# BIOCHAR

## CASE STUDIES







#### Gagnef, Sweden

The site receives sawmill wood production residues. The thermal energy from the C1000 is used for drying feedstock for the C1000 and other district heating biomass boilers

Local factories and industrial units receive heat energy from the C1000 and other site biomass boilers

Biochar is applied to urban at a sale price of EUR840/ £720 per tonne dry weight

Phase 1 is to supply thermal energy to neighbouring industrial units and dry feedstock Phase 2 is to install a second machine with large electrical generation for the summer months when thermal energy is not required.



## **BIOCCUS - Haywards Heath, England**

An R&D project to produce carbon negative electricity and direct air carbon capture after pyrolysis An extension on the R&D schedule has been accepted. Soon the plant will be for sale. The plant produces a net electrical output of 53kWe, which could generate over £80,000 in additional income per year.

Interested buyers are looking at the C1000 and Bluebox Hot air turbine utilising the thermal energy from the HAT



#### **Brodies Biomass - Surrey, England**

The site takes over 8000t of locally sourced tree surgeon chip and arboricultural arisings annually. Small amounts at £0 gate fee, large bulk chip is purchased at £11-25/tonne

All feedstock is screened before drying, 13mm and down is removed for mixing with Biochar for organic compost or direct sales for a growing medium base

After drying, the biochar feedstock is screened out with the remaining feedstock sold for biomass boiler feedstock

Selling a premium grade biomass boiler feedstock and wet fines pays for all the feedstock the site takes each year. Production of Biochar and carbon credits can potentially earn a net of over £500,000 per year based on a biochar net profit of £200/tonne and £140/CORC. Installation of a second C1000 with electrical generation is in planning for 2026

## Welshpool, UK Commissioned Dec24

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#### **BDC - Welshpool, Mid Wales**

BDC is supplied with feedstock and produce Biochar for £200/tonne. The supplier is responsible for sourcing feedstock and the offtake of Biochar

All dried feedstock is screened before drying, 13mm and down is removed for mixing with Biochar for cattle bedding The C1000 provides thermal energy for feedstock drying, industrial unit heating and electrical generation

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A large arable farmer recently commissioned a dehulling plant to dehull his own grains and produce. The primary feedstock for the C1000 will be oat husks, generating electricity from the Bluebox Hot air turbine with spare thermal energy as feedstock drying is not required.

After electrical generation, the Bluebox HAT provides over 4000m3/hour of clean hot air at over 425°c. This heat stream will be fed into a grain roaster (normally gas fired). Extra thermal energy will be used to heat ambient air blowing into the roasting process to ensure maximum throughput during operation.

When the grain roaster is not operating, the thermal load is diverted to a waste heat ORC for additional electrical generation generating over 100kWe net



#### Additional income: Electric

The C1000 technology is a market leader for both a low parasitic electrical energy load and thermal energy available for processes. Using this thermal energy for electrical generation provides another income stream. The main barrier to good income is low export cost, so locating near an industrial process that requires electricity 24/7 is a good option.



The Bluebox Hot Air Turbine is a UK-made generator that uses hot air from post-pyrolysis gases. The advantage is the "waste rejected" heat after the process is over 4000m3/hour of clean hot air at over 425°c. Valuable thermal energy for the process, if the right use can be found as it has been with the Ormskirk project, this heat has a high value and significant carbon footprint saving. On the Ormskirk project, operating the roaster 5 days per week for 8 hours providing the "waste reject" hot air will save over £150,000 per year in gas with a carbon footprint saving of 218tonnes

#### **Additional income: Green heat**

1MW of thermal energy for space heating will heat 10,000m2 of moderately insulated industrial space. Over a five-day working week, this is 40MW x £156.20/MW = £6248(As of recent data, the average industrial gas price in the UK is approximately 15.62 pence per kWh). If a C1000 was installed where feedstock drying was required, and electrical generation was not viable, then there would be the option to provide green heat space heating to neighbouring units. In general, we have seen £120/MW, the standard price paid for industrial heating from green heat where a consistent supply is available. Over 6 months, 5 days, 8hour days, a single C1000 could supply 750kwh = 780MW.

780 x 120 =  $\pm$ 93,600 (Electric cost estimated  $\pm$ 43k/year so over  $\pm$ 50k additional income

Working on whole tree and arb chip/tree surgeon chip a single C1000 would be expected to produce 925t dry weight biochar per year at a target net profit of £200/t = £185,000.00
Minimum LCA for carbon credits is 2.5CORC/t biochar. (925 x 2.5) \* £140/CORC = £323,750.00
Operation cost, servicing & maintenance approximately -£ 168,000.00 = £340,750.00

Electric (net) = £37,000.00 low value export or £123,000 site use saving

or Green heat supplied for a net income of £93,600.00