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How can farmers and landowners be motivated to plant more trees to deliver a wide range of benefits, especially mitigating climate change?

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Introduction

With the UK government this year enshrining a target of net zero carbon emissions by 2050 into law, the need for swift action on the causes of climate change has been given a renewed impetus. Cuts to greenhouse gas emissions alone are unlikely to be sufficient to mitigate climate change to the extent required in order to achieve the targets of the Paris Agreement (Smith et al., 2016). The conservation and enhancement of natural processes and carbon sinks will also need to be implemented at a large scale (Griscom et al., 2017). Of the natural processes that can be most easily enhanced, carbon sequestration via forestation of land shows the greatest potential to mitigate climate change (Griscom et al., 2017; Bastin et al., 2019).

The forestry sector therefore finds itself perfectly placed as a conduit via which the UK might reach its Paris Agreement objectives. This is partially recognised in the recent governmental announcement and funding of a new Northern Forest linking five existing community forests with the planting of 50 million new trees. However, there is a recognition that annual planting rates, falling consistently since the late 1980s, are too low and will need to increase substantially in order that UK forests can continue to perform their essential role as a carbon sink (CCC, 2018). The challenge ahead will not only require the continued efforts of public bodies such as the Forestry Commission but will also depend upon private landowners and farmers planting trees on their land.

The rationale behind this piece is that the challenge facing our society is one that demands cross disciplinary cooperation and collaboration. The UK's construction industry, long unconcerned by issues of environmental sustainability, is beginning to wake up to the responsibility it must bear on such matters and could therefore offer forestry a wealthy ally.

Construction Background and Context

For the past five years I have been a sustainability consultant employed in the construction industry. I work with developers and contractors, architects and engineers, universities and public services. I am also a part time MSc Forestry student at Bangor University. This is a fantastic opportunity for me to demonstrate how I feel the construction and forestry sectors could serve each other.

Similarly to a number of other sectors, the construction industry is finding itself waking up to the reality that action on climate change is not an issue that will sit on the sidelines but demands our most urgent attention. The UK Green Building Council (UKGBC) estimate that the built environment accounts for 42% of the nation's carbon footprint (UKGBC, 2017). Total built environment emissions for the year 2014 have been estimated as 184 $MtCO_{2eq}$ including construction sector emissions of 48 $MtCO_{2eq}$ (Giesekam, 2018). This latter figure includes emissions of both the construction process as well as those of the industry's supply chain and equates to approximately 22% of the UK's carbon footprint for 2014 (UKGBC, 2017). This is known as embodied carbon: those emissions associated with a building's materials, construction and end of life disposal.

Recognising the high embodied and operational carbon emissions of built assets, the UKGBC have recently released guidelines on how it is anticipated new construction projects may achieve net zero carbon emissions when considering their full life cycle (UKGBC, 2019). In brief, the guidelines recommend, firstly, reducing the embodied carbon impacts of the construction, secondly, constructing efficient buildings with a reduced operational energy demand, thirdly, installing renewable energy generation capacity within each project and, lastly, offsetting any remaining carbon that cannot be eliminated through the first three steps. It is important to note that, in its current form, the guidelines do not extend the definition of net zero carbon to include a building's end of life emissions, only construction and operational emissions as illustrated in Figure 1.

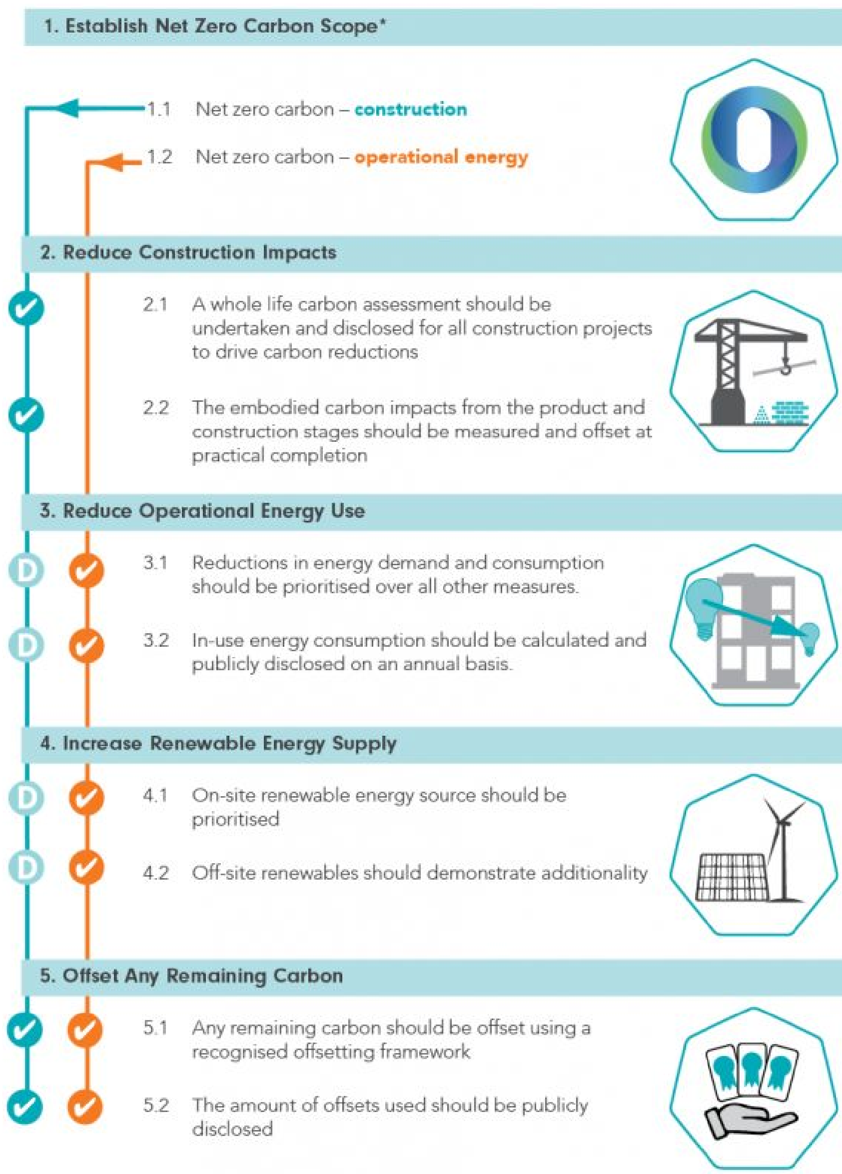

Figure 1: The steps towards achieving net zero carbon for a built asset according to the UKGBC's definition. Source: Net zero carbon buildings: A framework definition (UKGBC, 2019).

In my employment in the construction industry I am already seeing interest in adopting this net zero carbon standard and am also working on one such project. I predict that its uptake will see a gradual upward trajectory as more developers and contractors look to realise the national government's net zero carbon objective. It should be noted that, to achieve net zero carbon, developers are under no obligation to use the UKGBC's definition and could approach it differently through, for example, use of carbon offsetting only.

However, regardless of how a project aims to achieve net zero carbon, as illustrated by Figure 1, the UKGBC do not believe that any UK construction project can achieve net zero carbon without offsetting. This is where the forestry sector could benefit.

Carbon Offsetting

As a concept and requirement of planning consent, carbon offsetting is not new to the construction sector, albeit not widespread. Since 2012, Islington Borough Council have required that each development achieve a 40% improvement in energy performance over a building regulations compliant building. For each tonne of carbon that a building may fail this requirement by, a rate of £920 per annual tonne is set (Islington Council, 2012). The most up to date recommendation for London boroughs from the Greater London Authority is to set a rate of £1,800 per annual tonne which assumes a 30 year life span and therefore a rate per tonne of £60 (GLA, 2018). However, a new set of planning guidelines for London boroughs due for release soon could increase the rate per tonne to £95 (GLA, 2019). The funds collected from these rates are ring-fenced for energy efficiency projects within the same borough such as installing cavity wall insulation in social housing.

However, in my scenario, I am recommending that the carbon associated with a construction project be offset through the planting of trees. This is not to absolve the construction industry of its responsibility to reduce embodied and operational carbon emissions but in recognition of the fact that, given existing methods of production and construction as well as available technologies, carbon offsetting will be required for the majority of projects to attain net zero carbon. Tree planting should be employed to offset carbon only after possible energy efficiency measures and renewable energy technologies for a project have been exhausted.

Motivation for Landowners and Farmers

There is a myriad of sources of funding for woodland creation in the UK. However, the majority, especially those looking at larger scale plantations, rely upon state funding such as the Woodland Creation Grant and Woodland Carbon Fund. Given existing fiscal pressures on the government as well as an insufficient planting rate (CCC, 2018), it is unclear if these grants can deliver the number of new trees needed to meet UK climate commitments.

If landowners and farmers were paid by the construction industry to plant trees on their land this could offer a valuable new source of private funding that is not reliant upon public finances nor impacted by changes in the political landscape.

For example, a hectare of land planted with native broadleaves at 2.5 m spacings, that is 1,600 stems. Carbon sequestration capacity of trees varies with age but, taking this into account, the total carbon stored by the time the trees are 60 years (a common reference period used for a building's life span in the construction industry) in both above and below ground biomass could be 518 tonnes (Greig, 2015).

Assuming the upper carbon price of £95 per tonne described earlier this would yield farmers or landowners in this example a fee of £49,210, or £31,080 if carbon were priced at the lower rate of £60 per tonne.

This example is based upon rates that some developers are already paying to offset carbon. Further research into an appropriate rate per tonne is required to include factors such as carbon prices in other industries, costs of planting and the opportunity cost of land which is beyond the scope of this short piece.

Conclusion

This essay has explored the possibility and theory behind a partnership between the construction and forestry industries in order to motivate landowners and farmers to plant more trees. Rates per tonne of carbon have been suggested, although it is recognised that these would need extensive further evaluation as well as consultation between the two industries.

For further consideration is the possibility of an intermediary body between the two industries that could not only coordinate the planting on behalf of landowners, but also act as the recognised framework UKGBC recommends to offer developers substantiated assurance of the carbon offset.

The precedent for offsetting carbon within the construction industry has already been set, however not for the purpose of achieving net zero carbon and not specifically through afforestation. It is hoped that this piece may initiate a conversation between the two industries leading to collaboration in the future.

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