

CABINET
17 DECEMBER 2024

**DEVELOPING THE MARKET FOR CARBON DIOXIDE REMOVAL
AND BEYOND NET ZERO**

Report by the Director of Economy and Place

RECOMMENDATION

1. **The Cabinet is RECOMMENDED to:**
 - a) Note the underdevelopment of the market for Carbon Dioxide Removal (CDR) technologies, and the risk this creates for meeting net zero.
 - b) Support the recommendations to scale the market for CDRs through the council's policy making and partnership activity, growing both the supply and demand side of the market, subject to funding.
 - c) Subject to funding, commit to go 'Beyond Net Zero' - extending the council's current carbon neutral target for the council's own estate emissions to be 'beyond zero', with a target figure to be agreed at a later date.

Executive Summary

2. Carbon Dioxide Removals (CDR), sometimes referred to as 'negative emissions', are technologies or nature-based approaches to remove carbon from the atmosphere and store it on land, underground or in oceans. Examples include tree planting, production of biochar and direct capture and removal of CO₂.
3. CDRs are required at scale in all major policy commitments to reach net zero – including Intergovernmental Panel on Climate Change (IPCC), UK government, as well as the County's Pathway to Zero Carbon Oxfordshire (PAZCO). CDRs are needed in addition to extensive cuts to emissions to reach net zero.
4. In the Future Oxfordshire Partnership's Strategic Vision for Sustainable Development in Oxfordshire, councils have committed to accelerate towards a carbon negative future beyond 2050, removing more carbon than emitted each year.
5. However, many of these technologies are nascent, and in all cases, they lack the regulatory and financial frameworks to scale. With no alternative pathways to meet net zero, developing the market is therefore an immediate issue.

6. As global emissions fail to decline at the rate needed to limit global average surface temperature rise to 1.5 degrees, CDRs may be needed in even greater quantities as an 'emergency brake' to warming, possibly before 2035.
7. Another dimension is "reversibility": the possibility of sequestered carbon re-entering the atmosphere in human timescales. Carbon stored in soils or trees may be lost if soil management changes, or there is a forest fire, respectively. Progressively we need to bias our efforts towards promoting (semi)-permanent sequestration.
8. This paper seeks Cabinet support for Oxfordshire taking a leadership role through its policy making and partnership activity to build CDR markets.
9. Whilst some of these markets will be national, or trans-national, those markets appropriate to Oxfordshire (such as nature-based solutions) could generate co-benefits to the rural economy, access to nature, flood resilience and health.
10. A number of these activities are new and will require funding to be delivered as set out in the finance section.

Background

11. The range of CDR needed nationally is set out in Annex 1. Afforestation and biochar are the most immediate viable opportunities in Oxfordshire. They are well-established mechanisms to sequester carbon with multiple co-benefits.
12. Once a national carbon transportation and storage network develops, some carbon capture from Bioenergy (BECCs) may also play a role, as well as stack carbon capture for Oxfordshire's larger industry (e.g. waste-to-energy plant).

Current Market Position: Woodland Carbon Credits

13. Woodland cover in Oxfordshire needs to be doubled from 9% to 18% to meet net zero (UK average is 13%). This requires diversification of some of the 70% of land that is farmland in the County for agroforestry, tree planting and habitat restoration, and new hedgerows, as well as trees in amenity green space (such as round the edge of parks) and residential gardens.
14. Woodland Carbon Code Credits offer a payment mechanism to landowners (circa £30-70 per tonne) as an incentive to plant and maintain woodland to established standards.
15. There are currently very few Woodland Carbon Code schemes available in Oxfordshire. At the low end of prices per tonne these schemes are not attractive for landowners to develop. As the offset market is largely voluntary (this will change as planning policy moves to net zero) work is needed to create a clearer line of sight for future demand so landowners can have confidence that upfront investment costs will deliver long term returns.

16. There are also a number of innovation projects (e.g. between Network Rail and the North East Cotswold Farmer Cluster) looking at the potential to trade multiple benefits from a unit of land such as reducing flood risk alongside carbon capture, to increase the attractiveness to landowners to bring forward schemes, and to maximise the range of positive benefits each unit of land delivers.
17. Other accredited nature based schemes are expected in the market such as Hedgerow Carbon Credits.

Current Market Position: Biochar

18. Biochar involves heating organic matter (waste or grown for the purpose) to high temperatures in low oxygen to produce a crystalline form of carbon that is added to soil; enhancing soil fertility, water retention and flood resilience. It is a highly persistent way to lock up carbon. Revenue streams include sale of carbon credits (circa £70-200/tonne), sale of biochar and potentially renewable energy.
19. In Oxfordshire there are some existing examples of biochar activity e.g. Tumblebug and Oxford Biochar. As a rural county there is an opportunity to significantly scale the use and production of biochar, with reported interest from Local Nature Partnership farming and land holding members, as well as organisations such as Thames Water.
20. Shropshire County Council has recently created a Special Purpose Vehicle to develop Biochar as a commercial enterprise.

Proposal

21. Cabinet supports activity to scale the availability of CDRs through its policy making and partnership activity, growing both the supply and demand side of the market subject to funding these activities:

Growing Supply of CDRs:

22. Through the Local Nature Partnership and others support activities such as Oxfordshire Nature Catalyst Investment Fund to encourage landowners to bring to market Woodland Carbon Code accredited schemes situated in Oxfordshire.
23. Work with partners to explore and promote development of biochar facilities in Oxfordshire.
24. Work with Viridor and other large-scale emitters to make the case to government about the need for acceleration of national CDR infrastructure and markets.
25. Play a leadership role in promoting the need for market development, regulatory and financial frameworks for CDRs through supply chains, local, regional and national networks.

Growing Demand for CDRs:

26. With partners agree and champion a set of principles to guide the council's and other organisations' approach to Carbon Offsetting:
 - (a) That progressively develops the market for more durable CDRs
 - (b) That prioritises CDR, within Oxfordshire where it is possible, and seeks co-benefits to Oxfordshire' economy, health and natural environment
27. Commit to go 'Beyond Net Zero' on the council's estate emissions post-2030, including exploring allocating budget to make early purchase of CDRs to drive the market.

Financial Implications

28. Setting a new 'beyond net zero' target requires an additional and sustained investment in CDRs in perpetuity.
29. The council has an existing net zero target and is predicting circa 1000 tonnes of residual emissions – based on successful delivery of the council's investment programme, and government reaching their target for zero carbon grid by 2030. Investment in CDRs to meet the council's existing net zero target will decrease over time as hard to decarbonise assets at 2030 progressively become zero carbon over time as technologies develop.
30. At this stage there is no proposal to define the negative emissions target for a 'beyond net zero' policy. A future Cabinet report would agree the target and therefore identify the level of investment needed from 2030 onwards. To help understand the scale of investment the cost per tonne of CDR is circa £70 at current value (this is likely to increase over time). Should the council set a target of 1,000 tonnes of negative emissions the cost to the council would be £70,000 per annum in carbon credits purchased, in addition to those already required to reach net zero.
31. Should the council not agree, or sustain this investment, the council would be unable to meet a 'beyond net zero target'. Purchases in early years under this policy may need to be outside the county.
32. The Local Nature Partnership (LNP) is establishing a revolving loan scheme, the Oxfordshire Nature Catalyst Investment Fund, to help landowners to bring a portfolio of nature recovery and CDR projects to market readiness in Oxfordshire¹. This would also support delivery of the Local Nature Recovery Strategy. The LNP will need sufficient investment to establish this fund for this activity to take place. The council may choose to support the establishment of this fund through decisions taken in the budget setting process.
33. The waste management team is exploring an outline business case for Biochar. This work can only continue further if this exploratory work demonstrates a

¹ The Local Nature Partnership is developing Oxfordshire Nature Investment Catalyst Fund (ONCIF) to remove barriers to landowners in bringing to market Woodland Carbon Code and Biodiversity Net Gain schemes in Oxfordshire. ONCIF is a revolving loan scheme to landowners to bring a portfolio of nature recovery and CDR projects to market readiness in Oxfordshire.

commercial business case and therefore resource allocated to continue with feasibility.

Comments checked by:

Rob Finlayson, Strategic Finance Business Partner,

Rob.Finlayson@Oxfordshire.gov.uk

Equality & Inclusion Implications

34. The council's climate vulnerability assessment shows the impacts of climate change are likely to disproportionately affect the most deprived areas of the County.
35. Supporting landowners who wish to bring forward land diversification projects such as investment in nature recovery and afforestation can directly support jobs in rural economies.
36. Afforestation can have a positive impact on air quality and a cooling effect in urban areas, supporting improved health and wellbeing. Opportunities will be sought to improve access to nature where this is possible.
37. Consideration will be given in the further development of these schemes to ensure any potential negative effects on a diverse range of communities can be both identified and mitigated. Examples include considering whether any existing access routes or perception of safety in these routes are affected and what mitigations are possible to avoid impacts on communities who may be disproportionately affected.

Sustainability Implications

38. The [Oxford Principles for Net Zero Aligned Carbon Offsetting](#) emphasize the importance of incentivising well thought out carbon removal offsetting, as a strategy to offset Hard to Decarbonise areas and not as a substitute for emissions reductions. The council already has a significant investment programme to take action to reduce emissions on its own estate. The council is now aiming for energy efficiency, renewables and electrification projects to take the council's emissions down to circa 1200 residual tonnes in 2030.
39. Committing to go 'beyond net zero' recognises that the world is not on track to reduce emissions on a trajectory to meet global agreements to keep temperatures within 1.5 degrees. CDRs can act as an emergency brake.
40. Where CDR is delivered through afforestation and biochar in Oxfordshire these may deliver additional benefits for flood resilience and access to nature.
41. CDR from 'Bioenergy with Carbon Capture' (BECCs) can have a large landtake and therefore is not the focus for this paper.

Risk Management

42. Building the market for CDRs will help address a risk in the council's ability to meet net zero on the council's own estate and in Oxfordshire.
43. With regards to setting an extended target 'beyond net zero' there are currently no other councils in the UK that have set such a target. This would make Oxfordshire a first-mover amongst local authorities.
44. With that however, there is no clear framework to guide the council on where to set a negative emissions target e.g. How many negative tonnes of carbon would the council commit to be credible in declaring themselves to be 'beyond zero'. The council therefore does not intend to set a specific target at this stage but will revisit this as the market develops and our net emissions fall towards zero towards 2030.
45. The council will need to develop an offsetting strategy and procurement strategy to purchase CDRs. The purchase of CDRs will be a new market for the council and may require specialist advice.
46. As markets are under-developed it is likely that if the council choose to invest in CDR early these may be outside of Oxfordshire.

Annex: Annex 1: Greenhouse Gas Removal (CDR) Technologies

Contact Officer: Sarah Gilbert, Head of Climate Action
Sarah.gilbert@oxfordshire.gov.uk

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