Energy&Climate
INTELLIGENCE UNIT

LEVELLING UP FARMING

Net zero and farm profitability

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About

The Energy & Climate Intelligence Unit (ECIU) is a non-profit organisation supporting informed debate on energy and climate change issues in the UK. Britain faces important choices on energy and on responding to climate change, and we believe it is vital that debates on these issues are underpinned by evidence and set in their proper context.

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Executive summary

These are difficult times for many farmers with the surge in the prices of oil and gas squeezing profits, particularly as gas is used in the manufacture of fertiliser. Previous ECIU research found that in 2021 alone, high gas prices saw a possible additional £160 million fertiliser bill for UK farmers.

Farmers in the UK are also very much on the frontline of climate change, driven in part by the burning of fossil fuels, and are having to cope with more extremes of heat, drought and conversely rain, all of which can hurt yields, our food security and farmer livelihoods.

Agriculture currently generates around 10% of the UK's greenhouse gas emissions, and while the power and transport sectors' emissions have fallen, agriculture's have remained stubbornly high (most of them from methane and nitrous oxide) and were the same in 2020 as back in 2010.

But farming has a unique role to play in achieving the UK's net zero emissions target. Unlike other sectors it can also absorb carbon dioxide emissions, storing carbon in soils, hedgerows, trees and grasslands. As trees and plants grow, thanks to photosynthesis, carbon dioxide from the atmosphere is turned into leaves, stems, branches, trunks and roots, burying it in the soil too. This locking up of emissions from the atmosphere is essential for reaching net zero – indeed it is the 'net', compensating for any residual emissions from sectors like aviation.

These measures will help farms become climate and heat-proof too. Hedgerows and trees can help to reduce flooding, keep more nutrients on the farm to support food production, and to shade livestock during heatwaves.

And the drive to net zero presents new economic opportunities and funding streams to farmers and as this report has found, these could benefit some of the smaller, more marginal farms that are struggling in current times. There is a £3.1 billion per year private and public sector funding opportunity coming down the road that many of these farms are uniquely well-placed to take advantage of. For farms on the brink this income could be the difference between going out of business or being able to remain profitable.

New ECIU figures show that companies keen to offset emissions could create a £700 million a year market for farmers who can increase stores of carbon in vegetation and soils on their land. These companies could effectively pay farmers to compensate for some of their emissions, creating a new private market and new private investment in restoring soils and carbon-storing nature.

On top of this, the government's new farm payment scheme will provide £2.4 billion of support for farmers who boost carbon and encourage nature on their land.

Smaller, marginal farms are often in areas of great potential for storing carbon, such as upland peatlands, described as the UK's 'rainforests' because they are such carbon rich habitats. New ECIU postcode-level analysis of 25 constituencies in these areas found they already benefit disproportionately more from the current, much-smaller government schemes to support environmental measures.

In these constituencies farms are already getting a higher proportion of their payments for environmental measures than average. 21% of payments are for environmental measures in these areas, whereas for England as a whole the average is 14%. That means farms in these areas are receiving, proportionately, 50% more of their farm subsidy for environmental measures than farms on average across England.

To date, these farms have relied on funding from just 15% of the total £2.4 billion England farming budget that has been allocated for environmental measures (around £360 million a year). By 2024 57% of the budget, £1.3 billion, should be available for these environmental measures and by 2028 it will be the entire £2.4 billion.

These are often farms where the diversification of revenues is important to their long-term economic sustainability as they are less productive in terms of food. Indeed 20% of farmland in the UK produces just 3% of calories; while 30% of farmland produces 60% of them. The opportunities for carbon storage and nature restoration have significant overlap with the areas of low food productivity.

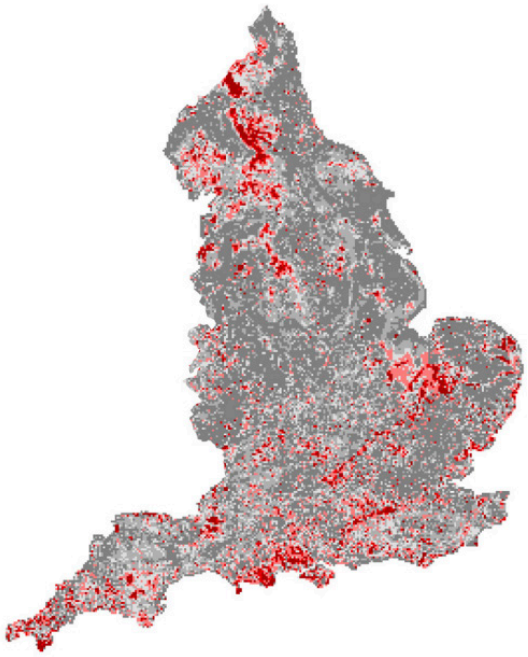
Many farmers are already aiming to help achieve net zero, including by using new and improved farming techniques and by restoring carbon-rich habitats on their land, planting new hedgerows, or incorporating more trees into fields. New private and public sector funding is set to come online rewarding and boosting these efforts.

The potential for greater carbon storage in England

ECIU looked at a sample of 25 constituencies based on their overlap with areas identified as having greatest potential for future carbon storage and restoration of nature (see below). The analysis used government support payment data provided by postcode district, by the Government's Rural Payments Agency. These postcode districts were matched as closely as possible to constituencies to see what payments farms were currently receiving.

In these 25 constituencies - located in the North West, the North East, Yorkshire and The Humber, the South West, and the South East of England - ECIU found that environmental funding from government schemes currently makes up, on average, 21% of all government payments to farms. Across England as a whole the average is 14%. This means these farms are already securing proportionately 50% more government support for environmental measures on their land.

FIgure 1: A significant area of land (red) is well suited simultaneously to sequester carbon and protect nature



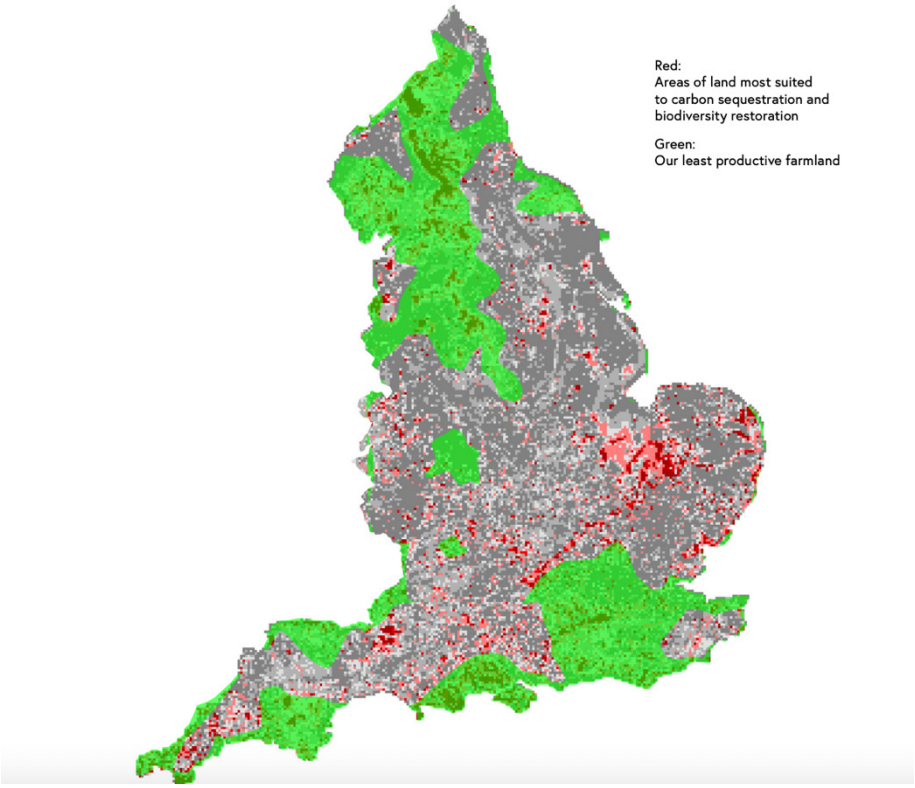
Source: National Food Strategy

Farms in these areas also tend to be smaller. England's average farm size is 87 hectares, but in the North West it is 78 hectares, in the South West 69 hectares, and in the South East 85 hectares. In the North East, and Yorkshire and The Humber farms larger than average at 153 hectares and 94 hectares respectively. In those regions of England (except the North West) farms tend to have lower than average profits too.

In the North East and South East farms on average make a loss from agricultural activities alone and only make a profit from other activities (e.g. tourism and renewables) and from government payments. These more marginal farms also tend to be located in areas of low food productivity, which varies hugely in England. Across the country as a whole 20% of farmland produces just 3% of calories; while 30% of farmland produces 60% of them.

Generally the areas that are least productive for calories have a high level of overlap with the areas with greatest potential for restoring nature and storing carbon (see below).

Figure 2: Much of the land that is best suited to nature restoration and carbon removal produces little food



Source: National Food Strategy

This indicates that in the areas most suited to future carbon storage and nature restoration and with lowest food productivity, farmers are already earning a higher than average proportion of their farming subsidy in return for net zero or nature measures. So, these farms, also having a likely need to diversify revenue streams, are better placed to take advantage of new private and public net zero revenue streams.

Private Carbon Markets

Many businesses may be interested in paying or working with farmers to store more carbon, especially those from sections of the economy where technology to get to zero emissions is not fully developed, like parts of heavy industry and aviation.

New private schemes and certification standards are being developed to allow private buyers to purchase carbon credits to offset their emissions.

The creation of carbon-rich soils and habitats on farms may allow farmers to take advantage of these new private carbon markets, in addition to Government payments.

Analysis by ECIU suggests that in 2030, at projected carbon prices of £75 per tonne, better management of arable soils and creation of new habitats on farms in England could absorb carbon worth almost £700 million per year. This is equivalent to roughly one third of the entire government farming budget for England and could help to significantly increase the contribution of the farming sector to net zero using private investment.

The £700 million is made up of 70% of arable soils being in some form of environmental management from 2027 onwards (which is Government's aim), expansion of hedgerows by 11% (in line with the Climate Change Committee's recommendations) and an additional 156,000 hectares of trees on farms by 2030 (in line with the Climate Change Committee's recommendations).

Many observers caution that these offsetting markets need more oversight and robust rules to ensure that the emissions absorbed and stored are stored permanently and are genuinely additional (i.e. the carbon would not have been stored otherwise).

The absence of shared standards, regulations, and infrastructure is currently reducing confidence in private carbon markets and slowing their development. There are scattered schemes relating to separate habitats and individual standards in development (e.g. a soil carbon code) but no cohesive private carbon market for nature and land. This is holding farmers back from tapping into these potential payments of up to £700 million per year.

The Government is looking at including land use in the UK Emissions Trading Scheme (ETS), which may mean yet another additional source of private revenue. This would mean that any carbon absorbed would contribute to the UK's national net zero target.

To ensure a broad range of farmers could benefit from these private investments, new rules would need to be developed particularly to support tenant farmers. In England 52% of farms are wholly owned, but 14% are wholly tenanted and 34% are mixed tenure. This may limit farmers' options or ability to sell credits as they may not be the decision-makers for the land or be incentivised to build carbon stores on land that they don't own outright.

Private carbon markets may take some years to develop and clear rules will be needed, but they provide a sizeable new income stream, particularly for farmers on land with great carbon-storing potential.

The new farming system in England: incentivising net zero

The UK's countries were previously part of the EU-wide Common Agricultural Policy. With the decision to leave the EU, the four countries of the UK are now introducing new farming systems In England this system is being phased in, while the previous system is phased out.

In England, farms currently receive Basic Payments linked to the size of the farm, as well as some farms receiving money through agri-environment schemes for measures that benefit the climate and nature. The lion's share of current public farming subsidies though are paid as the Basic Payment in relation to the size of farms, and the proportion given for environmental payments is relatively small. The new farming system will prioritise carbon storage, net zero measures and nature restoration.

At present environmental payments make up only around 15% of the overall budget of farming payments in England, compared to the payments awarded in relation to the size of a farm. In doing so, the current system rewards a very small proportion of farms - the 10% of largest farms receive more than half the total budget of direct payments related to farm size, while the bottom 20% of farms receive just 2% of the budget.

In a system that rewards net zero and nature measures (instead of farm size), farms that are smaller, have lower profits, and already receive more from environmental payments (as outlined in our analysis above) may be best placed to benefit most.

The biggest change is a shift from the majority of payments being based on farm size, to payments being based on farms helping to deliver environmental outcomes, including carbon-rich habitats and low-carbon farming methods. These policy changes are underpinned by the new Agriculture Act for England.

The Government's new farming system - Environmental Land Management - is divided into three new schemes. The overall budget for this new system will be £2.4 billion. This is the same as the current budget, but at the moment only around 15% of it, £360 million, goes to environmental measures. By 2028 it will be the whole budget. The first part, the Sustainable Farming Incentive, is intended to be universally available to farmers everywhere and to be the simplest measures that all farmers could take.

The other two parts - Local Nature Recovery and Landscape Recovery - may be those that reward most additional carbon storage and nature restoration. But little detail has so far been published on these two parts of the new system. Concerns remain that Landscape Recovery may favour projects at scale that are more difficult for individual farmers to access. However, Defra says that most of the 51 bids it has received for Landscape Recovery funding have included farmers.

The Government says that the new system will help to cut emissions from agriculture by 6 million tonnes per year. In England agriculture's emissions are around 32 million tonnes of greenhouse gases per year. According to the Government's Net Zero Strategy the Farming Investment Fund and Farming Innovation Programme will also help to drive emissions cuts from the sector.

Bridging the gap to a new system may be challenging and will not be achieved overnight. Until the new system is fully rolled out farmers may miss out on these funding opportunities. Farms that already rely heavily on subsidies to remain profitable may need support to adapt their businesses to take advantage of the new public (and private) revenue streams for carbon

and nature. But this analysis shows that many of the farms that tend to be smaller and less profitable may be best placed to take advantage of future carbon and nature payments.

This may involve reducing the intensity of farming in some places, but analysis has already shown that for upland farms - those that are predominantly found in these areas and tend to be least profitable from farming alone, without government payments - reducing the intensity of food production (but not stopping it altogether) may increase profit and generate carbon benefits (which in turn may generate a greater financial return in future).

Case Studies

Some farmers are already taking steps to cut emissions and store more carbon on their land.

The NFU highlights the example of John Taylor, a farmer in Lancaster who receives farming subsidy for environmental measures, caring for moorland, pastureland and woodland habitat that helps to store carbon and benefits breeding birds such as lapwings.

Meanwhile James Drummond in Northumberland has planted over 45,000 trees on his sheep farm, and uses vegetable crops to restore richness to the soil. He allows grass to rest for a long time after grazing, up to 150 days in winter, which helps plants to store more carbon in roots and in soil and increases the range of plant species, benefiting insects.

Conclusion

If the government can support the development of proper private carbon markets, England's farmers can tap into an annual income stream of up to £700 million for carbon storage.

Farms that tend to be smaller, less profitable, and in 'levelling up' areas may be best placed to take advantage of such private payments as many of them lie in areas with high carbon storage potential.

These farms already receive a slightly higher proportion of their Government payments in return for environmental activities than average farms, showing that they stand ready to take advantage of a farm subsidy system geared towards net zero and nature.

Annex: Methodology

Data on farming payments was provided by the Rural Payments Agency. This data was provided broken down by postcode district. Postcode districts are not a precise match with constituency boundaries, however these areas were matched as closely as possible with constituencies for the purpose of generating the sample.

All constituencies are made up of more than one postcode district, so the average figure was used. In some cases, data were not available for all postcode districts within a single constituency. Some postcode districts cover more than one constituency. In this case, the postcode district data was used for all constituencies it covered within the sample.

25 constituencies were analysed, representing a significant proportion of the area of least food productivity and high carbon and nature potential. Spatially, this sample was selected to overlap with the areas of England also identified by National Food Strategy analysis as: having lowest food productivity, and having greatest potential for the restoration of nature and for storing carbon. But other than this overlap the selection of constituencies was random. Some of the 25 constituencies are very large ones in northern England and therefore the geographical area covered is significant.

These areas are on page 93 of the National Food Strategy: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1025825/national-food-strategy-the-plan.pdf

Private Carbon Payments

England's farmers could be in line for almost £700 million per year of private carbon payments from new hedgerows, and trees, and better management of arable soils that can absorb carbon while continuing to produce food.

A carbon price of £75 per tonne by 2030 is reasonable to keep the UK on track for net zero. https://www.zeroc.org.uk/news/article-at-what-price-zero-carbon-commission-backs-economy-wide-75-a-tonne-carbon-tax

Arable soils

Soil carbon payments could be up to £40 per hectare at current carbon prices and could be £75 by 2030

https://sustainablesoils.org/soil-carbon-code/economic-and-policy-context
70% of England soils due to be in SFI measures from 2027 onwards
Soil carbon sequestration on arable can be up to 1.1tC/ha per year (http://publications.naturalengland.org.uk/file/6257983284838400)
Arable (including temporary grasslands): 4.7 million hectares
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/972103/regionalstatistics_overview_23mar21.pdf
Many arable soils will be overall emitters of carbon, whereas many grasslands may be net absorbers and therefore most grasslands are excluded.
70% this area is 3.29 million hectares arable, absorbing 3.6 million tonnes of carbon per year, generating income of up to £271 million at 2030 carbon prices.

Hedgerows

Hedgerow payments could be £75/tonne by 2030
A hectare of hedgerow can sequester as much as 131 tonnes of carbon per year
https://www.cpre.org.uk/wp-content/uploads/2021/09/Hedge-fund.pdf
In England hedgerows cover 2.5% of land area, which is 325,697 hectares
https://hedgelink.org.uk/hedgerows/importance-of-hedgerows/
CCC foresees 40% increase in hedge length by 2050, which would require a 11% increase by 2030. https://www.theccc.org.uk/wp-content/uploads/2020/01/Land-use-Policies-for-a-Net-Zero-UK.pdf
This would mean an additional 35,826 hectares of hedgerow, absorbing up to 4.6 million tonnes of carbon per year.
At 2030 carbon price of £75 then this could be worth £351 million.

Trees

England agricultural area is 9.1m ha https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/868945/structure-jun19-eng-28feb20.pdf
At present 385,000ha of this have trees on https://cdn.forestresearch.gov.uk/2022/02/complete_fs2021_jvyjbwa.pdf
CCC models that by 2050 10% of agricultural land should have trees on, which means a further 546,000 hectares. https://www.theccc.org.uk/wp-content/uploads/2020/01/Land-use-Policies-for-a-Net-Zero-UK.pdf
That means an annual increase of 19,500 hectares of trees on farms. By 2030 this would mean 156,000 additional hectares of trees.
Ranges for sequestration by trees range from 2 to 10 tonnes per hectare per year. A reasonable mid-point is 6 tonnes per hectare per year.
This means an additional 156,000 hectares could sequester 936,000 tonnes per year.
At 2030 carbon prices, this equates to £70 million.