



**Renewed carbon**

# **BioHubs – A Concept to Value Add Primary Production**

**Processing Biomass for Supplementary or Replacement  
Products (& energy) in a Carbon Constrained Economy!**

**A catalyst for sustainable regional growth and development**

**Mark Glover – Principal, Renewed Carbon  
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10 Minute Teaser

[www.renewedcarbon.com.au](http://www.renewedcarbon.com.au)

- Some inconvenient truths about sustainable biomass supply
- Systems and infrastructure required to address these “truths”

# Why is Biomass So Important?

A price on carbon discourages fossil fuel (coal, oil, gas) use but the complex industrial economy can't operate without the carbon based molecules. So back to the source!

- Biomass – the original source of the solar powered conversion of atmospheric carbon (CO<sub>2</sub>) into vegetative biomass.
- All that's missing is >300 Million years of free natural “pyrolysis” to energy concentrate the material ready to present as a “drop in” substitute for immediate use with existing (petrochemical industry) systems, infrastructure and products.

# Biomass Products - Every Application Currently Supplied from the Traditional “Fossil” Sources

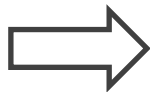
1. Provision of “drop in” bio-crude to supply traditional oil refineries;
2. Provision of platform chemicals to supply the broader petrochemical sector;
3. Provision of finished fine chemicals, both to supplement/replace existing fossil sourced products and to supply entirely new products;
4. Provision of bioenergy in solid, liquid and gaseous forms;
5. Charcoal products to supplement/replace existing coke/coal products in industry;
6. Biochar (and compost) products to augment/supplement fertilizer products and services and stimulate optimised soil productivity; and
7. Provision of carbon sequestration outcomes where carbon is incorporated into both soils and fixed infrastructure for >100 yrs.

All these end uses are competing for sustainable supply.



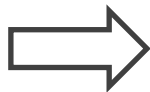
# Context – Extractive Vs. Agricultural Supply/Value Chains

## Extractive Supply/Value Chain:



Products & Markets

Power



Fuels & chemicals

## Agricultural Supply/Value Chain:

Possibly 2-4 finished product bio-refineries



Refined fuels & chemicals

Possibly 10 biocrude refineries



Interim Biocrudes

250 BioHubs nationally



Reductants, biochar & energy

# How Biomass Presents as a Feedstock

Biomass currently presents as 5 generic sources (defined by commercial circumstances at point of presentation):

1. **Forestry and Agricultural harvest residues** – Characteristics: seasonal or campaign availability but homogeneous by-product of core activity.
2. **Forestry and Agricultural processing residues** – Characteristics: regularly available, homogenous and geographically concentrated but a supply pushed by-product.
3. **Urban waste streams** – Characteristics: end of (first) life arisings to be recovered as reliable, but heterogeneous flows via streaming/cascading systems.
4. **Land Management & Development Arisings** – Characteristics: one off or irregular arisings of potentially high value homogeneous biomass.
5. **Specially grown or generated biomass** – Characteristics: highest quality, reliably available but most expensive as primary production costs to be recovered in sale of materials. Needs cost effective outlet for by-products.

# Biomass “Supply” Characteristics

- Ubiquitous – but disparate, low bulk/energy density (value add before transport);
- Presents in myriad of different forms – all with quite different HNRV applications;
- No uniform “sight unseen” market – as a generic commodity;
- HNRV end markets awaiting assured supply – vice versa;
- Currently affordable supplies are by-products and residues – not the primary products; and
- **Zero** systems and infrastructure to address these issues (compare cereals or scrap metals).

Biomass Source	<sup>1</sup> Sustainability of biomass yield	<sup>2</sup> \$ Value/gate fees likely to be realised at the gate of the initial processing centre (or BioHub)		<sup>3</sup> Reliability/predictability of supply or availability			<sup>4</sup> Relative quality of material	
		Input materials that pay a disposal fee to the facility operator	Input materials that need to be paid for	365 days/yr	Regular but seasonal	Sporadic, campaign based, unreliable	Homogeneous	Heterogeneous
		\$200+	0 - \$200					
1. Agricultural & forest residues	Essential prerequisite for all sources if the benefits over using fossil resources are to be fully achieved and monetized.		0-----150			X	X	
2. Downstream processing of agricultural & forest materials		(30)-----100	X	X		X		
3. Urban wastes								
a) MSW organics		(100)-----0	X					X
b) Green/garden wastes		(50)-----0	X			X	X	
c) C&D/C&I wood wastes		(60)-----0	X					X
4. Land management residues								
a) Development/infrastructure maintenance operations		(20)-----50					X	X
b) Woody weed/land management sources		(20)-----50					X	X
5. Special purpose plantings								
a) Agroforestry		0-----80				X		X
b) Dedicated plantations		50-----150	X	X			X	
c) Algae and similar	50-----150	X	X			X		

# And Biomass is so much more than firewood!

## Biomass – the Sustainable Competitive Advantage

**Table 1: Comparison of benefits and properties of non fossil sources**

Low carbon energy sources	Features/Properties								
	A	B	C	D	E	F	G	H	I
	Renewable	On demand supply	Heat	Power	Gas	Oil	Char	PetroChem industry manufacturing precursors	Potential to be Carbon negative
Fossil fuels with sequestration		✓	✓	✓					
Hydro	✓	✓		✓					
Wind	✓			✓					
Solar – thermal	✓		✓	✓					
Solar – PV	✓			✓					
Geothermal	✓	✓	✓	✓					
Wave/Tidal	✓			✓					
Nuclear		✓	✓	✓					
<b>Biomass</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓

Whilst <100yrs biomass can be converted to fulfil all the roles currently provided by fossil resources – there is nowhere near enough – so should be applied to highest and best uses – bioenergy as a by-product.



# An Agricultural Activity rather than an Extractive Industry

- Broad based supply pyramid feeding ever more capital intensive and specialised “conversion”/refining facilities.
- Acting as “first points of receipt” – like railhead silos or “receivers of last resort” – like metal scrap yards.

**We call them BioHubs** 

# How BioHubs Work

