

Supply and Demand in the UK Voluntary Carbon Market

July 2022

Introduction	3
Overview	4
Supply	4
Woodland Carbon Code	4
Peatland Code	5
Soil Carbon	5
Demand	6
Outlook for the UK Market	7
Data Collection	8
Methodology	9
Bibliography	17

Introduction

The following report was prepared by AlliedCrowds, a data and technology firm behind AlliedOffsets. AlliedOffsets provides data services around the voluntary carbon market, aggregating data on nearly 20,000 projects and 250,000 retirements transactions globally.

This report examines the voluntary carbon market in the United Kingdom. The report, and the supplementing datasets, were commissioned by the Committee on Climate Change (CCC); any views expressed are solely of the authors' and do not reflect the views of the CCC.

The CCC put out a tender looking to answer the following questions about the VCM in the UK:

1. a. What total tCO₂ and monetary value of emissions offsets are purchased by companies with operations in the UK?
b. What tCO₂ and value of offsets are sold by companies with operations in the UK?
1.c. What tCO₂ and proportion of UK company emissions reductions plans use offsets?
2. a. What proportion of land is used for offsetting in the UK?
b. What proportion of offsets bought by UK companies to offset their UK operations are 'realised' in the UK versus overseas (ie – what proportion would have implications for UK national emissions accounting)?
c. What is the breakdown of offset type by tCO₂ and monetary value that are (i) realised in the UK (ie activity happens in the UK) (ii) purchased in the UK and (iii) sold by UK companies?
d. What proportion of offsets used by large UK companies are being used to counterbalance emissions for which direct measures to reduce are available?
e. – What scale/proportion of emissions are sold not under an established code?
3. a. What is expected UK demand?
b. What is the projected expected supply range (tCO₂)?
c. What are the key risks and dependencies to achieving future projections?

These questions are answered in full at the end of this report, and the underlying data and assumptions are included in the corresponding workbooks.

Overview

The UK voluntary carbon market has grown rapidly over the past 2 years, with increased corporate demand driving an increase in the price of offsets, investor interest in funding projects, and growth in the number of support services and products around the space.

This report and the associated datasets examine the supply of and demand for carbon offsetting credits and projects in the United Kingdom. In order to estimate the supply, we examined the Woodland Carbon Code (WCC), the Peatland Code (PC), as well as fledgling soil carbon initiatives that take place in the agricultural sector in the UK. In order to gauge demand, we looked into the corporate commitments of FTSE 350 companies, and noted their usage of offsets.

In order to create this report and underlying dataset, we made a number of assumptions, which may or may not hold in the future. Given the relative lack of data around this market, we chose to make the assumptions flexible – we encourage everyone to experiment with setting their own growth targets in order to see how they would affect the UK's voluntary carbon market.

As part of our research, we spoke with a number of companies and experts in this space, and we are very grateful for their input.

Supply

The core datasets used to identify the potential supply of carbon offsets in the upcoming decades were the WCC and PC registries. We analysed currently-issued credits, upcoming credits that will be issued to projects currently in the pipeline, as well as forecasted credits that will be issued if the current growth trends are maintained.

Woodland Carbon Code

WCC is the largest carbon standard in the UK, with over 1,500 projects registered across all four nations. Projects are able to issue Pending Issuance Units (PIUs), or Woodland Carbon Units (WCUs). PIUs can be issued for future vintages, but they are not guaranteed to materialise; they also cannot be used for offsetting current emissions. This affects their value, which has buoyed to ~£15 per PIU. PIUs are converted to WCUs every ten years, following a verification event; their value varies, but has grown to ~£30 over the past year.

One key assumption made for WCC (as well as PC and Soil carbon projects) is that ~30.7% of the land will be brought under the code. This comes from a Strutt and Parker report, which shows that roughly that

amount of agricultural land has been purchased over the previous two years is intended for 'plantable' use. This estimate is based on a fairly small sample size, and the report authors themselves make several caveats about it. Furthermore, it is likely to be an overestimate, as several people we have spoken with stated that there has been a recent push to purchase land for the purpose of carbon project development, in anticipation of tightening rules to register for the WCC. In other words, it should be interpreted as a high estimate.

In order to analyse future credits, we mapped out the number of projects that may be coming online in the future, based on the current growth trajectory. We modeled the growth on a sigmoid function, which begins with an exponential growth phase (as is currently observed), a steady-state linear growth phase, until the number of projects plateaus at its maximum.¹ The maximum number of projects has been determined by the amount of land that may be covered by carbon offsetting projects, and the corresponding number of projects that would be needed to cover that land, using average project hectareage; in other words, we attempt to model the land coverage that may fall under a certain code, and extrapolate the number of projects and credits generated by those projects from the total land coverage. It should be noted that we modeled only claimable credits, not those credits that are put into the buffer pool. This is because the WCC does not allow credits from the buffer pool to enter back into circulation, meaning only claimable credits can be used for offsetting by companies.

Peatland Code

PC is the second largest registry in the UK, with nearly 100 projects registered as of April 1, 2022. PC projects follow an issuance schedule similar to WCC projects, with a key difference being the first pending unit conversion taking place five years after project start, and all subsequent conversions taking place every ten years afterwards. Pending units in the PC are reportedly fetching ~£15 per unit, with converted Peatland Code Units (PCUs) being sold for higher prices.

Like WCC, the PC is undergoing an exponential growth stage; we therefore modeled the project growth in a similar pattern as the WCC.

Soil Carbon

There is a growing number of companies looking to promote sustainable farming practices among UK farms. Unlike WCC and PC, there is no central repository for soil carbon projects; there is also no

¹ A sigmoid function models S-curve growth, with an initial exponential growth phase (like we observe today), a period of steady-state growth, and a slowing growth phase, as the number of projects approaches its limit. Because the amount of land that can be brought under any carbon code in the UK is finite, it is reasonable to model the growth trending toward a limit, rather than growing indefinitely.

agreed-upon methodology that projects must adhere to. The Soil Carbon Alliance is currently working to establish a list of guidelines that projects can adhere to in order to generate carbon credits.

Currently, there is little transparency in the data reported by the companies involved. Using estimates from ballpark figures provided by some of the players in the market, the amount of land covered by these projects is estimated at 60,000 hectares, corresponding to about 150 farms generating credits. The credits or certificates generated are sold at a range of prices, generally between £23 and £45, with some companies asking for over £100 per tCO₂e.

There is also increasing interest among food and agriculture companies in order to reduce their scope 3 emissions, meaning there is pressure from the demand side in order for projects to be developed. This has led to a debate around whether farmers should sell their reductions, or keep them to reduce their own emissions in the future.

Demand

In order to analyse potential demand, we examined the reports of FTSE 350 companies. Encouragingly, most companies had provided information on scope 1, 2, and 3 emissions, and many had charted a pathway towards reducing those emissions. However, there were inconsistencies in how companies report the data, making it difficult to draw out clear comparisons or to pull out a market-wide overview. For instance, most companies did not break down their emissions by country, meaning it's difficult to understand where the emissions should be counted. Some companies reported carbon intensity, rather than the overall amounts. Some broke down scope 2 emissions as location and market-based², while others did not.

Few companies make clear what emissions they offset, with most indicating that they offset 'residual' or 'hard-to-abate' emissions, if they report the information at all. Some make clear what projects they offset with, but most only make vague statements about offsetting. Of the companies that make clear the number of credits they are offsetting, on average, they offset 36% of their scope 1 and 2 emissions (according to the latest data shown in the annual reports).

² [GHG Protocol](#) defines the two as: A location-based method reflects the average emissions intensity of grids on which energy consumption occurs (using mostly grid-average emission factor data). A market-based method reflects emissions from electricity that companies have purposefully chosen (or their lack of choice).

Furthermore, it's not immediately clear what percentage of the economy FTSE 350 companies are responsible for, making it difficult to extrapolate across the wider UK economy. We made the assumption that these companies are responsible for around 50% of the overall demand for carbon credits in the UK, given their prominence in the UK economy; however, we encourage users to alter the assumptions and examine how the updated figures affect the overall supply and demand for carbon credits.

Outlook for the UK Market

The outlook for the market appears to show growth in the number of projects created and credits sought. Given the increased demand from corporates, and given that it's unlikely the number of projects in the UK will be able to meet UK companies' demand; this is likely to continue to push prices up for projects.

WCC and PC are still early on in their establishment, and there is recognition that the codes will shift and change as they move forward. Earlier this year, for instance, Scottish Forestry made the listing requirements more stringent, which likely means a slowdown of registered projects. Ensuring that there is trust in the underlying carbon reductions taking place due to the projects is key, and while there is a reputation that the codes offer quality credits, this is likely to be scrutinised further as more projects begin to issue and sell units. There is also a seeming lack of understanding among buyers of the difference between PIUs and WCUs, with only the latter being eligible for offsetting current emissions. Instead, brokers assign future credits, but note that the credits are being used to offset past emissions. (For instance, 'Assigned by Forest Carbon Ltd. Woodland creation supported by Zennor Petroleum Limited in recognition of its 2019 calendar year Scope 1 & 2 emissions. Credits will be automatically retired as they are verified.')

Emerging soil carbon companies are currently competing to sign up farmers, and they do not report data to any registry. Some are currently selling certificates or other instruments, careful to not label them as 'offsets'. As there is no centralised code, each company takes a different approach in creating a baseline and measuring carbon reductions, though most base their analysis on one of existing soil carbon methodologies globally. Not wishing to crowd out the private sector, the Soil Carbon Alliance is setting up guidelines for the companies to adhere to, instead of establishing a centralised code like the WCC. While this is likely to spur innovation, it will also make it difficult to create consensus around what a ton of soil carbon represents, with multiple entities setting up multiple products at different price points. If one company is found to be issuing credits without applying proper rigour to its measurement, it can make it difficult for other, more meticulous companies, to sell the credits their farmers generate.

Across all project types, there is an ongoing debate about whether and how to enter the market. While there is interest among landowners and farmers in farming in more sustainable ways, and a need to supplement income, there is also a hesitation to part with any credits they generate. Some are waiting for the industry to take firmer shape, while others are conscious that by selling their credits today, they may need to purchase credits themselves in the future, if they will need to be carbon neutral themselves.

Data Collection

As part of this exercise, we learned a lot about the data availability around the UK's voluntary carbon market. Overall, the WCC and PC capture a large set of data, standardised and consistent among the projects on their registries. This is not the same for the emerging soil carbon initiatives, and we encourage all actors in that space to report data in a consistent manner to a public registry.

Within WCC and PC, much of the valuable information is held within static PDF documents or spreadsheets, which make it difficult to analyse and compare projects to each other. The data on carbon calculations, the project locations, and the project design documents (which hold the crux of the information on a project) are stored as downloadable files, rather than in more easily accessible formats like form submissions, which can be compared among all projects. While this is an issue among all voluntary carbon market registries, we encourage the UK standards to take a leading role in digitising and making this data more accessible to the public.

Methodology

In this section we set out each of the research questions outlined by the CCC, and our approach to answering them with available data. The full outputs for each research question are captured in the excel workbooks published alongside this report, which include a fuller description of the assumptions and methodology. For illustrative purposes below we provide a few key data snapshots from these workbooks.

1.a. What total tCO₂ and monetary value of emissions offsets are purchased by companies with operations in the UK?

Method: We examined registry data (listed bellow) in order to understand the tCO₂ retired by companies; and used estimates of credit prices (from anecdotal interviews with industry stakeholders, as well as our own pricing models derived from wholesale prices reported by brokers and project developers) in order to understand the value of credits retired. Additionally, we examined company reports in order to understand the demand potential among the largest firms in the UK. In the chart below, for 2021, we looked at registry data to understand the value of retired credits by companies, separating them by FTSE 350 and non-FTSE 350; then then scaled this up assuming these retirements represented 40% of total retired credits, based on registry data showing that 60% of retirements are made anonymously.

Scope: Registries covered: Gold Standard, Verra, Woodland Carbon Code, Peatland Code; FTSE350 companies, as well as some non-FTSE350 firms.

Assumptions/limitations: Not all companies report data on what retirements are related to them on Verra and Gold Standard; we have found identifiable data on about 40% of retirements, so we extrapolated out the numbers collected to account for companies that retire credits anonymously. Due to lack of data on what percentage of the UK economy the FTSE350 takes up, we have limited the scope of this research to those firms, as well.

Output: List of FTSE350 companies and select non-FTSE350 firms, with associated transactions, both in terms of number of credits and estimated value of offsets; list of transactions associated with UK entities (above 5,000 tCO₂e).

Retirements (tCO ₂)	Total	2021
Retired Credits (FTSE350):	19,586,099	5,973,164
Retired Credits (Non-FTSE350):	4,248,984	1,955,345
Credits Anonymously Retired:	60%	60%
Total estimate for FTSE350 and Non-FTSE350:	59,587,708	19,821,273
Total credits retired globally in 2021:		196,361,676
% of UK market participation:		10.1%

Value of Credits	Total	2021
Retired Credits (FTSE350):	£162,461,598	£53,177,231
Credits Anonymously Retired:	60%	60%
Total estimate for FTSE350:	£406,153,994	£132,943,078
Retired Credits (Non-FTSE350):	£38,378,336	£17,182,345
Total UK estimate:	£444,532,330	£150,125,423

The information above shows the total number of credits retired by FTSE 350 and non-FTSE 350 companies, as well as the estimated value of those retirements. It shows the data for all time (since 2009) until April 1, 2022; as well as activity in 2021.

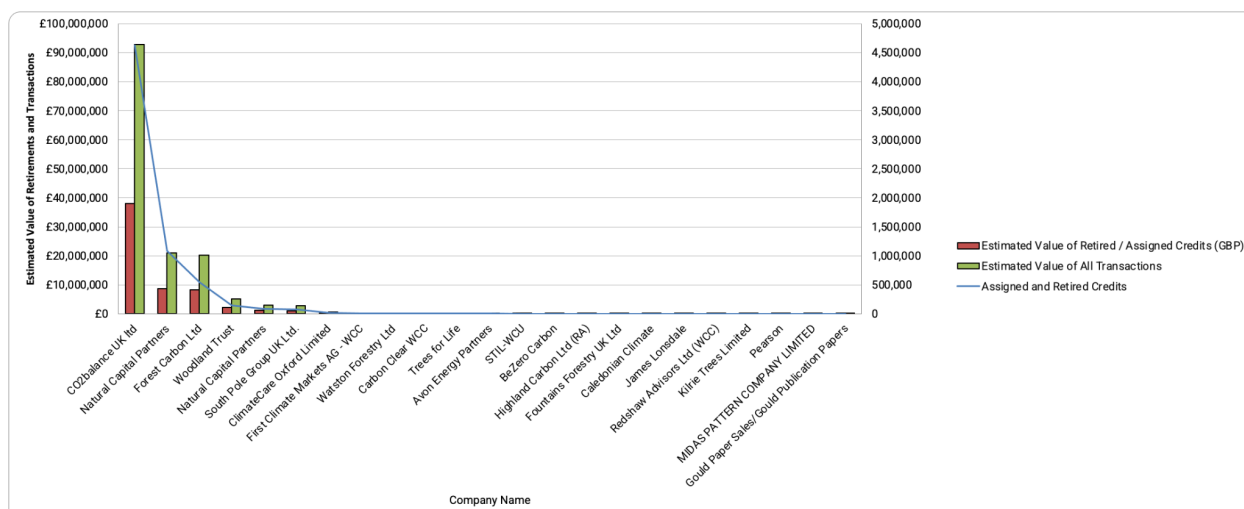
1.b. What tCO₂ and value of offsets are sold by companies with operations in the UK?

Method: We examined registry data to understand which project owners (from international as well as domestic projects) are UK-based; we attempted to capture the total number of credits those entities have retired, and the potential value of the credits.

Scope: Registry data from WCC, PCC, Gold Standard, and Verra.

Assumptions/limitations: We assumed credits retired constitute 41% of credits sold by intermediaries. Intermediaries are involved in selling credits among themselves, as well as to the end buyers (retirers) of the credits. They provide liquidity and access to credits in the market, typically for a fee. This is based on research published by Ecosystem Marketplace on market transactions in 2021, gathering info on 298.4m tCO₂e transacted on Verra and Gold Standard between January 1 and November 8, 2021; in the same time period, 122.2m tCO₂e were retired. While we have estimated the number of credits sold and the value of credits for soil carbon projects, we omit them from this analysis, due to gaps in the data.

Output: List of UK-registered entities with the number of credits their projects have retired, as well as an estimated value of the credits retired. We will also estimate the total number of credits they have transacted (for example, forward-sold), without having a record of retirement or assignment.



The chart above shows the total number of credits retired by projects with an associated project proponent / developer. This data includes information from 2009 onwards. The first two companies are active primarily on Gold Standard and Verra; the rest are active on WCC and PC.

1.c. What tCO₂ and proportion of UK company emissions reductions plans use offsets?

Method: We manually examined FTSE350 companies' annual and / or sustainability reports (most recent year available) to understand which companies have set net zero goals, and estimate potential number of credits to be purchased by these companies, based on their commitments.

Scope: FTSE350 firms.

Assumptions/limitations: As only large firms are required to report data to the public, we were limited to only listed companies while conducting this research.

Output: List of companies with stated goal to use offsets; total number of credits that may be used by companies.

Firms surveyed:	354
Plan to use offsets:	123
Percentage:	35%
Indicate tCO ₂ e offset in latest report:	48
Percentage:	14%
Amount of Scope 1 and 2 emissions offset	6,923,115
Percentage of Scope 1 and 2 emissions offset:	36%

The information above shows the total number of companies in the FTSE 350 that plan to use offsets, as mentioned in their annual reports (35%). We also show what percentage of companies actually mention the amount of credits they have purchased (13%). Finally, we took a weighted average of the stated offset quantities, as compared to their total emissions (36%), which equals ~7m tCO₂e.

2.a. What proportion of land is used for offsetting in the UK?

Method: We have WCC and PCC data to understand the amount of land currently being used for offsetting; we also scanned news reports and press releases in order to understand which companies are purchasing land that may be used for creating offset projects; we also reached out to agricultural firms identified in order to understand the total amount of land used for offsetting (or similar initiatives). Finally, we referred to desk research, which is documented in the bibliography section below.

Scope: WCC, PCC, non-registered projects, and purchased land that has not yet been converted to carbon projects (from FTSE100 company press releases).

Assumptions/limitations: We received anonymised data on non-registered agriculture carbon initiatives. We assumed that, as all such initiatives are currently in the early stages, they control equal shares of the market; in other words, we modeled each company to have the same share of the market as the others. As there are no registries of projects that are available to the public, we were unable to verify the information given to us; given the rapid growth in this market, there may also be initiatives that have launched since our market survey, which we do not capture in this analysis.

Output: Total amount of land covered by offsetting schemes, as well as land covered by non-registered projects, and potential for corporate land ownership that will go towards offsetting.

	Total UK land (ha)	Land used for credits currently (ha)	Current + Company Announcements (ha)	% of land used (near term)
Agricultural	17,600,000	62,214	62,214	0.4%
Peatland	2,962,624	14,052	16,797	0.6%
Woodland	3,206,000	57,174	83,841	2.6%

The information above shows the current land use for carbon offsetting projects in the UK, and the expected near-term ha of the land covered by carbon crediting projects (calculated using data from company land purchase announcements, which specifically mention carbon offsetting as the purpose of the land purchase).

2.b. What proportion of offsets bought by UK companies to offset their UK operations are 'realised' in the UK versus overseas (ie – what proportion would have implications for UK national emissions accounting)?

Method: We examined registry data to understand the total amount of credits retired by UK firms, and the location of projects that are used for offsetting.

Scope: Registry data from WCC, PCC, Gold Standard, Verra, and Puro.earth.

Assumptions/limitations: We saw that, of all retirements that are made in the voluntary carbon market, about 40% disclose information on what is taking place within the registry; therefore, we extrapolated the total amount of credits retired from the 40% we have information on.

Output: List of UK-based retirements vs. non-UK-based retirements, broken down by year. The total estimate below reflects the fact that 60% of retirements are anonymous, so we extrapolated any potential missing retirements by assuming that only 40% of the known retirements are reflected in the registries.

Proportion of Credits Realised in the UK	Total	2021
Global Retirements (FTSSE350)	19,586,099	5,973,164
Credits Anonymously Retired:	60%	60%
Total estimate for FTSE350:	48,965,248	14,932,910
Global Retirements (Non-FTSE350):	4,248,984	1,955,345
UK (FTSE350)	41,456	16,976
UK (Non-FTSE350)	1785	279
Proportion of UK Credits	0.08%	0.10%

This table shows the number of carbon offset retired in the UK and globally, and the percentage of credits retired in the UK vs. rest of the world.

2.c. What is the breakdown of offset type by tCO₂ and monetary value that are (i) realised in the UK (ie activity happens in the UK) (ii) purchased in the UK and (iii) sold by UK companies?

Method: We used the information collected for questions 1.a., 1.b., and 1.c., we will be able to categorise the offsets by type of project.

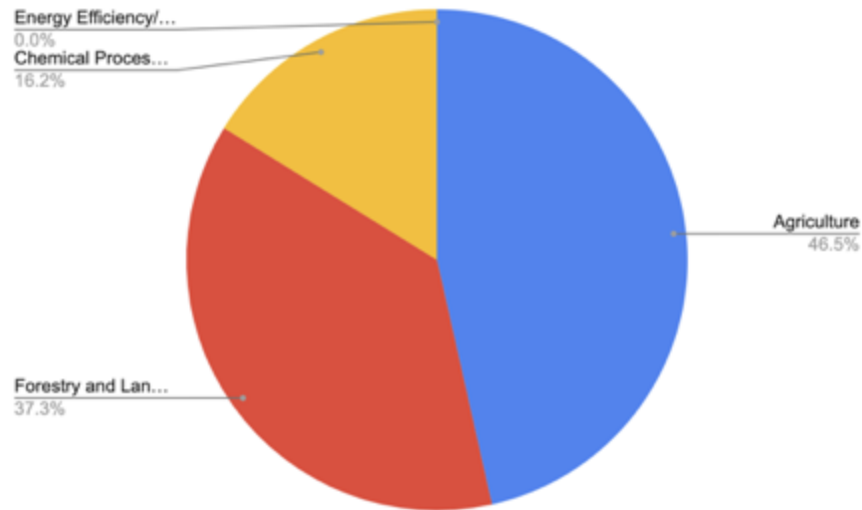
Scope: See 1.a., 1.b., and 1.c.

Assumptions/limitations: See 1.a., 1.b., and 1.c.

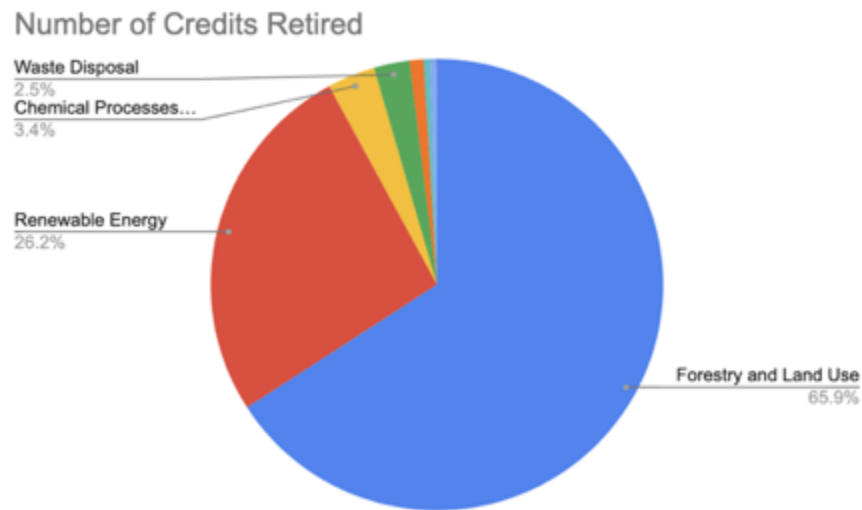
Output: We specified the projects identified in 1.a., 1.b., and 1.c. by project type.

The below charts showcase the breakdown of UK projects by type, as well as the types of projects that UK firms offset with, and the types of credits UK project proponents have retired (skewed towards energy efficiency projects run outside of the UK).

- i. UK Projects: The data on estimated number of credits generated by project types is heavily skewed by two Verra projects, which anticipate to generate nearly 300,000 tons of carbon per year.

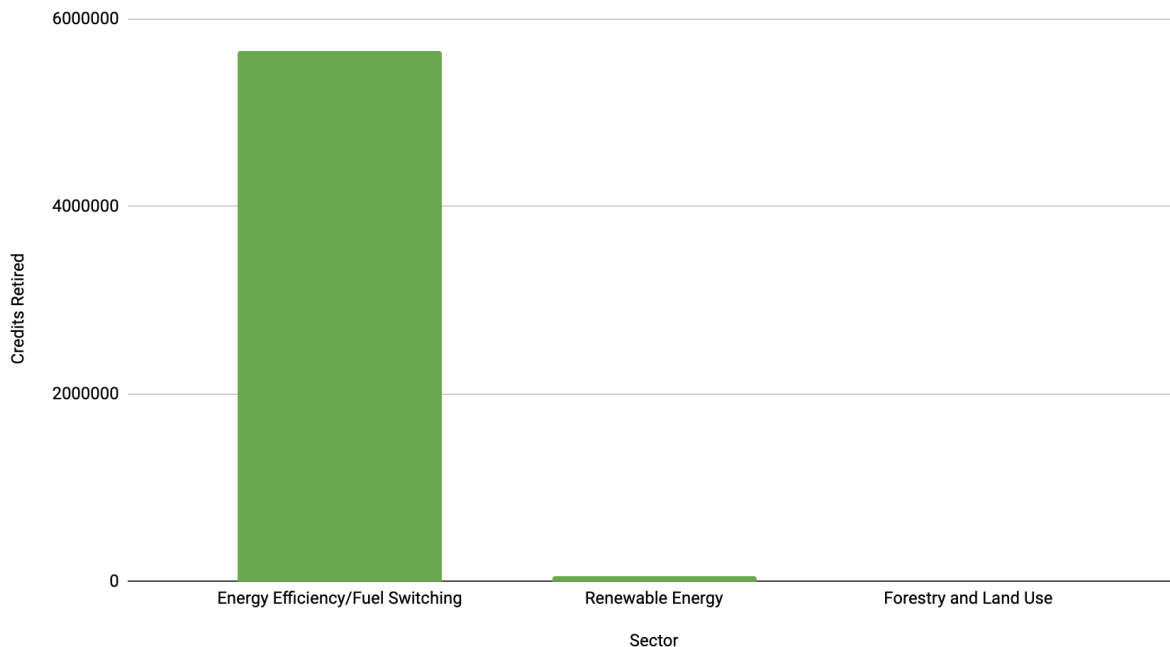


ii. Projects purchased by UK companies



iii. UK Proponents

Credits Retired vs. Sector



2.d. What proportion of offsets used by large UK companies are being used to counterbalance emissions for which direct measures to reduce are available?

Method: We examined company reports to identify which companies are using offsets, and whether they explain which emissions are being covered by the offsets.

Scope: FTSE350 companies.

Assumptions/limitations: Few companies make clear what emissions are being counterbalanced by offsets, with most companies stating they offset 'residual' or 'hard to abate' emissions.

Output: List of companies that indicate what emissions offsets cover. While there are some exceptions, overwhelmingly, companies do not make clear what emissions are being offset, and usually not with which projects. We found that, among those that report the numbers, companies are offsetting about 80% of their Scope 1 and 2 emissions.

2.e. – What scale/proportion of emissions are sold not under an established code?

Method: We identified relevant schemes through reports and online searches. We spoke with the schemes, when possible, to understand the size (tCO₂ and GBP) of UK offsets they sell/retire each year, and expect to in future. We also asked them for a breakdown of whether the offsets are using woodland/peatland/soil/something else. We aggregated these to give an indication of the minimum size of offset trading happening not under WCC or PC.

Scope: 7 main organisations mentioned as engaging in offset sales in the UK (6 agriculture firms and one peatland firm).

Assumptions/limitations: Does not include insetting, or purchases of land and companies' own woodlands etc.

Output: Estimated range of TCO₂ and GBP of UK offsets sold not under an established code, with range of scenarios.

3.a What is expected UK demand?

Method: We used company emissions reductions plans to track what companies' offset commitments are, and what their GHG emissions will be. We scaled up the resulting projected offset use based on the proportion of employment and / or revenues that these companies comprise (possibly limited to large companies).

Scope: FTSE350 companies.

Assumptions/limitations: Assumed there will be the same proportion of offset usage regardless of business size. Assumed most offset usage is captured in emissions reduction plans.

Output: Estimated range of tCO₂ and GBP of UK company offset demand from 2022-2050, with .

3.b. What is the projected expected supply range (tCO₂)?

Method: We used WCC/PCC data to map the estimated number of credits available per year, over the next 100 years (from existing projects); based on the current growth trends and modeling for several land usage scenarios, we created adjustable models that can be used to predict the amount of tCO₂ coming on the market in the near future.

Scope: WCC/PCC data for existing projects; modelling potential soil carbon projects.

Assumptions/limitations: We identified an average credit per ha number based on existing projects' data, and modelled growth of the sector based on a sigmoid function. This maps to the current (exponential) growth of the number of projects registered, followed by a steady growth phase, ending in slowing growth as the number of projects reaches its maximum. The maximum limits have been modelled using the total amount of land available (i.e., total amount of farmland, peatland, and woodland), and the amount of land that has been purchased for natural capital investment purposes over the previous two years. The WCC has recently tightened rules on additionality for its projects – it remains to be seen how this tightening will affect the number of projects registered on an annual basis; however, it is likely to slow growth in at least the short term. For PC, we have used the CCC goal for restoring peatlands in order to extrapolate the amount of land privately owned that would need to be registered under the PC in order to meet the goal.

Output: Annual number of credits available from 2022 onwards.

3.c. What are the key risks and dependencies to achieving future projections?

Method: Desk research and consultation with relevant stakeholders.

Scope: We identified current relevant regulations and how they may affect the carbon offsetting market.

Assumptions/limitations: We have been limited to current regulation and will not be able to prognosticate on future government guidelines to determine potential for demand or supply of credits.

Output: Opportunities and threats analysis report based on the current regulations and scope for risk and dependencies in the near future. (This report)

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