A World Leading SFI Research Centre

Science Foundation Ireland SFI For what's next

Energy Efficiency and Solar PV workshop
23rd March 2022

biorbic

CARBERY

Aim of the FZC Project

Farm Zero C is an SFI funded project and a collaboration between BiOrbic, Carbery and others to create an economically viable, climate neutral dairy farm

The project presents a holistic approach to reduce greenhouse gas emissions and increase the health and resilience of the farm

Farm Zero C will be a beacon for sustainable agriculture and provide a bright future for farmers and rural communities

biOrbic CARBERY

Our Partnerships

About Shinagh Dairy Farm

- Shinagh Farm is a working dairy farm, milking 250 crossbred Holstein Friesian/Jersey cows on 250 acres
- Set up in 2011 as part of a joint programme between Teagasc and Carbery and is owned by the four West Cork Co-ops
- Aim of this joint programme is to demonstrate the design, set up and operation of a large scale dairy unit on a grass based system and to provide information on the profitability and sustainability of this type of farming system
- The focus of Shinagh Farm has now pivoted as part of the Farm Zero C project

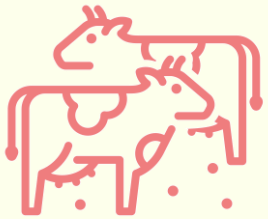
bioRbic CARBERY

Monitor farmers

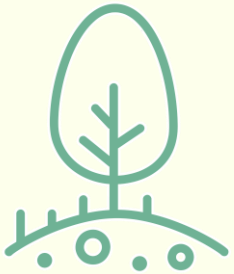
- 10 monitor farmers
- Early adopters of the technology used on the project
- Objectives
  - Reduce carbon footprint
  - Improve or maintain biodiversity
  - Improve air and water quality

biorbic CARBERY

About the Project – Our Pillars



Animal Diet & Breeding



Soil & Soil Carbon

Renewable Energy

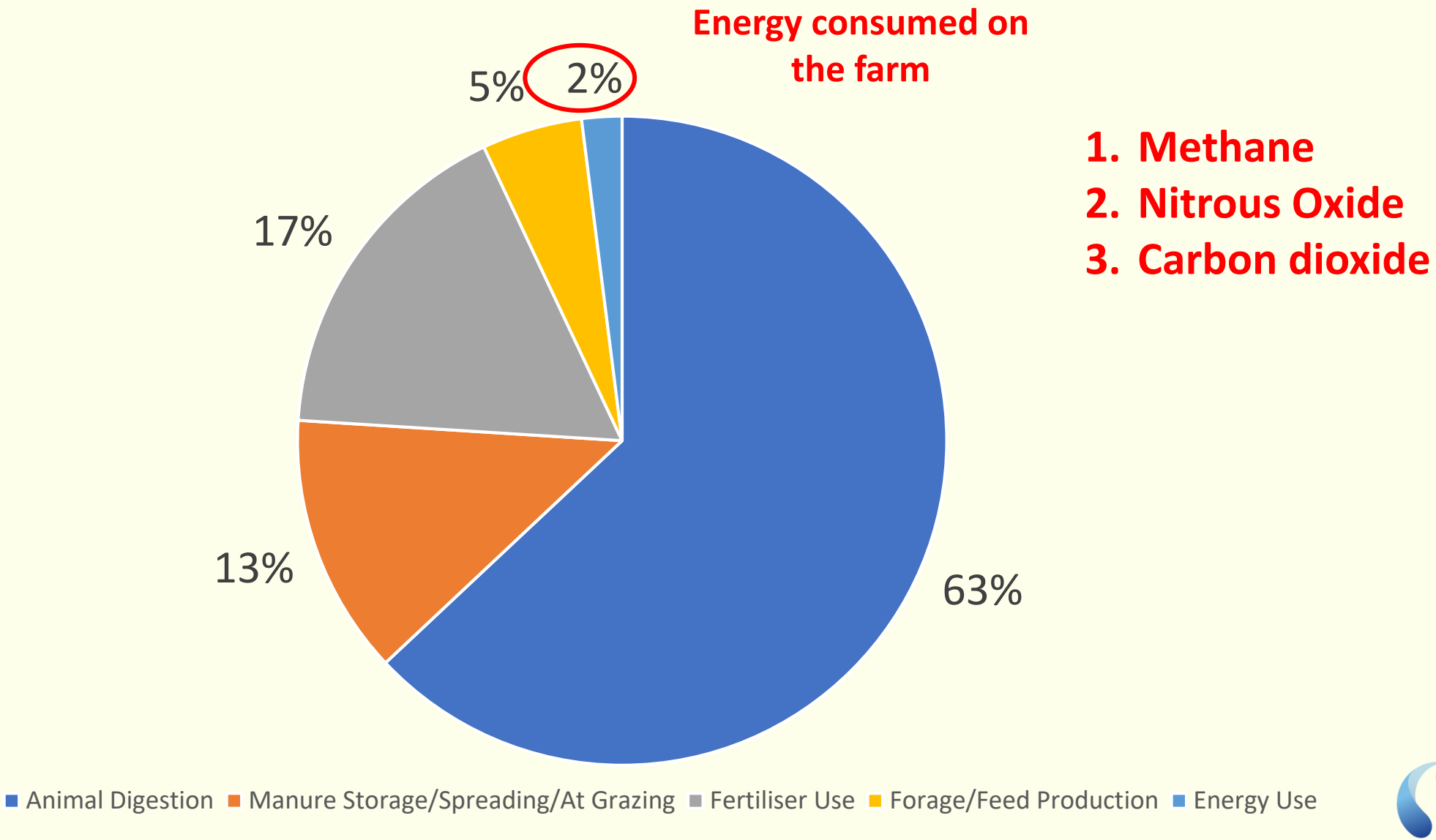
Biodiversity

Clover & Multi Species Swards

Life Cycle Analysis

biorbic CARBERY

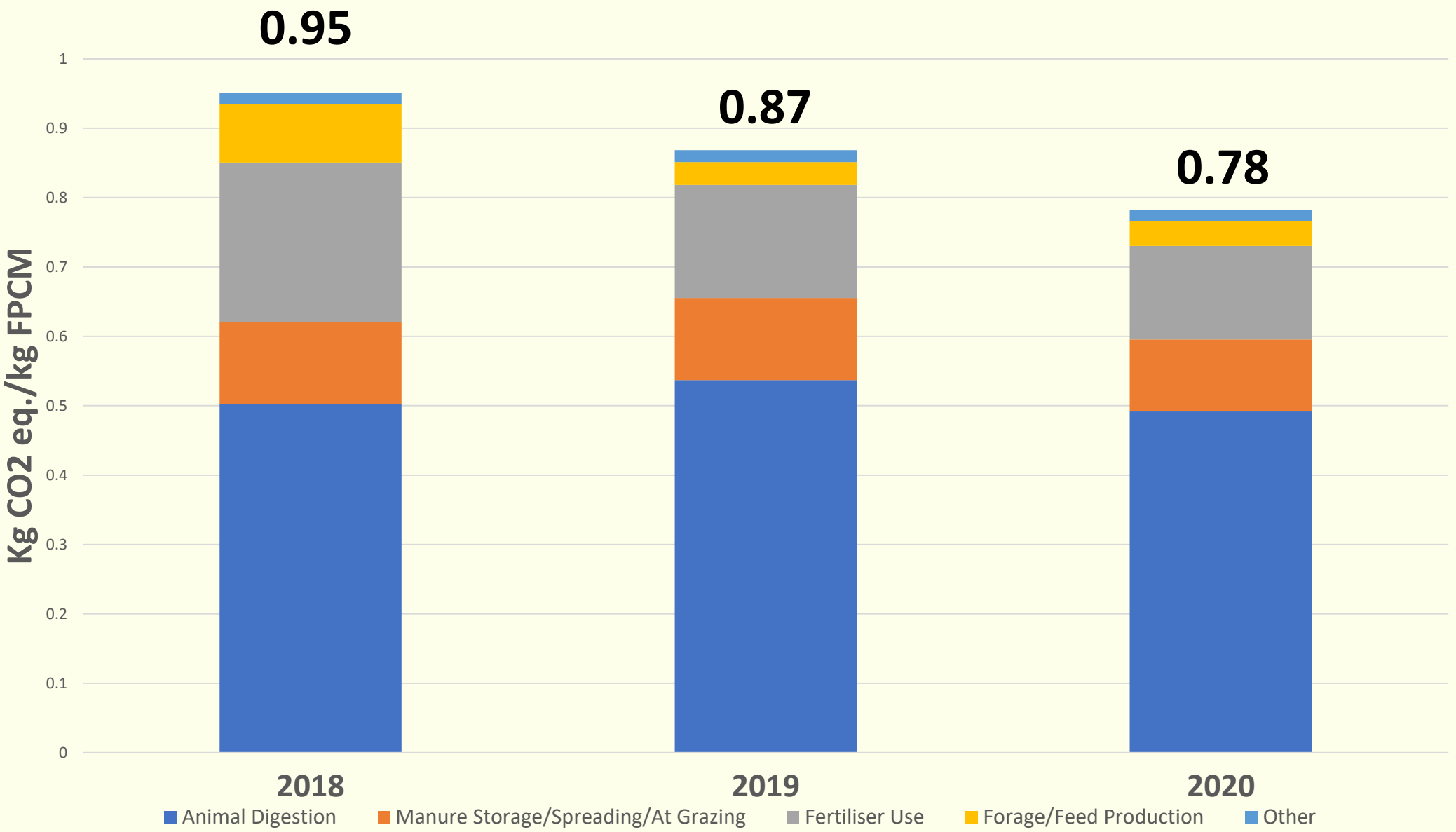
Carbon Footprint



1. **Methane**
2. **Nitrous Oxide**
3. **Carbon dioxide**

biorbic CARBERY

LCA Analysis



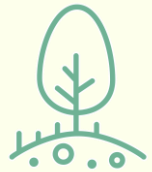
GHG Mitigation Measures Implemented on Shinagh Farm

We are incorporating clover into swards to reduce our chemical nitrogen (N) usage. The aim is to reduce chemical N to an average of **150 kg/ha.**

We are using low emission slurry spreading (LESS) equipment on the farm since **2020**. LESS increases the N fertiliser value of the slurry allowing us to reduce the total chemical N input and also reduces ammonia emissions by up to **30%**.

We are using the Economic Breeding Index (EBI) to improve milk solid production, fertility and health, to maximise profitability and environmental sustainability. The EBI of the Shinagh herd is in the top **5%** nationally.

We are using protected urea since **2020** to reduce GHG emissions. Protected urea has **71%** lower nitrous oxide emissions compared to Calcium Ammonium Nitrate (CAN)

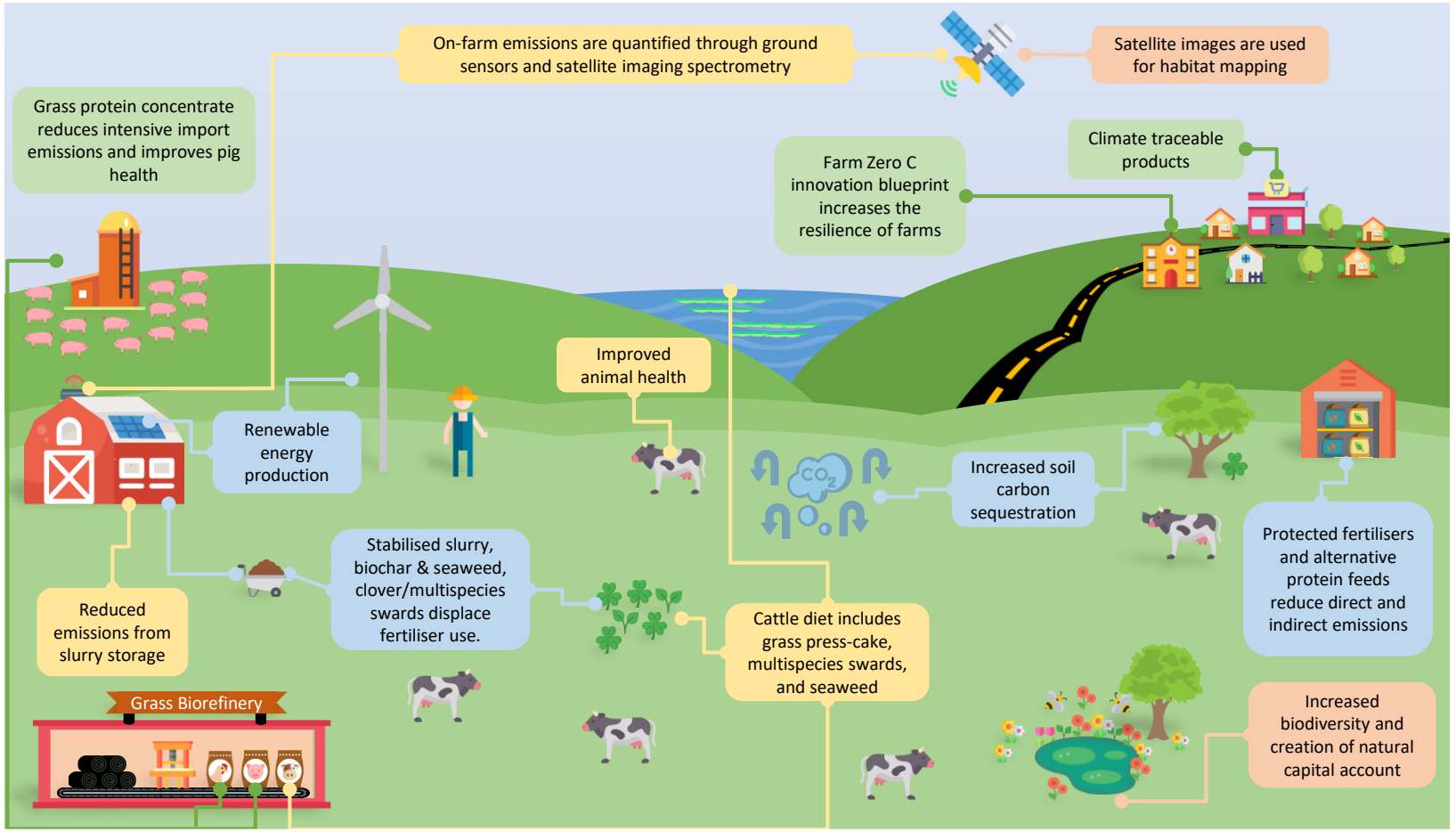


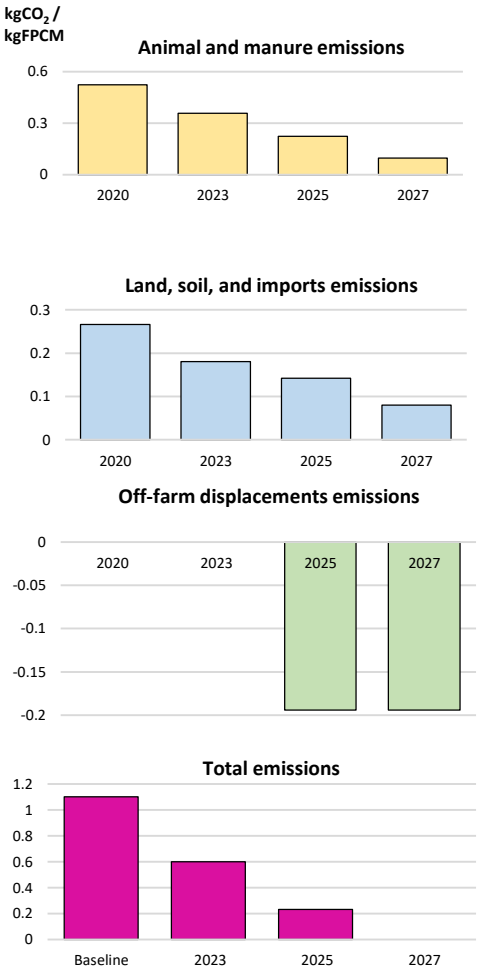
Grassland management is excellent on the farm with an average of **14 T DM/Ha** grown over the last few years. The target is to enter covers of **1300/1400 kg DM/Ha** over the main grazing season and achieve 280 days at grass.

A wind turbine was installed at Shinagh in **2011**, it supplies approximately **30%** of the farm's energy requirements

biorbic CARBERY

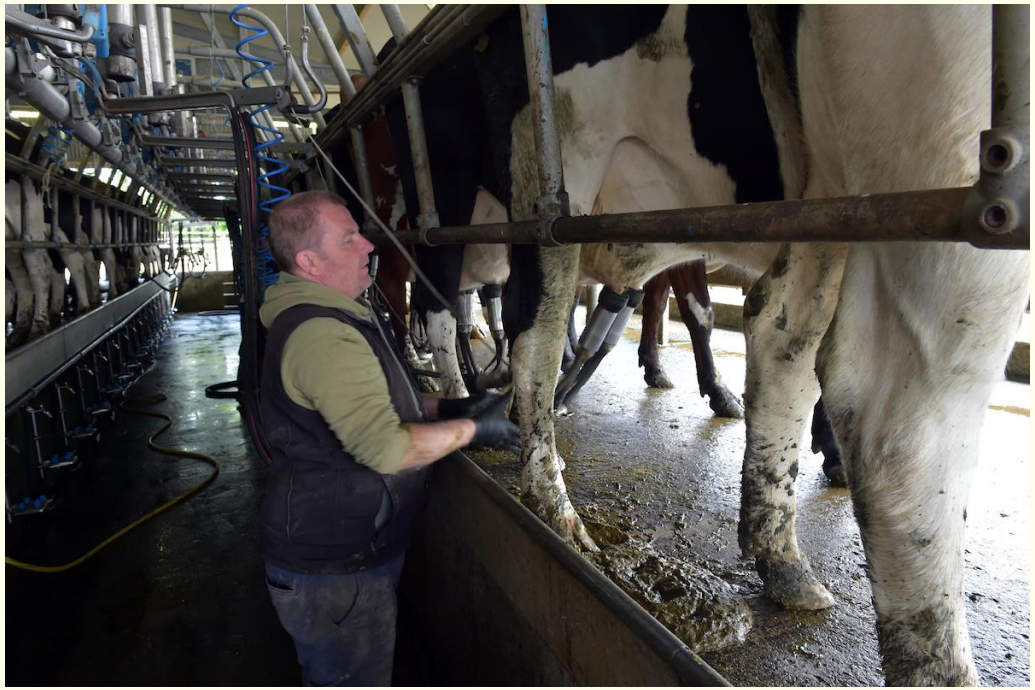
Our holistic approach





Energy use – how can we improve?

- Contributes approx. 2% of GHG emissions – still an area that needs to be improved
- Our objective is to displace fossil fuels and reduce energy costs
- The system used needs to make financial sense, practical and easy for farmers to implement
- Working with Watt Footprint to ensure these goals are met



biOrbic CARBERY

Current Farm Facilities

- 20-unit herringbone parlour
- 17,000 litre bulk tank
- Plate cooler to pre-cool milk
- Kerosene boiler used for hot water
- Variable speed drives (VSD) on the milk and vacuum pumps
- 15 kw wind turbine – installed in 2011
- ESB cost – 0.67 cent/litre (Profit monitor)

bioRbic CARBERY

Solar PV

- Two systems proposed:
  1. 6kW ground mounted system
  2. 18kW roof mounted system - East/West configuration
- Both systems will be supplemented with battery storage (buffer between usage and generation)
- Applications have been submitted to the ESB micro and mini generation scheme with the aim to supply surplus electricity back into the national grid

biOrbic CARBERY

Hot Water

- Significant consumer of energy on farm
- Requirement of 540 litres of hot water @ 80 degrees Celsius
- 2 Hot water cylinders will be installed
- Excess solar PV energy will heat the water
- Heat recovery from refrigeration compressor should give lift of 15-20 degrees
- Back up immersion in place if ever needed

biorbic CARBERY

Other technologies

- Replacement of existing compressors – meters have shown that the current equipment is extremely inefficient
- Review of existing lighting – plan to replace this with modern, more efficient lighting
- Addition of user-friendly monitoring system to show generation across all renewables

Conclusion – Farm Zero C Delivering Impact

Placing the farm at the centre of the solution

We want to build the solution foundation that can be rolled out rapidly to farmers

Transform agriculture in Ireland and provide a bright future for farmers and rural communities

Help Ireland to meet and exceed EU targets (2030/2050)

Farm Zero C will be a beacon for sustainable agriculture globally

biorbic CARBERY

Questions?

gavin.hunt@biorbic.com