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Green your eats

A living-standards-first approach to cutting emissions from agriculture and land use

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Executive Summary

The UK can be proud of its progress towards net zero, but there is one key area where the transition has barely started: agriculture and land use. Emissions here have fallen by just 5 per cent over the past 15 years, with the UK's legally binding climate targets requiring a seven-fold increase in pace to remain on track. That means reducing greenhouse gases by nearly a seventh (13 per cent) by the end of this decade – a sharper fall than currently planned for industry.

These carbon savings will come by changing how food is made. That means using less, or greener, fertiliser; managing soil differently; reducing livestock numbers and changing the feed they eat. It will also mean using land in different ways – such as repurposing that currently used to rear animals, restoring damaged peatlands, or planting trees.

One key reason for the lack of progress is that decarbonising farming is hard. There are no 'silver bullet' technological solutions (such as electric cars for transport) to do the heavy lifting on cutting carbon. Moreover, deep changes will be managed by a large number of small farming businesses – 200,000 farms employing 450,000 people – making it more difficult to coordinate and monitor change than in industries where large companies dominate, such as the electricity sector. And third, changes in farm production and rural land use are politically sensitive – as evidenced by the furore over inheritance taxes – and crucial to food security in an age of growing geopolitical division.

But policy makers mustn't shy away from the challenge. Meeting statutory decarbonisation targets with no further contribution from land use and agriculture would make decarbonising the economy more expensive than it needs to be. We estimate that meeting the UK's 2030 target with no further contribution from land use and agriculture would require an extra £12 billion of capital investment in the 2020s, as more expensive mitigation options would need to be brought forward to cut carbon from other sources. This is a significant outlay – equivalent to the cost of more than a million heat pumps – and risks households being forced to shoulder more expenditure than is affordable, either financially or politically. But we must also be alive to the potential for decarbonising farming to impact living standards. So, in this report we assess the economic state of the agricultural sector, look at how the transition will feed through to food production, and consider how changing the way land is used can best be managed.

UK farming is already under strain

Our farmers are being asked to do a lot. The sector is waking up to challenging new targets to halt species decline, improve water quality, restore degraded habitats and protect 30 per cent of the UK's land and sea for nature by 2030. Each of these is significant; together they represent a generational change in the practice of farming.

These goals are driving an overhaul of the sector's generous subsidy system. Payments to farmers are changing from levels proportional to the area of land farmed to a system that rewards positive environmental actions. Even though the overall scale of these subsidies will remain close to current levels of around £2.5 billion a year, the new system will see winners and losers, as well as placing new demands on time and working practices.

On top of this, the sector struggles with low productivity, as highlighted by the recent Farming Profitability Review. Despite a long-established secular increase in agricultural productivity – averaging 0.8 per cent a year over the past half century – the typical family farm only made enough profit (after subsidies) to

pay its owners £6 for each hour worked in 2024, less than half the minimum wage. Further, nearly one-in-three (30 per cent) of farms lost money, meaning they essentially paid to farm, and a further quarter (25 per cent) were kept profitable only by government subsidy.

Poor productivity is seen even more starkly when we consider levels of wealth in the sector. The typical family farm has assets of £1.5 million, five-times that of the typical household. But annual returns on these assets are incredibly poor, at just under 1 per cent. Such low returns reflect the long tail of low-productivity farms. This has resulted in a wildly uncompetitive sector in which most farms (86 per cent) used more inputs in their agricultural businesses last year than they created in outputs. This is not a sector in the sort of rude financial health to take on an even heavier burden.

The costs of decarbonisation are low, but it matters who bears them

A clear flashpoint in decarbonising food production is the fear it will drive up prices in shops. Reducing emissions will not be free: input costs will increase, low-carbon machinery requires investment, and novel production methods will take up considerable amounts of farmers' time. And unlike in other sectors, such as electricity generation or transport, there is little expectation that resultant savings will outweigh upfront costs.

Thankfully, the costs of decarbonising food production should be low, adding less than £1 billion a year (in constant prices) to the cost of producing food in the UK, according to the Climate Change Committee (CCC). At peak, these costs reach 3 per cent of the value of annual farm output between now and 2050 – an entirely manageable sum. But, even if the costs are modest, it's still important to consider who bears them.

An obvious candidate to bear these costs is farmers themselves. Food and farming are highly competitive industries with many prices set on world markets. As such, producers operate with very limited pricing power, and almost all the farmers we spoke to explained how they would have very limited ability to recover

any increases in input or operating costs from their direct customers.

Razor-thin margins in farming mean that even a modest 3 per cent increase in costs could have highly detrimental effects on the sector. We estimate that costs of this magnitude would lead to the annual average income of farmers falling by around a fifth (from £43,000 in 2024-25, to £35,000), and one-in-twenty farms would drop into the red. Further, looking at costs averaged across the sector also likely understates the challenge for some farms, with even greater pressure on those with the most carbon-intensive methods.

To be clear, these impacts are daunting because the farming sector is financially fragile, not because net zero costs are large. That means it might be better that consumers bear the brunt through higher food prices – trading a small impact across the wider population against an existential threat to a (much smaller) number of farmers. Here, the impact on households will be even smaller than the 3 per cent uptick on farmers' costs, because farm output prices make up only a small fraction of overall family food bills: agriculture accounts for less than a tenth of the value of the entire agri-food sector (even excluding catering).

This means that, even if the entire cost of decarbonisation were transferred to consumers, the additional increase in overall food prices between now and 2050 would be less than 1 per cent – a negligible impact. In fact, last year saw several individual months where food prices rose more than this. And while some foods will be more affected than others, it is the overall cost of food that matters most for living standards.

All this suggests that passing on the costs of decarbonising food production to consumers should be the aim of policy makers, and the urge to increase subsidies in order to protect farmers from such costs should be resisted. While the latter approach would no doubt be popular with farmers, using subsidy to shield a low-productivity sector from market pressures would effectively mean taxpayers supporting inefficient firms. In any case, the low profitability of many farms suggests that financial

incentives may only have a relatively weak effect on the behaviour of farmers.

Net zero is a global goal, so farmers abroad should also see their costs rise and international market prices increase. But some countries will inevitably lag others, potentially putting UK farmers at a disadvantage. One way around this is to soften the impact of unfair competition by regulating other actors in the food supply chain. For example, mandating supermarkets to procure increasing volumes of food that complies with emissions standards would be a powerful option – mirroring the Government's approach on electric cars, where manufacturers' sales are required to become increasingly electric over time. This would avoid additional demands on government finances and place the onus onto some of the largest, best-organised, and most-resilient businesses in the UK to drive action, rather than burdening thousands of small farming enterprises. It would also show farmers they aren't being singled out to deliver change, a worry shared by many that we spoke with. And, crucially, it should help to incorporate the costs of change into the price of food.

Policy makers must move beyond subsidies to deliver a successful change to how land is used

Cutting carbon from food production isn't the only challenge facing the sector. Using land in a way that removes emissions produced in other parts of the economy – that is, sequestering carbon through tree growth or fuel production, for example – is central to the Government's net zero plans. Indeed, these 'negative emissions' are assumed to account for more carbon savings than cleaner food production in 2050, according to CCC figures. But achieving this would require close to a tenth of agricultural land to be taken out of production.

Unlike the move to low-carbon farming, however, there is currently no market through which farmers can be compensated for not farming. Here, subsidies already play a key role in socialising the costs of providing public goods that have no market value. The Government's Environmental Land

Management Scheme is therefore right to provide funding for these non-agricultural activities. Also, while greener food production will require most farmers to adapt, the challenge of using land differently will be concentrated on a smaller number of businesses, impacting them to a far greater extent.

But subsidy is not a foolproof way of influencing farmers' behaviour. Our discussions with them surfaced a general acceptance of the case for cleaner production methods, but ceasing production entirely is much more contentious, in many cases calling time on generations of working the same land. Many said they would simply reject any financial incentive to stop, highlighting an emotional attachment to the land that overrides pure economics.

So while policy makers should be aiming for the least productive land to be repurposed first – allowing land use change with as limited impact on food production as possible – this could be difficult to achieve with subsidies alone. The upcoming Land Use Framework must address the friction between farmer choice and optimal land use, and be prepared to direct which land would be better used as a carbon sink instead of to grow food.

An additional concern is the plight of tenant farmers, for whom change in land use brings insecurity rather than opportunity. Short leases compound this problem, potentially giving landowners a low-resistance route to replacing farming tenants with 'easier' returns from environmental subsidies, such as solar or forestry. But tenant farmers are often the nation's most productive, producing enough to earn three-quarters more in profit per hour worked than farmers who own their land. A transition that sweeps away productive tenants in favour of passive landlord income would be neither fair for the farmers nor optimal for UK consumers (or for food security). Government policy must, therefore, ensure that tenancy contracts protect farmers. This could be achieved by regulating to ensure prime tenanted land remains in agricultural production, or, better still, guarantee tenants a long-term role in managing environmental change on land they occupy.

Decarbonising agriculture is fundamentally a challenge of delivery, not cost. The transition to a new economic reality is manageable – even the worst case impact on consumer prices will be limited. However, the fragility of farm businesses and deep-seated cultural attachments to traditional methods make implementation difficult. This report sets out an approach to this challenge that puts living standards first – identifying routes to prevent either lower-income households, or farmers themselves, from shouldering an unfair burden.

Section 1

Progress on cutting emissions from farming must accelerate

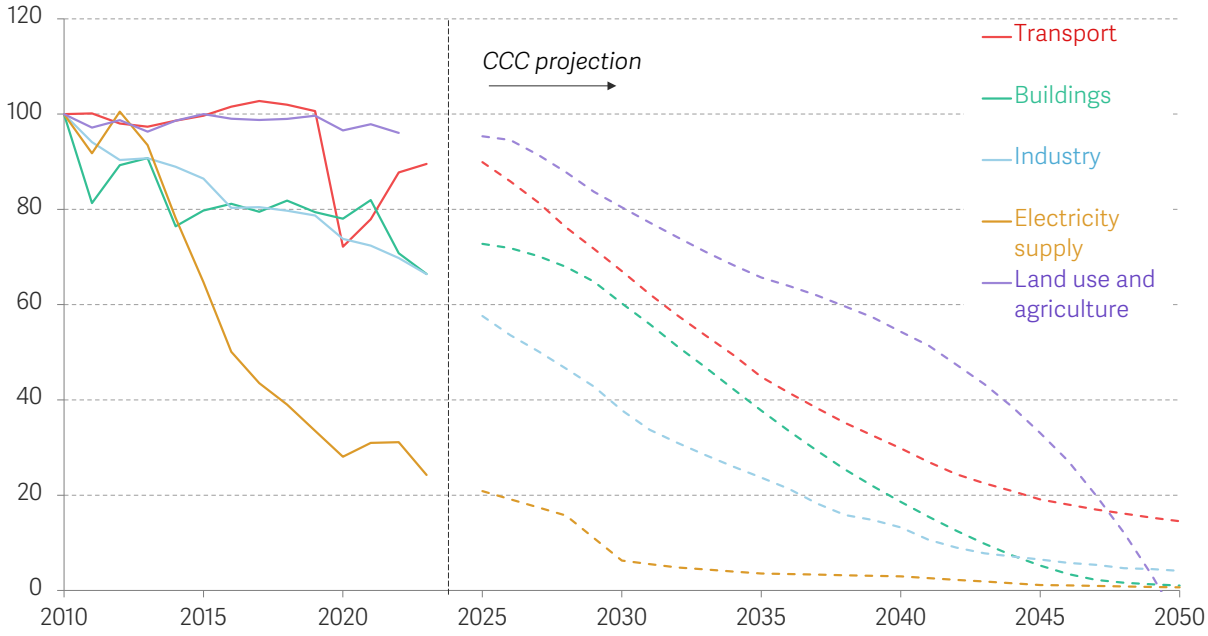
The UK's historical progress towards net zero has been impressive, with emissions having more than halved since 1990. But this effort has been uneven across the economy: while carbon dioxide produced from generating electricity, for example, has fallen by 30 per cent since 2010, other sectors are lagging.1 And here there is one key area in which barely any progress has been made: agriculture and land use, which account for 12 per cent of the UK's carbon footprint but has seen emissions fall by only 5 per cent over the past fifteen years – a smaller drop than any other major emissions source (see Figure 1).

This pace now needs to accelerate sharply: the CCC's lowest-cost route to net zero requires emissions from land use and agriculture to fall by 13 per cent by 2030 – a seven-fold increase on progress since 2008. This is a cut deeper than that being asked of the industrial sector.2

1 Department for Energy Security and Net Zero, Provisional UK greenhouse gas emissions statistics 2024, March 2025.
2 Department for Energy Security and Net Zero, Provisional UK greenhouse gas emissions statistics 2024, March 2025; Climate Change Committee, Seventh Carbon Budget, February 2025.

FIGURE 1: **The pace of cutting carbon from agriculture and land use needs to increase**

Greenhouse gas emissions by sector, 2010=100: UK



NOTES: Some emissions sources not shown.
SOURCE: RF analysis of DESNZ, Final Greenhouse Gas Emissions statistics, Climate Change Committee, Seventh Carbon Budget data.

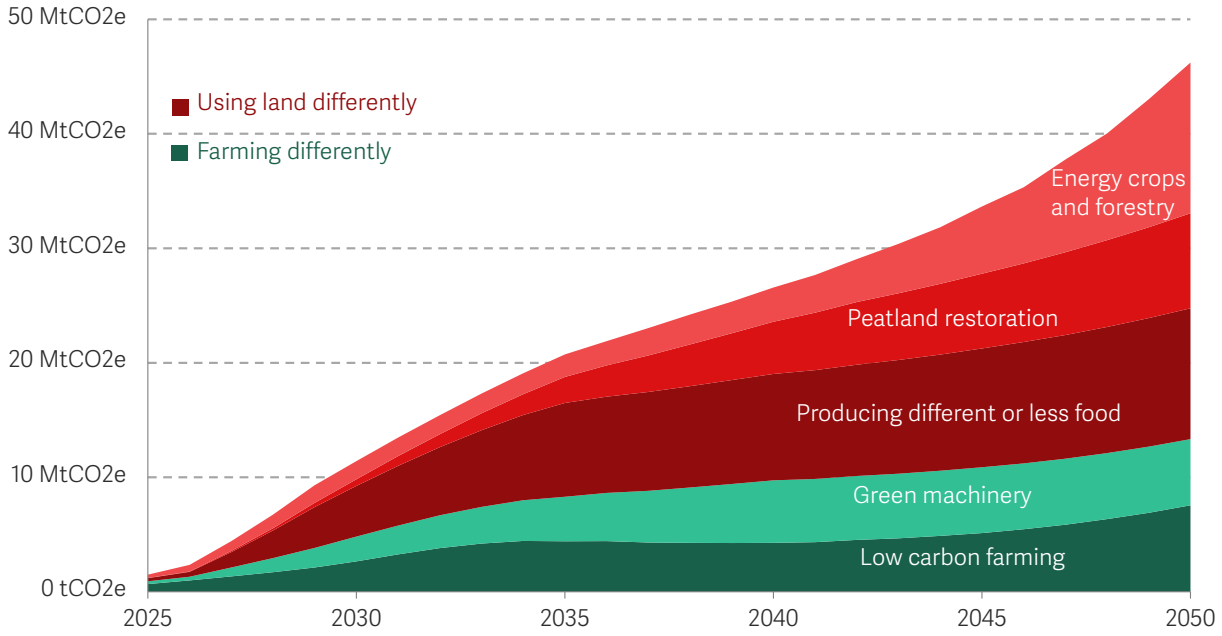
But compared to other sectors where a small number of large emissions sources (such as power stations or factories) can be replaced or repurposed; or where a clear technological solution (such as electric cars) will do most of the heavy lifting, reducing emissions from farming and land use is far from straightforward. In fact, carbon savings must come from a range of sources: the CCC's latest Carbon Budget sets out no fewer than thirty measures that farmers will have to deliver.[3] These include using less, greener, or different fertiliser; managing soil differently; and reducing the number of livestock and changing what they eat. It will also mean using land in new ways: repurposing that currently used to rear animals; turning agricultural land over to energy production, nature or to other non-farming activities; or restoring damaged peatlands.[4]

Changes to the food we eat may also be needed if we are to avoid simply importing our emissions from overseas – replacing emissions-intensive food with that with a lower carbon footprint. In short, the route to lower emissions involves action on many fronts, as shown in Figure 2.

3 Climate Change Committee, Seventh Carbon Budget, February 2025
4 Climate Change Committee, Seventh Carbon Budget, February 2025; National Farmers Union, Achieving net zero – meeting the climate change challenge, September 2025.

FIGURE 2: **Multiple policies are needed to decarbonise farming and land use**

Projected emissions savings in agriculture and land use, by policy type: UK



NOTES: Producing different or less food refers to reducing waste and livestock numbers, and accounts for any subsequent release of land. Megatonnes of carbon dioxide equivalent ($MtCO^2e$) is a measure of emissions that converts the warming potential of all greenhouse gases to that of carbon dioxide.
SOURCE: RF analysis of Climate Change Committee Seventh Carbon Budget data.

The diffuse nature of farming also creates a challenge. There are no large manufacturers that can drive through change by their dominance of supply, and sustainability is a lower priority for customers than price, healthiness and taste – meaning demand-led change is not a given.[5] Instead, decarbonisation will be driven by the efforts of a large number of small businesses – 200,000 farms employing 450,000 people – which are predominantly family-run, changing working practices and methods and replacing earnings from higher carbon activities with those that produce fewer emissions.[6]

So, when faced with the complexity of decarbonising agriculture, it may be tempting for policy makers to revert to the historical approach of looking elsewhere for carbon cuts. But doing so would leave some low-cost measures on the table. Increasing forest cover, for example, is projected to have a marginal abatement cost of £12 per tonne of CO^2 by 2050, a tenth of that of using hydrogen in industry (£123), and just one-twentieth of the cost of delivering carbon savings through increased public transport use.[7] Further, some measures associated with changing farming practices are forecast to have a negative marginal abatement cost by mid-century (i.e. their operational cost savings will outweigh upfront expenditure). As such, a route to net zero that sidelines agriculture would make the overall transition more expensive than it needs to be.

5 L Berrebi et al., Whetting Consumers' Appetite for Sustainable Foods, Boston Consulting Group, May 2023.
6 There are around 200,000 farm business in the UK. Source: Defra, Farming evidence – key statistics, October 2025.
7 Climate Change Committee, Seventh Carbon Budget, February 2025.

Shying away from farming and land use change would also require other areas to go further and faster, increasing costs (and often necessitating more behavioural changes) in sectors which are already failing to keep pace with Governmental decarbonisation trajectories. Meeting this decade's statutory targets with no further contribution from land use and agriculture would require an extra £12 billion of capital investment in the 2020s, as more expensive mitigation options would need to be brought forward to compensate for lost emissions savings.[8] This is a significant outlay – equivalent to the cost of more than a million extra heat pumps – and risks seeing households shoulder more net zero related expenditure than is affordable, either financially or politically.

Decarbonising a sector as complex as farming must be done fairly, avoiding undue and disproportionate costs falling on particular groups. So in this report we examine how the transition could play out. With that in mind, the rest of the report is structured as follows.

- First, in Section 2, we dig into the economic health of the farming industry, which provides important context for policy decisions.
- Section 3 then considers how the increased cost of food production could impact the living standards of households (if the cost of food rises) or of farmers (if profitability is reduced).
- In Section 4 we assess how policy can be used to bring about a fundamental change to the way land is used.
- Section 5 presents our conclusions.

In Sections 3 and 4, we assess the potential scale of decarbonisation impacts on farmers, households and the taxpayer, and explore how any downsides can be minimised. Throughout this report, we draw on qualitative research. We conducted more than a dozen interviews with farmers, seeking views from those with different types of business and different financial circumstances to understand their personal ties to farming and the impact of decarbonisation. We also convened a focus group of people living close to farms but not directly employed by them, gaining insight of the importance of farming to rural economies and the lifestyles of people who live there. We used this information to shape our quantitative work and to underpin our conclusions.

8 Agriculture and land use contributes 7 per cent of all emissions savings between now and 2030. Going further in other sectors to fill this gap would incur capital costs of £12 billion, assuming that additional effort can be made without increasing the average costs of savings. Source: RF analysis of Climate Change Committee, Seventh Carbon Budget, February 2025.

Section 2

Cutting carbon is not the only challenge that farmers face

Tackling emissions from agriculture and land use is vital for a cheap and fair net zero transition. Emissions from this sector have fallen just 5 per cent over the past 15 years, and the UK's legally binding climate targets require the sector to decarbonise seven-times faster to remain on track. And with a lot set to be asked of the farming sector, it is worth assessing its economic health in the first place. Here, our assessment shows that farming is starting far from a position of strength.

Farmers are already tasked with achieving myriad new environmental goals: halting species decline, improving water quality, restoring degraded habitats and protecting 30 per cent of the UK's land and sea for nature by 2030. Each of these represents a change to long-established business practices, but together they represent generational change in the way our food is produced. These goals are also driving an overhaul of the sector's generous subsidy system, with payments to farmers changing from levels proportional to the area of land farmed to a system that rewards positive environmental actions.

Farmers are also grappling with financial uncertainty, with low and highly volatile earnings typical across the industry. In 2024, the typical family farm only made enough profit to pay its owners £6 for each hour worked – less than half the minimum wage. On top of this, farming struggles with low productivity, limited dynamism and an ageing workforce. The parlous financial state of the farming sector compounds the challenges that net zero brings, but it does not mean that no action should be taken.

The previous section set out the need for farming to contribute towards the nation's net zero efforts. But before diving into what that transition might mean for household food bills or for the living standards of farmers, we first set out the fragile financial state of the farming sector – key context that policy decisions in this area will need to navigate.

Farmers are being asked to deliver far more than the transition to net zero

Net zero is just one of a panoply of environmental ambitions the Government has set for farmers. They are also being tasked with halting species decline, restoring degraded habitats, improving water quality, reducing nutrient and chemical pollution, and protecting 30 per cent of land and sea for nature by 2030. These targets sit within a broader suite of statutory environmental goals under the 2021 Environment Act, including legally binding targets on biodiversity, air quality, and soil health. Each of these changes adds complexity to how businesses are run; together they represent an overhaul in how farming is practiced in the UK.[9]

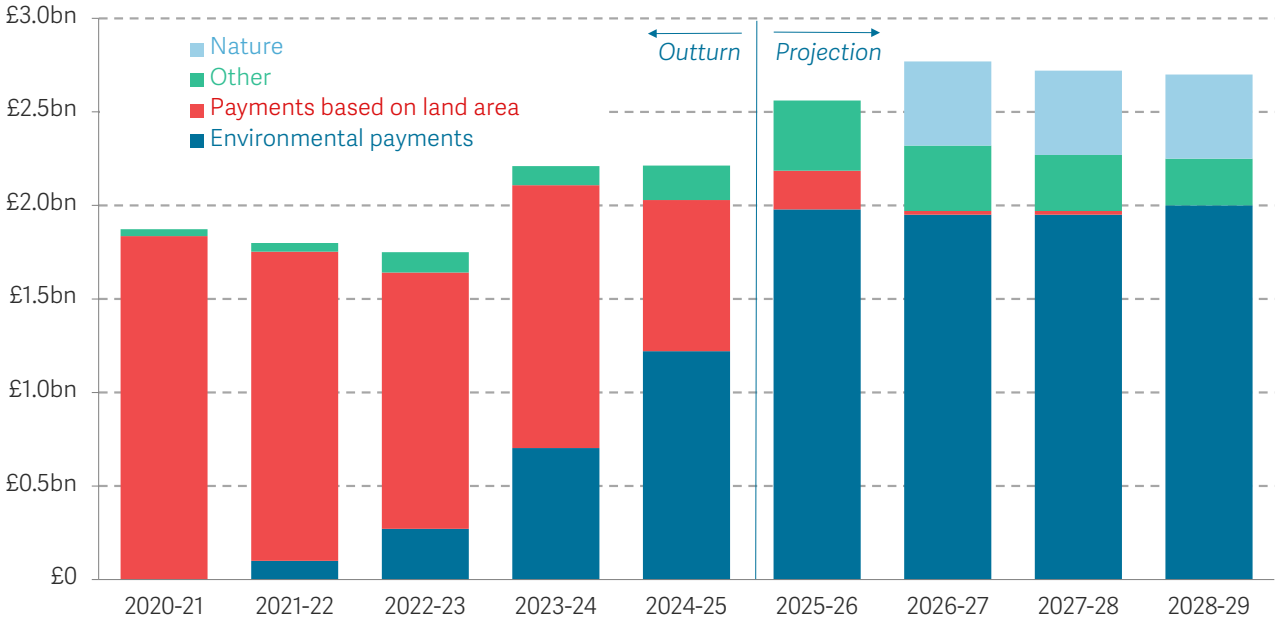
Environmental aims underpin the ongoing overhaul of farming's generous and long-standing subsidy regime. Although the total public budget for farm support has increased from around £2 billion to £2.5 billion, in current prices, since the start of the decade (see Figure 3 below), the composition of this spending is undergoing a rapid transition. The 2020 Agriculture Act, implemented by the Boris Johnson-led Conservative Government, set out how payments to farmers would move away from those linked to the area of land farmed, to subsidies for providing 'public good' between 2021 and 2027.[10]

This change has upended decades of stability in how farmers are subsidised. The value of payments under the basic payments scheme – a residue of EU agricultural policy which mostly allocates subsidy according to the area of farmed land – was overtaken by those associated with environmental outcomes in 2023-24, with the latter becoming the dominant form of support in England from 2024-25 onward and almost entirely displacing the old system during 2025-26, as Figure 3 also shows.

9 For more, see: Defra, World-leading Environment Act becomes law, November 2021.
10 In England, this transition is taking place primarily through Environmental Land Management schemes (ELMs), which include the Sustainable Farming Incentive (SFI), Countryside Stewardship Plus, and the Landscape Recovery programme. Each scheme places a different emphasis on actions ranging from incremental on-farm improvements to large-scale land use change such as peatland restoration or habitat creation – and rewards farmers accordingly.

FIGURE 3: **Farming subsidies are increasingly linked to environmental outcomes**

Composition of public spending on agriculture, historical and projected: England



NOTES: EU-administered payments not shown. Environmental payments includes Sustainable Farming Incentive, Countryside Stewardship Scheme and other Environmental Land Management schemes. Nature includes Defra nature schemes not covered by Environmental Land Management. Area-based payments are provided by the Basic Payment Scheme.
SOURCE: RF analysis of Defra, Rural Payments Agency data.

Farmers can now be paid for a wide variety of actions – from establishing wildflower margins and reducing pesticide use to improving animal health and welfare, planting cover crops, or restoring hedgerows and riparian zones, instead of for just farming land.[11]

But UK farmers produce much of the food we consume (62 per cent of all food eaten, and 75 per cent of that which can be grown in the UK's climate) and are essential in maintaining good levels of food security – a valid priority for this, or any, Government.[12] But the competing wider objectives put on farmers represent a profound cultural and economic shift and come with a risk of disrupting the supply chain behind the food we all eat, with many of these new demands having limited direct connection to food production.

Farms face these challenges in poor financial health

Delivering such deep change is made harder by farming's fragile economic foundations – many of which were recently spelt out in the Farming Profitability Review.[13] Despite

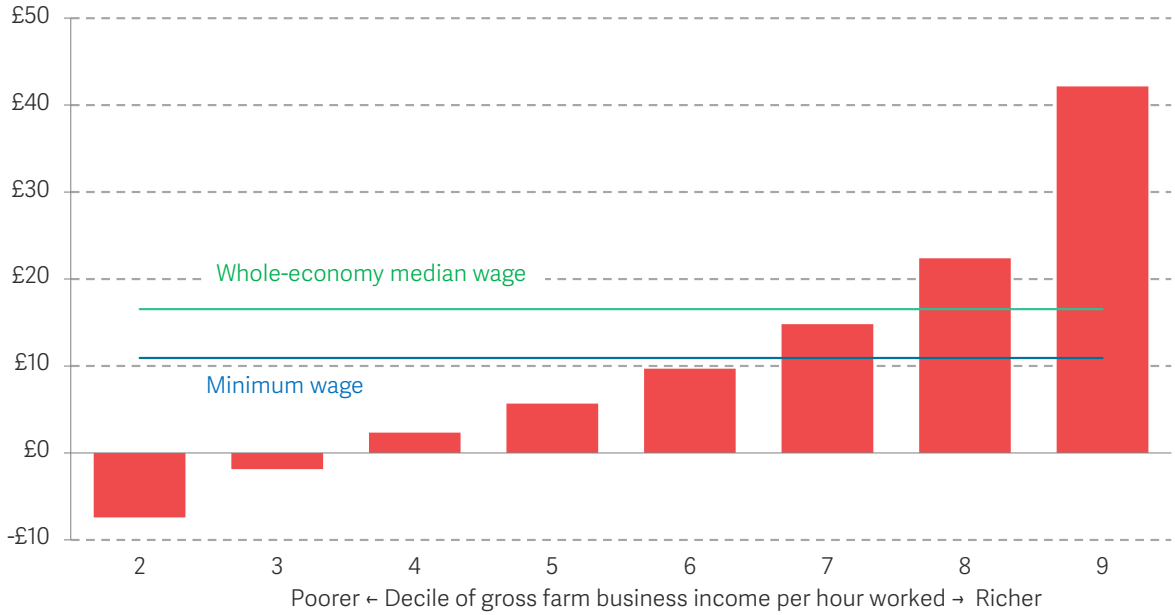
11 UK Government, Environment Act 2021, accessed December 2025.
12 See: Defra, A UK government food strategy for England, considering the wider UK food system, July 2025 and Defra, United Kingdom Food Security Report 2024, December 2024.
13 M Batters, Farming Profitability Review 2025: an independent review, Defra, December 2025.

strong long-run increases in input-adjusted productivity (known as 'total factor productivity', which is up 53 per cent since 1973, or 0.8 per cent per year – compared to just 14 per cent for the whole economy in a similar period), financial returns remain anaemic.[14]

In 2024, the most recent year for which complete data is available, workers on a typical family farm that depend on farm business income for their earnings made the equivalent of just £6 per hour worked (even after government subsidies), just over half the minimum wage in that year, as Figure 4 shows.[15] Indeed, almost a third (30 per cent) of farms made a loss in 2023-24, meaning they effectively paid to farm, a figure that increases to more than half (55 per cent) were subsidies removed.[16]

FIGURE 4: **Hourly returns in farming are often well below the minimum wage**

Farmer income per hour worked, by decile of farmer income per hour worked: England and Wales, 2023-24



NOTES: Wages from farm profit are calculated by dividing farm business income – a measure which includes all agricultural and diversified farm income and subsidies, less total farm costs – by the total number of unpaid hours worked by employees of the farm. Unpaid hours are those done by any employee which do not attract a wage rate and are paid out of profit in the business. In reality unpaid employees at the same farm may be paid different amounts. This does not account for the possibility that some business costs may be inseparable from family incomes and living standards (such as domestic energy where farmers live and work in the same place). Deciles 10 and 1 are excluded due to outliers.
SOURCE: RF analysis of Defra Farm Business Survey.

14 Defra, Total Factor Productivity of the United Kingdom agricultural industry in 2024, June 2025; and R Feenstra, R Inklaar & M Timmer, The Next Generation of the Penn World Table, American Economic Review, 2015.
15 RF analysis of Defra, Farm Business Survey, 2023-24. For more information on the definition of profit used see Defra, Farm Business Income by farm type in England 2024/25, November 2025. Total factor productivity growth measures increases in outputs that can't be explained by higher inputs, such as additional labour, capital, or land.
16 Complete data is not yet available for 2024-25, but headline figures suggest that average farmer incomes rose by 48 per cent compared to 2023-24, reflecting the variability of farming incomes. Though a substantial increase, if the median farmer wage we calculate here rose by the same amount, it would still not rise above the minimum wage.

As well as being low for the majority, farming incomes are also highly variable. Some level of price volatility is expected in any business: variations provide important signals to steer production and investment decisions. But farming is more impacted by volatility than most other sectors: weather patterns often drive short term yields, demand for food is highly inelastic, and sunk investments in land and machinery result in time lags between price signals and production decisions. Farmers are also highly exposed to uncontrollable and unpredictable shocks such as extreme weather, with the effects of climate change increasingly impacting growing seasons and yields.[17] At the same time, farmers are typically price takers with little market power, cannot easily pass rising input costs on to consumers, and rely heavily on volatile global inputs like energy and fertilizer – themselves another source of volatility. These pressures can shift profitability dramatically from one year to the next, even for well-managed businesses.

Within this variability, famine years are unfortunately more common than feast. Over the 20 years to 2023-24, the average annual farm income was £65,100. Yet in five of those years, earnings fell below 75 per cent of that average; in three years they exceeded 125 per cent.[18] This level of volatility far surpasses that seen in most sectors of the economy.

Many farmers hold substantial wealth, particularly in land and buildings. The typical family farm has assets worth around £1.5 million, roughly five times the £294,000 owned by the typical household.[19] Indeed, even the average level of wealth across the lowest-income farms sits comfortably above that level.[20] When couched against levels of capital 'invested', farming's low earnings look even more stark. Even in years of record profits, returns on capital are typically less than 1 per cent, far below what similar levels of wealth might earn elsewhere.[21] For example, global equity funds have returned an average of 9 per cent over the past two decades.[22] Why, then, do farmers tolerate such low and unstable earnings?

The answer lies beyond economics. Our interviews with farmers from across England, Scotland and Wales all highlighted the lifestyle, identity, and cultural heritage associated with running a family farm. As one explained:

17 A recent survey of farmers found that more than eight-in-ten reported that extreme weather had reduced their productivity (87 per cent) or led to declines in crop yields or livestock output (84 per cent). Three quarters had seen a reduction in income as a result. (From: T Lancaster, Farmer confidence battered by climate change – new research, Energy and Climate Intelligence Unit, July 2025.)
18 Figures in 2024-25 prices. Source: RF analysis of Defra, Farm Business Income, November 2025.
19 RF analysis of Defra, Farm Business Survey, 2023-24; ONS, Household total wealth in Great Britain: 2020-2022, January 2025.
20 Source: RF analysis of Defra Farm Business Survey data.
21 The return on capital is income (subtracting labour inputs) divided by asset values. Unpaid labour was valued according to market rates for agricultural labour. Asset values are taken from 2023-24 Farm Business Survey, while the highest average farm business income on record is £96,000 from 2022-23.
22 See, for example: MSCI, All Country World Index, accessed December 2025.

> *"I think family farms are a lifestyle choice. I don't think you're in it to make big money."*
>
> **(Farmer)**

This emotional tie to farming – a revealed preference that explains why farmers persist against the economic odds – helps explain why decisions are often shaped by more than narrow commercial logic. Our interviewees described farming as a vocation, a family legacy, and a deeply rooted identity as much as a business activity. Crucially, many also expressed a strong reluctance to liquidate assets and invest elsewhere, both because of the emotional significance attached to long-held farms and due to a desire to pass the business on to the next generation:

> *"Do we go and cash in as such because we are asset rich and we are very cash poor in a manner of a lot of farmers. Do we sell up? No, we carry on going."*
>
> **(Farmer)**

> *"So we don't really have the money at the minute...we can't sell the farm because the farm has been there for generations."*
>
> **(Farmer)**

These cultural and emotional ties help explain why many remain in the sector despite seemingly relentless financial pressure. But farming's thin and unstable margins come at a cost: they leave little room for new investment; reduce farmers' capacity to absorb risk; and – most importantly for the subject of this report – make it harder to respond to new demands associated with meeting environmental and climate goals.

Farming productivity is low and shielded from competitive pressure

The strong desire to maintain family and cultural traditions, combined with the security provided by high wealth, means the farming sector lacks dynamism seen elsewhere in the economy. This inertia is structurally evident in the life cycle of farm businesses, which show the lowest rate of 'churn' of any major industry. In 2022, the business birth rate in agriculture was less than 4 per cent, just one third of the UK average (11.5 per cent).[23] We see a similar lack of movement in the workforce: from 2015 to 2019, just 1.5 per cent of agricultural workers moved jobs in each quarter (compared to around 2.5 per cent for the wider working population).[24]

23 Source: RF analysis of ONS Business demography data. Figures include fishing and forestry.
24 N Cominetti et al., Changing jobs?, Resolution Foundation, January 2022.

This low dynamism is a key driver of the low productivity seen across most of the sector: in 2024, 86 per cent of farms used more agricultural inputs than they created in agricultural outputs.[25] This reflects a sector partly shielded from competitive pressure by subsidy, cultural attachment, and the difficulty of new entrants accessing land or capital.

Farm businesses are also mostly tiny. Almost all (98 per cent) are microbusinesses, typically employing two people, and the typical farm holder is almost 60 years old.[26] One-in-three farm holders (29 per cent) are older than 65, compared to less than one-in-twenty (4 per cent) among all working adults.[27] Such an old age profile poses challenges for change today – with many farmers set in their ways – and for labour market supply tomorrow, if not enough young people are entering or rising through the profession. These dangers aren't lost on many of the younger farmers we spoke to:

> *"[Our farm hasn't applied to new environmental schemes]. My granddad's too old. He's not savvy anymore. So it's one of those things that just fly over people's heads."*
>
> **(Farmer)**

> *"There's a farmer [near me] who is 83 today and he's still going, but there's a lot of people that don't have any sons or daughters behind them that are going to carry on".*
>
> **(Farmer)**

These characteristics – an ageing workforce operating small, long-lived firms with low turnover – make rapid behavioural or technological change harder, precisely at a time when environmental goals demand it.

Farms remain central to rural communities and food security

The traditional role of farmers as providers of the nation's food gives them substantial political influence. Domestic production is vital for national food security: the UK currently produces around 62 per cent of the food it consumes (and 75 per cent of that which can be grown in the UK), and increasing this is a priority for the current Government.[28]

More locally, though, farmers are seen as vital to maintain rural culture and the aspects of

25 Defra, Farming evidence – key statistics, October 2025. This is calculated by comparing outputs from the farms' agricultural business with inputs, including labour valued at market rates for agricultural labour. It differs from Farm Business Income as it ignores subsidy, non-agricultural businesses, and values unpaid labour as an input, pushing a greater portion of farm businesses into unprofitability.
26 Defra, Farming evidence – key statistics, October 2025.
27 ONS, Census, 2021.
28 Defra, A UK government food strategy for England, considering the wider UK food system, July 2025 and Defra, United Kingdom Food Security Report 2024, December 2024.

country life that many enjoy. Feedback from people living in very rural areas underscores how farms anchor local economies, provide employment, and help sustain community life.

> *"And the farmer, for instance, if there's snow on the road he's out there. Tractor clearing it. The council doesn't do it... tree comes down in a field and you can call the farmer ... they're not being paid for this. They're really really integral parts of the community."*
>
> **(Rural resident, Wales)**

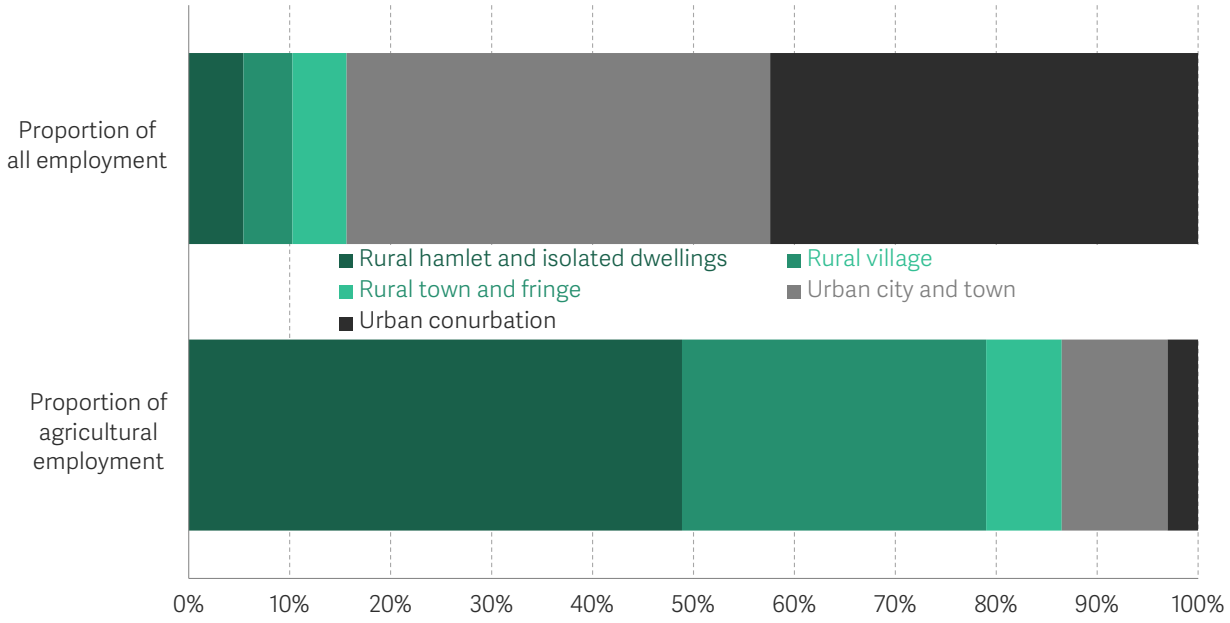
The economic and social value of farming is also clustered in the most remote rural areas, where farm businesses act as anchors for the wider community – providing employment and underpinning entire supply chains.

The very nature of farming – particularly the requirement for large areas of undeveloped land on which food can be grown – means that farmers are spread widely across England's countryside. Focusing on England, where around 300,000 people work in farming, it is perhaps unsurprising that these jobs are overwhelmingly in rural places. Half (49 per cent) of all agricultural employment is in the most agrestic areas (see Figure 5), where just 5 per cent of all jobs are located. This means that while agriculture accounts for a small fraction of the workforce, it represents a much higher proportion of workers – around one-in-eight (12 per cent) – in very rural places where other employment opportunities can be hard to find.[29]

29 RF analysis of Defra, Statistical digest of rural England, 2022-23.

FIGURE 5: **Agricultural employment is concentrated in the most rural places**

Proportion of agricultural employment and all employment, by rural-urban classification: England, 2022-23



SOURCE: RF analysis of Defra, Statistical digest of rural England.

Hard data on the economic importance of farmers to local economies is sparse. They only employ around 160,000 people as on-farm workers UK wide, but they do support a number of supply chains (from vets to machinery salespeople).[30] So to get a better picture on the importance of farming to rural Britain, we talked to people living in these very rural areas who were not themselves farmers.[31] They told us about all the ways that farms have value in their area, particularly through their diversified activities, which make farms little community hubs.

> *"[There's a] Christmas tree farm, pumpkin farms. About and a half mile away from me. There's [a farm] that's made the entrance to the farm like a little picnic area with a few slides for the kids, but they've also got vending machines where you can get milk and meat that's produced on the farm. You can also get milkshakes and hot drinks, there's a veg shed. They have a like food trailer every day serving breakfast and lunch."*
>
> **(Rural resident, South West)**

30 M Batters, Farming Profitability Review 2025: an independent review, Defra, December 2025.
31 To deepen our understanding of the economic importance of farming to rural Britain we conducted an online focus group with eight participants from across the country. Here we asked about their emotional, cultural and economic links to farmers and the farming community, developing insight hard to accrue from quantitative research alone.

It's noteworthy that participants focused more on the economic contributions made by farmers that have diversified away from just food production. When it came to farming itself, it was the cultural importance to the area's traditions and respect for farmers' role as stewards of the land that shone through most strongly.

> *"The thing about farming is it's a constant, it's always been here and I think everything that's been mentioned about farm shops [is important], but it's the fact that it's just so long standing. [Farming has] gone through generations. The benefits aren't sort of directly economical, but there's a lot of nostalgia around here about farms"*
>
> **(Rural resident, East Midlands)**

Ultimately, when asked, several residents said that farming decarbonisation and land use change would have little direct economic impact on them or on their surrounding area. This suggests that while farming has cultural importance, substantial disruption to the sector is not likely to cause the same level of disruption to local economies (and living standards) than seen in previous industrial transitions, such as the decline of coal mining.

> *"Yeah, it would upset me, but would it have a direct impact [on me or the economy]? Maybe not."*
>
> **(Rural resident, East Midlands)**

> *"I don't think I'd ever notice [the decarbonisation of farming]. It won't make any difference to me."*
>
> **(Rural resident, West Midlands)**

So although farming is central to many rural communities, we shouldn't assume that disruption from decarbonisation brings big material impacts for those living close by. This is because rural economies are typically more diverse than they appear, with income and employment spread across multiple industries beyond agriculture.

This section has shown that agricultural decarbonisation needs to accelerate against a backdrop of farmers being asked to deliver a wider range of environmental outcomes, while operating on thin margins and within structures that make such change difficult. Understanding this starting point is essential for assessing how decarbonisation could affect living standards – both through food prices and through the incomes and resilience of farm households themselves. The next section turns to these questions, starting with potential implications for the weekly shop.

Section 3

The impact of decarbonisation on food prices is manageable

Decarbonising farming isn't costless and it is important to ask how big these costs are and who bears them. According to the CCC, the costs of greening the food system will add less than £1 billion a year to the cost of producing food. At peak, this will only add 3 per cent to the value of annual farm output between now and 2050 – an entirely manageable sum. But even if the costs are modest, it's still important to consider who bears them: the distribution of costs is more important than their magnitude.

Farmers are economically fragile and could be harmed substantially by new costs. Food and farming are highly competitive industries with many prices set on world markets, meaning farmers operate with limited power to recover increases in input or operating costs. Razor-thin margins mean that even a modest 3 per cent increase in costs could have detrimental effects on the farming sector, resulting in a fall in annual farm income of around a fifth.

It might therefore be better for consumers to bear the brunt through higher prices. A wrong move here risks pushing up food prices for households already hit by the high cost of living. But our analysis shows that the impact on households would be small, particularly because farm output prices make up only a small fraction of grocery bills. Even if the entire cost were transferred to consumers, we estimate the additional increase in food price levels would be less than 1 per cent.

Policy should focus on passing these costs through to consumers – something unlikely without Government intervention. Here we should look to regulating bigger actors – such as supermarkets – who have more capacity to drive change.

One of the two major parts of the net zero transition on farms will be making food production greener. This won't be without costs, particularly in the case of greener machinery and more expensive inputs, and for most farms costs aren't likely to be offset by operational savings – as is the case for, say, the transition to electric vehicles. So net

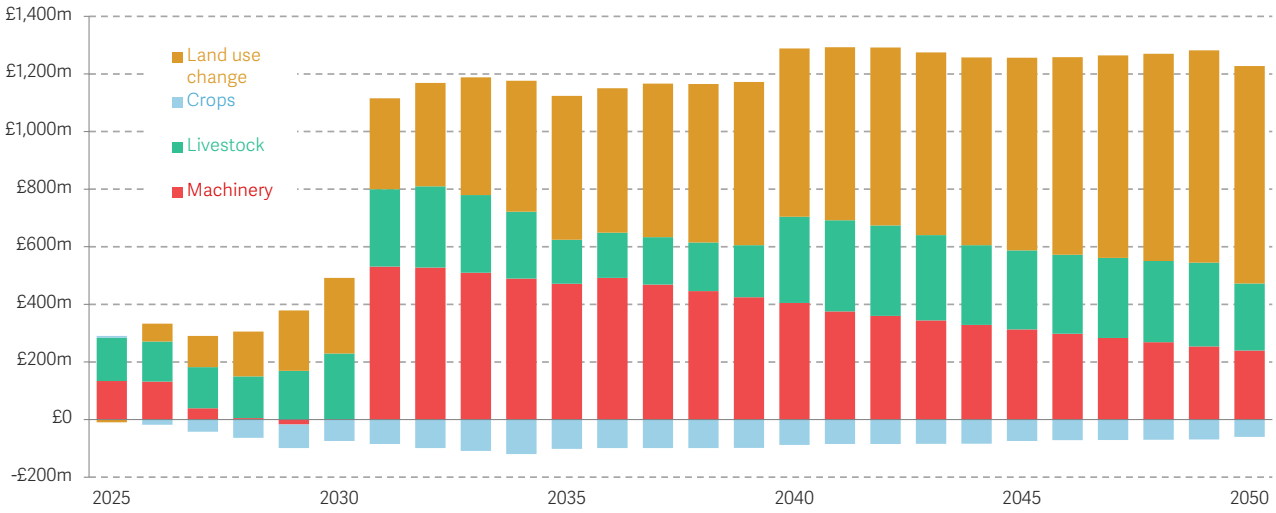
zero does mean a permanently more expensive food system than the one we have today – but how much more expensive?

Low carbon farming won't cost the earth

The clear good news is that we expect the costs of decarbonising food production to be low. The CCC estimates that costs should be less than £1 billion a year in today's prices (topping out at £720 million in 2032 when costs associated with land use change away from agricultural production are excluded) between now and 2050.[32] Comparing this to the annual value of agricultural output shows that this is a small figure (Figure 6) – at most just 2.5 per cent of the value of current annual farm output. This peaks in 2030 then gradually falls as machinery cost reductions come through.[33]

FIGURE 6: **Changing food production will only cost a small fraction of the sector's revenue**

Additional system costs in agriculture as a percentage of 2023 agricultural output, by type: UK



NOTES: This includes both capital and operating costs. Capital costs are smoothed over the lifetime of the asset. Costs are expressed as a percentage of estimated sales at the farm gate to approximate the proportional increase in output prices necessary to absorb decarbonisation costs while holding profit and other inputs equal. This includes all measures that will coexist alongside agricultural production. Most of these are changes to food production methods but some land use changes, such as hedgerows and paludiculture, are also included.
SOURCE: RF analysis of Climate Change Committee, Seventh Carbon Budget; Defra, Agriculture in the United Kingdom 2024.

32 Climate Change Committee, Seventh Carbon Budget, February 2025. This includes both costs of low carbon farming practices, decarbonizing machinery, and costs of land use change where that will happen alongside agricultural production, such as paludiculture. Costs of land use change that will replace agricultural production are not included.

33 The main pressure on farming budgets will be electrifying farm machinery, accounting for two-thirds (67 per cent) of net additional costs over the coming two-and-a-half decades.

This relatively modest cost reflects several factors. First, food production does not need to fully decarbonise to meet net zero, obviating the need for the most difficult solutions.[34] Second, some of the measures the CCC recommends cut emissions by increasing yields, so they have upsides as well as costs. This is particularly true of measures to improve soil health, which will save farmers money on aggregate.

This estimate suggests that there should be relatively little difficulty in absorbing the extra costs from the transition to net zero. And to the extent that farmers abroad are also seeing their costs rise, the net zero transition should manifest as slightly higher global prices. But some countries will inevitably lag behind, putting UK farmers at a disadvantage.

The question of who should bear the costs for greening our food system is one that demands the attention of policy makers. So below we discuss how it should be borne by farmers, households (through higher food prices), or other actors in the agri-food supply chain.

The likely place for costs to land is on farmers

It is farmers who will shell out for upgrades to their equipment and see higher costs of business practices, and those we spoke to were clear that the financial burden of transition is at the front of their mind. For businesses already operating on tight margins, looming future costs justifiably create anxiety about whether decarbonisation is economically viable. This was borne out in our interviews.

> *"It's a shame that it all comes down to money always, but at the end of the day, farmers are businesspeople and we've got to make [low-carbon farming] stack up."*
>
> **(Farmer)**

Costs falling directly on farmers would not be an issue if accompanied by a commensurate rise in output prices. But there are good reasons to think farmers are right in suspecting they will end up bearing most of the costs. A consistent theme in our interviews was the difficulty farmers face in influencing the price they receive for their goods. If true, it would be tough to meet higher environmental standards without reduced profit. As one put it succinctly:

> *"Farmers are very much price takers, not price makers"*
>
> **(Farmer)**

34 The CCC's modelling suggests that negative emissions in the land use sector – from, say, new forests – can broadly offset residual agricultural emissions from unavoidable or hard-to-abate sources like ruminants and fertiliser. Source: Climate Change Committee, Seventh Carbon Budget, February 2025.

> *"It doesn't matter what the input [costs] were [...] we're going to go and sell our corn and we're told what price we're selling it for."*
>
> **(Farmer)**

This perception is grounded in economic reality. Farmers sell homogenous goods into a highly competitive world market, with prices set globally in many cases. With around 35 per cent of the UK's food imported, wholesalers are deeply integrated into global markets, and as such will look to source their products as cheaply as possible, wherever they are grown.[35] The farmers we spoke to are well aware of this exposure to industry abroad:

> *"Why do [supermarkets] buy from New Zealand or America? [...] Well, it's because it's cheaper"*
>
> **(Farmer)**

"You've got no say at all over the price [in] your corner. It's got nothing really to do with what's happening in this country. It's all to do with global demand and geopolitics"

> **(Tenant farmer)**

This comes with benefits for consumers – food prices in the UK are 12 per cent lower than the OECD average despite the UK's overall price level being 8 per cent higher.[36] But it puts strain on farmers. Interviewees often mentioned the threat to small family farmers of losing a contract, and the ability supermarkets have to switch suppliers easily – not just to imports but to other family farms willing to sell at the price supermarkets want. Several contrasted this the situation in some other countries.

> *"Well, you go to somewhere like France, they have more like a cooperative [system]... They all kind of band together and fight for what they believe in... But British farmers tend to not."*
>
> **(Farmer)**

Taken together, these structural realities severely limit farmers' ability to pass on additional costs without policy to help.

If the costs of the transition are indeed simply absorbed within farm budgets, the impact on farm incomes could be substantial. Figure 7 shows how extra costs (consistent with

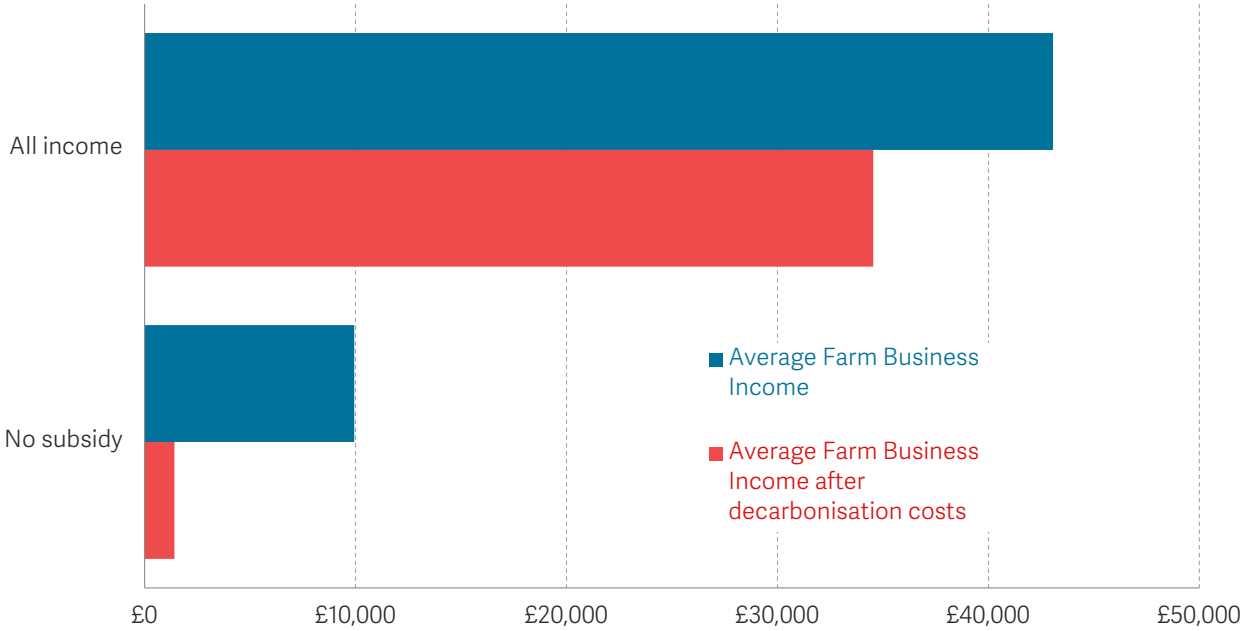
35 The recent increases in food prices provide several examples of our dependence on global markets for our food prices. According to ECIU two-fifths of the recent food inflation can be accounted for by five products that have seen price rises due to extreme weather. Some of this has been driven by domestic shocks to beef production, but these price rises have followed through to consumers partly because beef is growing in prices everywhere. Source: ECIU, Why food prices are still rising, October 2025; AHDB, Global cattle prices, accessed 3 December 2025.

36 Defra, Competition and profitability in the grocery sector, July 2024; S Pittaway & Z Janan, Resolution Foundation, Whose price is it anyway?, January 2025 https://doi.org/10.63492/UQEX34

the additional system costs calculated by the CCC, allowing for greater cost pressures on livestock farms than on those producing crops) would change farm business incomes. Impacts on incomes are shown with and without other sources like subsidies and non-agricultural revenue raisers. The razor-thin – and often negative – margins discussed in Section 2 mean that even a 2.5 per cent increase in costs would reduce average farmer pay last year by around a fifth (from £43,000 to £35,000), all else being equal. Worse still, one-in-twenty farms would drop into the red. And when subsidy is excluded, median farm income would have fallen close to zero.

FIGURE 7: **Many farm businesses would struggle to stay afloat if they had to absorb the costs of decarbonising food production**

Farm business income, with and without net zero costs: England, 2023-24



NOTES: Subsidy includes both basic payments and payments from the new environmental subsidy schemes. Non-agri income includes other income sources, such as retail, tourism, hirework for other farms, and rent. Non-agri income is likely to be underestimated, as diversified income sources only appear where they accrue to the farm business. Calculations assume that farms experience homogenous increases in their livestock, crops, and general costs equal to that required to meet maximum 2.5 per cent increase in costs shown in Figure 6.
SOURCE: RF analysis of CCC, Seventh Carbon Budget Dataset; Defra, Farm Business Survey.

These averages also likely understate the downside risk to less-productive farms. The figure above assumes that farms are affected similarly, but there will naturally be a lot of diversity – not least between farms growing different foods. So some will face much bigger falls in income if forced to bear the costs of change.

To pick one example, most of the costs of low carbon farming will come from more expensive machinery. This is a change every farmer will have to engage with, so one might expect it to affect farmers similarly.

> *"Everybody needs tractors and machinery. Even if you've only got pigs, or even if you've only got cattle and you don't have any arable, you're still going to need some machinery."*
>
> **(Farmer)**

But this is far from the truth. The impact of switching out machinery depends on the farmer's methods – those we spoke to ranged between high-intensity methods, where machinery is worked as hard as possible, to those preferring low-intensity, 'minimum-tilling' methods that make lighter use of machines. Another difference is where farmers buy their machinery. Buying second-hand is a popular source of farming machinery but a comparable second-hand market for low-carbon alternatives could be decades away for the farmer we spoke to whose newest piece of machinery was from 2007. Those starting with older equipment, or using more of it, will see a bigger step up in costs.

> *"We run very old bits of kit. That's how we pay our bills. We're not taking out loans for new tractors... The cost of some of those things would be absolutely beyond us."*
>
> **(Farmer)**

Consumers are better placed to take on the costs of decarbonising food

The relatively severe impacts reflect the financial fragility of the farming sector rather than the large size of the costs themselves. But it means that the end consumer may be better placed to bear some of the brunt through higher food prices. If all costs of decarbonising food production were borne by households, and the profits of farms were unchanged, there would be a permanent rise in the cost of agricultural goods of around 2.5 per cent a year, adding to the cost of living challenges we face as a country.

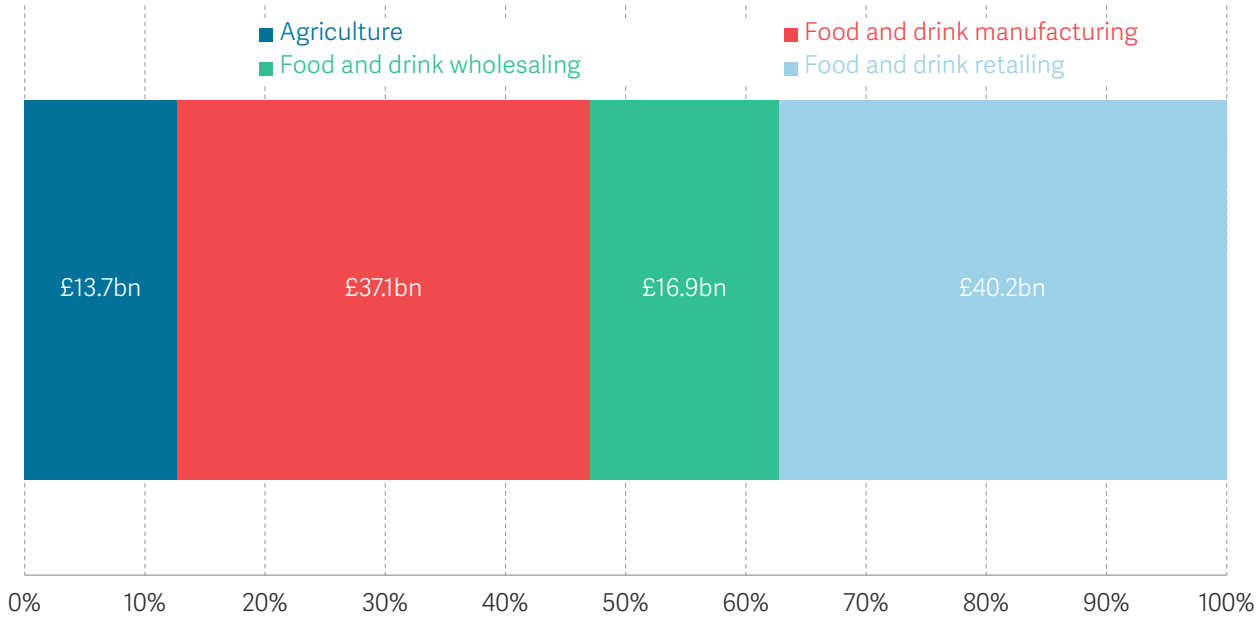
But the price of food in the shops would rise by much less. Farm gate prices make up only a small part of the cost of a weekly shop. Instead, much of the final consumer price comes from processing farm goods, distributing them, and the costs associated with retail.[37] All told, agriculture makes up just a tenth of the value of the UK's agri-food sector (excluding value added from restaurants and cafes serving food outside of the home), as Figure 8 shows.[38]

37 Sustain, Unpicking Food Prices, December 2022

38 That's not just because we import so much of our food. Even allowing for the fact that we produce less than two-thirds of what we eat, agriculture still makes up less than a fifth of the value of the food sector. Source: Defra, Agriculture in the United Kingdom 2024 Chapter 14: The Food Chain, July 2025. Assuming that GVA of imports is proportional to GVA of domestically produced food, then increasing production to 100 per cent of the food we consume would increase agricultural GVA to £21 billion, or 18 per cent of GVA in the UK food sector.

FIGURE 8: **Farm output prices are only a small part of the food system**

Gross value add of the agri-food chain, by category: UK, 2023

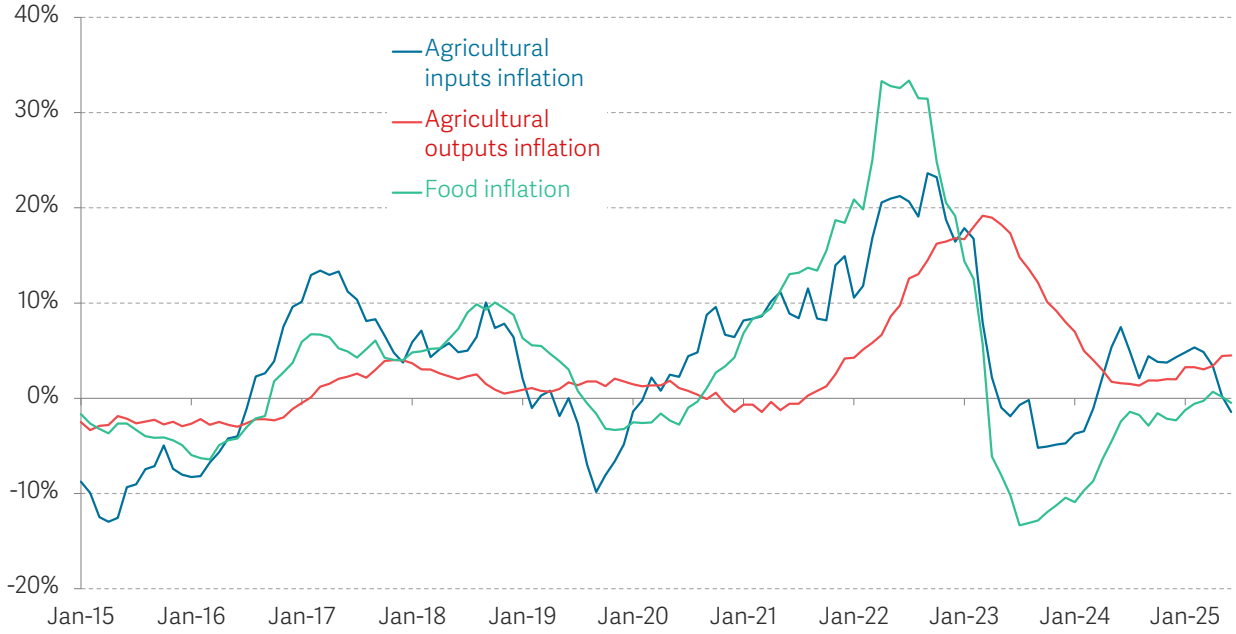


NOTES: The prepared food sector is excluded.
SOURCE: RF analysis of Defra, Agriculture in the United Kingdom 2024.

This means that rises in agricultural prices will be expected to have a smaller effect on consumer food prices. As shown in Figure 9, high historical swings in agriculture input costs have fed through to much smaller swings in food prices. For example, the sharp peaks in input costs in 2021-22 led, eventually, to a moderate and temporary uptick in food prices. And in the three years following January 2016 agricultural output prices rose 19 per cent, over four times more than the 4 per cent rise in food prices. Ultimately, the cost of growing food just isn't a huge portion of the cost of supplying food.

FIGURE 9: **Agricultural input and output prices are more volatile than food prices**

Agricultural input and output inflation, and food inflation: UK



SOURCE: RF analysis of ONS, Food price index; Defra, Agricultural price indices.

Even if we assume that retailers' margins remain unchanged, the effect of decarbonising agriculture remains very small. If farm-level price changes were passed through proportionally to agriculture's share of the total food sector (once imports are accounted for), the entire transition would raise food price levels by no more than 0.5 per cent, a negligible impact.[39] Indeed, there are several months in 2025 in which food prices increased by more than that.[40] Price pressures already present in the food system dwarf the expected effects of greening farming, even under the assumption that every pound of decarbonisation cost is pushed directly to consumers.[41]

It is, however, worth questioning whether poorer households will see bigger rises for the foods they buy

So far, we have thought only about food prices at the aggregate level. But the link between decarbonisation and higher food prices won't be the same across all food types. As shown in Figure 10, for items that undergo minimal processing – such as meat, milk or

39 If the average impact on farm gate prices is 2.5 per cent and UK farming represents 18 per cent of the cost of food, that suggests an average impact on food prices of 0.5 per cent.

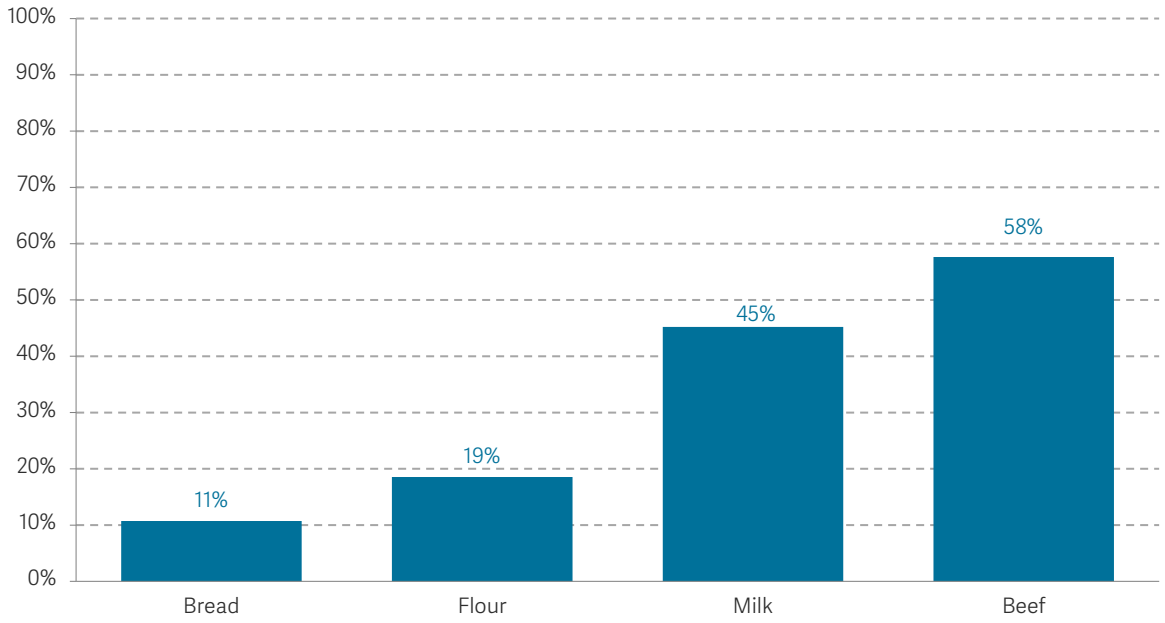
40 Month on month food inflation was 0.6 per cent in January 2025, 0.6 per cent in April 2025, and 0.7 per cent in May 2025. Source: ONS, CPI Index for Food, December 2025.

41 Of course, any long-term estimate of costs is uncertain. The Climate Change Committee's projections we use are highly likely to change as technologies mature, costs fall, or practical challenges emerge – points that farmers themselves emphasised in our conversations. But even if the real costs of low-carbon farming end up an order of magnitude higher than CCC estimates, the resulting price impact by 2050 would still be smaller than the food inflation the UK has weathered in the past year alone.

cheese – over half of the final price can reflect what happens on the farm, rendering them more exposed to cost pressures. For more processed products like bread or flour, farm gate costs account for less than a tenth of the shelf price, with the bulk added by millers, bakers, processors, and supermarkets.

FIGURE 10: **Cost pressures on the farm won't affect all supermarket prices equally**

Farm gate price as a proportion of cheapest available Tesco price, by foodstuff: England, 2026



SOURCE: RF analysis of AHDB, UK Farmgate prices; Tesco prices.
NOTES: All price comparisons are made with cheapest available Tesco product. Bread and flour compare wheat prices with the price of sliced white bread and strong bread flour respectively; milk compares farm gate milk prices with whole milk; and beef compares deadweight cattle prices with that of diced beef.

Higher prices for certain goods could, in theory, be problematic. Lower-income families already spend a higher proportion of their income on groceries, and so are more exposed to increases in prices. But despite the disproportionate impact on poorer families, the small magnitude of cost changes means impact should be negligible. But if price rises are concentrated in the foods that low-income families buy most, the harm to living standards could be considerably higher. Here we find that, thankfully, spending patterns are relatively even across the income distribution: both the richest and poorest fifth of families spend half (49 per cent) of grocery budgets on unprocessed foods and a sixth (16 per cent) on meat and dairy.[42] In other words, the types of products most sensitive to farm-level price changes do not make up a disproportionately large share of the food budgets of low-income families.[43]

42 RF analysis of ONS, Living Cost and Food Survey.
43 But what ultimately matters for living standards is the overall rate of food price inflation, not isolated movements in the price of particular products. And here the evidence shows that decarbonising UK agriculture will have only a negligible effect on that aggregate.

And, crucially, consumers retain the ability to adjust their baskets over time, substituting toward cheaper lower-carbon alternatives as a rational response to price shifts. This change of consumption patterns (commonly referred to as 'diet change') is a contested part of the net zero transition: many campaigners say it is necessary and indeed the CCC underpins its carbon budgets with projections of falling meat and dairy consumption.[44] But successive UK governments have been reluctant to lean into diet change as an explicit policy solution, even though there has been a long-term trend of changing food consumption in UK households, something we discuss in Box 2 below.

BOX 2: **British families are already shifting towards lower-carbon diets**

Meat and dairy sit at the heart of food's environmental footprint. Ruminant livestock such as cattle and sheep generate large quantities of methane – a greenhouse gas far more potent than carbon dioxide – and requires far more land and food to produce than crops or poultry do. Producing a kilogram of beef uses around 27 times as much farmland as chicken, and emits roughly ten times as much greenhouse gas. [45] For this reason, the CCC and others argue that meeting the UK's climate targets requires significant diet change: reducing meat consumption by a third by 2050, and dairy consumption by around a fifth.[46]

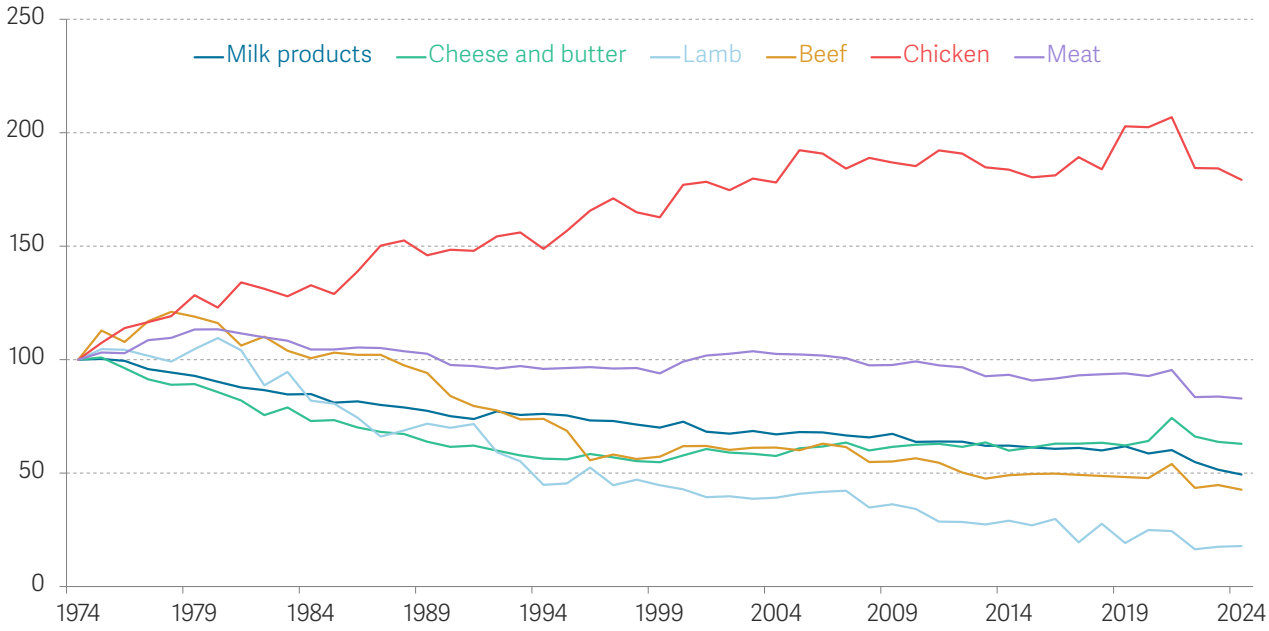
Diet change seems to touch something deeply personal, cultural, and emotionally charged, and any suggestion of change (even if voluntary) often results in political blowback.[47] As such, the Government has explicitly ruled out measures designed to change patterns of food consumption.[48]

But there are signs that British diets are moving in this direction anyway, with dramatic shifts in grocery shops over the past half-century: per-capita lamb consumption has fallen by around three-quarters, beef consumption by half, and milk consumption has drifted downward (see Figure 11). Chicken is the only major meat whose popularity has grown. If these trends continue, we may end up decarbonising our diets naturally and without much explicit government intervention.

44 Green Alliance, A better food system for people and the planet, accessed 15 January 2026; CCC Seventh Carbon Budget, June 2025.
45 When the comparator is a crop such as wheat, the ratios rise to 85 times as much land and 63 times as many carbon emissions per kilogram of food. Source: Our World In Data, Greenhouse gas emissions and land use per kg of food product, accessed 3 December 2025.
46 Climate Change Committee, Seventh Carbon Budget, February 2025.
47 See, for example: J Leake, Britons urged to eat less meat to hit latest net zero target, Daily Telegraph, October 2024; T Gordon, Plans to tell families to eat less meat could be death-knell for the Sunday roast, Daily Mail, May 2025; F Harvey, UK urged to act now on net zero – and skip two kebabs' worth of meat a week, the Guardian, February 2025; J Saunders, Labour risks sparking 'public unrest' by forcing Britons to eat less meat, Tories warn, GB News, October 2024.
48 D Maddox, I won't make Britons cut out meat to meet climate goals, says Starmer, the Independent, March 2025

FIGURE 11: **Families have been replacing beef and lamb with less carbon-intensive meats for decades**

Consumption of food per person, by food type, 1974=100: UK



SOURCES: RF analysis of ONS, Family Food Survey.

Further, nearly a third of people now say they "avoid or eat less meat", and the growth of vegetarian, pescatarian and especially flexitarian diets suggests a continued willingness to adapt. Average levels of meat consumption declined by 17 per cent in the decade between 2008–09 and 2018–19, and retailers have reported a rapid expansion in plant-based alternatives.[49] So the extent to which any policy intervention is needed in this area is at least unclear. Nonetheless, any strategy involving dietary shift must balance climate ambition with public consent, economic impacts on farming communities, and the realities of people's everyday lives.

Policy should focus on helping farmers pass their costs on

The tension between a moderate cost increase to the consumer and an existential risk to some farmers should set the tone for how Government should act. For example, an obvious response to the potential threat to farmers' profitability would be to continue to pay farmers for implementing low-carbon farming methods, and expand schemes to cover

49 For details, see: A Corlett and J Marshall, Shrinking footprints, Resolution Foundation, March 2022.

all of the actions needed from farmers. The Environmental Land Management scheme represents a natural vehicle for this strategy: more climate-focused actions could be added to the long list of practices already eligible for support.[50] This would no doubt be popular with farmers, who reasonably want to be compensated for new demands from Government. But there are several downsides to this approach.

First, using subsidies as a tool to persuade farmers to act as well as to compensate them will involve big giveaways to farmers that would have to well exceed the costs to farmers of decarbonising. This is already happening – currently farmers can be subsidised to take up soil management practices that the CCC estimates will save them money. This amounts to taxpayers taking the hit for farmers' hesitance to change their ways. It may also not even work – farmers we spoke to often raised anecdotes of fellow farmers that would not engage with even generous subsidy schemes.

> *"We went to visit [another] farmer yesterday – whatever you did, you wouldn't incentivise him to go in this [environmental scheme] because he likes how he farms and he doesn't want to be told what to do when he likes doing what he does."*
>
> **(Farmer)**

Second, fixed subsidies will dampen incentives to drive the costs of low-carbon solutions down, as farmers can depend on full compensation and may worry that innovation could lead to the subsidies being withdrawn.

And third, adding more subsidies would also further entrench the preferential treatment already afforded to the food sector at a time when public funds are limited. Current support schemes are already worth around 8 per cent of the value of agricultural output, while VAT exemption on food costs the Government over £30 billion in lost receipts each year.51 It's hard to argue that consumers should be protected more from the costs of food, while expanding subsidies to cover low-carbon measures risks reinforcing protection for farmers.

Instead, regulation should be used to help farmers pass on higher costs

So, if not subsidies, how should the Government think about the policy response? We suggest that the broad aim should be to allow farmers to pass extra production costs up the supply chain (and, if necessary, eventually to consumers).

50 Indeed, recent policy developments suggest this is the direction of travel: alongside the Sustainable Farming Incentive, which supports day-to-day operational changes, Defra has begun issuing targeted grants for emissions-reducing investments such as the slurry infrastructure grant. Source: Defra, Slurry Infrastructure Grant, accessed 3 December 2025.

51 T Leunig, Fiscal options: untangling VAT, Nesta, August 2025. See Figure 3: Farming subsidies are increasingly linked to environmental outcomesFigure 3 for the size of agricultural subsidy.

One option would be to expand the UK's carbon-pricing scheme (the emissions trading scheme, or ETS) to agriculture, internalising carbon costs and allowing imports to be taxed in a way that doesn't undercut domestic production.[52] On the face of it, this makes economic sense. But it would be far from straightforward to implement. Currently, the ETS covers only emissions from large and stationary sources, such as factories or power plants from which carbon production is easy to quantify. Shifting this burden onto farmers would consume significant resource, especially considering the wide range of farming activities across the sector.[53] It would also be challenging to apply carbon pricing to food imports – through expanding the new Carbon Border Adjustment Mechanism – without which supermarkets could easily keep prices down by importing food made to lower standards.

A better approach, then, is for policy makers to use regulation that targets other actors in the supply chain, such as supermarkets and other large distributors, requiring them to procure food meeting farm-level climate standards. A regulatory approach should also incentivise farmers to implement changes as efficiently as possible, to spur much-needed productivity in the sector.

Such a scheme could draw on elements of existing policies. For example, Red Tractor is a voluntary programme that allows farmers to certify that they meet high animal-welfare practices in return for modest price premium. And in transport, the Zero Emissions Vehicle is mandates car manufacturers to increase sales of electric vehicles in-line with Government targets.[54]

A similar 'low-carbon food' mandate, backed up by a certification scheme checking implementation of low-carbon measures and fines on supermarkets or other procurers of food, could require retailers to source a growing proportion of their products from farms that are actively decarbonising production methods. Supermarkets would then have to decide how best to provide the financial incentives or rewards to farmers in return for implementing the necessary changes.

This sort of policy would follow the UK's approach to net zero in other sectors, where regulations have successfully targeted car makers, boiler manufacturers, and energy companies. By acting in a market-led way, this route preserves incentives for efficient implementation while avoiding the complexities of trade policy or direct subsidies. And by targeting the largest and most resilient actors, the Government can ensure that farmers do not feel singled out, and that responsibility for change lies with the best

52 HMRC, Carbon Border Adjustment Mechanism, November 2025.
53 The carbon emissions of a farm are complex to calculate, and depend on a much larger range of factors than areas where fossil fuels account for most emissions. Relevant factors include fertilizer use, soil management practices, crop yields, animal feeds and many more.
54 DfT, ZEV Mandate, January 2024; Red Tractor, About Red Tractor, accessed 3 December 2025.

organised companies with greatest capacity to bear new costs and meet regulatory burdens.

Gradually rising procurement targets should allow a smooth transition, maintain flexibility for both supermarkets and farmers, and ensure food imports can continue while signalling that all products will eventually need to meet domestic standards.[55]

In this section we have argued that, overall, consumers have little to fear from a transition to lower-carbon farming, even in the cases where they bear all the costs of the transition. The bigger risk is in how to fund greener food production without exacerbating the already tight financial conditions for farmers. Rather than turn to subsidies, the Government should prioritise mechanisms that ensure farmers receive a fair price for their products.

But decarbonising food production is only half of the change facing the sector – in the next section we turn to the very different challenges of repurposing how UK land is used.

55 To conform with World Trade Organisation rules, any mandatory accreditation scheme must be 'non-discriminatory' and so have a route to compliance for exporters to the UK. This could be challenging to enforce, but it isn't uncommon for food imports to be affected by farm-level standards and regulations. For example, the recent New Zealand trade deal liberalised imports of lamb but any produced that fail to meet UK food and safety standards will still not be permitted in the UK.

Section 4

Policy makers should be bolder in directing how land is used

Cutting carbon from food production isn't the only challenge facing the agricultural sector. Using land in a way that removes emissions from the atmosphere is central to the Government's net zero plans, and by 2050, it will account for more carbon savings than cleaner food production. But it means big changes: close to a tenth of agricultural land could be taken out of production by the middle of this century.

Unlike low-carbon farming, where extra costs can be passed on to consumers, there is currently no market mechanism to compensate farmers for not farming. Here, subsidies for the provision of public goods will be essential – the Government's Environmental Land Management Scheme is right to provide funding for such non-agricultural activities.

This approach also means substantial upsides for the nation's less productive farms, were they to cease food production. But subsidies alone can't do the job well – we also need to think about how land use change can be concentrated on the least productive land, which may require strong regulatory guidance.

And changing land use shouldn't happen in a way that leaves tenant farmers, some of the nation's most productive, high and dry. Short average lease lengths give landowners a low-resistance route to replacing farming tenants with 'easier' returns from environmental subsidies, but this would bring negatives for those no longer able to farm, and potentially for UK food security. Government policy must ensure tenancy contracts protect farmers, guaranteeing tenants a long-term role in managing the new environmental landscape they occupy.

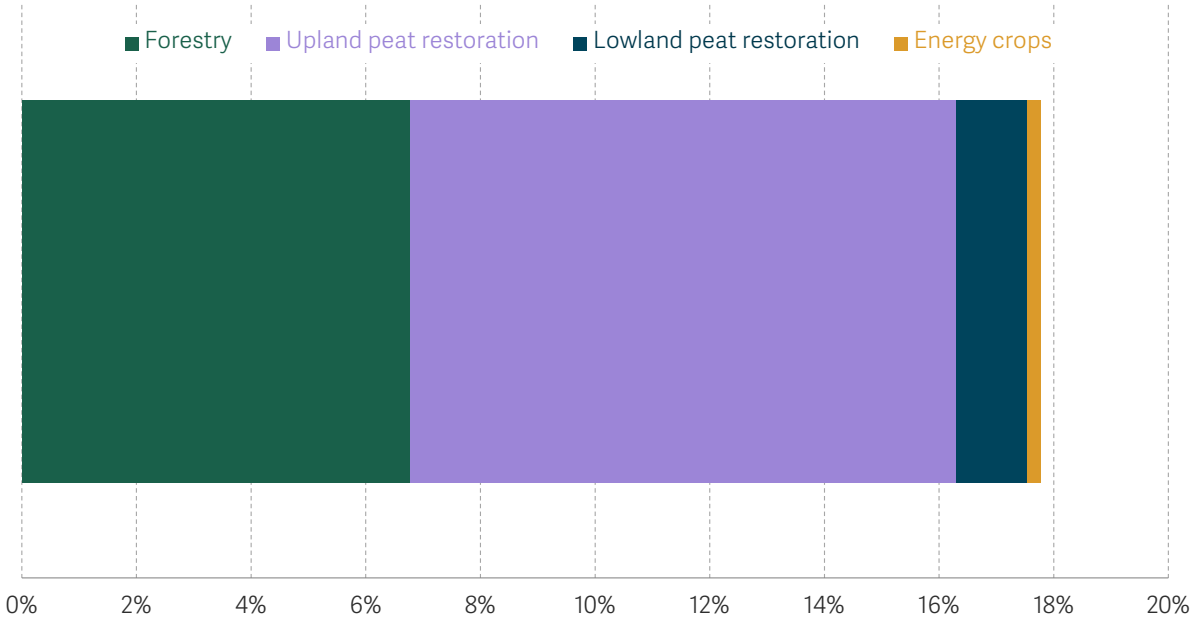
The previous section discussed how the cost of cutting carbon from food production might fall either on consumers or farmers. But this is only part of the overall decarbonisation challenge in the agricultural sector. Land use change, such as restoring

peat land, planting woodland – that is, using carbon offsets – and growing energy crops to produce bio-fuels for transport and electricity generation, is set to deliver around two-and-a-half times more emissions savings than low-carbon farming by 2050, and will mostly have to be managed by farmers.[56]

The latest Government estimates suggest that around 9 per cent of agricultural land in England could be taken out of production by 2050, with another 10 per cent shifting to mixed or multifunctional uses.[57] This is substantial change: close to one fifth of farming land may no longer be used to grow food. As Figure 12 shows, the overwhelming majority (88 per cent) of this land would be repurposed for forestry or restored peatlands, with energy crops and solar playing a smaller role.[58]

FIGURE 12: **Almost one-fifth of agricultural land will make way for forests, restored peat, and energy crops**

Proportion of agricultural land changing use by 2050, by net zero use: UK



SOURCE: RF analysis of CCC, Seventh Carbon Budget.
NOTES: This includes all land that will at least partially transition to a new use. In some cases, this use will be in addition to, rather than replace, agricultural production.

In the rest of this section, we consider the impacts that land use change and the policies to deliver it may have on farmers.

56 RF analysis of CCC, Seventh Carbon Budget, February 2025.
57 Source: RF analysis of Defra, Land Use Framework Consultation.
58 Consistent figures are not available for the land use impact of solar panels, an issue raised frequently by the farmers we talked to. Research suggests that if a highly ambitious solar target of 90GW was entirely met by the most land-hungry ground-mounted solar panels, this would still only require 0.7 per cent of UK land, or less than a tenth of projected land use change linked to carbon targets. Source: University of Lancaster, Researchers use satellite imagery to shed light on UK solar farm land use, April 2025.

Land use change will be a big and uncomfortable change for those affected

The move to low-carbon farming discussed in Section 3 will require adjustments by almost all farmers. Land use change, on the other hand, will affect a far smaller number of farmers, but to a much greater extent. In particular, where agricultural land becomes forest or rewetted peatland, for example, farmers may be asked to stop producing food altogether. This represents a profound cultural shift for a workforce which often sees its core purpose as feeding the nation. Many of the farmers we spoke to were enthusiastic about cleaner food production but firmly resisted giving up farming entirely. For some, the ethical objection was clear:

> *"Farmers just want to feed people and just want as much of the food as possible to come from Britain"*
>
> **(Farmer)**

> *"I like growing stuff at the end of the day. I think it's an amazing process."*
>
> **(Farmer)**

> *"Everyone's trying to be brainwashed into the [idea that the] answer to everything is to plant trees on the whole farming countryside, and I don't agree with that."*
>
> **(Tenant farmer)**

These emotional attachments – which also explain the persistence of farmers in the profession despite low incomes and the strong outside options that asset wealth brings – sit uneasily with the imperative to meet net zero. As such, there is a clear challenge to persuade the sector that this is worth doing.

Subsidies must be part of the answer to driving land use change

There is no hope of achieving such seismic shifts without fair economic rewards. Thankfully, and unlike for low-carbon farming, a subsidy driven approach makes economic sense. Compared with cleaner food production, where higher on-farm costs can (and should) be passed along the supply chain, there is no market mechanism for paying farmers to not farm. If land is repurposed for environmental goals, many farmers will lose their primary income stream altogether. This makes subsidies essential: the Government must socialise the costs of providing public goods that have no or little market value.[59] In this respect, the

59 There will be other sources of finance for this part of the transition. One is revenue from elements of land use change that have private benefits, such as timber sales, tourism, and compensation for benefits like reduced flood risk. These will reduce the level of subsidy needed for public goods. Another type is private finance in carbon credit markets. There will be tight constraints on negative emissions needed to meet the 2050 net zero target, so the Government should be wary of approaches that allow private companies to attach negative emissions to sources that may be socially optimal to abate, rather than offset.

Environmental Land Management Schemes should prioritise funding for afforestation and peatland restoration, rather than focusing funds predominantly on day-to-day farming practices.[60]

Subsidies should also serve to incentivise changes in land use for the right farms – those that are least productive as food producers. In a world where the land use transition is designed to maximise emissions savings with the least impact on food production, lower-income producing farms on less-productive land should be the priority for land use change. Conveniently, the land most suited for repurposing is often also the least productive – including upland grazing and those on peat soils or 'disadvantaged' land – and farmers in these areas typically have the lowest incomes.[61] As Figure 13 shows, these businesses already earn less than average (though cattle farms, which are the most emissions intensive but also some of the most lucrative, might be harder to shift). If subsidy is set at a reasonable level that means a fair income for land management, many farmers on these land types would gain substantially from switching roles.

FIGURE 13: **Some of the farm types most exposed to future changes are already earning less than average**

Median hourly wage for farms particularly likely to change use, by type

NOTES: The wage is calculated by dividing Farm Business Income by the number of unpaid labour hours that are compensated out of post-tax business profit. See Figure 4 for more information.
SOURCE: RF analysis of Farm Business Survey.

60 Defra, Landscape Recovery, May 2023.
61 Disadvantaged land is a classification afforded to land that has less potential for growing food, and typically includes upland areas. Most farms on peat soils are upland farms, but there are some highly productive lowland peat farms that present tough trade offs between maximizing food production and emission savings.

But the knowledge that financial incentives are not the only thing that drives the behaviour of farmers should make us cautious about the extent to which subsidies alone can drive the necessary change. Some of the farmers we spoke to said that they had turned down subsidies, and spoke of their objections to farmers being paid for non-agricultural activities:

> *"Personally, I'm in no [subsidy] schemes at all. I don't agree with it. I'm not in any and [have] no intention of going into [any]".*
>
> **(Farmer)**

> *"I think it's a farce really, because the government are paying farmers, in effect, not to farm."*
>
> **(Farmer)**

Policy will also need to grapple with the fact that subsidies at fair levels could attract more than just the least-productive farmers. As Section 2 showed, many farmers earn well below the minimum wage, and agricultural land often yields very low returns. This is a situation any regime to reward farmers for land use change should not seek to replicate, and subsidy levels must compensate farmers fairly for their labour and assets.

But the prevalence of low incomes across the industry means that fair subsidies could be attractive to farmers much further up the productivity distribution than is ideal. Indeed, several farmers we spoke to warned that poorly calibrated payments had already encouraged the misuse of higher quality land:

"Local to here a farmer bought Grade 2 [high productivity] land and planted it with trees, over 1,000 acres of it. Where does that set you in food, you know?"

(Farmer)

"I think he planted 200 trees… he just let the sheep go in and knock all the trees down. But he got paid for that, so he wasn't bothered."

(Farmer)

The need to achieve an efficient allocation of land means the Government must be prepared to guide which land changes use, alongside subsidy. Tougher measures will be needed to place guardrails both on farmers that are too hasty to stop producing on productive land, and on those reluctant to make changes to the land best positioned for repurposing. Other ways that the Government can shape the use of land – such as the planning system, taxes, or limiting subsidies to specific areas – would reduce farmer choice, but also perform better on efficiency while creating a food system closer to what

farmers say they want. The upcoming Land Use Framework should consider these more heavy-handed options, with a goal of ensuring that land use change is concentrated in the places where it makes most sense.

Tenant farmers have the most to lose from changing how land is used

Land use change is even more complicated for farmers who work land they do not own. Around 14 per cent of farms are completely tenanted, and a further 30 per cent are in part.[62] In these cases, it is up to landowners – not farmers – to decide whether land is taken out of production, potentially leaving farmers out of work or with less land on which to grow food. Several tenant farmers we spoke to highlighted that these changes bring insecurity rather than opportunity:

> *"If tomorrow [my landlord] decided [to sell] or he died and left it to his son or whatever, he'd sell it to the highest bidder or put it all in forestry."*
>
> **(Tenant farmer)**

> *"In order to meet our rent we have to have the numbers of cattle and [if] someone says actually you can only have half of them [then] there's no way our business would be able to support that rent"*
>
> **(Tenant farmer)**

This issue is made worse by the short leases – that have been common in the sector since generational contracts were reformed in the 1990s – which leave tenants with little security.[63] The average tenant is now on a contract lasting under four years, leaving tenants with little incentive to commit to long-term land use projects. Meanwhile, the subsidies needed for a fair transition would give landlords an incentive to displace tenants in favour of easier returns from environmental subsidies.[64] As one affected farmer pointed out, these decisions require clarity over the long term:

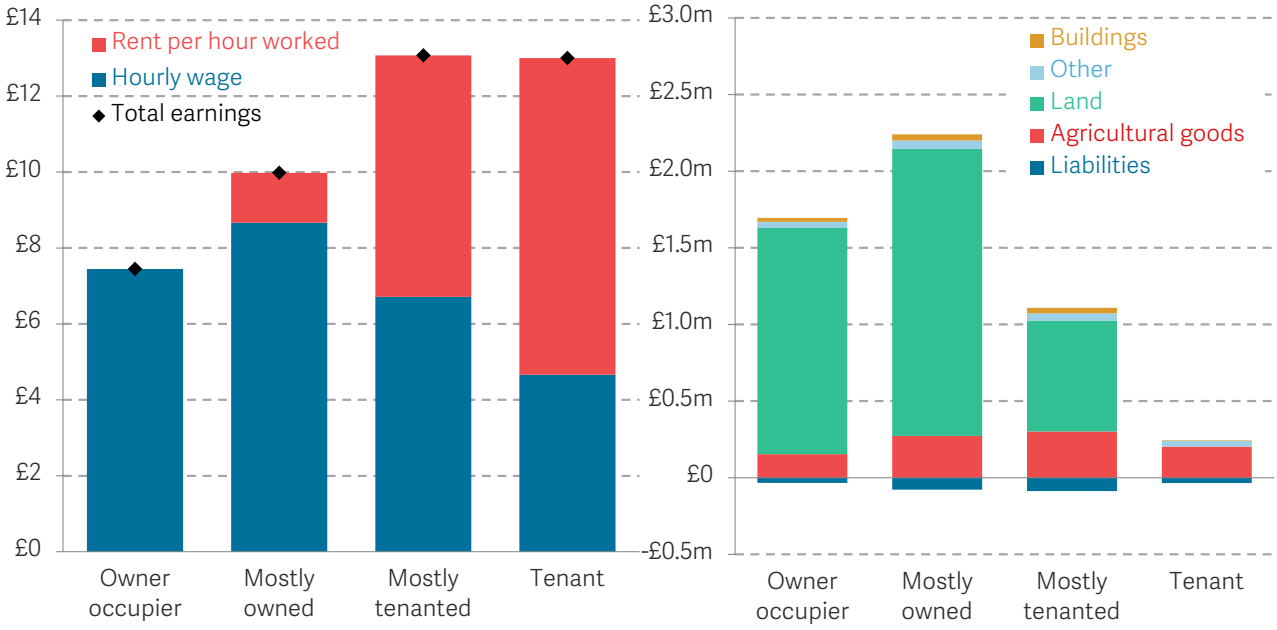
> *"If they're genuinely serious about this net zero, they should be offering farmers a 25-year contract. You can't say you want a 25-year [transition] but only incentivise a farmer for three."*
>
> **(Tenant farmer)**

62 Defra, Farming evidence – key statistics, October 2025.
63 House of Lords Library, Agricultural tenancy reform, January 2021.
64 The Central Association for Agricultural Valuers, Agricultural Land Occupation Survey, November 2024.

Although tenant farmers take lower wages from their farms and hold far less wealth – largely on account of lacking land assets (see Figure 14) – they are among the country's most productive. If tenants didn't pay rent but were just as productive, they would have earned three-quarters more in profit per hour worked than owner-occupier farms last year, suggesting that they make an outsized contribution to the UK's food supply.

FIGURE 14: **Despite lower wages, tenant farmers produce more per hour worked than those who own the land they farm**

Left panel: Median farmer income per hour worked, by tenure of farmer: England, 2023-24; Right panel: median assets of farm businesses, by tenure of farmer: England, 2023-24



SOURCE: RF analysis of Defra, Farm Business Survey.
NOTES: Agricultural goods includes both machinery and the value of other agricultural products not yet sold. Other assets comprise cash and uncategorised wealth. Rent per hour worked is rent for each hour of unpaid labour (that is, labour which is paid out of profit). For more information on how wage rates are calculated see Figure 4.

A transition that pushes these businesses out in favour of passive landlord income should be avoided. The Government therefore should ensure the land use transition protects tenants, either by ensuring that prime tenanted land remains used for food production, or by giving tenants a long-term role in managing new environmental landscapes. Priority should be given to securing longer leases, clarifying responsibilities for land use decisions, and ensuring tenants share fairly in any new environmental revenue streams.[65] Addressing this will be essential if the UK is to decarbonise land without sacrificing productivity or the livelihoods of some of its most capable farmers.

65 Here the Rock Review offers a strong starting point, but implementation remains incomplete. For more, see: Defra, The Rock Review, May 2023.

Section 5

Conclusion

Emissions from agriculture and land use have barely shifted over the past decade. But decarbonising this sector is essential if the UK is to meet its climate goals without increasing use of less efficient approaches or placing additional burdens on other parts of the economy. The coming decade must, therefore, see a step change in progress in greening the country's food production.

The good news is that the cost of the change required is manageable. The direct costs of cleaner food production are modest. But that doesn't mean change is straightforward – instead, the challenge is one of distribution. Many farm businesses operate on razor-thin margins, are highly exposed to global markets and are already navigating competing pressures. Farming is also an identity as much as an occupation, and the emotional connection to producing food shapes how change is understood. These factors mean decarbonising agriculture cannot be approached as a purely technocratic exercise.

The Government must not shy away from this challenge. Instead, a clear-headed approach that considers the sector's financial fragility is needed. In this context, expanding subsidies may feel like the default answer, yet the food sector is already unusually sheltered by the state through direct support payments to farmers and preferential tax treatment of food. Instead, decarbonisation policy should pursue an approach that combines competition between farms and higher prices to cover costs. A market-based approach, led by new low carbon regulations on supermarkets would ensure that costs were not shouldered solely by farmers.

Of course, if the Government is successful in allowing farmers to pass the costs of decarbonisation up the supply chain, then the price of food may rise. But even in the worst-case scenario for the final consumer, there would be only minimal impacts on price or inflation, mostly because the farm gate price is only a small part of the overall cost of food in the UK.

Land use change, however, requires a different approach. If we want farmers to deliver 'public goods' – most obviously using their land to provide carbon offsets – rather than for

purposes for which private markets already exist, then subsidies are the inevitable policy tool to socialise costs. Yet the scale of change required – potentially shifting close to one-tenth of agricultural land out of production – would represent a profound cultural shift for farming communities.

Subsidies can cushion the transition and open new business models, but alone it will not resolve every challenge. The Government must ensure that the most productive land remains available for food and avoid poorly targeted incentives that may lead to suboptimal land decisions. It should also protect the long-term role of tenant farmers, who are among the most productive yet the least secure.

This report shows that an efficient, fair transition will require a proactive and tailored strategy to deliver the required change. We leave some of the detail of the approach to future work, but the Government should be aiming for better regulations, long-term commitments to subsidies for changing land use, and a framework that ensures farmers continue to play a central role in the UK's food and environmental future.

Annex 1

Data citations

Labour Force Survey (series page here):

Office for National Statistics. (2024). Labour Force Survey. [data series]. 11th Release. UK Data Service. SN: 2000026, DOI: http://doi.org/10.5255/UKDA-Series-2000026

Farm Business Survey (series page here:)

Promar International. (2025). Farm Business Survey, 2023-2024: Special Licence Access. [data collection]. UK Data Service. SN: 9360, DOI: http://doi.org/10.5255/UKDA-SN-9360-1

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