



RESPONSIBLE
SUSTAINABLE
KNOWLEDGEABLE

Carbonisation: Expediting the Journey to Net Zero and Beyond

A circular economy approach to
waste materials using
Pyrogenic Carbon Capture and
Storage Negative Emissions
Technology at source

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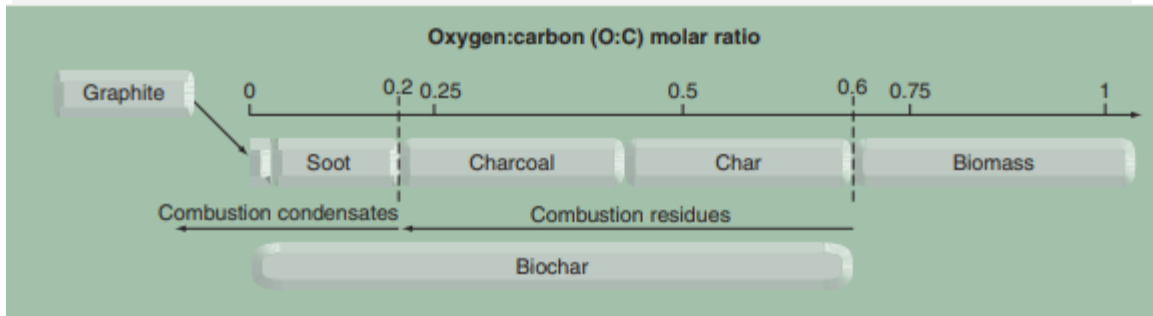
Carbonisation: A New Technology?

- Technological innovation and utilisation of woody biomass, dating back 7,000 years
- Charcoalification: first true chemical process
- ‘Dost see the great thicket yonder?’ “I see.” ‘I must have it uprooted out of the earth and burnt on the face of the ground so that the cinders and ashes thereof be its manure...’
 - Culhwch and Olwen; The Mabinogion 14th Century

The Challenges

- Thermal treatment of organic matter produces a variety of materials
 - Do not consist of one chemical compound
 - Do not form a group with well-defined characteristics
 - Varying biogeochemical properties
- *Lack of consistency = confusion*

- Perception of 'pyrolysis'
- Historic plants
- Calorific value of the material
- Moisture content of the material
- Blending of materials
- Regulatory movement
- Concentration of heavy metals



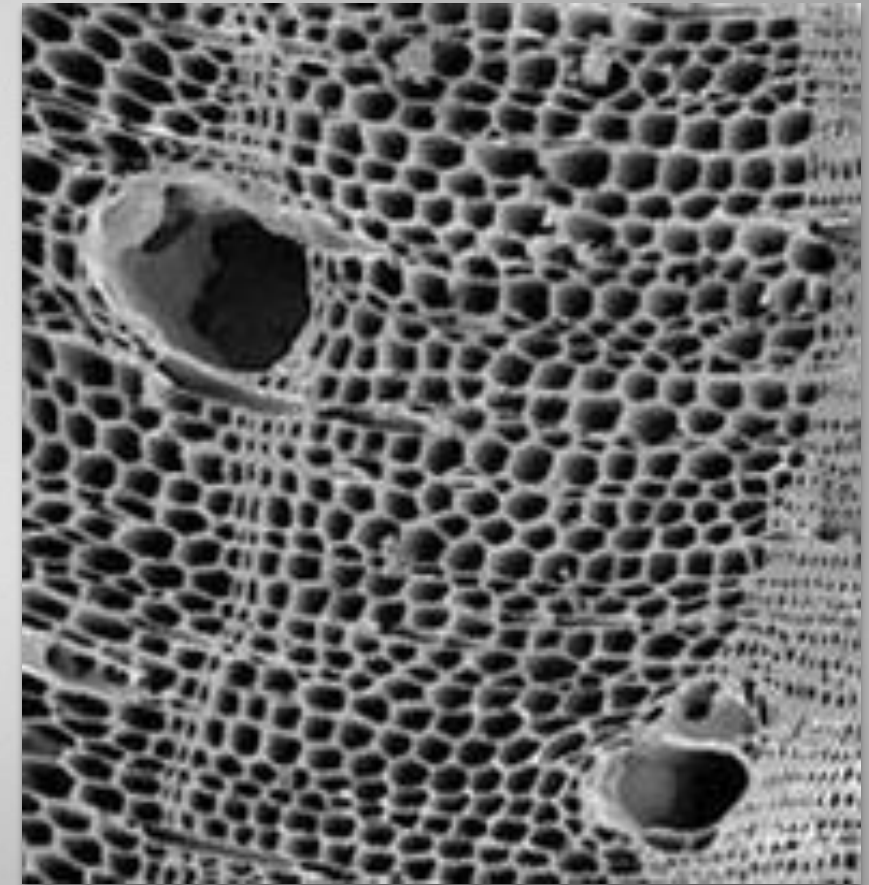
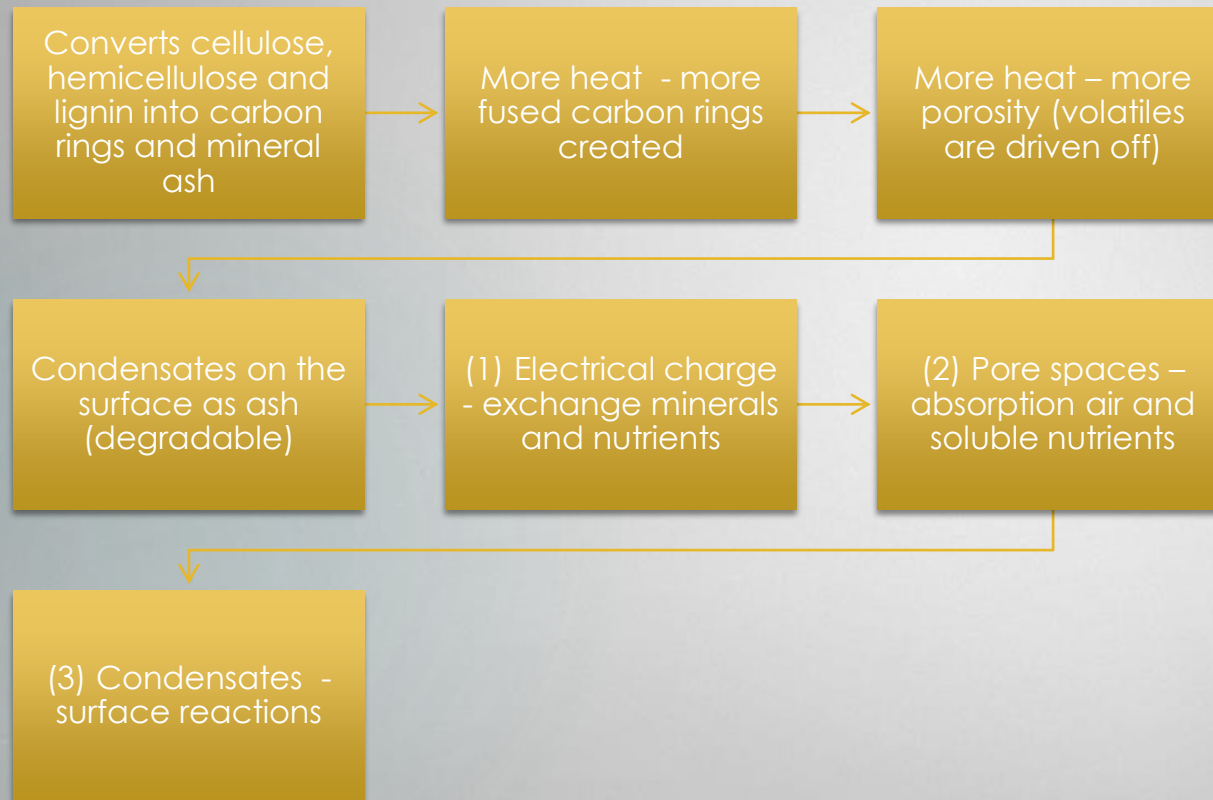
Pyrogenic Carbon Continuum (Spokas, 2010)



What is Biochar?

- A carbon rich product formed by thermal decomposition of organic material under limited oxygen
 - 500 – 800 °C
- A highly stable (refractory) form of carbon. i.e. resistant to degradation for millennia
- Pyrogenic Carbon Capture and Storage (PyCCS)
- Negative Emissions Technology (NET)
- 20MT CO₂e/yr by 2050
- Offset 12-16% global emissions per year
- **Produced for C-sequestration and soil amendment – NOT A FUEL**

Carbonisation and Properties





Tree Planting



Land Re-vegetation



Contaminated Land Restoration

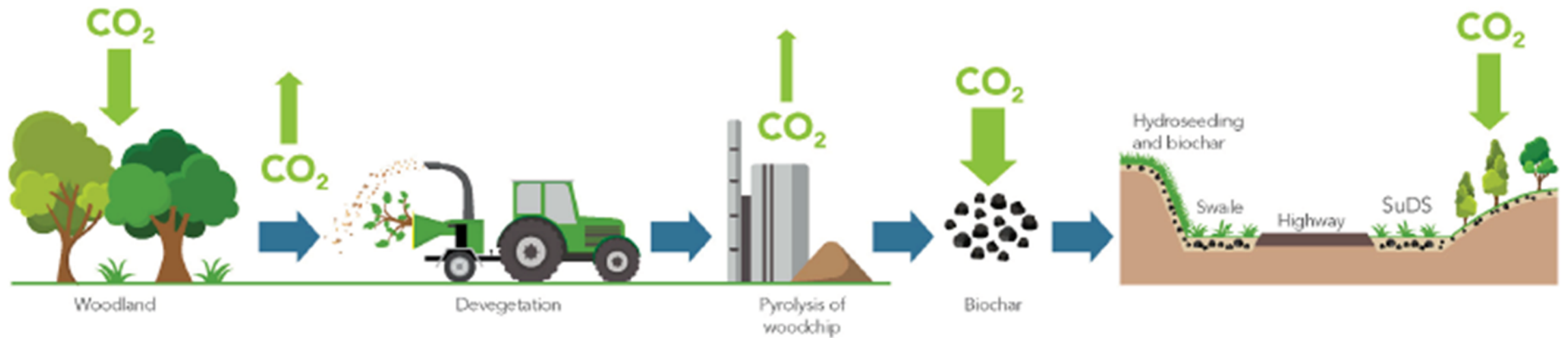
Construction Materials



- ▶ Carbon-negative construction materials can be realised by emerging biochar applications.
- ▶ Incorporation of biochar can mitigate CO₂ emissions and natural resource depletion.
- ▶ Biochar as construction materials foster the attainment of Sustainable Development Goals.

Unique RSK full lifecycle Carbon sequestration opportunity

The Pyrolysis Solution



Woody Biomass example

1

- 100 tonnes of wet wood
- 50 tonnes of dry wood chip for carbonisation

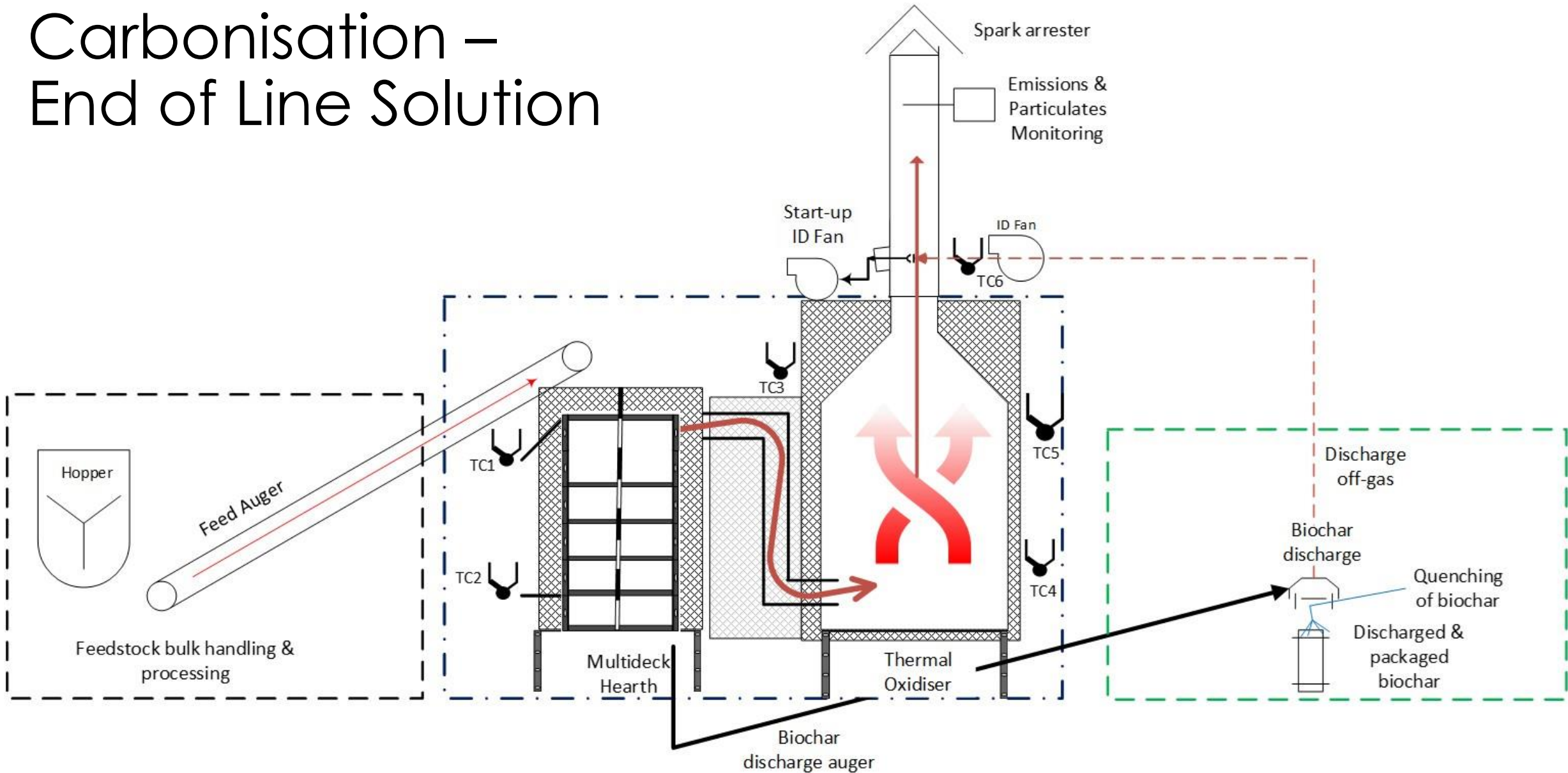
2

- 25% biochar yield
- 12.5 tonnes of biochar produced

3

- 11.5 tonnes of refractory carbon
- 42.20 tonnes of CO₂-e sequestered

Carbonisation – End of Line Solution

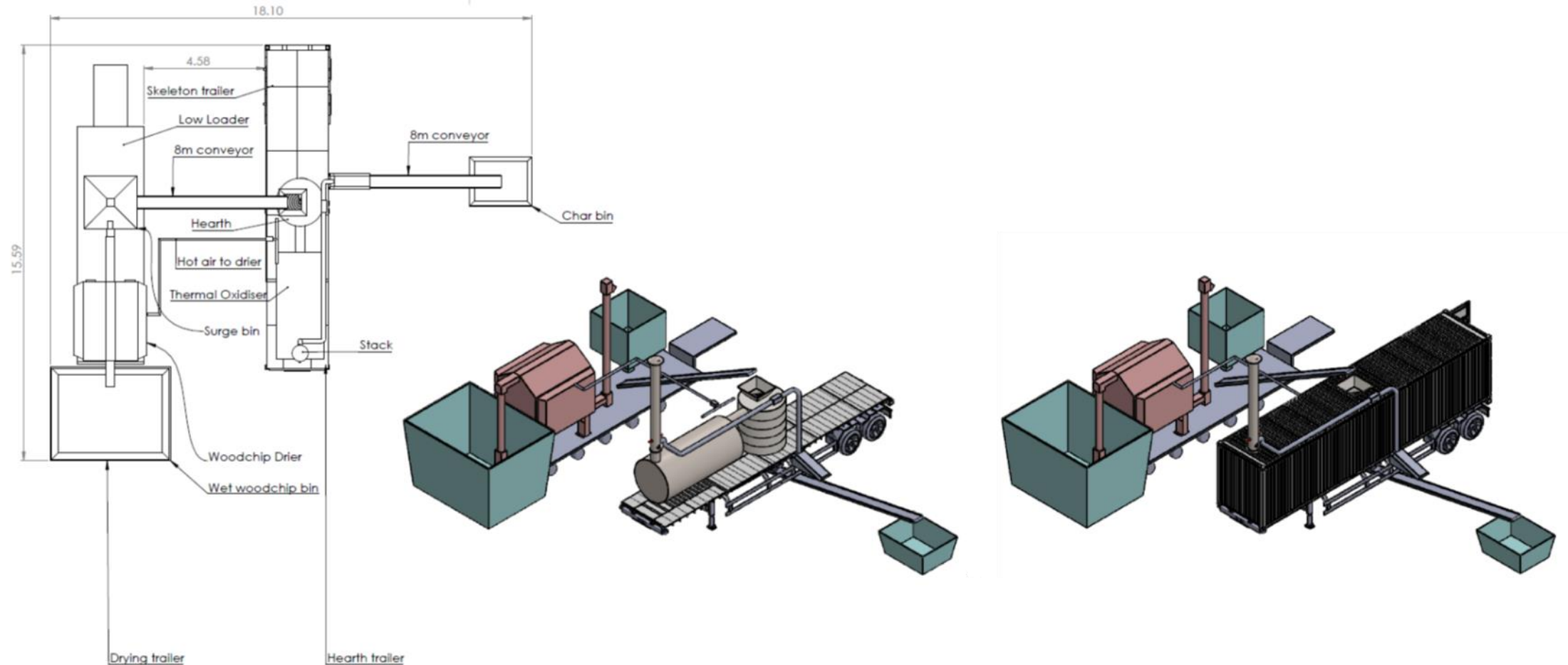


Container 1: Feedstock

Container 2: Carbonisation Process

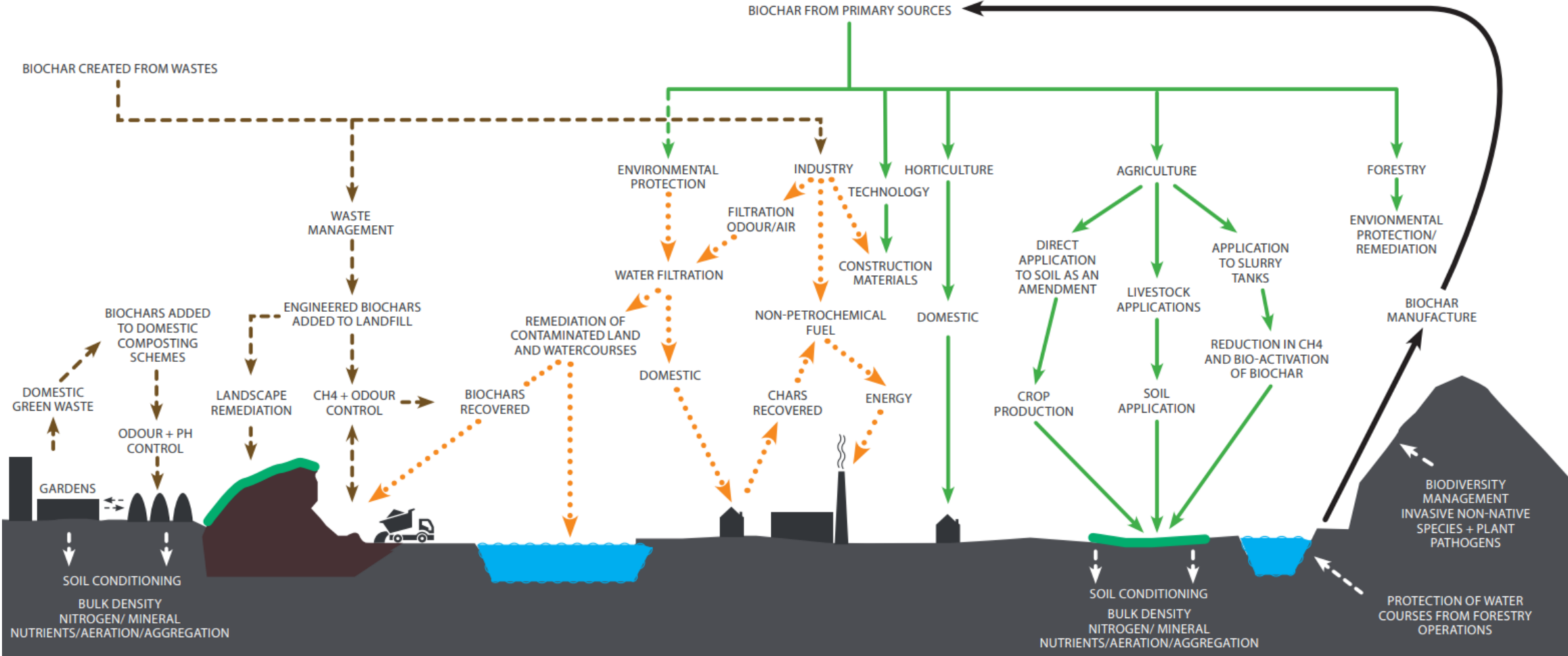
Container 3: Output - Biochar

Carbonisation – Mobile, Relocatable System



A CARBON CIRCULAR ECONOMY

- - - BIOCHAR DERIVED FROM WASTES
- . . BIOCHAR DERIVED FROM WASTES AND NON-WASTES
- BIOCHAR DERIVED FROM NON-WASTES



Regulatory Compliance



- Significant volume reduction
- Thermal oxidation and destruction of volatiles
- Removal of SO₂ and particulates (<2.5µm)



- Volatilisation & immobilisation of heavy metals
- Reduction/Destruction of POPs, nano/microplastics



- Nutrient Recovery: P & K, plus trace elements
- Regulatory compliant form of refractory carbon – biochar
- 1 tonne of biochar ≥ 2 tonnes of CO₂e sequestered

Parameter	Regulation/Standard	Compliance
Emissions, inc. particulates and PFAS	DIRECTIVE 2010/75/EU	✓
Destruction of Pathogens	DIRECTIVE 86/278/EEC	✓
Heavy Metals: As, Cd & Hg	<ul style="list-style-type: none"> • European Biochar Certification • International Biochar Initiative Certification 	✓ FeedPlus – Basic Materials ✓
Heavy Metals: Cr, Cu, Pb, Ni & Zn	<ul style="list-style-type: none"> • European Biochar Certification • International Biochar Initiative Certification 	✓ FeedPlus – Basic Materials ✓
Organic Contaminants, inc. PCB and PFAS	<ul style="list-style-type: none"> • European Biochar Certification • International Biochar Initiative Certification 	✓ FeedPlus – Basic Materials ✓
Destruction of Micro/Nanoplastics	No comprehensive Law: <ul style="list-style-type: none"> • DIRECTIVE 2010/75/EU • REGULATION (EU) 2019/1009 - <u>Fertilising Products Regulation</u> 	✓

Carbonisation Offers





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