Can We Plant Our Way to Carbon Zero?

Carbon sequestration using trees may distract from necessary action on carbon emission reduction

Understanding the sequestration limits of trees

The 2019 general election in the UK saw major parties enter a bidding war on tree planting. The highest commitment to date is 2 billion trees by 2040. The UK needs more trees but how many is sensible? The UK emits 364 million tons of CO2 a year and its aviation contribution is estimated at 35 million tons a year. Individuals may be forgiven for thinking that massive tree planting will have a big and immediate impact in reducing emissions. Up to a point they are right. Trees planted in the UK will absorb CO2, but at low annual rates and take up to 100 years to reach this rate.

UK Woodland approved carbon projects are scheduled to absorb 356 tons per hectare. Even allowing 40 years for fast growing species, that's 8.9 tons a year, or the per head emissions of 1.5 UK residents per year per hectare. The pace of absorption will be outstripped by further emissions in the critical pre-2030 period, leading up to the carbon zero date set by the UK Government.

Tree planting in conflict with agricultural land use

The UK uses 17.5 million hectares of its land for food production which supports 53% of UK food consumption. Planting 2 billion trees could require up to 4.1% of the UK farming landmass, which would lead to a corresponding reduction in food production that would increase food imports and related "imported" emissions by 4.8%. 1 year of UK CO2 emissions or 10 years of UK aviation offset via tree planting would require the equivalent of 10% of the UK farming landmass, leading to an increase in food imports of 13.5%. Non-agricultural land that is not already woodland/forest has limited ability to support mass afforestation on the scale envisaged.

Plant trees here and less food is available to feed the projected extra 3.7 million UK residents expected by 2029. Plant trees somewhere else for the same purpose, and its likely this will be at the expense of agricultural land elsewhere in the world, which in turn expects to have to feed another 2 billion people by 2050. Although absorption rates are faster in more tropical climates, it is not at a pace that reduces landmass demand to a sustainable level. The global campaign to plant one trillion trees will have similar challenges for landmass, food production and carbon absorption rates. In simple terms trees will not be a silver bullet and may be a distraction from the core emissions reduction agenda.