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Work Package 1
Carbon Insetting Feasibility
Study

Briefing Paper

September 2026

Partnered with

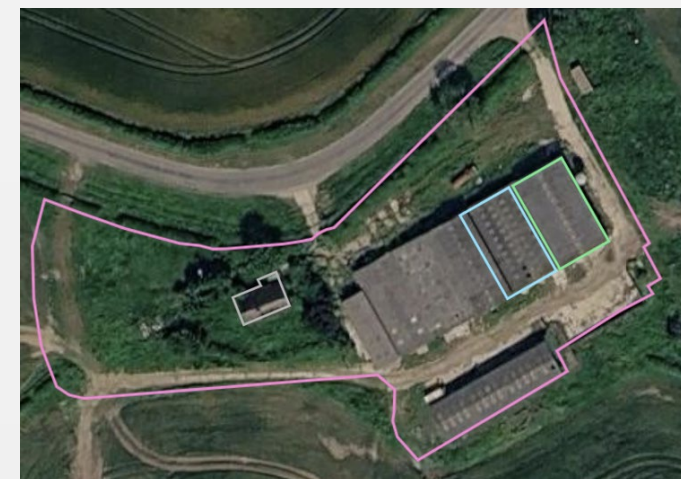


Synopsis

Leicestershire and Rutland Consortium (LRC) collaborated with the Midlands Net Zero Hub (MNZH), Shropshire Council (SC) and Klere Ltd to conduct a high-level Feasibility Study for a 'single' Energy, Biochar and Carbon Capture (EBACC) pyrolysis plant at an LCC Farm site to produce **biochar**, generate carbon-negative **energy**, and trade high-quality carbon remove certificates (**CORCs**).

The problem and opportunity

- The study tested if EBACC technology is a financially sound method of delivering carbon insetting for Leicestershire & Rutland. It examined suitable locations, ownership models, energy off-take, feedstock sources e.g. LRC biomass, energy off-take potential, biochar production and carbon removal.
- Scope covered energy off-take potential, comparator technologies, risks, and a cost benefit model using the HM Treasury five-case methodology.
- Five sites were identified from a longer list of potential locations across Leicestershire & Rutland, which were scored / assessed during a SWOT evaluation / F2F site visits. This identified three preferred sites: an LCC owned farm & an agricultural college in Leicestershire for a single plant; and an LCC-owned industrial estate site for a twin plant. The Business Case model presented five Options across these sites.
- The LCC owned farm site was identified as the preferred site based on the outcomes of the site scoring, Business Case modelling, and potential for significant strategic development.
- The site has existing buildings / infrastructure (which would require moderate upgrades) which are sufficient to house a single pyrolysis plant and associated storage / operations.
- This would annually generate 700 – 850 tonnes of biochar, sequester 1,600 – 2,045 tonnes of CO₂e and produce approx. 1,337 MW of electrical energy, sold to National Grid at approx. £97,300. This equates to a potential net income of £8.35 m across a 20-year period.



Aerial view of Preferred site

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.

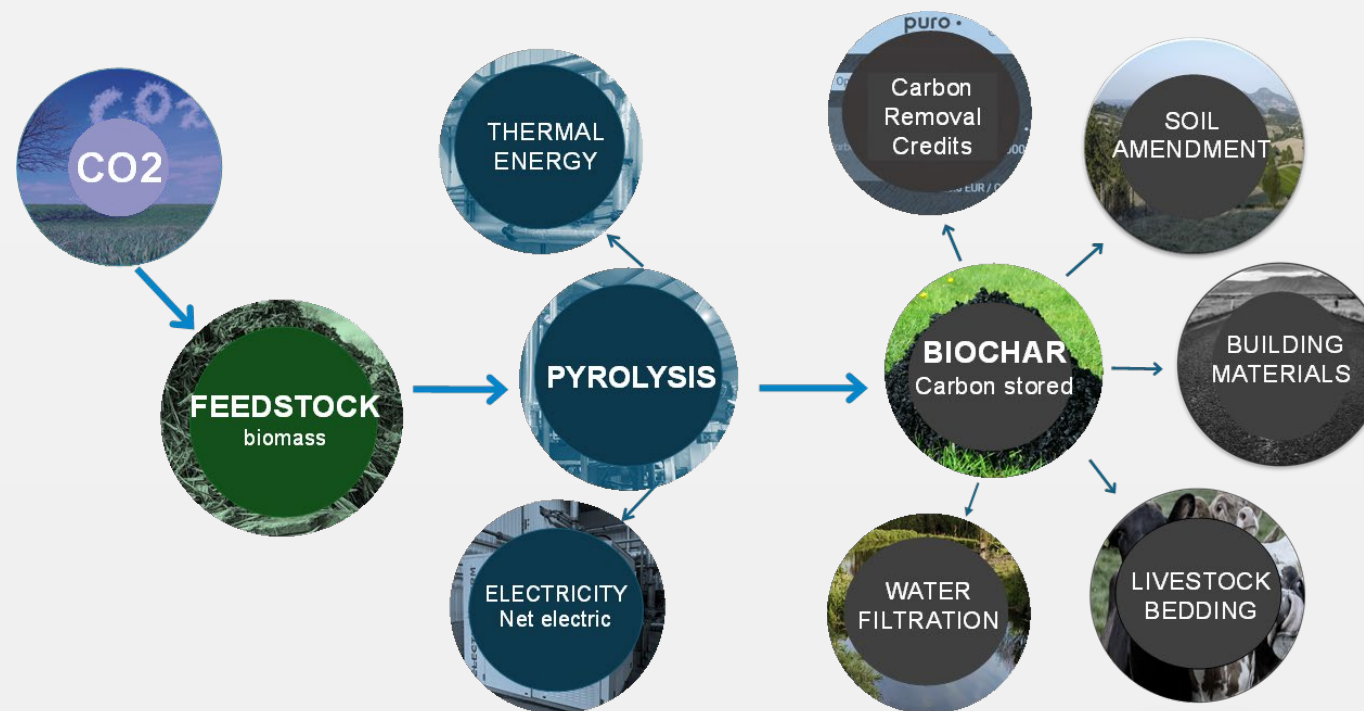
What is biochar?

Biochar is a valuable product of pyrolysis: the thermal breakdown of biomass (e.g. wood chips, tree cuttings, arboreal arisings) in the absence of oxygen. Instead of compost or burning, it turns into biochar, a valuable high-carbon material.

Each tonne of CO₂ removed through pyrolysis equates to a carbon removal credit 'CORC', with real market value.

The four key revenue items through this process include:

- **Thermal energy**
- Green **electricity**
- Sale of **biochar**
- Sale of **CORCs**



Power from Pyrolysis

An LCC farm has been selected as the preferred site to house a single EBACC biochar plant. The site has existing infrastructure, storage capabilities, utility connections & three access roads. With site upgrades (exp. capital cost £250k), Barn 1 & 2 on site could be suitable to house the facility & associated operations. Excess electricity generated by the plant could be directed to the grid however future commercial occupation at the site could create opportunities for excess heat sales i.e. greenhouse businesses.

Identified Solution and Options

- Installation of a single EBACC pyrolysis machine in Barn 1 at the LCC farm. Current modelling assumes a Woodtek Engineering C1000 unit however final technology selection is subject to full evaluation and procurement.
- Annual output: 7,000 tonnes woodchip (50% moisture content (MC)) → ~820 tonnes of biochar, ~1,965 CORCs, and 1,337 MW exported to the grid.
- Thermal output: Based on the drying requirements for 50% MC feedstock, there is potential for ~8,900 MW of thermal energy, although this has not been realised in the current modelling due to lack of an obvious off-taker on-site. Heat output is the most efficient and profitable off-take option and the Consortium should consider potential customers within the next stage.
- A wholly owned single plant requires £2.01 m of capital expenditure (which requires equipment for electrical generation i.e., ORC).
- Funding of the project could be through the PWLB (6.12% interest). The capital expenditure is estimated to be repaid by the 20th year of operation. Other funding routes / options may be explored by the Consortium, if available.
- **Delivery Routes:** A single C1000 plant owned by LRC at the LCC farm has been selected as the preferred option based on the strong financial case and strategic potential for the Consortium. The financial case for a twin plant under this model has also been presented to LRC, which offers a stronger ICR / NPV and should therefore be considered by the Consortium at Design & Verification (D&V) phase. The option for a Joint Venture (JV) may also be possible under both of these options.



Woodtek C1000 Pyrolysis Unit at Welshpool, SC

**Outline
Business
Case**

Follows the **HM Treasury Five Case model**. Options considered 1) Single plant owned by LRC at the LCC farm; 2) Single plant owned by LRC at the agricultural college site; 3) Single plant operated as a 50:50 JV at the agricultural college site; 4) Twin plant owned by LRC at the industrial estate site; and 5) Twin plant operated as a 50:50 JV at the industrial estate site.

Budget Options Summary

Option	Capital Cost (pre-tax) £ m	Net Income (20 yr) (pre-tax) £ m	NPV (20 yr) (post-tax) £ m	ICR (post-tax)
LCC-Owned Farm Site – LRC Owned	£3.41	£8.35	£0.95	1.27
Agricultural College Site – LRC Owned	£2.53	£7.37	£0.78	1.28
Agricultural College Site– JV	£1.52	£7.37	-£0.40	0.81
Industrial Estate Site – LRC Owned	£6.66	£22.57	£5.46	1.69
Industrial Estate Site – JV	£4.39	£22.57	£0.89	1.19

- Four of the five modelled scenarios return a positive NPV and an ICR above 1.0. Assumptions are deliberately conservative, with biochar sales at £650 / tonne, CORCs at £112 each, electricity sold to the grid at £72.79 / MW, purchased feedstock at £45-50 per tonne.
- The Outline Business Case (OBC) also presents an optimistic / cautious view for each budget option (i.e. with +/- 10% revenue and costs, respectively)
- A high-level financial view has also been prepared for an LRC-owned twin plant at the LCC farm site, with an indicative NPV / ICR of £3.22 m / 1.51. This option has a total capital cost of approx. £5.55 m.
- No capital commitment is sought now. Exposure at this stage is limited to seeking approval and funding for a D&V budget (£100-£115k) 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 broader LRC sustainability and environmental strategies and targets. Potential risks correlate to assumption costs calculated within the OBC (to be confirmed within D&V) and potential feedback from LCC finance, who have not completed a review of the Business Case at feasibility stage.

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 and operating model i.e. Wholly owned or JV.

Recommendations & Next Steps

- Obtain approval and funding to commence a four-month D&V (Set-up) Phase, cost ~£115 k. D&V to include: technology evaluation and selection, FBC, LCA, pre-app planning & permitting, and legal and commercial structuring.
- Engagement of stakeholders, local authorities, MPs, Exec Members 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 the operator / JV partner and set-up SPV).

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

Draft Milestones

Key Milestone	Additional Detail	Delivery Date
Complete feasibility	Briefing Paper.	Sep-26
LCC Finance review	LCC Finance to review business case assumptions.	Oct-26
Decision on D&V Phase	Whether to proceed into D&V, funding contingent.	Nov-26
Set-up Phase 2: D&V	Appraisal of technology, options & selection, FBC	Dec 26 - Apr-27
LA / Cabinet Decision	Final decision & approval to commit capital funding.	May-27
Design & Planning	Full site design, building planning & permit. Tech dependent.	Sep-27
Build & Site Remediation	Complete build. Aim to commission early.	May-28
QA, Test & Commissioning	Final commissioning & QA of site.	Jun-28
Live	Fully operational.	Sep-28

Scope & Outcomes:

- Agreement on preferred site (LCC Farm) and ownership model (i.e. JV / wholly owned)
- If JV, agree split (e.g. 50:50 or 75:25)
- PMEN and tender undertaken for JV partner, and technology supplier / operating agreement (no LRC commitment at this stage)
- SPV Set-up paperwork, if needed
- Full technical evaluation and agreement, including outline high-level plant design
- Feedstock prices, supply chains, types, availability and seasonality confirmed, including assessment of LRC sources
- Full assessment on energy off-take infrastructure and corresponding cost / benefit analyses
- Business model defined for log / kiln drying revenue stream using excess heat
- Full Business Case (FBC) with confirmed quotes rather than current assumptions
- Evaluation of the site, plant and operating model with external legal advice, including permits
- Agreed full site plan and operating model
- Planning and permitting applications outlined and prepared
- Legal paperwork of project delivery

Benefits of D&V:

- Confidence of the benefits the project will deliver
- Assurance in the scope, timeline, and costs of the subsequent Delivery Phase
- Confidence in the Business Case, costs and residual risks
- Removal and validation of current LRC assumptions, utilising Klere / SC's experience of the SPF approach to develop operational site for LRC

Deliverables:

- Outline planning and permitting application(s)
- Operational site plans, off-take agreement prepared (if relevant)
- Outline Operation & Maintenance (O&M) Agreement
- Contractor costs and risks removed with firm quotations
- Updated Full Business Case
- SPV / JV tender support and materials / outcomes with partner and technology agreed
- Project management and reporting throughout the phase
- Cabinet Paper / Exec Member Report for decision on capital investment

Glossary of Terms

- **CORCs** – Carbon Removal Certificates
- **D&V** – Design & Verification
- **EBACC** – Energy, Biochar and Carbon Capture
- **F2F** – Face-to-Face
- **FBC** – Full Business Case
- **HM** – His Majesty's
- **ICR** – Income Cost Ratio
- **JV** – Joint Venture
- **LA** – Local Authority
- **LCA** – Life Cycle Assessment
- **LCC** – Leicestershire County Council
- **LRC** – Leicestershire & Rutland Consortium
- **MC** – Moisture Content
- **MNZH** – Midlands Net Zero Hub
- **MP** – Member of Parliament
- **MW** – Mega-Watt

- **NPV** – Net Present Value
- **O&M** – Operations & Maintenance
- **OBC** – Outline Business Case
- **ORC** – Organic Rankine Cycle
- **PMEN** – Preliminary Market Engagement Notice
- **PWLB** – Public Works Loan Board
- **QA** – Quality Assurance
- **SC** – Shropshire Council
- **SPF** – Shropshire Pyrolysis Framework
- **SPV** – Special Purpose Vehicle
- **SWOT** – Strengths, Weaknesses, Opportunities & Threats