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Sustainably Sourced Biomass Fully Valued as a Crucial Industrial Input Especially in the Context of a Carbon Constrained Economy

A project developer's perspective, including:

- ✓ **Market needs and drivers**
- ✓ **Some project development disciplines**
- ✓ **BioHubs – installed capacity to fully value a particular region's biomass generating activities**
- ✓ **Q&D**

Market Needs and Drivers

- ✓ If “fossil” is on the nose – for whatever reason – “Bio” is the logical alternative for the carbon to sustain our complex industrial economies.
- ✓ We just need to replace 300M years of mother nature’s “free” conversion of biomass into the fossil reserves we exploit today! Easy Really!
- ✓ But “Bio” sells predominantly on its “sustainability” characteristics in the market, so….
- ✓ “Bio” products must demonstrate **Sustainability of Yield** if the “sizzle” is to justify the “sausage”!!
- ✓ But the bad news is that can never be enough sustainably sourced biomass to replace more than approx. 50% of the products and services that we currently source from oil. So we must specialise and focus on HRNV applications.

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Biomass – the Sustainable Competitive Advantage

Comparison of benefits, features and properties of non fossil sources

Low carbon energy sources	Renewable	On demand supply	Heat	Power	Fossil source replacements ↓ Bio Gas	↓ Bio Oil	↓ Bio Char	PetroChem industry precursors	Potential to be Carbon negative
Fossil fuels with sequestration		✓	✓	✓					
Hydro	✓	✓		✓					
Wind	✓			✓					
Solar - thermal	✓		✓	✓					
Solar - PV	✓			✓					
Geothermal	✓	✓	✓	✓					
Wave/Tidal	✓			✓					
Nuclear		✓	✓	✓					
Biomass	✓	✓	✓	✓	✓	✓	✓	✓	✓

Whilst <100yrs biomass can be converted to fulfil all the roles currently provided by fossil resources, there is nowhere near enough.
So what can be sustainably sourced should be applied to highest and best uses, where bioenergy usually presents as a by-product.

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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.

All wastes, residues or by-products of some other primary activity

Still genetically immature

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Inconvenient Truths in Relation to Supply

Generic Sources of Biomass		$ Value / gate fees likely to be realised at the gate of the initial processing centre.		Reliability / Predictability / Availability			Relative Quality of Material	
All sources of biomass, for use in such industrial applications, must demonstrate "sustainability of yield" if the benefits over using fossil resources are to be fully achieved and monetized.		Input materials that pay a disposal fee to the facility operator.	Input materials that need to be paid for by the facility operator.	365 days / yr	Regular but seasonal	Sporadic, Campaign based, Unreliable	Homogeneous	Heterogeneous
Forestry & Agricultural	- Harvest residues		0 to 150			✓	✓	
	- Processing residues		(30) to 0 to 100	✓	✓		✓	
Urban Waste Streams	- MSW Organics	(100) to 0		✓				✓
	- Green / Garden wastes	(50) to 0		✓		✓	✓	
	- C&I / C&D Wood wastes	(60) to 0		✓				✓
Land Management & development arisings	- Development / Infrastructure maintenance operations	(20) to 0 to 50				✓	✓	
	- Woody weed management	(20) to 0 to 50				✓	✓	
Purpose grown crops	- Agroforestry		0 to 80		✓		✓	
	- Dedicated Plantations		50 to 150	✓	✓		✓	
	- Algae & Similar		50 to 150	✓	✓		✓	

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Project Scoping Principles

i. "Biomass ain't Biomass"

Thoroughly assess and identify every available source of Biomass (Types 1-5 above) and the conditions of their availability in any particular catchment being assessed.

N.B.: A potential biomass source isn't available until the current material owner/manager has been thoroughly consulted to transparently establish what "criteria for success" need to be proven to stimulate a change of current practice and proactive participation in the nascent project.

Project Scoping Principles (Cont.)

ii. Once the available and sustainably available biomass resources in a particular region have been identified (quantity, quality, conditions of availability) consider the HNRV (Highest Net Resource Value) products that could/should be manufactured from each material type identified.

N.B.: Most potential product markets will come with essential supply prerequisites that must be considered.

Project Scoping Principles (Cont.)

iii. Conversion technologies/logistics can now be considered and shortlisted with the primary focus on achieving how best to convert the various potential inputs [(i) above] into [(ii) above], and the preferred product range identified.

N.B.1: Starting this process with a technology and then trying to retrofit inputs and markets is fraught!

N.B.2: This approach is almost essential to avoid stranded investments and cranky investors.

Project Scoping Principles (Cont.)

Design each project to best service the regional Biomass generating activities:

- Ag/broad acre
- Horticulture
- Grazing and/or intensive animal husbandry
- Urban wastes

Each “Bio” project should be able to convert the respective “secondary” resources into much higher value products than any individual biomass generator can achieve in isolation and access much broader markets than any single source generator.

NB: We have found that we have been able to generate the same or more revenue from the “secondary” biomass” resources than the primary products can achieve if the project is fully integrated into the local “Bio” economy. Hence, doubling GSP from each hectare in production!

BioHubs

What we call the resultant facilities, specifically designed to exactly address the specific needs and value adding opportunities for any particular local/regional situation. They are:-

- ✓ Points of first receival
- ✓ Receivers of last resort
- ✓ Tailor made to be able to offer the highest value outcome (±) for any identified biomass material
- ✓ Linked and networked with other BioHubs to optimise market opportunities not available to anyone single facility in isolation
- ✓ To receive and pre-treat if necessary to service higher value end users/markets

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Strategic Services

BioHubs value add all/any biomass received by managing:

- Market risk – securing “supply reliability”
- Inventory risk
- Seasonal/campaign issues/opportunities
- Underwrite the QA/QC risks at the very base of all subsequent supply/value chains
- Provides “cascading” end users
- Provides a platform, to support new technology developers test their respective offerings

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A CASE STUDY

Initially supported and promoted by RDA ORANA!!

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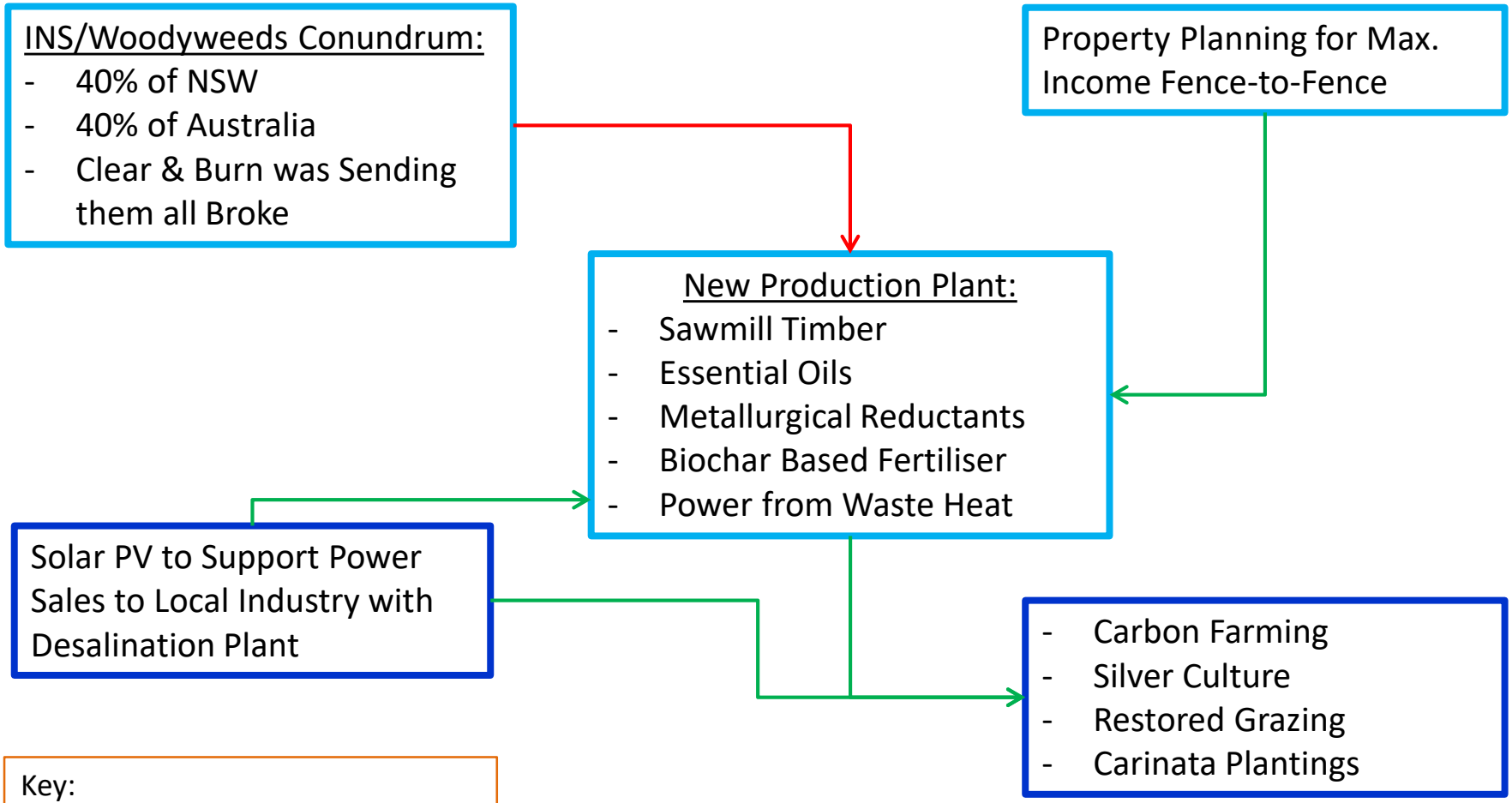
Project Objectives

To restore badly damaged landscapes to their full potential productivity:

- The resultant BioHub designed solely to support this primary objective; and
- The resultant “bio” product range arose from detailed analysis of the locality specific situation.

Example: An "Abattoir for Vegetation" Solution

Highest Net Resource Value in Action



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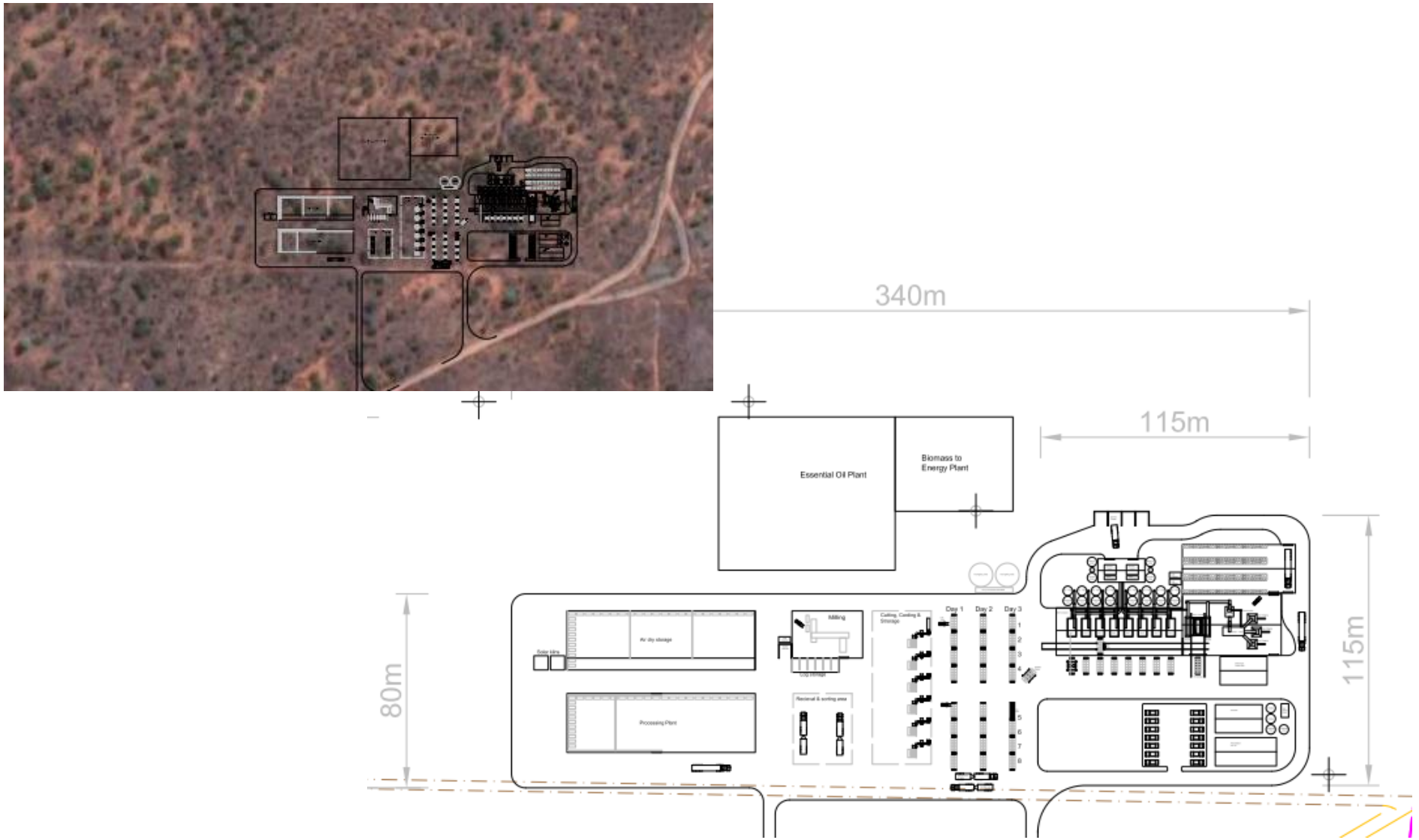
Cobar Site Plan



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Potential

- The Green Triangle is “Biomass Central”
- Apparently, materials recently quantified include:
  - Plantation residues - 452kt/pa
  - Saw mill residues - 165kt/pa
  - Straw/chaff - 404kt/pa
  - C&I paper/card - 32kt/pa
  - Dairy slurries - 133kt/pa (%solids?)
  - Poultry litter - 12kt/pa
  - ???

TOTAL = HEAPS!!

Does This Look Familiar?

It must always start with thorough Community/Stakeholder consultation

When do we start?? Who's in for the ride?

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