

- Policy framework for deep emissions
- reductions and carbon removals in agriculture and land use in the UK



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Executive Summary

Achieving the objectives of the Paris Agreement and the net zero target, which the UK set itself in June 2019, is expected to be difficult to achieve across all sectors of the economy, and would require a major ramp-up in policy effort. Recent modelling has shown that agriculture and land use will be of central importance in the context of net zero both as a source and sink of emissions. Achieving land's contribution to the net zero target will only be possible if clear, stable and well-designed policies to reduce emissions are introduced without delay.

Policies in the land use sector have been especially lagging with respect to climate objectives, due in part to the influence of the EU's Common Agricultural Policy (CAP). A post-Brexit policy framework therefore represents an opportunity to integrate these objectives in UK land management and to phase in new environmental land management schemes in England¹ and the devolved administrations, focused on delivery of public goods, including climate mitigation and co-benefits, such as recreation and water quality improvements.

The first of two reports on how to improve the use of land to meet climate goals was published by the Committee on Climate Change in November 2018 (Committee on Climate Change, 2018). This report, titled *Land use: Reducing emissions and preparing for climate change*, highlighted the need to define a better land strategy that responds fully to the challenge of climate change, and presented measures with multiple benefits across a range of climate, environmental and societal objectives. The work presented here fed into a second report, titled *Land use: Policies for a net zero UK* (Committee on Climate Change, 2020), carrying out a deeper assessment of the policy framework to mitigate climate change through land use, and to inform the development of the government's new Environmental Land Management System in England and applicable schemes elsewhere in the UK.

This project's objective is to identify policy options to drive emissions reductions and carbon removal within existing agricultural systems and through changes in land use. This covers management of soils and livestock; afforestation, agro-forestry (and hedges) and energy crops; restoration of upland and lowland peatland; and, management of agricultural production on lowland peatlands.

Barriers to uptake of mitigation options include both financial and non-financial factors. In particular, changing land use and land management practices is hindered by a lack of awareness, skills and confidence amongst land owners and managers plus cultural resistance and bureaucratic transaction costs. This suggests that achieving change will require a mix of policy instruments, not all directly related to financial incentives.

The main policy instrument for afforestation could be to open the Emissions Trading Scheme (ETS) to forestry credits. An alternative would be a Contract for Difference scheme funded by a levy on liquid fossil fuel suppliers. The benefits would be: it would not rely on public expenditure; it has been implemented overseas; there is an existing monitoring, reporting and verification system, called the Woodland Carbon Code (Forestry Commission, 2018); and, it would be consistent with the polluter pays principle. The revenue for afforestation investments would include proceeds from the sale of carbon credits, supplemented by ELMS payments for non-carbon benefits, such as recreational access, flood risk mitigation and biodiversity. Enabling policies would include concessionary finance, a risk mitigation instrument and government-backed commitments to expand the nursery supply chain. Public ownership or charitable ownership of land could be options in the longer term.

The main policy instrument for agroforestry could be ELMS or a similar public payments scheme in the devolved administrations. The costs and benefits of agroforestry are likely to vary spatially and would not justify a regulatory requirement. Moreover, given the small scale of carbon revenues associated with

¹ In England, this would be implemented under the Environmental Land Management (ELM) system.

agroforestry for most farm enterprises, most landowners and managers would find the receipts from the sale of ETS credits a helpful top-up, while relying principally on payments for public goods such as biodiversity or landscape.

Upland peatland restoration could be taken forward in the short-term with a ban on blanket bog burning and a regulatory requirement on water companies to restore peatland that they own or manage. In the long term, public ownership of upland peatland may be a potential answer for the most important sites. Under a transfer to public ownership, landowners could be compensated through a sale consideration and also offered lifetime beneficial use of the land and farm buildings. The public owner could then engage in restoration on a large scale. An alternative, if public ownership proves unacceptable, is to invite NGOs to take on ownership. The alternative is a regulatory requirement to restore upland peat, perhaps backed up by a cross-compliance requirement of ELMS or equivalent DA schemes². In the longer term, any of the above options could be run in parallel with the issuance of carbon credits from peatland restoration, making these eligible in a UK ETS, using a modified version of the Peatland Code to estimate emissions reductions.

There are several policies for lowland peatland. The first is a ban on peat extraction and sale. The second, a regulatory requirement not to leave soil bare. The third, a requirement on Internal Drainage Boards to maintain water tables at a minimum level. The viability of a policy involving requirements on Internal Drainage Boards is pending on-going work by Defra and the Centre for Ecology & Hydrology (CEH) on sustainable management practices on lowland peat. A system of Environmental Land Management payments for lowland peatland restoration could also be envisaged, in which options would be specifically targeted at emissions reductions. In the longer term, carbon credits from peatland restoration could be made eligible in the UK ETS.

As regards on-farm practices, changes in livestock diet could be incorporated into ELMS cross-compliance requirement.

Policies for fertiliser use, manure storage and manure application could be introduced through extensions of existing Nitrate Vulnerable Zone (NVZs) and the proposed Clean Air Strategy measures. The enabling policies for fertiliser use, manure storage and application include advice and training on best practice. These would show farmers how to sample organic manures and calibrate spreaders, for example.

Policies which change livestock diets could include a regulatory requirement on the small number of manufacturers of compound feed to include low-methane additives. This would mean that whenever compound ruminant feed is sold, it would include nitrate additives and/or probiotics, for example. Advice and training could be provided to farmers on diet planning, herd health, genetic breeding, legume- and herb-rich swards, as well as silvo-pastoral agroforestry; the development and demonstration of genetic improvements could also be supported by Government funding. An innovation-focused knowledge and training provision programme could be designed to (i) highlight and promote low carbon practices and new technologies, (ii) be delivered at the local scale; (iii) build on existing R&D infrastructure e.g. agricultural colleges and research Institutes; and (iv) leverage public and private advisors.

The recommended set of policies builds on the existing demand-side instruments aimed at developing and strengthening the market for perennial energy crops³. These include a continuation of the ETS exemption on biomass in combustion, risk mitigation instruments such as Contracts for Difference, an obligation on biomass combustion facilities to source a fixed proportion of their energy crops from the UK, and obligations on suppliers of electricity to purchase renewable power. Enabling policies could include R&D expenditure and the provision of concessionary finance. Intermediaries could play a key role to provide information and help with risks and administration while state-sponsored advice could raise awareness of the benefits of energy crop production for farmers. Monitoring, reporting and verification for afforestation and peatland

² Cross compliance requirements are rules and standards that farmers must respect in order to receive income support.

³ Energy crops are plants that are cultivated for the purpose of producing (non-food) energy.

restoration could build on existing tools such as the Woodland Carbon Code and the Peatland Code respectively, and make use of technologies such as remote sensing or drone surveys. For on-farm practices, monitoring, reporting and verification could be based on record-keeping and physical inspections.

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1 Introduction

1.1 Background

The 2015 Paris Agreement has committed the world to global average temperature increases of less than 2°C above pre-industrial levels and has encouraged efforts to limit the temperature increase to 1.5°C above pre-industrial levels. The Agreement also committed the world to the global peaking of emissions as soon as possible and for the need to ‘achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century’, the so-called net-zero goal. The linked obligations of 1.5°C and net-zero have captured attention around the world and countries such as Sweden and New Zealand have legislated net-zero targets. In June 2019, the UK adopted its own net zero target for 2050 (HM Government, 2019d) following advice provided by the Committee on Climate Change (Committee on Climate Change, 2019).

The net zero target would meet the UK’s obligations under the Paris Agreement and is achievable with known technologies but would require a major strengthening of effort. Some sectors of the economy will be difficult to reduce to close to zero emissions and therefore may require offsetting, for example, by afforestation. Agriculture and land use change play an important role in the net zero policy, both as a source and sink of emissions. Stable, well-designed policies to reduce emissions are necessary and urgent as the current policy environment has been judged insufficient (IUCN UK, 2018).

The current CAP funding package offers little incentive to farmers and landowners to pursue climate mitigation options. There are opportunities to integrate climate mitigation into UK land management. If the UK leaves the EU, a new UK policy framework will replace CAP. In England, this is based on a progressive reduction in Direct Payments and the phasing in of a new Environmental Land Management (ELM) system, set out in the Agriculture Bill, focused on delivery of public goods, including climate mitigation, and also recreation and water quality improvements (UK Parliament, 2018a). Similar powers extend to Wales and Northern Ireland, while Scotland has its own plans.

The first of two reports on how to improve the use of land to meet climate goals was published by the Climate Change Committee in November 2018 (Committee on Climate Change, 2018). It demanded a better land strategy that responds fully to the challenge of climate change and presented measures to achieve this which offer multiple benefits relating to climate, the environment and society. This informed the recommendations from the Climate Change Committee’s Net Zero report, which emphasised that agriculture and land use are priority areas where progress on emissions reductions has been too slow (Committee on Climate Change, 2019).

The work presented here feeds into a second Climate Change Committee land-use report. The second report contains a deeper assessment of policies to mitigate climate change through land use and informs the development of the future Environmental Land Management System and of the policy mechanisms that are required to deliver emissions reductions and GHG removal in the agriculture, land use, land use change and forestry sectors. These include: support with high up-front cost and long-term pay-backs of investing in alternative uses of land, help with skills, training and information to implement new uses of land, and action to address barriers to the take-up of innovative farming practices (Committee on Climate Change, 2019). This report from Vivid Economics and ADAS identifies policy options to drive emissions reductions and carbon removal within existing agricultural systems and to incentivise alternative uses of land. It spans management of soils, livestock, waste and, afforestation, agro-forestry, hedges, perennial energy crops, restoration of upland and lowland peatland, and management of agricultural production on lowland peatlands. It also sets out how the existing regulatory baseline in agriculture could be strengthened at low cost.

1.2 Project objectives

The aim of this project is to identify a range of policy options that would drive emissions reductions and carbon removals within existing agricultural systems and alternative uses of land. Measures under consideration include:

- Higher afforestation rates, improving the yield class (productivity) of new trees, and increasing management of existing broadleaf woodlands.
- The planting of trees on farmland (agroforestry) and extending the length of hedgerows.
- Restoration of upland and lowland peatland, and the adoption of management practices on lowland peat that remains in agricultural production.
- The uptake of management practices and technologies on-farm to reduce non-CO₂ emissions from soils, livestock and waste and manure management.
- The planting of perennial energy crops, such as miscanthus, short-rotation coppice and short rotation forestry.

1.3 Approach

Table 1 lists and defines the policy instruments within the scope of this report.

Table 1 Policy instruments under consideration

Policy instrument	Description
Baseline regulation	Baseline regulation can take two forms: <ul style="list-style-type: none"> • Cross compliance rules: these apply to those who receive direct subsidies.). • Regulation, which is not based on direct payments (e.g. Nitrate Vulnerable Zones).
Emissions Trading Schemes	Market-based carbon pricing instrument for climate change mitigation, in which a regulator defines an upper limit (cap) of greenhouse gas emissions that may be emitted in clearly defined sectors of an economy.
Emissions taxes	Form of carbon pricing in which a tax is levied on carbon emissions from sectors or activities.
Feed-in-tariffs	Under feed-in-tariffs, a commodity or service is bought at a price which reflects the production cost rather than the market price, under a contract with a term of perhaps 10 or 15 years, in order to encourage investment in technologies which have high upfront costs.
Contracts for Difference	Contracts for Difference are one way of implementing feed-in tariffs. Applications are based on sealed bids. The current 'Contracts for Difference' (CfD) scheme in the UK is the main policy instrument incentivising low carbon electricity generation (HM Government, 2019b). Renewable power generators apply for a CfD by submitting sealed bids through a reverse auction mechanism and successful bidders are paid a flat (indexed) rate for the electricity they produce

	over a 15-year period by the Low Carbon Contracts Company (LCCC), owned by BEIS.
Payments for actions	Approach of paying land managers to undertake specified management actions.
Payments for outcomes	Approach of paying farmers according to the environmental outcomes they achieve.
Concessionary finance	Concessionary finance refers to loans which have more generous terms than market loans. This can include, for instance, below-market interest rates, debt repayment holidays and less onerous criteria for credit-worthiness or security over assets.
Advanced market commitments	An advanced market commitment is another way for the government to help develop a new market, by guaranteeing that a minimum volume of product will be purchased.
Risk mitigation tools	Contracts in which risk is transferred from one party to another which can better manage or bear it, for example, in the form of a guarantee or insurance contract.
Public ownership	Ownership of land by the state or a public body representing the community.

Note: More detail on Emissions Trading Schemes and Contracts for Difference can be found in the Appendix at the end of this report.

Source: Vivid Economics, ADAS

The work undertaken in the preparation of this report included a review of existing literature, the examination of the track record of existing policies globally, a criteria-based assessment of policy options, case studies and expertise from within the consultants’ and CCC’s teams and many land based industry and nature experts who gave their time to discuss options and share information.

The criteria which determine the suitability of policy instruments are set out in Table 2.

Table 2 Criteria used in the assessment

Criteria	Description
Track record	Has the policy been implemented successfully in the past in the UK or elsewhere?
Value for money	Is the measure cost-effective for the agriculture sector and UK as a whole?
Incentives to innovate	Does the measure provide incentives for farmers to innovate and reduce costs over time? Does it give farmers flexibility to find their own solutions?
Easy for farmers to understand and implement	Is it easy for all types of farmers to comply with and does it limit potential distortions between types of farmers?

Does it assist farmers through change?	Does it provide an effective transition between the current payments system for farmers and the future?
Political acceptability	Is the policy expected to receive broad support and does it limit the costs to the Exchequer?
Administrative complexity	Is the policy feasible to implement, monitor and verify over time?

Source: Vivid Economics, ADAS

This report also considers barriers to uptake and ways to overcome them. Both financial and non-financial barriers are relevant. Non-financial barriers include: the reluctance to make long-lasting changes in the use of land; the perception of farmers’ role as one of food producers; a lack of interest in or awareness of carbon emissions; administrative burden; difficulties with monitoring, reporting and verification (MRV); and leasehold agreements. Financial barriers include: low financial incentives to implement measures and uncertainty of future revenues, and cashflow (where capital costs are significant).

1.4 Appendix

Supplementary information can be found in the in Appendix at the end of this report. For each measure, it contains:

- An overview of the domestic and international track record;
- The rationale behind the shortlisting of instruments;
- Expected barriers to uptake and how the proposed policy mix addresses them;
- Considerations on monitoring, reporting and verification (MRV) and the baseline.

2 Policy recommendations

2.1 Afforestation and agroforestry

Box 1 Policy instruments for afforestation and agroforestry

The main direct policy instrument for afforestation could be an Emissions Trading Scheme (ETS) open to forestry credits. Several reasons support this recommendation:

- A UK ETS open to offsets from afforestation schemes would reduce reliance on public expenditure in the policy mix;
- Emissions trading schemes, compliance-based and voluntary schemes which are open to forestry credits have been implemented in Australia, New Zealand, Japan, California and Alberta;
- Monitoring, reporting and verification could be based on the existing Woodland Carbon Code (Forestry Commission, 2018);
- An ETS would be consistent with the ‘polluter pays’ principle.

Proceeds from the sale of carbon credits could be supplemented by public payments for non-carbon benefits, such as recreational access, flood risk mitigation and biodiversity.

Enabling policies would include concessionary finance, a risk mitigation instrument, a top-up instrument, and government-backed policies to unblock bottlenecks in the nursery supply chain.

Public acquisition of land might play a role.

The main direct policy instrument for agroforestry could be a system of payments for public goods.

- It is not justified to introduce a regulatory requirement to implement agroforestry, and for this reason it would be expected to meet significant political resistance.
- For most landowners and managers, an ELMS carbon payment is expected to be preferable to an ETS, because the carbon captured by agroforestry would be modest, with the commercial case relying primarily on ELMS payments for the provision of public goods such as biodiversity and landscape.
- Large landowners or managers engaging in agroforestry could be given the option of receiving carbon credits eligible in the ETS instead of ELMS payments.

The preferred instrument for afforestation is an Emissions Trading Scheme (ETS) open to forestry credits. In the event that the UK stays in the EU, forestry credits would not be fungible with the EU ETS under current rules. As well as trying to reform those rules, the UK could adopt a Contract for Difference scheme funded, for example, by a levy on liquid fossil fuel suppliers. Landowners or managers engaging in agroforestry or planting of urban street trees would have the opportunity to receive carbon credits for planting trees.

Including forestry credits in ETS schemes is not widespread, but afforestation as a source of offset credits is developing. The New Zealand ETS is the only ETS scheme worldwide which is open to forestry credits (Carver, Dawson, & Kerr, 2017). Afforestation projects can also be a source of offsets in compliance-based schemes or schemes involving carbon credits purchases by the Government like in California (Smith, 2019), Alberta (IETA, 2015) or Australia (Blakers & Considine, 2016) or in voluntary offset schemes like in Japan (Timperley,

2018). These initiatives have highlighted two main challenges: the bureaucratic complexity can be off-putting to some potential investors (especially smaller landowners), and in some cases the permanence and additionality of projects has been difficult to ascertain⁴. Several lessons can be identified from these experiences:

- As evidenced by the New Zealand experience, afforestation decisions have been influenced by the introduction of an emissions price and/or expectations about the emissions price in the future (Carver et al., 2017).
- The design of offset protocols – estimating the reduction in carbon generated by a given project – is crucial to the effectiveness of the scheme.
- Offset schemes should specify the length of time that land is assigned to forestry and ensure the proper management of the forest during that time. If there is lack of permanence or if the area undergoes deforestation, then the landowner should be liable for the corresponding emissions reduction.
- These schemes should also incentivise good forest management to ensure that forests remain effective carbon sinks. The associated co-benefits should also be taken into consideration.
- There should be clear policy objectives as well as predictable processes for updating the system in order to limit policy uncertainty.
- Authorities should be aware that the overall programme effectiveness is likely to involve trade-offs between project quality and quantity: for instance, stringent standards for permanent and additional projects can present barriers to participation but these also ensure that emissions reductions are effective

These experiences create precedents that the UK Government can build on to effectively introduce a market for forestry credits.

ELMS payments could be the primary source of funding for agroforestry. ELMS will pay for the provision of public goods and services covering climate mitigation, biodiversity, recreational access, water quality and flood risk mitigation.

Concessionary finance could be provided to landowners and farmers to cover upfront planting and establishment costs. This concessionary finance could take the shape of loans secured against the land, including associated contracts for ELMS, CfD or ETS receipts. The loans might be packaged and sold as green bonds.

Other enabling policies to support the implementation of an ETS could include a risk mitigation mechanism and a top-up instrument. Specifically, a risk mitigation instrument could be used to address the issue of price uncertainty in the UK ETS by providing landowners with the possibility of a fixed price contract. These fixed price contracts (which could need to be market-tested by Government to ensure that they are tailored to the risk profiles of market participants) could be provided by a new Land Carbon Purchasing Authority (LCPA) or an agency in a similar role, in exchange for carbon credits. Landowners would therefore be able to choose between two options: (i) selling their credits on the compliance market through an intermediary (carbon broker); and (ii) receiving a fixed price for their carbon offsets from the agency. Another option is for a top-up carbon payment of a fixed amount per tonne of carbon dioxide, funded by a levy on fossil fuel suppliers to make afforestation more commercially attractive.

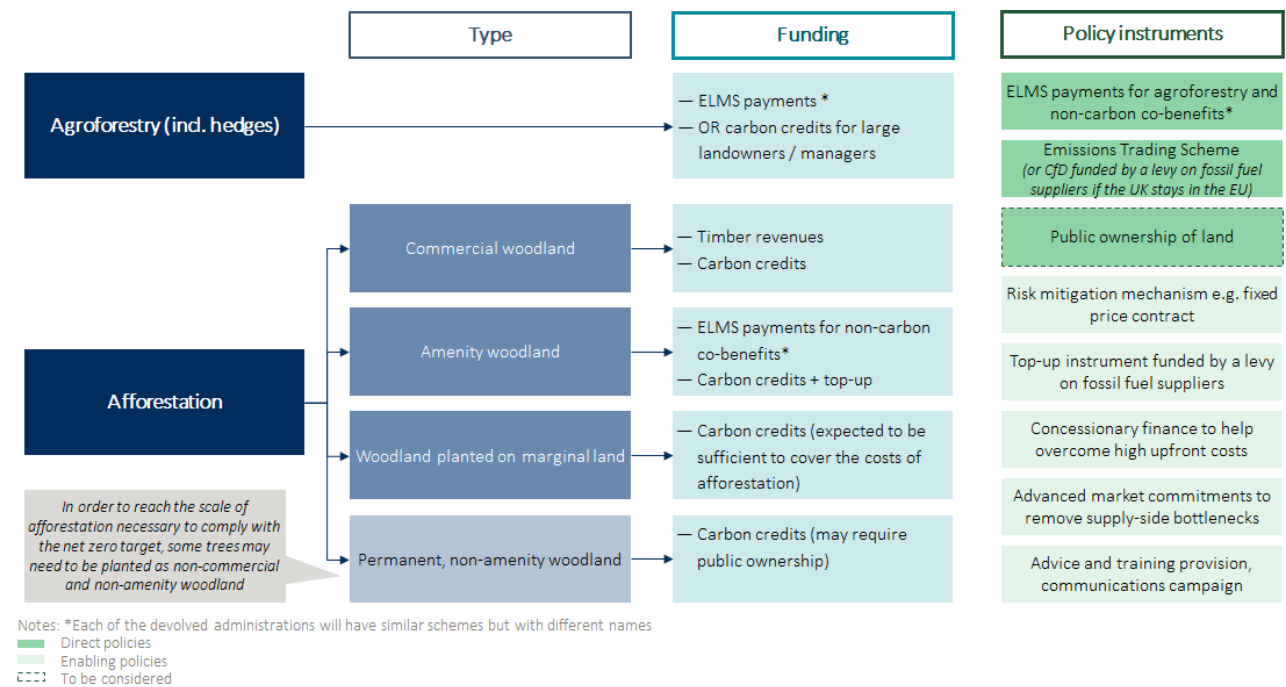
⁴ Additional information on these schemes and the lessons that can be derived from them can be found in the Appendix.

Government-backed advanced market commitments may be required to remove bottlenecks in the nursery supply chain. UK nurseries currently have a certain amount of capacity and carry a certain level of inventory. Imports of seedlings carry phyto-sanitary concerns. Private nurseries may be wary of ramping up production because of a risk that policies will not be enacted or that farmers will not afforest in the quantities predicted. Investment in capacity could be achieved either by Government calling upon the three state-owned nurseries to increase their output, and/or by providing advanced market commitments to support investment by private nurseries.

In order to reach the scale of afforestation necessary to comply with the Net Zero target, public purchase of land may be needed. Trees could be planted as non-commercial and non-amenity woodland. Public purchase of land may therefore be needed in the cases that incentives for private owners to plant permanent (woodland which will not be harvested for timber) non-amenity woodland are insufficient. These public purchases of land could be operated through the Forestry Commission in England, equivalent authorities in the devolved administrations and land-owning NGOs such as the Wildlife Trusts and the National Trust.

Adoption of agroforestry and afforestation could be supported by the provision of advice and training, as well as targeted communications. This would help relieve non-financial barriers which are key to uptake (see Appendix for details) and would address the concerns of potential non-professional foresters. It would raise awareness of forestry (and forest carbon revenues), provide advice and training to develop skills, simplify administration and reduce cultural resistance to land use change. It could be complemented by a communications campaign to elicit a shift in farmers’ self-identity from food producers to food and environmental services suppliers.

Figure 1 Afforestation and agroforestry – Proposed set of policy instruments



Source: Vivid Economics, ADAS

Box 2 The proposed set of instruments for afforestation in practice

- Farmers or landowners considering afforestation would gather advice on the options that are available to them: they would have access to rough estimates of projected income streams from the sale of carbon credits and ELMS payments for non-carbon benefits, based on the characteristics of the site, its size and the type of forest.
- They would have access to information on available financing and risk mitigation instruments and the commercial heads of terms for carbon credits contracts. Landowners preferring a fixed price would sign a contract with the Land Carbon Purchasing Authority (or its equivalent); those willing to take on more risk would engage with private emissions trading intermediaries.
- Owners of land suitable for afforestation but not wishing to undertake the afforestation themselves would be able to find out about the possibility of selling their land to a public body or NGO for conversion to forest use.

2.2 Peatland restoration

Box 3 Policy instruments for peatland restoration

Policy instruments for upland peatland restoration include the public adoption of peatlands and regulatory requirements to restore land.

- Upland peatland areas could be taken under public ownership through the adoption by public bodies or NGOs (under public contract) of upland peatland. To make the exit for incumbent farmers more attractive, the new owner could offer the incumbent lifetime beneficial use of the land and farmhouse.
- For land currently owned or managed by water companies, a regulatory requirement for restoration could be imposed.
- In the longer term a regulatory requirement to restore upland peat, particularly in Sites of Special Scientific Interest (SSSIs), and could be a cross-compliance requirement through ELMS. Alternatively, carbon credits from peatland restoration could be made eligible in the UK ETS.

Short-term policy instruments to preserve lowland peatland could include a ban on peat use and a regulatory requirement not to leave lowland peat soils bare for extended periods.

- Internal Drainage Boards could be required to maintain water tables at a minimum level.
- In the longer term, ELMS payments for the management of lowland peatland and possibly also the inclusion of carbon credits from peatland restoration in a future UK ETS.

The proposed policy mix for upland peatland restoration could include a ban on blanket bog burning and a regulatory requirement on water companies to restore peatlands. Some environmental NGOs have been pressing for a ban (The Guardian, 2019) on the practice of rotational burning of blanket bog, whose purpose is to expose new shoots upon which grouse feed. Achieving ambitious restoration targets will require an increase on recent voluntary enrollment. The second policy could be to impose a requirement on water companies to restore peatlands on the land they own or manage, provided that costs are not prohibitive.

Water companies already have the economic regulator's approval to undertake peatland restoration, so restoration costs could be recovered through customer bills.

Public ownership of upland peatland may help to achieve restoration on a large scale. A public body could offer to adopt upland peatland from farmers, providing lifetime beneficial use of the land and farmhouse while undertaking restoration on a large scale. Public ownership and/or management of land would not necessarily be more costly than the alternative of long-term annual payments to private landowners and managers, and would deliver greater certainty. Alternatively, bodies such as NGOs, Wildlife Trusts and community trusts could take on this ownership role under contract.

Regulatory instruments for lowland peatlands could include an early ban on peat use and a regulatory requirement not to leave lowland peat soils bare for extended periods. A ban on peat use would put an end to peat extraction, which still continues in Northern Ireland, Scotland and England, mainly for horticultural use. The Government announced in the 25 Year Environment Plan (HM Government, 2018a) that, if the voluntary phase-out target for amateur gardeners by 2020, and for professional growers by 2030, had not progressed sufficiently by 2020, then further measures would be considered. Replacing the voluntary phase-out by a ban of peat use in horticulture would signal the industry to start using alternatives, which include peat-free compost or sphagnum, on which trials have already taken place in Germany, Lancashire and Cumbria. Second, a regulatory requirement could be introduced not to leave lowland peat soils in agricultural use bare for extended periods, to avoid soil erosion and carbon loss.

Other direct policies for lowland peatland could include a requirement on Internal Drainage Boards (IDBs) to maintain water tables at a minimum level. However, the viability of a policy involving requirements on Internal Drainage Boards is pending on-going work by Defra and the Centre for Ecology & Hydrology (CEH) on sustainable management practices on lowland peat. Winter re-wetting has been shown to deliver significant emissions reductions (Evans et al., 2017) and the Internal Drainage Boards (IDBs) have the powers to control water tables. It would be much easier to implement this control through dozens of IDBs than through hundreds of farmers and individual farmers often cannot control the water table on their own land independently from the water table of neighboring farms. The obligation on IDBs would have to be drafted in a manner that allows the peat objectives to be met with minimum disruption to farming, in consultation with the farmers affected. Further research would be needed to estimate the cost of raising water tables (which is expected to depend on the type of crops and the location) and the share of peatland restoration costs that the raising of water tables would represent.

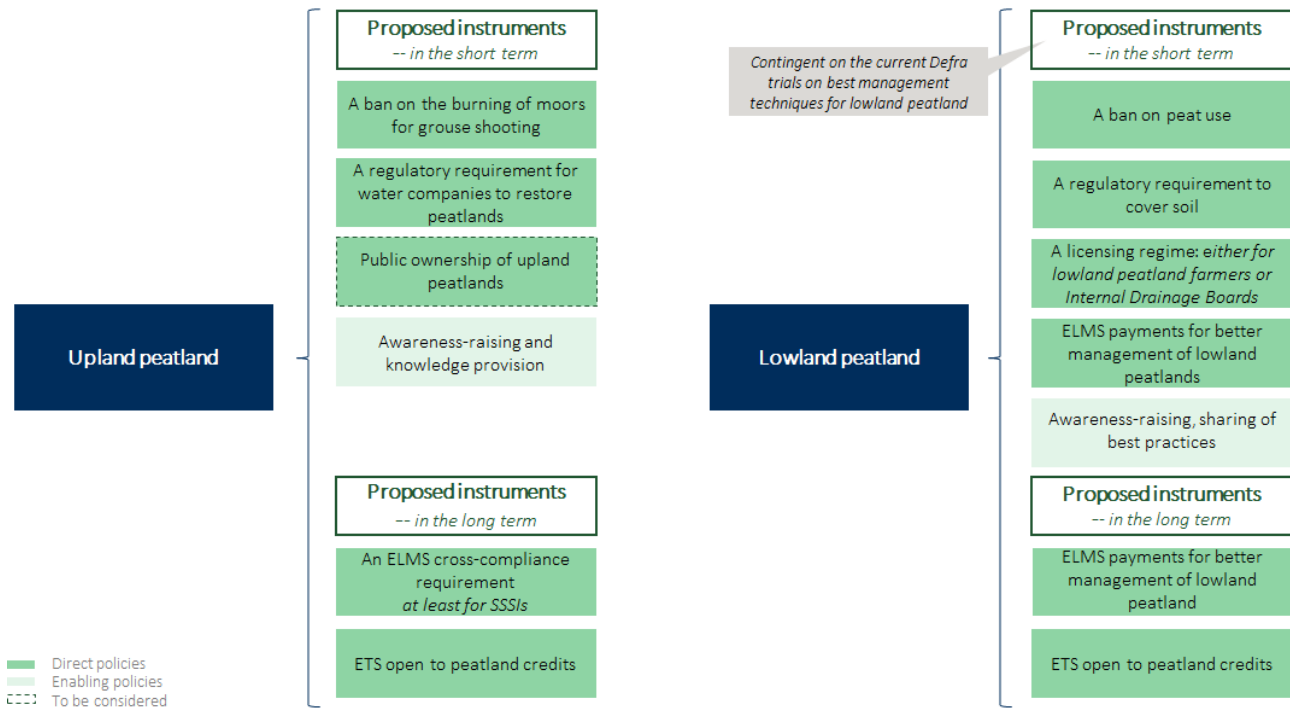
In the longer term, other policy instruments such as ELMS cross-compliance for upland peatland, ELMS payments for better management of lowland peatland and an extension of the UK ETS to credits from peatland restoration could be envisaged. For instance, a regulatory requirement to restore upland peat, particularly in SSSIs, could be implemented as an ELMS cross-compliance requirement. This would be especially relevant if ELMS payments continue to be an important source of financial support for upland farmers, and if upland farming provides sufficient environmental co-benefits, such as water quality and biodiversity. Similarly, a system of ELMS payments for better management of lowland peatlands could be set up, in which options would be specifically targeted at emissions reductions. It will be possible to draw up detailed recommendations once the outcomes are known of the current Defra trials on best management practices in lowland peatland areas. Alternatively, carbon credits from peatland restoration could be made eligible in the UK ETS (although the Peatland Code will need to be amended and issues may arise in relation to credits for emissions avoided rather than sequestration). The Peatland Code would need to be extended to cover more types of restoration, but the enabling policies recommended for afforestation could easily be extended to peatland.

Enabling policies for both lowland and upland peatland preservation could include awareness-raising efforts. As with forestry, finance is not the only barrier and efforts will have to be made to overcome cultural

resistance. Awareness-raising efforts would encourage regulatory compliance, support the dissemination of best practice for peatland management and could lead to mandatory commitments from the horticulture industry and peat retailers. In the longer-term it could also support landowners' engagement in peatland restoration in exchange for carbon credits eligible in the UK ETS.

2.2.1 Peatland restoration: Proposed set of policy instruments

Figure 2 Peatland restoration: Proposed set of policy instruments



Source: Vivid Economics, ADAS

2.3 On-farm practices

Box 4 Policy instruments for low carbon farming practices

Cover crops are already covered by greening measures in Ecological Focus Areas (EFA) and studies have shown that they benefit farmers by improving soil quality and retaining fertiliser; for these reasons they could be covered by an ELMS cross-compliance requirement.

Direct policies for fertiliser use, manure storage and manure application could be based on the extension of existing regulatory requirements such as Nitrate Vulnerable Zones (NVZs) and the Clean Air Strategy.

- Enabling policies for fertiliser use, manure storage and application could include advice and training in order to encourage the adoption of best practices. Specific actions could include the sampling of organic manures, the calibration of spreaders and the maintenance or calibration of slurry application equipment.

Policy instruments to support changes in livestock diets could include a regulatory requirement on feed manufacturers as well as the provision of advice and training.

- Advice and training could be provided to farmers on diet planning, herd health, genetic breeding, legume- and herb-rich swards, as well as silvo-pastoral agroforestry; the development and demonstration of genetic improvements could also be supported by Government funding.
- An innovation-focused knowledge and training provision programme could be designed to (i) highlight and promote low-carbon practices and new technologies, (ii) be delivered at the local scale; (iii) build on existing R&D infrastructure e.g. agricultural colleges and research Institutes; and (iv) leverage public and private advisors.

2.3.1 Cover crops

Cover crops, which limit fertiliser use and therefore GHG emissions, could be covered by a regulatory component through ELMS cross-compliance. Not only can cover crops achieve public goods, such as the prevention of soil erosion, biodiversity, runoff and fertiliser use, they are also relatively low cost and can benefit farmers by improving soil quality. The barriers to their adoption so far have been mostly informational, as can be seen in the results of the survey from Storr et al. (Storr, Simmons, & Hannam, 2019)⁵. From 2015, 'Greening measures' have supported the use of cover and/or catch crops under Ecological Focus Areas in the Basic Payments Scheme, which has increased farmers' awareness to a limited degree. For these reasons, in a Brexit scenario, an ELMS cross-compliance requirement could support a stronger change of farmers' attitude towards cover crops. Nitrogen-fixing crops which draw nitrogen from the air and store it in their roots, such as legumes, could be included in the list of eligible cover crops.

2.3.2 Fertiliser use, manure storage and application

Direct policies for fertiliser use, manure storage and manure application could be based on the extension of existing regulatory requirements such as Nitrate Vulnerable Zones (NVZs), while livestock emissions could be captured by the proposed Clean Air Strategy. NVZs, which include rules⁶ on the use of nitrogen fertilisers (including organic manure) and the storage of organic manure, already cover 55% of England, 100% of Northern Ireland, possibly 100% of Wales from 2020, but only 14% of Scotland. Decisions to increase the coverage of NVZs could be informed by a risk assessment, targeting areas where fertiliser inputs and organic manure production is highest, thereby avoiding an unnecessary burden on farmers. Similarly, the Clean Air Strategy, which is targeting greenhouse gas emissions in addition to ammonia could capture additional sources of non-CO₂ emissions not currently regulated (e.g. enteric fermentation). For instance, the Strategy could cover measures on livestock waste management, livestock health, livestock diets and breeding to reduce methane emissions.

Enabling policies for fertiliser use, manure storage and manure application could include advice and training in order to encourage the adoption of best practices. Not all farmers optimise their fertiliser use: in some instances, farmers waste money by applying fertiliser that they do not need, or fail to take full account of organic manures before applying mineral fertilisers. This observation is shown clearly in the Farm Practice Survey results, according to which 42% of farmers do not implement a nutrient management plan and 36% do not have manure management plans (HM Government, 2019c).

⁵ A recent survey of UK farmers showed that the majority of respondents 'didn't know' if yield had improved following cover crops, but that cover crop users observed changes that have potential positive impacts on the environment and ecosystem services such as reduced herbicide and chemical fertiliser use. Of those using cover crops, 71% indicated that the EFA guidelines for cover crops were not suitable and that they should include more species, and allow for single species cover crops. Of those not using cover crops, 90% said that they would consider their use in the future if additional information on their use and benefit were known.

⁶ Rules include limits on the average amount that can be applied to crops, and the obligation for farmers to keep their nitrogen plan as part of their farm records.

Specific actions can also be taken to improve on-farm practices. For instance, the sampling of organic manures produced on farm could help farmers to avoid over-application of nutrients, rather than relying on standard figures, while the more widespread and effective calibration of spreaders and the maintenance or calibration of slurry application equipment would increase the efficiency of fertiliser use. Initiatives have started to emerge: for instance, the Catchment Sensitive Farming scheme in England has included manure and slurry sampling and calibration as part of funded 1:1 advice; farm events offer training on equipment maintenance in certain High Priority Water Quality Areas (HM Government, 2019a).

2.3.3 Livestock diet, health and breeding

Policy instruments to support changes in livestock diets could include a regulatory requirement on feed manufacturers as well as the provision of advice and training. The acceptability of an obligation on compounded feed manufacturers, requiring a minimum percentage of additives, is expected to be reasonable so long as the impacts on costs and prices are low. Moreover, due to the limited number of feed manufacturers, monitoring costs would be low. Alternatively, a cross-compliance requirement building on Statutory Management Requirement 4 ('Food and Feed Hygiene') and delivered through ELMS could be envisaged, but it would represent a serious undertaking for farmers and audit would be significantly more difficult than it would be for the obligation on feed manufacturers. The proposed extension of environmental permitting of intensive dairy and beef farms under the Government's new Clean Air Strategy also offers opportunities to cover a wide range of non-CO₂ emissions: Defra will work with the industry to agree appropriate emission limits and Best Available Technique (BAT) documents for limiting pollution from these sectors.

Awareness-raising and knowledge exchange on carbon-reducing livestock measures could also be included in the policy mix. Advice and training could be provided to farmers on diet planning, herd health, genetic breeding, legume- and herb-rich swards, as well as silvo-pastoral agroforestry. Funding could also be provided by Government to support the development and demonstration of genetic improvements.

Low carbon practices around livestock health and breeding are commercially viable and available but there is a gap in awareness and capacity to adopt these practices, and in some cases also access to capital. Therefore, the policy response could be an innovation-focused knowledge and training programme, which would: (i) highlight and promote low carbon practices and new technologies; (ii) be delivered at the local scale; (iii) build on existing R&D infrastructure at agricultural colleges and research institutes; and, (iv) be delivered in part by public and private advisors. This could be supplemented by grants for technology uptake, for example, through the UK Shared Prosperity Fund, and with veterinarians and technology companies adding to a coherent low carbon technology message.

2.3.4 Influence of the supply chain

All the policies targeting changes in on-farm practices considered in this report could be supported by the involvement of the downstream supply chain. Recent shifts in public opinion have created incentives for food processors and retailers to reduce their carbon footprint and they have been developing initiatives to support low carbon farming practices among their suppliers. Examples of corporate initiatives aimed at increasing supply chain sustainability include the following:

- Launched in 2010, PepsiCo's '50 in 5' programme aimed to cut carbon and water used to grow potatoes in water-stressed areas in the UK by 50% over 5 years. This was done through the development and the provision of technology to help farmers understand and minimise their water consumption and carbon emissions (PepsiCo, 2016).
- Nestlé announced in September 2019 its ambition to reach net-zero emissions by 2050; as part of this effort, Nestle has started paying premiums to UK dairy farms which implement biodiversity-, soil-

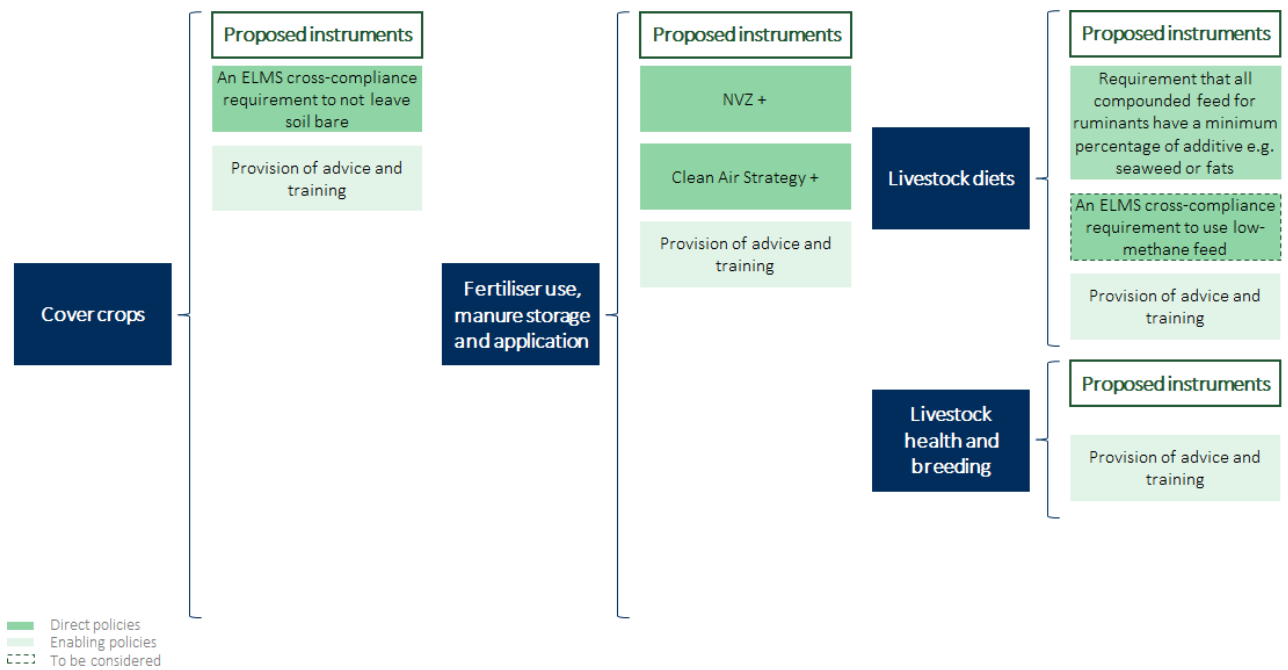
or water-protecting measures (University of Cambridge Institute for Sustainability Leadership & Natural Capital Impact Group, 2018).

- The Arla dairy co-operative set itself a net zero target by 2050. To achieve this, they invested in research on feed composition and have implemented a programme, Arla360, which mandates farmers to undertake carbon footprint assessments and monitoring, maintain and enhance soil quality through regular sampling and commit to evaluating the use of renewable energy sources on their farms (Arla, 2019).

Such initiatives could be encouraged by more stringent greenhouse gas emissions obligations on processors and retailers. The mandatory reporting of emissions could represent the first step towards low carbon supply chains.

2.3.5 Low carbon on farm practices: overview of policy recommendations

Figure 3 Low carbon farming practices: Proposed set of policy instruments



Note: [Click here to enter note](#)

Source: Vivid Economics, ADAS

2.4 Energy crops

Box 5 Policy instruments for energy crops

The recommended set of policies builds on the existing demand-side instruments aimed at developing and strengthening the market for energy crops. These include the ETS exemption on biomass, risk mitigation instruments such as Contracts for Difference and obligations on suppliers of electricity to purchase renewable power.

- Enabling policies could include R&D expenditure and the provision of concessionary finance.

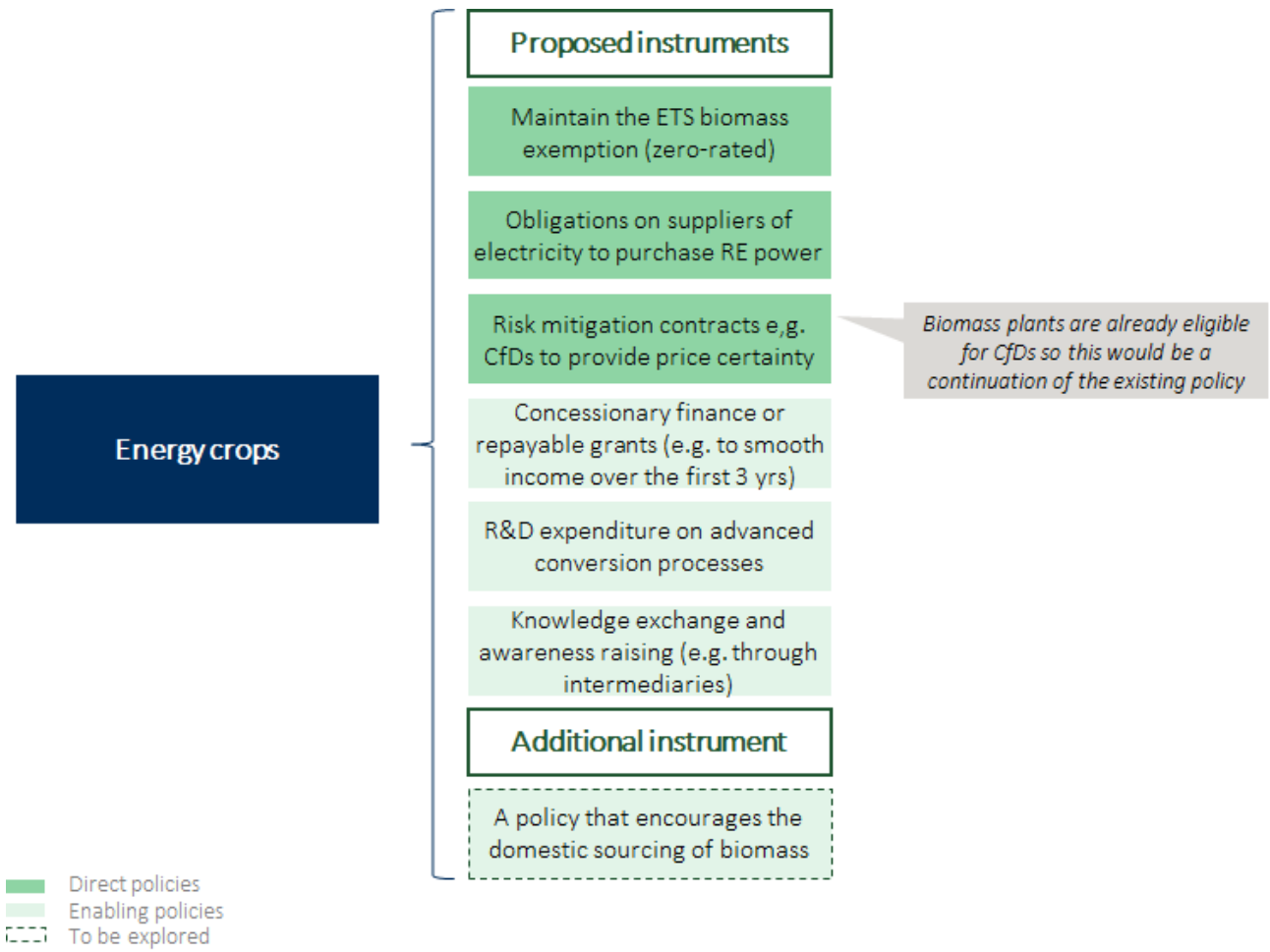
- Intermediaries could play a key role to provide information and help with risks and administration, while state-sponsored advice could raise awareness of the benefits of energy crop production for farmers.

The recommended set of policies places the emphasis on demand-side instruments in order to develop and strengthen the market for energy crops. Indeed, previous experience of supply-side planting grants is that they often led to poorly established crops with no market when the crop was due to be harvested. The demand for energy crops could be supported by: (i) maintaining the ETS exemption on biomass used for combustion; (ii) maintaining existing risk mitigation instruments such as Contracts for Difference (between the Low Carbon Contracts Company and power generators) which provide funding for electricity generation from biomass and certainty to generators; and (iii) continuing current obligations on suppliers of electricity to purchase renewable power. Enabling policies could include repayable grants or concessionary finance to help smooth income during the first [three] years. R&D expenditure to advance research on advanced conversion processes could be considered. The feasibility of a policy to require preferential sourcing domestically produced biomass in power generation could also be explored.

Intermediaries could play a key role in addressing awareness and confidence in the energy crops sector through the provision of information and training, for which they could receive some support. They could also act as an interface between farmers and plant operators, to aggregate supply, provided that they have sufficient assets behind them to be a credible counterparty for the power generators.

State-sponsored awareness-raising of the opportunity could make available evidence of the economics, commercial arrangements, land suitability and techniques. It could increase awareness of the benefits of energy crop production for farmers, including the case for planting energy crops on low productivity land, support for the diversification of farm income and reduced labour input.

Figure 4 Bioenergy crops: Proposed set of policy instruments



Source: Vivid Economics, ADAS

3 Case studies

3.1 General characteristics of the current agricultural sector

The average age of farmers is between 57 and 60 years old and business succession rates are low (43%) (HM Government, 2018b). This might limit the uptake of measures which represent a long-term investment, such as afforestation and energy crops. One way of supporting younger farmers, who are often more attuned to low-carbon farming practices would be to provide financial support for older farmers to retire.

The proportion of land under tenancy is expected to limit the uptake of irreversible decisions (e.g. afforestation). The proportion of land under tenancy ranges from 27% (for arable farming in the East of England) to 63% (for upland sheep farming in the North West of England). In some cases, landlords' attitudes limit tenants' freedom and are resistant to change.

Many farm businesses are highly reliant on subsidies and agri-environment payments. Payments from the Basic Payment Scheme represent around 100% of Farm Business Income in upland livestock farms in the North West of England, whereas they represent only 10% of Farm Business Income for poultry farms in Yorkshire and Humber. In addition to Basic Payment Scheme payments, Farm Business Income also contains income from agri-environment schemes, income from diversification and output from agricultural activities.

The Farm Practices Survey 2019 shows significant existing uptake of measures. The Farm Practices Survey (see Table 3 below for details) results show that farmers' attitudes to emissions reduction vary by segment. The rate at which measures are currently undertaken and preferred actions vary widely and reflect input use and relevance. Similarly, the reasons for not taking action differ.

Table 3 Uptake of GHG-reducing measures

	Upland sheep farming	Arable farming	Dairy farming	All farms	
Proportion taking action to reduce greenhouse gases (GHG) emissions	67%	73%	49%	61%	
Decarbonisation measures currently implemented	Nitrogen fertiliser application	19%	91%	58%	44%
	Slurry/manure management	27%	38%	66%	34%
	Feed efficiency	9%	14%	47%	16%
	Use of legumes in crop rotation	4%	38%	13%	16%
Proportion who believe GHG action will positively impact productivity	26%	53%	51%	41%	
Main reasons for not taking action	Farm does not produce many GHG	59%	48%	18%	47%
	Lack of information	24%	31%	51%	32%
	Perceived as best practice	36%	35%	51%	35%
	Lack of incentives	20%	33%	40%	22%
	Too expensive	14%	15%	27%	13%

Note: Farms are classified according to their dominant enterprise but can engage in other enterprises; some farms classified as 'arable' can thus engage in slurry/manure management.

Source: Farm practice survey (HM Government, 2019), Vivid Economics, ADAS

3.2 Case study #1: Upland sheep farming in the North West of England

Table 4 Upland livestock farming in the North West of England: State of the sector in 2018

Number of heads (sheep)	3,094,000
Average headage per farm (appr.)	530
Share of English headage	20%
Average farm size (ha)	177
Average age of the farmer	60
Proportion of land under tenancy	63%
Farm business income (average per farm)	36,837
BPS payments as a proportion of farm business income	108%
Income from diversified activities as a proportion of farm business income	17%
Agri-environment scheme payments as a proportion of farm business income	71%

Note: [Click here to enter note](#)

Source: Farm Business Survey (year 2017-2018), Duchy school of rural business (2018), 'The value of the sheep industry', Vivid Economics, ADAS

Options to reduce emissions and increase sequestration:

Tax-based measures would not have impact as most farmers do not pay substantive amounts of income tax. The Farm Business Survey reported an average Farm Business Income of £15,500 for Grazing livestock (LFA) farms for 2018/19 (HM Government, 2018c), with Basic Payment Scheme, Diversified income and Agri-environment payments offsetting negative income from agriculture (-£21,500).

Actions on little-used inputs are of limited value (fertilisers, cultivation and technology) but there is scope for genetic improvement and productivity gains. Grazing livestock farms have the lowest fertiliser N use across all farm types (41 kg/ha in 2017/18).

Payments for peatland restoration, afforestation and agro-forestry could be the main income streams for upland farmers, especially when linked with other ecosystem services (biodiversity, landscape, flood control). The Pumlumon Project in Wales offers an example of how upland landscapes can gain value from provision of ecosystem services. This pilot project, across 40,000 hectares of the Cambrian Mountains has demonstrated how large-scale ecological restoration can bring economic, social and environmental benefits (Montgomeryshire Wildlife Trust, n.d.).

3.3 Case study #2: Dairy in the South West of England

Table 5 Dairy in the South West of England: State of the sector in 2018

Number of heads	431,000
Share of English headage	38%
Average farm size (ha)	159
Average age of the farmer	57
Proportion of land under tenancy	47%
Farm business income (average per farm)	131,300
BPS payments as a proportion of farm business income	28%
Income from diversified activities as a proportion of farm business income	9%
Agri-environment scheme payments as a proportion of farm business income	4%

Note: [Click here to enter note](#)

Source: Farm Business Survey (year 2017-2018), Vivid Economics, ADAS

Options to reduce emissions and increase sequestration:

Livestock measures can reduce methane production from cows. The genetic selection of animals and the use of feed additives have been identified by the Committee on Climate Change as drivers of reduced methane emissions (Committee on Climate Change, 2018). For instance, adding fats to cows' diets offers a promising solution for reducing methanogenesis, without having a significant negative impact on other functions of the rumen.

Larger farms, especially those with year-round housing, will be most affected by regulations on the storage and application of manure and fertiliser. The proposed Clean Air Strategy will extend environmental permitting to the dairy and intensive beef sectors and require farmers to make investments in the farm infrastructure and equipment that will reduce emissions. There is also scope for the Strategy to cover measures which reduce enteric fermentation such as supporting better animal health, improving performance through breeding and optimising feed digestibility.

While there is potential for high incomes from dairy farming, milk prices are volatile. Grant-based measures may be relevant to promote technology uptake and manure storage in this sector. The last 10 years have seen an unprecedented period of price volatility in the dairy sector (UK Parliament, 2016).

Dairy farming can also benefit from agroforestry and hedge creation. By providing shelter to cattle from wind and heat, agroforestry and hedges can improve animal welfare, while trees and shrubs can be used to provide additional fodder. Moreover, if these are situated next to a water course, trees and hedges can reduce diffuse water pollution. Financial support for agroforestry and hedge creation would be provided to dairy farmers through environmental land management payments.

3.4 Case study #3: Cereal farming in the East of England

Table 6 Cereal farming in the East of England: State of the sector in 2018

Total farmed area (ha)	654,000
Share of English production area	26%
Average farm size (ha)	208
Average age of the farmer	60
Proportion of land under tenancy	27%
Farm business income (average per farm)	67,143
BPS payments as a proportion of farm business income	67%
Income from diversified activities as a proportion of farm business income	44%
Agri-environment scheme payments as a proportion of farm business income	7%

Note: [Click here to enter note](#)

Source: Farm Business Survey (year 2017-2018), Vivid Economics, ADAS

Arable farmers in the East of England are highly reliant on direct payments so will be open to ELMS options post Brexit, including cover crops, energy crops and afforestation. The loss of current direct payments is expected to encourage the pursuit of alternative income streams, including environment payments.

Lowland peatland farms are unlikely to be responsive to restoration grants. Public payments for restoration and on-going annual income would therefore need to be much higher than they are currently to entice voluntary enrolment.

There will be opportunities for delivery of some measures via water utilities such as nitrate offsetting. EnTrade Auctions offset 40 tonnes of nitrogen from entering Poole Harbour through land managers bidding to undertake mitigation actions (EnTrade, 2018). Farmers can see the private benefits of improving productivity and 40% grant-aid lessens the private costs

Farmers are not homogenous, but a proportion are relatively open and responsive to change. Farmers differ in their circumstances, attitudes and capabilities, but do respond to a variety of policy instruments

4 Conclusions

Due to the complex nature of carbon sources and sinks in the agriculture and land use sectors, and of significant barriers to uptake (both financial and non-financial), the recommendations in this report cover a broad set of policy instruments. Some of them extend similar existing instruments, such as Contracts for Difference, payments for agri-environmental interventions, and emissions trading schemes, though in the case of afforestation (and possibly for peatland restoration) access to an emissions trading scheme would represent a major shift from current policy.

The nature and novelty of some of the policy instruments recommended in this report mean that some preparation time is needed before implementation. The setting up of a UK emissions trading scheme, dependent on Brexit, its associated agreements and domestic policy, will result in an allowance price which is not known at this time. Similarly, the design of the new Environmental Land Management Scheme, which will replace the Common Agricultural Policy by 2024 in England, is largely unknown. The Government has announced that ELMS will be oriented towards the delivery of public goods but the scale and ambition of the scheme, as well as the amount of public funding that will be available are still under discussion (UK Parliament, 2018b). Some instruments, such as risk mitigation instruments, may benefit from pilot testing to ensure their suitability and effectiveness before they are rolled out on the national scale.

It has been difficult to find policy instruments well suited to deliver all of the low carbon measures highlighted in the first of the Climate Change Committee's land use reports. There may therefore have to be some reliance going forward on softer incentives, such as the provision of advice and training. Examples include some low carbon on-farm practices, such as fertiliser use efficiency, improvements in livestock health and improvements in manure management, storage and application. Meanwhile, other measures could be addressed by ELMS policy, either directly or through cross-compliance. The effectiveness of policies targeting agro-forestry and peatland restoration, which lie outside the Woodland Carbon Code (Forestry Commission, 2018) or the Peatland Code, as well as on-farm measures, may be hard to measure. Extensions to the codes may be needed.

The next step is to cost the policies and to set those costs out alongside the wider benefits of the implemented measures.

Appendix

Additional information on Emissions Trading Schemes and Contracts for Difference

Emissions Trading Scheme

- In an Emissions Trading Scheme (ETS), some sectors (usually the most pollution-intensive) are subject to obligations in terms of greenhouse gas (GHG) emissions. A cap is set on the total amount of GHG which can be emitted by these sectors. Companies receive or buy permits within this cap and can trade permits with each other. The freedom to trade permits means that companies which have the lowest abatement costs can abate further and sell surplus allowances.
- Obligated companies can also invest in emissions-reduction activities in eligible sectors to satisfy their obligation. This is called an offset.
- Currently, the EU-level ETS covers mostly large industrial sectors which emit CO₂. The current price of one ton of carbon on the EU ETS is 25€.
- Farming practices and afforestation are not currently eligible for offsets in the EU ETS. Under the set of policy instruments presented here, farmers and landowners who engage in emissions reductions through afforestation and large-scale agroforestry would receive carbon credits to sell.

Contracts for Difference

- Contracts for Difference are one way of mitigating market price risk.
- The current 'Contracts for Difference' (CfD) scheme in the UK is the main policy instrument incentivising low carbon electricity generation.
- Renewable power generators apply for a CfD by submitting sealed bids through a reverse auction mechanism. Successful bidders are paid a flat (indexed) rate for the electricity they produce over a 15-year period by the Low Carbon Contracts Company (LCCC), owned by BEIS.
- When the market price for electricity generated by a CfD power generator is below the strike price set out in the contract, payments are made by the LCCC to the CfD generator to make up the difference. When the reference price is above the strike price, the CfD generator pays the LCCC the difference.

Afforestation and agro-forestry

Afforestation: Track record

Table 7 Afforestation: Track record

Scheme	Description	Remaining challenges
Woodland Carbon Code	Certification of the carbon content of UK forestry projects.	<ul style="list-style-type: none"> Credits can only be sold on the voluntary market, which means that prices are low.
Woodland Carbon Fund, Countryside Stewardship Scheme	Grants for woodland planting.	<ul style="list-style-type: none"> Incentive levels are too low to overcome landowners' reluctance towards forestry Grant assignment and planting permission processes are complex.
New Zealand ETS	Only ETS to include forestry as a source of obligation.	<ul style="list-style-type: none"> Impact on new planting has been limited due mostly to price uncertainty.
Alberta Emission Offset System, Japan Offset System, Australian Emissions Reduction Fund, California Air Resources Board	Offset schemes with afforestation protocols.	<ul style="list-style-type: none"> Permanence and additionality of projects is difficult to ascertain. The bureaucratic complexity is off-putting to at least some potential investors (particularly smaller landowners).

Source: Vivid Economics, ADAS

Afforestation: Track record – New Zealand’s Emissions Trading Scheme (NZ ETS)

The New Zealand Emissions Trading Scheme (NZ ETS) is currently the only one to include forestry both as a source of both emissions and credits. It was developed to provide price incentives for planting trees and carbon sequestration and a price disincentive for deforestation. Additional information can be found in Table 8 below.

Table 8 Overview of New Zealand’s Emissions Trading Scheme

Item	Comments
Description	<p>Launched in 2008. Forest owners participate in the NZ ETS in two ways:</p> <ul style="list-style-type: none"> Mandatory participation: owners become participants when non-exempt pre-1990 forest land is deforested; they need to offset their deforestation prior to deforesting and establish a carbon and area equivalent forest elsewhere.

Item	Comments
	<ul style="list-style-type: none"> Voluntary participation: owners can apply to register their post-1989 forest land into the ETS to earn New Zealand Units (NZUs): they are entitled to receive NZUs for increases in carbon stocks and must pay units for decreases.
Results	<p>Prior to the introduction of the EU ETS, predictions of the level of afforestation ranged from 20,000 hectares to 50,000 hectares per annum over the period 2008-2020, with a guaranteed carbon price of NZ\$25/tCO₂ throughout the period. According to recent evaluations:</p> <ul style="list-style-type: none"> There were massive levels of deforestation in the three years prior to the introduction of the NZ ETS. Only 45% of eligible forested land that has been planted since 31 December 1989 is registered in the NZ ETS. Large forest owners have been more responsive to the NZ ETS' financial incentives than small forest owners. So far, the NZ ETS has had a positive but limited contribution to changes in behaviour and decisions. Interviews with industry participants suggest that the carbon price had an influence (i) on afforestation decisions on marginal forestry investments and (ii) over the period 2011-2012 when the NZU price was around NZ\$20/tCO₂. <p>The improved productivity of other agricultural commodities (dairy and sheep/beef farming) has led to deforestation and reduced afforestation.</p>
Lessons learnt	<p>Several factors have reduced the effectiveness of the scheme:</p> <ul style="list-style-type: none"> Interviews with industry participants suggest that the carbon price had an influence (i) on afforestation decisions on marginal forestry investments and (ii) over the period 2011-2012 when the NZU price was around NZ\$20/tCO₂. The fall in the global carbon prices and the delayed decision by the NZ Government to delay delinking from international markets significantly reduced the price signal for forestry; The high policy uncertainty. The complexity of forestry credits and liabilities for small landowners who are not professional foresters: for instance, large forest owners have had the possibility to smooth harvest liabilities compared to small forest owners.
Next steps	<p>The introduction of averaging accounting for all forests registered from 2021 is expected to allow landowners to take a long-term view of the amount of carbon in a production forest and could alleviate price uncertainty.</p>

Source: Vivid Economics, ADAS, New Zealand Ministry for the Environment (New Zealand Ministry for the Environment, 2018), Carver et al. (Carver et al., 2017)

Afforestation: Track record – Australia’s Emissions Reduction Fund (ERF)

The ERF supports Australian businesses, farmers and land managers to undertake emissions reductions projects; eligible activities include energy efficiency, waste management, revegetation, livestock management and savanna fire management. Additional information can be found in Table 9 below.

Table 9 Overview of Australia’s Emissions Reduction Fund (ERF)

Item	Comments
Description	<p>Launched in 2015. The government funds emission-reduction projects which go beyond business as usual; the projects are chosen through a reverse auction, so that the lowest-cost options are selected.</p> <ul style="list-style-type: none"> • Land-related projects eligible under the scheme include farm management methods to reduce methane emissions and/or improve carbon sequestration in soil, avoided clearing of forests, reforestation, afforestation and savannah fire management. • After registering a project, landowners and companies can participate in an auction and if successful, contract to sell their carbon units to the Australian Government; an alternative is to sell these credits to businesses seeking to offset their emissions.
Results	<ul style="list-style-type: none"> • The land and agriculture sectors accounted for >80% of the total contracted abatement by 2018 • According to the Australian Farm Institute, US\$239m in annual revenue accrued to landholders who had been awarded contracts under the scheme • The true impact on emissions of the projects funded by the ERF has been questioned: <ul style="list-style-type: none"> – Most of the implemented projects concern avoided deforestation. Not only is deforestation outpacing habitat restoration by a rate of five to one across the country, but concerns about the additionality of projects have also been raised. – The permanence of projects is also questioned, as most have a permanence period of under 25 years. – Good forest management is not incentivised under the scheme, even though it is crucial to ensuring forests remain carbon sinks. – Despite the reverse auction mechanism, the price-effectiveness of the Fund has been questioned as most regeneration projects are located on Mulga land, which is very cheap. Estimates suggest it would have been cheaper for the government to purchase the land than to fund non-deforestation projects through the ERF.
Lessons learnt	<ul style="list-style-type: none"> • Price-effectiveness rather than cost-minimisation should be the focus, especially when public money is being used. • Offset schemes should specify the length of time that land is assigned to forestry and ensure the proper management of the forest during that time. • The scheme has been criticised as a way of making payments to farmers.
Next steps	<p>In February 2019, the Australian Government announced the provision of an additional A\$2bn, which will bring the total investment in the Fund to A\$4.55bn; according to the Australian Government, ~ 100MtCO₂e of emissions reductions are expected to be delivered by 2030.</p>

Source: Vivid Economics, ADAS, Australian government (Australian Government, 2019), The Green Institute (The Green Institute, 2016)

Afforestation: Track record – California’s Air Resources Board Compliance Offset Programme

The offset programme associated with California’s cap-and-trade programme is an example of a compliance-based offset programme: companies regulated under the cap-and-trade system have an obligation to invest

in offset projects if they do not otherwise reduce their emissions. Additional information can be found in Table 10 below.

Table 10 Overview of California’s Air Resources Board Compliance Offset Programme

Item	Comments
Description	<p>The Air Resources Board (ARB) is responsible for implementing California’s cap-and-trade programme, launched in 2013:</p> <ul style="list-style-type: none"> • Up to 8% of permitted emissions may be compensated through offsets. • Projects may be based anywhere in the U.S. • In addition to forestry and urban forestry, two types of agricultural offset projects are accepted, each aimed at reducing methane emissions: biogas systems in dairy cattle and swine farms and rice-cultivation projects. • The level of reduction generated by each project is determined by ‘offset protocols’; independent verification of offsets is required. • Around 28 MtCO₂ are expected to be abated through the scheme.
Results	<p>The US Forest Protocol has generated 80% of the offset credits in California’s cap and trade program.</p> <ul style="list-style-type: none"> • However, according to a recent study, 82% of the credits generated by projects under the US Forest Protocol likely do not represent true emissions reductions. • The estimate of over-crediting is equal to one third of the total expected effect of California’s cap and trade program on emissions over the period 2021-2030. • One of the main reasons is that leakage is under-estimated: the assumed rate of leakage is about 20%, whereas the true rate is probably closer to 80%. • The additionality of projects has also come under question: additionality requires offsets only to be earned for increases in carbon stocks above those in the baseline scenario and the baseline carbon storage level in the Forest Offset Protocol has been considered low.
Lessons learnt	<ul style="list-style-type: none"> • The design of offset protocols – estimating the reduction in carbon generated by a given project – is crucial to the effectiveness of the scheme, yet subject to deep uncertainties. • Stringent standards for permanent and additional projects can present barriers to participation. • Overall programme effectiveness is likely to involve trade-offs between project quality and quantity.
Next steps	<p>The Air Resources Board is currently considering approval of the ‘Tropical Forest Standard’ which, if approved, would allow regions such as Acre, Brazil, to link their forestry programs to the Californian carbon market.</p>

Source: Vivid Economics, ADAS, California Air Resources Board (California Air Resources Board, 2019), Haya (Haya, 2019), Ruseva et al. (Ruseva et al., 2017)

Agroforestry: Track record

Table 11 Agroforestry: Track record

Scheme	Description	Remaining challenges
Ecological Focus Areas	Agroforestry is eligible under the greening payments regulation. However, Basic Payment Scheme eligibility rules limit its widespread adoption	<ul style="list-style-type: none"> • Very few schemes exist to incentivise agroforestry, and those that do are not aimed at carbon reduction • Bureaucracy puts off some potential applicants
Tree felling regulations	Protect the existing stock of trees on- and off-farm	
Healthy Soils programme	Conservation planting is available for grants through this programme, although the aim is not carbon reduction	
Offset and ETS schemes	None of the offset and ETS schemes considered (EU, California, Alberta, New Zealand, Japan) have protocols related to agroforestry	

Note: [Click here to enter note](#)

Source: Vivid Economics, ADAS

Afforestation: Shortlisting of instruments

Table 12 Afforestation: shortlisting of instruments

Policy instrument	Assessment	Key reasons for recommendation
ETS open to forestry credits	✓	<ul style="list-style-type: none"> • Would not require public money. • Has been implemented abroad. • Monitoring, reporting and verification could be based on the Woodland Carbon Code. • Application of the “polluter pays” and “payments for public goods” principles. • Upside potential would create strong incentives to invest in afforestation. • Risk mitigation mechanisms could address concerns on price uncertainty.

Policy instrument	Assessment	Key reasons for recommendation
Payments for actions	~	<ul style="list-style-type: none"> • Would rely solely on public funding. • Payments rates would need to be significant to ensure uptake. • Limited uptake in the current system. • Environmental land management payments could be used as a complementary instrument to pay for the provision of public goods and services other than carbon (biodiversity, recreational access, flood risk mitigation, etc.).
Feed-in tariffs	×	<ul style="list-style-type: none"> • Would rely solely on public funding. • Would not provide incentives for innovation.
Payments for outcomes	×	<ul style="list-style-type: none"> • Would rely solely on public funding. • Payments rates would need to be significant to ensure uptake. • The uncertainty on outcomes may be a deterrent to farmers.

Note: [Click here to enter note](#)

Source: Vivid Economics, ADAS

Agroforestry: Shortlisting of instruments

Table 13 Agroforestry: shortlisting of instruments

Policy instrument	Assessment	Key reasons for recommendation
Payments for actions	✓	<ul style="list-style-type: none"> • Agro-forestry is already included as a candidate for “greening” payments under CAP Pillar I. • Dissemination of best practice and clear integration in the ELMS framework. • Payments would also cover non-carbon benefits (e.g. biodiversity, recreational access, water quality, etc.).
ETS open to forestry credits	✓	<ul style="list-style-type: none"> • Would not require public money. • Agroforestry is already partially covered by the Woodland Carbon Code. • Application of the “polluter pays” and “payments for public goods” principles. • Upside potential would create strong incentives to invest in agroforestry.
Baseline regulation	×	<ul style="list-style-type: none"> • There is no sufficient justification to introduce a regulatory requirement. • Expected to meet resistance as it would impose additional costs on farmers.

Policy instrument	Assessment	Key reasons for recommendation
		<ul style="list-style-type: none"> • Would not align well with the ETS for afforestation.
Payments for outcomes	x	<ul style="list-style-type: none"> • The uncertainty on outcomes may be a deterrent to farmers.

Note: [Click here to enter note](#)
 Source: Vivid Economics, ADAS

Afforestation: Barriers to uptake and how to address them

Table 14 Afforestation: barriers to uptake and how to address them

Category	Barrier to uptake	Proposed solutions
Non-financial barriers	Reluctance to immobilise land.	<ul style="list-style-type: none"> • Price incentive provided by the ETS (upside potential), with the option of a fixed-price mechanism.
	Perception of farmers’ role as one of food producers.	<ul style="list-style-type: none"> • Communications campaign to present farmers as providers of a range of services.
	Lack of interest in or awareness of carbon emissions.	<ul style="list-style-type: none"> • Provision of advice and training; promotion of the Woodland Carbon Code. • Communications campaign.
	Administrative burden.	<ul style="list-style-type: none"> • Advice and guidance and low administrative burden.
	Difficulties with MRV.	<ul style="list-style-type: none"> • Monitoring, reporting and verification to be done through remote sensing and the Woodland Carbon Code. • Ensure criteria are clear and laid out in advance.
	Tenancy contracts.	<ul style="list-style-type: none"> • See section on tenancy.
Financial barriers	High upfront costs (planting & establishment).	<ul style="list-style-type: none"> • Complemented by concessionary finance.
	Low financial incentives.	<ul style="list-style-type: none"> • The ETS would provide carbon revenue (+ upside potential). • ELMS would pay for the delivery of non-carbon public goods.
	Uncertainty on future income levels.	<ul style="list-style-type: none"> • Farmers would be given the option of a fixed price mechanism from the Government.

Note: [Click here to enter note](#)
Source: Vivid Economics, ADAS

Peatland restoration

Peatland restoration: Track record

Table 15 Peatland restoration: track record

Scheme	Description	Remaining challenges
MoorLIFE	Channel private and public investment from multiple sources to restore damaged peat in the Peak District.	<ul style="list-style-type: none"> • The level of investment has been too low to deliver widespread restoration • Long-term commitments to land use change are difficult for most farmers • The lack of regulatory obligation and financial incentives means that restoration only takes place via voluntary initiatives • Knowledge gaps in peatland restoration technique and peatland condition monitoring are being addressed
Dartmoor Farming Futures	Harness the expertise of local land managers to restore and manage peatland.	
DigiBog	Record and monitor the health of peat across the country.	
Countryside Stewardship scheme grants	Grants to restore peat or adopt best farming practices on peatland, such as through limited grazing.	
Peatland Code	Voluntary certification standard for UK peatland projects.	
Specific grants for peatland restoration	£10m invested from 2018 in four restoration projects across England; Peatland Action in Scotland.	

Note: [Click here to enter note](#)

Source: Vivid Economics, ADAS

Peatland restoration: Shortlisting of instruments

Table 16 Peatland restoration: shortlisting of instruments

Policy instrument	Assessment	Key reasons for recommendation
Cross-compliance	✓	<ul style="list-style-type: none"> • Would not require additional public money (other than through an environmental land management scheme). • Clear integration in the environmental land management framework.
ETS with statutory offsets	~	<ul style="list-style-type: none"> • Would not rely on public spending. • Application of the 'polluter pays' and 'payments for public goods' principles.

Policy instrument	Assessment	Key reasons for recommendation
		<ul style="list-style-type: none"> Upside potential would create strong incentives to invest in peatland restoration. Monitoring, reporting and verification could build on the Peatland Code but the Peatland Code is not robust enough for inclusion in the compliance market. An ETS may be perceived as complex but advice and risk mitigation tools could be provided
Baseline regulation	~	<ul style="list-style-type: none"> Upland farmers who are already loss-making would have to incur restoration costs – low political acceptability. Strong political resistance expected from lowland farmers. Rather than restoration regulation could take the shape of a regulatory requirement to cover soils.
Payments for actions	x	<ul style="list-style-type: none"> Would rely solely on public funding. Payment rates would need to be significant to ensure uptake. Limited uptake of the current system.
Payments for outcomes	x	<ul style="list-style-type: none"> Would rely solely on public funding. Payment rates would need to be significant to ensure uptake. The uncertainty on outcomes may be a deterrent to farmers.

Note: [Click here to enter note](#)

Source: Vivid Economics, ADAS

Peatland restoration: Barriers to uptake and how to address them

Table 17 Peatland restoration: barriers to uptake and how to address them

Category	Barrier to uptake	Proposed solutions
Non-financial barriers	Reluctance to change land use.	<ul style="list-style-type: none"> Upland peat: regulatory components + additional options (incl. financial incentives or purchasing land from farmers). Lowland peat: focus on banning the use of peat.
	Perception of farmers’ role as one of food producers.	<ul style="list-style-type: none"> Communications campaign to present farmers as providers of agricultural services.
	Lack of interest in or awareness of carbon emissions.	<ul style="list-style-type: none"> Ban on peat burning and peat use. Regulatory requirement on water companies to restore degraded peatland. Provision of advice and training.

Category	Barrier to uptake	Proposed solutions
	Administrative burden.	<ul style="list-style-type: none"> • Farmers to receive advice and guidance.
	Difficulties with MRV.	<ul style="list-style-type: none"> • Remote sensing and/or drone surveys for category changes (e.g. revegetation of bare peat). • Physical inspection for species-mix changes.
	Tenancy contracts.	<ul style="list-style-type: none"> • See section on tenancy.
Financial barriers	Upfront costs of restoration.	<ul style="list-style-type: none"> • Would be paid for by water customers, the sale of carbon credits, environmental land management payments or Government.
	Uncertainty on future income levels.	<ul style="list-style-type: none"> • Risk mitigation mechanism for the sale of carbon credits.

Note: [Click here to enter note](#)

Source: Vivid Economics, ADAS

On-farm practices

On-farm practices: Track record

Table 18 On-farm practices: track record

Type	Scheme	Description	Remaining challenges
Regulation (UK)	Cross-compliance requirements .	Soil protection, fertiliser management around water courses, best practice around feed to protect consumer health	<ul style="list-style-type: none"> Limited enforcement capacity restricts the scope of existing regulations. Regulations are not homogenous over the whole country, making enforcement and compliance more complex.
	Nitrate-Vulnerable Zones.	Fertiliser and manure management and storage.	
	Storing Silage, Slurry and Agricultural fuel oil regulations.	Specific manure storage regulation.	
Best practice (UK)	Farming rules for Water, Clean Air Strategy.	Best practices for climate-friendly and pollution-preventing farm management.	<ul style="list-style-type: none"> Advice without enforcement capacity and incentives only works for measures which have productivity side-effects. The administrative burden of grants limits uptake.
Best practice (Wales)	Blue Flag Scheme.	Voluntary approach to nutrient management with incentives through recognition mechanisms.	
Grants (UK)	Countryside Stewardship scheme.	To support the implementation of capital-heavy measures such as new manure storage facilities.	
Grants (International)	Alternative Manure Management Programme (California).	To support good manure management practices.	
Offset schemes (International)	Australia Emissions Reduction Fund.	Some protocols are related to on-farm practices, but uptake is low.	<ul style="list-style-type: none"> There is a move to include on-farm practices in offset schemes and/or ETS, but design is complex.
	Alberta Emission Offset System.	Several protocols on farming practices.	
ETS scheme (International)	New Zealand ETS.	The introduction of obligations on the	

Type	Scheme	Description	Remaining challenges
		agricultural sector is under review.	

Note: [Click here to enter note](#)

Source: Vivid Economics, ADAS

Cover crops: Shortlisting of instruments

Table 19 Cover crops: shortlisting of instruments

Policy instrument	Assessment	Key reasons for recommendation
Cross-compliance	✓	<ul style="list-style-type: none"> • Would not require additional public money (other than from an environmental land management scheme). • Cover and catch crops are already part of the 'Greening measures' for Ecological Focus Areas in the Basic Payments Scheme. • MRV could be done through remote sensing.
Baseline regulation	×	<ul style="list-style-type: none"> • There is no sufficient justification to introduce a regulatory requirement. • Acceptability would depend on the flexibility attached to the requirement.
Payments for actions	×	<ul style="list-style-type: none"> • Would rely solely on public funding. • Payment rates would need to be significant to ensure uptake.
Payments for outcomes	×	<ul style="list-style-type: none"> • Would rely solely on public funding. • Payment rates would need to be significant to ensure uptake. • The uncertainty on outcomes may be a deterrent to farmers.

Note: [Click here to enter note](#)

Source: Vivid Economics, ADAS

Fertiliser and manure storage and application: Shortlisting of instruments

Table 20 Fertiliser and manure storage and application: shortlisting of instruments

Policy instrument	Assessment	Key reasons for recommendation
Baseline regulation	✓	<ul style="list-style-type: none"> • Would not rely on public spending. • Could be based on the extension of Nitrate Vulnerable Zones and the Clean Air Strategy. • May be costly to some farmers, but private benefits could be demonstrated.
Emissions tax	×	<ul style="list-style-type: none"> • Would be tricky to implement, as demonstrated by implementation exploration in New Zealand. • Strong political resistance is to be expected. • There is a general reluctance to increase tax levels.

Note: [Click here to enter note](#)

Source: Vivid Economics, ADAS

Livestock diet, health and breeding: Shortlisting of instruments

Table 21 Fertiliser and manure storage and application: shortlisting of instruments

Policy instrument	Assessment	Key reasons for recommendation
Obligation on feed manufacturers	✓	<ul style="list-style-type: none"> • Acceptability expected to be reasonable if low impact on costs and prices. • MRV costs are expected to be low as only feed manufacturers would require monitoring.
Cross-compliance	~	<ul style="list-style-type: none"> • Could be based on the expansion of Statutory Management Requirement #4 (Food and Feed Hygiene). • Acceptability would depend on the flexibility attached to the requirement. • Expected to be a serious undertaking for farmers and audit would be difficult.
ETS with statutory offsets	×	<ul style="list-style-type: none"> • Administration and implementation costs are expected to be high. • Expected to be perceived as complex.
Payments for actions	×	<ul style="list-style-type: none"> • Would rely on public funding and would not support economic efficiency.

Note: [Click here to enter note](#)

Source: Vivid Economics, ADAS

On-farm practices: Barriers to uptake and how to address them

Table 22 On-farm practices: barriers to uptake and how to address them

Category	Barrier to uptake	Proposed solutions
Non-financial barriers	Dislike of top-down approaches, mistrust toward government.	<ul style="list-style-type: none"> Ensuring practices are adapted to location as required. Running consultations through local stakeholders identified as trusted by farmers.
	Lack of interest in or awareness of carbon emissions.	<ul style="list-style-type: none"> Regulatory nature of the measures means no reliance on intrinsic motivation of farmers. The productivity co-benefits of some measures (livestock diet, fertiliser management) can be emphasised.
	Administrative burden.	<ul style="list-style-type: none"> Farmers to receive advice and guidance.
	Difficulties with MRV.	<ul style="list-style-type: none"> Monitoring of fertiliser and manure application use could be done through record keeping of fertiliser purchases and application history. Monitoring of manure storage could be done through physical inspection.
	Tenancy contracts.	<ul style="list-style-type: none"> See the section on tenancy.
Financial barriers	Upfront costs of new practices.	<ul style="list-style-type: none"> Financial incentives offered with concessionary finance where needed.
	Low financial incentives to maintain new equipment or enforce new practices.	<ul style="list-style-type: none"> Monitoring and enforcement of regulations over time.
	Dampening effect on change of CAP direct payments.	<ul style="list-style-type: none"> Their removal is expected to spur more responsiveness to market and policy signals.

Note: [Click here to enter note](#)

Source: Vivid Economics, ADAS

Energy crops

Energy crops: Track record

Table 23 Energy crops: track record

Scheme	Description	Remaining challenges
EU ETS	Energy crops are covered under the ETS due to their use in the energy sector (zero-rated).	<ul style="list-style-type: none"> • Complexities and inefficiencies in responsibilities for planting approvals. • Limited availability of secure fixed-term contracts. • Existing financial incentives are not high enough to compensate for establishment costs and delayed income from planting energy crops. • Government and industrial users still make use of imported biomass.
Renewable Heat incentive	Scheme set up to encourage uptake of renewable heat technology by householders, communities and businesses through financial incentives.	
Renewables Obligation, Contracts for Difference	Incentivisation of energy crops for electricity generation through offsets (RO) and long-term prices for electricity generation (CfDs).	
Feed-in-tariffs	Used to promote the uptake of small scale renewable and low-carbon electricity generation technologies from 2010 to 2019.	
Planting loans	Only available through some interest-free processor loans e.g. for SRC planting. Interest-free loans are provided by the Scottish Government for RHI-eligible installations. Grants are available for uptake of boilers and renewable heating systems and for the woodfuel production through the Rural Development Programme (previously for SRC and Miscanthus).	

Note: [Click here to enter note](#)

Source: Vivid Economics, ADAS

Energy crops: Shortlisting of instruments

Table 24 Energy crops: shortlisting of instruments

Policy instrument	Assessment	Key reasons for recommendation
Feed-in tariffs	✓	<ul style="list-style-type: none"> • Biomass power generation is already eligible under the current FiT CfD system. • The 15-year CfD agreements between the LCCC and biomass power generators support long-term supply contracts with energy crop growers.
Payments for actions	×	<ul style="list-style-type: none"> • Supply-side planting grants (benefitting farmers) often lead to poorly established crops and sometimes no market when the crop is due to be harvested. • Would rely solely on public funding. • Payment rates would need to be significant to ensure uptake.

Note: [Click here to enter note](#)

Source: Vivid Economics, ADAS

Energy crops: Barriers to uptake and how to address them

Table 25 Energy crops: barriers to uptake and how to address them

Category	Barrier to uptake	Proposed solutions
Non-financial barriers	Reluctance to immobilise land for 20+ years.	<ul style="list-style-type: none"> • Increased availability of long-term contracts for energy crops.
	Perception of farmers' role as one of food producers.	<ul style="list-style-type: none"> • Provision of knowledge on the wider benefits of energy crops. • Better representation of energy crops in the media. • Communications campaign to present farmers as providers of agricultural services. • Discussion groups with farmers who are producing energy crops to favour knowledge exchange.
	Lack of interest in or awareness of carbon emissions.	<ul style="list-style-type: none"> • Provision of advice and training. • Financial incentives to avoid reliance on intrinsic motivation.
	Lack of up to date advice for energy crops.	<ul style="list-style-type: none"> • Advisory service for bioenergy planting and management (best practice agronomy and

Category	Barrier to uptake	Proposed solutions
		management, variety lists, planning requirements and financial support). <ul style="list-style-type: none"> • Case studies, demonstration farms.
	Administrative burden.	<ul style="list-style-type: none"> • Simplification of approval processes for planting energy crops. • An integrated land use strategy joining up policy elements.
	Tenancy contracts.	<ul style="list-style-type: none"> • See section on tenancy.
Financial barriers	Capital investments.	<ul style="list-style-type: none"> • Concessionary finance or repayable grants for specialist machinery and other upfront costs.
	Uncertainty on future income levels.	<ul style="list-style-type: none"> • Increased availability of long-term contracts for energy crops.

Note: [Click here to enter note](#)
 Source: Vivid Economics, ADAS

Considerations on tenancy

Agricultural tenants wishing to enroll in afforestation and agri-env schemes are dependent on landlords' permission. There are long-standing and complex cross-cutting tenant-landlord issues, despite repeated legislative change. These issues primarily relate to rent levels as well as entry, exit and succession but are also linked to enrolment in forestry and agri-environment schemes. Since the majority of farms and land is not tenanted this is not an impediment to aggregate enrolment in the short-run, but it may become an impediment in the longer-term, at the same time as it raises concerns about the equity of access to schemes.

The duration and nature of tenancies matter, but so do other factors. For instance, older-style leases explicitly assign more (e.g. timber) rights to landlords; newer-style leases are more flexible, but much depends on (heterogenous) landlords and agents' attitudes and motivations. If the enrolment extends beyond the end of the lease, then the negotiation of compensation for enhancement or dilapidation is crucial.

Legislative change could help, but it is likely to be contentious and possibly counter-productive; therefore, other measures could be envisaged. These include:

- changes to tenancy terms and/or tax breaks (Ag Property Relief from IHT; dual use, etc.) but these create a risk regarding the availability of leases;
- firmer guidance on negotiation of compensation for enhancement and dilapidation and encouragement for flexibility.
- wider policy efforts to raise awareness for both landlords and tenants towards schemes.
- a proactive approach to key landlords (e.g. Crown, Church, MoD) to address barriers and support action.

With varied incentives facing the sector, a slow adjustment to the preferred management structure is expected. The fact that longer term investment options are available may lead to a potential conversion to ownership.

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