Biochar Project Feasibility Sensitivity Analysis

Adriana Downie

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PacPyro Commercialisation Approach

- Technology Development and Demonstration
- Product Marketability – Biochar and Bioenergy
- Lifecycle Sustainability and Risk Management
- Strategically Supported Commercial Readiness

Project Delivery

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Scale

- Economies of scale = the bigger the better
- Marketing and compliance need volumes to be justified
- Biomass and markets however are distributed and hence limited by distance
- Big projects have large capital cost hurdles
- Small projects go under the radar of regulators

Small scale charcoal production

Advantages:
- Accessible
- Low cost

Disadvantages:
- Labour intensive per unit product
- Measuring and monitoring expensive per unit product
- Air emissions (smoke, CO, hydrocarbons)
- Difficult to justify marketing product
- Difficult to meet regulatory requirements for carbon offsets
- Dangerous
- No monitoring or process control

Appropriate Rural Technology Institute
Field Research Station in Phaltan, India
Working with Hemant Mahajan (ARTI Engineer, with the white cap)

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Biochar Production Costs: Small scale example

Biochar Batch Unit 200 kg of biomass.

200kg Biomass (free) ~ 100kg Water + 100 kg dry biomass

100kg dry biomass → 30kg biochar (often less due to oxidation)

Labour Cost – 2 hours	Inferred Biochar Cost
$3 per hour	$0.20/kg - $200/tonne
$30 per hour	$2/kg - $2000/tonne

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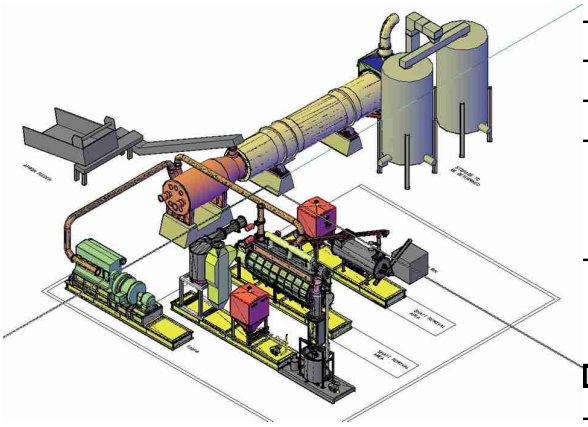
Large (ish) scale biochar production



~ 5000 tonnes per annum of biochar - PacPyro Project Planned for construction in Melbourne Victoria with support from the Victorian State government.

Advantages:

- Multiple products (biochar, bioenergy)
- Marketable product quantities
- (@ $200 = $1m/year revenue stream)
- Cost of measuring, monitoring and verifying for carbon offsets and quality control relatively small per tonne
- Safe: meets strict work place health and safety and environmental regulatory requirements

Disadvantages:

- High capital cost (~ AU$10m)
- Highly scrutinised by regulators (Advantage?)
- Industrial scale, not accessible for private operators

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PacPyro Project Value Areas

Waste $

Disposal or tipping fee

Biochar

Energy $

Excess energy integrated into waste facility, embedded customer and/or grid

Soil Amendment $

Carbon Storage $

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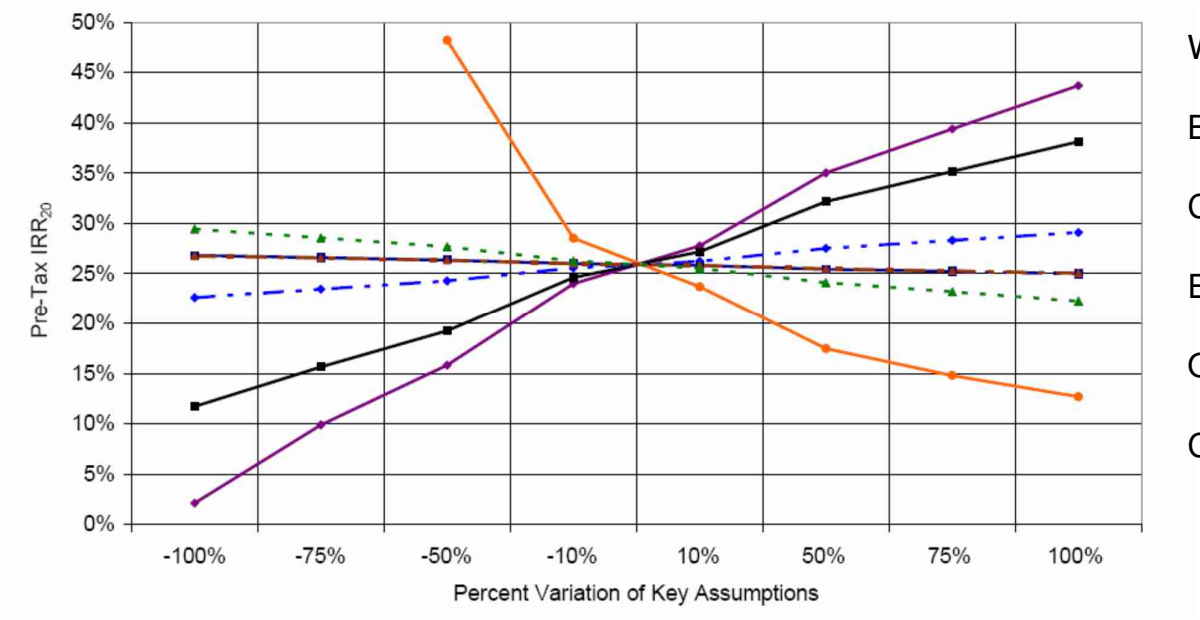
Economic Sensitivity

Waste Management - Biochar Optimised



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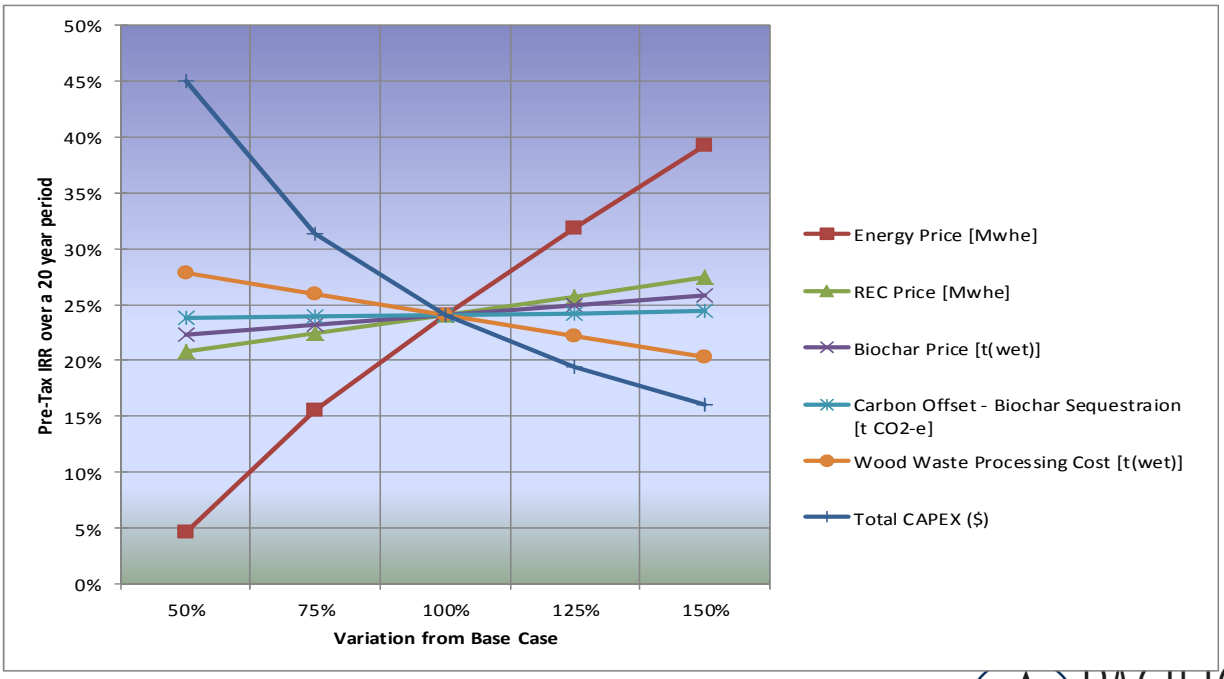
Economic Sensitivity
Wood Residues



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Project Pipeline Funnel

Third-world Development

Clean Syngas - BTL

Solid Carbon Products

Carbon Sequestration

Regional Development

Thermal Energy

Biochar Soil Amendment

Energy Security

Renewable Electricity

Waste Management

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The 'Waste' Challenge

- Contamination
- Consistency

Target 'waste' that is of a quality that will make a quality biochar product of environmental benefit

OR

Reduce the volume of waste, achieve energy recovery, stabilise carbon and send char residue to landfill

Quality 'Waste' Organics for Biochar Production






Capex vs Performance vs Opex

- **Energy Efficiency** – continuous feed rather than batch processing, exothermic operation without air infiltration (i.e. pyrolysis conditions rather than gasification/combustion), waste heat recovery and recycling, utilisation of insulation, lagging and refractory;
- **Reduced Pollution** – air emissions managed (i.e. no smoke, low NO_x burners, low organic pollutants such as dioxins etc), monitoring;
- **Improved biochar yields and quality** – slow pyrolysis rather than gasification or fast pyrolysis, process control to ensure consistent product quality, feedstock pre-processing;
- **Operability** – decreased labour requirement (i.e. automated materials handling, continuous operation etc), steady state operation resulting in control of product quality and quantity, high workplace health and safety standards;
- **Feedstock flexibility** – allowing broader range of low-cost feedstocks to be processed;
- **Scalability** – big enough - economies-of-scale, whilst small enough to not be limited by biomass availability.

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PacPyro Projects Include

- Offered $4.5 million from the Victorian Government Sustainable Energy Pilot Demonstration Program grant to build a biochar and bioenergy production facility in Melbourne
- MOU for project development with Ballina Shire Council
- MOU for project development with Norske Skog
- MOU for project development with Transfield Services
- Several projects currently undergoing scoping and feasibility studies – many first to be second
- Partnered development programs underway for carbon products – co-firing, coke replacement etc
- Extensive participation in collaborative biochar research

PacPyro acquisition - ASX

- PacPyro acquired the global rights to the technology from Best Energies Inc.
- ASX listed company WAG has exercised their option to acquire Pacific Pyrolysis Pty Ltd.
- WAG is currently undergoing a capital raising for working capital, finalisation of technology licensing package and project development.

www.pacpyro.com

www.anzbiochar.org

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