

# Proposal for Biochar Centre

SUBMISSION TO MOUNT BARKER DISTRICT COUNCIL

FOR APPROVAL TO OPERATE

A COMMUNITY BIOCHAR CENTRE

IN MACCLESFIELD

‘MAKING MACCY CARBON NEUTRAL’

Prepared by the Macclesfield Community Biochar Centre Steering Committee comprising Brian Lewis, Kelvin Williams, Kath Thurmer, Greg Marlu, Stephen Heading, and Tess Minett (Ward Councillor).

31 March 2019

## Executive Summary:

**In accordance with the Mount Barker Council’s Environment Strategy & Goals**, in particular in relation to the planned Action to “reach GHG reduction targets” and “investigate carbon neutrality” we propose to establish a Community Biochar Centre in Macclesfield. This proposal also supports **Council’s 2035 Strategic Plan** in relation to Community Wellbeing Objective CW:1; Economic Prosperity Objectives EP:1 and EP:3; and Natural Environment Objectives NE:1, NE:2 and NE:3.

**The Centre will receive tree litter and other dry organic woody material** from local households, landowners, businesses and local Councils.

**The woody material will be converted to biochar** by heating at a very high temperature without air and thereby capturing carbon. In doing so, the Centre will be preventing the carbon dioxide absorbed by the woody material from returning to the atmosphere; thereby reducing carbon dioxide (a greenhouse gas) in the atmosphere by a measureable amount.

**Biochar is a form of charcoal and is good for the soil**, good as an animal feed supplement, has numerous industrial uses and combats global warming and climate change by sequestering carbon.

**Local households that register to supply woody material** will receive a regular statement detailing the weight of carbon that has been sequestered on their behalf and therefore the amount of greenhouse gases averted; hence the amount of their electricity consumption GHG emissions that has been offset; and so the extent to which their household is therefore carbon neutral.

**The Appendices to the proposal provide the detailed calculations** used to justify the claims made, and also provide examples of the agreements needed, the methods to be used to minimise risk, and other factors relevant to the proposal.

**We ask that the Council** support our proposal; assist us in locating a suitable site; and become a supplier of woody material to the Centre when established.

### **Summary of Objectives:**

- **Receive tree litter** and other organic debris (eg. prunings, off-cuts, woody weeds, etc ) from local households, landowners, businesses and Council;
- **Produce and sell biochar** in bulk to retailers for local gardens, local horticulture, agriculture and other local industrial uses;
- **Sequester carbon** and thereby accumulate carbon offsets;
- **Trade carbon offsets** with local consumers of non-renewable energy (eg: to offset local electricity consumption, gas consumption and motor vehicle use);
- **Demonstrate** that a small community can make an important contribution to offsetting and reducing its greenhouse gas emissions.

### **Community Benefits:**

- **Local households** will not be charged a processing fee and will share the Centre's total carbon credits to offset the emissions from their electricity consumption and other non-renewable energy consumption (oil and gas heating; petrol vehicle use etc). **See Appendix 1.**
- **Local businesses** and landowners will have the convenience of a local facility to process their woody material for a modest fee. They will also have the option of paying the Centre to process their wood litter on-farm.
- **Improved soils** and more productive farms and gardens.
- **Local employment** opportunities at the Centre once it is financially self-sustaining.
- **Potential** for local businesses to provide:
  - o a local pick-up service;
  - o local processing and packaging of biochar for special uses (eg animal feed supplements; water filters; air filters; concrete colouring; art crayons; etc);
  - o local firewood (by using the larger sizes of wood not suitable for biochar).
- **Education** in the use of biochar in gardens and on farms.
- **Outside interest** in Macclesfield as a world leader in showing what a small community can do to combat climate change. Guided tours of the Centre will be offered to schools and

various other groups, all of which will contribute to increased commercial activity in the town.

### **Design Concept:**

The Biochar Centre will comprise:

- **A cleared site** outside the town boundaries on which will be located a receival area, a drying area, an operations area with operator shelters, a water supply, a packing/storage area and an administration office.
- **The receival area** will be used to sort the incoming wood into sizes and moisture content. Wood with moisture content greater than 15% will be moved to the drying area. Each registered user will be allocated a dedicated storage area.
- **The drying area** will contain racks on which wood can be stored so as to facilitate drying by air circulation.
- **The operations area** will contain a number of medium sized kilns of 0.5 m<sup>3</sup> capacity of the flame-cap style. These kilns are virtually smoke-free and burn the tars and gases that arise during pyrolysis leaving only the char.
- **The water supply** from a rainwater tank collecting rain from the shelter and office roofs will be used for quenching the char and together with a petrol-driven pump serve as a source of fire water in an emergency. After quenching, the char will be allowed to drain before being transferred to drums and bags. The drain water will be collected and re-used.
- **The packing/storage area** will be used to pack the char into bags or drums and store them for sale or disposal as the case may be. This area will also be used to crush excessively large lumps of char to facilitate packing and later use.
- **The administration office** will register each delivery to the Centre and maintain an inventory of the biochar and carbon offsets arising from the feedstock each user has supplied. Each registered user will be issued a quarterly statement showing the following items:
  - § Number of deliveries;
  - § Dry weight of biochar produced;
  - § Weight of carbon dioxide captured;
  - § Number of kWhr of electricity whose greenhouse gas emissions have been offset;
  - § Amount payable (if any) by the user.
- **A number of operators** to man the Centre. Each operator will be trained in the principles of pyrolysis and flame-cap kilns. There will be a strict emphasis on Risk Analysis and the rules governing when operations will be permitted or not. Safety equipment and protective clothing will be supplied to each operator.

**Householders** living within the Macclesfield town area (where burning is no longer permitted without a permit) will be able to take their garden woody

material and free up much needed space in their green bins. There will be no charge to those Macclesfield residents who register for this service.

**Landowners** in the Macclesfield region and local businesses such as sawmillers, furniture manufacturers, crate and pallet makers, post makers, carpenters & joiners, builders, wood products suppliers etc will be able to take their offcuts (provided they are untreated and still purely organic) to the Centre. They will incur a small charge for the service.

**Fees and charges** will be set so as to cover the costs of operating the Centre. Profits from the operations of the Centre will initially be used to transfer volunteers to employee status.

**All suppliers** will be registered and required to sign an Agreement covering the terms and conditions of use. If any supplied material is found to be non-organic or to be contaminated then penalties may apply. **See Appendix 2.**

**Operation of the kilns** will be carried out by trained operators who will ensure that particulate emissions are virtually nil. The resulting biochar will comply with the latest biochar methodology when approved by the Climate Change Department for the creation of carbon credits.

**Biochar production** will be strictly controlled for safety, health and quality of the final product. Periodically samples of the biochar will be taken for analysis of carbon content, ash content, volatiles content, moisture content, water holding capacity, etc.

**Bulk packaging** of the biochar for use in soil and/or compost improvement will be carried out on site and where necessary the biochar will be crushed to a particle size that is suitable for soil or compost addition. The biochar will be offered for sale at the current wholesale market prices. The following sale categories are anticipated:

- a) Wholesale to biochar retailers (eg garden centres);
- b) Wholesale to other local biochar producers;
- c) By special arrangement with industrial users.

If any of the output from the Centre is used as cooking charcoal (which may be appropriate at times) then it would NOT be classified as biochar and would not be eligible for carbon credits.

**The total dry weight of biochar** produced will be used together with the analysis of carbon content etc to compute the net weight of greenhouse gases

avoided. One carbon credit will be claimed for each tonne of greenhouse gas abatement achieved.

## **Organisational Structure**

The Biochar Centre will be operated as a not-for-profit (NFP) organization with status as a deductible gift recipient (DGR); i.e. entitled to receive tax-deductible gifts. The Centre will be managed by a committee of volunteers.

The initial workforce will comprise a Site Manager, 3 Operators and an Administrator.

The Site Manager will be experienced in kiln operation, the principles of pyrolysis, risk assessment, biochar sampling and analysis, workforce supervision and be responsible for compliance with Work Health & Safety Regulations; and will report to the Board.

The Operators will be trained in kiln operation, the principles of pyrolysis, risk assessment, packing and quality control.

The Administrator will be trained in user registration, order processing, quality control, packing and dispatch.

The Operators and Administrator will report to the Site Manager.

The workforce will be employed part-time as needed to process the incoming material in response to orders for biochar and to conduct whatever off-site processing that may be required. Hence it is expected that the workforce size will grow in step with the level of biochar sales and contract work.

Volunteers will be sought in the early years of operation to assist with receivals and storage of incoming materials when the kilns are not in use. Volunteers will report to the site Manager.

Other work areas that will initially need volunteers are Accounts; Advertising; Promotions; Public Relations; Training; Website.

### **Estimated start-up costs:**

The establishment costs for the Centre are estimated \$35 024.

### **Notes:**

1. Assumes that the site is on Crown land or Council-owned land; or on private land where rent is paid in biochar as a % of production.
2. Insurance: \$5000. It is hoped that Council would be able to cover this under its existing policies. The perceived risk would be no greater than that posed by Council's existing rubbish disposal facility.

### **Estimated production:**

**In the first full year of operation a conservative estimate of production weight of dry biochar is 45 tonnes.**

The calculation is as follows:

No. of operating days per annum: 60 (allowing for rain and fire bans)

No. of kilns processed per day: 6

Volume of each kiln: 0.5 cu.m.

Average bulk density of dry biochar: 250 kg/cu.m

Therefore weight of dry biochar per kiln: 125 kg

Total weight of biochar produced in 1st year:

$60 \times 6 \times 125 = 45000\text{kg}$  or 45 tonnes.

This amount of biochar will be used to offset the emissions from local household electricity consumption. **See Appendix 3.**

### **Potential Income:**

#### **· Processing fees:**

Large amounts of woody biomass from businesses will be charged a processing fee. The fee will need to be competitive with the cost of other means of disposal available to them (eg skip hire, etc). The fee will need to be structured according to the volume, type and dimensions of the waste.

#### **· Biochar production:**

Conversion of woody biomass into biochar will incur a fee based on processing costs and the market price of biochar. The typical market price of bulk biochar is currently \$1000 per tonne.

So based on the estimated production in the first full year of operation sales revenue in 1st year could possibly be: \$45,000. However it will take time to establish a solid base of customers, and to establish credibility with those that require a reliable supply source to satisfy their on-going production needs.

The following market sectors will be pursued:

Agrifood suppliers

Biochar retailers.

Councils

Compost and soil suppliers

Farmers

Garden Centres.

Horticulturalists.

Soil remediation contractors.

Storm & waste water filtration system suppliers.

· **Off-site production:**

Where a landowner prefers to process his woody biomass on his own property (eg to avoid loading and cartage costs) and use the resulting biochar directly on his own land the Centre will offer a service to manage the production of the biochar on a contract basis. The use of the Centre's expertise and production accounting methods will ensure that the biochar so made can be counted towards the Centre's total production.

· **Equipment Hire:**

Spare kilns will be made available to hire out to local households and landowners for a hire fee to allow them to make their own biochar on their own land for their own use. However the biochar so made will need to be verified, weighed and analysed in order to be counted towards the Centre's total production and to be accreditable towards carbon offsets.

· **Biochar carbon offsets:**

Based on the first year's target production of 45 tonnes of biochar, the Centre will claim 123 biochar specific carbon offsets.

The calculation is  $45 \times 0.75 \times 3.66 = 123.53$  tonnes carbon dioxide.

A certificate will be produced for each 1 tonne carbon offset.

A number of certificates will be made available for sale to anyone who wishes to defray their carbon emissions. (However it must be stressed that at this point in time biochar specific carbon offsets are not legal currency. If and when they do become officially recognized it will be important that the certificates that we have issued can be traced back to us (wherever they are, and whoever has bought them) and can be verified.

A simplified system will be offered whereby carbon offset certificates are only sold locally and are only allowed to be used to offset local emissions. An example could be a local fuel retailer who applies carbon offsets to his fuel sales. The price increment paid by the motorist for carbon neutral fuel could be relatively minor and comparable to the normal fluctuations in the retail price of petrol.

The sale price of such carbon offset certificates will be determined by market demand. At this time they can be expected to sell for \$50 - \$60 each.

· **Training courses:**

Training courses will be offered on biochar basics; biochar production; biochar uses, including preparation and application for soil improvement; and carbon accounting.

· **Guided Tours:**

Guided tours of the Centre will be offered to anyone that wants to see biochar production in progress and learn about the operations of such a Centre.

**Quality Control:**

· **Smoke and/or particulate pollution.**

The methods to be used to make biochar will **exclude** retorts of any kind and therefore will avoid the possibility of large dark smoke emissions that can arise if the gases from the retort are not fully combusted.

The method to be used is known as ‘flame-capping’ in which the feedstock is pyrolysed (i.e. heated at a high temperature without air) in an open vessel or pit designed to allow air only to the top layer of feedstock. Thus the top layer burns in a very hot flame, and in so doing burns off all the gases, heating the layers below that are starved of air and so producing biochar with a low level of tar and other volatiles.

This method is characterized by very low smoke emissions, mainly during the first few minutes of start-up. For the same reasons the level of particulate emission is very low; i.e. because the flames consume virtually all the emissions; so no dark smoke can occur.

Forced air access will be prevented on windy days by the use of windscreens on each side of the kiln. The screens will be raised about 200 mm above ground level to allow air to be sucked up the sides of the hot kiln thus pre-heating the air that is sucked down into the flame area thus also assisting to fully combust all tars and gases.

· **Fire hazard.**

The risk of fire escaping from the facility will be mitigated in a number of ways:

- o **No operation during the fire-ban season.**
- o Strict adherence to risk analysis protocols.
- o No operation without a “Permit to Operate”. **See Appendix 4.**
- o On-site fire-fighting equipment.
- o Low probability of ember emission when using ‘flame-capping’.
- o Complete quenching of biochar before packing.

· **Noise.**

The level of noise is expected to be low at all times. Feedstock will be supplied cut to size so no chain-sawing is expected to be needed on-site.

· **Traffic.**

Deliveries of feedstock will be limited to normal business hours by prior appointment. Deliveries from local households are most likely to be via car and trailer or utility vehicle. Deliveries will not be permitted on those days when production is in progress.

**Letters of Support:**

**We have received letters of support for our proposal from the following community groups and organisations:**

Macclesfield Community Association; Macclesfield Primary School; Macclesfield Mens Breakfast Group; Regional Development Australia; Member for Heysen – Josh Teague; SA Biochar Works; Rebekha Sharkie, Federal Member for Mayo (attached) and others to be advised. Copies of letters are available on request.

**Location:**

The Centre can be on either one or all of the following types of land:

- a) Crown land reserved for community use where the community supports such use;
- b) Council-owned land;
- c) Private land.

In each case the location needs to be in the near vicinity of Macclesfield so as to best serve local households and preferably be on a main road for easy access and visibility.

Private land leased for the purpose could be of interest to landowners who wish to use biochar on a large scale and/or who have significant quantities of tree litter that they wish to convert to biochar. A symbiotic arrangement of this sort would perhaps see payments by the Centre in the form of biochar (eg an agreed % of biochar production.)

No permanent structures are required.

**Conclusion:**

In conclusion we seek:

1. In-principle approval from Council for this proposal;

2. Assistance from Council in determining a suitable location for the Centre; and
3. On-going support of the Centre as a supplier of dead tree litter from Council reserves and roadsides.

### **Implementation Strategy:**

Following Council approval of this proposal and agreement on a suitable location we would then proceed to:

Register the organization.

Launch the website.

Complete the Strategic Business Plan.

Seek necessary start-up funds.

Erect facilities.

Recruit volunteers.

Conduct training courses.

Conduct trials.

Commence operations.

Brian Lewis

Chair, Steering Committee

Macclesfield Community Biochar Centre

Website: <https://maccybiochar.wixsite.com/mysite>

Email: [strongbold@adam.com.au](mailto:strongbold@adam.com.au)

31 March 2019.

### **References:**

1. Australian Government. Department of the Environment and Energy. National Greenhouse Accounts Factors July 2018.
2. ABC Landline – biochar topics (various). <https://www.abc.net.au/tv/programs/landline> and search for ‘biochar’.
3. Biochar production for carbon sequestration. Allyson Stoye. 15 March 2011.

4. Using biochar systems to sequester carbon. AgMRC Renewable Energy Newsletter, January 2010.

5. <https://warmheartworldwide.org/flame-cap-trough>

6. Making Biochar – With Technical Manual”, Brian Lewis, 2016. Strong & Bold Publishing. ISBN 978-0-9923979-9-9.

### **Appendices:**

1. Household Supplier Statement Template.
2. Supply Agreement Template.
3. Calculations.
4. “Permit to Operate” pro-forma.
5. Potential customers.
6. Similar projects.

### **Drawings**

1. Typical Site Plan.
2. Typical Kiln construction with windscreen and ember screen.

### **Letter of support from Rebekha Sharkie MP.**

### **APPENDIX 1. HOUSEHOLD SUPPLIER STATEMENT TEMPLATE.**

Each registered household user will be allocated a password and a dedicated page on the website on which the following information will be entered:

**User Name**

**Email address**

**Report date**

**Report period**

Grid Electricity consumption, kWhr

Your gross CO2 emissions

Type of feedstock

Vol. of feedstock, m<sup>3</sup>

Dry weight of biochar, kg

Plus:

Your share of non-household biochar, kg

= Total biochar, kg

Average %C in biochar

CO2 averted, kg

Your net CO2 emissions, kg

**% Carbon neutral**

**Note:** This statement can be extended, on request, to include CO2 emissions from hot water services, gas heating and motor vehicle use.

**APPENDIX 2. SUPPLY AGREEMENT TEMPLATE.**

An AGREEMENT dated

.....  
.....

between Macclesfield Community Biochar Centre Inc., of Macclesfield SA 5153

AUSTRALIA and email address

.....(hereinafter referred to as the Centre) and

Full Name

.....  
.....

of Address

(optional).....

.....

and email address .....(hereinafter referred to as the Supplier)

to allow the use of the Supplier's feedstock (hereinafter referred to as the Feedstock) by the Centre for the production and disposal of biochar and to set out the terms and conditions of such Agreement.

WHEREBY:

The Supplier certifies that:

The Supplier wholly owns the Feedstock. The Supplier is legally entitled to supply the Feedstock for disposal. The Feedstock is wholly organic in nature and does NOT contain any vestiges of inorganic material.

And accordingly it is agreed as follows:

The Supplier will provide the Feedstock to the Centre without charge. The Centre will convert the Feedstock to biochar and may sell or otherwise dispose of the biochar as it sees fit. The Supplier absolves the Centre of any legal liability whatsoever that may arise from the use by others of the biochar produced from the Feedstock and warrants that the Feedstock does not contain any inorganic contamination. The Centre will provide a quarterly statement to the Supplier via email setting out a summary of the deliveries of Feedstock, the amount of biochar produced, and the amount of carbon dioxide captured. This Agreement is an exclusive agreement between the Centre and the Supplier. The term of this Agreement is 12 months from the date of the Agreement. On the expiration of the term of this Agreement, and each extension thereof, it shall be automatically extended and renewed for a further 12 months unless terminated by advice via email from either party. The Centre may terminate this Agreement at any time via email for any reason.

I AGREE ..... (Supplier) Witness  
.....

I AGREE ..... (Centre) Witness  
.....

The above agreement will be available on the **maccy biochar** website to allow users to register as suppliers, either as household or commercial.

### **APPENDIX 3. CALCULATIONS.**

Based on the estimated production of 45 dry tonnes of biochar in the first full year of operation the number of tonnes of carbon dioxide captured can be calculated as follows:

1. The % carbon in the biochar can be expected to be in the order 70 – 80%. Let us assume 75%. Then 45 dry tonnes of biochar will contain 33.75 tonnes of carbon.
2. Each mass unit of carbon captures 3.66 mass units of carbon dioxide. Therefore 33.75 tonnes of carbon will have captured 33.75 x 3.66 or 123.5 tonnes of CO<sub>2</sub>.

The offset potential of this amount of carbon dioxide in terms of electricity generation from fossil fueled power stations in South Australia can be calculated as follows:

In South Australia (Ref.1) the emissions factor (EF) for the State grid is 0.51 kgCO<sub>2-e</sub> per kilowatthour of electricity consumed.

$$Y = Q \times EF / 1000$$

where

**Y** = emissions attributable to the quantity of electricity purchased measured in CO<sub>2-e</sub> tonnes;

**Q** = quantity of electricity purchased in kilowatthours.

**EF** = emissions factor for the State grid;

So if  $Y = 123.5$  tonnes/annum

And  $EF = 0.51$

then

$Q = 123.5 \times 1000 / 0.51$  kWhr/annum

**= 242 MWhrs/annum.**

Based on a typical household without solar panels with an electricity consumption of **8MWhrs/annum** this represents the total electricity consumption of about **30 households.**

Based on a typical household with solar panels with an electricity consumption of **2MWhrs/annum** this represents the total electricity consumption of about **120 households.**

#### **APPENDIX 4. PERMIT TO OPERATE.**

##### **PERMIT TO OPERATE BIOCHAR KILN**

NUMBER:

**TYPE OF KILN:** FLAME CAP TYPE 1.

PROCESS: PYROLYSIS.

**DATE:**

JOB NO:

**PREPARED BY:**

OPERATION DETAILS:

APPLICANT NAME:

LOCATION:

##### **PRE-REQUISITE CONDITIONS:**

1. WEATHER: NO FIRE BAN DECLARED.
2. 4 METRE CLEARANCE FROM FLAMMABLE ITEMS (CFS REQUIREMENT).
3. SAFETY EQUIPMENT: ALL ITEMS READY AND AVAILABLE AS PER FOLLOWING LIST:

- GLOVES
- DUST MASKS
- HEAD PROTECTION (FROM SUN)
- EYE PROTECTION
- LONG SLEEVES AND TROUSERS (WOOL OR COTTON; **NOT** Polyester)
- FIRE EXTINGUISHER
- HALF FACE MASK AND VAPOUR FILTERS
- OTHER (eg DRINKING WATER; FIRST AID KIT;.....)

**PERMIT APPROVED BY:**

NAME:

DATE:

POSITION:

**TASK COMMENCED:** .....AM/PM...../...../.....  
/.....

**TASK COMPLETED:** .....AM/PM  
...../...../...../.....

NOTES:

DATE:

APPROVED BY OHSE REPRESENTATIVE:

PERMIT FILED:

DISTRIBUTION:

**APPENDIX 5. POTENTIAL CUSTOMERS.**

The applications of biochar are too numerous to completely list here. However the most appropriate to our location are the following:

Agribusiness:

- Stock feed supplement.
- Soil improvement.

- Seed mix supplement.
- Water filtration.
- Odour reduction.
- Tree litter disposal.

Building industry:

- Concrete colouring.
- Plaster supplement: for electromagnetic screening.
- Air filtration (odour reduction).

Forestry:

- Litter disposal
- Emission reductions.

Horticulture:

- Soil Suppliers & Compost manufacturers:

Local Government:

- Disposal of roadside tree litter
- Disposal of tree prunings
- Storm water filtration.

## **APPENDIX 6. SIMILAR PROJECTS.**

- **H500, West Bengal, India.**

Dr. Paul Anderson, PhD, Exec. Dir. Of Juntos Energy Solutions NFP stated in an email to [biochar@yahoogroups.com](mailto:biochar@yahoogroups.com) on 26/11/18:

“Carbon that is sequestered as biochar should receive financial rewards”. HOW to do that?  
Dr. Anderson explained:

“The UNFCCC and Gold Standard and other mechanisms for selling carbon credits do not allow for recognition and financial compensation for char into soil. So, for the near and medium future, that avenue is not open to us. However, VOLUNTARY contributions for carbon offsets (i.e. accomplished CO<sub>2</sub>e reduction but without recognition as carbon credits) is possible. People can put their money wherever they want to spend it. (Whereas Governments and large corporations that need official credits cannot.)

The need is for a mechanism of reasonable documentation and proof of carbon being extracted from the atmosphere (plant growth and then pyrolysis yields charcoal) AND THEN the charcoal going into the soil. This is an ideal situation for the use of blockchain (distributed ledger technology), Ref. 4. Immutable records are created and used with appropriate 3rd party verification and certification. This is done with appropriate charcoal that becomes available to be sold. This is precisely what is being implemented in the final months of 2018 for a project in West Bengal, India. The project is called H500 because it uses 500 TLUD (Top-Lit, Up-Draft) char-producing cook-stoves.”

Sales of charcoal-specific carbon offsets from the H500 project are expected by January 2019.

- The Tenkawang Factory, Borneo.

This project can be viewed at: <https://youtu.be/j5jo4yC6H1g?t=490>

- The Warm Heart Project, Thailand.

Design details and operation of their flame cap troughs can be viewed at <https://warmheartworldwide.org/flame-cap-trough>