RICS PRACTICE INFORMATION

Impact of carbon markets on the rural economy

UK

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Document type	Definition
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Glossary

Term	Definition
Agriculture	Agricultural activities include the traditional practices of cultivating soil, growing crops and raising livestock, while also integrating forestry and various ecosystem services, such as carbon sequestration, to enhance and sustain natural capital.
Carbon allowance	Carbon allowances are permits issued to companies within a compliance market, authorising them to emit a specified amount of carbon. The aggregate of these allowances forms the emissions cap, which is established by a regulatory body to limit total greenhouse gas emissions in a jurisdiction.
Carbon credits	Carbon credits operate predominantly in the voluntary carbon market, where companies or individuals voluntarily purchase credits to offset their emissions. Carbon credits can also play a role in compliance markets, where they are used to meet regulatory requirements set by governments or international bodies.
Carbon insetting	Carbon insetting typically does not operate in a formal market like carbon credits or allowances. It is a strategy used by companies internally to reduce their carbon footprint in their own operations or supply chain. It is more about corporate environmental responsibility than participating in a specific market.
Carbon offsetting	Carbon offsetting is the action of counterbalancing carbon dioxide emissions generated from industrial or other human activities by engaging in initiatives aimed at achieving equivalent reductions of carbon dioxide in the atmosphere.
Forestry sector	The forestry sector encompasses the management, conservation and sustainable development of forests for the purpose of harvesting timber and non-timber products. It also includes activities related to carbon sequestration projects and other associated natural capital services.

Acronyms

BEIS	Department for Business, Energy and Industrial Strategy
BNG	Biodiversity net gain
BPS	Basic Payment Scheme
CCM	Carbon compliance market
CCP	Core Carbon Principles
CPM	Carbon Pricing Mechanism
CO_2e	Carbon dioxide equivalent
CRC	Carbon Reduction Commitment
ELMS	Environmental Land Management Scheme
EU ETS	EU emissions trading system
GHG	Greenhouse emissions
GWCT	Game and Wildlife Conservation Trust
ICROA	International Carbon Reduction and Offsetting Accreditation
ICVCM	Integrity Council for the Voluntary Market
JV	Joint venture
MRV	Monitoring, reporting and verification
NDC	Nationally determined contributions
NFU	National Farmers Union
PC	Peatland Code
PDD	Project design document
PII	Professional indemnity insurance
PIU	Pending Issuance Unit
SCSP	Soil carbon sequestration project
SFI	Sustainable Farming Incentive
SPE	Special purpose entity
UK ETS	UK emissions trading scheme
VCM	Voluntary carbon market
WCC	Woodland Carbon Code
WCU	Woodland carbon unit

1 Introduction

The emergence of carbon markets presents new opportunities for income diversification for landowners. This paper explores various facets of this nascent market, delving into the complexities and challenges of incorporating soil carbon sequestration projects (SCSPs) into property valuations and the wider surveying industry.

The benefits of adequate carbon in agricultural soils are well established. However, since the dawn of agriculture some 12,000 years ago, around 133 giga tonnes of carbon (approximately 5.3% of global soil carbon stocks) have escaped the earth and are now present in the atmosphere. This release has been exacerbated since the industrial revolution, as anthropogenic activities have led to vast emissions of carbon dioxide and other greenhouse gases (GHGs), causing significant disruption to the Earth's atmospheric conditions.

British farming is also going through a period of disruption following Brexit. The transition from the EU's Common Agricultural Policy (CAP) to domestic Environmental Land Management Schemes (ELMSs) is a central shift. While the CAP focused more on subsidies based on the amount of land farmed, ELMSs aim to pay public money for 'public goods', including environmental benefits. The National Farmers Union (NFU) has indicated that this shift may result in a 37% reduction in funding. The NFU has also challenged the sector to achieve net-zero emissions by 2040, introducing additional financial pressures for landowners and farmers.

To compensate for these potential deficits, diversification of income is key. The emergence of carbon markets offers a promising avenue for this diversification. Carbon markets are a market-based mechanism for incentivising the reduction of GHG emissions through the trading of carbon credits, aligning environmental objectives with economic incentives. Considering that 70% of the UK's land mass is dedicated to agricultural land, the sector is well-positioned to contribute to carbon sequestration solutions while enriching its carbon-depleted soil. However, realising the full potential of this solution requires the establishment of a link between SCSPs on rural land and the finance industry.

One option involves incorporating the value of carbon credits generated from SCSPs into property valuations, which presents novel challenges for valuers. The varied nature of SCSPs, along with the diverse and emerging voluntary carbon market (VCM) requires valuers to gain expertise in multiple disciplines to understand the complexities and diversity of SCSPs. While this domain will eventually become a specialised field, valuers are not yet equipped with the skills to accurately assess the value of carbon credits.

The valuation industry is not alone in the need to incorporate the VCM into property valuations; the broader property sector also faces this challenge. Successful integration of carbon credits will require collaboration across various sectors, including finance, insurance and law, as well as support from government entities such as the Land Registry. Currently, these stakeholders are not fully prepared to accommodate such changes.

1.1 Purpose

The purpose of this paper is to provide an overview of how carbon markets, both international and UK domestic, present opportunities and challenges for the British agricultural sector, forestry projects, the valuation industry and, by extension, related stakeholders. The objectives are as follows.

- Increase awareness of both domestic and international carbon markets, highlighting the diversity of potential SCSPs.
- Investigate the potential carbon markets have for incentivising landowners to engage in carbon sequestration.
- Examine the common structures of an SCSP that a valuer should be familiar with.
- Chart pathways to bridge between agricultural carbon sequestration initiatives and the finance sector.
- Discuss the perspectives and reservations of stakeholders involved in SCSPs.
- Propose potential methodologies that valuers could adopt when valuing rural assets hosting carbon sequestration projects.
- Examine a woodland project in the Woodland Carbon Code (WCC) as a representative example of a common carbon sequestration project in the UK.

This paper seeks to initiate a discussion that unravels some of the complexities of carbon markets and SCSPs, rather than prescribing a definitive method for incorporating carbon credit values into property valuations. It aims to present a variety of perspectives from key stakeholders – including landowners, the finance sector and those within the valuation and property industry – and highlight the multifaceted opportunities and challenges they face. This paper also proposes avenues for advancing this critical dialogue, thereby contributing to a more informed and collaborative approach to valuing our natural resources.

This paper explores carbon markets, with a particular focus on the evolving VCM both in the UK and internationally. It examines the progression of the VCM, its impact on the UK market and the broader implications for the valuation industry.

1.2 Scope

Understanding the mechanics of how carbon credits are generated is essential, particularly the standards SCSP developers are required to follow in order to create high-integrity carbon credits. The paper discusses the prerequisites for establishing an SCSP and how the carbon credits generated can be accounted for in a valuation. The paper then identifies three primary stakeholders that this proposal will impact: rural and agricultural landowners, the property and valuation industry, and the financial industry. It outlines how the expansion of VCM and SCSPs may affect these groups, detailing the potential opportunities and challenges as the carbon market matures.

This paper is primarily addressed to a UK audience, and therefore a woodland project under the WCC will be used to demonstrate the potential impact on key stakeholders as SCSPs gain prevalence on rural land. However, many of the topics discussed, including suggestions on the various methodologies a valuer could potentially employ when assessing land that hosts an SCSP, or the considerations for key stakeholders, are not location-specific.

Many of the ideas proposed in this paper are not without limitations. There is a notable lack of detailed transaction data for assets hosting SCSPs, particularly outside of woodland and peatland projects, which restricts a thorough market analysis. Project longevities introduce uncertainties in feasibility assessments due to fluctuating discount rates and carbon credit prices. While it highlights the WCC's role, this paper does not extend to a global perspective or capture the variety of SCSPs applicable across different UK land types. Moreover, despite efforts to consider diverse stakeholder viewpoints, this paper may not capture the full spectrum of their experiences and issues.

2 Carbon markets

The Clean Development Mechanism (CDM) was the first international carbon market, established by the Kyoto Protocol in 1997. The Protocol's objective was to facilitate a market-based approach to cost-effectively reducing GHG emissions, and expediate the development of low-carbon technologies by assigning a monetary value to the reduction of GHG emissions. Since its inception, carbon markets have evolved into a complex array of systems and carbon programmes, often accompanied by confusing narratives; the widespread belief that carbon markets function as a uniform, global marketplace for carbon credits is a misconception. The reality is quite different.

It is important to acknowledge that carbon markets are still developing, making navigation complex. Specialist consultants often become necessary to steer through this landscape effectively. Therefore, the information provided here should be considered in light of ongoing developments in the field, and it may be subject to change as the dynamics of carbon markets continue to develop.

Most people are now acquainted with terms such as 'carbon markets' and 'carbon credits' due to extensive media coverage, evolving workplace practices and various other initiatives. However, this familiarity can lead to an oversimplification of these complex and continually evolving concepts. Carbon markets are driving significant, if not fundamental, changes in the operation of the global economy. As with any substantial shift, it will take time for the full implications to be realised and understood. Despite the uncertainties associated with these changes, the relevance of carbon markets is becoming increasingly apparent, particularly in the context of rural land in the UK. As a result, surveyors, especially those valuing land hosting carbon sequestration projects, will need to develop an understanding of how carbon markets work in order to better advise clients, as well as how carbon sequestration projects will influence the value of the land assets.

2.1 Market landscape

The Paris Agreement, established in 2015, extended the groundwork laid by the Kyoto Protocol. Unlike the Kyoto Protocol, which imposed international emissions reduction targets on participating developed nations, the Paris Agreement introduced nationally determined contributions (NDCs). This framework grants every participating country, regardless of their stage of economic development, greater flexibility to devise emissions reduction strategies that are optimally suited to their individual circumstances. These evolutions have each impacted the development of carbon markets, which today can be broadly classified into three different types.

2.1.1 Carbon compliance market (CCM)

The CCM is the result of regional, national or international government regulations where mandate-covered entities or industries have carbon allowances for their emissions, which are reduced over time. Examples of compliance markets include the UK Emissions Trading Scheme (ETS) and the EU emissions trading system (EU ETS). Compliance markets often involve heavy polluting industries where there is little opportunity to reduce GHG emissions, like the airline industry or the energy sector (agriculture is not part of the compliance market). Governments introduced these policies to meet their countries' NDC targets, which they committed to under the Paris Agreement.

Currently, the EU is in the process of creating a carbon removal certification framework that could have a significant impact on domestic compliance markets. This scheme is poised to allow credits to offset emissions within these markets and drive innovation and investment in carbon removal technologies, providing companies with new opportunities to manage their carbon liabilities.

Agriculture is not currently included in the scope of compliance markets; therefore, the market does not directly affect the SCSPs discussed in this paper. Nonetheless, the sector represents a significant area of interest, particularly if the UK develops a carbon removal certification analogous to that of the EU. The vast potential of agriculture as a reservoir for carbon sequestration makes it a sector worth monitoring closely.

2.1.2 Voluntary carbon market (VCM)

The VCM consists of companies, organisations and individuals purchasing carbon credits on a voluntarily basis – for example, to fulfil a self-imposed net-zero commitment or to market their products as having a lower carbon footprint. These credits are generated by projects designed to reduce, avoid or reverse emissions, and can be traded for commercial profit or to support not-for-profit initiatives. It is important to recognise that the VCM is not a uniform market; in 2022 alone, there were more than 170 different types of carbon credits.

Carbon credits are differentiated by their various attributes, particularly when linked to broader environmental and social projects. Organisations that create frameworks for certifying carbon offset standards, such as Gold Standard and Verra, set the criteria and methodologies by which they will certify and award carbon credits. A summary of some of these standards can be found in Table 1 (see section 2.5.7).

Although dwarfed by the CCM, the VCM is expanding rapidly. In 2022, the global VCM was valued at approximately £1.58bn ($2bn USD). Projections for its growth span from £197bn ($250bn USD) to as much as £394bn ($500bn USD) by the year 2050. This expansion is driven by nations that, in the quest to cut emissions entirely, acknowledge carbon offsets as an essential instrument to fulfil the sustainability commitments established by the Paris Agreement.

2.1.3 Article 6 transactions

Article 6 is a key section of the Paris Agreement. It introduces carbon trading mechanisms that empower countries to purchase carbon credits from projects in other jurisdictions to fulfil their emissions reduction targets.

Article 6.2 introduces a bilateral mechanism between countries, in which carbon credits are generated and transferred between the partnering countries, according to criteria and based on methodologies agreed between themselves. These credits are counted towards countries' NDCs.

Article 6.4 represents the follow-up mechanism to the Kyoto Protocol's CDM, and provides a framework for the international trading of carbon credits used for fulfilling countries' NDCs, but also other purposes such as voluntary offsetting. As opposed to Article 6.2, Article 6.4 defines specific rules and procedures for traded carbon credits, such as standardised impact quantification methodologies. Article 6.4 also involves a broader spectrum of participants and specifically aims to mobilise private sector investment.

Although Article 6 is yet to be implemented, the markets established through its mechanisms are expected to significantly impact future climate action and carbon trading, and have far-reaching consequences for the VCM as well.

2.2 Market prices

Prices of carbon credits can vary widely, from less than £3.94 ($5 USD) to more than £78.83 ($100 USD), and sometime more. There are many variables that impact price, not least stemming from market confidence with the quality of credits. The prices of most carbon credits declined in 2023, following public controversies about the quality of selected avoidance projects that affected the whole industry. Predicting future carbon credit prices is extremely difficult and relies on a set of assumption. Bloomberg New Energy Finance forecasts that carbon credit prices will likely remain steady or increase slowly, unless the market splits based on quality. If the market includes both high- and low-quality carbon offsets, an excess of supply could drive the average price down to just £14.19 ($18 USD)/tonne by 2050. Conversely, a market focused exclusively on high-quality carbon removal offsets could push the average price to £100 ($127 USD)/tonne. Bloomberg also suggests a third outcome: a hybrid. In this scenario, prices would be kept at a reasonable level but may not attract enough investment in technology-based removal and high-impact avoidance projects.

To complicate matters further, additional benefits for communities or biodiversity, so-called 'co-benefits', also impact price as well as scarcity. Take, for instance, the mangrove restoration project undertaken by Delta Blue Carbon, which aimed to sequester carbon by restoring 350,000 hectares of tidal wetlands in Pakistan. Despite 60% of piecemeal bids exceeding £47.30 ($60 USD), Delta Blue Carbon sold all 50,000 available carbon credits to a single purchaser for a final price of £23.43 ($29.72 USD). This final price is approximately three times higher than that of similar projects based on land. The premium reflects the

significant environmental, biodiversity and social value provided by the project in addition to the sequestered carbon.

As markets evolve, significant variations in the quality and price of carbon credits will persist, reflecting the differing costs of credit development. As more transactional data becomes available and the creation of credits becomes more transparent, we can expect price stabilisation for specific categories of credits, such as those generated under the WCC or the global Verified Carbon Standard.

2.3 UK carbon markets

The UK emissions trading scheme (UK ETS) has limitations and does not allow the use of carbon credits generated from projects outside the UK to be included towards their emissions reduction targets. All efforts to reduce emissions are supposed to happen within the UK itself. The UK is also unlikely to sell carbon credits created domestically under Article 6 in the short term. Despite discussion about linking the UK ETS with other international systems, such as the EU ETS, the only current, relevant market for soil sequestration projects in the UK in the foreseeable future will be the VCM.

Green Alliance, an environmental think tank, highlights the VCM as a key growth sector for soil sequestration projects in the UK, anticipating a surge in carbon credit demand. Currently, UK companies are the third-largest buyers of such credits globally, purchasing 5.9 million tonnes of carbon dioxide equivalent (CO_2e) in 2019, accounting for 5.7% of the global market. However, most of these credits are sourced from overseas. Green Alliance also revealed that domestic schemes like the UK's WCC generate only around 1.2 million tonnes of credits annually. By 2030, the demand from UK companies is expected to reach 14–42 million tonnes per year, escalating to 35–128 million tonnes by 2050.

This demand for carbon offsets is determined by two critical factors in the UK:

- the level of demand from UK businesses for these credits, and
- the proportion of UK businesses' carbon credit demand that can be met by UK-based offset projects.

As the demand for carbon offsets outpaces what UK-based projects can provide, businesses may increasingly turn to international markets to meet their needs. This shift could paradoxically lead to a decrease in funding for SCSPs managed by UK farmers and landowners, thereby limiting the growth of the domestic carbon credit market.

Incorporating a broader range of SCSPs in the UK and fostering the creation of a carbon removal certification could enhance the domestic supply of credits, potentially retaining more investment in the UK. Additionally, maintaining the integrity and credibility of carbon credits is crucial to ensuring market confidence and price stability, and achieving the desired environmental outcomes.

2.4 Market participation in the UK

The minimum requirement to sell carbon credits is to get the project certified. In order to get certification, projects need to comply with the methodology of the standards body. There are various organisations that project developers could choose from, which fall into two categories:

- **UK government-backed**: the Peatland Code (PC) and the WCC (see Table 1 in section 2.5.7) are standard setters in the UK, applicable to the creation of woodland and restoration of peatland respectively. These are supported by the UK government and specifically apply to the UK, but only play an insignificant role in the broader VCM.
- **Private organisation**: there are a number of international standard setters, most notably Verra and Gold Standard, which together accounted for more than 80% of carbon credits generated in the international VCM in 2022. Their methodologies cover a wide range of activities and apply globally. They also have methodologies relevant to UK soil sequestration developers. A certification under an international carbon standard could open up a larger pool of buyers for project developers.

Notably, projects certified under voluntary standards are not subject to government oversight, and recent reports from academia and media have revealed flaws in project certification. This has led to significant overestimation of achieved impacts, which raised concerns about the quality of some existing credits and intensified the focus on initiatives that seek to ensure integrity in the VCM. An important initiative is the Integrity Council for the Voluntary Market (ICVCM), which defined the Core Carbon Principles (CCPs) designed to identify high-integrity credits. The ICVCM's next step is to evaluate projects and methodologies, expediting some for faster accreditation. At the same time, rating agencies for carbon credits are playing an increasingly important role. However, despite these developments, uncertainty remains. Project developers may face challenges selling credits that do not meet the CCPs in the future.

An important criterion that will impact market participation in the UK is compliance with Article 6. Credits recognised under voluntary carbon standards can become more valuable if the host country's government allows for their international transfer and agrees not to count the emissions reductions they represent towards its own NDCs. This ensures that the credits aid in enhancing global climate efforts and eliminates the risk of double-counting emissions reductions.

To facilitate this, host countries will need to adjust their national emissions records to include these authorised credits, a process known as 'corresponding adjustments'. Many developing nations are currently creating carbon laws to permit such authorisations. Notably, Gold Standard has announced that its registry now includes the first batch of carbon credits authorised by host countries for international use, aligning with Article 6 provisions.

Overall, the choice of standard setters by project developers will depend on various factors, such as suitability of methodology and the cost of certification. Other criteria can include the perceived credibility of the organisation and the depth of the market.

2.5 Carbon sequestration project

A carbon sequestration project is the fundamental building block in any carbon market and is where tradeable carbon credits are generated. The types of projects vary widely to match the diverse types of carbon markets they supply. Despite differences in project location, process and credit type they produce, they share fundamental organisational and management similarities that are important to understand. Below are some of those elements that are universal, and not just applicable to the UK.

2.5.1 Carbon offset programme

This is an overarching system or initiative that involves various activities related to carbon reduction or offsetting projects. Programmes may encompass defining standards, reviewing projects against these standards and overseeing the issuance and retirement of carbon credits. Programmes are often active in different geographies. For example, the California Air Resources Board runs the cap-and-trade programme in California, while the Peatland Code is limited to the UK.

2.5.2 Standards

Standards incorporate independently-verified methodologies that prescribe the operation of sequestration projects for effective carbon sequestration and carbon offset credit generation. Standards that have been verified by the International Organization for Standardization (ISO) 14000 series are considered the minimum required benchmark.

The standard methodology for generating a credit from trees under the WCC would be different to the Verra standard methodology for generating a credit from the creation of biochar.

2.5.3 Carbon market registry

This is a platform or database where carbon credits are registered and transacted. It tracks the issuance, ownership and retirement of carbon credits to ensure transparency and avoid double counting. Registries are an integral part of the carbon market ecosystem, ensuring that each credit represents a real, verified emissions reduction and that it is only counted once. This topic is discussed in greater detail in section 3.1.3.

2.5.4 Project developers

These organisations specialise in creating and managing projects designed to reduce GHG emissions and ultimately generate carbon credits, which can then be sold in the VCM. Some key responsibilities of a developer include conducting feasibility studies to assess the viability of a project and ensuring the project complies with the established standard's methodology.

2.5.5 Accreditors or verification

Independent third parties verify the amount of carbon that has been or is projected to be sequestered. The accreditors consider adherence to the project design document (PDD) and the respective standard methodology, and the progress of a project.

2.5.6 Credit purchaser

The downstream market consists of entities looking to offset their GHG emissions, either partially or fully. The VCM credit purchasers can, broadly speaking, be broken into two main categories.

- Wholesale purchasers. These are typically large institutions and corporations engaged in high-volume transactions. They seek to buy substantial quantities of carbon credits to meet large-scale emission reduction targets or for financial investment. Wholesale purchasers often buy credits directly from developers. For example, in June 2024, Microsoft announced its commitment to purchasing eight million carbon credits from BTG Pactual Timberland Investment Group, marking it as the largest carbon removal transaction to date.
- Retail purchasers. These buyers are generally smaller-scale and include individuals or businesses making purchases to meet specific emission reduction goals or voluntary commitments. Retail purchasers typically buy credits from brokers or traders, who have bought a large tranche from a developer, and broken it into smaller packages. The retail market offers greater flexibility and a wider range of credit types, with more emphasis on specific attributes such as co-benefits related to social or environmental impacts. An example of retail purchasing is airlines offering passengers the option to contribute to carbon offset projects when purchasing a ticket as part of a carbon offset programme.

2.5.7 Carbon programmes

Certain programmes are regarded as the global benchmark for any carbon sequestration project, and projects that use standards that fall outside these programmes should be viewed with caution.

Table 1 provides an overview of major global VCM programmes, including two that are operational in the UK, each adhering to ISO 14064 for reliable carbon credit trading, emissions reduction and environmental integrity. The table also details the predominant regions and sectors of activity, such as forestry, waste, agriculture or energy. Specifically, the WCC and the PC are recognised by the UK government, signifying official endorsement as effective and credible mechanisms for meeting environmental goals and potentially qualifying for governmental grants. The absence of UK government recognition for other programmes, like Verra, does not imply a lack of legitimacy but may indicate a misalignment with UK-specific regulatory and policy requirements.

Name of programme	Name of registry	Certificate name	Credit code	High quality?	ISO verification standard?	Recognised by UK government?	Project locations	Project sector
Verified Carbon Standard	Verra Registry	Verified Carbon Units	VCU	Varied	Yes	No	Developing countries	All sectors
Gold Standard	Impact Registry	Verified Emissions Reductions	VER	Varied	Yes	No	Mostly developing countries	All sectors excluding REDD+
American Carbon Registry	American Carbon Registry	Emissions Reductions Tons	ERT	Varied	Yes	No	United States	AFOLU, industrial processes and wastes
Climate Action Reserve	Carbon Market Directory	Climate Reserve Tons	CRT	Varied	Yes	No	North America	Agriculture, forestry waste, energy
Woodland Carbon Code	UK Land Carbon Registry	Woodland Carbon Units/ Pending Issuance Units	WCU	Yes	Yes	Yes	UK	Forestry
Peatland Code	UK Land Carbon Registry	Peatland Carbon Units/Pending Issuance Units	PCU	Yes	Yes	Yes	UK	Peatland

Table 1: Major global and UK VCM programmes

3 Considerations for valuers

The valuation industry has continually evolved to adapt to changing market dynamics and client needs. Currently, the industry is navigating the complexities of emerging global carbon markets. Although the agricultural sector is excluded from the UK ETS (the compliance market), rural land plays a crucial role in the VCM, offering opportunities for landowners, the finance sector, and project developers. This shift presents new challenges for surveyors, particularly in assessing the impact of carbon-related initiatives on rural land values.

3.1 Nascent market

Despite the growth of the VCM globally, land hosting SCSPs in the UK is still in its infancy. Only the WCC and the PC are active, with the WCC being the larger of the two. As of June 2024, there are 656 validated WCC projects, up from 36 in 2013. However, the market is still niche and has existed for just over a decade, resulting in limited transactions of land hosting WCC projects. This scarcity of transactional evidence contributes to not just scepticism towards carbon-oriented forestry, but makes it difficult for valuers, and the broader surveying industry, to draw definitive conclusions about how SCSPs will impact land value.

Landowners typically retain land with WCC projects, anticipating that the value of future Woodland Carbon Units (WCU) – a verified and tradable carbon credit – will rise, especially as 2050 approaches. This expectation is partly due to the lengthy development process for WCUs – only 8–10% of credits are realised within the first 10 years of a project, with around 60% maturing by year 25. Since the first validated projects started in 2013, none have yet reached their peak carbon sequestration phase, making it challenging to accurately factor in the value of carbon credits into land values.

There has been minimal re-trade of carbon-oriented forestry. Land that has sold off its Pending Issuance Units (PIU) – a future carbon credit, not verified – often struggle to sell and is withdrawn from the market, as uncertainties about contractual obligations and project completion risks deter buyers. Selling off PIUs before project maturity appears to negatively impact the underlying land value.

In the medium term, as more transactions involving land hosting SCSPs are completed, evidence will become available and valuers will need to incorporate the impact of SCSPs on land value. Future considerations will include familiarity with carbon markets, identifying and reporting asset value components, the extent of valuation, and understanding the specific interest being valued.

3.2 Nature of interest

Given the lack of transaction evidence, it remains uncertain how the market will price land hosting SCSPs. The market may consider two primary perspectives: viewing the interest

in the land as a real property asset as defined by IVS 400, or as a financial instrument as outlined in IVS 500.

According to IVS 400, a real property interest involves the rights associated with owning, controlling, using or occupying land and buildings. The valuation of these interests can utilise the three principal approaches detailed in IVS 105.

- Market approach: compares similar property sales. The valuer might compare the sale of this land to similar properties with established SCSPs, such as the WCC.
- Income approach: evaluates the income potential of the property. The valuer could project future income from selling carbon credits generated by the woodland.
- Cost approach: considers the cost of replacing the property. In this scenario, the valuer might calculate the expenses incurred in planting and maintaining the woodland.

IVS 500 defines a financial instrument as any contract that results in a financial asset for one entity and a financial liability or equity instrument for another. The valuation of financial instruments may involve market-based methods or model-based methods, or a combination incorporating elements of market conditions, valuation models and judgemental inputs. Given the absence of transparency and transactions in the market, it may be likely valuers using IVS 500 will use a model-based method.

As the market develops in the medium term, there may not be a single preferred or dominant method for pricing land hosting SCSPs. It is crucial for the valuer to have a clear understanding of the specific interest being valued, in conjunction with other factors that could impact the overall value.

3.3 Factors affecting value

There are number of universal variables that impact the value of land, such as location, access to transportation links, topography and shape. Additional emerging factors specific to SCSPs may include the following.

- Carbon credit revenue potential: The projected income from selling carbon credits generated by the project.
- Regulatory compliance and certification: Costs and processes associated with meeting and maintaining regulatory standards and certifications.
- Project duration and permanence: The length and reliability of the carbon sequestration commitments.
- Risk and insurance considerations: Potential risks to the project's success and the associated insurance costs.
- Ownership and contractual obligations: The impact of ownership structures and any binding agreements on the land's use and revenue.

The above is not an exhaustive, and the weight of their influence on a valuation is yet to be determined.

3.4 Related industry challenges and future guidance

Completing a valuation involves collaborating with other industries and services that intersect with the real estate sector. Including the value of SCSPs and carbon credits is not feasible without allied industries also having an understanding. Allied services and industries include:

- Land Registry: Surveyors should work with the Land Registry to ensure carbon credit rights and land use restrictions are accurately documented in the Title Register, facilitating proper valuation and legal clarity for SCSP projects.
- legal industry: Legal professionals need to integrate carbon credit information into their assessments, ensuring clear guidance on the obligations and rights associated with SCSP projects, which is crucial for advising clients on land transactions.
- insurance industry: Collaboration with insurance firms is essential to develop policies covering the risks of carbon credit under-delivery and uncertainties in valuations, thereby providing security for investors and clarity for valuers dealing with SCSPs.

Given the evolving nature of carbon markets, RICS will keep abreast of their impact on real property and financial interest transactions. As more transactional evidence involving SCSPs emerges, the RICS will assess the feasibility of issuing future guidance to ensure valuers are equipped to handle these new elements.

4 Considerations for landowners

With the rising global and UK demand for carbon credits, new SCSP opportunities are emerging for landowners, potentially enhancing the value of their property. Yet these opportunities also introduce novel considerations into the decision-making process when considering whether to advance an SCSP.

Landowners face a fundamental question: how do they wish to use their land, and how would an SCSP impact this use? This requires a forward-thinking and often multigenerational perspective, bringing with it a complex set of factors.

This paper, which is set in a rural UK land context, presents a foundational framework for landowners to evaluate the long-term viability and strategic fit of hosting SCSPs. While the focus will be on woodland projects within the WCC framework, many of these considerations can be applied to a wider array of SCSPs.

4.1 Project suitability

The global VCM offers a diverse array of SCSPs, with each project presenting unique suitability challenges. Factors influencing suitability range from financial availability and market demand to the technical expertise required for project management. As a starting point, policy, land suitability and the principle of 'highest and best use' are key factors that will need to be thoroughly considered.

4.1.1 Policy

Prior to Brexit, many UK farmers relied on Basic Payment Scheme (BPS) support via the EUs Common Agricultural Policy (CAP). DEFRA estimated that 42% of farms were unprofitable without the BPS. Post-Brexit, the CAP is being phased out and replaced with the UK government's Environmental Land Management (ELM) scheme. The two, however, are not directly comparable. The BPS provided financial support directly to farmers or rural development projects in an effort to improve agricultural productivity, stabilise markets and ensure reasonable prices for consumers. The ELM scheme shifted from direct payments to a system of 'public money for public goods', which rewarded sustainable farming practices that contribute to environmental goals. The shift not only changed the incentives for land management practices, but has resulted in a funding shortfall, resulting in farmers looking to diversify their incomes. Already by 2022, 68% of UK farms had ventured into alternative businesses like hosting weddings in renovated farm buildings and glamping. This presents an opportunity for SCSP as a way to secure alternative revenue, although Green Alliance notes that it will not come close to making up CAP funding, as demonstrated in Figure 1.

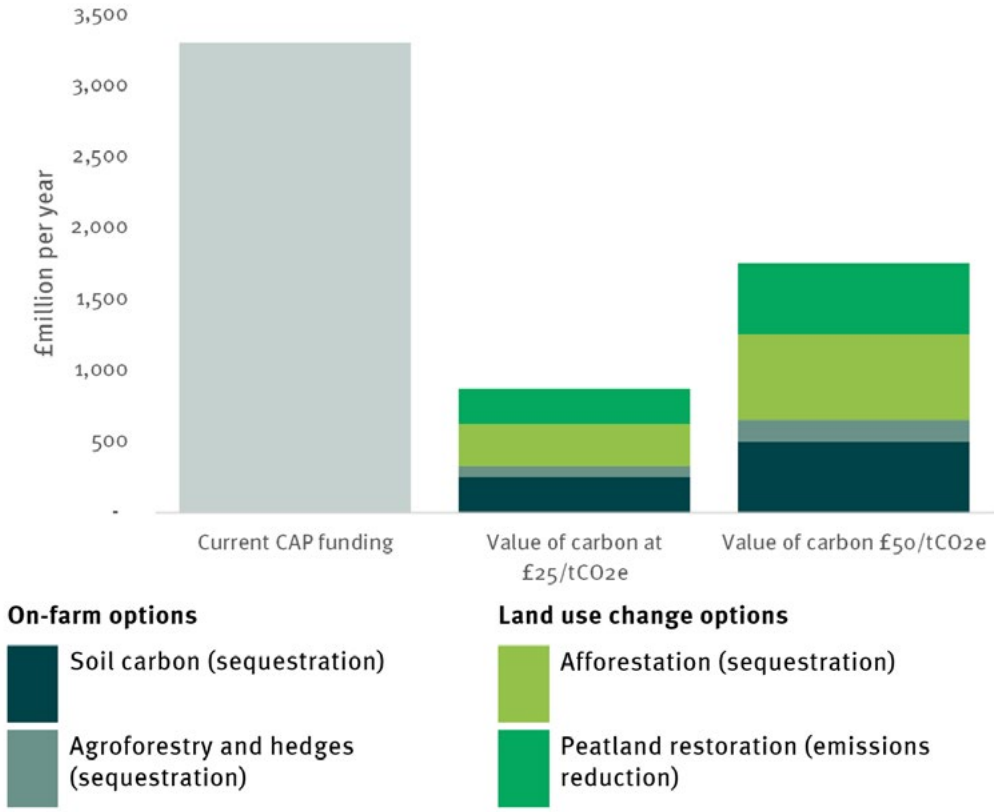

Figure 1: Potential yearly value of carbon sequestration and emissions reductions (in 2050) comparted to current CAP payments; source: Green Alliance

Policy plays a pivotal role in determining the type of SCSP that landowners might choose. The ELM's Sustainable Farming Incentive (SFI), for instance, supports activities that enhance soil quality and biodiversity, which can also lead to increased carbon sequestration. Such regenerative farming practices, endorsed by standards set by organisations like Verra, can help farmers mitigate the funding gap while adhering to the ELM's objectives.

Looking forward, policy continues to evolve. DEFRA has announced it will launch 50 new actions, including access to schemes funding agroforestry for the first time. This forthcoming development could further shape the landscape of sustainable farming and SCSPs.

4.1.2 Highest and best use

The 'highest and best use' is a concept that refers to the most profitable legal use to which an asset might be utilised, which is physically possible, appropriately supported, financially feasible and results in the highest value. When considering whether rural land is suitable for an SCSP, alternatives should be considered. Parcels of rural land close to urban centres are almost certainly going to be more valuable when benefiting from possible development potential rather than hosting an SCSP, regardless of future carbon prices. This is also true of fertile land used for conventional agriculture or parcels poised for commercial development. However, for land where there is low development, agricultural or amenity value (among other things), an SCSP might indeed represent the highest and best use.

While 'highest and best use' analysis incorporates risk into the assessment, this point merits reemphasis, especially concerning SCSPs. The attractiveness of SCSPs on marginally productive agricultural land should be carefully weighed against the novel uncertainties inherent in such projects. As outlined earlier, uncertainties include fluctuating carbon market prices and the substantial inputs required when managing a successful SCSP. When factoring in the risk of project failure, maintaining the land for marginal farming may emerge as a more prudent and appealing option, especially when considering the long-term stability and lower risk profile it offers.

4.1.3 Land suitability

The trope ‘soils ain’t soils’ gained popularity from an advertising campaign, highlighting the considerable yet often overlooked variability among different soil types for domestic gardening. The phrase rings true when applied at the macroscale. In areas where profitable food production is difficult, alternative uses like SCSPs become more attractive.

The National Food Strategy found that 17% of non-intensive farming areas in England (contributing to less than 3% of England's output) had the potential to be converted to broadleaf and mixed woodlands. Viewed from the perspective of a woodland project, this analysis highlights land that could feasibly sustain such an initiative, without encroaching on land crucial for primary food production.

Figure 2: Locations most suitable for either mixed broadleaf or commercial coniferous forest; source: Green Alliance

Beyond afforestation, alternative sequestration strategies like silvopastoral or regenerative farming could be adopted on more productive lands. These practices not only offer additional revenue but also enhance soil carbon levels, boosting both the yield and resilience of core farming activities.

4.2 Land value implications and income

The impact of SCSPs on land value presents a challenge in analysis due to the scant transactional evidence. However, a 2023 report from the Scottish Land Commission provides some insights in the forestry sector context, which encompasses woodland SCSPs. The report highlights that commercial forestry businesses are outbidding upland and livestock farmers for land suitable for afforestation. The paper also identifies a competitive tension between the commercial timber industry and initiatives focused on enhancing natural capital and carbon sequestration. Conversely, investor confidence in acquiring land for woodland

carbon sequestration projects was variable, primarily because of changes in the 'additionality testing' for WCC projects (see section 6.2). The intricacies of the market and the resultant effects on land values are compounded by reports that properties with established WCC projects, having sold their available PIUs, struggle to find buyers. This is attributed to, among other factors, the uncertainty surrounding ongoing management responsibilities and land use restrictions, which detract from the potential benefits.

While a woodland SCSP may potentially affect the residual value of land, it is essential to consider this in the broader context of a landowner's situation. This could involve aspects such as being part of a larger estate management strategy, the need to raise funds without incurring debt or integrating SCSPs as part of a company's carbon insetting efforts. Notably, the adverse effects on land value mentioned above are specific to woodland SCSPs; other SCSP types active in the VCM may not negatively impact land value, or the benefits of a capitalisation event are greater.

4.2.1 Expert advice

This situation underscores the need for landowners to seek expert advice from estate managers and surveyors in order to make informed decisions that consider the full spectrum of their circumstances. Due diligence is crucial, especially concerning SCSP-related risks and their potential impact on land value. Although the strategies for navigating these complexities are still developing, insights from carbon market experts and SCSP developers will be instrumental.

4.3 Soil health

In addition to the financial gains from carbon credits for landowners, enhancing soil carbon has other advantages. Carbon-rich soils not only become more fertile, but increase drought resistance, provide higher crop yields and quality, and decrease soil erosion.

A comprehensive global meta-analysis conducted in 2019 underscored the impact of soil carbon on yields. The study revealed an average yield increase of 10% (and 11% standard deviation) for maize and 23% (and 37% standard deviation) for wheat. These increments correspond to 32% and 60% of the respective projected yield gaps for these crops. Moreover, the study highlighted the interconnection between soil organic carbon (SOC) and nitrogen efficiency in farming. Elevating SOC concentrations can substantially decrease dependency on nitrogen-based fertilisers. To illustrate, by increasing SOC from 0.5% to 1%, it is possible to sustain current yield levels while reducing fertiliser usage by 50%. A further increase of SOC to 2% could potentially cut the requirement for synthetic nitrogen by up to 70% in certain scenarios. Enhanced SOC also bolsters the structural integrity of soil and its capacity to hold water and supply vital nutrients that are key to crop growth, even when nitrogen inputs are minimised.

Although soil carbon is beneficial, certain farming practices result in significant soil carbon loss, which may take centuries to replenish naturally. However, strategies exist to mitigate these losses. Land management practices, such as incorporating exogenous carbon sources

like biochar or organic amendments, can help restore SOC. A comprehensive global study suggests that these practices not only revive depleted soil carbon but also create a financial opportunity for farmers. They can generate additional income by serving as a repository for carbon captured from direct air capture systems or biochar projects. Therefore, landowners have the opportunity to earn revenue by contributing to the storage of externally captured carbon, while restoring their own soil carbon levels without having to significantly alter their land use, as some SCSPs might require.

Improving SOC content also holds significant interest for lenders. Recognising the benefits, financial institutions could acknowledge that investments in soil health not only contribute to environmental stewardship but also reduce risk profiles for agricultural loans, as they underpin stronger and more reliable farm productivity. In this context, the Sustainable Soils Alliance (SSA) is actively developing the UK Farm Soil Carbon Code. While it is currently speculative, should the SSA decide to issue certificates or other measures related to soil health, these could potentially be integrated into financial valuations utilised by banks – not necessarily as collateral, but as a means of modifying risk profiles.

4.4 Project ownership, control and management

Recognising the potentially decades-long or even multigenerational lifespan of some SCSPs, it is crucial to address project ownership, project management, and control of the host land. The structure of ownership can have significant downstream effects, including on succession planning and tax implications. Therefore, input from multidisciplinary specialists will be essential when advising clients on the administrative complexities of an SCSP.

4.4.1 Ownership structure

There are three principal frameworks for ownership that this paper will explore, although it is important to note that these do not represent the full spectrum of possibilities. As with renewable energy developments on rural properties, a variety of alternative ownership models exist. The optimal model for any given project will depend on a range of variables, many of which have been outlined earlier in this discussion.

Landowner

When the landowner both registers and manages the project, they maintain full control over the land and the project's management. This ensures that the landowner will fully enjoy the benefits arising from the sale of any carbon credits.

Nevertheless, adopting this approach comes with its own set of challenges. The landowner assumes all liability should the project fail or underperform. Additionally, there is the risk of a potential lack of expertise needed to manage the project effectively, the possibility that income generated may not meet expectations and the requirement for a comprehensive succession plan to address the long-term commitment the project entails.

Surveyors should prepare to offer expert advice to clients on navigating carbon markets and the development of SCSPs, particularly if the VCM broadens to include initiatives beyond the WCC and the PC in the UK. With a growing trend similar to the recent demand for Biodiversity net gain (BNG) project guidance, landowners will seek an understanding of the complexities of global carbon registries and effective SCSP management. In response, the surveying sector will need to build robust partnerships with carbon consultants, finance professionals, agronomists and project developers in order to offer comprehensive and strategic support to landowners.

Third party

Opting for a third-party structure, the landowner leases land to a tenant who then assumes responsibility for managing the project. This arrangement is particularly appealing to landowners not wishing to engage in direct management of the project. It allows for steady rental income from the tenant, providing an opportunity for income diversification, especially if other parcels of their land are used differently. This structure also offers an option for less productive lands to yield higher returns.

However, the landowner misses out on the potential financial upside from selling credits. There is also a risk of tenant default, and there will likely be a limited market for future tenants with the motivation and skill set to pick up an incomplete project. Furthermore, there may be uncertainty regarding the landowner's responsibility to complete the project in the event of the tenant breaking their lease.

Joint venture

The joint venture (JV) model presents various configurations, including the 'farm clusters' model (see section 4.7.2). This model is particularly attractive for neighbouring landowners with smaller parcels of land, as it allows them to pool their resources into a larger, combined JV cluster. Projects that were once cost-prohibitive for individual holdings become viable. This collaborative approach enables shared management costs and risk distribution, where a deficit in one area may be offset by gains in another.

An alternative JV structure involves a partnership between a landowner and a specialist project developer, creating a special purpose entity (SPE) JV. Here, the SPE leases the land and assumes project management responsibilities. This model retains many benefits of the farm clusters approach, while simplifying the complexities related to multiple ownerships and partnership dynamics.

Despite these advantages, JVs can also present challenges, such as conflicts arising from differing management styles or decisions related to financing versus the pursuit of established credits. Additional complexities may ensue if a partner wishes to sell or lease their land share. It is also important to consider the associated risks. For instance, if the SPE developer partner fails or exits the project, the landowner could be left to complete it without the requisite skills or resources. Such a risk necessitates careful planning and contingency measures for landowners when entering into a JV agreement.

4.4.2 Project design and land use

Considering how a landowner wants to use their land in the long term will influence the type of SCSPs they select. Finding a balance between maximising the development of carbon credits against future land use and management obligations will be an important decision that may be difficult to change in the future.

4.4.3 Succession planning and tax implications

The three ownership structures will influence the intricate interplay between capital gains tax (CGT) and inheritance tax (IHT), and advice from a specialist would be prudent. CGT implications arise from the disposal of assets, with rates contingent on both asset type and the individual's tax band. IHT considerations come into play at the estate level upon death, potentially offset by reliefs such as agricultural property relief. The relationship between CGT and IHT can be complex, especially when considering the potential for tax reform to alter the current 'step up' in basis provisions. Selecting the right project management structure and advisors is critical.

Specifically for woodlands, profits from commercial timber sales on privately owned arboreal tracts are exempt from income tax, and standing timber sales are not subject to CGT. Woodlands may qualify for 100% IHT relief on the timber's value through the Woodland Relief scheme if managed commercially. The sale of land itself may incur CGT, and landowners should be aware of VAT obligations for other forestry-related activities. Commercial woodlands are exempt from business rates, but landowners are advised to seek specialised tax advice to navigate these regulations effectively.

4.4.4 Project management

Securing a competent project manager is particularly important if the project is not being managed by the landowner themselves. Their expertise and industry networks, especially with specialists like agronomists and ecologists, are vital. Additionally, a project manager well-versed in nominated carbon registry standards will ensure the project adheres to regulations and successfully integrates into the VCM.

4.5 Cash flow

SCSPs are distinct from typical business ventures due to their substantial initial costs and the delayed timeline for generating revenue through carbon credit sales. To get these projects underway, forward financing, often via the pre-sale of anticipated credits, is crucial. For effective management of SCSPs, it is imperative to model and understand the cash flow, both incoming and outgoing, to ensure the financial sustainability of the project and to minimise the risk associated with cash flow variability.

4.5.1 Income streams

Project managers embarking on SCSPs need to be aware that revenue streams will potentially be inconsistent. Initial capital injections are essential, not just for covering initial setup costs but also for ensuring the project's sustainability through long-term expenses such as ongoing management and verification, even when income from the sale of carbon credits may be delayed. This is especially critical for projects under the WCC: budgets should account for the immediate revenue from the sale of PIUs at potentially lower rates, and also consider the strategy for selling WCUs later on, which could command higher prices.

4.5.2 Costs

The initial capital required to set up an SCSP can be reasonably calculated and justified, particularly when seeking financial backing. The challenge arises in estimating the long-term costs of project management. For instance, changes in the standards for verification can influence the project's financial viability by altering ongoing expenses or affecting future credit prices. Market developments, however, also hold the potential to drive down costs. An example is Ecometric, a firm that employs remote sensing technology to assess soil carbon sequestration, which is considerably more cost-efficient than traditional methods of collecting soil samples and performing laboratory analysis.

4.6 Project failure

There is always a risk that an SCSP will fail by not generating sufficient carbon credits to render the project economically viable or to meet the obligations of pre-arranged credit sales. The potential for such shortcomings is multifaceted and varies depending on the specific SCSP type. Landowners should evaluate and prepare for the potential liabilities that may arise from an unsuccessful SCSP conducted on their property. These liabilities could encompass a range of issues.

- Contractual accountability: they must honour agreements with buyers, delivering on carbon sequestration services. Non-fulfilment can lead to claims for damages.
- Legal compliance: they are required to comply with environmental laws, which may dictate the maintenance of the land for carbon sequestration and the prevention of deforestation.
- Restorative actions: in cases of avoidable project failure, landowners may need to implement measures to restore the land's carbon sequestration capacity.
- Financial liabilities: mismanagement or failure to meet project standards could result in financial consequences for undelivered credits.

In a situation where a tenant is the project developer and manages an SCSP, further considerations for the landowner include the following.

- Tenant liability: tenants may default on rent and breach the lease agreement, possibly leading to liability for environmental damage or non-delivery of carbon credits.

- Landowner liability: there are current provisions to ensure the continuity of woodland creation projects by allowing the transfer of grant funding responsibilities to new owners upon the sale of the land. Likewise, the implementation of any SCSP will necessitate equivalent provisions.
- Shared responsibilities and loss recovery: both parties may share the burden of remediation, and landowners might pursue compensation for unpaid rent or property damage.

In both situations, landlords will likely be responsible in varying degrees for an SCSP's failure. While insurers like Kita offer policies to carbon credit buyers, such coverage is scarce for developers. Consequently, project failure poses a significant risk for landowners in the current market.

4.7 Agricultural sector

The benefits of adequate SOC are often overlooked in the quest for the high yields that conventional, high-input farming methods achieve, methods that frequently result in soil carbon depletion and compromised soil health. However, the development of carbon markets has now created an economically viable opportunity for farmers to sequester carbon back into the soil. In this context, different sectors within the agricultural industry are poised to play a significant role in reducing atmospheric carbon and, at the same time, improving the quality of agricultural soils.

4.7.1 Sectoral level

The National Farmers Union (NFU) represents over 46,000 farming and growing businesses in the UK. The NFU recognises the significant role agricultural soils could play in sequestering atmospheric carbon, and in September 2019 set an ambitious target to achieve net-zero greenhouse gas emissions for the entire agricultural sector in England and Wales by 2040. The strategy to reach this goal includes improving land management and altering land use to boost carbon capture.

Still, reaching a net-zero target involves more than just planting; it will require adopting technology-driven SCSPs. One such method is biochar production, converting organic waste into a carbon-rich substance through pyrolysis. Another is the advancement of bioenergy with carbon capture and storage (BECCS), marrying biomass energy production with carbon sequestration. Both technologies would require a place to store the carbon – agricultural land could be a solution. The NFU's advocacy should extend to securing endorsements from government bodies like Defra and the Treasury for carbon pricing, as well as the Department for Business, Energy and Industrial Strategy (BEIS) for technological investments, in harmony with national strategies for industrial growth and clean energy.

The NFU's mandate is broader than simply guiding and educating farmers. It involves unifying efforts and fostering an economically sustainable framework for farming communities to implement SCSPs at a scale that aligns with their net-zero goals.

4.7.2 Farm clusters

Farm clusters represent a collective movement where landowners collaborate to meet shared environmental, economic or social goals. This collective approach offers advantages that might elude individual farms, an important consideration given that the average UK farm spans just 81 hectares, and nearly half of the UK's 216,000 farm holdings are under 20 hectares. Collaboration is not new to UK farmers, who have worked together for generations, but the 21st century has seen the formalisation of these partnerships. The Game and Wildlife Conservation Trust (GWCT), founded in 1931 to improve game and wildlife management, has played a pivotal role in shaping these collaborations. Today, the GWCT continues to lead the way in advocating for farm clusters, placing a strong focus on enhancing biodiversity and promoting sustainable farming practices.

In partnership with the NFU, the GWCT played a key role in establishing the Environmental Farmers Group in May 2022. This initiative encourages Avon Catchment's farmers to form clusters, with ambitious environmental targets in sight, such as achieving net-zero GHG in farming.

With regards to SCSP, forming clusters can harness economies of scale, mitigating costs related to the initiation and management of these projects, which are often a major hindrance. This joint effort diminishes the financial pressure on individual farmers by sharing costs and pooling resources for essential technology and infrastructure. Economies of scale also enhance the accessibility of the international VCM and the financial viability of the SCSP. Moreover, by combining carbon credits, clusters can offer larger quantities for sale, making them more appealing to large requirement purchasers or institutional investors. Importantly, clusters provide a buffer against the risk of project failure: if one farm's SCSP fails, the others within the cluster can provide support and balance out the shortfall.

4.7.3 Individual landowner

Approximately 70% of the UK's landmass consists of agricultural land, and the landowners and farmers who manage that land are facing new pressures and challenges, many of which have been discussed throughout this paper.

There are also many opportunities. Landowners have the potential to tap into the burgeoning natural capital markets, which include SCSPs. Carbon sequestration alone could represent £1.7bn pa, nearly half the prior public subsidies for agriculture, with even greater potential if the VCM were more accessible internationally.

As the agricultural industry moves toward net-zero emissions, farmers are tasked with understanding the complexities of transitioning to carbon neutrality in response to growing internal and external demands. Selling carbon credits in the VCM now poses a conundrum: does it jeopardise a farmer's ability to offset their own future operations, especially when emerging supply chain audits may require all participants to demonstrate their own carbon neutrality?

Even as they spearhead the initiative toward a carbon-neutral industry standard, the NFU cautions farmers to consider the long-term value of credits and to continue prioritising food production. The Green Alliance echoes this sentiment, cautioning that selling carbon offset credits too soon could undercut the farmers' decarbonisation efforts.

Therefore, the onus falls back onto individual landowners and farmers – those who will directly engage in carbon sequestration – to assess the feasibility of participating in SCSPs against a backdrop of risks and uncertainties. Encouragingly, the NFU is developing governance principles to foster collaboration between the public and private sectors on natural capital initiatives, including innovative economic models centred around farm cluster groups. Until further guidance and assistance is provided, it will be difficult for the individual entities to make any decisions around SCSPs confidently.

5 Bank perspective

To enhance the integration of carbon credits from SCSPs on agricultural land into financial frameworks, banks and financial institutions – key players in transaction facilitation and risk management – also need to appreciate the potential value of these credits.

One strategy to achieve this involves recognising carbon credits as collateral, specifically those generated from carbon sequestration projects on rural land. This acceptance would inject liquidity into the VCM, offer alternative land use options for landowners and bolster the viability of regenerative farming practices. The proposal is not straightforward. Banks are yet to establish how their risk assessment criteria, routinely applied to conventional assets in lending, can be adapted for carbon credits.

5.1 Risk criteria fundamentals

Understanding the influence the Paris Agreement has on the financial sector is a starting point for how banks might devise a risk criterion. This subsection explores how the Agreement influences the fundamental pillars of risk assessment, within the context of the domestic UK VCM.

5.1.1 Trustworthiness

The WCC enjoys a high level of trust and respect in the UK. Its operations are specifically tailored to domestic woodland projects, and the resultant WCUs are traded exclusively within the UK market. The WCC benefits from recognition by the UK government. Conversely, the international VCM is more expansive, embracing a wider variety of sequestration projects and therefore a diverse spectrum of available carbon credits. The international VCM does not benefit from governmental recognition, resulting in heightened concerns regarding their transparency and credibility.

One option that would bolster banks' trust in the international VCM is to ensure they are recognised by the ICVCM. As noted before, the ICVCM is an independent, internationally-recognised organisation that identifies high-integrity credits in the global VCM. In March 2023, it published the CCPs, developed in collaboration with leading scientific bodies. These principles outline threshold standards for high-quality carbon credits, and set eligibility criteria for carbon-crediting programmes and methodologies.

Other options include BeZero, a rating agency that compiles numerous factors that affect the quality of a carbon credits and grades them accordingly. Another is the Carbon Credit Quality Initiative, which has developed a scoring tool for carbon projects. These initiatives have set a precedent for the rigorous assessment of carbon credit quality, paving the way for the CCPs' standardised approach to bolster market confidence further.

It is important to acknowledge that a substantial number of carbon credits were generated by historic projects before the development of the CCPs. Many of these projects are of high quality and played a pivotal role in expediting investment into decarbonisation initiatives prior to the establishment of the CCPs.

Banks should therefore mandate that all future generated carbon credits that will be considered collateral bear the CCP 'label'. This label would guarantee that the methodologies underpinning the credits have been independently verified and scientifically endorsed as trustworthy and effective. Furthermore, the transparency and standardisation of these methodologies will assist in distinguishing between different types of credits, leading to the emergence of more reliable price signals.

While the ICVCM's CCP label is a significant tool for enhancing trust in carbon credits on a global scale, the recognition of credits by national governments remains a fundamental feature of their credibility. Banks and other financial institutions operating within the UK may therefore find the government's recognition of the WCC as sufficient for their due diligence processes, given the WCC's compliance with domestic standards and objectives.

5.1.2 Liquidity

Liquidity, which describes how easily an asset can be bought or sold without significantly impacting its price, is another factor for banks. Market depth and price volatility pose challenges for carbon credits to be considered collateral. Currently, there is considerable supply-side interest in carbon credits, and demand looks reasonable in the medium term, although it is contingent on multiple causes (see section 2.3). Consequentially, today there is demand-supply imbalance in the very small UK carbon credit market. This will likely persist unless the government mandates a quota for carbon offsetting by businesses or acknowledges additional standards, which will also likely maintain the current state of limited market depth and ongoing price volatility.

The Voluntary Carbon Markets Integrity Initiative (VCMI) is one organisation that plays a pivotal role in expanding the market by actively engaging in partnerships with national and regional governments, as well as other relevant stakeholders. This collaborative approach is geared towards the establishment of a reliable and credible VCM that aligns with the standards outlined in the VCMI Access Strategies Toolkit and compliant with the Paris Agreement. Such alignment and compliance serve to expand the VCM while enhancing transparency.

This improved transparency has a positive downstream impact on prices, fostering greater confidence among buyers in the market. Heightened confidence, in turn, lends itself to generating a stabilising effect on market prices. Adherence to these standards by project developers not only attracts confident buyers, but also assures banks of a reliable buyer market for credits used as collateral.

5.1.3 Quantifiable

Quantifying tangible assets like land is relatively straightforward due to their identifiable and measurable characteristics. However, quantifying carbon credits necessitates reliance on third-party documentation. The accuracy of this information is particularly important for valuers who report on it, and for banks that rely on these reports.

Valuers should first examine the relevant carbon market registry, which holds key details like the volume of available carbon credits, their status (are they retired?) and ownership data. Additionally, the registry will display the PDD outlining the expected carbon credit output of the SCSP.

After a project has been validated (as outlined in section 3.1.4), it enters the monitoring, reporting, and verification (MRV) phase. This phase is essential for ensuring that the project's carbon offset claims are accurate, credible and verifiable. During monitoring, data on the carbon sequestered by the project is regularly collected. This data is then compiled into a report, typically prepared by the project developer, which details the carbon reductions achieved. Independent entities, such as SustainCERT, Earthood or Carbon Check, subsequently verify this report. These third-party verifiers periodically review the project to confirm that the actual carbon sequestration matches the claims made, ensuring that the project's activities are in accordance with the PDD. This MRV cycle will be the eyes and ears for valuers and banks alike in quantifying the carbon credits generated throughout the life of a project.

5.1.4 Quality

Quality is another primary concern for banks, given there is notable variance between carbon credits and reliability issues within the VCM. Third-party verification, like those identified by the ICVCM as high-integrity, could be a prerequisite for banks when assessing carbon credit quality. As the ICVCM continues to develop the CCPs, it will serve as a significant indicator of quality in the future.

Directly assessing the quality of carbon credits will be a challenging task for valuers and bankers. However, the private sector offers tools like BeZero, a carbon credit rating agency that provides a quality, letter-based ratings for carbon credits, similar to bond ratings. Utilising such services for cross-checking credit quality can be instrumental for banks to gauge the collateral value of the credits they handle.

5.2 Carbon credit value

When a bank considers accepting an asset as collateral for a loan, a pivotal question arises: will the asset retain sufficient value to cover the loan in the event of a borrower default?

In the context of accepting carbon credits as collateral, it is imperative to first ascertain their value, which the bank can then incorporate into their loan criteria for this specific asset class. Several approaches could achieve this.

- Independent experts: in the real estate sector, independent property valuers act on behalf of banks to estimate the likely market value of assets intended as loan collateral. A parallel relationship can be applied for carbon credits, where carbon market specialists can determine the likely value of a credit by considering the factors influencing its creation, including the credit type, registry standard and adherence to methodology, among others. Independent carbon analysts, with their deep expertise in this emerging and rapidly changing market, can provide valuable insights.
- Contract sales price: forward financing is a common approach to cover the initial investment required to set up a project before a single credit is generated, a method detailed in section 4.5. This strategy is functionally akin to purchasers acquiring PIUs within the WCC, which will be discussed further in section 6. Alternatively, companies may commit to buying credits at a predetermined price once they are issued, which provides developers with the financial assurance needed to embark on a project. Banks can assess the strength of these agreements, much like evaluating covenant strength in lease contracts, to inform their decision-making process or to use as evidence.
- A recent example of forward financing an SCSP can be found in Australia, where Australia's largest bank, the Commonwealth Bank of Australia, completed a deal worth £883,560 ($1.7m AUD). This transaction advanced funds for a share in the credits produced by the project, which involves the purchase and sustainable redevelopment of land management practices at cattle stations located at Narndee Station and Mount Magnet in Western Australia. This transaction marks a significant milestone for Australia's agricultural sector and its domestic carbon market, potentially serving as a model for banks both in Australia and internationally on structuring such deals.
- Spot price: financial institutions commonly accept shares in publicly-listed companies as collateral, through a process known as securities-backed lending. This approach involves conducting liquidity assessments, analysing market depth and volatility, and closely monitoring the loan-to-value ratio. Hypothetically, carbon credits could undergo similar treatment. Several VCM exchanges, like the Carbon Trade Exchange, facilitate the trading of credits from various industry standards, including Gold Standard, Verra's Verified Carbon Standard and the UN's Clean Development Mechanism (CDM). This option might be more feasible in the future, as current carbon exchanges are relatively small and unstable, and likely don't meet the stringent requirements of securities-backed lending.

5.3 Applying risk

Not all collateral assets or borrowers carry the same level of risk; each asset is unique, and banks need to account for these variances accordingly. For instance, loans deemed higher risk often attract higher interest rates, less favourable loan-to-value ratios and more stringent collateral requirements. In the property sector, a single asset can encompass different risk levels. Consider a multi-tenanted commercial building with both blue-chip tenants and others prone to default. The variance of covenant strength necessitates a nuanced approach to risk assessment and management.

While assessing collateral risk, banks consider many variables; however, these are especially pertinent to carbon credits.

5.3.1 Carbon credit risk

The price of carbon credits is highly variable both within and across sectors. Their value can also fluctuate based on factors like prevailing scientific consensus, degree of government support and accepted best practices. Viewed through a real estate perspective, the value of arable land tends to be more stable than that of carbon credits from an active agroforestry project on the same piece of land.

5.3.2 Market risk

As initiatives around carbon sequestration gain traction and the VCM grows, the odds improve for the stabilisation in carbon credit prices. This, in turn, should reduce the lending risks against carbon credits over time. A similar trend can be observed in the realm of renewable energy projects. A study published in the European Journal of Development Research explored the relationship between a nation's renewable energy use and the default risk of banks. Analysing data from 80 banks in 20 countries from 2006 to 2017, the study found that companies financed to convert to renewable energy became more profitable and were therefore more likely to repay loans, reducing banks' default risks.

A testament to this evolving financial landscape can be seen in the UK's solar sector. In 2008, the UK had a solar capacity of 22 megawatts, which increased dramatically to 14,660 megawatts by 2022. While the use of carbon credits as collateral is a different proposition from directly financing renewable energy endeavours, the overarching theme remains: banks' risk appetites adapt with the maturation of markets concerning new asset classes.

Conversely, carbon markets act as transitional mechanisms to incentivise the reduction of GHG emissions. By pricing carbon, they direct investments towards more sustainable solutions. The ultimate goal is to establish a carbon-neutral economy, at which point the need for carbon markets will diminish as an emissions balance is achieved. As 'peak carbon' approaches, the inherent risk associated with carbon credits will inevitably increase.

5.3.3 Land use risk

Land values hinge on their potential uses, so the way in which the PDD dictates that the land is to be used to produce carbon credits set by the relevant standard greatly influences this. For example, the WCC requires a permanent land use change to woodlands, substantially affecting the land value. This can be compared to regenerative farming SCSPs, which impose minimal changes like no-till practices, without altering the land's primary use.

Conversely, SCSPs can enhance degraded or unproductive farmland by increasing soil carbon content or by elevating the land to a more valuable use. This potential improvement is a boon for banks and is discussed more comprehensively in section 4.

5.3.4 Project risk

SCSPs aim to sequester atmospheric carbon, yet projects may not meet their targets or even exacerbate emissions. Each PDD is required to identify potential risks and detail measures to mitigate them. Despite these precautions, project shortfalls or failures do occur.

To address this, programmes like Verra and Gold Standard establish a buffer pool (as does the WCC; see section 6.4) to safeguard against losses from natural disturbances like wildfires, floods and disease. This buffer, however, does not cover failures due to mismanagement, or failure to adhere to the PDD or its risk mitigation plan. These issues are consequently addressed through legal and contractual avenues.

It is the mismanagement cause for project failure that banks will be particularly concerned about, especially given the limited availability of insurance products that cover such types of failure. In the event of a mortgage default, the bank may face challenges in repossession. The marketability of land with an incomplete and faltering SCSP – where the funds for completion have been depleted – is uncertain. Banks will need to approach the financing of SCSPs with caution, aware that the risks of mismanagement can complicate not just the project's completion, but also the bank's ability to recover its investment.

5.3.5 Regulatory risk

Regulatory jurisdiction risk emerges when governmental or regulatory bodies alter rules, regulations and laws within sectors, regions or jurisdictions. Such changes are often linked to governmental transitions and frequently impact global carbon markets.

For instance, Australia introduced the Carbon Pricing Mechanism (CPM) in 2012, obligating liable entities to pay for their GHG emissions. This mechanism was repealed in 2014 following a change in government. In the United States, the country's commitment to the Paris Agreement seesawed: it joined in 2016, withdrew in 2020, and re-joined in 2021, with each change corresponding to a different administration. The UK is not exempt either. The Carbon Reduction Commitment (CRC), introduced in 2010, targeted large, energy-intensive organisations in both public and private sectors. Despite its initial mandatory nature, it was discontinued in 2019, with the government citing its redundancy due to overlaps with the EU ETS, which itself was replaced by the UK ETS in 2020.

More recently, and relevant to the woodland project example in section 6, the criteria for woodland project were tightened by Scottish Forestry in 2022 by changing the 'additionality test' requirements (see section 6.2) – a move that is anticipated to significantly reduce the registration of new projects.

Regulatory uncertainty is compounded by the long-term nature of many carbon sequestration projects. Projects like woodlands span decades before completion, with credits only being fully realised upon completion. Given the significant changes that can transpire within each election cycle, or otherwise, there are substantial difficulties for banks in assessing regulatory risks relating to carbon credits.

5.4 Income-only

After discussing the complexities of recognising carbon credits as collateral, a possible interim measure could be for banks to acknowledge the added value of carbon credits in improving the serviceability of a loan. For instance, banks might place a lien on carbon credits, incorporating their income stream when determining loan-to-value ratios and debt serviceability. This mirrors previous approaches with renewable energy installations on land. While valuing assets like wind turbines or solar panels is specialised, banks have previously emphasised the income they generate rather than their intrinsic value for loan serviceability.

6 Worked example: Woodland Carbon Code

There are only two active VCMs in the UK: the WCC and PC. While this paper advocates for broader government recognition of programmes, the WCC was chosen as a proxy to illustrate the process of setting up an SCSP for several reasons. First, the WCC is the most extensive VCM in the UK, and the processes by which trees sequester carbon are well-understood. Secondly, the UK government acknowledges both PIU and WCC – an important distinction separating the two from other global programmes (see Table 1). Finally, it is the most common form of SCSP that valuers will likely encounter in the short term.

This section does not prescribe a particular methodology for the valuation of woodland SCSP projects, but outlines some essential elements in establishing a project within the WCC. It is important for valuers to consider and fully understand these aspects when assessing the value of land hosting an SCSP, whether it involves woodland or other types of projects.

6.1 Relevant participants

The relevant participants in a WCC project include:

- carbon offset programme: the WCC
- standard: compliance with sustainable forest management practices in line with the UK Forestry standard, including the elements of sustainable forestry management
- project developers: not all landowners actively manage their land. Those that don't can elect third parties who will typically charge a management fee. Active landowners may manage the project themselves given they are already working the land – assuming they have the requisite skills to do so
- accreditor: only the Soil Association and the Organic Farmers and Growers are recognised accreditors for the WCC
- credit purchaser: typically, a business that chooses to offset its carbon footprint by purchasing credits in the VCM not due to regulation, but as part of its sustainability goals or corporate social responsibility initiatives.

6.2 Eligibility prerequisites

There are several requirements that must be completed before a project can be eligible with the WCC. Some of these requirements will have long-term impacts on the land, which owners will need to consider carefully. Eligibility requirements include:

- registration with the WCC before works starts on site
- permanent land use change to woodland
- compliance with the UK Forestry Standard
- abiding by the Forestry Act 1967 (future timber felling will require a license)
- complying with the Environmental Impact Assessment regulations
- demonstrate 'additionality', which confirms that the carbon sequestered is above what would have occurred in the absence of the project. To do this, two tests must be passed:
  - legal: demonstrate that woodland creation is not mandated by any laws, regulations or legal requirements; the project is genuinely additional and not merely fulfilling a legal obligation
  - financial: evaluate the financial viability of the project without the income from carbon finance; it aims to demonstrate that, without carbon credits, the project would either not be the most economically attractive option or might not be viable at all.

Passing the additionality test will be simpler for new woodlands where no other income streams, such as timber sales, can be generated.

6.3 Pending issuance units and woodland carbon units

The WCC is underpinned by scientific data provided by Forest Research, the UK's leading body for forestry and tree-related research. This data was put into the WCC carbon model, which is designed for potential project developers to forecast the volume of carbon sequestered by woodland projects for up to one hundred years. This process has been endorsed by the International Carbon Reduction and Offset Alliance (ICROA), an industry association that sets best practice standards for organisations offering voluntary carbon offsetting and reduction services.

Woodlands differ from other SCSPs in that they do not capture carbon uniformly over time. The bulk of carbon sequestration occurs within the first two decades, although very little is sequestered during the initial years after planting. Despite this, significant investment is needed at the outset. The delay in generating credits that can be sold on the market may discourage developers from undertaking these projects due to the high initial costs and the wait for financial returns.

Addressing this issue, the WCC has introduced two related but distinct carbon units: the PIU and the WCU. Both units represent one tonne of sequestered carbon and are saleable, but they have important differences affecting their respective market values.

A PIU is a commitment to deliver a tonne of carbon in the future, serving as a provisional credit that isn't guaranteed and can't be utilised for a company's current emissions reporting. However, firms can purchase PIUs for future accounting against emissions. Conversely, a WCU represents a tonne of carbon that has successfully been sequestered in a WCC-verified woodland, making it viable for immediate use in a company's carbon accounting practices. Over time, as a project advances and reaches verified stages, PIUs will convert into WCUs, as demonstrated in Figure 3.

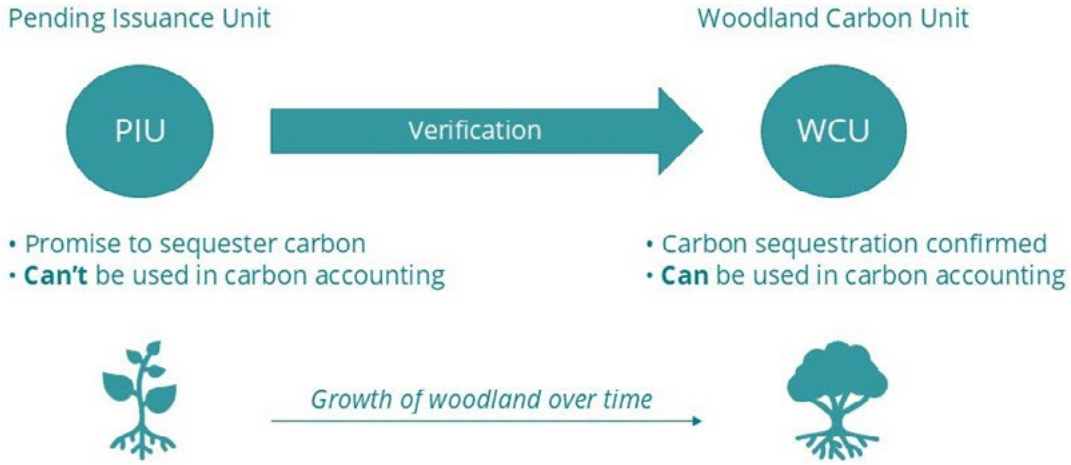

Figure 3: Transition of a PIU to a WCU over time and with successful verification

Each PIU is assigned a 'vintage year', indicating when it is expected to convert into a WCU. This detail is fundamental for companies planning their GHG emissions reduction strategies. For example, a company aiming for net-zero emissions by 2050 would value a PIU with a vintage year earlier than 2050 more than a PIU with a vintage year of 2060, due to the timeline fitting with their carbon neutrality targets.

6.3.1 Sales ratio: timing of PIUs and WCUs

PIUs are generally priced lower than WCUs, yet it is common for developers to sell a significant portion of PIUs upfront – often around 70% – decreasing potential WCU revenue later. This strategy is employed because PIUs act as forward financing, providing crucial early-stage capital. Without these sales, developers would have to seek external financing, which could incur interest and additional fees, or use their own funds, tying up cash reserves.

6.4 Project life cycle

The landowner is required to register the project with the WCC prior to initial planting. Following registration, the project should then be submitted for verification to either the Soil Association or Organic Farmers and Growers. The verifier will conduct an audit against WCC standards, a process that needs to be completed within three years from the date of project implementation.

Each validation undergoes a review by the WCC Secretariat. Upon approval, the PIUs are then listed on the carbon registry, the platform where all WCC units are catalogued and monitored.

It is important to note that a 20% buffer of PIUs is withdrawn from the project and allocated to a 'pool'. These reserved units are not available for sale; their purpose is to shield purchasers from potential losses associated with woodland destruction due to fires, pests, diseases or other unforeseen events. By reserving 20% from every project, the WCC safeguards the purchaser's investment, maintaining an adequate number of buffer PIUs to compensate for any unexpected losses.

Five years post-planting, the project becomes eligible for its initial verification. The organisation responsible for the initial validation also undertakes this verification process and the WCC Secretariat reviews all verifications. Every unit listed on the verification statement is then convertible into WCUs on the UK Land Carbon Registry. Subsequent verifications follow a similar procedure at a minimum of every ten years. This cyclical process repeats until the project reaches completion (see Figure 4).

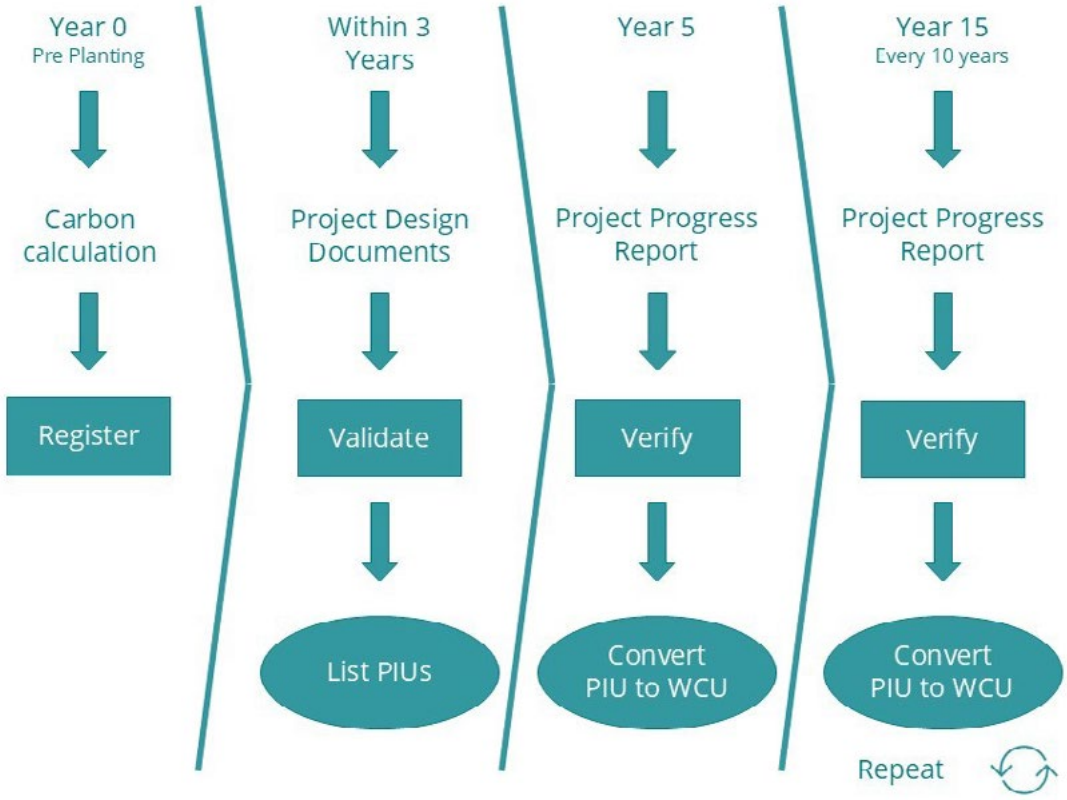

Figure 4: Life cycle of a WCU: registration, validation and verification within the WCC framework

This section has outlined the key components needed to initiate a woodland SCSP, using a WCC project as a worked example. While this provides a starting point for woodland projects, it is essential to recognise that each type of SCSP has unique characteristics and requirements. Consequently, a more in-depth exploration of each specific SCSP category is essential to fully grasp their respective valuation processes and market dynamics.

7 Conclusions: next steps, support and guidance

As the UK agricultural sector navigates the post-Brexit landscape and strives to meet ambitious net-zero targets, the integration of SCSPs into property valuations presents a unique and expanding opportunity. This paper outlined the potential for SCSPs to serve as a conduit for environmental enhancement and financial diversification for landowners, while also contributing to the broader goals of reducing atmospheric carbon.

The intersection of carbon markets and agricultural land use offers a pathway to reconcile economic viability with environmental stewardship. However, this nexus also introduces complexities requiring cooperation among various stakeholders, including landowners, the finance sector, the insurance industry and legal experts, each grappling with the nuances of a market that is both diverse and dynamic.

For the valuation industry, the task at hand is to develop competencies that enable accurate assessment of carbon credits as assets in property valuations. This requires not only a sound understanding of the VCM, but also the ability to navigate the intricate relationships between SCSP and land value. In this evolving market, continuous education and the development of specialised expertise are imperative.

From a policy perspective, encouraging the UK government to recognise a broader range of SCSPs, including those beyond the WCC and PC, could stimulate the domestic supply of credits. Such recognition, coupled with potential government endorsements, could encourage investment in the UK and aid in meeting national emissions reduction commitments. Furthermore, fostering a more inclusive and transparent VCM will be vital for ensuring market confidence and stability. The evolution of the market with the ICVCM's development of the CCPs is a key factor to monitor.

The legal and insurance industries also face the challenge of integrating carbon credits into their practices. Legal frameworks need to evolve to accurately reflect the ownership, transfer and encumbrance of carbon credits in property transactions, while insurance products need to adapt to cover the unique risks associated with SCSPs. This adaptation is not only crucial for the protection of project developers and credit buyers, but also for providing assurance to financial institutions considering carbon credits as viable collateral. Furthermore, adaptions will need to be made to PII coverage for valuers if they are to include carbon credit value in a report.

Looking to the future, institutions will need to develop clear criteria for accepting carbon credits as collateral, incorporating the income from them into debt serviceability assessments. The development of robust risk assessment models that consider the

specificities of carbon credits and SCSPs will underpin this new asset class's integration into traditional financial frameworks.

Landowners should strategically assess land use when considering SCSPs, weighing potential carbon credit income against impacts on land value and agricultural productivity. Informed decisions should encompass policy incentives, optimal land use and long-term fiscal and environmental goals. It is essential that the surveying industry adapts to these evolving client needs; fully grasp the associated challenges, risks and opportunities; and be equipped to offer quality guidance.

The emergence of the VCM presents the potential for rural landowners to profit from soil carbon sequestration. Realising this opportunity's full potential requires a link between the carbon credits generated from SCSPs on rural land and the finance industry. One approach is to include the value of carbon credits in valuations, allowing them to serve as collateral for banks. Integrating SCSPs into property valuations will be complex, fraught with uncertainties and challenges. Fostering collaboration among stakeholders in the property, legal, finance and insurance spheres, coupled with urging the UK government to acknowledge a broader range of carbon standards, will create a stronger and more adaptable agricultural industry. This paper calls for a concerted and knowledgeable effort to value natural resources, harmonising financial incentives with the pursuit of lasting environmental sustainability.

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