

AGRI BUSINESS

SUMMER 2020

AN IRISH FARMERS JOURNAL REPORT IN ASSOCIATION WITH KPMG

SUSTAINABILITY 2050

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FOREWORD



**LORCAN
ALLEN**

Agribusiness editor,
Irish Farmers Journal

The COVID-19 pandemic has placed huge strain on Ireland's agri-food industry but the sector has responded with the kind of resilience and determination that is embodied by our farmers and food producers. It's a credit to everyone in our industry that meat and milk continues to be processed, supply chains remain open and shelves are stocked with food. It's during difficult times like this that consumers can see and appreciate how important their food is.

Ireland's economy is facing severe challenges as a result of the virus. However, just like the last downturn, Ireland's agri-food sector will be ready to support the economic recovery.

With the backdrop of the COVID-19 crisis, along with the ongoing Government formation talks involving the Green Party, it couldn't be more appropriate that the theme of the 2020 Irish Farmers Journal/KPMG *Agribusiness* report is sustainability.

This will be the eighth annual edition of the report produced by the *Irish Farmers Journal* and our long-standing partners in KPMG whose support makes this report possible every year.

Since Bord Bia launched its Origin Green programme in 2012, Ireland's food industry has been at the forefront of sustainability.

As you will read in this year's report, Irish farmers and food producers are not standing still when it comes to climate action, improving biodiversity, switching to renewable energy and transforming our food production system into one that meets the 2050 sustainability goals.

There's enormous change taking place. However, we must always be aware that true sustainability is a journey that not only delivers for the planet and society, but also provides a fair economic return for the primary producer. We hope you enjoy this year's report.



**DAVID
MEAGHER**

Partner-in-charge for
agribusiness, KPMG

As 2020 dawned, Ireland's agribusiness industry was in a good place, albeit with clouds on the horizon such as Brexit, CAP reform, the impact of the EU Green Deal and a likely general election. Then, of course, COVID-19 hit and changed everything.

As the world works through this unprecedented crisis, it has become clear that the result will be a "new normal" across many industries, including agribusiness.

While the full impact of potential changes is not yet clear, one thing that is certain is that a fundamental driver of this change will be sustainability, in all of its aspects.

We, in KPMG, are delighted to partner with the *Irish Farmers Journal* for this, our eighth annual Irish Farmers Journal/KPMG *Agribusiness* report. Reflecting the impact of sustainability on all aspects of our sector, this year's report is devoted to the topic.

You will read a range of interviews with key global influencers from across the sustainability spectrum. These interviews provide real insight as to likely future developments in this area – and the consequent effects on Irish agribusiness.

CHALLENGING

These are challenging times for all of us as we grapple with the effects of COVID-19 and Brexit. However, we must also look to the future. As an industry we must embrace the sustainability agenda.

We should also be assertive about how best to adopt many aspects of sustainability.

We are rightly proud of what we as an industry produce and a continued focus on producing high-quality, sustainable food and drink will confirm Ireland's position as a global leader in food production, and will benefit future generations around the world.

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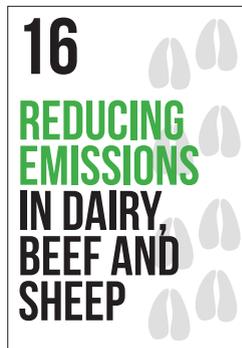
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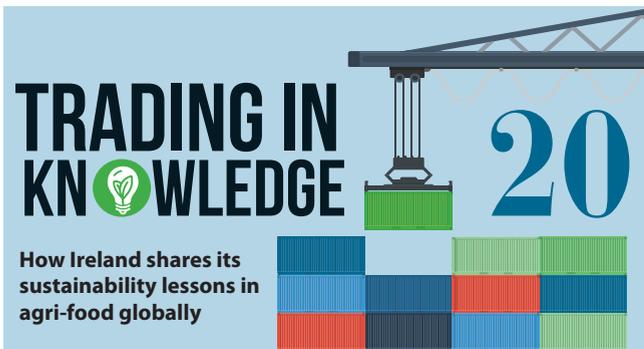
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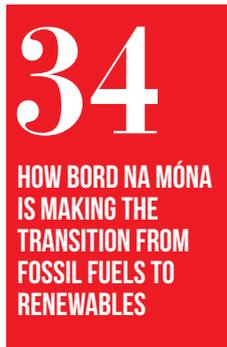
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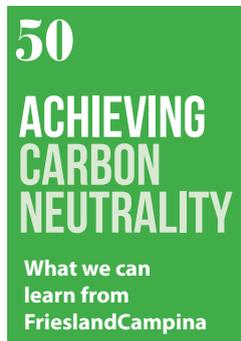
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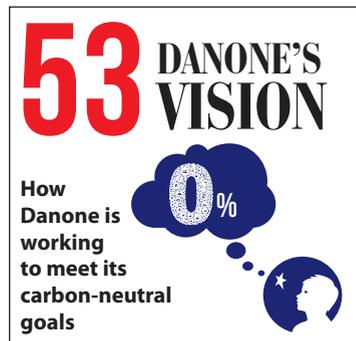


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Together.

We may be working apart more than we're used to. But you're not alone.

At KPMG we're here to support our clients and help Irish business overcome the challenges of COVID-19.

A photograph of a woman with dark hair, wearing a light blue button-down shirt, sitting at a desk and looking at a computer monitor. She has a slight smile and is holding a red mug. The background is softly blurred, showing what appears to be an office or library setting with bookshelves.

#Together | Learn more at [KPMG.ie](https://www.kpmg.ie)

INTRODUCTION



JUSTIN MCCARTHY
Editor and
chief executive,
Irish Farmers Journal

LOOMING POLICY CHANGES WILL BE CRUCIAL FOR IRISH FARMERS

Leaving aside the serious challenges posed by Brexit and the COVID-19 pandemic, the coming years will be crucial for Irish agriculture as major policy changes are coming down the line in Europe and Dublin that will shape the future of our industry.

In Brussels, the new president of the European Commission, Ursula von der Leyen, has spelled out her ambition for the future direction of the EU with her Green Deal proposal. Von der Leyen wants the EU to be carbon-neutral by 2050 by introducing sweeping changes across member states in terms of energy, transport and agriculture.

It says much about current thinking in Brussels that its new Farm to Fork strategy for European agriculture is under the remit of the Commissioner for Health Stella Kyriakidou and not under the direction of DG Agri.

COMMON AGRICULTURAL POLICY

At the same time as Brussels is preparing its new Farm to Fork strategy, EU member states are struggling to find common cause on the direction of the Common Agricultural Policy (CAP).

The European Parliament has already kicked for touch on the issue of CAP reform by voting to delay any policy changes out to 2022. With the UK out of Europe, protecting the CAP budget has to be the priority for Ireland.

After this, some major commonsense reforms are badly needed in the CAP. Farming is often blamed for biodiversity loss in Europe. Yet, under the current CAP policy, if a farmer takes out part of their land to preserve it as an area of biodiversity or a natural habitat, they are penalised in a reduction of their basic payment. Simple changes like this that actually reward farmers for the sustainability benefits they deliver will add up to huge gains across Europe. Yet, there are positives. Speaking at an event in Dublin earlier this year, the EU's head of

climate strategy Dr Artur Runge-Metzger said the EU could never achieve carbon neutrality without carbon offsets from agriculture.

Dr Metzger, who is one of Europe's leading policymakers on climate change, said farmers needed to be rewarded for removing carbon from the atmosphere and storing it in soils, hedgerows and trees on their farms. This is the kind of thinking on policy we need in Europe, with the sustainability of the farmer given just as much credence as environmental or climate sustainability.

QUICK-FIX SOLUTION

In Ireland, the Green Party's condition for entering government formation talks was a commitment to reduce emissions by 7% per annum. This has led to renewed calls for a reduction in our national herd as a quick-fix solution to reducing Ireland's emissions profile.

Yet the enormous volume of CO₂ that Irish grasslands and farms actually sequester out of the atmosphere every year is consistently absent in this debate. There is a huge knowledge gap in our understanding of carbon sequestration and significant investment in research on this side of the carbon cycle is badly needed in the coming years. Setting a fair emissions target for farmers is impossible without knowing the net figure for agricultural emissions.

Ideology aside, Ireland's grass-based production system makes it one of the most sustainable places in the world from which to produce high-quality beef and dairy. Reducing production here will only see that production shift to other parts of the world where the associated emissions will probably be higher.

Ireland has all the ingredients for sustainable food production. All that's missing are policies that back our farmers and put their economic sustainability on an equal footing with the environment or climate. That's what true sustainability will look like.



Kerry is the world's leading taste and nutrition company, serving the food, beverage and pharmaceutical industries, and a leading supplier of added value brands in selected EU markets. Every day millions of people across the world consume food and drinks that contain our taste and nutrition solutions. We lead the industry with our investment in Research, Development and Application across our global centres of excellence. Along with our industry-leading portfolio of taste and nutrition technologies and our development and application teams, who are central to our innovative culture and ongoing success, this enables Kerry to add unprecedented value by delivering better food, in a better way, for a better future.

Kerry; a global leader in innovation:



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Employees



150+

Sales in over 150 countries



1,000+

R&D Scientists

€291.4m

Invested Globally in RD&A in 2019



151

Manufacturing Locations Globally



Global Leader in Clean Label

Pictured: Kerry Global Technology and Innovation Centre in Naas, Co. Kildare, Ireland.

AN APPETITE FOR change

Listening to media coverage over the last month, you would think Ireland's agri-food industry was doing nothing to tackle climate change



LORCAN
ALLEN

Agribusiness editor,
Irish Farmers Journal

Sustainability is a funny word. It can mean many things depending on what context you use it in. It is most often used in connection with the sustainability of our environment or climate. It can also be used in reference to the sustainability of our society or rural communities.

Far too little is sustainability used when discussing the incomes and future prospects of Europe's food producers and farmers. In Ireland, sustainability is a word we've become all too familiar with over the last decade, particularly in the agri-food industry.

In 2012, Bord Bia launched its pioneering Origin Green sustainability programme, which was rightly seen by many as the global forerunner in terms of setting out an ambitious, co-ordinated plan to achieve sustainability within the food supply chain.

Yet Origin Green's momentum has stalled and all the positivity that surrounded the programme's early years has since been overtaken by a climate and biodiversity crisis that is asking hard questions of the global food system.

GOVERNMENT

Ireland's food industry is not immune. Over the last month, we've watched on as Fine Gael and Fianna Fáil have sought to persuade the Green Party into Government formation talks. Ireland badly needs a stable Government to guide the country through the current COVID-19 pandemic and the severe economic crisis it will leave in its wake.

However, the Green Party has stuck to its principles and made reducing Ireland's emissions by 7% every year a red-line issue for entering Government. The 7% emissions reduction target triggered a wave of commentary and analysis of how this could be achieved.

Unsurprisingly, agriculture featured strongly in this debate. With agriculture accounting for more

than one-third of Ireland's total emissions, culling our national cattle herd is seen by many as the simplest way to achieve our climate goals.

Listening to the media coverage over the past month, one could easily be forgiven for thinking that Ireland's agri-food sector had its head in the sand and was refusing to change or adapt to the climate crisis. But you could not be more wrong.

As you will read in this report, enormous change is taking place within Ireland's agri-food industry from the farm right up to the supermarket shelf.

FARM LEVEL

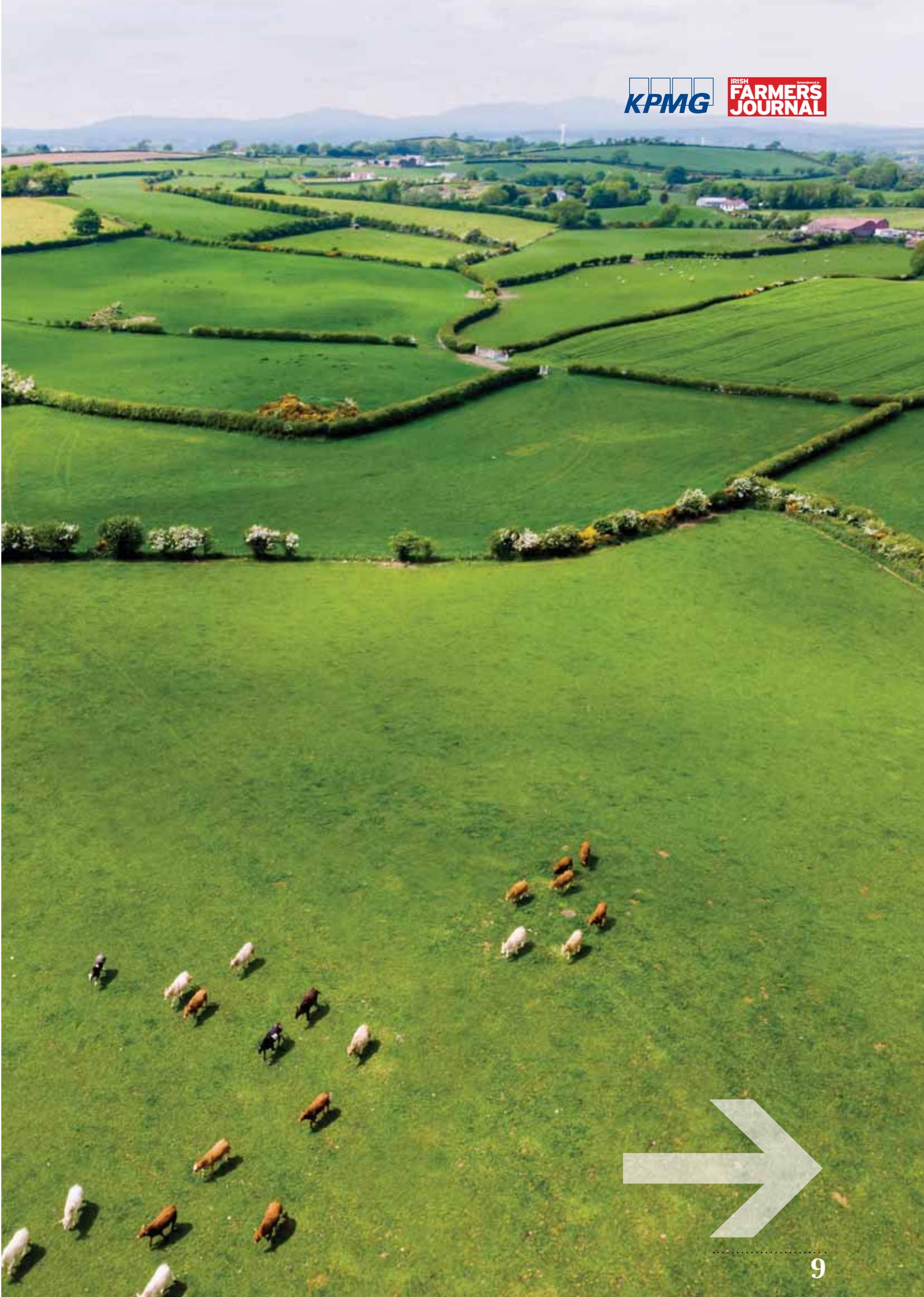
At farm level, Teagasc has developed the Marginal Abatement Cost Curve (MACC) as a roadmap for reducing greenhouse gas emissions from agriculture. At the same time, Prof Donagh Berry, one of the world's leading livestock geneticists, continues to carry out groundbreaking research on how farmers can breed low-carbon livestock (see page 16).

At Wageningen University in the Netherlands, Prof Rogier Schulte has identified 11 Lighthouse Farms around the world that he believes are already meeting the UN's 2050 sustainability goals of food production but, most importantly, the farmers have found a way to make sustainability a profit driver for their business (see page 12).

It's hugely encouraging to see Prof Schulte has identified an Irish suckler beef farm as one of his Lighthouse Farms.

Carbon-neutral beef and dairy farming is possible in Ireland. We just need to invest in measuring sequestration as well as emissions to show policymakers the positives that farming delivers to the earth's climate and not just the negative.

The other major charge levelled against European farmers over recent years is the decline in biodiversity. Addressing this issue is perhaps an even greater challenge than reducing carbon emissions.





Yet, there is hope. As you will read on page 24, west Cork dairy processor Carbery has developed a hugely successful sustainability programme known as its Greener Dairy programme.

As part of this pilot programme, Carbery mapped the amount of biodiversity on 12 dairy farms in its catchment and found that about 8% of the area on each farm is an area of biodiversity or natural habitat, which is significantly ahead of international standards.

However, the co-op is not trumpeting this as a success. Instead, Carbery is helping its farmers to stop any further biodiversity losses and maintain these levels on farms. Once this is achieved, farmers can start to rebuild biodiversity even more.

One of the major roadblocks to rebuilding biodiversity on farms is European agricultural policy. Under the current CAP, farmers will receive a reduced basic payment if they take some of their land out of production to install an area of biodiversity. This makes no sense and needs to change fast.

FOOD INDUSTRY

Outside the farmgate, the agribusiness industry is not idle either when it comes to lowering emissions and meeting 2050 sustainability goals. On page 53, we speak to Danone's head of sustainability for the UK and Ireland about the company's ambition to be carbon-neutral by 2050.

Danone is one of the largest brand holders in the global food industry and it has a lot to lose if it cannot scientifically verify its low-carbon credentials to its consumers. The company has two infant nutrition plants here in Ireland that must meet carbon-neutral targets by 2025.

When a company such as Danone, which is a major buyer of Irish dairy ingredients, starts pulling its supply chain along in the journey towards carbon neutrality it will mean huge top-down changes. Already, Irish suppliers to Danone are adapting to its new sustainability goals.

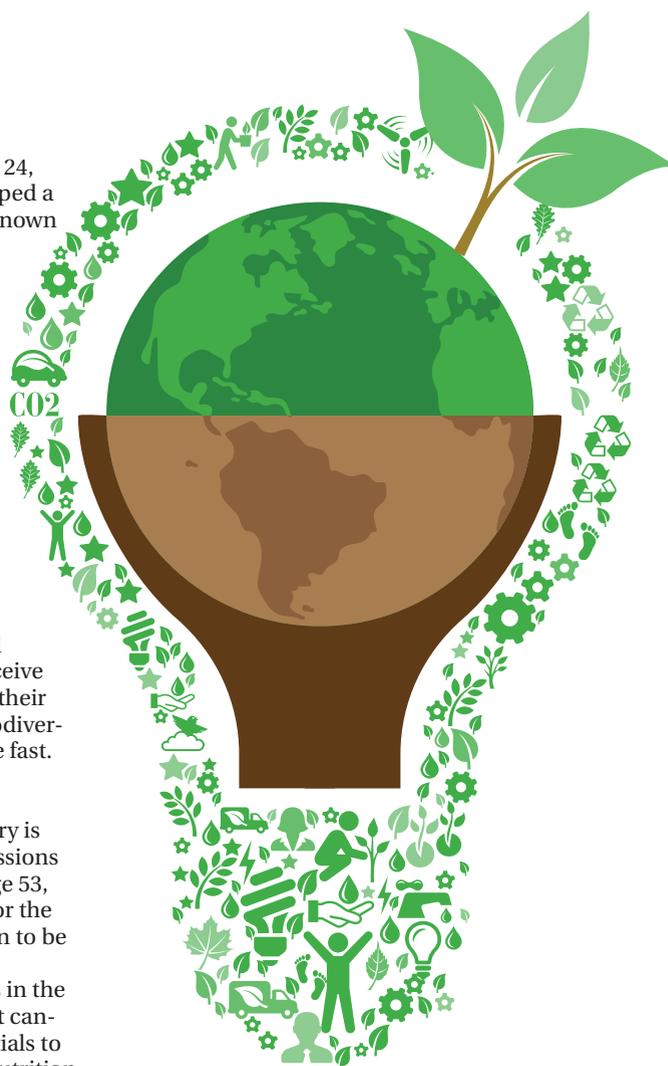
However, one of the biggest challenges facing Danone Ireland is its ability to source a renewable alternative to natural gas. The company believes biomethane produced from anaerobic digesters (AD) on Irish farms is the only way its Irish plants can become carbon-neutral.

Again, this is where Government policy is out of line. There is a clear market for biomethane, the technology is there and the raw material is readily available. All that is missing to get a biomethane industry off the ground is a Government-supported feed-in tariff.

On the renewable electricity side, Ireland has been relatively successful in leveraging its natural wind resources. However, more is needed to bring stability to the national power grid during times when the wind is not blowing.

On page 34, we profile the enormous changes taking place at Bord na Móna as it transforms itself from a company that harvested and burned a finite fossil fuel in the midlands to one that aims to be 100% renewable by 2023.

Once again, policy changes are needed to allow for the final phase of this transition. Without this State support, the sustainability of the midland's economy looks increasingly jeopardised.



TRANSFORMING TO A SUSTAINABLE SYSTEM

Nobody in the Irish agri-food industry is denying the seriousness of the climate crisis we face or the challenge of transforming our food production system into one that is truly sustainable, both for our planet and for the financial viability of the farmer.

As you read this report, you will get a small flavour of the enormous energy and capital that is being invested into adapting how we produce and process food in this country. For some, the pace of this change is not enough. They want overnight solutions using drastic measures. But that would not solve our long-term challenge where we need to feed 10bn people in a sustainable manner by 2050.

The global food industry could feed 10bn people in the morning if it wanted to but our planet would soon be exhausted. The goal is to be able to produce food for a global population of 10bn over and over again.

Farmers and food companies know better than anyone that our planet has finite natural resources. And that is why they have been on the sustainability journey longer than most. But sustained and lasting change takes time. True sustainability cannot be achieved overnight.

**THE GLOBAL
FOOD
INDUSTRY
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EXHAUSTED**

1

SUSTAINABILITY RESEARCH

It's often said that science knows more about space than it does about the microbiology in the soil under our feet. And, yet, our soils are the starting point of how we sustain ourselves as a species. The sustainability agenda has risen to the fore over recent years but our scientific understanding of many of the issues is still in its infancy. We still have a lot to learn in this area but new research and ways of transferring knowledge around the world are emerging every year. Given the importance of agri-food to Ireland, it's crucial that we remain at the forefront of sustainability research.



LIGHTHOUSE FARMS: READY TO MEET THE CHALLENGES OF 2050

Rogier Schulte, chair of the Farming Systems Ecology group at Wageningen University in the Netherlands, introduces the Lighthouse Farms project, which has identified 11 commercially viable farms already meeting 2050 sustainability goals

When designing early maps of the world, the first cartographers wrote “Hic sunt dracones” on the fringes of their maps, meaning “here be dragons” – this is as far as our knowledge extends. Today, the world needs new solutions to old challenges. How can we sustain the essential service of food production within the resources of our planet in such a way that it can absorb biological, financial or climate shocks? The majority of farmers that I have worked with over the last 20 years are proud custodians of the countryside but are grappling with the competing demands for environmental and economic sustainability. For these farmers, how can we circumnavigate today’s dragons and chart a path towards a future that is sustainable in the widest sense of the word? At the Farming System Ecology group of Wageningen University and Research, we set sail to

explore the world in search of Lighthouse Farms. These are farms in the “new reality” that are already operating as if they are in the year 2050.

They have somehow escaped the pragmatic constraints that most farmers find themselves in and have found new ways to make sustainability the engine, rather than the constraint, for profitability. We find them where we least expect them or where we weren’t necessarily looking. Beside a busy motorway in the Netherlands. In the deserted inlands of Spain. In the middle of urban Havana. And in the moon-like landscapes of northern Ethiopia.

Sometimes they stand out, visually, in the landscape, while others blend in, like any other farm.

Across the continents, we have brought 11 of the finest exemplars together in our global network of Lighthouse Farms.

WELCOME TO LATVIA

Last year, we made our second visit to our Lighthouse

Farm in Latvia, AS Ziedi JP. Driving the unpaved road, the forest opens up to large fields and a collection of large industrially sized buildings. Not quite the arcadia where you'd take your family on a camping trip, but inside these buildings the Pilvere family has redefined what we know as circular agriculture.

The Pilvere family has cleverly combined 1,000 dairy cows, six anaerobic digesters, two industrial generators and dozens of fish tanks so that the farm produces milk, meat, electricity, fish fillets and caviar.

What is the main product of this farm and what is the byproduct? That depends on your interest. Economically, this is a caviar farm powered by the heat from the regenerator that runs on methane belched out by the dairy cows.

From an energy perspective, this farm is a power station that happens to produce food on the side. If our interest is in biomass flows, then this farm is a dairy farm with a diversity of additional end-products.

What makes AS Ziedi JP a Lighthouse Farm is that it has redefined the concept of circularity. It has moved beyond the concept of "recycling byproducts". In fact, it makes the distinction between "main product" and "byproduct" irrelevant.

REDEFINING SUSTAINABILITY

Circularity, or circular agriculture, is merely one of many dimensions of sustainability. Others include climate-smart agriculture, nature-inclusive farming, agro-ecology, regenerative agriculture, conservation agriculture and community-supported agriculture.

There are contrasting approaches to sustainability that have similar ingredients brought together using different recipes that depend on the environments and societies that farms find themselves in. Irish agriculture is shaped by ruminants so it is no surprise that the climate dimension takes centre stage in the national discussion on sustainability.

Nor is it surprising that Dutch agriculture, with its large manure surplus, focuses on circularity. Or that the focus further south in the Mediterranean region threatened by land degradation is on regenerative agriculture.

We have carefully brought together our network of Lighthouse Farms so that each radically redefines at least one of these dimensions of sustainability.

YMPÄRISTÖYSTÄVÄLLISIMPÄNÄ

Take the Knehtilän cereal farm in Palopuro in southern Finland. As we turn into the yard on a visit to the farm our host Kari Koppelmäki fills his car with biogas that is produced on the farm using surprisingly accessible technology: ordinary silage pits filled with green manure in a process known as dry anaerobic digestion.

This produces not only methane for motor fuel but it also reduces the volume of green manure, which concentrates its nutrient value. It allows farmer Markus Eerola to apply the nutrients to the soils on the farm that are most deficient rather than ploughing in the green manure in situ.

The result equals more cereals and more biofuel. The Knehtilän farm has found a way to overcome the old dilemma of competition between food and biofuel, and in the process redefined the meaning of the Finnish word Ympäristöystävällisimpänä ("most sustainable").

In the Netherlands, the ERF farm is redefining the meaning of "nature-inclusive farming" by growing



their crops, the same crops that they have always grown, in narrow strips rather than entire fields. Why would they do this?

Seven years of research show that the mixing of crops slows the outbreaks of pests and diseases as they struggle to find their target crops between the strips. At the same time, as the variety of crops ensures that there is biomass on the field at all times, strip-cropping allows the natural enemies of pests to move in faster from adjacent crops.

We have also turned our attention to one of the countries where climate-smart agriculture is most challenging – Ireland. With more ruminants than people, and an absence of heavy industry, Ireland's national greenhouse gas profile is dominated by methane emissions from bovine animals, something which is notoriously difficult to mitigate.

Unsurprisingly, beef production has received negative attention in the media, both for its impact on human health and the environment. At our Lighthouse Farm at the Lands at Dowth, we partner with Devenish Nutrition and University College Dublin to turn this challenge into a success story.

The question we are asking is, can we design ruminant production systems that contribute positively to human health, to climate mitigation and to biodiversity? Early results from our joint research team encourage us to search for solutions from the soil all the way to society.

COMMON INGREDIENTS TO SUCCESS

Together, our 11 Lighthouse Farms (note that we have left open one vacancy to complete the dozen) show the diversity of solutions that are available, and necessary, for global agriculture to meet the sustainability challenge of the next generation.

Do we expect each Lighthouse Farm to be perfect in all dimensions of sustainability? No. Lighthouse Farms, too, are continuously evolving and adapting to changing priorities but each Lighthouse Farm does radically redefine at least one dimension of sustainability.

Do we expect all farmers to relate to every lighthouse example? No, we don't, but we have selected our network so that all farmers can find inspiration from at least one of the Lighthouse Farms.

Yet, despite their diversity, their different approaches, their different scales of operation and the vastly different climates they are operating in, all of our Lighthouse Farms also have many common ingredients.

ABOVE:
Finnish farmer Kari Koppelmäki fills his car with biogas extracted from his farm's silage pit.

MAIN IMAGE (OPPOSITE):
Strip-cropping in the Dutch polders.





An agro-forestry system in Brazil. It takes a village to manage a successional agro-forestry farm. In areas with high unemployment, this is seen as a welcome development.



SECRETS TO SUCCESS

It is these common ingredients that we have been studying over the last few years as they provide the keys for farmers to design their own future-proof farming systems. So far, we have found three secrets to the success of all Lighthouse Farms.

1 Harnessing the power of complexity: all Lighthouse Farms make use of complexity by combining multiple varieties and crops (Netherlands), mixed swards (Ireland) and indeed a range of farm enterprises (Latvia, Finland and Spain). When we visited our colleague Dr Uma Khumairoh on the island of Java in Indonesia, she brought us on a tour of complex rice systems.

Here, farmers combine paddy rice production with the cultivation of azolla, fish, ducks and border plants. Azolla is an aquatic plant that fixes nitrogen from the air much like white clover in grassland. The ducks provide pest control, as well as eggs, while the fish recycle nutrients and provide a valuable source of protein and income.

Border plants diversify the household menu and serve as habitats for biodiversity. On their own, each of these components struggles to deliver food in the absence of chemical inputs but assembled together, they work in synergy and deliver both a healthy diet and sustainability as human-made ecosystems.

We find the same principles apply in a very different part of the world in the Atlantic rainforest of Brazil. The Atlantic rainforest is one of the biodiversity hotspots of the world but now less than 20% of its original size remains today.

Here, we find ourselves exploring the successional agro-forestry systems of Fazenda da Toca. This system has complex, multi-year rotations of vegeta-

bles, bushes, citrus trees and woody perennials that together deliver a variety of food and wood products and, equally important, create corridors between the last remaining patches of virgin rainforest.

But managing complexity does not come easily. If it was easy, we would have seen a lot more farms reaping its benefits. Complexity comes at a price. It takes labour and it demands a lot of knowledge.

2 Combining ecology and technology: to manage the labour requirements, all Lighthouse Farms combine their human-made ecosystem approach with new technologies. Technology comes in many forms. In some cases, it comes in the form of steel such as the roller-crimper technology used by our arable Lighthouse Farm in Austria.

This one-pass machinery rolls the green manure for direct-drilling of the next crop, providing an instant mulch layer that provides nutrients, protects the soil surface and prevents weeds. As we are increasing the diversity of crops we have joint robotics experts who are designing autonomous machinery to tend to the crops.

But technology can also come in the form of management support tools for farmers. In Colombia, our climate-smart Lighthouse Farm village base their decisions on long-term climatic forecasts made by scientists from the International Centre for Tropical Agriculture.

Similarly, we are building holographic interactive landscapes for our lighthouse community in Northern Ethiopia to support them in science-based decision-making. In all its manifestations it is the clever use of technology to unlock and support ecology that allows Lighthouse Farmers to manage their complex systems.

3 Working together to manage the knowledge: the final ingredient to success is that each of our Lighthouse Farms has found a way for people to work together. It is immensely challenging to reinvent farming systems so that sustainability becomes the engine, rather than a constraint, for profitability.

If there is one thing that we have learnt then it is that farmers cannot be expected to make that transformation alone. But our Lighthouse Farms have shown that this goal is within reach if we get people to work together, both within the farm but also within the wider rural community. These collaborations, too, come in many forms.

Our Latvian dairy/caviar/power-station farm is so complex that the Pilvere family employs a hundred experts, from vets to fish farmers to full-time technicians in the anaerobic digestion plant to ensure they have all the expertise needed.

A similar picture appears in a different setting. At our urban Lighthouse Farm in Havana, Cuba, farmer Isis Maria Salcine Milla employs a hundred staff, each with their own skill sets, to grow food in the middle of the city.

Closer to the equator, expert knowledge is brought together in many forms that are appropriate to local conditions and traditions. In Brazil, this is in the form of a large organic company called Rizoma. In Ethiopia, it comes in the form of local community-supported land management plans, while in Colombia it is brought together through strong institutional arrangements.

GLOBAL CLASSROOM AND LABORATORY

This shared learning encouraged us to bring our Lighthouse Farms together as part of our Global Network of Lighthouse Farms, which will act as our global classroom and laboratory. Together, the Lighthouse Farms shine their light as inspiring examples of new solutions on the horizon that are available to our farmers and food industry.

Together, we learn to inspire the next generation of farmers. The Lighthouse Farms also inspire our students here at Wageningen University who will become the next generation of farmers, policymakers and industry captains.

Stay tuned and watch out for our upcoming column in the *Irish Farmers Journal* to explore each Lighthouse Farm and to learn with us as we continue our quest for ingredients to successful entrepreneurship and business models.

You can explore the Lighthouse Farms from the comfort of your home at: <https://www.LighthouseFarmnetwork.com/> Or follow us on Twitter @FSElighthouse or Instagram @FSElighthouse

Thanks to Dr Annemiek Pas Schrijver, Dr Vivian Valencia and Mariana Debernardini for their input on this article.

A massive thank you to...

- The West Cork farmers keeping us supplied with the highest quality milk
- Our employees working every day to keep our plant open and processing and our company operating
- Our customers for supporting us and buying Irish during this time

Carbery Group would like to wish good health and safety to our farmer suppliers, employees, and customers. We appreciate the efforts you are making to keep food production operating and to minimise the spread of Covid-19 in Ireland.

*Thank you
and stay safe*



REDUCING THE ENVIRONMENTAL HOOFPRINT

Prof Donagh Berry, a quantitative geneticist with Teagasc and director of VistaMilk research centre, outlines the latest research on reducing livestock emissions

Traditional animal breeding is credited globally with contributing half the gains in animal performance observed in the past century. Despite this, it is clear that optimum performance can only be achieved through a co-evolution of breeding and management strategies. On top of this, component research and deployment of specific tools (eg complementary feeds and breeding strategies) must remain cognisant of upstream and downstream ramifications along the highly integrated and interdependent agri-food chain. For example, what effect could feeding methane inhibitors to cows have on milk or meat quality?

The current breeding indexes in Irish dairy, beef and sheep are designed to improve environmental efficiency, even in the absence of direct measures of environmental traits. Improvements in the environmental efficiency of the animal should also produce economic efficiencies for the farmer.

For example, biological data from Teagasc's next generation dairy herd was recently used to model the greenhouse gas emissions and nitrogen efficiency of two genetically divergent groups for the Irish dairy breeding index, the EBI. The two genetic groups consisted of either the top 5% of animals in Ireland on EBI (EBI = €181) or a group representative of the national average for EBI (EBI = €82).

Total greenhouse gas emissions were similar for both groups of animals, but when expressed relative to fat and protein corrected milk production (FPCM), the elite group produced 10% less greenhouse gas emissions compared to the national average. This was primarily due to their superior reproductive performance, which improves the parity structure and the productivity of the herd.

A further analysis demonstrated that selection for increased EBI could lead to a reduction in Ireland's greenhouse gas emissions intensity from its current



value of 1.14kg of CO₂/kg of FPCM down to 1.03kg of CO₂/kg of FPCM over the coming decade. This would equate to a 10% improvement in the carbon emissions intensity of Irish milk.

Additionally, breeding for increased EBI can improve nitrogen efficiency as the elite group had a 5.3kg lower nitrogen surplus (kilos of nitrogen entering the system minus kilos of nitrogen leaving the system) compared to the national average group.

BEEF AND SHEEP RESEARCH

In beef, preliminary results from measuring methane emissions at the ICBF Tully Performance test station, as part of the GreenBreed project, suggest that each €10 increase in the terminal index value of an animal corresponds to a reduced methane output of 2.9g. This benefit is compounded when the known younger age at slaughter in higher-index animals is factored in.

Research on methane emissions in sheep is still in its infancy and to date has focused on hoggets. The average daily methane output has been 8.62g. Preliminary results reveal that five-star hoggets produced less methane emissions (7.87g per day) compared to one-star hoggets (8.47g per day).

While none of the dairy, beef or sheep breeding indexes explicitly include environmental traits, consideration of direct measures of environmental efficiency will improve the rate of genetic gain.



Breeding for increased EBI can improve nitrogen efficiency



Methane being measured in dairy cows.

How much these observed gains in environmental efficiency can be further accelerated by explicitly considering actual environmental traits must first be quantified. To do this, actual animal-level environmental data will be required.

To this end, Teagasc, the ICBF and the VistaMilk SFI research centre (hosted by Teagasc) are strongly engaged in research to identify solutions to reduce the environmental hoofprint of dairy, beef and sheep. The approaches taken consider both breeding and feeding solutions. Breeding has the advantage that the benefit of improvement is cumulative over years.

As part of the GreenBreed project funded by the Department of Agriculture (DAFM), breeding solutions to further improve efficiency in dairy, beef and sheep are being explored. A dual strategy is being taken to evaluate how to reduce methane emissions per day, but also how to improve lifetime efficiency using readily accessible data. The latter includes improved lifetime productivity of the mature herd but also reducing age at slaughter in growing cattle and sheep.

The advantage of the latter approach is that the data is already available and breeding programmes can be implemented relatively quickly. The Science Foundation Ireland (SFI) research projects (VistaMilk SFI research centre and Starting Investigator Research Grant, or SIRG) focused on dairy cows are evaluating the potential to breed for reduced methane emissions and improved nitrogen use efficiency through the exploitation of information contained with milk.

If successful, predictions of methane output and nitrogen use efficiency could be available on all milk-recorded cows for both management and breeding purposes in the years ahead. The VistaMilk SFI centre is also evaluating complementary feeds for dairy cows as a means of further reducing methane emissions.

MEASURING METHANE

Key to quantifying the potential reductions in methane emissions that can be achieved from breeding or feeding is a measurement of the actual methane produced per animal. While different approaches exist, Teagasc research is using GreenFeed measurement systems for cattle and portable accumulation chambers for sheep.

While most global studies in cattle focus on indoor feeding systems, Teagasc Moorepark has the only two GreenFeed machines in Ireland to enable the measurement of daily methane output in outdoor

grazing animals. Each GreenFeed machine costs about €125,000 and can measure methane emissions on approximately 15 to 20 animals at a time.

Each outdoor GreenFeed machine is mounted on wheels, which enables it to be moved between paddocks along with the cows. Pellets are dropped down into a hood every 20 seconds for three to four minutes. Animal visits are monitored and restrictions can be put in place to prevent excessive use.

A fan pulls air past the animal's muzzle into ducts where airflow rates are captured and subsampled to measure methane and carbon dioxide concentration in the air. Each measurement is only two to seven minutes in duration and cows usually visit one to three times daily. This can then be extrapolated to calculate daily methane output, although research at Teagasc is under way to evaluate alternative mathematical approaches to modelling this better.

The first measurements of beef and dairy cattle, as part of the GreenBreed and VistaMilk projects, started in 2019. In Tully, on average, the steers and heifers belch out 248g of methane daily.

The first measurement of methane emissions in the Irish sheep population commenced in winter 2019 at Teagasc Athenry. Portable accumulation chambers (PACs) were purchased from New Zealand, which enable the measurement of methane emissions of 12 sheep simultaneously.

Individual sheep are placed into each of the 12 chambers for one hour where the methane emissions of the sheep are measured three times. The chambers are mounted on a trailer, enabling them to be transported to various sheep farms once validated in a research setting.

Validation of the chambers against gold standards is nearing completion.



Connected bins to measure feed efficiency of cattle at the ICBF progeny test centre in Tully, Co Kildare. \ Thomas Hubert

METHANE EVALUATION

The aim of the different projects in cattle and sheep is to collect methane data on several thousand animals over the next few years, which would be the minimum number required for national genetic evaluations.

The beauty of the strategy taken in these projects is that all cattle and sheep are also measured for an array of different characteristics such as perfor-

mance (growth or milk yield), feed intake (indoors and grazing), liveweight, fertility and health, as well as product quality (milk and meat).

These rich datasets will facilitate the estimation of the relationships between performance and environmental traits, enabling the estimation of the potential to reduce daily methane emissions with minimal consequence on performance.

For example, based on beef steers and heifers fed indoors, there is a difference of more than 100g of methane

per day between animals even with the same liveweight and growth rate.

GROSS EFFICIENCIES

The strategy of reducing daily environmental footprint will be pursued in tandem with improvements in gross efficiencies. The impact of this will mean that dairy, beef and sheep breeding programmes in Ireland are breeding for a more environmentally benign animal, the benefit of which accumulates over time.

MAORI VALUES LEAD THE WAY

Ian Proudfoot, global head of agribusiness for KPMG, argues that now is the time for transformational leadership in New Zealand's food industry to achieve lasting sustainability

It was only a couple of months ago. A beautiful summer's day in New Zealand's Bay of Plenty. I was presenting to kiwifruit growers on how taking strong principled positions in relation to a range of sustainability issues (including water, climate, packaging, labour and community engagement) was of critical importance in ensuring New Zealand's food and fibre industry maximises the value that it returns from the products that we grow and sell to the world.

However, that was a couple of months ago – before the disruption, before the uncertainty, before travel stopped, shops closed and economies were locked down by governments trying to protect their populations from the COVID-19 pandemic.

My work is now focused on how the food system has changed as a result of COVID-19. How will mass unemployment and lockdowns play out on the demand for food? How does the pivot towards digital affect our storytelling? What product formats should we be producing, and which markets should we target our products at if the food and fibre sectors are going to lead New Zealand's economic recovery?

Blanket coverage of the pandemic has left no airtime for any other story. Climate change, the issue that dominated the World Economic Forum in January, has vanished from the airwaves despite our prime minister, Jacinda Ardern, describing it as the challenge that would define her generation, or in New Zealand speak, provide their “nuclear-free moment” (referring to David Lange's government in the 1980s which declared New Zealand a nuclear-free nation).

In fact, the only recent mentions of the climate have come in comfortable, smug puff pieces telling us how much less carbon we are burning as our planes are not flying and our cars no longer sit in traffic jams on Auckland's streets.

With the massive economic consequences of a five-week hard lockdown and months of gradual unlocking of the economy still to come, people are

starting to realise just how much less money we will have as a country, as businesses and as individuals, and the choices this takes away from us.

SURPRISE

It has been no surprise that groups within New Zealand's food and fibre sectors have already started to argue that now is not the time to load cost on to farmers in relation to new regulations around climate, water, packaging or labour.

They suggest that the best response to the economic crisis we now face is allowing farmers and growers to get on with maximising production volumes so that we can export ourselves out of trouble as we have done countless times before.

It is fair to say 2019 was a confronting year for many agricultural producers in New Zealand but not for the usual reasons.

The weather largely played ball. Prices for most of our core commodities were at good, and in some cases, record levels, which would usually suggest a year with strong producer confidence, rising land prices and a general view that the industry was successfully creating wealth for all involved.

However, farmer confidence was at unusually low levels for much of the year, something I believe was connected to the level of structural change that farmers were facing.

The Reserve Bank of New Zealand had proposed new capital requirements for banks which would make rural lending harder to come by and more expensive (although the implementation of the rules has been deferred because of the pandemic).

Government policy continued to restrict the availability of foreign migrant labour and overseas direct investment to all businesses, but particularly agribusinesses that had used both as lifeblood for several years.

In addition, generational regulatory reforms in relation to water and greenhouse gases were com-



New Zealand will take actions to see it become a carbon-zero country by 2050



ing and everybody expected material impacts on the day-to-day operations of the industry (including potential forced land use change and the emergence of new carbon-neutral farming sector).

OUTCOMES

What eventuated towards the end of the year was two quite markedly different outcomes. While everybody agrees that improving water quality is key to maintaining the industry's social licence to operate the mechanism the government has proposed for achieving this will make farming uneconomical for many.

It is not unreasonable to suggest that the proposed regulations probably delivered the worst possible outcome to the industry after decades of consultation and farmers' concerns about regulatory change were well-founded.

In respect of greenhouse gases, we got the Zero Carbon Act, which passed unanimously through Parliament. The act legislates that New Zealand will take actions to see it become a carbon-zero country by 2050.

While the initial drafts of legislation gave rise to industry concerns about how methane emissions would be handled, the final legislation provided the industry with an ability to set its own course towards zero carbon through a process called He Waka Eke Noa – The Future is in our Hands.

This gives the industry a blank piece of paper and time to plan its own transition focused more on the outcomes achieved than the starting line. The industry did not get a free pass but it did get more than it could ever have hoped for from a government where the climate change minister is the co-leader of the Green Party.

Towards the end of 2019, the industry also received an overarching vision for the first time called "Fit for a Better World".

The vision, developed by the Primary Sector Council (a body established by the Minister of Agriculture), utilises the Maori principle of Taiao to

ABOVE: dairy cows on the South Island of New Zealand. INSET: a sheep farm on the North Island.

articulate an approach to producing food, fibre and other biological products in a way that balances the land, water, climate and living things (including our people and communities) in a regenerative manner so they can be used indefinitely.

CONSEQUENCES

COVID-19 is undoubtedly an event that will have dramatic consequences on countries, businesses and people but like other shocks it is something that over time we will solve and ultimately recover from.

If history is anything to go by, the global recovery is likely to be led by government-funded stimulus into carbon intensive infrastructure and fuelled by low oil prices. I would not be surprised to see a world in 10 years' time where our climate challenges have amplified to such an extent that they become unsolvable. Again, not everything has changed.

Our belief that to be the world's best food producers means that we need to be good for the world is still correct and true. In fact, it's more vital today than ever. Coronavirus has reconnected people to the importance and scarcity of food in ways we could not have even imagined at the start of this year.

As a country that needs to create our wealth from selling food and fibre products to the world for the foreseeable future (as tourism, our second largest export earner, will take years to see life let alone recover) we need to be proud in sticking to our purpose and continuing to work to deliver on our goals in an economically sustainable manner.

How we look after our land, our water, our climate, our people and our communities is more important today than it was on that beautiful summer's day in the Bay of Plenty in February.

Being the first carbon-zero food system in the world will give us a market positioning many will take decades to achieve. Now is the time to push harder and realise our vision for the good of all New Zealanders; today and for future generations. To do anything else would be to fail at the very time bold and transformational leadership is required.

SUSTAINABILITY



Coming into 2020 we had an industry aligned around a vision. A vision that was centred on creating a more sustainable and prosperous future for all New Zealanders. Our pathways were clear.

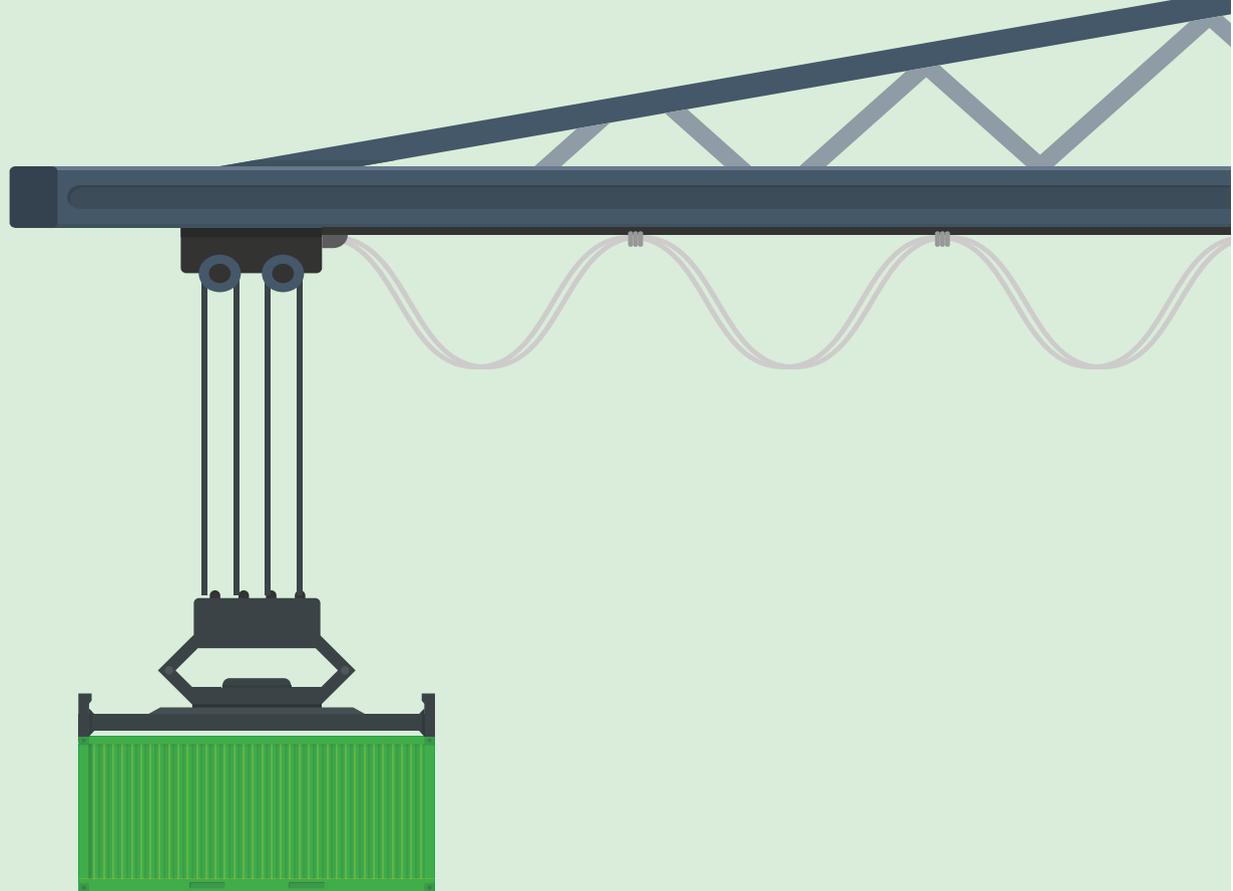
Our goals were bold and organisations had started to make strong commitments around the contribution they would make to a more sustainable future as Zes-pri did at its growers' conference in February, that I referred to in my introduction.

Then, in February, we saw the first signs of the coronavirus carnage start to roll in and everything changed. China, our number one export destina-

tion, closed for the new year's festival, as it does every year, but this time it did not reopen. Then Japan, then Europe, then Australia and then the US.

The tourists left New Zealand, our borders closed and everything was different. Except not everything changed.

Our planet continues to warm at unsustainable levels. Some of our rivers are still not swimmable. Many in our community still believe that farmers are not the kaitiaki, or guardians, of the land that they need to be. The food system around the world continues to exploit labour and leave hundreds of millions of people without the access to the nutrition that they need to fuel fulfilling and constructive lives.



TRADING IN KNOWLEDGE

Since 2014, Ireland has pursued a deliberate strategy of sharing the lessons we have learned in sustainable agri-food globally, writes **David Butler** of Sustainable Food Systems Ireland

Taking Irish experience and skills in the agri-food sector and applying them around the world is the role of Sustainable Food Systems Ireland (SFSI). It was set up by the Department of Agriculture (DAFM) to work with State agencies Enterprise Ireland, Teagasc, Bord Bia and the Food Safety Authority of Ireland.

The goal of SFSI is to bring Irish know-how, including the skills of our public bodies, to the challenges faced by agri-food globally, namely food security, food safety and the huge challenge of sustainability.

In doing this, we recognise that Ireland's competi-

tiveness internationally depends as much on knowledge and expertise as any natural advantage. SFSI exists not because it's a nice thing to do, but because it can contribute to Ireland's international success in the agri-food sector.

Sharing our knowledge, technologies and experiences can help us strengthen our hand when it comes to market access, identifying and opening new export opportunities for Irish food and agri-tech, building our reputation as well as being a revenue earner in its own right.

We even have cases (Indonesia and Nigeria) where countries are beginning to say that if you want to continue to export food to us, you also have to invest in food production directly in our countries. We see knowledge transfer and collaborative projects to improve local capability as a way of protecting Ireland's interests when this happens.

COMPLEXITY

When going around the world with this offer, we have seen the complexity of the problems facing countries and companies everywhere. Whether it's Asia, the Americas, Russia, the Middle East or multiple countries in the developing world, the issues usually boil down to similar desires:

- To export and create more economic return from agriculture and food.
- To add more value domestically through investment and innovation.
- To modernise and reinvigorate farming and rural communities.
- To get more young people into farming.
- To improve nutrition, food safety and food security to feed growing global populations.
- To compete for new investment.

Countries are seeking to achieve all of these goals while faced with the increasing impacts of climate change. When you think about it, that's not much different to what Ireland wants. The starting point and baseline may vary, but the end goals are often similar.

At the heart of Ireland's message to our partners and clients is that a sustainable food systems approach is the starting point in addressing some or all of these needs. The term "food systems" is increasingly common.

In 2021, a major UN summit on food systems is likely to generate more attention on the topic and increase its prevalence. It is useful as a framework to help us think about improving the sector.

A generally accepted explanation of a food system is that it is a set of inter-dependent systems which together create and deliver safe and adequate food. They include:

- Natural elements – climate, air, genetics, ecosystems.
- Societal elements – legal framework, regulation and standards, norms and social licence to operate, infrastructure, institutions.
- Core functions of production, aggregation, processing, logistics and distribution.

Influences on the operation of all of these include skills and people, governance, quality of inputs, access to finance, knowledge and information, and so on.

This approach perhaps makes it easier to think about the sustainability and resilience of the whole food system. Sustainability means having the capacity to achieve what we want from agriculture in the present, without damaging future capacity to achieve the same outcomes. Resilience means the ability to do all this despite external shocks and increased pressures.

Each of the sub-systems need to be robust and resilient in the face of shocks, and sustainable in the true sense of that word – environmentally, economically and socially. The different parts of the food system can be influenced and acted upon, and this is where public and private sectors can help to improve how they work.

COVID-19

The COVID-19 pandemic is a perfect example of why we need resilient food systems. Maintaining strong and functioning markets and building-in redundancy to prevent disruption in the value-chain is vital in overall management of crisis response in an inter-dependent world.

Countries and multilateral institutions need to



Indigenous African cattle.

think about this, but the private sector too. We see some good examples of international companies taking a long-term value chain approach in order to create their own stronger systems such as ensuring security of supply and increase local sourcing in the global south.

Unilever, Diageo, Nestlé and Cargill are often cited as multinationals that take this approach. Self-interest may be the key driver, but it presents an opportunity to achieve a beneficial win-win from new investment in the developing world.

The multilateral agencies such as the Food and Agriculture Organisation (FAO) of the UN have been promoting what's called climate smart agriculture for some years. This is an integrated approach to farming which pursues three objectives:

- Increasing agricultural productivity and incomes.
- Improving resilience to climate change.
- Reducing or removing greenhouse gas emissions, where possible.

Incorporating climate-smart principles to any agri-food development intervention is now essential.

At home, the role of co-operatives in the dairy sector is a good example of a sectoral food system in operation. It is a combination of deep and long-term relationships between supplier and processor, guaranteed off-take, support given through advisory services, availability of high-quality inputs, social networks, and investment in regulatory compliance through voluntary standards and demonstration projects to show good practice.

Such relationships are a lever to promote improved environmental efficiency and productivity, for instance through the Sustainable Dairy



Teagasc staff at Oak Park present to a group from the Kenyan Plant Health Inspectorate in July 2019 as part of a potato capability building project.



Assurance Scheme (SDAS).

Other examples from the history of Irish agricultural development are also relevant, such as the creation of co-op marts, which helped to balance the power dynamic between buyers and sellers and built up considerable goodwill and farmer confidence.

Similarly, the provision of better market information and prices (remember *Mart and Market* on RTE?) was an important service to producers. Whether part of a grand plan or not, these improved the functioning of Irish agriculture, and we can extract valuable lessons that still have relevance in many parts of the world.

Technological change means we can consider new delivery methods such as smartphones and on-demand services, but the principles remain important.

GLOBAL REACH

SFSI has sought to bring this thinking into projects around the world. For example, in Kenya, SFSI brought together partners including Teagasc, its Kenyan counterpart KALRO and an Irish NGO to undertake a project on climate smart innovations in dairying.

In that case, Irish expertise is being accessed on dairy genetics, breeding policy and farm systems to help create a productive and robust dairy cow which is bred for Kenyan conditions and can deliver profitable results within a forage-based farm system.

The objective is to help Kenya improve the productivity of its dairy herd, not just in terms of yield but also in fertility and health status. Important sustainability aspects will be around improved fodder production and conservation, reducing reliance on imported and expensive concentrate feed, allied to better innovation management and knowledge exchange.

In sectors such as dairying in Africa, the role of women is very important and specific interventions tailored to giving women access to training, advisory services and finance are often needed.

In Saudi Arabia, we worked with an Irish partner firm, IDI, in the dates sector. Dates are a culturally significant and cherished food throughout the Middle East, but one that suffers from high levels of pre- and post-harvest losses, seasonality and missed opportunities to add more value.

Integrated pest control, better handling practices and investment in the processing sector are all part of the mix in making that sector more sustainable and profitable.

In parts of Russia, SFSI has been laying the groundwork for the application of Irish skills in the cattle breeding sector. Irish know-how in creating large-scale genomic programmes is at the leading edge globally, a fact not unnoticed by Russian counterparts who want to use DNA-based selection to improve the genetic merit of their herds also.

This is a case of a country with many sophisticated investors and operators, but which suffered from skills and capital flight post the breakup of the Soviet Union. As a result, its agri-food sector is still catching up. The key approach of improving genetic merit to generate environmental and efficiency gains – a win-win – is of similar interest there as it is here.



Department of Agriculture, Food and the Marine inspection staff at Dublin Port with Serbian counterparts.

FOOD SAFETY



Food safety is another area of strong interest globally – growing from an acceptance of the need to improve consumer health protection, but also because of its role in global trade.

Many countries are investing in sanitary and phytosanitary (SPS) standards and capability in order to improve their trade access to regional or global markets. In this context, food safety is a key component of a sustainable food system.

SFSI has worked on food safety and SPS projects with its stakeholders in the Food Safety Authority of Ireland and DAFM in countries such as Albania, Belarus, Saudi Arabia and Kenya.

There are many other aspects of Irish thinking in the agri-food sustainability space that we would also like to internationalise. We take for granted the integrated nature of our sector in Ireland, and the ease with which government, state agencies, private sector and farmers can interact.

In other parts of the world this is often much more difficult. The multi-stakeholder and industry-led planning process for the sector, the current iteration being FoodWise2025, generates strong interest from our international counterparts.

Secondly, the environmental services opportunity needs to be figured out if many aspects of what’s needed globally are to be achieved. Pricing and generating financing to pay for environmental services such as carbon sinks and biodiversity protection potentially offers a huge incentive towards sustainable agri-food systems. It can work in many different contexts globally, from rainforest protection to the rehabilitation of degraded soils and the prevention of land conflict in Africa.

As a final point, innovation can play a huge role in strengthening food systems and achieving greater resilience and sustainability. The kind of thinking being applied in Ireland in the research programmes of technology centres such as VistaMilk, Food for Health Ireland, Meat Technology Ireland, Dairy Processing Technology Centre and in leading Irish agri-food and feed companies has relevance way beyond Ireland. There’s much to be done.



Applying climate-smart principles to any agri-food development intervention is key

David Butler, director of SFSI, meeting the Tanzanian permanent secretary for livestock and fisheries in September 2019.



2

**SUSTAINABILITY
IN IRELAND**

Since Bord Bia launched its Origin Green programme in 2012, Ireland's agri-food industry has been at the forefront of delivering proven sustainability. The programme gave us a crucial edge during the important years of expansion in our food exports under the Food Harvest and FoodWise targets. Now, sustainability is entering a new phase where food companies and farmers are being asked to produce food with a minimal impact in terms of emissions, energy and water consumption. Yet, Ireland's food industry is rising to this challenge and setting new standards every year for sustainable production.

CARBERY PLANS CARBON-NEUTRAL DAIRY FARMING

Carbery's director of sustainability Enda Buckley tells **Lorcan Allen** about the co-op's aim to develop the world's first carbon-neutral dairy farm and how it adds value to grass

For almost a decade now, west Cork dairy processor Carbery Group has had a strong focus on sustainability, particularly within its own supply chain. Carbery is aiming to be carbon neutral by 2035 and is already sourcing 100% of its electricity and 5% of its gas supply from renewable sources.

Since 2012, the co-op has been running its Greener Dairy programme, which is run in conjunction with Teagasc and aims to map the carbon footprint of a number of dairy farms supplying milk to Carbery.

Originally working with 12 farms spread throughout its supply catchment, Carbery's Greener Dairy programme started by measuring water and energy usage, mapping biodiversity on farms and measuring nutrient application levels, as well as profit monitoring the financial performance of each farm.

According to Enda Buckley, director of sustainability at Carbery, the Greener Dairy programme has delivered phenomenal learnings for both the co-op and the farmers.

"For Carbery, sustainability starts at the farm. If you take a block of cheese, 85% of the embedded carbon in that block of cheese comes from the farm," says Buckley, who grew up on a dairy farm in west Cork. His father, brother, uncle and cousin still farm in partnership and are suppliers to Drinagh Co-op.

"We're now actively working with 25 farmers in the Greener Dairy programme. Over the years, we've seen a 15% reduction in the carbon footprint of those farms. Not only that but we can show that for every one litre of milk produced on those farms it takes just 6.5 litres of water to produce it. That is honestly best in the world standards. In other countries, the figure for water footprint would be multiples of 6.5," says Buckley.

DIPLOMA

The practical learnings that farmers have taken from Carbery's Greener Dairy programme are now



being academically recognised by University College Cork (UCC) in what's known as Recognition of Prior Learning, or RPL

Under this process, UCC recognises the competencies, experience and skills learned by farmers who participated in the Greener Dairy project. The farmers are awarded over 60% of the credits needed for UCC's level 7 diploma in environmental science and social policy. Farmers are then given the option by UCC to achieve the remaining credits needed for the diploma in a more formal learning environment.

"To date, 23 of our farmer suppliers have now completed that course and been awarded diplomas by UCC. Some of them may not have even finished the Leaving Cert and here they are with a diploma in environmental science and social policy. It really gives those farmers huge confidence in themselves for what they have achieved," says Buckley.

Despite the obvious success of the Greener Dairy farm programme, Buckley says the co-op is only getting started in what it hopes to achieve in terms of sustainability. In what would be a world-first, Carbery is now collaborating with BiOrbic, Teagasc, UCD, Trinity College, Devenish, IT Tralee, Grassa and a number of ag-tech companies from the US to scientifically measure the world's first carbon-neutral dairy farm.

Buckley says the consortium, known as Farm Zero C, has recently been awarded €200,000 in competitive research funding by Science Foundation Ireland (SFI) and is using the Shinagh dairy research farm located near Bandon as its trial farm to try to achieve a zero-emissions dairy farm. Shinagh is a joint research farm established in 2011 by the four west Cork co-ops and Teagasc. It is home to a herd of over 230 dairy cows.



BIOREFINERY GLAS

Alongside this, Carbery is also working with IT Tralee, Grassa, UCD and Barryroe Co-op in a project known as Biorefinery Glas to carry out some very interesting trials that will be of real interest to its farmers.

Using grass silage as a feedstock for an anaerobic digester (AD) plants to produce biogas has been on the table for quite some time now. But there are genuine concerns that if a biogas industry developed to real scale in Ireland, the volume of grass it requires as a feedstock could grow to millions of tonnes and leave livestock short of fodder. However, the Biorefinery Glas project is now trialling a new concept that may get around this concern by using a small-scale biorefinery to extract the valuable constituents of grass, including a liquid feedstock for AD.

GRASS CO-PRODUCTS

The grass biorefinery squeezes as much liquid from fresh grass as possible to leave four valuable co-products from the grass. These include:

- 1: Dry silage:** this is a much drier grass fibre similar to lawn cuttings or haylage, which can be ensiled as winter fodder for cows.
- 2: Fructooligosaccharides,** a prebiotic commonly known as FOS that can be used as a natural health supplement for gut health.
- 3: A high-protein liquid** which can be dried into a whey protein-type powder. This high-protein byproduct makes an excellent feed for monogastrics and could help to reduce Ireland's dependence on soya.
- 4: A grass residue:** this can be used as a fertiliser but it's also showing promising results in trials as a feedstock for AD.

The benefit of this system is that it maximises the value of grass. By breaking down the grass into many components, it provides a suitable feedstock for the AD plant but not at the expense of grass to feed to cows as the dry silage fibre is still left over to feed to cows. Ongoing trials of feeding the dry silage to cows at UCD's Lyons Farm have shown promising results to date. On top of this, the bio-refinery also extracts a high-value prebiotic (FOS) and a high-protein feed suitable for pigs or poultry.

"We see this as the valorisation of grass. It's actually very comparable to what happens to milk in the processing plant," says Buckley.

"We break down the milk into its different components and make a range of products from it, such as liquid milk, cream, cheese, whey, butter, protein ingredients, etc. Now we're doing that with grass and there's not a scintilla of waste," he adds.

SUSTAINABILITY

It seems strange that so much new value is being found in grass – a natural resource that has been the cornerstone of Irish agriculture for generations. Yet, this is what the future will look like. The bio-economy is asking us to get more from less and find new ways of innovating to improve the sustainability of our food system.

Carbery continues to lead in this area and it will be exciting to monitor how it progresses its zero-emissions dairy farm, along with this new concept of integrating a grass biorefinery with AD over the years ahead.

EMISSIONS

Buckley says the aim at Shinagh will be to follow the approach taken by Devenish in how it mapped a carbon balance sheet at the Douth research farm by measuring both carbon emissions and carbon sequestration, which will allow them to find the net figure for the farm's carbon footprint.

In this way, the farm can aim to become carbon-neutral with net zero emissions by increasing the amount of carbon being sequestered on the farm to fully offset the emissions created by the herd of dairy cows.

"We think there will be unbelievable learnings from Shinagh and the move to being a zero-carbon dairy farm. We're still at the carbon measurement phase in terms of both emissions but also carbon sequestration on the farm," says Buckley.

"But we've a lot of other areas to work on in terms of sustainability. Biodiversity and animal welfare are the next big areas that we are aiming to tackle. Farmers have a really strong environmental conscience and, in my experience, they really care about the environment and biodiversity," he adds.

Carbery has begun mapping the amount of biodiversity on some of the farms in its catchment. The results show that about 7% to 8% of the typical farm is considered to be natural habitat or an area of biodiversity.

Again, Buckley says these figures are ahead of international comparisons but more can be done. Biodiversity is being lost across Europe at an alarming rate. As such, the focus for Carbery in the near term is to maintain the existing biodiversity on farms and stop the losses. Only then can it start to help farmers improve those figures towards double digits.

The dry grass fibre left over after the grass biorefinery squeezes as much liquid as possible from fresh cut grass.

BUILDING THE FACTS BEHIND SUSTAINABLE MEAT PRODUCTION

The sustainability agenda presents both threats and opportunities for Ireland's meat industry. **Lorcan Allen** looks at the research being done to prove the sustainability credentials of Irish beef



O

ver the last number of years, no sector of agriculture has found itself in the firing line quite as much as the global beef industry.

Beef farming has found its sustainability credentials under attack on a number of fronts including its environmental impact, the water footprint of beef production, the food

conversion efficiency of beef, as well as the impact of methane emissions from cattle on our planet.

Many climate activists have singled out an end to beef production as one of the quickest ways to reduce carbon emissions, while growth-hungry investors smelling disruption have ploughed billions of dollars into plant-based, or fake meat companies, such as Impossible Foods or Beyond Meat.

For Ireland, the anti-beef sentiment that is being pushed on consumers by climate activists and influencers is a major threat. Not only is beef farming a core part of the social fabric of this country but it is also the backbone of Ireland's rural economy.

Ireland's beef sector contributes about €3bn to the Irish economy every year, provides 30,000 jobs directly to the economy and supports 100,000 farming families. For 2019, Irish beef exports stood at €2.25bn with 560,000t of beef shipped to world markets.

Ireland has a lot to lose if its beef industry is simply allowed to fall by the wayside. Yet, the industry is fighting back with new science on the nutritional superiority of meat protein to plant-based alternatives and the overall health benefits of meat consumption.

SUSTAINABILITY

From an environmental and climate sustainability perspective, Ireland's low-intensity grass-based production gives

our beef sector a lot of important differentiators to beef production in other parts of the world. It may be traded as a commodity but it's obvious that not all beef is produced equal.

Recognising the challenges facing the sector and the need to accentuate our different production system, Ireland's beef industry came together in 2017 to fund a new collaboration called Meat Technology Ireland (MTI).

Based in Teagasc Ashtown, MTI is a five-year research programme co-funded by Ireland's meat industry and Enterprise Ireland to the tune of €8.1m. The meat companies involved in the project are ABP, Ashbourne Meats, Dawn Meats, Hilton Foods Ireland, Irish Country Meats, Kepak, Liffey Meats and Slaney Foods.

Together, these companies account for 85% of the beef and sheepmeat processing on the island of Ireland. The research partners collaborating in MTI include the Irish Cattle Breeding Federation (ICBF), TU Dublin, University College Cork, Dublin City University and University College Dublin.

Led by Dr John Colreavy, MTI is the only research centre of its kind in the northern hemisphere that focuses solely on innovation and R&D in meat. While MTI initially focused on projects relating to areas such as genetics, meat tenderness and health,

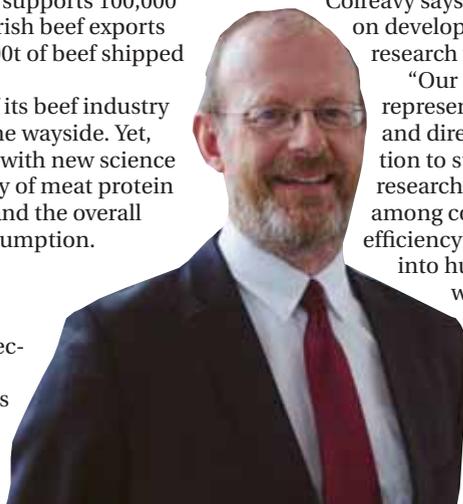
Colreavy says the organisation is now focused on developing sustainability further in its research work.

"Our first academic publication in 2017 represented the start of both the intent and direction of MTI in making a contribution to sustainable beef production. Our researchers recognised that apprehension among consumers was mounting on the efficiency by which cattle convert feedstuffs into human edible protein and energy, as well as the consequential effects on

Many climate activists have singled out an end to beef production as one of the quickest ways to reduce carbon emissions.



The anti-beef sentiment pushed by climate activists and influencers is a major threat



Dr John Colreavy of Meat Technology Ireland.



CASE STUDY: DAWN MEATS

While Ireland's meat industry is collaborating to fund MTI's research work aimed at improving the carbon efficiency of Irish beef production at farm level, some processors are also investing within their own network of processing sites to improve their sustainability credentials.

Dawn Meats, the Co Waterford-based meat processor, has been a leader in this area by making ambitious commitments to reduce the environmental and carbon footprint of its processing plants.

As far back as 2015, Dawn committed to delivering a 50% reduction in greenhouse gas emissions intensity from its own facilities by 2025, while it also targeted a 40% reduction in water and energy intensity over the same period.

Last year, the company published its latest sustainability report which showed significant progress has already been made.

Dawn has already reduced its CO₂ emissions by 33%, while water usage is down 23% across all sites and energy consumption is down 18%. These are known as scope 1 and scope 2 emissions.

Scope 1 emissions are those directly associated with a company's manufacturing sites such as the consumption of fuels. Scope 2 emissions are indirect emissions arising from the consumption of electricity by a company.

SAVINGS

According to Gill Higgins, head of CSR and sustainability at Dawn Meats, making small changes in energy efficiency at each of its processing sites accumulates into big savings across the Dawn group.

"Our goal is to be Europe's most sustainable meat company. The majority of our scope 1 emissions relate to resources that we control and operate on our sites. Heating water at our plants is the biggest contributor to our scope 1 emissions, while energy used for refrigeration and effluent treatment are the biggest contributor to our scope 2 emissions," says Higgins.

"To reduce our scope 1 and 2 emissions we've taken a number of actions. When it comes to water, different processes in our plants require different temperatures and volumes of water. We installed meters to measure water usage

and have assigned targets for each individual plant to manage water usage for things like washing and cleaning," she adds.

When it comes to lowering scope 2 emissions associated with energy consumption, Dawn has implemented a similar strategy of measure and manage.

"Again, we've used meters to identify the largest energy users across our plants," says Higgins.



33%
drop in CO₂
emissions.



23%
drop in
water usage.

"Refrigeration is one of the largest energy consumers across our plants in the UK and Ireland so we use smart temperature controls to avoid over chilling and keep temperatures stable in fridges," she adds.

REDUCTION

Dawn has since updated its sustainability targets following the acquisition of the Dunbia sites in Ireland and the joint venture with Dunbia UK. The enlarged company now aims to reduce its absolute scope 1 and 2 greenhouse gas emissions by 30% up to 2030.

However, like most companies in the food industry, the largest part of Dawn's carbon footprint comes from its scope 3 emissions, which are all the indirect emissions linked to its supply chain. For Dawn, these mainly include the emissions associated with the beef and sheep it buys from farmers.

Dawn has made an ambitious commitment to reduce its scope 3 emissions by 28% per tonne of finished product by 2030. The company is currently in the process of building a roadmap to achieve this target, which will require greater collaboration between processor and farmer to mitigate greenhouse gas emissions and improve efficiency in processing and on-farm.

Despite the challenges, the ongoing research at MTI should help meat companies such as Dawn overcome these hurdles.

the environment," says Colreavy.

"The objective of that first study from one of our lead PIs Donagh Berry, was to quantify the phenotypic and genetic variability in the age at which cattle reach a pre-defined carcass weight and subcutaneous fat cover. The researchers contended that there is large exploitable genetic variability that exists to shorten age at slaughter in cattle," he adds.

RESEARCH

The initial research from MTI showed a difference of 150 days for the fastest and slowest growing 10% of cattle to reach the same carcass weight and fat cover. The research showed that up to 26% of this 150-day difference was down to genetics, meaning there is huge potential for efficiency gains within individual cattle breeds.

"Assuming the (genetic) variability in the number of days from birth to reaching a desired carcass specification can be exploited without any associated unfavourable repercussions, considerable potential exists therefore to improve not only the (feed) efficiency of the animal and farm system, but also the environmental footprint of the system," says Colreavy.

"The beauty of this approach relative to strategies that select directly for feed intake, complex and enteric methane emissions, is that data at age-at-slaughter are readily available from the MTI processing companies, in addition to the yield of the animal," he adds.

MTI's research aims to identify and unlock the most efficient genetic traits in the Irish beef herd. This will allow farmers to produce more beef from less, which will in turn improve farm efficiency and profitability, as well as lowering the environmental and carbon footprint of Irish beef even more.

By pooling resources into MTI, Ireland's meat processing industry has given itself a strategic competitive advantage that will allow it to tell a very positive story for the sustainability of Irish beef production based on hard science.



RICH PICKINGS IN CLIMATE CHANGE

Norman Crowley grew up on a farm in Clonakilty Co Cork. A serial entrepreneur, Crowley tells Lorcan Allen how he has now set his sights on helping to solve the global climate crisis by using cutting-edge technology to reduce energy waste in some of the largest companies in the world

Norman Crowley is one of the more interesting characters you will come across in Irish business. A native of Clonakilty in Co Cork, Crowley undoubtedly sees himself as a force for change. He's strongwilled, deeply passionate about effective climate action, has little time for "Green socialism" and he approaches everything with a "just get it done" attitude.

The son of a farmer, Crowley describes himself as a "serial entrepreneur" having started, developed and sold businesses all throughout his career. These include a gaming software business, which he sold for €500m in 2008 and a computer business, which he sold in 1999 just before the bursting of the dot-com bubble.

But for the last decade, Crowley has dedicated his energy to meeting the climate challenge head on and plans to make a lot of money while doing it.

In 2010, he founded the company Crowley Carbon, which helps businesses to slash their carbon footprint by improving the energy efficiency of large processing plants, supply chains and offices. The company is growing rapidly. Turnover in the business is doubling every year and will reach €100m for 2020. In 2021, Crowley is forecasting that his business will achieve €200m in turnover. It's a bit of a monster, as he says himself.

When I first heard Norman Crowley interviewed on the radio, I was immediately drawn to his passion for climate action even though I didn't necessarily agree with all of his views, particularly when it comes to agriculture.

When I subsequently reached out to him for an interview Crowley said he was "intrigued" that the *Irish Farmers Journal* would be interested in speaking to him, especially since he recently established his own plant-based meat company and is quite vocal on the inefficiency of beef production.

Nonetheless, he agreed to sit down for a chat. On a bright day in February this year, I found myself overlooking the well-manicured gardens of Powerscourt Estate from the third floor of the stately Powerscourt House in Enniskerry, Co Wicklow, which also serves as the home offices of Crowley Carbon.

LORCAN ALLEN: WHAT'S YOUR VIEW ON SUSTAINABILITY?

Norman Crowley: I feel that the term "sustainable" is always associated with the lesser or the least worst option. The Green lobby has done itself no favours in

how it's approached the climate change issue by essentially just offering consumers two choices. Either live minimally without the trappings of modern life such as foreign travel and eating meat, or else you can live to the max and damage the planet. And consumers may feel guilty about damaging the planet but they will always choose progress and to live to the max when those are their options. It's like telling people they have to eat a veggie burger even though they'd much rather have a steak. They won't do it.

THAT'S AN INTERESTING VIEW. DOES THE GREEN LOBBY THINK ITS APPROACH HAS BEEN A MISTAKE?

For me, the big problem with sustainability is there are always overtones of socialism about it. The Green lobby doesn't think anyone should be profitable from sustainability. Heaven forbid anyone could be sustainable and wealthy! Our tagline is "Life Unlimited", yet the amount of climate activists who come to us and say that life can't be unlimited if it's sustainable. Why the f**k not? I want to live my life to the max but I can also be sustainable.

I'VE NEVER HEARD THAT VIEW BEFORE. SO TELL ME ABOUT YOUR BUSINESS AND WHAT YOU DO TO SOLVE CLIMATE CHANGE?

Our overall organisation is what's known as Cool Planet Group. We're a weird bunch because Cool Planet is a mix of for profit businesses along with a non-profit foundation that just tries to do good basically. So we break our approach into three areas: impact, educate and inspire.

The "impact" side of our business is Crowley Carbon and a bunch of other businesses that aim to suck carbon out of the air as fast as humanly possible.

The "educate" side of our business is basically a foundation called Cool Planet Experience, which is an interactive experience here in Powerscourt designed to educate people about climate change. Since we opened it, there's been 30,000 people through the doors.

And the "inspire" side of the Cool Planet Group are a number of businesses that are designed to shake up the system. So our first "inspire" business is called Electrifi, where we convert old classic cars to electric engines. Most of these cars we're converting wouldn't have a price tag of less than €1m. We're currently converting the cars at a plant in Wales but, by Christmas 2020, we hope to be converting classic cars to electric here in Powerscourt.

LET'S START WITH CROWLEY CARBON. TELL ME ABOUT THAT BUSINESS?

Well, as I said, we want to suck as much carbon out of the air as possible. And the fastest way you can suck



carbon out of the air is with efficiency. The reason for that is because humans waste 50% of the energy we consume. That's just life. So our job is to stop that 50% energy waste. And to have the biggest impact we go directly to the biggest users of energy.

SO YOUR TARGET MARKET ISN'T WORKING WITH SMALL SME-TYPE BUSINESSES?

No, not at all. We're aiming to work with large-scale manufacturing business such as Glanbia here in Ireland, but even bigger. Four of the eight largest food companies in the world are clients of ours. In pharma, eight of the top 10 companies are clients while in the technology sector five of the top 10 companies are clients of ours. When we started off first, we were working with local SuperValu stores in Ireland where the average energy bill would be €60,000 per year.

Today, if your company's energy bill isn't €10m a year, then you probably don't know what Crowley Carbon is. And the reason for that is because we can save one-third of your energy costs. So if you have a €10m energy bill, then we can save you €3m. And now we're operating at an even bigger level. The biggest client we work with has a €3.4bn energy spend every year. So our target is to reduce that spend by €1bn annually. It would take us about five years to do that because we have to carry out projects at every factory owned by the company, which is time-consuming.

SO HOW DO YOU ACHIEVE THAT?

Well, it's very similar to a dairy farm actually. The biggest energy user on the farm is the refrigeration of the bulk tanks. So we would optimise that and take one-third of the energy consumption off it. How we do that is because refrigeration globally is not efficient.

REALLY?

Yes. Refrigerators do all the wrong things at all the wrong times. We improve this by either replacing the refrigeration technology or improving it. For instance, if you have a bulk tank on your farm it's likely



Norman Crowley, CEO of Crowley Carbon, and Gerard De Brun from Real Safe Always.

using a Freon system, also known as F gas. We would replace that system with a CO₂ cooling system, which will halve the energy cost. CO₂ is a natural refrigerant so it's not damaging the environment.

Every meat factory in the world has a really inefficient cooling system and the biggest energy user in a meat factory is its refrigeration system. Over 50% of energy usage in a meat factory is cooling. Normally, at least half of that energy is wasted.

I DIDN'T REALISE THAT. WHY IS REFRIGERATION TECHNOLOGY SO INEFFICIENT?

Because you have large refrigeration companies that are lobbying governments all over the world to prevent a move towards natural refrigerants such as CO₂ or ammonia, which are the main two natural gases for refrigeration. Have you ever seen the "drawdown" list?

NO.

It's a list of the top 100 things that we can do to stop climate change. The drawdown list is all about the top five solutions. What would you say is number one on that list of things we can do to stop climate change?

I'D IMAGINE IT'S SOMETHING TO DO WITH CUTTING OUR RELIANCE ON FOSSIL FUELS

It's actually not. The number one is refrigerant gases, or F gases. They are biggest global problem for climate change.

I NEVER KNEW THAT.

Most people don't. The reason we don't wake up and worry about this more is because large refrigeration companies don't want people to know about it.

AND WHY WOULD THOSE COMPANIES NOT TRANSITION TO NATURAL REFRIGERANTS?

Because it would cost them billions. It's much easier to lobby governments every year. People say the oil companies are the ones holding back any meaningful action on climate change. It's actually those refrigeration companies that are the biggest block.

INTERESTING.

It's incredible. A lot of what we do is migrate companies from Freon systems to natural cooling systems and then optimise those systems, whether that's meat factories in the US or monster district cooling plants in the Middle East. We would go into a cold store business and comfortably reduce their energy consumption by 40%.

I IMAGINE HEAT IS ALSO A BIG REASON FOR ENERGY WASTE?

It is. Large-scale cooking or heating systems are also incredibly wasteful. So in the food sector we work with companies such as Bunge (one of the biggest vegetable oil and soy producers in the world) and their competitors such as Cargill. Those companies are monsters and they have enormous energy consumption. But margins are still quite tight in those

One of the sensors developed by Crowley Carbon.



businesses so they're very glad to see us coming in the door to reduce their energy costs by one-third.

And then we work with Big Meat; so all the big meat companies such as Tyson Foods, BRF Brazil, JBS and others. To give you an idea of how we work with a customer like that we'd be aiming to save them €200m a year in energy costs.

HOW DID YOU GET CLIENTS LIKE THOSE?

We just knocked on their door. The same way Kerry Group did it all those years back.

DO YOU HAVE ANY IRISH CUSTOMERS?

We do. The meat companies here are clients of ours such as Dawn Meats and Larry Goodman's ABP. We're working with them all the time as there's still plenty of money they can be saving every day in their meat factories. Hilton Meats would be our most efficient meat client by far. They're an amazing company. They've excellent engineers who are awake all the time and we have a real partnership with them. Other meat factories wouldn't be half as efficient as Hilton. They're very clever and understand what they want.

Irish dairy could be more efficient as well. Some of the major co-ops are clients of ours. Glanbia is a client but there's still plenty of opportunity to save energy there.

DO YOU CARRY OUT ONCE-OFF PROJECTS WITH COMPANIES OR ARE YOU CONSTANTLY WORKING WITH THEM?

One of the problems with maintaining optimal energy efficiency is that processing plants are changing and operating differently all the time. If you save money today, you will probably lose that money tomorrow.

HOW DO YOU MEAN?

To take it back to a farm example – we would take a bulk tank system and save the farmer 30%. But you've a condenser on the outside of the bulk tank. If that gets blocked, you've lost that 30% saving and it makes the system inefficient again. So we've developed our own software that tells us about daily changes in operational efficiency. We create a "smart factory" using this sensor technology.

[Norman hands me one of the sensors].

So that sensor detects pressure changes within pipes in a factory. That allows us to tell if something is blocked or not running optimally and then we can fix it. We have about 50 different types of those sensors developed. This technology is extremely cutting-edge. We developed this ourselves and nobody else has anything like it in the world. We can deploy 200 sensors in a day inside a factory. This is the internet of things right in front of you.

Traditionally, a sensor like that would cost €1,000 and take a day to install. I can install that in two or three minutes and you can have it for €2 or €3 per week.

SO YOU DON'T ACTUALLY SELL THE SENSOR TO THE CLIENT?

No. We lease them to clients. We have sensors for pressure, temperature, vibration... you name it. And that's part of our "smart factory" approach. Data makes a factory smart but then you need the software to automatically look at that data and recognise when temperature or pressure or whatever is not right. These sensors provide us with an entire picture of how the factory is running. And the money that saves. It's not just energy cost. It's throughput and quality too.





HOW SO?

There's a pet food plant here in Ireland and we were able to increase the plant's throughput by 7% just by monitoring its chilled water temperature. That allowed it to cook a lot more batches of pet food every day because we were able to give it chilled water a lot faster. And it wasn't by replacing the technology they had installed. It was just by optimising it. We do a lot of that kind of optimisation.

LET'S TALK ABOUT FARMING. WHAT ARE YOUR VIEWS ON IRISH AGRICULTURE?

I grew up on a farm. I ran our farm at home for two years after I left school and I can tell you there's a lot of work in 120 cows. My sense of Irish farming is that the Government has really let down the small Irish farmer. The CAP is just about keeping some farmers alive but the suckler beef farmer is not making any money and the Government really hasn't done anything to fix that in 20 years. The sector is just dying off. For example, my brother's kid isn't going to go into beef farming. We did a climate event in Clonakilty before Christmas and I met a good few farmers at it and none of their kids were going into farming.

IT WILL BE FASCINATING TO SEE HOW CLIMATE POLICY SHAPES OUR AGRICULTURE SECTOR OVER THE COMING YEARS. I THINK YOU WILL SEE THE EU STARTING TO PAY FARMERS TO CAPTURE CARBON FROM THE ATMOSPHERE.

I think you're right. I enjoy arguing with farmers who think farming will stay the same as it is right now because all the numbers are against them. You have to change and if you don't change you'll be left behind.

Some farmers don't get climate change but most of them do. A lot of farmers are out in the weather and they can see it with their own eyes. I've talked to farmers who say they can sense the change in climate. It probably scares farmers more than most people. The dry summer we had two years ago scared the shit out of me.

OUTSIDE OF BREXIT, CLIMATE CHANGE AND SUSTAINABILITY ARE WITHOUT A DOUBT THE DOMINANT ISSUES IN IRISH AGRICULTURE.

Really? That's fascinating. I'm actually delighted to hear that. The media wouldn't reflect that.

THAT'S BECAUSE THE MAINSTREAM MEDIA GENERALLY ONLY COVER NEGATIVE STORIES ABOUT FARMING.

Like the impact of dairy expansion on the environment?

YES. BUT THE EXPANSION IN IRISH DAIRY IS NOW SLOWING.

It's fascinating that you think the expansion is slowing. There's a farmer leasing some of my brother's farm and he has 500 cows. He just keeps growing and growing and growing, and has no plans to stop. How are those farmers going to slow down?

FARMERS ARE BEING GIVEN SIGNALS TO SLOW DOWN. ENVIRONMENTAL REGULATIONS ON THINGS SUCH AS WATER QUALITY AND NITRATES LEVELS ARE ALREADY PUTTING THE BRAKES ON FURTHER



**Norman
Crowley, CEO
of Crowley
Carbon.**

EXPANSION. WE DON'T WANT TO REPEAT THE MISTAKES IN PLACES LIKE NEW ZEALAND. THERE'S A NATURAL BALANCE IN PRODUCTION TO BE FOUND AND WE HAVE OUR IMAGE TO PROTECT.

It's milk quotas all over again! That's interesting. I hadn't realised that.

IRELAND WILL ALWAYS BE A GOOD PLACE TO PRODUCE MEAT AND DAIRY. IF MEAT AND DAIRY PRODUCTION ISN'T SUSTAINABLE IN IRELAND THEN THERE'S NOWHERE IN THE WORLD IT CAN BE.

I agree with you that Ireland has a place to produce high-end meat. I'm not a vegan or a vegetarian. I eat meat, although I don't eat a lot of meat because I understand the problems it causes. And I don't eat steak at all. Ever.

WHY NOT?

If you put on your engineer's hat, the cow is a 2% converter of food to food. And that's not a sustainable business. The reason meat production is challenged is that if everybody in the world started eating meat like we do in Europe, we would need seven planet earths to feed everyone.

IN WHAT DIRECTION WOULD YOU LIKE TO SEE IRISH FARMING HEADING?

We should focus on growing things like hemp and more trees. All the weird things. How about a farm with cattle or sheep, a load of trees and a load of solar panels? Crowley Carbon would like to get involved in something like that. I know farmers love sitting in the pub and chatting about cattle but those days are gone. Farming needs to change.

ARE YOU SAYING YOU'RE GETTING INVOLVED IN THE FARMING SECTOR?

Believe it or not, we're actually at the early stages of putting something together that will help Irish farmers fund energy-efficiency investments or start generating renewable energy on their own farm. Solar is going to be big on farms and wind farming will also be huge in the future.

We're aiming to work with farming partners by 2021 to do a big project on energy efficiencies. So that's milking and lighting, as well as solar batteries. The aim will be to put together a package, which we definitely can do. We can get the investment. It's more who can service the farmer because they're too small for us to call to. We've identified some partners already to help us.

I also think Irish farmers need to embrace meatless food products, as much of a contradiction as that is for most farmers.

BUT WHAT ROLE IS THERE FOR FARMERS IN PRODUCING MEATLESS PRODUCTS?

Farmers can grow the ingredients needed to make these products. But they need to set up new co-ops to take their share from the market. Back in the 1930s, farmers got around the problem of being bullied by London by setting up their own co-ops to get a fair price for their produce. So why don't farmers set up a co-op today to make meatless products?

If you want to get farmers into meatless products you don't get them growing the plant ingredients. You need to get them directly to the end market.



Farmers can grow the ingredients needed to make these [meatless] products

Coronavirus COVID-19

Working Capital Loan Scheme

How do I apply for the Covid-19 Scheme?



Check the guidelines on the SBCI website (www.sbc.gov.ie) to assess if your business is likely to meet the eligibility criteria;



If yes, complete the Eligibility Form available on the website and return it to the SBCI by email or post;



The SBCI will assess the application and determine if you are eligible or not;

Eligible applicants will be provided with an Eligibility Reference Number;



Provide the Eligibility Reference Number - along with your updated Business Plan - to your preferred finance provider when completing your credit application;



The Covid-19 Working Capital Loan Scheme is available through AIB, Bank of Ireland and Ulster Bank.

Who can apply?



To be eligible, a business must meet the following criteria

- Be a viable business with up to 499 employees (SMEs and Small MidCaps);
- Be Covid-19 impacted;
- Meet the scheme criteria (Covid-19 criterion and Innovation criteria).



Key features of the Covid-19 Scheme

- Loan amounts of between €25,000 to €1.5m per eligible enterprise;
- Maximum interest rate of 4%;
- Loan terms ranging from 1 year to 3 years;
- Loans unsecured up to €500,000;
- Optional interest-only repayments may be available at the start of the loans;
- The loan amount and term is dependent on the loan purpose.



Loans can be used for

- Future working capital requirements;
- To fund innovation, change or adaptation of the business to mitigate the impact of Covid-19.

For further queries on the Covid-19 Working Capital Loan Scheme and/or assistance with the Eligibility Form, please visit www.sbc.gov.ie or call 1800 804 482.



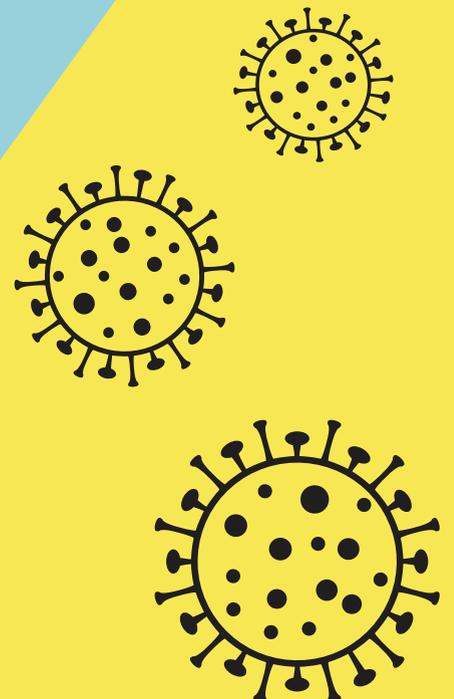
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At its peak, Bord na Móna harvested 6.5m tonnes of peat every year.



FROM UNWANTED TO MOST WANTED

Lorcan Allen speaks to Tom Egan, head of Powergen and Bioenergy Operations at Bord na Móna, about the major transition from fossil fuels to renewables taking place at the Edenderry power plant

It's over 80 years since Bord na Móna was founded in 1934 with the express goal of developing the state's natural peat resources for the economic benefit of the country. The semi-state body has made a huge contribution over that time to the Irish economy, particularly in how it supported the local economy of the midlands region of Ireland.

Over many difficult decades for the Irish economy, Bord na Móna always provided secure employment to thousands of people in the midlands of Ireland by training high-skilled engineers, fitters and machine operators.

It's no surprise, therefore, that communities in the midlands have a deep-rooted connection with Bord na Móna. The organisation has always been an integral part of the social fabric of the region.

For this reason, the seismic changes that are currently taking place at Bord na Móna can be difficult for those who remember times gone by when the semi-state body harvested up to 6.5m tonnes of peat every year. Today, Bord na Móna's annual peat

harvest is just a fraction of this figure at less than 1m tonnes.

Of the 80,000ha (200,000 acres) of peatlands owned by Bord na Móna, less than 16% is still used for peat harvesting today.

CARBON EMISSIONS

With the Irish State committed to reducing its dependence on fossil fuels and lowering carbon emissions, the days of harvesting peat to produce electricity are coming to an end. Over the next decade, Bord na Móna will dramatically transform the peatlands of the midlands that it manages.

Tens of thousands of acres will be rewetted to protect carbon sinks, natural habitats and biodiversity areas will be restored and new forests will be established, while renewable energy will be produced by new wind and solar farms. These are enormous changes that will transform the entire business model behind how Bord na Móna operates.

However, some things will continue as before. The semi-state body remains committed to producing electricity at its Edenderry power plant, which currently produces 850,000MWh of electricity for the national grid every year – enough to power 170,000 homes.

According to Tom Egan, head of Powergen and Bioenergy Operations at Bord na Móna, about 60% of the electricity currently produced by the Edenderry power plant comes from burning peat, with the remaining 40% produced using sustainable biomass.

About 500,000t of peat are burned every year at the plant, while 450,000t of biomass are used. However, Egan says the goal is to use 100% biomass to generate electricity at Edenderry, which would eliminate the need for peat altogether and see 850,000t to 900,000t of biomass used every year as feedstock for the plant.

While an increasingly large share of Ireland's electricity is now generated from wind, Egan says power plants such as Edenderry still have a crucial role to play in how the national grid operates.

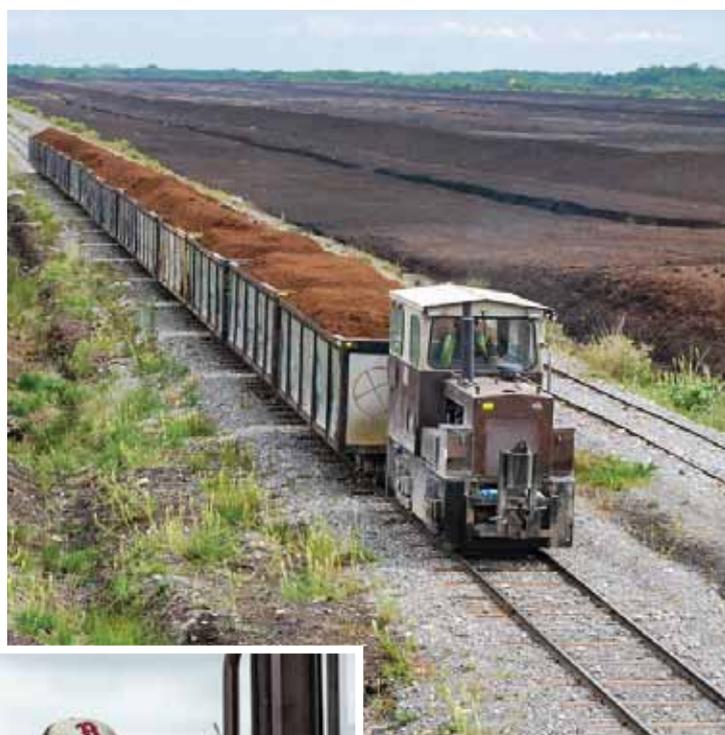
"EirGrid (the semi-state operator of the national power grid) needs to be able to ramp the national energy supply up or down to meet demand on a given day. But you can only reduce the amount of wind energy you have," says Egan.

"You can't increase the amount of wind energy you have if the wind isn't blowing. Unlike wind and solar, electricity from Edenderry can be ramped up or ramped down any day of the week to meet demand. It's what we call a dispatchable energy source because electricity can be generated and dispatched into the grid as needed," he adds.

Dispatchable energy sources such as Edenderry play a critical role in creating stability in the national grid, or what's known as inertia, where there is always enough supply to meet demand.

TRANSITION

While the Edenderry power plant has mostly fired on peat to date, Egan says the technical design of the plant makes it ideal to transition from a fossil fuel



ABOVE: Peat being hauled to the Edenderry power plant.

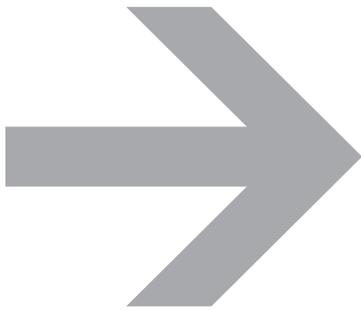
LEFT: Transport operative for Bord na Móna Philip Casey.

based feedstock to 100% renewable biomass at minimal cost and without any major physical modifications at the site. If the power plant had been oil, coal or gas-fired the transition would be much costlier.

"Because peat and biomass are very similar from a chemical and a physical point of view, we don't need to make huge changes. The same systems that work for peat will allow us to move to biomass," says Egan.

"On a daily basis, the Edenderry plant can switch from an 80:20 peat and biomass mix to 100% peat and no biomass. That's why it's eminently suitable to transition to firing with 100% biomass without any significant investment in the plant," he adds.





Switching to 100% renewables sounds straightforward but Egan says Bord na Móna still faces a number of obstacles.

Firstly, under the most recent Renewable Energy Feed-In Tariff scheme, commonly known as REFIT, state supports (guaranteed minimum pricing) on renewable energy produced from biomass at Edenderry power plant are capped at 40% of the plant's total output.

Egan says the thinking at the time when REFIT was developed was to provide minimum pricing for 30% of the renewable energy produced at each of the three power plants in the midlands that were powered on peat. Two of these were run by ESB (Shannonbridge and Lanesboro) along with the Edenderry plant.

However, in November last year, the ESB announced that it was closing both of its peat-fired power plants by the end of 2020. This means just the Edenderry plant will be left operational in the midlands.

Egan is arguing that the Government should allow the Bord na Móna power plant to transition to firing solely on renewable biomass by moving the subsidies from the two ESB plants to support 100% renewable energy production at Edenderry.

"With the other two peat stations going to shut down, we're making the case that those 30% subsidy caps shouldn't apply anymore. The transition to one plant supported for 100% biomass production is the equivalent of subsidising 30% renewable power at three plants," says Egan.

NATURAL HABITATS AND BIODIVERSITY AREAS WILL BE RESTORED AND NEW FORESTS WILL BE ESTABLISHED

"It's the logical thing to do and it would eliminate the use of peat altogether over a period out to 2023. Moving to 100% renewables will take time to achieve but there's a time limit for Bord na Móna because our current planning permission expires in December 2023. After that, our planning application only allows for 100% biomass generation. We're not looking to fire peat beyond December 2023," he adds.

RAW MATERIAL

Aside from state supports, transitioning Edenderry to being fired on 100% biomass will require a major



increase in the volume of raw material needed to fuel the plant.

At present, 80% of the biomass used to produce renewable electricity at Edenderry is sourced from within Ireland. This biomass is sourced from Ireland's forestry and timber industry and includes residual timber, leftover shavings from sawmills, unwanted or damaged logs, as well as other low-value byproducts of the timber industry.

The remainder of the biomass raw material is sourced from places such as South Africa, Brazil and Russia. Egan says there's been a myth that Bord na Móna is importing a huge amount of biomass which is something he's eager to dispel.

He says Bord na Móna recently signed a three-year deal with Coillte, the state forestry body, for the supply of 80,000t of residual biomass each year. The majority of this residual biomass is the unwanted brush from timber harvesting, as well as damaged timber from windfall.

On top of this, Egan argues the move to 100% biomass at Edenderry will create a major new demand for biomass and provide private forestry owners with a market, albeit low-value, for their previously unwanted residual timber.

"The most recent COFORD study shows that the amount of timber coming to maturity from the private forestry sector in Ireland is going to double by 2030. Private forestry owners can harvest their trees for pulpwood, stake wood and saw log and then we can take the residual material that's left to power the Edenderry plant," says Egan.

"We're adding that extra little bit of margin to the forestry owner so they can get the maximum value for the trees they have planted. We are creating value for the brush that would normally be left behind on the forest floor as an unwanted byproduct," he adds.

Renewable energy will be produced by new wind and solar farms.



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Bord na Móna plans to use biomass from residual wood and timber shavings to power its Edenderry plant.



While Bord na Móna is only looking out to 2030 in terms of the transition to 100% biomass, the group is watching what forestry companies are doing in Finland – a country long-renowned for its innovation in forestry and timber processing.

Fortum, an energy company owned by the Finnish state, has begun producing bio-oil from biomass such as wood shavings and other forest residuals and is using this bio-oil as a renewable alternative to transportation fuel and heating oil.

The company has recently teamed up with Valmet, a Finnish technology systems provider, and Preem, a Swedish refinery company, with the aim of producing 3m tonnes of bio-oil per year from biomass to be used as a renewable transportation fuel.

Egan says Ireland will never be a leader in developing this type of cutting-edge renewable technology but that it can follow the successes of Finland's highly innovative forestry industry.

JUST TRANSITION FUND

By creating a substantial new market for previously unwanted biomass, and following the Finnish model towards making renewable bio-oil from biomass, Egan believes Bord na Móna will continue to support the local economy in the midlands of Ireland in the decades ahead.

Right now, the Edenderry power plant directly employs 50 people and contributes an estimated €15m to the local economy of the midlands every year. A further 100 employees are involved in harvesting peat every year to run the plant.

While the harvesting of peat as a raw material is coming to an end, Egan says the transition to 100% biomass will secure future employment for people of the midlands. The company plans

to continue using its existing light rail infrastructure, which sprawls across the peatlands of the midlands.

The company is looking at establishing a number of secondary supply depots at different points along this light rail system where forestry owners could deliver biomass to. From there, Bord na Móna would use the rail system to transport the biomass raw material to the central Edenderry power plant, just like it did for decades with peat.

Bord na Móna estimates the transition to 100% biomass will cost the average household an extra €2.40 per year on their electricity bill.

To support the move away from peat towards 100% biomass, Egan says the European Commission's "Just Transition" fund will play a crucial role in financing

the major changes ahead without hollowing out the midlands economy.

"The EU is actively looking for projects like this to support under its Just Transition mechanism. This will also help Ireland meet its renewable energy targets, while at the same time protecting the socio-economic fabric of the midlands," says Egan.

This is a crucial point. Moving to renewable energy sources is clearly helping Ireland meet a number of its sustainability and climate goals. However, unless the transition can continue to provide economic sustainability for the midlands, it will not enjoy the same public support that has defined the close relationship between Bord na Móna and its local communities for the past 86 years.

3 NORTHERN IRELAND



STUART IRWIN
partner at KPMG
Northern Ireland

Northern Ireland has developed a resilient and innovative agribusiness sector, which does a superb job at feeding both the domestic and global market and has continued to do so during the lockdown. Its success is the result of work by industry, government and academia, including DAERA, AFBI, UFU, CAFRE, NIFDA, the Global Institute of Food Security at Queen's and Food NI. They have helped create not just a highly efficient agribusiness sector, but one which is sustainable and makes sure to care for the environment while feeding the world. In the past, profit and the environment may not have been comfortable bedfellows for some industries, but Northern Ireland's agribusiness sector is making sure both are strategic priorities. That is important for the future as the environment will come even more into focus with the rollout of DAERA's first Environment Strategy for Northern Ireland.



Nick Whelan,
CEO, Dale Farm.

SUSTAINABLE MARGINS: SOLVING THE AGE-OLD PROBLEM

Nick Whelan, CEO of the UK's largest dairy co-op Dale Farm, tells **Lorcan Allen** how margin sustainability is the greatest threat to farmers and how the co-op is working to solve this

Nick Whelan is a man who doesn't think in days or months or years. He thinks in decades. As CEO of Dale Farm, the UK's largest farmer-owned dairy co-op, Whelan takes a long-term outlook for the prospects of the co-op and its farmer suppliers.

"When I think about sustainability, I see sustainability of margin across the supply chain as a major problem. The biggest threat to our business here in Dale Farm is, who will be milking cows in 15 to 20 years' time to supply the co-op," says Whelan.

To improve the economic sustainability of its dairy farmer suppliers, Dale Farm is going back down along its supply chain and working directly with some of its farmers to try to improve on-farm effi-

ciencies. "As a co-op, I believe we have a role to help our farmers improve their economic sustainability. Some don't agree we should be doing this but it starts by building trust with our farmers and credibility. Then momentum will come," he says.

"The big question is, how to raise the productivity of agriculture. However, the potential for efficiency gains at farm level is absolutely enormous," adds Whelan.

EFFICIENCY

Dale Farm recently started a research trial with 160 of its farmer suppliers, with the aim of improving their bottom line by a minimum of 2p/l purely through

efficiency gains. The trial is taking a simple measure of feed concentrate efficiency on these 160 farms, otherwise known as margin over feed.

According to Whelan, the trial has uncovered some huge variations across different farms and, in general, revealed that many farmers are overfeeding their cows. The trial also showed a differential of 3p/l in the margin over purchased feed between the top 25% of farmers and the bottom 25%, which is a difference of £700/cow (€805/cow) between top and bottom.

By helping farmers to narrow this £700/cow gap, Dale Farm hopes to improve the economic sustainability of its suppliers. Outside the farm gate, the co-op has a number of other initiatives to help support margins across the supply chain.

Since the end of EU dairy quotas in 2015, dairy markets have become more volatile as European milk production has expanded. To smooth out some of this market volatility, Dale Farm is trying to bring its retail and B2B customers much closer to the farmer by creating fixed contracts for its products, particularly cheddar, which can take over a year to mature after the milk has been bought from the farmer.

This is a win-win scenario for farmers and buyers as it guarantees supply for large supermarkets while it also allows farmers to de-risk their business by entering a percentage of their milk into fixed milk price contracts with the co-op.

ENVIRONMENTAL SUSTAINABILITY

Dale Farm has not been idle on the other side of the sustainability coin either. Like many dairy processors on the island of Ireland, Dale Farm continues its investment in and transition to renewables energy.

PROCESSING CLOSE TO 900M LITRES OF MILK PER ANNUM, DALE FARM IS A CRITICAL ROUTE TO MARKET FOR DAIRY FARMERS IN NORTHERN IRELAND

The standout investment in this area has been a 4.9MW solar farm that the co-op has developed on 37 acres adjacent to its milk processing plant in Dunmanbridge, Cookstown, Co Tyrone. According to Whelan, the solar farm generates 25% of the electricity requirements of the Dunmanbridge facility, which produces 60,000t of cheddar cheese annually, as well as operating two driers for milk and whey.

The co-op expects that the solar farm will reduce its carbon footprint by 20% and deliver several mil-



The lean manufacturing programme has focused on energy efficiency within the co-op's processing plants.



Dale Farm's solar farm in Co Tyrone.

lion pounds in savings on energy costs over 20 years. Whelan says the business case for investing in its own solar farm was win-win.

Not only did it reduce its carbon footprint by producing renewable electricity but it also allowed the co-op to cut its reliance on standard electricity from the Northern Ireland grid.

On top of the solar farm investment, Dale Farm has implemented a major lean programme across the business, which has delivered major cost savings for the co-op.

The lean manufacturing programme has focused on energy efficiency within the co-op's processing plants with heat recovery systems recycling energy from steam to be used over and over again.

The energy efficiencies achieved through its lean programme has allowed Dale Farm to cut its electricity consumption per tonne of output (KWh/tonne) by 17%. This has also resulted in an 8% reduction in the co-ops CO₂ emissions per tonne of output (kg of CO₂/tonne).

FUTURE

Processing close to 900m litres of milk per annum, Dale Farm is a critical link in the chain and route to market for dairy farmers in Northern Ireland. While profitability in the short-term is important for any business, the co-op is also focused on building long-term economic sustainability within its supply chain, so that its farmer members can pass the business on to the next generation.

Thinking 20 years down the line to 2040, Whelan wants Dale Farm to help its members achieve greater economic sustainability so the co-op will still be supplied by over 1,000 different farms across Northern Ireland for many years to come.

KEEPING A CLOSE EYE ON SUSTAINABILITY

Lorcan Allen speaks to Terry Canning, co-founder of ag-tech startup Cattle Eye, on how his new business aims to bring greater economic sustainability to farmers

The sustainability agenda has been part of the debate within Irish agriculture (both north and south) for many years. The Origin Green sustainability programme, developed by Bord Bia in 2012, was arguably the global forerunner in terms of setting out an ambitious, co-ordinated plan to achieve sustainability within the food supply chain.

Yet for farmers, many felt a key component was missing in the Origin Green sustainability programme – namely the economy sustainability of the primary producer. Irish food exports have surged over the last decade yet many farmers, particularly in the beef sector, feel they have not benefitted from this expansion.

Indeed, farmers rightly argue that there is no such thing as real sustainability unless it provides a viable income for the primary producer. And with food prices never cheaper for consumers, this is no simple task. However, solutions to this age-old problem are emerging through new technologies.

One such example is Cattle Eye, a startup ag-tech company based in Belfast. Co-founded by entrepreneur Terry Canning, who is no stranger to the ag-tech world, Cattle Eye is a cattle monitoring system that uses artificial intelligence (AI) and machine-learning technology to help farmers keep a closer eye on the health and breeding cycles of their cows.

In simple terms, Cattle Eye monitors dairy cattle as they leave the milking parlour via a standard cam-

era and uses AI and machine-learning algorithms to give the farmer detailed information straight to their smartphone on the cow's body condition score as well as providing early detection of lameness in cows or those coming into heat. Cattle Eye also uses a form of recognition technology to identify individual cows as they pass without needing to read tags.

TECHNOLOGY

It's early days for this technology but Canning believes his Cattle Eye technology will be able to save farmers up to £350/cow per year (€400/cow per year). On a 100-cow dairy farm, this would equate to an annual saving of £35,000 (€40,000).

The important part of this type of innovation is that it occurs within the farmgate and allows the farmer to reap its benefits.

It's not even a year since Canning established Cattle Eye, along with his business partner Adam



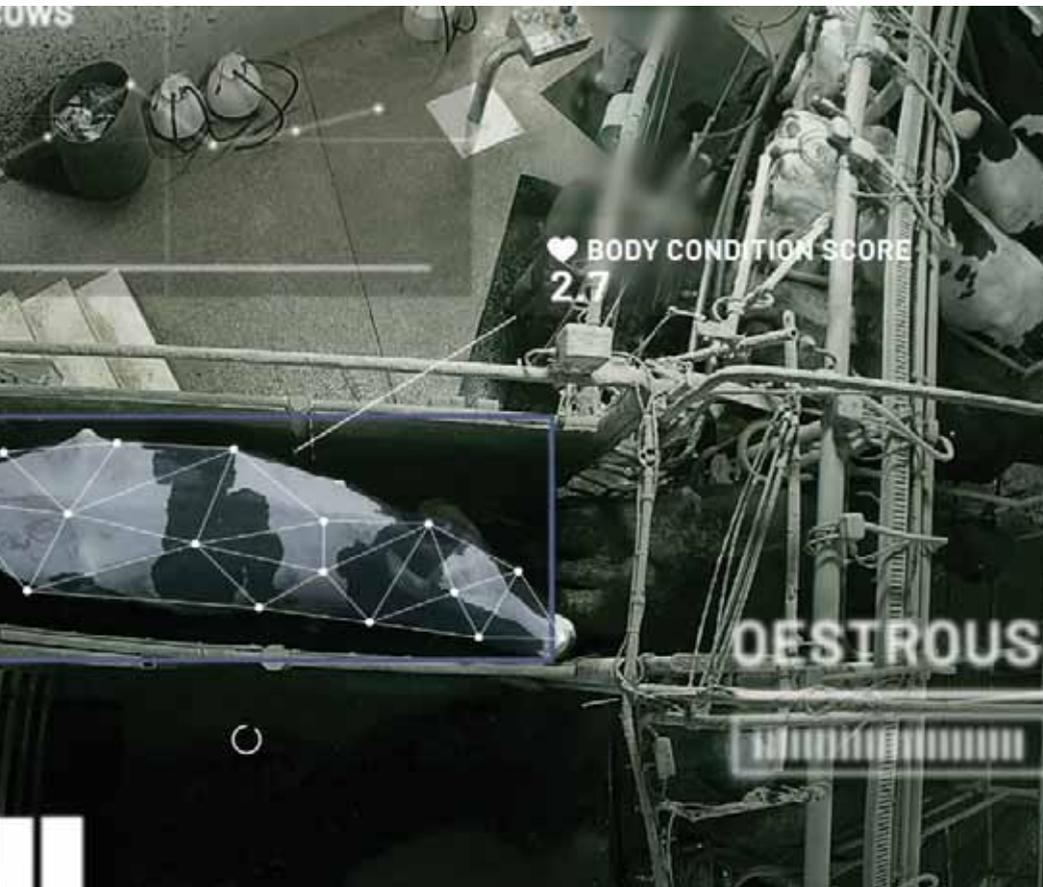
Cattle Eye technology is now data harvesting body condition scores and mobility scores from over 8,000 cows across the UK.



Northern Ireland ag-tech company Cattle Eye uses AI technology (above and right) to give cows' scores on mobility and body condition.



Cattle Eye monitors dairy cattle as they leave the milking parlour via a standard camera



TRACK RECORD

Growing Cattle Eye further should be no problem given Canning's track record in the technology sector. Having worked for many years in Silicon Valley and the tech sector in Beijing, Canning returned to Ireland in the early 2000s with the belief that farming was ready for cloud computing.

In 2004, Canning started Farm Wizard, which he says was the world's first livestock management platform.

He developed this business over 12 years before eventually selling to UK ag-tech investment firm W heatsheaf as part of an £8m (€9.2m) transaction.

The Co Armagh-native is very clear that he now wants to build Cattle Eye into a really big business over the coming years.

When he was building Farm Wizard, Canning says there was very little interest from investors in ag-tech at the time.

Today, the story is very different. Almost \$20bn (€18.5bn) of venture funding was invested in food-tech and ag-tech last year with investors now eager to pile in behind new startups.

With his track record in the sector and a cutting-edge new technology, Canning now hopes to build a new company that can solve the final leg of the sustainability puzzle and help farmers to improve their bottom line.



Askew, but the company is off to a fast start. Having founded Cattle Eye in September last year, Canning and Askew were able to raise £0.5m (€0.6m) in seed funding from Belfast-based Techstart Ventures and have also received grant money from Invest Northern Ireland.

Canning says they started off by developing the technology using the 90 cows on his father's dairy farm in Co Armagh. From there, Canning says they continued to trial the technology on other farms, including three research dairy farms run by the University of Liverpool that had more than 1,600 cows as well as a 5,000-cow dairy farm in Dorset in the UK.

Cattle Eye technology is now data harvesting body



€400
potential saving per cow from using Cattle Eye technology.

condition scores and mobility scores from over 8,000 cows across the UK. Canning says the company is already working with one of the large UK retailers to introduce autonomous mobility scoring for dairy herds that are directly contracted to supply milk to the supermarket chain.

The benefit of the technology for the supermarket is that it takes away human error in mobility-scoring cows and allows for claims around improved animal welfare standards.

As the platform continues to build capacity and improve its machine learning, Canning expects to raise further capital from international ag-tech investors later this year to help grow Cattle Eye further.

SPEAKING UP FOR IRISH AGRICULTURE

Lorcan Allen speaks to Nigel Edwards, group CSR director at Hilton Food Group, about how his company advocates the sustainability of Irish meat production

Over the last number of years, the global climate crisis has come to dominate news headlines and is now at the forefront of policymaking for many governments, particularly in Europe. And as the general public has grown more aware of global warming, certain sectors of the economy, such as the fossil fuel industry, have come in for very close scrutiny for the impact they have on our climate.

Despite being a core part of our diet, let alone our evolution as human beings, meat is also a product that has been on the receiving end of sharp criticism from certain elements of the climate movement. The methane produced by cattle is repeatedly cited as one of the main drivers of global warming.

Unsurprisingly, farmers feel deeply aggrieved and unfairly targeted by those calling for an end to meat consumption and a transition to plant-based diets when no mention is given to the carbon sequestration potential of their grassland soils or of the high nutritional density of meat proteins.

Is it any wonder that many farmers see climate change as a major threat to their livelihoods when, in reality, they have a crucial role to play in helping Europe achieve carbon neutrality by 2050 under its new Green Deal.

CONSUMER

Yet for all the noise, there are those who are quietly standing up for Irish farming where it counts – with the consumer. Hilton Food Group, the retail meat packer with a site in Drogheda, is just one example of this.

While operating below the radar slicing and packing meat for its retail partners, Hilton is a giant within the food supply chain selling more than 370,000t of beef, pork, lamb poultry, seafood and prepared foods last year. The company has an annual turnover of more than £1.8bn (€2.1bn) and sales to customers in 15 countries, including almost all of Europe and Australia.

Hilton's route to market is via the retail channel and its key customers are some of the largest supermarket chains in Europe and Australia. The company does not buy directly from primary producers. Instead, it sources meat from primary meat processors before producing meat products for its retail partners, mostly under own-brand labels. Leveraging its proximity to the end customer, Hilton has become a vocal defender of Irish farming by advocating for the nutritional benefits of eating meat, as well as the environmental credentials of Irish beef, pork and lamb.

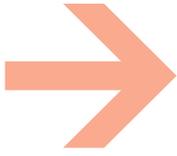
Nigel Edwards, group CSR director for Hilton Food Group, is at the forefront of this.

"Hilton is hugely proud to sell Irish beef, pork and lamb across a wide range of markets," says Edwards.

"And we're fully committed to getting the facts right about meat. Talking about the carbon footprint of meat is only one side to the story. But when you talk about the footprint of meat, combined with the nutritional value of the product, then you have a very different story. That's the key combination we need to be much more effective as an industry at communicating to the consumer," he says.

Edwards says that Hilton can give farmers a voice with supermarkets and advocate the scientific evidence that shows the benefits of meat. He adds that supermarkets want to sell a sustainable product but they're looking for accurate, scientific measurements





from their supply chain to prove the sustainability of the product, be that in terms of environmental impact, animal welfare or the water footprint of meat.

“Irish farming is already a winner when it comes to sustainability. It’s a really sustainable place to produce food because it has an abundance of water and sunshine and really productive soils,” says Edwards.

“We sell meat branded as Irish all over Europe. It’s seen as a premium product because of the production systems in Ireland. And I think the Origin Green programme was a leader in demonstrating that sustainability at farm level,” he adds.

EMISSIONS

Now, farmers are being asked to make changes to some farm practices in order to lower emissions from slurry spreading and chemical fertiliser. However, Edwards is clear that it is not Hilton’s role to go on to farms and start telling Irish farmers how to run their business.

Instead, the company sees itself in a coordinating role within the food supply chain where it can communicate those environmental and emissions improvements directly to customers.

“Our first responsibility at Hilton is to reduce our own carbon and environmental footprint,” says Edwards.

“We’re not going to tell farmers how to run their business but we will collaborate with our supply chain partners to help make farming more sustainable and we can then communicate that to the customer,” he adds.

Within its own business, Hilton has set itself a range of ambitious sustainability targets including reducing its water consumption, becoming much more energy-efficient, moving towards fully recyclable or compostable packaging and transitioning to renewable energy sources, where possible.

Packaging, in particular, is an area where many companies can make big improvements. By 2022, Hilton is aiming for 100% of its packaging to be fully reusable, recyclable or compostable. The company also aims to source a minimum of 50% of its plastic packaging needs from recycled sources by 2022. In its UK business, this figure is already at 70% and at 80% in Ireland.

PACKAGING

New innovations in packaging are also helping the group to reduce costs. Just by reducing the size and weight of packaging, Edwards says the company was able to save 60 tonnes of packaging weight last year.

The added benefit of improved packaging solutions is that it can improve the shelf life of meat products, which is the main way of reducing food waste – a major source of carbon emissions for many western countries.

All of this, says Edwards, is playing into the circular economy. At its processing sites, Hilton has invested heavily in cutting-edge technology such as heat recovery and smart energy management



Hilton Food Group packs meat for retail customers in 15 countries, including almost all of Europe and Australia.

systems to slash its energy consumption.

Edwards says Hilton’s Irish plant is among the most energy-efficient across its global operations, where it runs 17 processing plants located in Ireland, the UK, continental Europe and Australia.

At its Irish plant in Drogheda, almost half of the energy needed to heat water for cleaning comes from heat recovery systems, which has allowed Hilton to halve its natural gas bill for heating water.

The company has developed ambitious sustainability targets to reduce energy consumption across its global network of processing sites and has partnered with Crowley Carbon, the Irish energy efficiency company, to achieve the energy efficiencies needed to meet these targets.

So far, this focus on energy efficiency has enabled the company to reduce its energy consumption per tonne of output by 28% in the last number of years. With an energy bill that reaches into millions of pounds every year, these savings add up to a lot for a company the scale of Hilton.

“In Ireland, our factory is now highly automated. And that brings a lot of efficiencies. Not in terms of having less people but in terms of energy efficiency and production efficiency,” says Edwards.



370,000T

of beef, pork, lamb poultry, seafood and prepared foods sold by Hilton Foods last year.



€2.1BN

turnover.

ADVOCATE

They may not always see eye to eye, but Irish farmers and companies such as Hilton Food Group have common cause when it comes to communicating the sustainability of Ireland’s meat supply chain.

For farmers, it should be of some reassurance to know a company with the scale and reputation of Hilton Food Group is advocating on their behalf with important customers in the European retail channel.

As long as we continue to lean on science to illustrate the sustainability of Irish meat production from an environmental and climate perspective, it will ensure there is always a market for Irish produce.

Encouragingly, it will also help to differentiate and add value to Irish meat by showing consumers they can have a sustainable meat product that is nutritious and healthy but not at the cost of the environment or climate.

4

INTERNATIONAL INSIGHT

As an open economy, Ireland has never been afraid to look abroad for new ideas or systems. Our food industry is not alone in the huge transition that's needed over the coming years to lower emissions and the environmental impact of food production, while maintaining food production to feed a growing world population. There will be a lot to learn from our counterparts in innovative food-producing countries such as the Netherlands, New Zealand, the US and the UK. Our industry will be stronger for collaborating with our international partners and adapting to new technologies as they emerge.

Pannonia Bio's ethanol plant in Hungary is the largest in Europe.

**CIRCULAR
ECONOMY
IN ACTION**

In January of this year, **Lorcan Allen** flew to Budapest to visit Europe's largest ethanol plant. The Pannonia Bio facility is a wonder of engineering and cutting-edge renewable technology

Early January in Hungary is cold. The sun is shining and there's very little snow left after a mild winter but temperatures remain below zero throughout the day. Budapest, the capital of Hungary, is a beautiful old European city where east meets west in a mix of Ottoman, Byzantine and Roman architecture.

But I haven't come here to admire the old city that's split in two by the mighty Danube. Instead, I'm here to marvel at an altogether more modern and industrial form of architecture – Europe's largest ethanol plant. Leaving the city, I follow the course of the Danube south for about an hour deep into rural Hungary. Either side of the road the land stretches away in tracts of flat land for miles. This is farming country and we're right in the middle of Hungary's corn (maize) belt.

ETHANOL

And situated between this huge expanse of corn and the Danube River is what I've come to see – Europe's largest ethanol plant. The plant is owned by Pannonia Bio, a subsidiary company of ClonBio Group, a privately owned Irish agribusiness. The sheer scale of



500M
litres of ethanol produced every year.

350 
trucks supply the plant daily.

50% 
of maize is bought off local farmers.

this facility is hard to grasp.

Set on a 100ac site on the banks of the Danube, Pannonia Bio's ethanol biorefinery plant uses about 1.3m tonnes of maize corn every year to produce over 500m litres of ethanol, giving the company a 10% share of Europe's 5bn-litre ethanol market.

But why is an Irish agribusiness running an ethanol plant in southeastern Europe? The answer is maize corn. Hungarian farmers produce about 8m tonnes of maize every year, making it the ideal country to establish an ethanol plant in.

Clonbia sources over half of its maize needs directly from local farmers, with the remainder brought in through grain traders. On the morning I visit the plant, lines of trucks full with maize are queued up at the entrance weighbridge ready to drop off their load. On a given day, up to 350 trucks might arrive to supply to the plant. Once the corn is processed into ethanol it is shipped from the plant via tanker and rail to markets across Europe. The majority of Pannonia Bio's ethanol is exported to markets easily reached by rail such as Germany and Poland.

While ethanol is at the core of what Pannonia Bio does and by far its biggest cash driver, the company also invests in developing new bio-products as well as other forms of renewable energy. The two main byproducts from the production of ethanol are dried distillers' grain and corn oil.

BIO-ECONOMY

Pannonia Bio produces about 350,000t of distillers' grain, which it sells as animal feed to livestock farmers, and 15,000t of corn oil, which is used as a feed nutrient for animals. However, Pannonia Bio is a leader in the bio-economy and is constantly looking to see what extra value it can extract from its primary maize feedstock.

Its latest innovation has allowed it to begin extracting fibre from the maize corn. Fibre is a raw material that is extremely dynamic in its applications and can be used to make products such as cellulose or chitin, a natural polymer substance used to make bio-plastics.

“ The company believes the heat recovery systems, along with the renewable gas being produced by the four AD plants, will halve the company's natural gas bill from next year

Chitin can also be further processed into chitosan, which is used in health foods as a natural coating. It is also used as a coating on paper cups or plates, demand for which has grown substantially in the last two years after countries banned plastic straws.

Pannonia Bio also plans to use this fibre as a feedstock for four enormous anaerobic digester (AD) plants that are in the final phases of construction at the plant. These four AD plants will have a combined thermal capacity of 20MWth and digester volume of over 32,000m³. Once completed, the biogas plant will be among the largest of this scale in Europe, according to Pannonia Bio chief executive Mark Turley.

Alongside the AD plants, Pannonia Bio is in the process of retrofitting its ethanol distillery with cutting-edge vapour compression systems that will capture the steam from the distillation process and reuse this energy in the plant.

The company believes the heat recovery systems, along with the renewable gas being produced by the four AD plants, will halve the company's natural gas bill from next year, which will lower its dependence on fossil fuels and significantly reduce its carbon footprint.

CIRCULAR ECONOMY

Walking through Pannonia Bio's enormous ethanol facility shows what's possible when we talk about the circular economy. Starting with a commodity raw material such as maize corn, Pannonia Bio is using all of its imagination to extract the maximum value from the grain and its downstream processes.

Starting from simple animal feed grade byproducts, the company is now extracting specific components from the maize to make high-value products from fibre. Even more impressively, the group is also using the fibre extract to lower its dependence on fossil fuels and significantly cut its carbon footprint.

More thinking like this, where nothing is seen as a waste material in the bio-economy, is what's required to transition our heavy industries and major energy users away from fossil fuels and into more renewable technologies.



The four AD plants under construction at Pannonia Bio's ethanol plant in Hungary.



Heat recovery systems being attached to the steam stacks.



A tanker full of ethanol.



Grain silos at Pannonia Bio's ethanol plant in Hungary.



Distillers' grains left over after the ethanol production process.

MORE FROM LESS

FrieslandCampina plans to end its use of fossil fuels at its milk processing sites by 2050. **Lorcan Allen** speaks to Arnoud Smit, the company's programme lead on climate, about how this will be achieved

If you think Irish farming gets a hard time over its impact on the environment and climate change, you should spend a day in the shoes of a Dutch dairy farmer. Having initially expanded cow numbers and milk production after the end of milk quotas in 2015, the Dutch dairy industry soon found itself in the midst of an environmental storm.

The increased cow numbers led to a spike in phosphorus output on Dutch farms. In the first three years after quotas, the Netherlands exceeded its EU phosphate limits by up to 7m kg.

The extra phosphorus output forced the hand of the Dutch government to implement a cow-culling scheme, which incentivised the reduction of the national dairy herd by up to 180,000 cows in a bid to limit the phosphate overload in the

Netherlands.

The government also introduced quotas for the amount of phosphate that could be produced by individual farms for the next decade. These phosphate quotas essentially put a cap on the size of the Dutch dairy herd until 2028, at least.

If Dutch farmers want to increase production over the next decade, they will have to achieve it by getting more from less. However, this type of innovation has never been hard to find in the Netherlands.

But phosphates are just one challenge that the Dutch dairy industry must overcome. Society in the Netherlands not only wants the dairy industry to reduce its environmental impact but consumers are also demanding change in terms of climate emissions, biodiversity on farms and animal welfare.

To meet these changing consumer demands, Dutch dairy co-op



complete for FrieslandCampina, Smit says it won't be so straightforward to transition away from natural gas, which is the key fossil fuel used in most of its milk processing plants where a huge amount of heat is needed to dry milk into powders.

"Our aim at FrieslandCampina is to be carbon-neutral by 2050 with no fossil emissions at any of our facilities worldwide. However, it's a bit more of a challenge to switch from fossil fuels to renewables at our processing plants because we need a lot of heat to dry milk into powders. The majority of heat that we use is generated with natural gas right now but we do use other sources of energy such as woodchips and pyrolysis oil from wood residues at some of our plants," says Smit.

"We need to lower this reliance on natural gas, obviously. So our aim is to produce as much of our energy needs from within our own supply chain. This means using energy produced by our farmer members," he adds.

RENEWABLES

FrieslandCampina has started a number of programmes to nudge farmers further into the energy generation sector and is hoping to dramatically increase the amount of renewable biogas it can source from its farmers. Importantly, this would be a win-win for farmers and processors as it would also provide emissions benefits for farmers.

"We're trying to increase the amount of manure digesters on farms, which would be able to provide us with a source of biogas, but it would also reduce methane emissions from cattle manure," says Smit.

The digesters that FrieslandCampina is encouraging its farmers to establish on farm are mono-fermentation systems, or mono-manure plants, where slurry from cattle sheds accounts for 95% to 100% of the feedstock. Other raw materials such as grass or old silage can only account for a maximum of 5% of the feedstock.

This is different to anaerobic digester (AD) plants here in Ireland which, owing to the abundance of grass that we grow in Ireland, will use a more balanced mix of slurry and grass silage as the feedstock.

These mono-manure AD plants produce less energy than AD plants here in Ireland but it also means less cost for the farmer because they don't have to source feedstock. Using fresh slurry creates biogas that can be sold off the farm, while also reducing a significant amount of methane emissions on Dutch farms attributed to manure storage.

Like Ireland, there is one major challenge in establishing a large-scale biogas industry in the Netherlands, namely farm size. According to Smit, a lot of dairy farms in the Netherlands are small family-run enterprises, where the cost of setting up and feeding an AD plant is prohibitive.



LEFT: Dutch dairy cattle grazing under wind turbines. ABOVE: A small wind turbine and solar panels installed on a Dutch dairy farm.

FrieslandCampina has begun to overhaul its entire supply chain to meet a new sustainability agenda. From the milk produced on farms to the energy used to process milk at its factories, FrieslandCampina has set itself ambitious sustainability targets up to 2050. At a processing level, this means moving away from fossil fuels.

TRANSITION

According to Arnoud Smit, FrieslandCampina's programme lead on climate change, much of the renewable energy it needs to transition away from fossil fuels will actually come from its farmer suppliers.

"By the end of this year, FrieslandCampina will be sourcing 100% of its electricity needs from renewable or green sources to power its worldwide network of offices and dairy plants," says Smit. "At the moment, about 96% of our electricity needs worldwide come from renewable sources. The best part is that about 25% of this green energy is coming from our farmer members. About 2,500 farmers are supplying us with energy generated from solar panels on their cow barns. And this number is going to grow because we have another 400 farmers waiting to start producing solar power," he says.

While the switch to renewable electricity is almost





To help farmers establish on-farm digesters, FrieslandCampina has started a new subsidiary business called Jumpstart Co-operative, which helps farmers to finance the installation of biogas plants but has also provided €130m in price subsidies for the renewable natural gas (RNG) produced by Dutch farmers.

“Farm size determines whether there’s a viable business case for a farmer to install a manure digester on their farm. A viable business case for a small biogas plant starts at 130 to 140 cows (which is actually a large dairy farm in the Netherlands). These smaller plants produce combined heat and power (CHP or co-generation) of about 33kW to 75kW,” says Smit.

“An intermediate-sized biogas plant would be viable on a farm with 190 to 200 cows or higher, while on the larger farms of 350 to 400 cows the digester plants will generate only renewable biogas, with production typically the equivalent of 320,000m³ of natural gas,” he adds.

Apart from production of renewable energy, installation of an AD plant on the farm results in a substantial reduction of ammonia and methane emissions.

ENCOURAGED

Because the average dairy farm is so small in the Netherlands (less than 100 cows), neighbouring dairy farmers are encouraged to come together in groups of four or five to establish one large biogas plant between them. This spreads the capital cost and also ensures the volume of feedstock needed to supply the biogas plant is there.

Similar to Ireland, renewable biogas production is not competitive in terms of the low cost of natural gas. However, the Dutch government provides farmers with a 12-year subsidy that allows the farmer make some profit.

At this point, there are 10 farms in the Netherlands with an operational biogas plant installed, with a further 10 plants still under construction. Smit says the target is to get the number of biogas plants operational on its member farms up to 50 in the coming years as an intermediate target.

Looking to 2050, Smit says FrieslandCampina is looking at a range of alternatives to fossil fuels to power its processing plants. Renewable biogas has a role to play in helping the co-op decarbonise but FrieslandCampina also sees electrification of its processing plants as the way forward.

Smit says new technologies are being developed, which will allow the co-op to use electricity in place of natural gas in its processing plants, while hydrogen technology should also play a big part as it becomes more readily available to businesses.

FARM LEVEL

At farm level, FrieslandCampina is grappling with the same challenges we face here in Ireland – methane.

Agriculture accounts for about 14% of all carbon emissions in the Netherlands, whereas in Ireland agriculture accounts for more than one-third of all emissions due to the absence of a heavy manufac-



A mono-manure biogas plant installed on a Dutch dairy farm.

turing industry. However, Dutch farmers are under similar pressure to reduce emissions, particularly methane emissions.

“We’re still looking into how to achieve net zero at farm level by 2050. But we need the IPCC. Obviously, it’s a natural process for the cow to produce methane so it’s rather difficult to influence that,” says Smit.

The co-op recently started a joint research programme with global chocolate-maker Barry Callebaut, feed additive producer Agolin and feed provider Agrifirm to trial a new feed additive for cows that could reduce methane emissions per kilo of milk by up to 14%. Almost 50 Friesland farmers will participate in the research trial, which will last for 12 months.

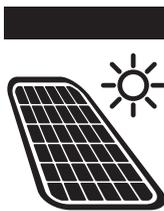
However, Smit says that carbon sequestration will play a key role if Dutch farmers are to achieve emissions reductions targets. Similar to Ireland, sequestration of carbon from the atmosphere by grasslands is not acknowledged by the Dutch government.

“Since 2018, we’ve made it mandatory for our farmers to calculate their carbon footprint and their nutrient balance. This is so our farmers know that their carbon footprint is considered to be important. Once the farmer knows what the main causes of emissions are on their farm, they can start to think about what they can do to reduce these emissions,” says Smit.

Right now, the Dutch dairy industry is at the same point on the carbon-neutral journey that our industry is here in Ireland. At farm level, dairy farmers are starting to be given more data about their individual carbon footprint, which should allow them to make changes to reduce emissions.

At the same time, more and more investment is being made in on-farm generation of renewable energy, which will provide an additional income stream for farmers of the future, but also provide the renewable green energy needed by FrieslandCampina or Irish dairy co-ops to transition their processing sites away from fossil fuels.

With farmers and co-ops in both countries on this shared journey towards carbon neutrality at the same time, there is a lot we can learn from each other and much to be gained through collaboration.



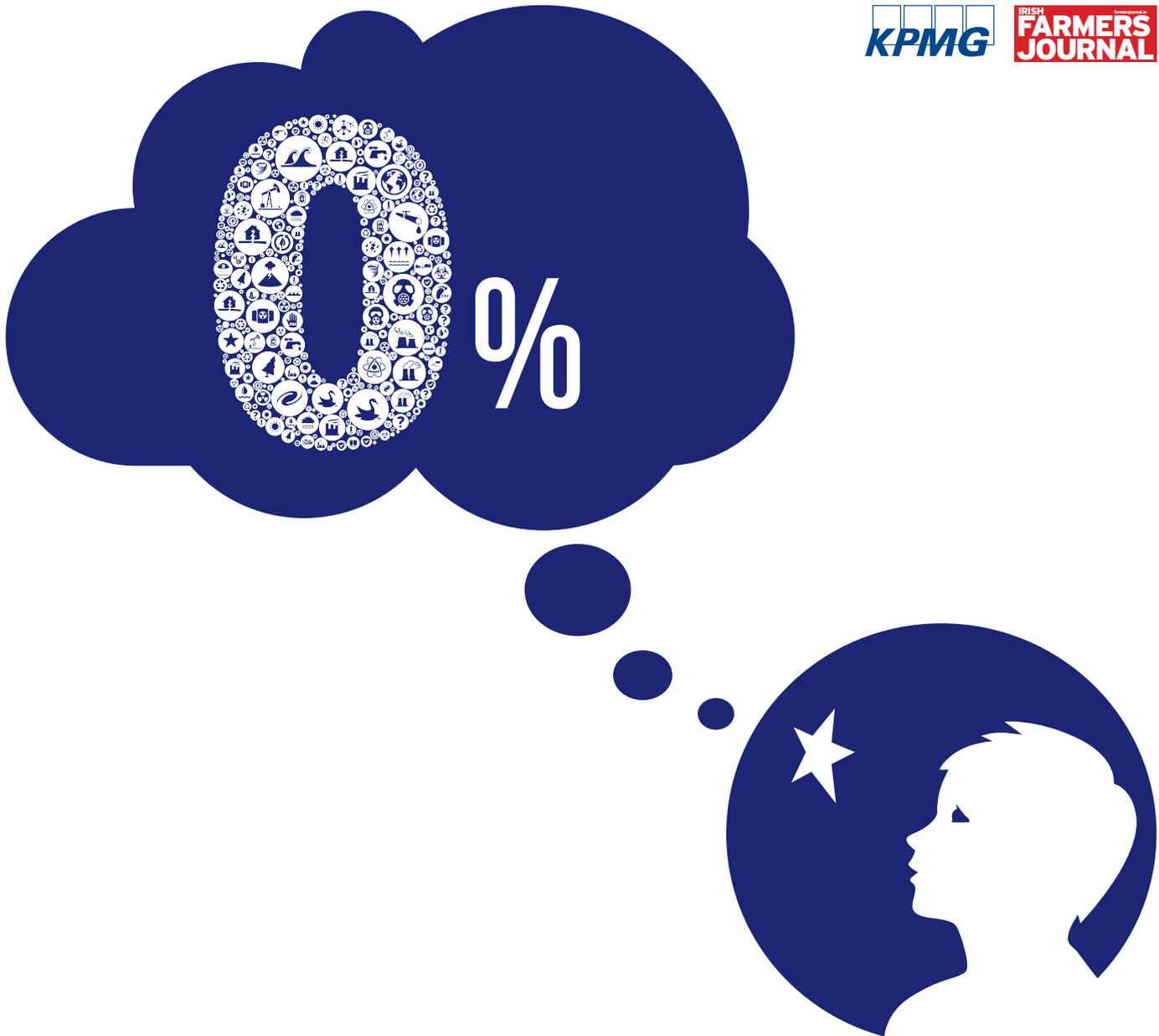
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Dutch farmers waiting to start producing solar power.



100%

of Friesland-Campina’s electricity needs will come from renewable sources by the end of this year.



DANONE'S VISION

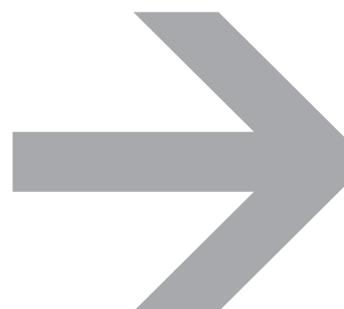
Since it first announced its aim of being carbon-neutral by 2050, Danone has been a leader in sustainability. **Lorcan Allen** learns how Danone Ireland is playing its part to meet these ambitious goals

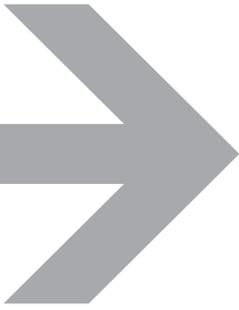
In February this year, Danone chief executive Emmanuel Faber did something unusual. He unveiled to investors for the first time a “carbon-adjusted” earnings target for Danone to take into account the estimated financial cost of the absolute greenhouse gas (GHG) emissions within its entire value chain.

Making the announcement, Faber said Danone couldn't “wait one moment longer” to build climate

resilience into its business and that he was dedicating a €2bn climate acceleration fund to transform Danone's agriculture, energy and operations, packaging and digital capabilities over the next three years.

Sustainability is a term that many pay lip service to, but here at last was a company putting its money where its mouth was. However, Danone has always been a leader in this area and was quick to identify





how important the sustainability agenda would become.

Since 2015, the French dairy, nutrition and water giant has committed to becoming carbon-neutral within its full supply chain by 2050. And this is not just within its own manufacturing plants. Danone has committed to achieving carbon neutrality within its full supply chain, which includes all carbon emissions associated with its suppliers and primary producers like farmers.

In 2017, the full scope of Danone's related greenhouse gas (GHG) emissions amounted to 21.6m tonnes. Of this, agriculture actually accounts for more than 60% of Danone's total carbon footprint, with dairy farming alone accounting for the largest share of agriculture emissions by far.

INVESTMENT

Clearly, for Danone to achieve carbon neutrality within its full supply chain is going to take time. For Chris Hillman, head of social innovation and sustainability at Danone UK & Ireland, sustainability is a journey that doesn't happen overnight.

"Back in 2015, Danone set its climate policy and made a commitment to be carbon-neutral by 2050. In order to achieve that goal, there's a lot of investment that needs to happen and a lot of steps that need to be taken," says Hillman.

"We're able to control what we do with our factories. Those are within our remit. But we also need to look at where are biggest carbon emissions come from. And if you look at our scope 1, 2 and 3 emissions, the majority of our emissions are scope 3 like most brands," he adds.

Scope 1 emissions are those directly associated with a company's manufacturing sites such as the consumption of fuels and energy. Scope 2 emissions are indirect emissions arising mainly from the consumption of energy. And, finally, Scope 3 emissions are all indirect emissions linked to a company's full supply chain such as supplier or consumer emissions.

"The vast majority of our emissions come from agriculture. Something in the order of 60% of Danone's total emissions are related to agriculture. In order to start to address our carbon footprint, there's a range of things we can do within our own scope. So that's making sure our factories are as efficient as possible and using renewable electricity. But that will only go so far," says Hillman.

"For me, working together with all stakeholders in our supply chain and building long-term relationships is key in empowering a new generation of farmers. To that end, Danone established long-term cost performance model (CPM) contracts, which makes it possible to guarantee stable income for farm-



Danone's infant formula plant at Macroom in Co Cork.

ers and long-term collaboration on sustainability issues. This, along with our regenerative agriculture programme, has resulted in a 9% improvement in carbon productivity in our farmers' fields over the last two years."

Hillman says Danone has recently signed up to RE100, a programme where businesses commit to using 100% renewable electricity. Across its global network of processing sites, Danone now has 50 plants using 100% renewable electricity.

Hillman says Danone UK & Ireland has also recently been awarded B Corp certification, which recognises the company's ambition to achieve goals beyond profit.

IRELAND

In Ireland, Danone operates two plants. One on the outskirts of Wexford town and the other in Macroom, Co Cork. Like the wider Danone group, these two facilities have been assigned targets to switch to renewable energy.

According to Donal Dennehy, supply chain director for Danone in Macroom, there's been a huge focus on investing in sustainability in Danone for many years now. Normally, a plc such as Danone has a short time frame of one to three years for capital expenditure projects.

However, investing in the transition to renewable

60%

of Danone's emissions come from agriculture



FUTURE

In Ireland, we've a proud tradition of supporting foreign direct investment (FDI) in this country. Danone is one of the largest food and nutrition companies in the world and has been operating in Ireland since 2007.

Yet the company has now set itself a very ambitious target of achieving carbon neutrality by 2050. The implications of this ambition are twofold for Ireland.

Firstly, if Ireland wants to continue to attract and retain global giants like Danone in this country, then it needs to develop a credible and scaled renewable gas industry that will allow users of natural gas like Danone to transition to a renewable alternative. If we fail to establish a renewable energy industry then we could see multinationals scaling back operations in Ireland.

The second implication of Danone's carbon-neutral target is that our dairy sector will need to change to meet climate targets. Danone is a large buyer of Irish dairy ingredients so it is dependent on the Irish dairy industry reducing its carbon footprint in order for it to meet its sustainability targets.

By helping Danone meet its carbon-neutral targets by 2050, Ireland has a lot to gain. Not only can we develop a world-class renewable energy industry to serve the needs of important multinationals like Danone, but our agriculture system can also benefit from improving its carbon footprint to ensure Danone remains a key buyer of Irish dairy for decades to come.

energy takes time and Dennehy says Danone is now signing off on medium-term capital expenditure projects so the company can meet its goals.

In Ireland, the Wexford and Macroom plants have already been converted to 100% renewable electricity.

"Switching to renewable electricity was really the low-hanging fruit for meeting our sustainability targets here in Ireland. The biggest challenge we now face is finding a renewable alternative to natural gas," says Dennehy.

Danone's Macroom facility in particular currently relies on natural gas for its energy needs and finding a renewable alternative is not straightforward. Yet there is one option that Dennehy feels holds the best chance for Danone to meet its goal of using 100% renewable energy in Ireland.

"Converting from natural gas to a renewable alternative is a big, big challenge. However, we see biomethane as the only route for Danone to achieve carbon-neutral processing in Ireland," says Dennehy.

BIOMETHANE

Right now, there is no biomethane industry in Ireland, although there has been increasing pressure on the Irish Government over the last two years to support the establishment of this new energy sector. Danone has been to the forefront of those calling for



The biggest challenge we now face is finding a renewable alternative to natural gas

the establishment of a biomethane industry.

The company has played an active part as a leading member of Renewable Gas Forum Ireland (RGFI), which is calling on the Irish Government to support the establishment of 300 anaerobic digester (AD) plants on Irish farms by 2030.

These AD plants would produce biomethane, which is a renewable gas produced from grass and cattle slurry and would be injected into the national gas grid for companies such as Danone to use as a renewable alternative to natural gas.

The initial reaction from the Irish Government to the proposals put forward by RGFI was lukewarm at best. However, Dennehy says he can see opinions beginning to change among policymakers and there are green shoots for a possible biomethane industry being established in Ireland.

"There's a market for biomethane here in Ireland. We have the means to produce it and the technology is there. All that's missing is the Government policy needed to get the industry off the ground. France has developed a biomethane industry and they really got it right. We can learn from them," says Dennehy.

"Biomethane is a little bit more expensive for me to buy but I'm willing to pay more for biomethane if it gives me carbon-neutral processing plants here in Ireland. I have to reach my carbon-neutral targets for our two Irish plants by 2025," he adds.

Irish farmers, working in harmony with nature

Irish farmers who are certified members of the Bord Bia Sustainable Beef and Lamb, and Dairy Assurance Schemes are members of Origin Green - Ireland's national food and drink sustainability programme.

Farmer Feedback Report

As part of the Origin Green programme, Bord Bia, in collaboration with Teagasc, has developed a **Farmer Feedback Report** that all Quality Assured beef and dairy farmers will receive following their audit (on-farm or remote).

The feedback report - generated from data gathered during the audit through the sustainability survey - will include a summary of the farm's environmental performance and advice on how to mitigate against farm emissions and improve production efficiencies.

To learn more about the **Farmer Feedback Report**, call the Bord Bia Helpdesk on 01 5240410 to speak to the Sustainable Quality Assurance team.

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