

REAP CONFERENCE 2021:

The Carbon Conversation

White Paper



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INTRODUCTION

It is a time of immense change within the rural sector, facing - as it is - a future without direct agricultural support (at least in England), and with significant macroeconomic pressures around net impacting the economy in general and for any farm business.

Yet agriculture is the only industry in the world with the potential to be truly carbon negative.

Farmers are considering opportunities to replace income lost through the Basic Payment Scheme, and to secure market opportunities through new concepts such as carbon management. But it's a complex and potentially confusing time for farmers - with no shortage of opportunities, innovations and concepts supposedly aiming to help manage, store and monetise carbon.

So what do farmers really want to see in order to have confidence and clarity about a route to effective and economically viable carbon management?

Agri-TechE hosted a farmer-exclusive Carbon Conversation (kindly sponsored by Savills) as part of the REAP 2021 conference to put the farmers at the centre of the discussion.

Four businesses - ranging from global agri-business to UK-based early and mid-stage ventures, plus a major technical design consultancy presented their ideas to frame the discussion with a series of innovative farmers to help them articulate clearly what is needed for a carbon-managed future.

Disclaimer: This is intended to be a summary of farmer-focussed discussions at an individual event, and is not necessarily a comprehensive or representative overview of the landscape around carbon management. Where possible the views of participants have been reflected but neither Agri-TechE nor Savills take responsibility for any inaccuracies.

The driver to Net Zero

It makes good business sense to be carbon efficient - not merely because it's externally expected by society and the supply chain. There are complex dynamics around the expectations of the agri-food supply chain; it is likely to be focused on requiring farm businesses to be net zero. In addition, other supply chain businesses or those that sit outside of food may not be under the same direct pressure, but instead will be looking to leverage the carbon benefits of the economic savings within farm businesses.

There is a genuine feeling among farmers that they can make a significant change to the marketplace via carbon trading solutions – but there are many uncertainties which are acting as barriers to adoption of new practices or technologies by farmers. Here we aim to present some of those uncertainties to policy-makers, innovators and supply chain partners to help navigate and expedite the journey to informed, effective, economically viable carbon management on farm.

The size of the prize

Before launching into the technological solutions, Savills' Natural Capital lead Jon Dearsley highlights some impactful changes that can be made to farms' carbon output which have a pretty minimal effect on net margin – an estimated £6.70 / ha and around 70% savings on carbon dioxide across the farm, according to Savills calculations. An 800 ha farm emits roughly 1000 tonnes of carbon dioxide a year, and while Countryside Stewardship and use of cover crops are not as profitable as straight arable cropping, they do create a significant 28% saving in terms of whole farm carbon dioxide.

Additionally, direct drilling reduces soil disturbance but also reduces fuel and wearing parts on machinery, leading to an ability to save around 13% carbon dioxide emissions. Cropping choices are also important when it comes to considering environmental benefits. In addition, reminds Jon, not all agricultural materials and inputs are created evenly, with some producers actively decreasing their own carbon footprint, so responsible sourcing is going to be key.

Carbon-conscious sourcing of inputs

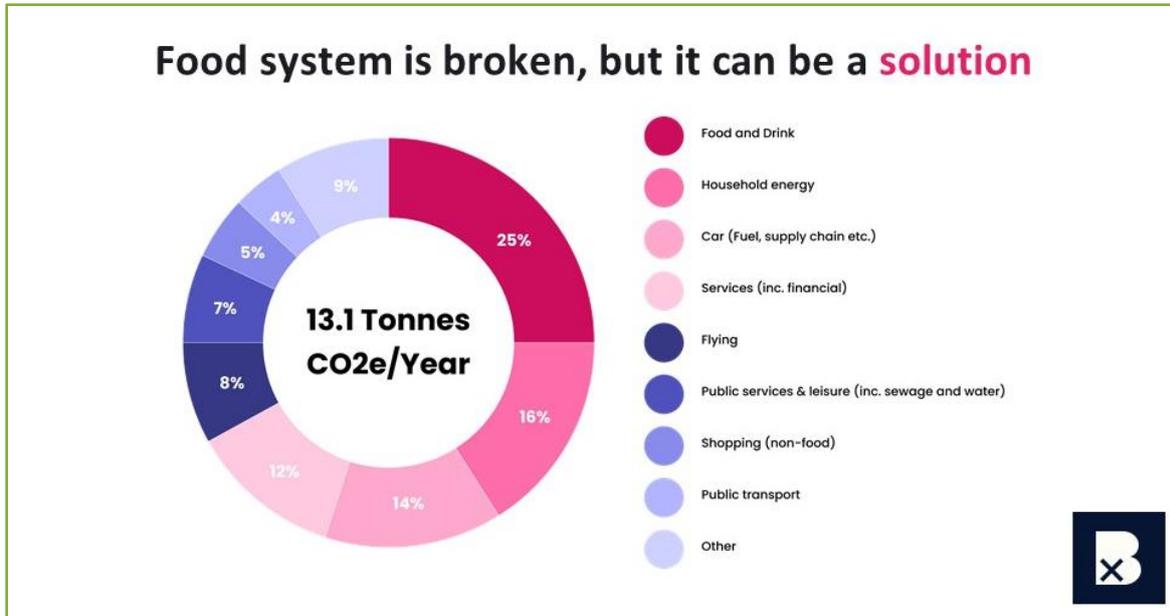
Bayer has committed to be net zero as a business, as well as reducing in-field greenhouse gas emissions by 2030. UK-based Business Development Lead Nick Duncan agrees with the need for a certified accreditation scheme with business models which appeal to both farmers and citizens. He explained that Bayer has two off-setting projects in the USA and Brazil and is developing a platform to connect farmers with their food chain customers – participating food chain customers will buy verified carbon credits from farmers in their value chain for implementing carbon friendly practices on their farm.

The key enabler is a scaleable, cost effective, simple digital tool that can be used across Europe to monitor and verify actions at field levels. This is in development and based on the [Cool Farm Tool \(coolfarmtool.org\)](https://coolfarmtool.org) calculator. Linked to that is identifying the food chain customers – and the farmers – who are prepared to join the scheme.

Currently 27 pilots are underway - with 5 participating farms in the UK and the rest in Belgium, Germany, France, Denmark, Spain and the Ukraine.

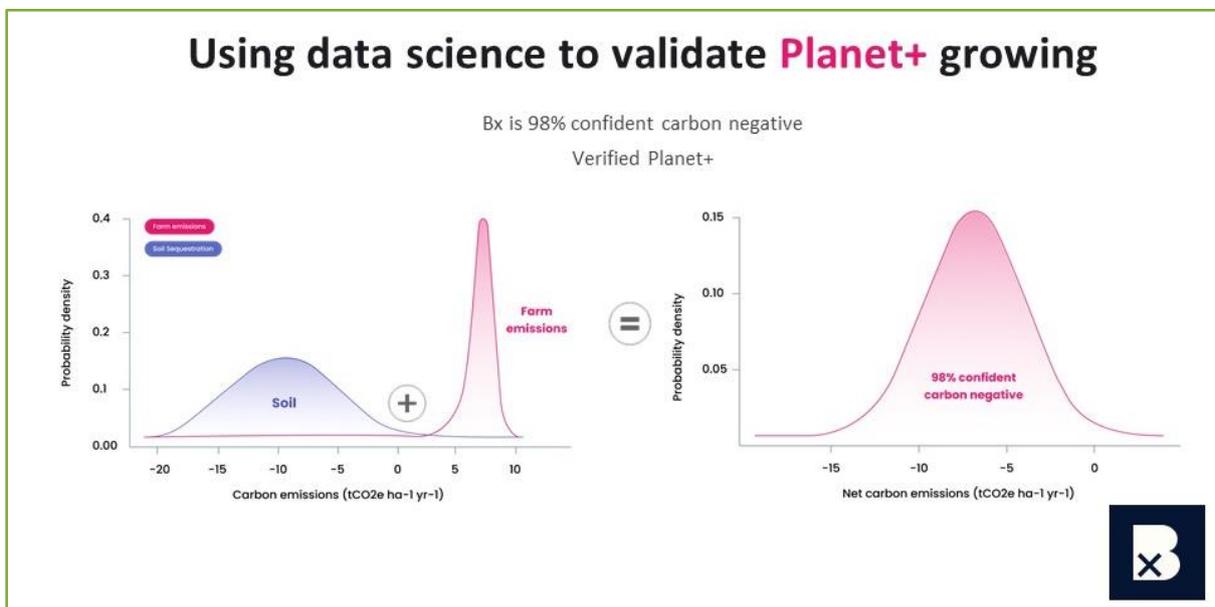
Empowering a Net Zero food system through innovation

Bx is a Kent-based start-up using blockchain and smart contracts to put innovation and decision-making in the hands of citizens. Given that the average household generate 13.1 tonnes of carbon annually, there is, according to Bx co-founder Antony Yousefian, a major opportunity for farmers to sequester carbon dioxide on a net basis and appeal to the conscious consumer.



Annually, an estimated £120bn is spent on the “green” pound – with 60% of citizens buying - or wanting to buy - from socially and environmentally responsible companies. However, a major barrier is the lack of information to enable choices to be made around ethical practices and values when making food choices.

Bx aims to incentivise growers’ best practice in the field around net zero, and connect it with provenance and consumer choice. They are clear that the carbon negativity is entirely achievable for growers, but that clear, verified and transparent rewards need to be in place.



A technology gap remains – measurement in the field, not the lab

Global technical design consultancy business Cambridge Consultants acknowledges the major change to infrastructure needed to achieve. The “chain of trust” that is needed between all the actors to deliver change over time requires rigorous, unified standards and agreed outcomes.

The demand across global businesses to buy carbon credits is driving a market from those who are inherently carbon positive (such as aviation, cement production etc), with no obvious mechanism of becoming carbon neutral any time soon.

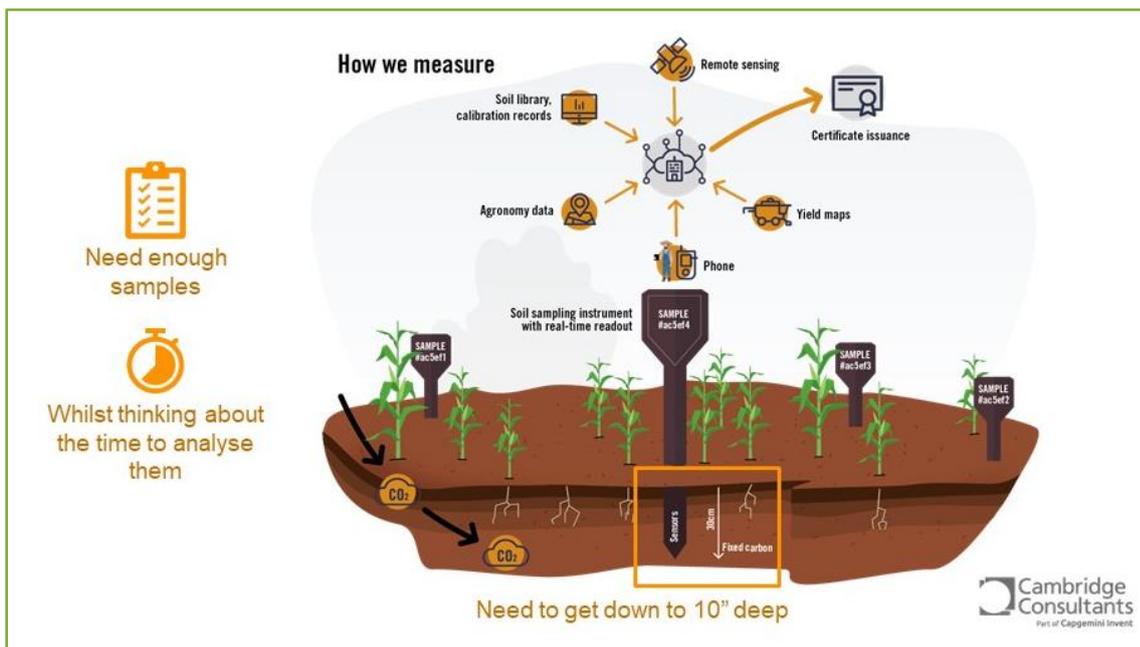
In practical terms, measurements need to be taken at least 10 inches into the soil, to give confidence in the longevity of the carbon being measured – as well as being representative across a given area, so an agreed methodology is needed.

An often underestimated element is the time that will be needed to analyse all the samples – the current state of the art is an elemental analyser, usually hosted off-site – and is based on decades-old technology requiring expertise to manage the process, making it laborious, but accurate.

So what are the options to make these measurements in situ? Spectroscopy enables measurements in the soil to be made – even using hand-held devices (as is being developed already in the US). Yet these are not without their issues – they are affected by water content, they need baselining against a library of soil data and at the moment are not as reliable as the existing solutions.

But a technology “bundle” of data science with combined data sources offer promise – satellite data linked to soil measurement solutions (potentially spectroscopic) and also potentially elements of drone imagery to measure canopy cover. This could lead to approximations of how much carbon has been taken up by the plants in the soil. Coupled with soil science and sound agronomic advice, this could be a game-changer.

The right model, can lead to a trusted carbon credit which will provide a unique and new revenue stream for farmers argues Niall Mottram, head of Industrial and Energy at Cambridge Consultants. The key to this will be by using a combination of data that a financial institution will be comfortable backing.



Baselining will be key – and avoiding double counting

Map of Ag's Head of Sustainability Hugh Martineau advocates strongly in favour of baselining to understand what has happened in soils to date – and establishing baseline carbon stock given the variability of soil textures and water / nutrient holding capacity. Understanding previous management practices and anticipated future interventions will be key to ensuring all future incentives for farmers are linked to an agreed management practice or cropping approach to enhance soil organic matter.

Models will be key – and require the validation discussed by Niall. But not all models are equal. Static models consider one management practice at a time, but dynamic models are becoming available to enable consideration of multiple variables at the same time. Such dynamic modelling approaches are critical to understand the changes in carbon stock over time, using a combination of data sources and can start to show designated zones within a field to show variability in soil carbon across the field. Robust protocols to ensure located (and marked / recorded) sampling points to enable them to be revisited in 10-15 years to detect changes and validate those against the models and predictions.

Finally, a mechanism to avoid double counting is needed – this is a huge risk at present. If farmers trade out all their carbon, there is a serious worry there will be nothing left to show that farm businesses have a net zero product.

THE ENABLING EIGHT – THE FARMERS' WISH-LIST

1 A clear methodology for baselining

In order to introduce carbon elements to decision-making processes on the farm, baseline measurements are crucial. Many farmers have little or no concept of how much carbon is being gained or lost on an annual basis. Trusted advice and a reliable tool to enable this is the major first step for many farmers. As they said – “we can't manage what we can't measure.” There is a huge appetite to demonstrate that positive action is being taken and to give confidence that they are moving in the right direction. Establishing the baseline position also then provides confidence to farmers in an opportunity to be able to trade their carbon.

2 Doing the right thing today – and for tomorrow

The challenge facing farmers now is making a decision now that will be of benefit in the future. There is a real concern as to whether farmers will have any carbon to sell – there is a feeling they need to retain it in order to offset their own emissions. A sale today could result in bankruptcy in the future if carbon will have to be bought back at a higher price. As well as uncertainty from a policy perspective, the requirements from retailers and processors are still unclear – although some of the latter have already made commitments around net zero. This means that what has been produced on the farm is effectively being committed to remarket. So farmers need to be careful what they trade with before actually understanding the net position clearly and accurately.

3 Trusting the motivation of others is crucial – but challenging

A lot of incentives are being discussed – but farmers feel it is a “seller beware” situation. They are keen to be able to trust the corporates to ensure there is a genuine desire for off-setting, rather than “green-washing.” COP26 demonstrated the importance of environmental social governance as a driver for future reporting structured – with corporates and institutions needing to justify how they are going to reach net zero, in addition to making net zero claims.

In addition, corporates are making bold statements around production methods of particular crops (eg mandating the potatoes for their product will all be produced by direct drilling, or using “regenerative agriculture practices”) is confusing and unhelpful without more understanding of the constraints and context of production at a farm level. It is critical for the supply chain partners need to understand what they are asking of farmers and the scale of the task to deliver it.

4 Not all GHG emissions are created equal

Livestock farmers in particular are feeling the pressure – but is the sector where there is the biggest opportunity for methodologies to assess GHG emissions and general models to generate better insights. Yet different livestock production systems are not equal – grass-fed, slow-maturing animals versus those that are consuming more input and being finished earlier are not the same – but it is a challenge to calculate their differences accurately. The timescale around farmland carbon is not equal across the sectors – some (particularly dairy) are seeing this coming much faster than others, but that should be equalised to ensure the different parts of the industry can more quickly and efficiently in a unified direction.

5 Recognising that one size doesn't fit all - but standards and audits are crucial

In terms of managing the most important uncertainties, the major challenge is understanding what supply chains are expecting, what their requirements are, and the data platforms farmers expect they will be required to use. Many trade-offs exist within farming systems and the wider supply chain – what works on one farm may not work on others. Models and guidance need the sophistication to manage these different elements and variables, all of which are potentially aiming to achieve the same outcomes.

Audit methods that enable different systems to be compared are needed – enabled by a standardised methodology that is sympathetic to the different variables is urgently needed to drive consistent change, within a complex multi-variate sector.

6 An appropriate level of risk

“We don't mind taking risks” comment the farmers in the group – “but the values need to be appropriate.” Fear of future unforeseen changes which will disadvantage them is rife. No-one is asking for a totally de-risked future, but there is an element of helping to manage the huge uncertainties – perhaps deploying “public money for public goods.”

The role of landlords and tenants will be crucial as well – current thinking is that carbon belongs to the landlord and there is an obligation to give a rent rebate if the tenant carries out interventions that will contribute to carbon improvements. Longer term agreements or other structures are needed to ensure that a tenant's resource invested into a block of land will be suitably recompensed if the tenancy ends.

7 Sound science is key – and more is needed

The appetite for sound science to direct activities is perhaps greater than ever among farmers. With many myths around (such as soils becoming “saturated” with carbon – spoiler alert – not true!) – there is a real need for science to help inform decisions. Examples included whether there is an intrinsic link between soil biome and residual fungicide within straw; the role of active microbes in the soils in affecting carbon levels and the role of allelopathy, the chemical inhibition of one plant by another, in terms of affecting carbon, soil organic matter and the wider rotation.

8 Support is needed for carbon-centric business planning on farms

It is still the case that a number of UK farmers lack a robust business plan to help guide future strategy, activities and profit forecasts – and there is a concern (especially among advisers) that the whole “carbon management” agenda will contain elements of activities that will be done to farmers, rather than for, or with farmers. There is a risk that some may end up in a situation where they are under pressure to comply with a new supply chain audit, or a new farm assurance type standard, and at some significant cost, and realising that those carbon emission savings and offsets are valuable to somebody but not realising that value themselves.

IN CONCLUSION

The National Farmers’ Union in the UK has the ambition to have a net zero agriculture industry by 2040. With many moving policy parts, lots of science still to be carried out, and lack of certainty around business models, it’s a risky time for farmers. Yet there is an appetite to learn more – to understand the potential prizes and pitfalls – and we hope the Enabling Eight published here will give inspiration to others around what farmers need to embrace the carbon revolution with confidence, clarity and profitability.

To continue the carbon conversation please get in touch: info@agri-tech-e.co.uk.

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