

# TRANSITION

Securing a sustainable future for your farm business



## LEAN AND GREEN

How Durham farmer is optimising inputs to meet SFI goals



# How to reduce risk while increasing farm revenue



**W**elcome to *Transition* – the quarterly supplement from *Farmers Weekly* to help secure a sustainable future for your farm business.

In this issue, we look at ways growers and livestock producers can take a planned approach to reducing the risks facing their farm businesses – from reducing reliance on the annual basic payment to renegotiating finance agreements.

Our cover story sets out how Transition Farmer Philip Vickers is optimising inputs and making the most of the Sustainable Farming Incentive. He explains how on-farm trials are helping him tailor direct-drilling, embrace biological pest control and use alternatives to artificial nitrogen.

We also examine ways farmers can improve their work-life balance and mental resilience at a time when many businesses are under tremendous pressure due to high inflation, rising interest rates and challenging market conditions.

A pioneering strategy for cutting carbon is next up – as we visit seven farmers and growers in Northern Ireland who have taken a forensic approach to identifying and cutting greenhouse gas emissions – helping to mitigate the impact of climate change.

We also look at renewable energy, including the planning issues, costs and pitfalls to be avoided when embarking on a new project. Our article includes expert advice on different energy types and explains how you can choose the right one for your farm.

As always, we are grateful to all our Transition Farmers for sharing their stories as they strive to secure a sustainable future for their businesses. We are equally grateful to our Transition Partners for sharing their expertise and advice along the way.

For more about our Transition initiative, visit our knowledge hub at [fwi.co.uk/transition](http://fwi.co.uk/transition)

**Johann Tasker, *Transition* editor**

## OUR PARTNERS

The *Farmers Weekly* Transition Partner Network is a UK-wide community of farmers, industry stakeholders and influencers working together to secure a



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## CONTENT HIGHLIGHTS



How to plan ahead to reduce business risks

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Carbon project shows how farming can hit net zero

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Renewable energy systems: Which is right for your farm?

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sustainable future for UK agriculture. If you would like to join and want more information, contact Anna Eccleston at [anna.eccleston@markallengroup.com](mailto:anna.eccleston@markallengroup.com)



# Biodiversity Net Gain: the questions you should ask for long-term security

From January, developers in England must demonstrate 10% biodiversity net gain (BNG) to secure planning permission. They can deliver BNG by purchasing biodiversity units from habitats created off-site.

Landowners can secure a long-term income stream by establishing these habitats on their land. **Those partnering with Environment Bank are typically earning between £20,000 - £60,000 annually – alongside annual uplifts and windfall revenue share – for at least thirty years. This income stream is de-linked from downside market risk, sales complexities, and delays.**



## Options for landowners

**Broadly, there are three routes for landowners to access the BNG income stream:**

- Creating habitats and selling units themselves
- Entering agreements directly with developers
- Collaborating with a specialist third-party provider

Landowners should avoid exposing themselves to risk and creating a stranded asset. Generating biodiversity units is a complex undertaking requiring industry expertise. **Here are the key questions you need to be asking to find the best option and secure a future for your business.**

### Who is liable for BNG delivery?

When generating biodiversity units yourself, you're legally bound to BNG delivery for thirty years. You'll need an ecologist to establish the site's baseline biodiversity and conduct regular monitoring to demonstrate gains.

Some third-party providers take legal responsibility for BNG delivery, while others place that responsibility on the landowner. If you deal directly with a developer, they take responsibility – though they may not have the ecological expertise to ensure delivery is even feasible.

### Who brokers the sale of biodiversity units raised from the land?

If you're delivering BNG, you may need to hire a sales broker to tackle the competitive local marketplace. Whereas third-party providers handle unit sales for you.

By doing things yourself, you keep all the profits. But the cost of habitat creation and management is considerable, with the government's BNG Market Analysis estimating the average cost per unit as nearly £19,000 (adjusted for inflation) – not including monitoring, reporting, legal, and sales costs – likely making the profit margins slim for a landowner going it alone.

### How will BNG impact existing income streams?

You cannot use existing restorative projects to count towards BNG. But

consider how BNG stacks with other services like carbon credits, water management, and renewable energy – and if they can be sold as bundle products.

Consider any land use restrictions after the delivery period ends and whether the change of land use will affect agricultural property relief (APR) on the land for inheritance tax (IHT) purposes.

Environment Bank can seamlessly integrate BNG into existing land uses and income streams for the long term. We establish agricultural Habitat Banks so we can endeavour to keep land use primarily agricultural throughout.

### Will third-party providers offer me a share in the profits from unit sales?

Some providers, like Environment Bank, will share revenue from unit sales once they have recuperated their initial costs, in addition to annual payments.

Tackling BNG on your own can be expensive and using a third-party provider could be the most profitable route overall. With a range of schemes on offer, you must consider the security of each offering to protect your income stream.

### Which BNG delivery options guarantee security for my business income?

By entering an agreement with a developer or third-party provider, you

## Discovering the best solution for your business

If you choose to explore the BNG market yourself, evaluate all aspects to safeguard your business from risk. Going it alone can be profitable if you have all the essential frameworks in place.

Third-party providers like Environment Bank might be the best option for you. We adapt our strategy to complement your existing business needs.



## BNG can be transformative

Richard Pendlebury, a Manchester-based landowner creating a 49-hectare Habitat Bank, commented:

**“The Environment Bank model means that we'll receive funding for thirty years, a guaranteed source of income quite rare in the farming landscape. By opening this income stream, we'll be able to pursue a work-life balance, which is especially important for our kids.”**

Our approach offers landowners an opportunity to enhance their landscapes and diversify their income while retaining ownership of their land.

remove much of the risk. But without guaranteed funding for thirty years, and without guaranteed unit sales, you risk leaving your asset stranded.

Some third-party providers use option agreements that involve waiting for a unit buyer to be found before your payments begin. But Environment Bank has forward funding for the full term – giving landowners income security from day one, regardless of fluctuations in unit demand or pricing.

Find providers with reliable funding and a track record for habitat creation. They're the best informed to accurately budget the cost of habitat creation and management for thirty years.



# Meet our Transition Farmers

These 16 farmers are sharing their journeys with us as they adapt their businesses

## Karen Halton

Cheshire



**Farm size** 240ha

### Enterprises

530-cow dairy herd

### Transition goals

- Recruit/retain staff
- Maintain animal health and welfare
- Increase direct sales

## James MacCartney

Rutland



**Farm size** 162ha

### Enterprises

Beef and sheep

### Transition goals

- Reduce disease in sheep
- Be better than net zero
- Establish herbal leys

## Vaughan Hodgson

Cumbria



**Farm size** 244ha

### Enterprises

Cereals, grassland, broilers

### Transition goals

- Support the next generation
- Replace lost Basic Payment Scheme income
- Adapt to uncertain weather

## Alan Steven

Fife



**Farm size** 138ha

### Enterprises

Potatoes, brussels sprouts, parsnips, malting barley

### Transition goals

- Reduce cultivations
- Improve soil health
- More resilient rotations

## Andrew McFadzean

Ayrshire



**Farm size** 285ha

### Enterprises

350 beef cattle, wheat, beans, barley, fodder beet

### Transition goals

- Slash finishing time
- Reduce dependence on inputs using solar energy
- Improve grassland

## Rachel & Richard Risdon

Devon



**Farm size** 151ha

### Enterprises

300-cow dairy herd

### Transition goals

- Secure adequate labour
- Better understanding of Environmental Land Management
- Reduce carbon footprint

## Kit Speakman

Essex



**Farm size** 275ha

### Enterprises

Mixed arable, beef and sheep

### Transition goals

- Bridge income gap
- Fully diversified business
- Widen the rotation

## Eddie Andrew

Sheffield



**Farm size** 73ha

### Enterprises

Dairy, milk delivery service, ice cream parlour and farm shop

### Transition goals

- Co-operating to reduce costs
- Establish a new dairy
- Reduce carbon footprint

## Irwel Jones

Camarthenshire



**Farm size** 375ha

### Enterprises

1,500 ewes on owned and rented land, suckler cows and followers, root crops

### Transition goals

- Manage natural woodland
- Plant hedgerows
- Rely less on volatile inputs

## Andy Bason

Hampshire



**Farm size** 800ha

### Enterprises

Cereals, spring beans, oats, linseed and oilseed rape

### Transition goals

- Cut carbon emissions by 30%
- Establish 10ha of agroforestry
- Establish 10ha of woodland

## Duncan Blyth

Norfolk



**Farm size** 2,650ha

### Enterprises

Cereals, oilseed rape, sugar beet, pulses, grassland, woodland, wetlands

### Transition goals

- Improve soil health
- Develop natural capital revenues
- Achieve net zero by 2030

## Fergal Watson

County Down



**Farm size** 285ha across three units

### Enterprises

170-cow suckler herd, beans, wheat, spring barley, oats

### Transition goals

- Recruit/retain farm staff
- Restructure suckler herd
- Improve business resilience

## Philip Vickers

County Durham



**Farm size** 1,250ha

### Enterprises

Winter wheat, oilseed rape, spring barley, spring beans, lupins, rotational grass; share-farming agreement with tenant sheep farmer

### Transition goals

- Maintain margins while changing approach
- Improve soil health and resilience
- Enhance natural environment

## Kate and Vicky Morgan

East Yorkshire



**Farm size** 1,700 breeding sows

### Enterprises

Weaning 1,000 pigs a week – finished on-site and through B&B arrangements with local farmers, 140ha rented out

### Transition goals

- Facilitate structural change in supply chain
- Establish more influence over own destiny
- Diversify

## Ed Shuldham

Wiltshire



**Farm size** 1,800ha

### Enterprises

Cereals, oilseed rape, oats, forage and grain maize, peas, solar, biomass, anaerobic digestion, events and property diversifications

### Transition goals

- Help shape Sustainable Farming Incentive through participation in pilot
- Make more use of data
- Take natural capital

## Matthew Williams

Shropshire



**Farm size** 1,100ha

### Enterprises

Cereals, oilseed rape, winter beans

### Transition goals

- Improve profitability and margins
- Continue to improve soil health
- Control and optimise input use

# Future-proofing your farm with Catchment Sensitive Farming

Natural England's Catchment Sensitive Farming Advisers are on hand to help you manage all things slurry management, including new grants.



A CSF adviser on a local farm visit



A covered slurry store

Farmers across England are being encouraged to improve slurry management on their farms, to help both their business and the environment.

Every year farms across the U.K. produce a massive 29 million tonnes of slurry, which can, if stored and applied correctly, be a useful and sustainable form of crop fertiliser. However, insufficient storage and poor slurry management can reduce the efficiency of nutrients on your farm (with a knock-on effect to farm profitability), as well as risking significant water pollution. Slurry can also release nitrogen (in the form of ammonia) into the atmosphere, which can have negative impacts on plant species diversity and abundance within affected habitats.

But it isn't all doom and gloom when it comes to slurry. It's a cost-effective nutrient source for fertiliser and, managed well, can hugely benefit your farm and reduce impact on the environment. Natural England's Catchment Sensitive Farming Advisers, based locally across England, are available to discuss improvements to slurry and nutrition management, and help you make informed decisions on better management, investments, and grants available from Defra schemes. Your local adviser can take a look at your farm and help suggest and facilitate improvements that

are beneficial for your farm business, and which also reduce impact on the environment.

CSF Advisers also host practical workshop events, farm walks and discussions for local farmers. Recently, the North West team hosted a farm tour with Cumbrian farmers where they could see in practice how new, well designed slurry storage (in this case, slurry bags) could improve their farm management and benefit crop performance.

**To see which local events are happening near you, search for 'csf' on [eventbrite.co.uk](https://www.eventbrite.co.uk).**

The next round of Slurry Infrastructure grants, ran by Defra and provided by the Rural Payments Agency, start at a minimum of £25,000 all the way up to £250,000 depending on the individual farmer's needs. Round 2 will be more than twice the size of round 1, so all farms looking to upgrade their storage are recommended to submit an expression of interest when online applications open in autumn. If the scheme is heavily oversubscribed, farms with the greatest environmental impact will be prioritised first.

*Thomas Proudfoot, Defra's lead for the grants, said of the scheme;*

"We know many farmers are already

looking at how to meet and go beyond their legal obligations and make better use of their slurry, particularly given the high fertiliser prices. We will fund as many farms as we can, and will continue to work with the industry to prioritise funding fairly while maximising environmental outcomes."

The autumn 2023 cohort will be the second, with the third and final round of grants becoming available during 2024 – subscribing to the Defra Farming blog ([defrafarming.blog.gov.uk/subscribe/](https://defrafarming.blog.gov.uk/subscribe/)) means you'll get a notification when the next round of applications opens.

With a future-proofed plan for slurry management, you can enjoy improved water and air quality on your farm, soil fed by organic nutrients, and a reduction in greenhouse gases – as well as securing your farm business for years to come.

**Get in touch with your local CSF Adviser for tailored advice on slurry management at [gov.uk/csf](https://gov.uk/csf).**



Working together for a healthy environment







# Tips for planning ahead to reduce business risks

Pressures on farming businesses are mounting as BPS cuts continue and market volatility and interest rates stay high. **Louise Impey** looks at the options

**A**fter the bumper year of 2022, today's lower commodity prices have resulted in farms feeling the squeeze and investment plans being revisited.

The government's shifting stance on its net-zero agenda and the stop-start nature of policy development have added uncertainty. At the same time, the supply chain's indifference to elevated costs of production is putting additional strain on farm finances and cash management, as well as the ability to plan for a sustainable future.

Profits need to be made while navigating the changing climate, continuing biodiversity collapse and a cost-of-living crisis, without the safety net of the Basic Payment Scheme (BPS), agree commentators. "Everyone needs to change," says Strutt & Parker's head of farming Jonty Armitage. "That may mean farming in a different way and taking a new approach to risk or working with others, to name just a few options."

## Latest government action

While Defra's recent commitment to making accelerated payments to those who enter Sustainable Farming Incentive (SFI) 2023 has been

welcomed, the controlled rollout of the scheme means it is unlikely that most applicants will be able to join in time to benefit this year.

An advance payment of 25% in the first month of the agreement – rather than at the end of three months – is the latest government offer. Given that 10,000 farmers have expressed interest in SFI 2023, the online application process will need to work well.

Defra has also announced three other new support packages: a £4m fund for small abattoirs, a share of £15m for installing rooftop solar

equipment and a further £15m for automation and robotics, all aimed to help farming remain competitive.

## Bank advice

Amid growing cashflow challenges, the advice to farmers is to remain calm. While solutions to cashflow issues are unique to individual situations, they typically fall into two scenarios, says Oxbury Bank's chief risk officer, Robin Hill.

"Usually, it's either increased working capital facilities to help through a specific situation or proactive management of the current debt to ensure that the actual repayment is in line with the ability to pay." That may include payment holidays or an interest-only period, he says.

Fixed costs, such as hire purchase, rent, labour and interest charges can be harder to vary – with the latter causing unexpected increases, most of which weren't budgeted for. "Speak to your bank if the repayment of the debt is not manageable within existing cash facilities," Robin advises. "That applies to land rents too – talk to your landlord about deferral or a temporary reduction."

## RISKS IN FARMING: MAIN CATEGORIES

- Production – yield, weather, pests and disease
- Markets/price – supply/demand, price changes
- People – staff, family, injury
- Finances – capital, debt, interest rates
- Legal/political – regulation, legislation, policy





**On-farm water storage is a long-term option to cut risks to the business**

< Ian Webb, Lloyds Bank area director for agriculture in the south and east of England agrees that communication is key. “Engage with your bank at the earliest opportunity. While some of the pressures that farms are under have eased a bit, we recognise that there are on-going challenges with debt profiles.” A wide range of finance options are available to farms, he reveals. “It’s usually best to keep the overdraft facility for managing the seasonality of the business and then look at other options for specific projects”

### Finance options

Asset finance is the obvious fit for new machinery and equipment, which has a shorter term repayment window, while longer term loans – for up to 25 years – should be used for business growth. This may include land purchase or a renewables project, such as solar or wind, or a development that helps to secure the farm’s capability and add in resilience, as well as meet the green agenda.

“A reservoir is a good example. Winter water

storage means the business is less reliant on rainfall during the growing season,” says Ian. It is also used for diversification projects – most of which are in tourism, renewables or property, he reveals. These may involve bringing in other professionals, such as accountants and solicitors, especially where lease arrangements are made. “Despite the current climate, there are plenty of farmers wanting to take their businesses forward and who have identified what they need to do,” says Ian.

### CONTRACT FARMING RETURNS

Latest comparison figures from Ceres Rural show that contract farming agreements (CFAs) remain popular, despite reducing returns and profits since the record year of 2022. The company’s data comes from 54 CFAs, covering 13,900ha of arable land, with the most recent 2023 figures being an estimate based on the results from 41 farms, reports consultant Seb Young.

An increase in the contractor charge in 2022 to £277/ha – the highest since the comparison started in 2018 – reflects the greater level of risk being experienced by the farming industry in that year and the need for contractors to ensure that all costs were covered. “Although 2022 was the best farming year that many can

remember, there were plenty of unknowns when it came to cashflow requirements and whether the markets would cover the costs of growing and harvesting crops,” says Seb.

The contractor charge is expected to be higher again in 2023, at an average of £294/ha, as the combination of rising costs, reducing BPS and market uncertainty continue to create difficulties for farming businesses. “Many businesses were carrying two years of fertiliser costs in 2023,” he continues. “They then had a much more mediocre harvest, so the figures that we have to date for 2023 reflect that.”

In the same way, the farmer total returns for harvest 2022 were much higher than previous years, also being the highest seen

within the Ceres Rural dataset. At £589/ha, it was £119/ha higher than 2021. This has dropped to an estimated £412/ha for harvest 2023.

The greatest increase seen in all the Ceres Rural figures is the contractor total return for harvest 2022. At £601/ha, this figure is £120/ha higher than in the previous year. “Again, we see this coming down substantially for harvest 2023.”

Ceres Rural partner Ed Hutley points out that unless commodity prices rise, figures for 2024 will be very similar to those of 2023. “It all looks quite flat,” he says. “When there’s less money in the pot, contractors need to make sure that they remain on track.”



**TRANSITION FARMER: MATTHEW WILLIAMS**

For first-generation arable farmer Matthew Williams, who works with nine different landowners in Shropshire, expenditure is the one thing he can control in the current climate.

Despite farming 1,100ha, he will receive just £6,000 in BPS this year, so isn't too concerned about how the business will make up any funding gap in future years and points out that it won't go bust without this support.

Instead, he is committed to making good margins for both parties, so keeps a tight rein on costs and runs a low-disturbance, sustainable farming system – in line with expectations and policy developments.

“The business side is what makes me tick,” he admits. “I’ve got no control over world markets, but I can influence whether we make money or not this year and how we grow our crops.”

Having started his business in 2016 with next to nothing, it doesn't carry any unnecessary costs or equipment and over time he has reduced his reliance on contractors – which were an essential resource in the early days. “Crunching the numbers showed that it made sense for me to buy my own baler, which I did in 2019,” he says. “Until that time, I used contractors.”

A switch to liquid fertilisers has saved £18/ha on nitrogen, improved accuracy and helped to stretch out cashflow, as the last tanks to be filled on the farm in the growing season don't have to be paid for until May or June. Even in 2022, when fertiliser prices hit levels that had never been seen before, Matthew managed to have an average nitrogen cost of £635/t. “I left the phosphorus and potassium purchases to the last minute as they were coming down in price – as a result, we benefited from a massive reduction.”

He employs two distributor agronomists to help with decision-making and puts the farm data through the Yagro platform, which gives him his costs of production



and shows how the business is performing compared with others. Although he describes himself as frugal, Matthew stresses that he is willing to spend if there is a return on offer. A good example was his use of a foliar micronutrient product on wheat last year – for a cost of £6.50/ha he saw a 0.8t/ha yield increase. “We saw some of our best wheat yields from it so I have committed to apply the product to all of our wheat this year.”

He is reluctant to pay a premium for new genetics, so sticks to wheat varieties that have performed well on the farm in previous years and have characteristics that make them easy to manage. Farm-saved seed is used in some circumstances. “We’ve got a couple of blocks of triticale being grown on our lighter ground – it has the necessary drought tolerance and requires fewer inputs.”

He sees the biggest risk for agriculture in England is land going into environmental

schemes and being taken out of production. As he doesn't own any land, Matthew's diversification options are limited. He does, however, run a couple of lorries, which provides another revenue stream and complements the farming activities. Any business expansion opportunities are assessed very carefully. “When I started, I needed more land to spread my fixed costs. Now I'm lucky enough to be in a position which allows me to stand back if the deal isn't right.”

In the meantime, he is focused on the little wins, such as the SFI 2023 and premiums for growing sustainable crops. “I get huge satisfaction from farming sustainably while both the farmer and the contractor make a good return.”

● **Follow Matthew Williams and our other Transition Farmers as they adapt their business for the new environmental schemes. Find out more on p5**

He adds that it's important that the length of the loan fits the investment requirement. This is why banks need to understand what the cashflow will look like and require a detailed financial forecast with some sensitivity included. “That helps us to agree on the timescales – should the loan be for 10 years or for longer, for example? “If you have a vision for the medium term, then you need to look at the best way of funding that. Banks can help if they are given the right information and are involved at an early stage.”

**Managing risk**

For Jonty, the loss of BPS means that many farms will inevitably have to take on more risk, so that they can reduce their costs. “With machinery, for >

**CONTRACT FARMING RETURNS – 2018-23 (FORECAST)**

Harvest year	No of data sets	Average farm size (ha)	Contractor charge*	Farmer total return**	% total return of farmer	Contractor total return**	% total return of contractor
2018	29	232	267	305	45%	380	55%
2019	31	251	273	345	46%	412	54%
2020	45	262	265	324	46%	375	54%
2021	46	270	274	470	49%	481	51%
2022	54	254	277	589	49%	601	51%
2023 forecast	41	234	294	412	48%	441	52%

\* (£/ha) \*\* (Inc D/S) (£/ha). NB. The 2022 Basic Payment Scheme £/ha has been added to the farmer total return for five farms where the income is not included within the CFA



**MANAGING THE CONSTANT STATE OF FLUX – SOME POINTERS**

- Minimise overhead costs
- Set goals and budgets
- Benchmark your performance
- Understand the market
- Focus on detail
- Develop your people management skills
- Specialise

**WHAT ABOUT DIVERSIFICATION?**

There hasn't been a huge uplift in diversification projects in the past few years although the Farm Business Survey results show a steady increase in the amount of income coming from diversification. "Most of this activity has been around the development and letting of buildings," says Strutt & Parker's Jonty Armitage. "There's good demand for housing and commercial lets, with rents being seen as a safe, guaranteed income."

Diversified businesses don't happen overnight and they shouldn't be seen as a replacement for BPS, he stresses. "Some of them fail, others prosper over time and become the dominant business."

**Ring-fencing**

Getting investment for a new venture may need a fresh approach, he says, as ring-fencing the new business can make it more investable. "You also have more lending opportunities to choose from – a partnership can work well."

Natural capital markets haven't been big income streams to date and it's becoming clearer with every day that they will be part of the mix on farms, rather than the salvation, he believes. "For most farms, food production will remain the core business."

< example, that may mean having fewer, smaller options at your disposal," he says. "While that leaves you exposed in the year that brings exceptional weather or unusual circumstances, those don't happen very often."

Most farms are over-resourced when it comes to machinery, he adds. "Making better use of kit, especially the bigger and more expensive machines, is an obvious move. With their higher work rates, they can lend themselves to a number of sharing opportunities."

These can be simple agreements, with costs being split between the parties on a per hectare basis, or they may evolve over time and become contract farming agreements (CFAs). "The choice between the two comes down to attitude to risk," he explains. "One is about machinery sharing and the other is about spreading costs – but they both result in machinery being used over a bigger area. In a CFA, only one party carries the risk of machinery ownership."

While CFAs remain popular, there are situations where some are being converted into Farm Business Tenancies, says Jonty. "As the risk in farming increases, some landowners prefer to take a fixed rental payment than a share of the profits. Profitability has always been uncertain in farming, even with the safety net of the BPS."

**Control of inputs**

When it comes to reducing input costs, there has been a move away from liberal applications of fertiliser – largely due to huge price hikes. Other sources of nitrogen and targeted applications have been adopted, with rates being scrutinised. "It's important farmers don't walk away from this better practice, even though fertiliser prices are back to more normal levels."

Those already in soil carbon schemes or supply chain partnerships, most of which are found in dairy and fresh produce, will be committed to this new approach. Others need to recognise that the green agenda will impact them too and find ways to engage with it sooner, rather than later, he says. "Reducing your focus on yield is possible if you are being rewarded in other ways for sustainable practices."

Otherwise, higher interest rates are forcing changes to the management of cashflows and putting the emphasis on better payment terms, with businesses able to negotiate delayed terms and saving money. "Money in the bank at the moment is worth more," he explains. "So the longer you can keep it there, the better." That also applies to any sales strategy. "If you are going to sell later, you need to know that there will be an uplift in the price. It costs you to keep grain in the shed." ■



Jonty Armitage, Strutt & Parker



# Grain trading and carbon farming deliver sustainable farming

Arable farming and carbon farming go hand in hand, leading to healthier soil and more resilient yields from your crop and from carbon certificates



## Boost revenue with sustainable farming

- Regenerative farming drives carbon farming
- Healthy soil boosts revenue stream from grain trading and carbon trading
- Trading carbon certificates presents a new revenue
- Agreena is the established and proven soil carbon program
- Farmers have full control of their carbon certificates with Agreena

## Healthy soil drives higher yield in terms of crop and carbon certificates

Carbon farming is a sustainable farming practice focused on reducing emissions. Regenerative farming practices like reduced tillage, growing cover crops and the addition of organic matter help capture and store atmospheric carbon in the soil.

Carbon farming can now be quantified, validated and audited. On average, one to two certificates per ha per year can be achieved depending on the farming practices that have taken place. Of the soil carbon programs that support farmers as they transition to carbon farming, Europe's largest, Agreena covers over 1,000,000 ha of farmland and has paid out over €6,000,000 in 2022-23 to farmers.

## Grain and carbon trading

In the same way that you trade grain on local or global markets, carbon certificates can

be traded on the Voluntary Carbon Market (VCM). Trading carbon certificates provides an additional and complementary revenue stream and certificates can either be traded individually or jointly with your grain.

Trading your carbon certificates on the Voluntary Carbon Market (VCM), provides an additional and complementary revenue stream, and certificates can either be traded individually or jointly with your grain. This diversifies income sources, reducing the risks associated with fluctuating grain prices and weather-dependent crop yields.

Engaging in carbon trading highlights your commitment to sustainable farming practices, which can attract environmentally conscious consumers and potentially command higher prices for your grain.

## Conclusion

Farmers are facing unprecedented challenges - from the transition to public money for public goods, the reduction in BPS payments to climate change. Carbon farming and the trading of carbon certificates presents a new and often much needed revenue.

We need to raise awareness that farmers are the true custodians of the land and by practising regenerative farming practices and carbon farming, are delivering crucial climate mitigation services.

## To find out more

**Email** [katharine.grubb@agreena.com](mailto:katharine.grubb@agreena.com)

**Visit** [agreena.com/farmer/](https://agreena.com/farmer/)

**Or scan the QR code**



## How to incorporate carbon trading and grain production into your yearly farming plan

- **During the crop year.** Each crop year you can begin carbon farming and create carbon certificates by joining a soil carbon program such as Agreena. Your carbon baseline and yearly carbon performance is assessed based on the potential number of certificates issued per ha, and dependent on the regenerative farming practices deployed, soil sampling and field monitoring.

- **Post harvest.** Once your crops are harvested, your final carbon certificate yield can be calculated for that crop year. Data is collected from the data you have entered into the Agreena program covering yield, fertiliser and diesel usage, etc., which is then run through Agreena's audited methodology, to determine the number of certificates to be issued.

- **Market Engagement.** You then are in a position to engage with both grain markets and the VCM market to obtain the best price for your crops and carbon certificates. Just as when selling your grain, when selling your carbon certificates, it is important to understand the carbon market you are engaging with to ensure you achieve the best price.

Adjusting to farming without direct support has added extra stress and uncertainty to an already tough way of making a living.

**Debbie James** looks at ways to achieve a better work-life balance and improve mental health

It is no secret that stress and poor mental health are endemic among the people who make their living from the land. As the UK moves away from direct farm payments to other kinds of funding, another tier of pressure has been added, with many questioning their future as active farmers.

Responses to the *Farmers Weekly* Transition survey earlier this year confirmed this, with 87.5% of farmers polled uncertain whether their farms would survive without Basic Payment Scheme (BPS) support. Even before the changes to farm support policies, levels of mental ill health were high among farmers, says Matt Loble, professor of rural resource management at the University of Exeter. The transition has created yet another stressor.

“It is taking so long for all the details of the new schemes to come out and farmers are having to make important decisions for the future of their businesses without having that full information. There is no question that some will have quite significant financial worries,” says Matt. “In fairness to Defra they couldn’t have changed everything at once, it had to be a staged approach, but that doesn’t help farmers.”

Add high input costs, stagnant commodity values, relatively high interest rates and labour shortages to the mix and the pressure on some businesses is acute.

Richard Wordsworth, NFU senior adviser for support schemes, says it is clear that some

# Stepping back: Ways to reduce effort and stress



farmers will need to take a different path in future. Some will continue as before, implementing no changes. For others changing business structure might be the answer, while some will exit the industry.

Richard suggests there is another option that farmers should consider. “Instead of continuing as an active farmer, he or she might take a different role in the sector, be that as a contractor, mentor, freelance worker, diversifying into a hobby, renting out the farm or share farming.”

Pursuing one or more of these pathways could help farmers navigate their way through the challenges ahead, achieve a better work-life balance and, critically, improve their mental health.

The farming sector will also gain, by retaining

valuable expertise. Taking this route should never be seen as a failure to farm, insists Richard, but “a way to enjoy life and be involved in the great industry we are connected to”.

Approaching change in a structured, timely and positive way while reassessing work-life balance is not only good for the wellbeing of the business, but for the people involved as well. So what to consider?

## Approaching the decision

Making an honest assessment of workloads, staffing levels, mental and physical fitness and the needs of family is a good place to start.

George Chichester, a director at Strutt & Parker, says there are a number of possible



Vaughan Hodgson

## TRANSITION FARMER: VAUGHAN HODGSON

Retirement planning is a work in progress for 54-year-old Cumbrian poultry producer Vaughan Hodgson, with it reviewed annually within the business accounts. Pension contributions for all family members are confirmed before the end of each tax year.

Vaughan, a partner in JG & DE Hodgson and director of Hodgson Poultry at Kirkbride, near Wigton, farms with his wife, Sandra, and two of their children, both of whom want to continue farming and expand the business.

The couple have “reasonable” self-investment pension provision (Sipp) and external investments outside the

business to enable some retirement planning. “However, this still requires more funding in the upcoming years to enable us to be more independent from the farm in our retirement,” says Vaughan. “Our accountant will guide us through this process to achieve the desired outcome.”

One area the Hodgsons will need to address is where they will live when they step back from the business. “We are comfortable that this can be achieved with careful planning in the near future,” says Vaughan.

● Vaughan Hodgson is one of our Transition Farmers. Find out more on p5





permutations of the paths farmers can take, but each needs careful consideration to understand the full implications of any change. “Perhaps the most important starting point is to consider the tax implications of change, though all too often this is the last thing that gets thought about,” George says. “A working farm status is perhaps the best tax structure possible, delivering inheritance, capital gains, income tax and VAT concessions.”

Even a change from full in-hand farming to using contractors will have tax implications, triggering profit on sale of machinery and equipment, therefore professional advice should be sought before decisions are made. For a tenant farmer, George recommends scrutinising the terms of the tenancy agreement, to establish if there are restrictions, such as with cropping, occupation of dwellings, or sub-lettings.

Effects on people from reducing the scale of operations needs full consideration too as it is likely to mean changes for employees or family labour. “If this leads to a redundancy situation one needs to ensure that there is no risk of unfair dismissal due to the employee’s duties being taken over by another, for example an employee of a contractor,” George warns. “The employee can easily become an innocent victim in such situations and it is important to protect them as best as possible for both legal and ethical reasons. There are moral and mental responsibilities here, in addition to financial considerations.”

There might also be consequences for housing if an employee’s home is in farm accommodation. If there is no written agreement between

the employee and employer an Assured Agricultural Occupancy is likely to have been created, which means that under the Housing Act the worker has a contractual right to stay in the house, even if no longer employed. The ability to remove the worker from the accommodation is limited, although it may be possible to charge a market rent.

### Leaving the industry

The most viable route for some farmers could be to cease farming, a process which requires careful management and planning. An exit pathway is possible for all farm types.

For farmers with a successor, handing over control and retiring from the business is the most common route. This comes with practical challenges such as housing, pensions, and supporting other generations associated with this, therefore good succession planning is necessary.

When there is no successor a farm owner might choose to rent out the land while continuing to live in the farmhouse, although by not occupying the land they will lose inheritance tax (IHT) relief on the house.

Land let under a farm business tenancy will qualify for agricultural property relief, but will not qualify for business property relief, so any value above agricultural value will not receive IHT >

### MENTAL HEALTH

The uncertainty and upheaval of transition is challenging the mental health and emotional wellbeing of farmers.

Volunteers from The Farming Community Network (FCN) are providing support to more than 300 cases in England and Wales, and new calls are received via its helpline every day, an increasing number of which are from farmers with financial worries.

It’s not only as a result of what is happening with changes to farm support, but also the increase in agricultural inputs and cost of living pressures, says FCN services manager Mark Thomas. “When there is a gap in the farm finances, a call can kick-start conversations on how that can be managed. We can help people consider their options, for instance through the new support schemes, diversification or part-time employment.”

Mark suggests the following tips for improving resilience and wellbeing.

- Stay connected, whether with friends, family, neighbours or organisations such as FCN.
- Don’t allow yourself to feel isolated or alone. Knowing there is a network of people willing to help can build mental resilience and alleviate stress.
- Communicating with family is important. Don’t feel that you have to solve all the



The effects on farm staff need to be considered if reducing the scale of operations

problems yourself. Talking to others will stimulate possible solutions and enable you to build personal resilience.

- Manage daily stress. Learn techniques that work for you. Eat well, plan exercise outside of the farm’s confines, whether walking, running, cycling or swimming.
- If the sheer volume of work is overwhelming, list tasks in order of importance and tackle the most urgent thing first. Creating a timetable can be helpful.
- Don’t be afraid to ask for help – we all need to at times. Farming has a really strong community spirit and that will be so important as it goes through a period of change.

● For more suggestions, visit [farmwell.org.uk](http://farmwell.org.uk)





pletely can create mental health and wellbeing challenges. For some, transitioning from one business structure to another through joint ventures allows that important link to be retained.

The type of farming system will have a bearing on how easily changes can be made. As George points out, a livestock farm with its multi-annual cycle needs year-round attention and a minimum two people to handle stock. For that reason these tend to be either fully in-hand or let businesses, although share farming is an option. A variant of this might see the farmer managing grassland and fences with a third party bringing grazing livestock onto the land. George thinks it is sensible for a farmer to work with the same grazier every year, as once the agreement is in place it can be easily replicated year after year.

Shifting the business focus to farming within environmental schemes is another option. These are relatively inexpensive to deliver, involve less risk and effectively guarantee an income irrespective of weather or markets.

In extreme cases, farmers are putting the entire farm into stewardship, says George. "This is a dramatic decision, but in some cases understandable, though the long-term implications, particularly on the capital value of the land asset, are often overlooked, and the tax implications are not entirely clear."

Increasingly, farmers are also taking up different roles within the industry, either by acting as a mentor or taking up a full- or part-time freelance-related role such as adviser or consultant. This provides the opportunity for skills and expertise that a farmer has developed over their career, to be used in a way which provides a steady and more predictable income and more regulated hours of commitment. For example, in Wales, farmers are involved in Farming Connect's new mentoring scheme, to give guidance and advice to others. Nationally, corporate programmes such as Tesco Future Farmer Foundation also require peer mentors. ■

< relief. It will, however, provide a release of capital and a guaranteed income with negligible risk if a good tenant is chosen, says George. He advises careful drafting of clauses within the tenancy agreement to mitigate loss of tax advantages and to ensure some ongoing control over the land. For farmers who are tenants, liquidating capital invested in the business will provide some cash for retirement.

Another option for farmers no longer wanting to actively farm, or who want to reduce effort and stress, is to introduce new entrants through alternative arrangements such as joint ventures, contract farming or share farming. Joint ventures can help businesses grow through the injection of different skills and resources.

In Wales, Farming Connect's Start to Farm initiative can pair landowners who are looking to step back from the industry with new entrants, and provide funding for business planning and legal guidance. In Scotland, the Scottish Land Matching Service will facilitate pathways to collaboration.

### Retaining links and input with farming

If a farmer is planning to leave the industry, an important consideration which is often overlooked is how they will fill their time. "Retirement can be quite a shock for a farmer after a lifetime of graft," says George.

Farming provides a deep sense of personal identity and meaning, therefore exiting it com-

## TRANSITION FARMERS: RACHEL AND RICHARD RISDON

Tenant farmers Rachel and Richard Risdon have almost reached the midway point in their 20-year farm business tenancy. Although their landlord has indicated he is likely to extend that agreement once it is beyond halfway, there is still concern about unknowns that may lie ahead.

With their children aged just 13 and 11, succession planning isn't directly relevant yet, but with the next generation in mind, Rachel says a better mechanism is needed for passing on farms to keen new entrants. That mechanism should work for both parties in a similar way to the traditional father-to-son model, enabling older generation farmers to gradually phase out their farming activities while supporting and encouraging a new entrant.

For the Risdons, it had been challenging to secure a tenancy despite Richard having farming experience and a good track

record with the bank and Rachel being a qualified farm vet. "This has always made us keen to take on a second tenancy in a joint venture with someone else, to give them a leg up into the industry," says Rachel. "We get on really well with our herd manager who joined us just prior to Covid and became part of our family, eating with us every weekend during lockdowns, so we are looking hard for that opportunity now."

Rachel suggests there could be many opportunities for people in their position if other farmers were able to leave the industry more easily. "Many hang on, often reducing

the workload from dairy to beef or forage, and sadly often not really maintaining what they have properly. "These farmers don't want to rent out their farms because then they are effectively not theirs but they could change into a form of joint venture and so keep the farm going and also encourage in a younger farmer."

The Risdons would love to be in a position to do this when they are in their mid-60s, reducing their workload while helping to establish someone else.



Rachel and Richard Risdon

● Follow Rachel and Richard Risdon and our other Transition Farmers as they adapt their businesses. See p5



# New approaches help farmers handle extreme weather

With 2023 showing what climate change might look like, regenerative farming is under the spotlight

With this year's El Nino phenomenon bringing a hotter summer to Southern Europe, the UK has endured wetter weather. But while one extreme pattern is a blip causing a bad year, scientists tell us once-extreme events will happen regularly, and possibly annually.

Rachael Watson, Head of Agriculture at Lombard, says: "Weather challenges are nothing new in farming, however, we must accept they are getting more extreme. The crops we grow in the UK could alter significantly as changes in temperature and precipitation are critical factors in sustaining crop growth."

"Agriculture is one of the world's major producers of greenhouse gases but it's too simplistic to say we should switch wholesale to methods that don't produce them," says David King, UK Head of Technical at global science-based agtech company Syngenta. "Farming is a lot more complicated than that, with so many variables – it's a challenge working with infinitely variable factors such as soils, raising crops that face biological challenges from weeds, diseases, insects, while reliably producing food that has to be of a certain quality. And then you add in our changing climate."

David believes that emissions are an inherent part of agriculture, which must by definition make a profit to be sustainable. "Ultimately people need to be fed. A vital part of sustainability in any business is profitability.

Regenerative agriculture is not just about how you can reduce greenhouse gases and create better impacts on biodiversity. It only works as a concept if it's profitable, because producing food in a sustainable way is also about keeping businesses going to be able to feed people."

Data will ultimately enable farming to strike a balance, with agritech playing a fundamental role. "For example, optimum photosynthesis on potatoes only works in temperatures of up to 24C," adds David. "If it gets hotter than that, it's like humans getting sunburn – the plant is getting too much light energy to process. But if you use the science to establish what's going on within the crop and how the biostimulus works, and if you understand those two things, you can produce models that show you how to get the best results by using these products only in these conditions."

As the world tackles the problem, regenerative techniques are becoming commonplace, such as planting for carbon sequestration and cover cropping.

"Many farmers have diversified in one form or another," says Tim Scott, who embraces regenerative farming at 400-acre Lark Rise Farm in Cambridgeshire and is a trustee of the Countryside Regeneration Trust.

"I do it for the biodiversity, and that's been phenomenally spectacular, but I do rely on an alternative income and I don't imagine many tenant farmers could afford to do it," he says. "One issue with regenerative agriculture is that

headlands tend to get compacted and the light tilling leaves hollows in the ground – I'd say 5% of land I've sown with spring crops has not been productive."

Such issues will affect take-up among farmers – which is maybe why David King at Syngenta calls regenerative agriculture "a process rather than a solution". He says: "Every stage of a seed, from planting to nitrogen for feeding, crop protection and efficient harvesting is about tools we're still developing and to truly maximise the impact you need precision. That will become the driver of better environmental outcomes and the core sustainable process of agriculture – less travelling around fields, less application of volume-based synthetic pesticides, better interventions that are less disturbing to biodiversity, less soil disturbance, reliable sensors and forecasts.

"Farming will be able to adapt to climate change and extreme annual weather patterns by farmers accessing ever more precise data. Applying scientific knowledge is the way to mitigate the effects, and we need as much information as possible so we can look at everything as a whole and make the best decisions we can. Ultimately, everyone has to eat."

**To understand how Lombard could support your agricultural needs please scan the below QR code**



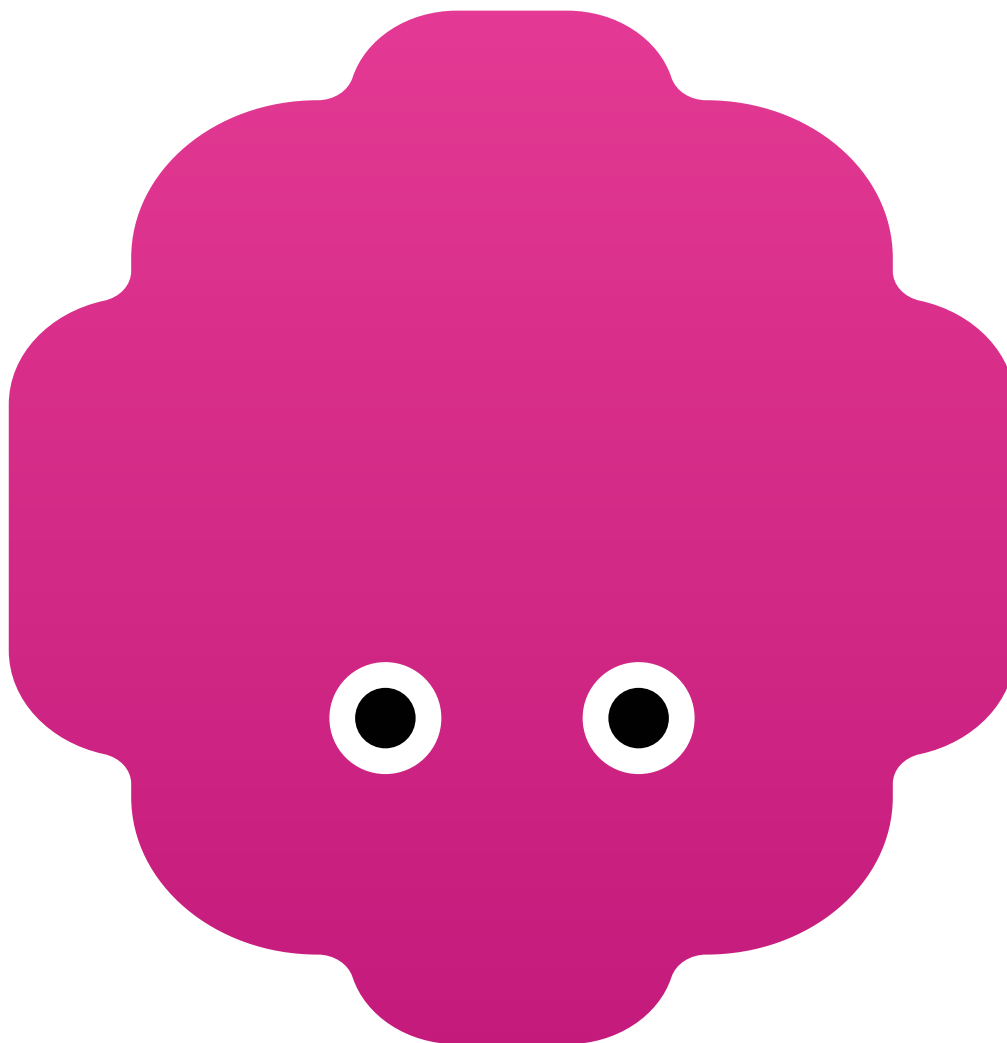
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# Project shows how farming can hit – or better – net zero

A trailblazing group is proving that farming can go well beyond offsetting its own emissions. **Jonathan Riley** reports

**A** pioneering carbon project in Northern Ireland has demonstrated that farms can make structured progress towards net zero and revealed that some are already hitting the target.

Under NI's Climate Change Act (2022), businesses must cut emissions by 48% before 2030 and make a 100% reduction, or reach net zero, by 2050. Agriculture in NI is key to those targets as the largest contributor to its greenhouse gas (GHG) emissions, accounting for about 27% of the total output. Because of this figure, NI farmers have been a major focus for policymakers, campaigners and the media.

However, these groups have persistently overlooked the fact that, unlike other sectors, agriculture has a capacity to capture, manage and store carbon. And that is where the Accelerating Ruminant Carbon Zero – or ARC Zero – project comes in. It aims to show that the focus on emissions alone does not paint an accurate or fair picture of the farming sector, which can go well beyond offsetting its own emissions.

The project was set up by Professor John Gilliland of Queen's University Belfast, a drystock farmer, former Ulster Farmers' Union president and environment adviser to the AHDB. John wanted to respond to the criticisms that have been made without science-based evidence. He says: "Farming is being short-changed in the environmental debate, with no recognition of our ability to manage carbon. Too much of this debate is about emotion and not about data. Everyone talks about gross carbon emissions but won't talk about sequestration. Farming builds

## ARC ZERO FARMERS

**John Gilliland** Drystock and coppice willow  
**Hugh Harbison** Dairy  
**Simon Best** Arable and beef  
**John Egerton** Suckler beef and sheep  
**Patrick Casement** Suckler beef and sheep  
**Ian McClelland** Dairy  
**Roger and Hilary Bell** Sheep and beef

carbon stocks as well as creating emissions, so we felt it was being unfairly treated."

Since the project began an initial phase in April 2021, the data produced has revealed that farmers manage huge carbon stocks totalling tens of thousands of tonnes stored in soil, pasture, crops, trees and livestock. Importantly, it has shown that net zero is achievable within the target timeframes and demonstrated how farmers can both cut emissions and increase their carbon storage.

"I can now demonstrate to any detractors

## WHAT IS LIDAR?

Light detection and ranging (Lidar) is a remote sensing technology which uses the light from a laser to collect measurements. These are used to create highly detailed 3D images of objects and maps that are more accurate and revealing than satellite scans.

that I successfully manage 24,400t of carbon on my own farm," says John. "I can face farming's critics and ask, 'can you do that?' I can also say, 'you need me in the push towards net zero'.

"Farmers are down and confused about managing carbon and how to reach net zero. But there is a way forward, so it is time to lift our heads, get on the front foot and prove to the public and governments that we can deliver net zero," he insists.

## ARC Zero phase one

Ahead of the project start date in 2021 John recruited six other farmers across a range of farming types (See "ARC Zero farmers", above). "We set out to amass the highest degree of quality data so that nobody could question our credibility," he says.

The target was to work out a figure for greenhouse gas (GHG) emissions set against carbon sequestration, to get a net farming position. The first stage after recruitment was to establish a baseline for carbon stocks.

This was achieved by:

- Auditing emissions from the farms
- Detailed soil sampling and analysis
- Using detailed aerial scanning via Lidar (see "What is Lidar?", left).

## Auditing

Auditing began in April 2021 using SAC's Agre-Calc tool. The process was comprehensive and exhaustive, with data captured on stock numbers, ages, animal production performance, >



< feed use, and buying and selling. Also factored in were fuel and fertiliser use, including applications, utilisation of animal manures, fodder conservation and electricity consumption.

**Soil analysis**

Farms were divided into 2ha blocks, including woodland, with each site recorded on GPS. Core samples were taken at 25 points in each block, to a depth of 7.5cm in grassland and 15cm in arable fields. Samples were then analysed for:

- pH
- Phosphate
- Potassium
- Calcium
- Magnesium
- Soil organic matter.

Further soil sampling took place at greater depths, cross-referenced to previous management of those fields to measure carbon stocks.

The project used Agricarbon, a dedicated soil sampling company that operates across the UK, EU and parts of North America. It was introduced to take deeper soil samples at levels to 1m, or as far as the rock below would allow. The analysis accurately measured soil carbon percentage and fine bulk density at 0-15cm, 15-30cm, 30-60cm and 60-100cm to give totals of carbon that would otherwise have been unaccounted for.

Agricarbon’s involvement also lent greater robustness to the process because of its recognised laboratory analysis procedure.

**Above-ground carbon**

Above-ground carbon levels were also measured in trees and hedgerows. This was carried out by

BlueSky International using aircraft-mounted Lidar to form a 3D image from 40 scans a metre. The scans build up a precise 3D picture of trees, hedgerows, pasture and cropping which would otherwise be impossible as satellites cannot deliver this resolution. Carbon levels were then calculated by Agrifood and Biosciences Unit Northern Ireland (AFBI) via a system initially trialled by Teagasc and ratified by Ireland’s Environmental Protection agency. Across the seven farms the results revealed a carbon store of more than 515,000t, in soil and above ground.

“This is a huge stock. Once we knew forensically, for the first time, the extent of what we were holding, we could manage it to keep it locked up or add to it, for the repeat measurement in five years’ time,” says John.

Significantly, results revealed that two farms were already capturing more carbon than they were emitting – so were beyond net zero.

**ARC Zero phase two**

With the precise carbon stocks and emissions identified, the project entered a second phase to improve via:

- Practical steps to cut GHG emissions
- Increased carbon capture
- Re-auditing the farms’ emissions after two years in April 2023.

A range of management tools and changes were assessed to drive production efficiency, cut high-carbon inputs and lock up more carbon. Carbon stocks will be measured again in five years’ time.

Lidar scanning proved to be hugely beneficial beyond delivering an accurate measurement of the carbon stored above ground. Scanning results provided detailed images of field features and contours, says John. The data highlighted areas that were prone to saturation, run-off, soil erosion and, therefore, nutrient loss and impact on water quality.

**MANAGEMENT CHANGES**

- Better genetics
- Improved animal health
- Using multispecies swards and legumes
- Better rotations
- Silvopasture (grazing woodland)
- Strategic tree planting
- Better management and creation of hedgerows
- Renewable energy use

CARBON STOCKS ON ARC ZERO PROJECT FARMS 2021		
Farmer	Soil carbon (tonnes CO2e)	Above-ground carbon (tonnes CO2e)
Ian McClelland	31,813	1,310
Hugh Harbison	68,054	1,969
John Egerton	31,813	1,310
Roger and Hilary Bell	50,819	688
Simon Best	237,915	6,493
Patrick Casement	54,556	4,022
John Gilliland	19,468	4,937
<b>Total</b>	<b>494,438</b>	<b>20,729</b>
<b>Combined total</b>	<b>515,167</b>	

EMISSIONS ON ARC ZERO PROJECT FARMS 2021				
Farmer	Gross emissions (tonnes CO2e/yr)	Gross sequestration (tonnes CO2e/yr)	Net emissions (tonnes CO2e/yr)	Reduction
Ian McClelland	1,101	309	792	28%
Hugh Harbison	2,009	549	1,459	27%
John Egerton	1,475	444	1,031	30%
Roger and Hilary Bell	754	456	298	60%
Simon Best	1,799	738	1,061	41%
Patrick Casement	492	548	-56	111%
John Gilliland	151	156	-4	103





John Gilliland explains that net zero is achievable on UK farms



Run-off and erosion risk areas were clearly identified by Lidar mapping

**CASE STUDY: SIMON BEST**

Armagh-based arable and beef producer Simon Best farms 450ha of cereals and 40ha of grassland for a herd of pedigree Aberdeen Angus cattle.

A Leaf farmer and long-time stewardship scheme participant, Simon was already used to environmental audits, so joining ARC Zero was a logical step. “We wanted to have a verifiable baseline that would help guide and secure the farm for the future, and the project was hugely helpful in providing this information,” he says. “Our farm made up half the total project area and soil sampling showed our carbon stocks – at 250,000t of carbon dioxide in soil, hedges and trees – were an equivalent 50% of the overall total.”

AgreCalc then provided emissions data at a detailed level. Some calculators use models that have a global measure for a cow’s emissions; more accurate ones provide a national or regional figure, explains Simon. “But the data we got showed up differences between one of our animals and the next. This detail, combined with Lidar analysis and nutrient data, gave us management information that we could really use to guide decisions on the unit.”

The farm recorded a 53% reduction in carbon emissions. However, Simon stresses that the project covered an exceptional weather period. The dry weather in 2022 meant grain came in at 15% moisture compared with 19% at the start of the trial. It meant the dryer was running at a fraction of its normal use and fuel costs were cut dramatically. “This obviously influenced our emissions figures. But having the detailed comparison showed just how much of a contribution fossil fuel makes, and this is extremely useful data,” he says. As a result Simon is looking at renewable energy to power the dryer, or a switch to floor drying to cut emissions.

The exceptional growing year also led to

good yields from much-reduced fertiliser use. This cut nitrous oxide emissions and again an outside event influenced project results. However, it suggested major benefits could be achieved without compromising yields if fertiliser use was refined.

Other changes introduced were straw incorporation to increase organic matter and hence improve soil structure and its capacity to store carbon. This was combined with some reduced cultivations, also in a bid to improve soil structure and encourage worm populations. “We took out the plough but going zero-till is difficult here because of the geography,” Simon points out.

The Lidar mapping was of real value when overlaid with the nutrient analysis from the soil sampling. Run-off maps were a real eye opener, showing hydrologically sensitive areas which will not receive slurry, he says. The farm is in the NI Small Woodland Grant scheme and has planted trees in some of the sensitive areas to intercept run-off. This will help build up carbon stocks.



**Tree planting/buffer strips**

Erosion and nutrient concentration maps were important in knowing where to site buffer strips. As well as reducing water pollution, buffer strips can be sited in such a way that they slow or channel flows. This reduces nutrient losses, maintaining productivity. One of the group achieved this by planting woodland as a riparian strip beside a watercourse.

Another of the seven farms used the Lidar data to switch an erosion-prone zone from production to strategic tree planting to slow down the run-off and mop up surplus phosphate.

The trees also sequester significant quantities of carbon as they grow, enhance biodiversity and help support production performance by providing shelter for livestock, John says.

**Multispecies swards and pH**

Other farms planted deep-rooting herbs and

nitrogen-fixing legumes. This negated the need for artificial fertiliser on these high-risk areas, avoiding losses and reducing nitrous oxide emissions.

Farmers also opted to stitch in clover to cut artificial nitrogen applications. Another practice widely taken up across pasture was the use of multispecies swards including deep-rooting herbs such as chicory and leguminous red clover. The deeper rooting swards, some reaching depths of 60cm, benefited soil structure, further improving drainage and carbon storage capabilities.

To make land more suitable for legume growing, particularly red clover, a number of the farms introduced liming to raise pH towards 6.5. This brought multiple benefits. Managing pH had the additional effect of chemically unlocking soil nutrients that could then be taken up by swards or crops, limiting the need for further artificial

fertiliser applications. Earthworm populations are also better able to thrive in a more balanced pH, so improving soil structure.

However, the use of multispecies swards meant making adjustments to grazing patterns. Multispecies swards need more time to recover from trampling, so longer intervals were introduced along with shorter grazing periods to ensure production was maintained. Production efficiency is hugely important in reducing carbon outputs per kilogram of meat or litre of milk. “The more efficient, the lower the emissions per unit,” says John.

**Genetics**

To improve efficiency, two of the farms on the project began the move away from bigger cows, which need higher levels of maintenance feeding than a lighter framed animal. The long-term switch should eventually lead to smaller feed

**PROJECT SUPPORT**

More than half of the funding was put up by the farmers themselves, with the remainder provided by the EIP programme of the European Agricultural Fund for Rural Development and the NI Department of Agriculture, Environment and Rural Affairs. Partners also included AgriSearch, Devenish, Birnie Consultancy and Queen's University Belfast.

< requirements for the same milk production, which is important because bought-in protein is one of the largest contributors to emissions for livestock and dairy businesses. Research by Scotland's Rural College suggests that this change could reduce emissions by about 15% without yield loss.

Reductions in cow size are being achieved by switching to smaller breeds or breeding replacements with a smaller sire. Genetic improvements are also under way across the livestock units to reduce finishing times, lowering carbon emissions for each kilogram of meat produced.

To ensure production targets were met, animal health management was put under a tighter focus. Disease can rapidly cut growth rates, throw out breeding targets, extend finishing times, depress milk yields or, worse, lead to mortality. All incur heavy penalties with lost production efficiency.

**Willow feeding**

Further efforts to cut methane emissions from cattle were made in grazing coppiced willow on John Gilliland's unit. Evidence suggests that willow leaves improve gut function, limiting methane output by up to 28% per kilogram of liveweight gain.

**Hedgerows**

Aside from the production changes, several farms adopted new hedgerow management regimes to sequester more carbon. When allowed to grow taller and wider, hedges can absorb and hold more above-ground carbon. Flourishing hedges then promote growth of already extensive root structures.

These can improve soil health, locking up carbon deposits below ground. New regimes followed advice which points to cutting at two- to three-year intervals, with reprofiling carried out only after 10-15 years.

Lidar information was a benefit in the new

**CASE STUDY: HUGH HARBISON**

Hugh Harbison runs a 180-head autumn calving dairy herd about 10 miles from the north coast of Northern Ireland in Coleraine. The herd calves within a 12-week window to maximise milk from grass and wholecrop silage.

Soils range from loamy to black with a high organic matter, and the farm's high rainfall makes poaching a problem and silage-making difficult.

Hugh says he was fed up with media rhetoric about farmers ruining the planet while he knew that his farm's extensive hedgerows, trees and species-rich grassland must be reducing its carbon footprint.

Like others on the project, he says the Lidar mapping was a gamechanger. "It showed us that across the 120ha farm we have 18.5km of hedgerows – and that was a shock, to realise how extensive an area they covered. It also showed us exactly where the run-off areas were highest and this was hugely valuable when combined with the deep-core analysis and nutrient mapping," he says.

Together with results showing fields were clover-poor, the data was used as a basis to switch to multispecies, nitrogen-fixing swards that included deep-rooting red chicory. This allowed fertiliser applications to be cut by one third overall, and the highest run-off risk areas received no artificial nitrogen applications at all.

Where dirty water and slurry are applied this is now carried out with a trailing shoe to limit emissions. Protected urea is also used rather than ammonium nitrate to further limit nitrous oxide emissions.

The carbon footprint calculations highlighted an issue with cow size, too. "Cow size has a direct correlation with emissions, so we have begun reducing



weights from the current 650kg towards 550-600kg," says Hugh. The aim is to maintain performance from lighter cows which have lower emissions and require less feeding. "There is a strong link between a farm's production performance and its carbon footprint," he says. "If the performance is good then the carbon will be good."

But a stroke of bad luck during the trial showed just how performance can be hit by an animal health issue. In 2022 the herd suffered an outbreak of dysentery introduced by a flock of starlings.

Milk output was reduced by 10% and the drop in performance showed up in the carbon footprint. Cuts in emissions were 4% between the 2021 and 2023 measuring points, when the changes put in place should have registered a far higher reduction. "It was hugely disappointing but clearly demonstrated the importance of animal health and its impact on the farm's carbon footprint, which we have taken as a learning point," Hugh says.

**Results**

The two farms that were beyond net zero were not reassessed in the second phase. The remaining five farms all made significant reductions in their carbon emissions. On that basis most would be on track to easily meet NI net zero timescales.

**Next steps**

John says the project can now precisely and robustly measure what these management actions are achieving. Initial funding from the Department of Agriculture, Environment and Rural Affairs has come to an end, but further studies have been backed by the Co-op Foundation. The hunt is on for further financial backing. "Ultimately, we would like to extend these practices so that hundreds or thousands of farmers across the UK can stand up when detractors tackle us and point to their own results with undisputable confidence," John concludes. ■

**CHANGE IN EMISSIONS 2021-23 (CO<sub>2</sub>e/kg of product)**

Farmer	2021	2023	Reduction
Ian McClelland	1.3	1.1	13%
Hugh Harbison	1.25	1.2	4%
John Egerton	32.8	25.6	22%
Roger and Hilary Bell	22	15.7	28%
Simon Best	0.99	0.47	53%

PHOTOGRAPHY: CM TEMES/ADOBE STOCK; FABIANO/ADOBE STOCK; DALE FARMS/MORROW COMMUNICATIONS; AFBI; STEFFAN HILL



# Chris' Story: A wildlife corridor to support farm biodiversity

A Scottish farmer with a passion for nature creates a 100 acre "wildlife corridor" by transforming his land, with new, native broadleaf trees. Preserving farm biodiversity was core to Chris' project goals.



John Bridges / WTML



Adam Burton / WTML

Chris Addison-Scott recently received subsidised trees through the Woodland Trust's MOREwoods scheme to support the transformation of a parcel of arable land on his Fife estate. Funded by Lloyds Bank, the scheme has already helped over 3,000 landowners with their planting projects.

When speaking about balancing the needs of a productive farming business with his nature-based goals, Chris explained the minimal impact the planting scheme has had on the productive farm land. Clever woodland design means his 1,000 new trees will have a significant impact for nature without taking up too much space; "Several years ago we had sown an area of canary grass and it so happened that this area connected a large piece of woodland on a couple of neighbouring estates. By planting more trees it has created a perfect wildlife corridor, linking perhaps over 100 acres of diversified cover."

Wildlife corridors are important as they bridge the gap between habitats which otherwise would be small and isolated and join them together. Linking core wildlife habitats helps to restore and preserve biodiversity, allowing movement between important habitats to maintain genetic diversity in wildlife populations.

Emma Briggs, who manages the Woodland Trust's MOREwoods scheme, said: "It's inspiring to see what Chris has done on his

farm. These trees will be essential for so many reasons – not least for boosting biodiversity and combating climate change. Our MOREwoods scheme is an easy, effective and low cost way for landowners to bring more nature to their land."

Chris' family has been farming on the Kinloss Estate for generations - since his great-grandfather bought the farm in 1887. In those days it was mainly down to grass but his father started to grow arable crops on the farm in the mid 1960s, something that Chris has continued. The business has now evolved into a mixed farm growing cereals and broccoli, with additional parcels of land let out land for grazing.

Most of the farm is now tended by contractors as opposed to direct employees, as Chris' day-job as a Land Agent for Galbraith takes up much of his time. However, he and his wife Margo, have also diversified into other ventures, letting out holiday cottages on the site. The farm is blessed with wildlife features as the couple had already created water habitats and hedgerows. There is a burn – or stream – which runs through the farm and an old mill pond which they restored in the 1990s. The Addison-Scott's have continued their passion for championing the countryside by hosting the Fife Show, which they began around 15 years ago. The event connects locals, attracting about 10,000 visitors on show day in May, as well as showcasing their land.

Chris has placed strong importance on ensuring a high survival rate of his new trees.

To protect the saplings from predators, tree guards have been incorporated into the scheme, but Chris has gone one step further to protect his new crop, adding; "We're able to inspect the site at least once a fortnight to carry out any repairs to the tubes. So far after one growing season the new trees are doing really well, with perhaps less than 5 per cent losses." Chris first heard about MOREwoods through his bank Relationship Manager. Liking the low levels of bureaucracy often associated with other woodland schemes, he decided to pursue a project; "It really has worked for us, and I would definitely recommend it as a way to increase nature on your land."

The MOREwoods scheme is open to anyone looking to plant at least 500 trees on at least half a hectare. The Woodland Trust can offer expert guidance tailored to each scheme from local woodland creation advisors, arrange delivery and tree protection – and cover up to 75% of costs.

   
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# Changing the way you manage compliance, traceability and performance records on farm



- Proagrica's Farmplan product strategy sees existing desktop solution, Gatekeeper, evolve into Gatekeeper Cloud with significant investment confirmed
- Gatekeeper Cloud is now available, offering an easy to use online crop recording system designed for compliance, traceability and crop input record keeping
- Standardised product information in Gatekeeper Cloud reduces input errors and enables improved integrated workflows

In recent years, the demand for data visibility, traceability and compliance vs performance has increased across the farming sector. For over 15 years, Farmplan Gatekeeper has played a vital role in bringing together farmers and growers with their agronomist and advisors through a single hub for all crop, stock and field records. On top of the essential compliance and traceability record management, it offers comprehensive record keeping, analysis and performance management tools from one place. The time has now come to look to the future, and Proagrica's Farmplan Gatekeeper solution is now set for a significant investment to develop into the cloud space.

"This marks an exciting evolution in farm management software for growers and agronomists alike with the cloud-based software being better suited to current and future market needs," says Piers Costley, VP Operations and Director of Farmplan.

"With new technologies and legislation continually evolving in the agricultural sector, supporting growers with software solutions has been key to this investment. Gatekeeper Cloud benefits from a clean and simple interface and is designed to save time and improve workflow efficiency in crop management activities, less clicks to get the job done."

Nearly 50% of existing users of Gatekeeper

called for improved traceability and compliance management tools alongside easier job recording. Feedback from a recent customer survey included "Gatekeeper provides good comprehensive data when entered into the system regularly, helping to keep on top of every day budgeting and record keeping, especially for Red Tractor compliance", and "Gatekeeper reports are particularly useful when we are completing our compliance paperwork."

Data standardisation is a key focus for the sector right now, with emphasis on enabling compatibility and seamless workflows between systems. Gatekeeper Cloud draws on a unique global product database, CDMS, which is the driving force behind standardised product pick lists in the system. Piers adds, "With a standardised, current and verified product pick lists in the system, users can spend less time manually adding information and avoid costly data errors, it also means there's more opportunity to align recommendations and data between systems again avoiding error and making workflows much simpler to manage."

Gatekeeper Cloud will be equipped to offer users an ability to choose who they share their data with and collaboration opportunities currently not available in other solutions. Data permissioning through integrated API links1

will enable users to quickly and efficiently share their data as they choose, saving time and errors which currently exist through exporting or manual input.

Being able to connect with your agronomist is essential for most farmers and growers, with Gatekeeper Cloud that movement of information, recommendations and workplans can be done in just a few clicks. With accurate information more readily available, whether it be in the office or out in the field, you will have the power to make informed business decisions that drive productivity and profitability.

To enquire about Gatekeeper Cloud, please get in touch today to book a demo by telephone on **01594 54500**, or by email [farmplansales@proagrica.com](mailto:farmplansales@proagrica.com)







# How optimising inputs can help meet SFI targets

Plans are afoot to transform the system at Raby Farms. **Louise Impey** reports

**T**he drive to reduce the use of artificial inputs is under way at Raby Farms in County Durham, with the business recognising the economic and environmental benefits of being less reliant on them.

This means fertiliser and pesticide use is under intense scrutiny, with on-farm trials conducted to see where they can be reduced or eliminated, without too much detriment to output or margin.

While input plans have to retain some fluidity according to seasonal factors, the direction of travel is clear and the whole farm team is intent on making improvements, says farm manager and Transition Farmer Philip Vickers. “We want to be as sustainable as possible,” he says. “That’s in line with the ethos of the whole estate, as well as being essential for our future.”

With this in mind, biological alternatives to agrochemicals are being put through their paces to see what they have to offer. Livestock is also playing a role, with sheep used to graze winter cereals and oilseed rape.

Philip is making brave decisions when it comes to the use of direct drilling too, most of which have rewarded him by preventing moisture loss, reducing fuel use and saving on labour – even if they have given him some sleepless nights. “We’ve still got a way to go, but we have learned that timeliness matters,” he says. In addition, nitrogen trials are being carried out in winter wheat, with the aim to optimise nutrition and minimise cost, while keeping crops healthy.

“We know that disease is linked to nitrogen use, as is lodging – which has been an issue for many this year. So by getting a better handle

on nutrition, we should be able to cut back on our use of fungicides and PGRs [plant growth regulators].”

## Grazing oilseed rape

Grazing has reduced the pest and disease threat in most circumstances by removing the parts of the crop that are harbouring pests or carrying disease, although it has to be managed closely to prevent poaching and crop loss.

Initially used as an emergency tool, the sheep proved their worth and helped to revitalise oilseed rape crops that had almost been written off last autumn, says Philip. “If you over-graze, it’s all over,” he cautions. “So you have to monitor the fields closely and pull them off at the right time.”

As a result of quick action and careful management, just 4% of the original area of the farm’s hybrid oilseed rape was lost in autumn 2022, following a flea beetle infestation. This year, the unfolding situation is challenging, with a higher percentage of the crop area struggling after pest damage. In 2022, the crop was not drilled at a rate of 55-60 seeds/sq m and established with a companion crop of berseem clover, so there had been some initial expenditure. “Fortunately, the crop was back in the rows by

late December. Due to its shaky start, we spent very little from then on – the crop received some early nitrogen and trace elements, followed by one fungicide.”

At harvest, the grazed crop yielded slightly less than the farm average of 4.1t/ha, coming in at 3.8t/ha. “Our income was £100/ha less from it, but it did feed the sheep for a while and it wasn’t being grown on our best land. Considering we were looking at a crop loss, it wasn’t a bad result at all.”

Total nitrogen use on oilseed rape was 170-190kg/ha last year, he adds, whereas historically it had been more than 200kg/ha.



Philip Vickers

## Nutrient management

“Our nitrogen plan is a work in progress,” notes Philip. “We cut back considerably on nitrogen in the previous year and our yields increased. We lifted the rate slightly in 2023, after a wetter winter, but we are also making better use of organic manures and using precision application.”

Nutrient management actions are included in the Sustainable Farming Incentive (SFI) 2023, he acknowledges, which shows the farm is on the right track with making more efficient use of nutrients. The fact SFI 2023 could also reward the business for actions such as not using insecticides and establishing a





When not grazing pasture, sheep are turned on to winter wheat, encouraging tilling and boosting yields

< companion crop is relevant, he admits, but the decision to move to a more regenerative approach had already been taken by estate owner Lord Barnard before Defra’s plans were announced.

This has seen a move to direct drilling and the introduction of a diverse rotation, consisting of both winter and spring crops, along with the strategic placement of cover crops. “We direct-drilled about 90% of the farm in autumn 2022, but the wetter soil conditions this year will see that figure decrease for autumn 2023,” reveals Philip. “I can’t see the plough ever disappearing completely, and this year has highlighted why, but we have still managed to establish a considerable area by direct drilling.

“Land that had to be ploughed due to ruts left by the combine ploughed very well after two years of direct drilling. The healthier and more resilient soils that are being created by our regenerative approach give us wider windows for getting field work done.”

### Winter wheat learnings

Nitrogen trials have been conducted in winter wheat, with three different regimes being compared to the farm standard of applying 177kg/ha. Foliar urea applications – following a base appli-

cation of 50kg of urea-ammonium nitrate – were done to see what level of yield was possible, with humates added to the three 10kg applications, each with 150 litres of water.

Early indications suggest that the highest yields were achieved with the farm standard, but the foliar urea programme did not appear to be far behind and may give a better margin. The final analysis was still being prepared as *Transition* went to press.

Sheep were also used to graze winter wheat crops in January, removing as much as half of the canopy. Just three-and-a-half weeks later, there was a bigger canopy, but there was also more disease – in the form of mildew and rust – on the new growth.

Yields rose by 0.85t/ha where grazing took place, probably as a result of increased tillering, he reports, and septoria levels looked slightly lower to Philip, with the trials company noting a minor decrease. “We look for wheat varieties with a septoria rating of 6 or above, to make the most of genetic resistance,” he says. “We are also growing blends of four varieties, to see how they perform, on a couple of fields.”

A yellow rust problem in the Group 4 feed variety Gleam wasn’t seen when the variety was included in a four-way blend with Graham, The-

### SFI 2023 APPLICATION

An application for a bigger, more ambitious Mid Tier Countryside Stewardship scheme was submitted by Raby Farms ahead of the original August deadline, with the hope of starting it in January 2024. This will give the business a known level of income for the next five years and ensure that environment and biodiversity targets are met.

Having submitted it, Philip Vicker’s next task is to take a much closer look at SFI 2023 and consider how it can be integrated with existing schemes on the farm, as well as with current cropping. “At first glance, it seems as though we are already doing some of the actions,” he says. “If that translates into additional income without compromising what we’re already doing, then we will be pushing ahead with it.”

odore and Extase. “We’re trying not to change everything at once and move too quickly,” he continues. “But changing the way that a crop is grown and making better use of diversity should help us to reduce inputs further.”

Trials using biological products, such as sulphur and a seaweed-based elicitor, have demonstrated their potential, but further work is required across different seasons. “In 2022, which was a dry year with low disease pressure, we saw encouraging results from incorporating some of these products into our disease control programme,” reports Philip. “There’s potential for them to have a place and reduce our use of fungicides, but we still need to learn more about them.”

The harvest 2023 results are still being analysed. “We were later to harvest it this year and there were some striking visual differences, so it will be interesting to see if they had the same effect.” ■

● Follow Philip Vickers and our other Transition Farmers as they adapt their business for the new environmental schemes. Find out more on p5



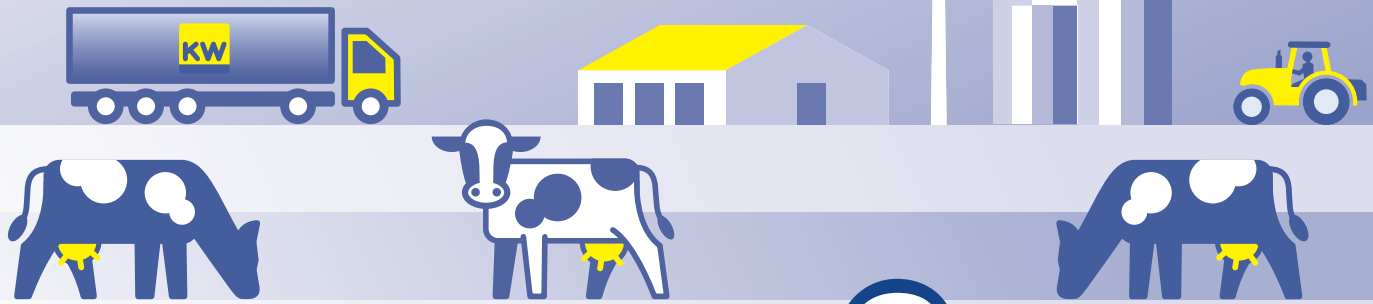
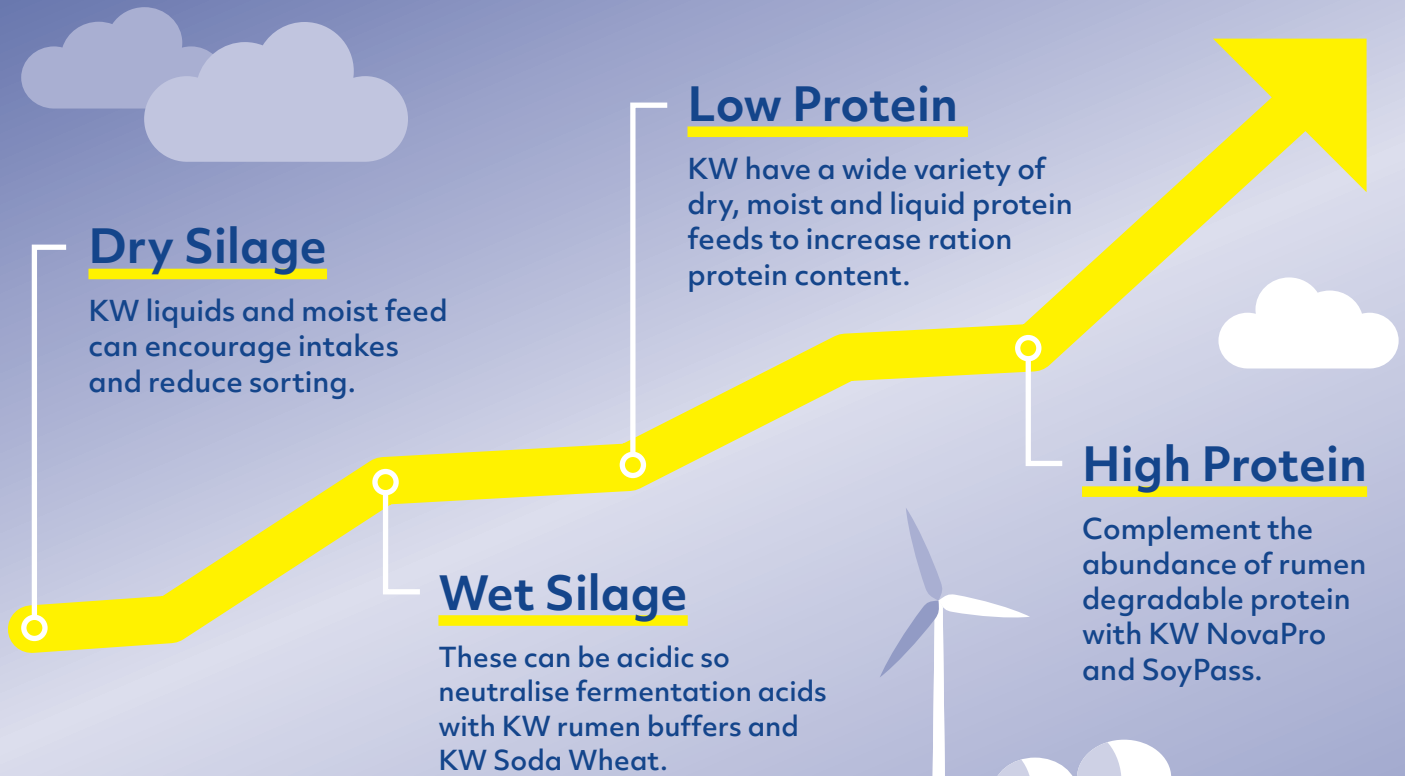
Bought-in fertiliser, fuel and labour inputs have been put under intense scrutiny





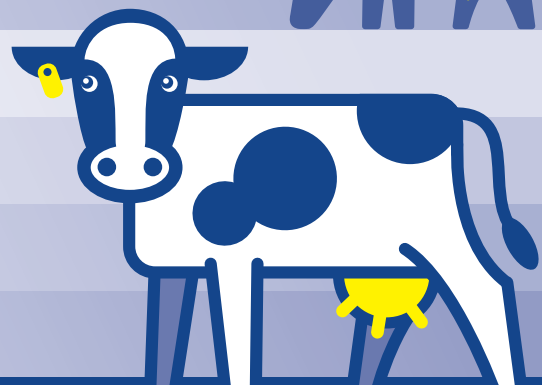
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# Renewable energy systems: Which is right for your farm?

Volatile input prices, decreasing capital costs and environmental benefits add up to a strong case for investing in renewables. But it can be hard to know where to start. **Jonathan Riley** takes an in-depth look at the options

**T**he case for investing in on-farm renewable energy has arguably never been stronger. Fuel prices have soared in the past 18 months, driven by the effect of the conflict in Ukraine, adding to an already difficult economic climate after the Covid pandemic.

Although fuel costs have dropped below record levels they remain high and are creeping up again, squeezing farm business margins. Pressure to hit environmental targets is growing as political and consumer influences demand action in a bid to avert climate change. At the same time, advances in the renewables sector mean the capital cost for hardware, such as solar panels and heat pumps, is lower, in relative terms, than it was when the technology was in its infancy.

These factors make investing in on-farm renewable energy systems feasible even without

government incentives, says Dr Jonathan Scurlock, NFU chief adviser, renewable energy and climate change. Some renewable energy systems could generate 75% of a farm's needs, isolating it from volatile fuel markets, Jonathan suggests.

Environmental, social and governance (ESG) standards, which measure a business's effect on society and the environment, are also a developing challenge. Renewables could help a business with its ESG targets and commitments. In addition, the government and industry champions such as the NFU have ambitions to counterbalance greenhouse gas emissions from farming.

Producers want to do their bit because they can see that agriculture is exposed to increasingly frequent periods of extreme weather, Jonathan says. They can see there is clearly a need to adapt and continue the move from reliance on

oil, diesel or LPG-powered machinery towards renewable energy for electrification.

But which source is best suited for your farm and what are the practical, legal and political challenges that might crop up?

## Pros, cons and advice for different renewable energy types

With all renewable energy types, you need to establish the capacity required. There is no such thing as a typical farm, so take advice and work out the capacity needed to cover peak and residual demand, Jonathan advises.

In the past, government incentives made for a lucrative income, so producing surplus energy was a target. But now, exporting is less valuable than the potential savings to be made with imported electricity at 25-35p/kWh, so matching demand and supply is critical.





## Solar

Photovoltaic (PV) panels are the most common form of renewable power source on farms, converting sunlight into electrical energy. They are simple with no moving parts, so require minimal upkeep. But it's not a case of fit and forget with PV panels – they are not maintenance free, Jonathan warns. An annual service is advisable and the effectiveness of the panels can be limited by dust or corrosive fallout from ventilation outlets on livestock buildings.

When working efficiently they could cut up to 75% from an energy bill. In most cases, panels are roof-mounted but where this is not possible a ground-mounted array could be set up on spare land. For roof-mounted panels generating less than 1MW of power, full planning permission is not necessary in England. Instead, an installation is covered by permitted development rights (PDRs). Even so, it is advisable to consult local authorities before going ahead. In Scotland a much tighter ceiling of 50kW is applied to PDR ventures. This is under review with a consultation completed in August and a response from the Scottish government awaited. For ground-mounted arrays, it is necessary to have full planning permission agreed before going ahead.

An interesting development in England is a current government consultation on the siting of solar canopies. These could be constructed over hard standing vehicle parking which is particularly useful for charging points for electric vehicles, for example, Jonathan points out.

## Considerations

Even a modest PV installation may be constrained by approvals from the power distribution network. Operators do not want overloads that can shut down a network or see frequency variations associated with solar- or wind-powered setups. An engineer will, therefore, scrutinise the project and decide whether it could trigger "faults" in the local grid. To overcome this likelihood power diverters can be fitted to limit exported electricity. For example, power can be diverted to an ice builder or other equipment with a switchable high demand. Alternatively a gate, known as a reverse power relay, can be installed to block the surplus energy from moving into the network.

NFU energy consultant Thomas Ovenden says battery banks are often associated with solar PV installations to store surplus power and mete out energy in periods when generation dips below demand. For example, a dairy farm may have a high demand early in the morning before solar generation kicks in. But battery systems are expensive and it may be better to store excess energy as hot water or an ice bank.



## TRANSITION FARMER: EDDIE ANDREW

Transition Farmer Eddie Andrew has embraced renewable energy systems with solar panels already in place and plans to install an anaerobic digester under way. Photovoltaic panels sited on the Sheffield farm dairy roof provide 15kW of energy to power the refrigeration unit and most of the dairy's needs. A 3kW panel on the farm cottage is used to charge a Mitsubishi Ecodan air-source heat pump supplying the house with hot water.

However, Eddie's belief is that an anaerobic digester (AD) plant is the way forward for the farm. "Although the panels are easy to use and require little maintenance, they don't provide the constant level of power we need 24/7," he says. "And with robot milkers being installed as part of a new building development, that demand for constant power will increase. That's one of the reasons we are progressing with plans to install a slurry-fed AD plant to meet the power need from the new building while supplying the farmhouse and cottage."

The plant will also reduce methane emissions, help isolate the business from the fluctuating prices of bought-in energy and produce a valuable fertiliser in the form of digestate. The chosen system is a slurry-to-electric unit supplied by Bioelectric.

Slurry passes into a manure pit to an automated system that pumps a fixed quantity of slurry into the reactor where biogas is formed. The gas is drawn off and purified to supply a generator that creates electrical power and hot water. Digestate

is pumped out into external storage tanks.

Eddie has also looked at two other systems for the future, including Bennamann and Nomad units, which recover methane from slurry lagoons. The lagoon is covered and, as methane is produced, the cover inflates to store gas. The methane is cleaned and siphoned off under pressure and can be used as biogas or converted into biomethane to power vehicles.

● Follow Eddie Andrew and our other Transition Farmers as they adapt their business for the new environmental schemes. Find out more on p41



## Wind

The options for wind energy on farms are more limited than solar. While almost one-third of farms have solar panels, and the number is increasing, just 5% have wind power and that figure has been almost static since 2015, says Jonathan.

The stagnation began when planning restrictions were tightened early in the Conservatives' administration under David Cameron. There was parliamentary opposition to the visual impact of turbines which, by necessity, must be sited on exposed land to exploit wind flow, he says.

This is a big and almost insurmountable barrier because the tighter rules apply equally to smaller, single wind turbines as well as large farms.

In practical terms the PDR limit, before full planning permission is required, is hopelessly too small at present. The maximum permitted size is a single 10m tower with a 2m-diameter rotor. This will

only produce 1-2kW of power, possibly enough for a house, but not a farm business. A turbine large enough for a farm business would need to be about 25m tall to produce about 30-40kW. Currently, that would require planning permission which is difficult to obtain, Jonathan says. A wind project will need local community support. It must also fit in with a local authority plan or it will be rejected by the planning committee.

## Considerations

The growing expectation is that an incoming government may look again at the situation which has all but shut down Britain's small wind power industry. The UK has relatively high average wind speeds and many small businesses and communities could benefit particularly in the winter when solar is less effective. A campaign is building to get height restrictions under PDRs raised. The premise is that mobile phone masts are permitted up to 30m, outside areas of outstanding natural beauty and National Parks and 25m within them, he adds.

Average wind speed is critical. Under 5m/sec is insufficient, Thomas explains. However, many sites are in excess of 6m/sec or even 8m/sec and large areas of the UK are suitable. The contradic-

tion is an open, hilly landscape might not meet stringent planning controls. But positioning a turbine out of sight is likely to mean it is too sheltered to be effective.

**Biomass**

About 8% of UK farms use or supply biomass fuel in the form of tree trimmings, an energy crop, crop residues or by-products. Woodchip- or pellet-fed boilers are generally the most convenient option for on-site heating. These can be automated, self-feeding, adding further convenience. Uses typically include heating livestock sheds or farmhouses. For example, in poultry sheds a 100-200kW boiler can produce hot water to circulate, radiating heat and, less commonly, hot air, says Jonathan.

**Considerations**

Sizing a boiler appropriately is imperative. Too large, and the boiler will need high feed-source inputs to run at optimum temperatures; too small, and the output won't be sufficient, says Thomas. But depending on considerations a

biomass boiler can still make sense, whether it's as a replacement for an existing heating unit or to provide supplementary heat.

**Hydro**

This is a minority area for renewable energy because of the particular geography requirements and stringent permitting controls, Jonathan says.

Generally, on-farm hydropower units are classified as micro when they are below 100kW, and mini from 100kW to 1MW. Capacity is, to an extent, dictated by the geography, says Jonathan. The ideal is for a high-head system with up to a 30m water drop and good flows in both summer and winter. A low-head unit, suited to lower water drops, on a wider river or weir, may channel off water through a slow-rotating Archimedes screw before returning it downstream.

**Considerations**

The Environment Agency's requirements, which include a permit to abstract water upstream of the unit and another to return it down-



**RENEWABLE ENERGY, COSTS AND OUTPUTS**

	Solar	Battery (li-ion)	Wind	Hydro	Heat pumps		Anaerobic digester (AD)		Biomass
					Air-source	Ground-source	Micro AD	Large AD	
<b>Cost</b>	£1,000-£1,400/kW	4kWh: £3,500 7kWh: £4,300 9kWh: £5,200 14kWh: £6,000 Tesla 10kW: £10,000	5kW: £24,000 10kW: £45,000 10kW installed: £80,000 15kW: £70,000 45kW installed: £150,000 100kW: £400,000	Smaller not economically viable 25kW: £169,000 (£6,800/kW) 50kW: £300,000 (£6,000/kW) 100kW: £529,000 (£5,300/kW) 250kW: £963,000 (£3,800/kW) 500kW: £1.6M (£3,200/kW)	5kW: £7,000 10kW: £10,000 16kW: £15,000	4kW: £17,000 8kW: £24,000 8kW vertical: £49,000 13kW: £35,000	Micro AD – AD with combined heat and power (CHP) 0.5t/day system £150,000 2.5t/day system £350,000-£400,000	AD with CHP and gas to grid injection 250t/day £10m (AD plus gas to grid injection point, without carbon dioxide capture)	100kW: £50,000 200 kW £80,000
<b>Maintenance</b>	£200/year cleaning Replacement of inverter (15 years)	Minimal - possible annual service or clean	100kW: £9,000/year Exponentially higher at smaller scale	5kW: £2,200 25kW: £4,000 50kW: £6,300 100kW: £11,000 250kW: £25,000 500kW: £48,300	Average house: £1,200/year on electricity bill (assuming 4,000kWh and 30p/kWh) £150 service two to three years	Lower than air-source heat pump, as ground temperature is more stable than air temperature	AD plants require skilled operators to maximise efficiency	Large AD plants require skilled management and a high labour input to maximise efficiency	£1,000/year
<b>Lifespan</b>	25 years (inverter 15 years)	15 years	25 years	25 years as precaution, likely 50+ years	15-25 years	15-25 years	25 years	25 years	15-25 years
<b>Generation</b>	850-1,000 kWh/year per kW installed	n/a	5kW: 8,900kWh 10kW: 21,500kWh 15kW: 36,000kWh	5kW: 22MWh 25kW: 110MWh 50kW: 219MWh 100kW: 438MWh 250kW: 1,095MWh 500kW: 2,190MWh	300% efficiency Produces 3kW heat per 1kW electricity	300-400% efficiency Produces 3-4kW heat per 1kW electricity	Can be fitted with CHP for outputs of 24kW, 30kW, 40kW, 60kW	Typically fitted with CHP ranging from 250kW to 500kW	n/a
<b>Grants</b>	None	None	None	None	Boiler Upgrade Scheme £7,500 for ASH	Boiler Upgrade Scheme £6,000 for GSHP	None	None	Boiler Upgrade Scheme £5,000 for biomass

Source: NFU Energy



Biomass boilers using fuels such as woodchip (inset) can heat livestock sheds or farmhouses

relatively cool fluid in piping draws heat from the ground passing through a heat exchanger and into the pump to heat water. Similarly, air-source heat pumps extract heat from air flowing through the unit.

Typical applications are in protected horticulture or poultry or in housed livestock sheds. Some producers run sheds entirely on an all-electric system.

### Considerations

A potential downside is that the system relies on a constant electrical energy source to power the pump, says Jonathan. In remote areas where the grid supply may be interrupted, a backup diesel generator for the pump or fossil-fuel powered heating system may still be required.

Heat pumps can be installed under PDRs, but larger set-ups will need full planning permission.

Ground-source pumps take up large areas of land – about 700sq m.

This is needed to bury long runs of coils at depths of about 1m to draw sufficient heat from the earth around them.

Heat pumps are three times more efficient at producing energy than a gas-fired system. But because a unit of gas is cheaper than a unit of electricity, some of the economic benefit is lost in running the air or heat pump system, according to Thomas.

### Anaerobic digestion

There are significant opportunities for anaerobic digestion (AD) energy production, whether it is slurry-fed on livestock farms or a crop/food-waste system. By capturing and storing carbon dioxide from the slurry or feedstock, it is possible



Anaerobic digestion plants produce nutrient-rich digestate for on-farm use

to run a carbon-negative AD plant.

But while there is a long-term need to displace gas from fossil fuels with green gas, the government is not particularly supportive of AD. This has led to the category being dubbed the Cinderella of renewables, says Jonathan. There are benefits aside from efficient renewable energy creation, which include the yield of nutrient-rich digestate, carbon capture, food-grade carbon dioxide production and reduced diffuse pollution risks.

### Considerations

Even without government support larger plants may be viable, particularly when gas prices are high. And markets are emerging for food-grade carbon dioxide and carbon offsetting, through geological carbon capture and storage.

However, there is a world of difference between the big 1-5MW commercial units designed to exploit these markets and on-farm 50-200kW systems. The economics of a small-scale AD plant are difficult to stack up without government support, but they can operate efficiently on big dairy units to manage slurry handling. ■

stream, along with planning permission, can push up the time and cost of a hydro-energy unit, he warns.

Costs also vary hugely, but whichever system, it is likely to be bespoke to meet the nature of the water supply and the outlay can be high, adds Thomas. To ensure flows are maintained and regulated, extensive construction work may be needed to create channels, pipework, reservoirs and pen stocks.

### Heat pumps

Heat pumps work by extracting heat from the ground or air using temperature differentials. The

## TRANSITION FARMER: IRWEL JONES

Transition Farmer Irwel Jones set up a small hydropower system on his Welsh sheep and beef unit in 2015 to provide electricity for the farmhouse and buildings. The steep-sided hill farm has the ideal geography to power a high-head system from a narrow watercourse.

Water drops 115m down the hillside through a pipe just 120mm in diameter. For every 10m fall the water produces 1bar of pressure so, by the time it reaches the outlet, it has created 11.5bar sufficient to run a 7kW turbine. This creates roughly four times as much energy as the farm uses with the surplus sold to the grid under a contract agreed in 2015.

The government Feed-in-Tariffs (Fits) system, which was still operating in 2015, paid enough to make the venture viable, says Irwel. The 25-year agreement is based on a notional amount of electricity generation and pays out even during drier months when the waterflow is slower.

“Generally, we are overproducing for three months of the year, six months somewhere in between and three months with the turbine idling,” Irwel reckons.

To even out the supply and make better use of overproduction in the peak



months, Irwel is considering a battery bank installation. It would also store energy generated during power cuts, which occur at the farm from time to time, preventing the export of power to the grid.

The total initial outlay of £70,000 has almost been recovered, and return on investment is expected in 2024, thanks to the Fits contract. Maintenance is low with everything on the turbine automated. An annual service which includes cleaning the 115m pipe is required and costs about £200. A potential looming cost is the turbine itself which may need replacing after 10 years at a cost of about £4,000-£5,000. But Irwel warns permitting and planning took five years due to the Environment Agency's rigorous process.

● Follow Irwel Jones and our other Transition Farmers as they adapt their business for the new environmental schemes. Find out more on p5





# A switch to strip-till cuts costs and boosts soil health

Transition Partner Claydon Drill opened its doors to explain how strip-till had turned the company's fortunes around. **Jonathan Riley** reports

**A**t a *Farmers Weekly* Transition project farm walk in Suffolk, Claydon Drill demonstrated how low-disturbance systems can boost soil health and improve margins.

Visitors to Claydon's 360ha Gaines Hall arable farm and equipment manufacturing site, near Newmarket, heard that soil structure had improved dramatically since moving to low-tillage operations in the early 2000s.

But company founder Jeff Claydon explained that the move was originally down to plummeting wheat prices that had forced the farm to reduce costs. "We couldn't afford to plough, so created a subsoiler-type drill as a combination in 2003 then moved on to tine drills," Jeff told about 50 visiting farmers and Transition Partners.

Figures show that cultivation time with the Claydon setup was just 26min/ha, compared with minimum-till 42min/ha and 110min/ha for plough-based systems. Fuel use dropped from more than 70 litres/ha under the plough-based system to 16-18 litres/ha with the tine drills.

Establishment costs at the arable unit average about £60/ha compared with a more typical average of between £150/ha and £170/ha. Average yields run at 10t/ha-plus, well above the national average.

Export sales manager Simon Revell explained how structure and health of the heavy clay soil had been improved and why it underpinned the success. The tine drill only disturbs a strip of

soil ahead of the seed. This strip-tillage protects beneficial soil bacteria, algae, protozoa and fungi, which would otherwise be exposed to ultraviolet light by the plough and destroyed. These organisms hold nutrients that will fuel the growth of the following crop, reducing the need for inputs and cutting costs.

At Gaines Hall, soil organic matter is boosted by retaining crop straw, which is broken up and spread evenly across the surface with a straw harrow. The organic matter from the straw supports worm populations that process it and add nutrients. Along with root matter from the previous crops, this helps retain the nutrients and structure of the soil.

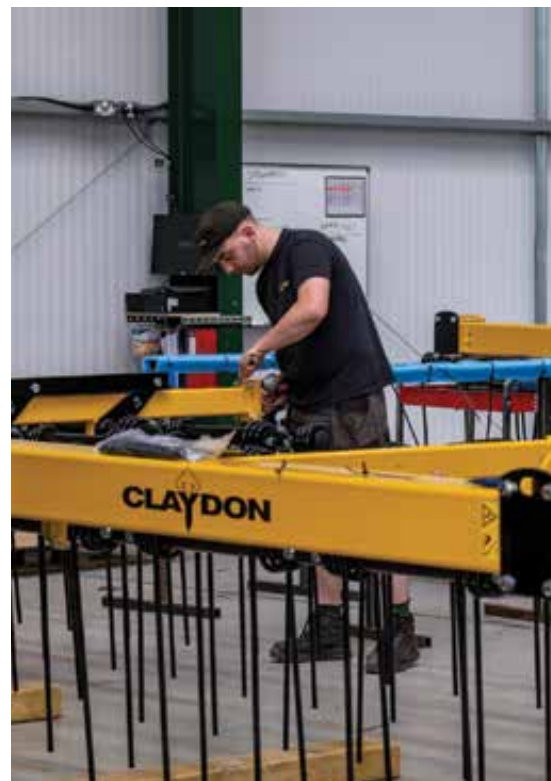
During the farm walk Simon dug a pit to show how the structure had benefited from the worm action. Worm channels, which provide air spaces for root growth, were clearly visible. The channels also aid water movement, promoting drainage and reducing run-off risk.

The Allerton Project policy director Dr Alastair Leake told visitors that min-till is economically and biologically beneficial. Alastair explained earthworms had flourished at the project's farm in Loddington, Leicestershire, increasing from 200/sq m to 700/sq m since moving away from ploughing in 1995.

The switch to min-till has seen an extraordinary transformation in heavy clay soil, according to Alastair. What used to be impassable after rain is OK to walk on in trainers two hours after

a downpour. The plough is only used where blackgrass is so bad we have had to start the process again, said Alastair.

The farm has also seen a 52min/ha saving in labour by switching from full cultivations. That equates to a man a month on a 300ha farm, he added. ■







Hutchinsons consultant Dick Neale explained how gypsum had been used to mobilise magnesium deposits locked up in the soil



TOP A finished Claydon drill working on the farm

ABOVE A tour of Claydon's manufacturing unit, which has grown to support a burgeoning export market

LEFT Export sales manager Simon Revell demonstrated the soil structure and health by highlighting worm activity

BELOW Company founder Jeff Claydon



LEFT The shop floor at Claydon

BELOW Rick Davies, of Newton Lodge Farms, told how his farm had taken on strip-till drilling and seen margins improve



**ABOUT THE FARM WALKS**

The Transition Farm Walks bring together farmers and other supply chain members to see how progress is being made towards a more sustainable farming future. For more details on the farm walks, see [fwi.co.uk/transition](http://fwi.co.uk/transition).



# Expert advice for making trees work on your farm

Tree planting at scale has been criticised for taking up productive farmland, but the expert panel at a recent Transition webinar offered a more positive view

Large-scale tree planting has come under fire for taking up productive farmland and altering the character of local environments. But the right tree, planted in the right place, can generate revenue, capture carbon and benefit biodiversity, according to an expert panel at a recent *Transition* webinar.

## Where to site trees

Every farm has marginal land where yields and profits are harder to eke out, such as frost pockets or boggy hollows. These could be suitable for tree planting without sacrificing large areas of productive land suggested farmer and Forestry Commission adviser Eddie Rixon.

Before planting it is also wise to consider any additional potential benefits that might influence prospective sites. Livestock farms could position trees to provide shelter or shade to help extend the grazing period and cut housing costs. Alternatively, woodland can provide a valuable public amenity or educational base to attract funding.

Where the landowner is planting trees as wild-

life habitats, positioning is vital. Assessing maps of the farm will allow strategic planting to join up other wildlife refuges such as existing woodland, scrub and hedgerows. This approach provides a better quality habitat for a wider range of wildlife, rural surveyor Peter Wilderspin added.

## Funding

Grants are available for tree planting under the England Woodland Creation Offer (Ewco) with similar schemes in the devolved regions, explained the Forestry Commission's Richard Pow. Payments, based on a national average figure, cover all of the capital items and activities involved in planting woodland. Beyond that, the scheme continues to make maintenance payments of £350/ha each year for 10 years to help establish the trees.

Other funding under Ewco includes payments towards installing infrastructure, such as maintenance tracks. Applications for multiple, additional funding on the same woodland will also be considered if it is sited where the public might benefit from access. It is also advisable to research local funding streams, Richard added. Although Ewco does not support agroforestry ventures such as tree strips across arable fields, some local authorities will offer grants for this activity.

## Carbon

About half the mass of a dried cubic metre of timber is composed of carbon, estimated Richard. There is a growing market for this carbon store as the government and other industry bodies push towards net-zero targets.

To meet targets businesses are required to offset their residual carbon output – the amount remaining after all other methods of reducing carbon impacts have been exhausted, Wanderlands' Tim Oliver explained. A net-zero carbon balance can then be achieved by the business

purchasing offsets from stored carbon like woodland for the residual amount, he said. To access the market, the first step – before planting – is to register with the Woodland Carbon Code (WCC). Failure to do so will mean the grower will not be able to access the regulated carbon markets. Acceptance onto the WCC register is based on the condition of additionality. The woodland proposal will be assessed according to the extra amount of carbon it will capture compared with the existing farming practice.

Carbon offset trading can then begin 10 years after planting. This means there is an opportunity to create a revenue stream from woodland well before the typical 20 years required for a timber crop to develop. The carbon offset market is growing and while current values are £40-50/t, forecasts suggest the price will increase to about £100/t in the next decade, said Tim.

A further option is to sell before the 10-year establishment is over by offering Pending Issuance Units (PIUs). These can be sold even while receiving Ewco funding but their value is roughly half that of a unit marketed after establishment.

## Timber

Finally, Richard urged potential growers not to overlook the timber market. Britain is the second biggest importer of woodland and the government recognises the value of home-grown stocks. That is reflected in the HMRC applying a 0% rating for both income and corporation tax and there is no cap on revenue levels. ■

### TREES ON THE FARM WEBINAR EXPERT PANEL

The following experts covered issues on the benefits of woodland, where to site trees, funding and the financial potential from selling timber and carbon credits.

**Richard Pow** partnerships manager  
Forestry Commission

**Peter Wilderspin** rural surveyor overseeing  
Cambridge University's rural estate

**Eddie Rixon** Oxfordshire beef and sheep  
farmer and development adviser for  
Forestry Commission

**Tim Oliver** managing director  
Wanderlands environmental consultancy

### WATCH THE WEBINAR

Watch the discussion in full at [fwi.co.uk/transition](https://fwi.co.uk/transition), where you'll also find the other webinars in the Transition series



# Unearth new revenue with complimentary biodiversity restoration & creation

Adopting science-based approaches to natural capital projects that optimise your marginal land and add new income streams alongside your core agricultural operations

**Wanderlands is an award-winning environmental and natural capital consultancy working with farmers & landowners to optimise marginal land with biodiversity enhancement projects that enable access to financial opportunities within the nature markets.**

## Natural capital projects

Wanderlands' Land Development team collaborate with foresters, soil scientists, ecologists, and landscape designers to carefully curate natural capital projects **from start to finish** that offer climate-resilient, biodiversity-rich locations.

**Innovative site designs** integrate a variety of habitats including broadleaf woodland creation, hedgerow restoration, soil regeneration, and wildflower meadow creation. Complimented by the deployment of **modern technology**, such as soil probes, for constant feedback to maximise overall project health and success.

We are committed to ongoing project maintenance and can manage sites for the long term where desired.

## Nature market opportunities

Investment in natural capital projects is in **high demand** due to rising regulatory requirements for businesses and developers.

Through experience working with these audiences at Wanderlands, we help you to optimise these new income streams and **connect with future buyers** who are ready to secure and purchase units.

We support every step of the way to ensure full project compliance with the recognised UK government reporting and regulatory frameworks so you can generate verified **Woodland Carbon Units and Biodiversity Units**.

**Wanderlands Habitat Bank** launches in November - our new digital platform to connect your projects and units with future buyers.

## Net-zero and carbon footprints

What's more, we also support farmers in their net-zero transition to implement science-based initiatives and deliver **permanent emissions reduction** of at least 85-90%.

In complement to robust decarbonisation, we deliver bespoke **nature-based carbon removal** projects such as woodland creation to enhance biodiversity and sequester the (often hard-to-abate) 10-15% residual carbon.

Contact our team to get started with a carbon footprint assessment or natural capital project!

**Visit:** [www.wanderlands.earth](http://www.wanderlands.earth)

**Email:** [hello@wanderlands.earth](mailto:hello@wanderlands.earth)