BBioNets

Boosting the adoption of Bio-Based Technologies

Rethinking Irish Dairy: Inside Farm Zero C's Climate-Neutral Blueprint

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SEPTEMBER 2025

Funded by the European Union

Article information

Title	Rethinking Irish Dairy: Inside Farm Zero C's Climate-Neutral Blueprint
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Brief summary	Farm Zero C is creating the world's first climate-neutral dairy farm at Shinagh Estates Dairy Farm, Co. Cork. Funded by Research Ireland and industry partners, the project brings farmers, scientists, and industry together to cut emissions through low-carbon feeds, renewable energy, clover pastures, smart breeding, and slurry treatment. Backed by over €2M investment and a leading research consortium, Farm Zero C is building a digital platform and carbon calculator to help farmers measure impact and scale solutions. The aim: create an economically viable, and climate-neutral system that can be replicated on Irish farms in the future.
Article date	10/09/2025
Edition	1
BBioNets Work Package	WP3 – Knowledge Transfer Activities (T3.3)

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the European Union

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Introduction

Funded through Science Foundation Ireland's Net Zero Emissions Challenge, Farm Zero C is on a mission to develop the world's first climate-neutral and resilient dairy farm. Based at Shinagh Estates Dairy Farm in County Cork, the project brings together farmers, scientists, and industry experts to tackle one of agriculture's biggest questions: ***How do you produce food sustainably without sacrificing productivity or profitability?***

By combining a wide range of emission reduction strategies — from low-emission feeds and renewable energy to multi-species grasslands and sustainable slurry management — the project is designing a real-world model for how Irish agriculture can move toward decarbonisation. And this isn't just about one farm, as Farm Zero C is building a blueprint for replication to help farmers across Ireland adopt similar approaches.

The project is backed by €2 million funding in Phase 1 and Phase 2.0 is supported by matched contributions from Research Ireland, and industry partners Carbery Group, Dairy Research Ireland, and Allied Irish Banks (AIB). It is delivered by a cross-disciplinary consortium that includes BiOrbic, Carbery Group, University College Dublin (UCD), Munster Technological University (MTU), Trinity College Dublin, Teagasc, Shinagh Estates Dairy Farm, Dairy Research Ireland, AIB and University College Cork (UCC). This collaborative approach brings together world-class research, hands-on farming expertise, and industry leadership — ensuring that Farm Zero C stays rooted in both scientific rigor and real-world practicality. The goal is to create an economically viable, and climate-neutral system that can be replicated on Irish farms equipping farmers with the tools to reduce emissions, enhance biodiversity, and monitor progress using life cycle assessment (LCA), soil carbon tracking, and natural capital accounting.

Replacing Imported Soy with Local Protein

One of the more innovative practices being explored is the use of native Irish beans as an alternative to imported soybean meal. These locally adapted legumes are rich in protein and grow well under Irish conditions. More importantly, they can be processed into cattle feed concentrates right on or near the farm.

This practice reduces dependence on overseas feed sources, cutting associated emissions and supporting local food systems. Native beans also fix nitrogen in the soil, reducing the need for synthetic fertilisers — another major contributor to agricultural emissions.

A Return to Clover-Rich Pastures

While the idea of using clover in pastures isn't new, Farm Zero C is putting this simple plant to work in a much more strategic way. White and red clover are being integrated along with multi-species swards into the grazing system, acting as a natural fertiliser by drawing nitrogen from the air into the soil. This significantly reduces the need for chemical fertilisers, while also enhancing soil structure, boosting biodiversity, and improving forage quality.

By tailoring grazing rotations and supporting clover persistence, the team is building a forage system that's both regenerative and productive — a key pillar of a climate-neutral dairy model.

Capturing Emissions at the Source

To tackle emissions from slurry — one of the sources of methane and ammonia on dairy farms — the project is trialling the GasAbate system, developed by GlasPort Bio. This technology uses a chemical additive and automated system to treat slurry during storage, preventing harmful gases from being released.

Field results have shown up to 80% reduction in methane emissions and 50% less ammonia. It's a clear example of how emissions control can double as a productivity gain — an approach Farm Zero C consistently favours.

Smart Tools and System Thinking

Beyond soil and slurry, Farm Zero C is also tackling emissions through animal genetics and clean energy innovation. By selecting cows with higher scores on the Economic Breeding Index (EBI), the herd becomes more productive and efficient — producing more milk with fewer emissions per litre. Healthier cows with better fertility and feed conversion rates help reduce waste and improve the overall environmental footprint of the dairy system. At the same time, the farm is investing in renewable energy, using solar panels and battery storage systems to power operations and cut reliance on fossil fuels, adding both resilience and self-sufficiency.

What sets Farm Zero C apart, though, is its deep commitment to tracking and evaluating these interventions. Using LCA, the team monitors emissions from feed, animals, fertilisers, and energy use, giving a full picture of the farm's environmental performance. They are also helping to develop tools to measure soil carbon, map biodiversity, and account for natural capital — all of which feed into a digital app designed to help farmers plan and implement emissions reductions and biodiversity improvements. The goal is to make climate-smart farming accessible, measurable, and scalable — not just for researchers, but for farmers across the country.

Conclusion

Farm Zero C is proving that net zero dairy isn't a distant aspiration — it's something that can be built today, field by field. The project's true ambition lies not just in reducing emissions on one farm, but in empowering thousands of others to follow suit, using science-based tools, collaborative learning, and proven strategies.

In doing so, it's shaping a new future for Irish agriculture — one where climate action, economic resilience, and environmental stewardship all work hand in hand. BBioNets leverages the knowledge and insights generated by Farm Zero C, with partners MTU and Teagasc integrating this experience into the Irish Forest and Agriculture Network (FAN) to inform regional sustainable farming strategies.

Disclaimer

The information contained in this article was compiled during one of BBioNets' Irish Info-Days and the accompanying visit to the Farm Zero C site, as well as through an interview with the Farm Zero C's project manager.

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Document information

Title	BBioNets – Creation and promotion of Forest and Agriculture Networks to boost Bio-Based Technologies adoption and Value Chain development (GA No 101133904)
Start – end date	1/11/2023 – 31/10/2026 (36 months)
Project type	Coordination and Support Action
Programme	Horizon Europe – Cluster 6
Funding	1,998,636.20 €
Coordinator	Munster Technological University Ms. Carmen Girón Domínguez (carmen.dominguez@mtu.ie)
Project overview	BBioNets constitutes a thematic network that relies on, promotes, and further advances the work carried out by EIP-AGRI Operational Groups (OGs) with respect to **management and/or processing of agricultural and forest biomass with Bio-Based Technologies (BBTs)**. The project has set up 6 regional Forest and Agriculture Networks – FANs (IE, ES, IT, EL, PL, CZ) that identify local needs, prioritise specific BBTs and share BBT knowledge ready for practice to farmers and foresters, boosting the (re)definition of value chains, stimulating cross-fertilisation beyond borders, and bringing Europe to the forefront of farming, forestry and bioeconomy with economically viable and sustainable practices.
Consortium	MTU, Teagasc, IUNG Institute of Soil Science and Plant Cultivation State Research Institute, crea, CTA, American Farm School Thessaloniki · Greece, TEPRO, FOCUS, BIO EAST HUB

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