



Work Package 3
Carbon Insetting Feasibility Study

Executive Summary

Partnered with
Midlands Net Zero Hub
8th September 2026

Synopsis

Birmingham City Council (BCC) collaborated with the Midlands Net Zero Hub (MNZH), Shropshire Council (SC) and Klere Ltd. To conduct a high-level Feasibility study for a full-scale Energy, Biochar and Carbon Capture (EBACC) pyrolysis plant at Bromford Drive Timber Recycling Depot to produce **biochar**, generate carbon-negative **energy**, and trade high-quality carbon removal certificates (**CORCs**).

The problem and the opportunity

- The study tested if EBACC technology is a financially sound method of delivering carbon insetting for Birmingham, using BCC's biomass such as street and park arboreal cuttings. It examined suitable locations, feedstocks, energy offtake, biochar production and carbon removal.
- Scope covered heat offtake infrastructure and potential, comparator technologies, risks, and a cost benefit model using the HM Treasury five-case methodology.
- Five sites were assessed via site visits and a scored SWOT/site evaluation. The clear preferred location is Bromford Drive Timber Recycling Depot due to its size, HGV access and proximity to the M6, weighbridge, existing chipper and telehandler on site, and high offtake capacity within the local vicinity.
- The site would need 4/5 buildings to be constructed on site to house a plant and storage, but has the capacity of operating 4 Woodtek C1000 units.
- This would annually generate 3200+ tonnes of biochar, sequester 8000+ tonnes of CO₂e and produce 35,600 MWth to offtake. This equates to a potential net income of £127.2 m across a 20 year period.
- **This project directly links to a number of BCCs strategies including targets to be Net-Zero by 2030, Tree City of the World status, City of Nature plans and Corporate Plans 2025-2028.**



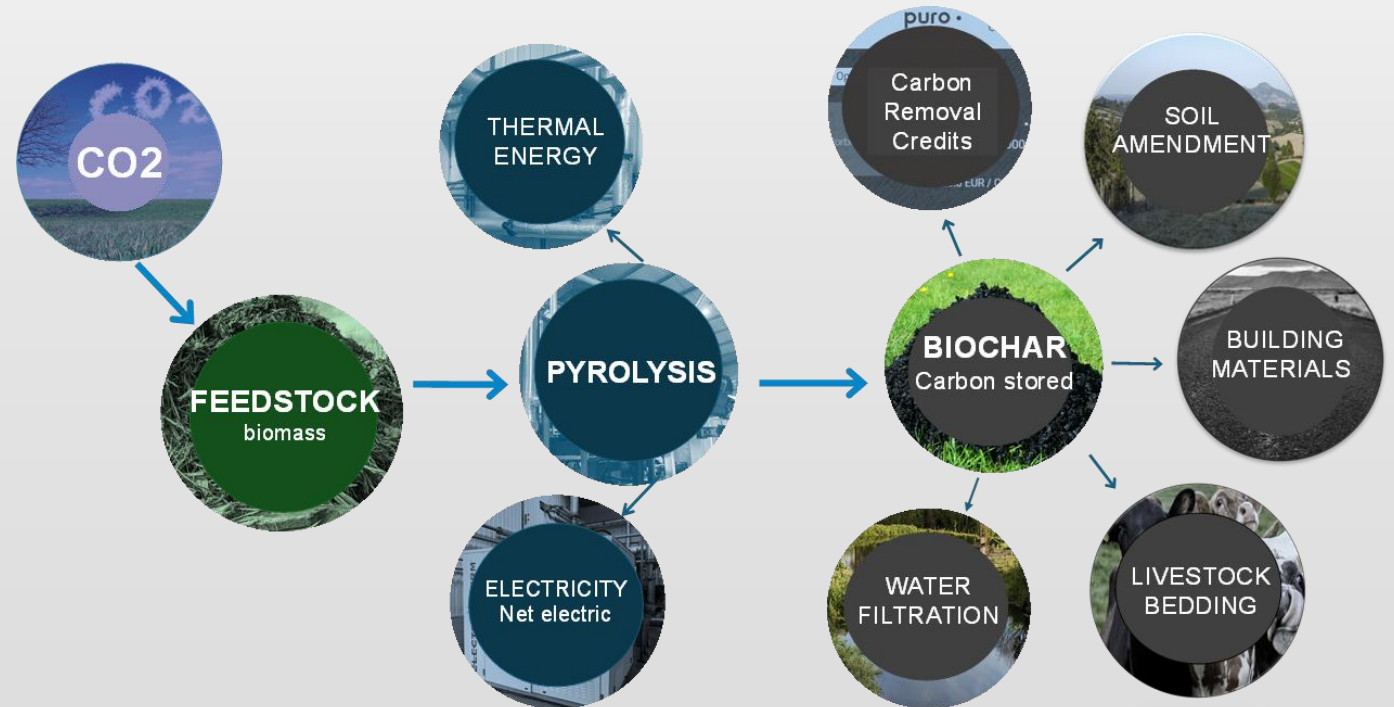
Aerial view of Bromford Drive Timber Recycling Depot

Pyrolysis & Biochar

Pyrolysis for biochar production transforms biomass into a valuable product, sequesters CO₂ that would have entered the atmosphere, and excess heat from production generates renewable energy. Local biomass for feedstock supports both the financial model and insetting targets.

Biochar is one product of pyrolysis: the thermal breakdown of biomass (e.g. wood chips, tree cuttings, agricultural arisings) in the absence of oxygen. Instead of compost or burning, it turns into 3 income streams:

1. **Biochar** – A stable, high-carbon material
2. **Energy** – Renewable heat and power from burning gases released during pyrolysis
3. **Carbon credits** – Certified carbon removal (CORC) credits. 1 tonne biochar locks away approx 2.4 tonnes CO₂



Power from pyrolysis

4/5 buildings will be constructed at Bromford Drive to house a quad plant and provide storage and processing space for feedstock and biochar. Heat network infrastructure will be constructed either directly to a proposed heat network ~1.3km from the site, or to surrounding consumers e.g., industrial est., hotel, council owned residential areas (including tower block).

Identified solution and options

- Construct buildings and install e.g. 4 Woodtek C1000 units. Final technology selection subject to full evaluation and tender/procurement.
- Heat output is the most efficient and profitable energy offtake option. However, electrical energy can be generated instead and distributed (5.3k MWe p.a.) back to the grid or to neighbouring communities. This could be the initial first output source whilst the heat offtake infrastructure is being built. This is to be confirmed and discussed within the next stage (Design & Verification) D&V phase.
- Annual input/output: 26k tonnes of BCC owned wet feedstock gives: 3.2k tonnes of biochar, 8k CORCs, and over 35k MWth exported to the community.
- A wholly Council-owned plant is recommended given the higher NPV and ICR scores, with a Joint Venture (JV) also presented.
- **Two realistic routes:** a wholly owned scheme; or a 50:50 Joint Venture (through a Special Purpose Vehicle set-up company).



Woodtek C1000 pyrolysis unit at Welshpool, SC

Outline Business Case

Follows the HM Treasury Five Case model. Options considered (i) do not invest, (ii) invest in a full-scale plant, wholly owned by BCC (iii) invest in a full-scale plant, operated under a JV. The model compares JV and wholly owned configurations across base, optimistic, and cautious assumptions i.e. 10% higher/lower revenue and costs respectively.

Option	Capital Cost (pre-tax) £m	Net Income pre-tax (20y) £m	NPV post tax (20y) £m	ICR post tax
Wholly Owned — Base Case	16.13	127.18	51.78	3.69
Wholly Owned— Cautious	17.75	110.72	40.21	2.97
Joint Venture — Base Case	11.68	127.18	20.34	2.46
Joint Venture — Cautious	12.85	110.72	14.22	1.97

- Every modelled scenario returns a positive NPV and an ICR above 1.0, including the cautious cases. Additional budgets of electrical offtake rather than heat offtake, and supplementary purchased woodchip are detailed in the outline business case (OBC)
- Assumptions are deliberately conservative: biochar at £500/t against £600+ observed spot sales; CORCs at £112 each; heat offtake at £92/MWh; no electrical off-take and no gate fees valued. Electrical offtake has still been presented within the OBC for reference.
- If the Council does invest on a JV basis, the majority goes in as a first-ranking loan secured over the plant, not equity at risk, with a par-value equity subscription giving 50% and full board representation.
- No capital commitment is sought now. Exposure at this stage is limited to seeking approval & funding for a £100k to £115k Design & Verification budget as many assumptions and technical aspects need to be further validated ahead of any investment decision.

This study presents the opportunity for a high profit return EBACC project aligning with BCCs sustainability and environmental strategies and targets. Potential risks correlate to: assumption costs calculated within the OBC (to be confirmed within D&V), and the need for buildings and offtake infrastructure to be constructed, to generate the high profits presented.

As BCC recently came out of S114, this project will have to be discussed with commissioners, especially considering the proposed capital cost. However, it will boost financial stability with its large net income potential of £127.2m (pre tax + loan repayments).

A decision at this point should be reached for this project to progress into a D&V phase, to further validate the study, site evaluations, including the proposed delivery & operating model i.e. Wholly Owned or JV.

Note: Within the Appendix a summary of the benefits, outcomes & scope of the D&V phase is included.

Recommendations & Next Steps

- Obtain approval & funding to commence a 4-month D&V (Set-up) Phase, cost up to £115k: technology evaluation and selection, FBC, LCA, pre-app planning and permitting, and legal and commercial structuring.
- Engagement of stakeholders, local authorities, MPs, Mayor with aim of boosting local support of project.
- Complete D&V phase for presenting Secure funding for wholly owned delivery OR If the preferred route is a 50:50 JV, determine operator/JV partner and set up SPV.

Draft Milestones

Key Milestone	Additional Detail	Delivery Date
Complete feasibility review	This report	Sep-26
Decision on D&V Phase	Whether to proceed into D&V, funding contingent.	Oct-26
Set-up Phase 2 — D&V	Appraisal of technology, options & selection; Full bus case. (Assumes Dec 26 – Apr 27)	Dec-26
Council /Cabinet Decision	Final decision and approval to commit capital funding	May-27
Design & Planning	Full site design, build planning and permit. Technology dependent.	Sep-27
Build & Site Remediation	Complete build. Aim to commission early.	May 28
QA, Test & Commissioning	Final commissioning and QA of site	Jun-28
Live	Fully operational.	Sep-28

Scope & Outcomes:

- Agreement on wholly owned or JV
- If JV, agree split (e.g., 50:50 or 75:25)
- PMEN & Tender undertaken for JV partner & Technology supplier / Operating Agreement (no BCC commitment at this stage)
- SPV set up paperwork if needed
- Full technical evaluation and agreement
- Full assessment on energy offtake infrastructure and corresponding cost/benefit analyses
- Full Business Case with confirmed quotes rather than current assumptions
- Evaluation of permits for the site with external legal advice
- Agreed full site plan and operating model
- Evaluation of this plan and model with external legal advice
- Planning & Permitting applications outlined & prepared
- Legal paperwork of project delivery

Benefits of D&V:

- Confidence of what the project / benefits can be delivered
- Assurance in the scope / timeline / costs of the Delivery phase
- Confidence in the business case, costs & residual risks
- Removal & validation of current BCC assumptions, utilising Klere's experience of SPF approach to develop operational site for BCC.

Deliverables:

- Outline planning & permitting application/s
- Operational site plans, off-take agreements prepared
- Contractor costs & risks removed with firm quotations
- Updated Full Business Case
- SPV/JV tender support and materials / outcomes with partner & technology agreed
- Cabinet/Council paper for decision on capital investment