
Sustainable Technologies

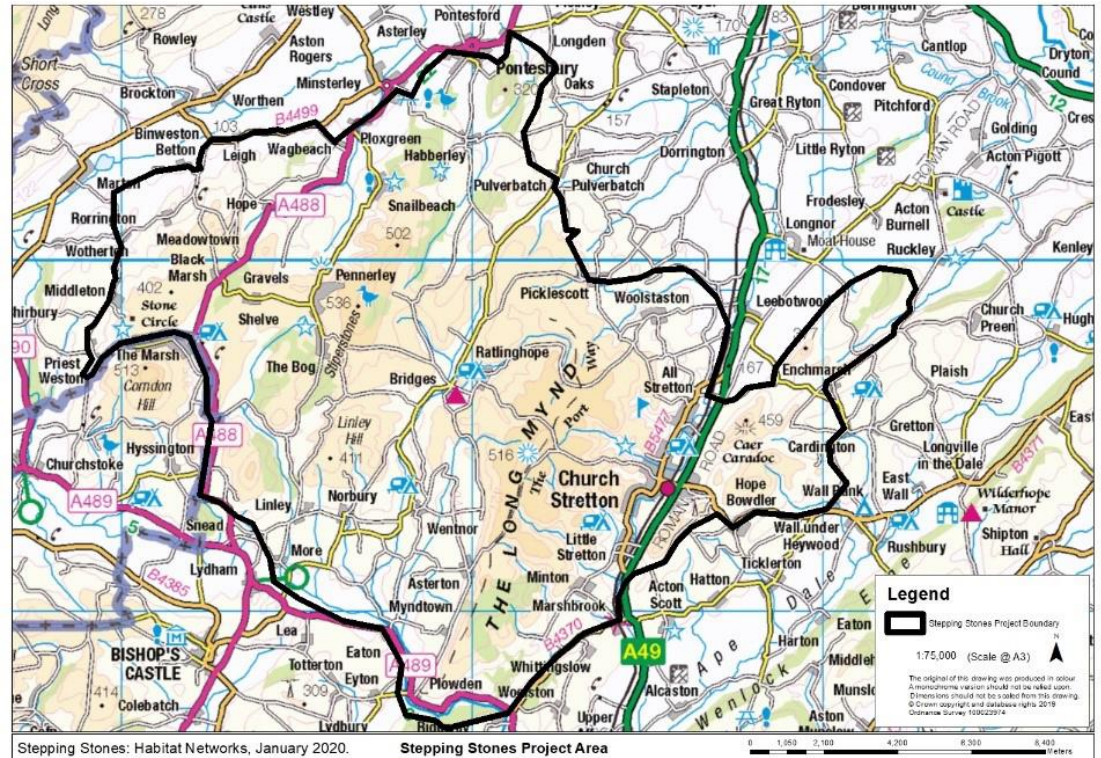
Utilisation of Roadside Verge Arisings

Alex Wilcox Brooke

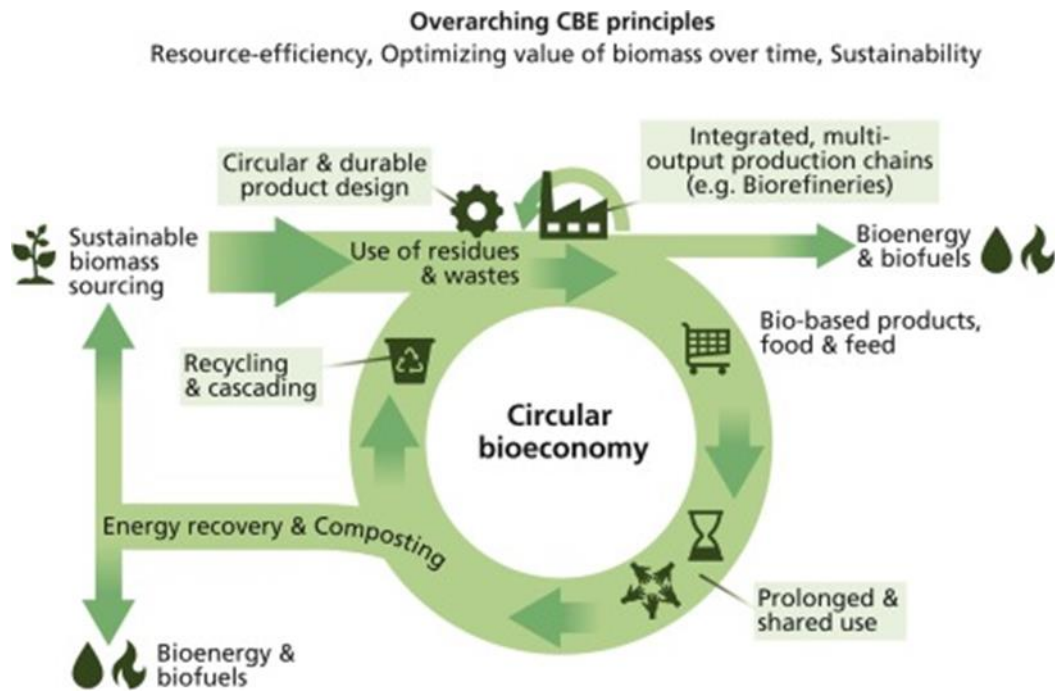


The brief

- Assess the economic value of the potential arisings in the Stepping Stones area including:
 - Costings
 - Yields
 - Management plans
- Roadmap for future opportunities
- Ideas for next steps



Background: THREE-C Creating The Circular Carbon Economy

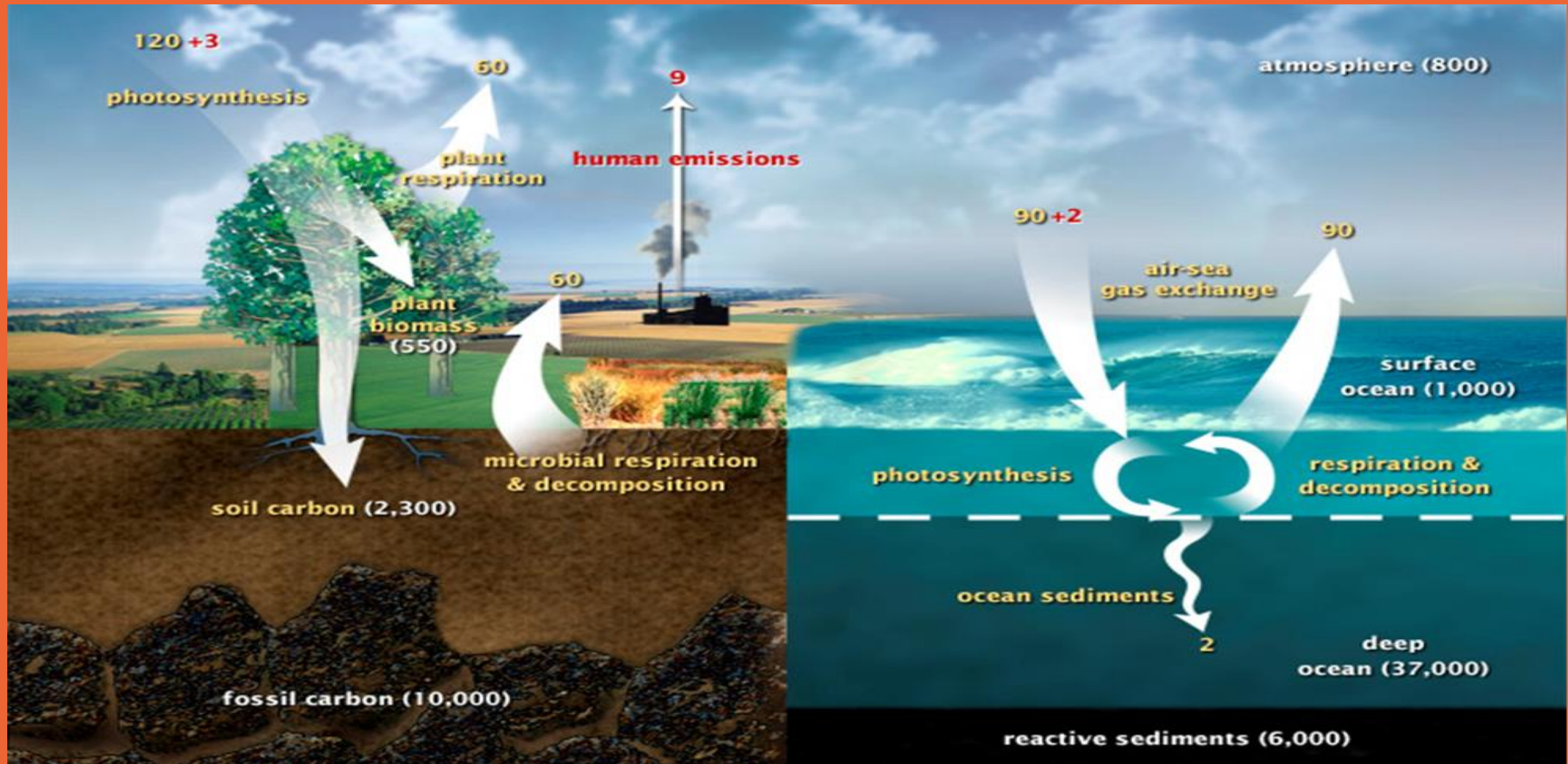


THREE

Interreg
North-West Europe
THREE C



The Carbon Cycle



Key Drivers

Why is the current practice cut and drop?

What is the ideal solution from an ecological perspective?

Lifecycle of grass & calorific value

Availability of existing treatment options –
AD/composting facilities

Key Challenges?

Alternative solutions?



DLG Expert Knowledge Series 386: Biogas from Grass

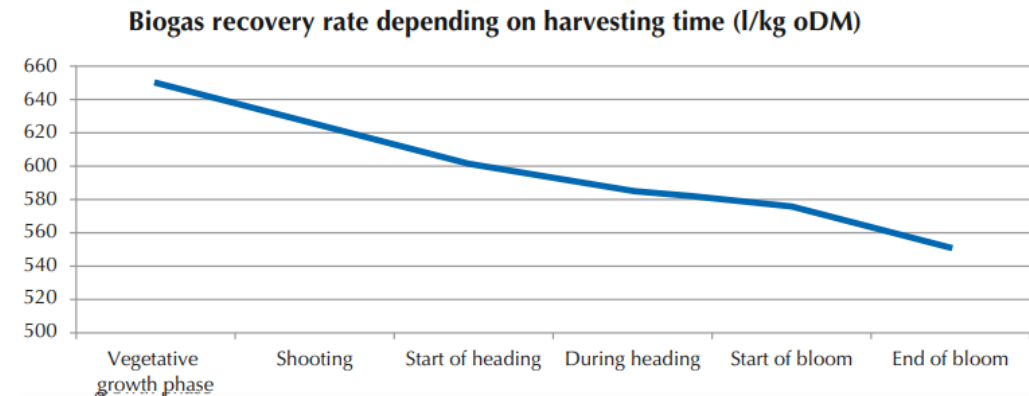


Figure 3: Biogas recovery rate from grassland growth depending on the harvesting time [Lütke-Entrup, Gröblichhoff, 2005]



Hope Bowdler trial

Trial area – Verge on B4371

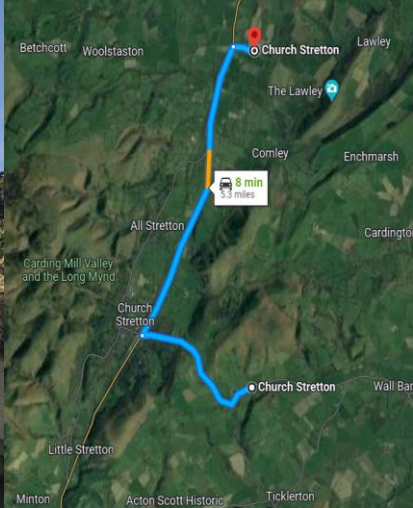
Volunteer time – Litter picking

Cut & collect – Gianna Ferrari front mower

Yield – 840kg

Transport – Iveco Flat Bed

Value - ???

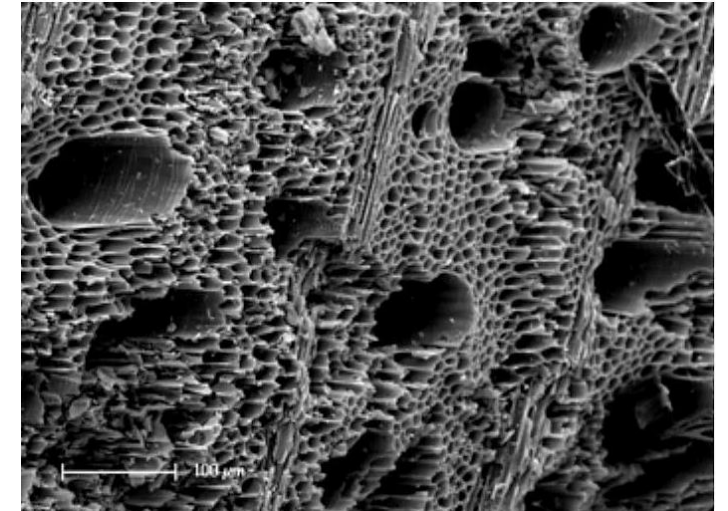


Smart Use of Biomass for Alternative Carbon Products



What is biochar?

- Black, solid, high carbon content material
- Highly porous
- Recalcitrant(stable)
- Made from a variety of biomass streams
- Formed during pyrolysis
- Variable in shape and size



How is Biochar made?



Kon Tiki style flame cap kiln



Source: <https://www.biocharretort.com/>



Source: <https://www.pyreg.de/>

Use within the agriculture, forestry and the farming community

- Slurry additive
- Animal feed additive
- Biofertiliser- EU Organic Fertiliser Regulations
- Animal bedding
- Soil additive/amendment
- Boosting biogas yields in AD
- Forestry Applications



Water Quality

Possible applications:

- WWTP Use
- Industrial Use
- Domestic Use
- Agricultural Use
- Municipal Use
- Remediation



<https://www.princetonhydro.com/blog/biochar/>

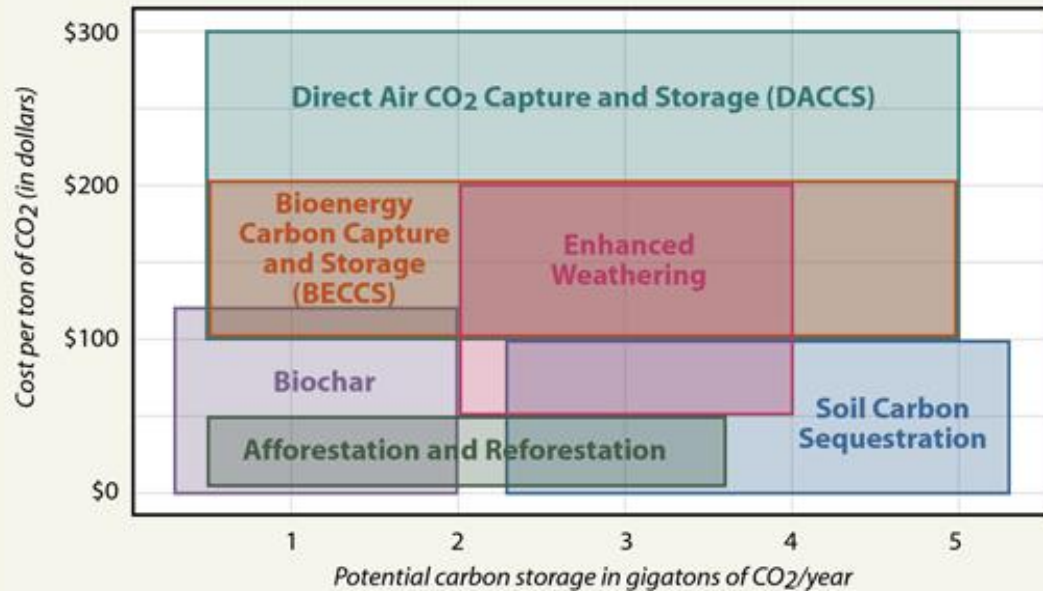


[High Plains Biochar](#)

IPCC NET- Negative Emission Technologies

How Do Carbon Storage Techniques Stack Up?

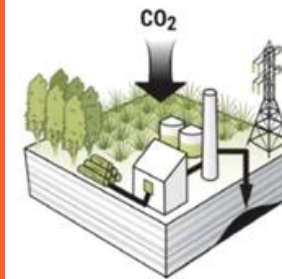
To meet the goals of the Paris climate agreement and keep global warming under 1.5 degrees Celsius, the world will have to increase the amount of carbon dioxide pulled from the atmosphere, the IPCC reports. It compared the costs and storage potential of six key methods of carbon dioxide removal. Soil carbon sequestration is one of the cheapest with the most potential.



SOURCE: IPCC

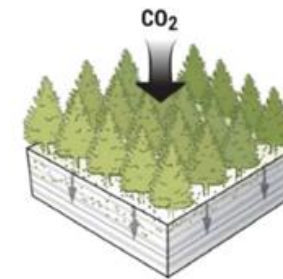
InsideClimate News

Six ways to pull CO₂ out of the air



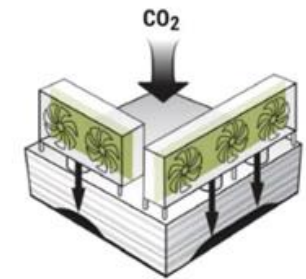
BECCS

Fast-growing plants are harvested and burned to make energy. Exhaust carbon is captured and piped underground.



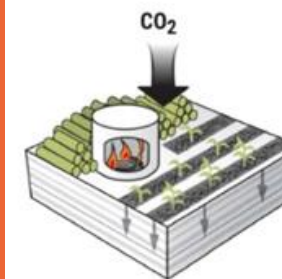
Forestation

Planted trees capture CO₂ as they grow. The carbon remains sequestered as long as forests are not cut down.



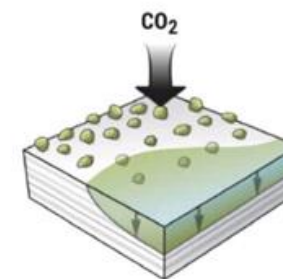
Direct air capture

CO₂ in air selectively "sticks" to chemicals in filters. Filters are reused after releasing pure CO₂, which can be stored underground.



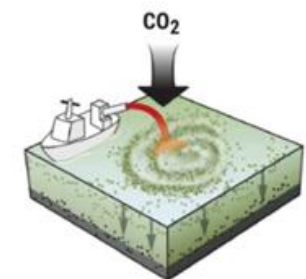
Biochar and soil sequestration

Charring biomass stores carbon in soil by making it resistant to decomposition. Altered tilling practices also enhance CO₂ storage.



Enhanced weathering

When spread across fields or beaches and wetted, crushed silicate minerals like olivine naturally absorb CO₂.



Ocean fertilization

Injections of nutrients like iron spur phytoplankton blooms, which absorb CO₂. When they die, they take the carbon to the sea floor.

Source: <https://insideclimatenews.org/news/12102018/global-warming-solutions-negative-emissions-carbon-capture-technology-ipcc-climate-change-report/>



What's Next?

Short term vs Long term

An integrated biomass management concept
Development of a site combining pyrolysis & composting facilities

Pre-treatment facilities

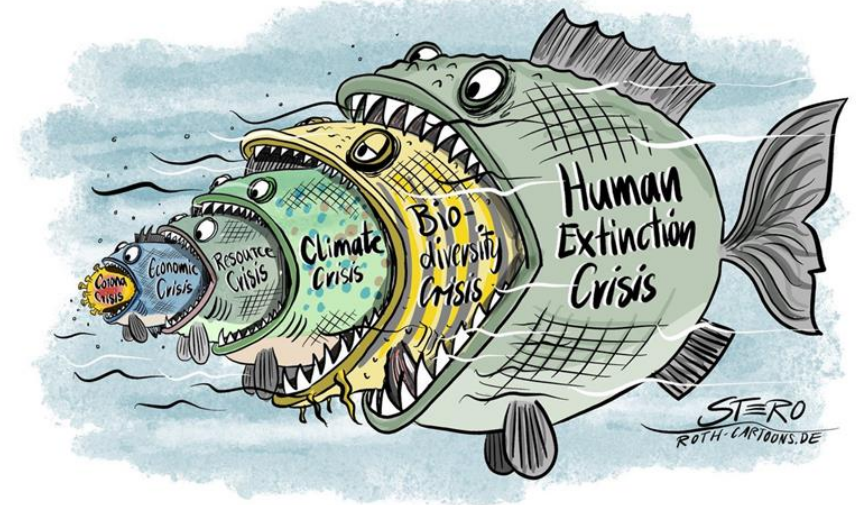
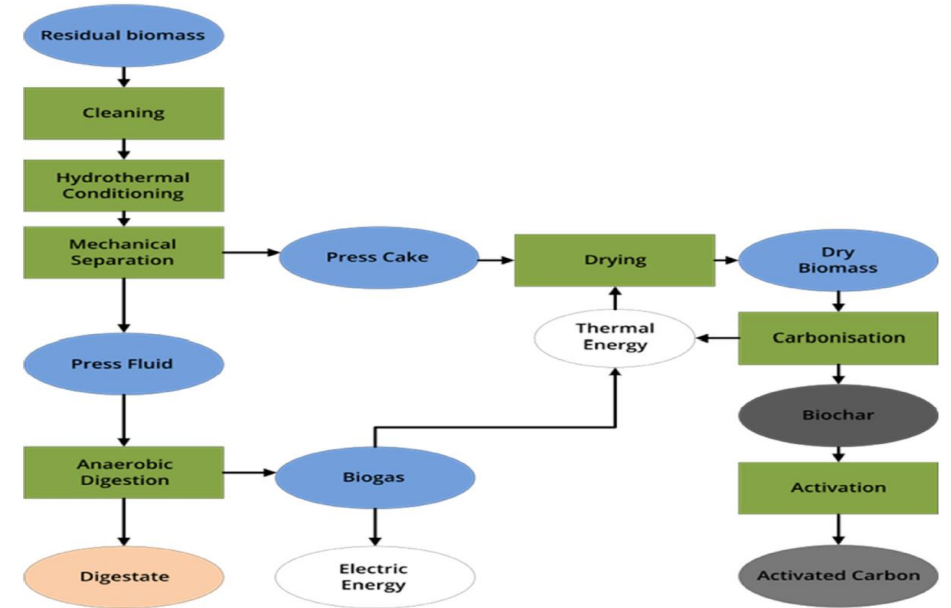
Drying capabilities

Briquetting capacity

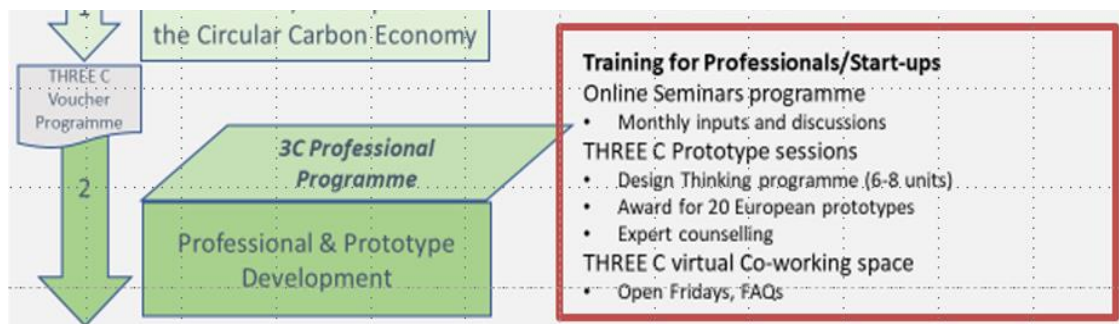
Designed to handle a variety of challenging and low value feedstocks

Wide variety of value streams

Significant Carbon Sequestration Potential



THREE C workshop series




Date	Contents	Design Thinking
	10 am to 1 pm	
16 December 2022	Start session; Intro on Biochar and the circular carbon economy	
13 January 2023	“Our” THREE C Procedure <ul style="list-style-type: none"> • Inputs, Processing, Outputs • Ecology, LCA 	Team Building
10 February 2023	Regional Scenarios <ul style="list-style-type: none"> • Municipal • Agricultural • Social economy • Regional development plans 	Regional Visions
10 March 2023	Ecology, Quality and Labs	Ideation session on products and services
14 April 2023	Application cases and Economy	Refining products
12 May 2023	Excursion	Prototyping
16 June 2023	Networking / Award	Pitches





severn wye

 severnwye.org.uk

 [@Severn_Wye](https://twitter.com/Severn_Wye)

 AlexW@severnwye.org.uk
