic CO_2, and market demand	Supplies the geography. EXPAND is economic and technological, with no spatial component
ICOS · Comhar BIA	A live co-owned AD-biorefinery with a real co-operative, plus 70 pages on co-operative governance structures	Shows where else that structure works, across regions rather than one catchment
Dingle AD study · Farm Zero C	A ten-phase community-owned AD roadmap, and a working AD-biorefinery at Shinagh	Identifies the regions where each of them replicates

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WP5 – Scenario-based AD-biorefinery in Ireland (M6–M48) **WP leader: Dr. Archisman Bose**

ANCHOR:

InformBio: WP5 does not start from a blank map

What InformBio delivered	What WP5 takes from it	Where it stops, and WP5 continues
▪ Bioresource Mapping Tool and D2.1 database: 221 feedstocks, all 26 counties ▪ D2.2 quantification of Ireland's biological raw materials ▪ Catalogue of feedstock-specific bio-based value chains ▪ 2050 National Strategic Foresight Report, by backcasting with OptiGOB ▪ Prototype national bioeconomy monitoring system	▪ The national bioresource layer, rather than rebuilding one ▪ The value-chain catalogue, to decide which configurations are worth siting ▪ The 2050 backcast, as the outer frame the regional scenarios nest inside ▪ A national baseline that keeps regional results comparable	▪ **Resolution is county level, and the deliverable is a spreadsheet, not GIS layers** ▪ **Mapping and foresight are delivered as separate strands** ▪ **No ownership dimension anywhere in the outputs** ▪ **WP5 adds sub-county resolution, joins the two strands, and maps ownership**

PARTNERS:

InformBio: funded by DAFM · coordinated by MTU · with Teagasc, University of Galway and the CSO. Teagasc sits on both InformBio and REGARD, which gives WP5 its route to the data.

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WP5 – Scenario-based AD-biorefinery in Ireland (M6–M48) **WP leader: Dr. Archisman Bose**

METHOD:

What WP5 therefore builds

WP5: GIS + Scenario Analysis + Ownership Models

OUTPUTS: Viable AD Clusters • Regional Deployment Opportunities • Suitable Co-ownership Models • Scenario-based Maps • Decision-support Tools

Scenario-based maps identifying

1 Viable AD clusters	2 Regional opportunities	3 Location potential
Where feedstock, infrastructure and stakeholder capacity coincide	Which co-ownership structure suits which region, and why	Siting alongside industry or community energy projects

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WP6 – Develop a pilot feasibility study for a co-owned AD-biorefinery (M1–M48) **WP leader: J. Brosnan**

SCOPE:

Main objective: To assess the feasibility of developing a co-owned anaerobic digestion (AD) biorefinery in a selected co-operative, evaluate the technical, economic, and commercial potential, and investigate a suitable co-ownership and business model

Specific tasks:

- Run an Expression of Interest (EOI) among co-operative members nationwide
- Identify and select a co-operative and geographical region for the pilot
- Act as the link between the selected co-operative and an engineering/commercial consultant
- Engage relevant regional stakeholders with an interest in participating in or co-owning the future AD-biorefinery
- Support the development of the technical, economic and commercial feasibility study and co-ownership business model

CONTRIBUTORS:

Prof. Andreoni; Dr. Power

WP6 – Develop a pilot feasibility study for a co-owned AD-biorefinery (M1–M48) WP leader: J. Brosnan

MILESTONES	
WP6 – M1	Expression of interest for dairy co-operatives (M12)
WP6 – M2	Selection of one co-operative and region to serve as the focus for the pilot feasibility study (M15)
WP6 – M3	Formation of a regional project consortium (M25)
WP6 – M4	Feasibility study (M36)

DELIVERABLES	
WP6 – D1	Expression of interest report detailing process, selection criteria, and outcomes (M12)
WP6 – D2	Feasibility study including feedstock mapping, technology options, and market potential (M36)
WP6 – D3	Summary report including key barriers, success factors, and recommendations for the feasibility phase (M48)

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WP7 – Communication, dissemination and outreach (M1–M48) **WP leader: Prof. V. Andreoni**

SCOPE:

Main objective: Maximise the visibility, uptake and impact of the project's findings by engaging academic, policy, industry and community stakeholders through publications, workshops, conferences, public events and social media management.

The WP will also translate research outcomes into **academic papers** (expected 9), a **policy roadmap and insights report**.

Creation of an **Advisory Group** (1 meeting a year)

National and International **Conferences** (at least 1 a year) – Global Bioeconomy Summit in Dublin October 2026

Project website: REGARD Project, funded by SEAI