



**PEOPLE'S POWER AFRICA**  
CONVERTING WASTE INTO ENERGY

## **Logistics and supply chain considerations for bioenergy production**

Draft of presentation to the  
African Caribbean and Pacific Group of States (ACP)  
Science and Technology Programme,  
Sustainable non-food sources of oil  
March 03, 2011

# Outline of Presentation

This presentation will focus on feedstock supply and logistic issues relating to the following proposed facilities.

- Integrated Bioenergy and Resource Recovery Hub at 2<sup>nd</sup> Creek
- Central Anaerobic Digester at Queenstown
- Rural biomass CHP at Amabele

# Integrated Bioenergy & Resource Recovery Hub at 2<sup>nd</sup> Creek

Processes: biogas digestion, biogas upgrading, biomass gasification, CHP composting and vermi-composting water reclamation.

Feedstock: wastewater, sewage sludge, OFMSW (food waste), abattoir waste and garden refuse.

# Output of 2<sup>nd</sup> creek initiative

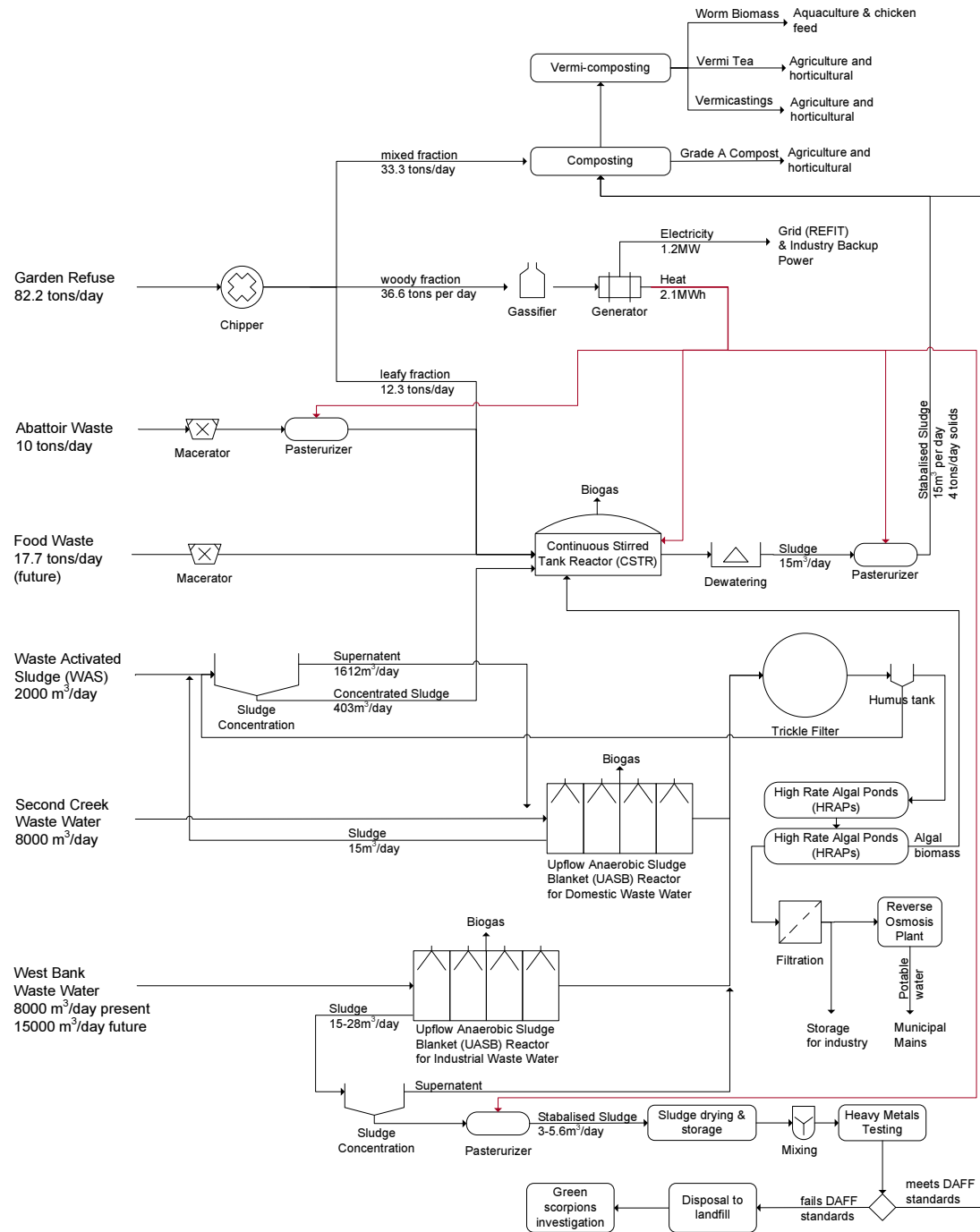
Feasible sustainable self funding business that:

- create over 70 direct jobs at the proposed 2nd creek facility;
- create over 120 indirect jobs in the upstream and downstream zerowaste sectors;
- divert over 30000 tons/year of waste from landfill;
- eliminate the unpermitted discharge of 10MI per day of untreated wastewater and sewage sludge into the surfzone at hoodpoint;
- generate over 1.35MWh green electricity capacity;
- generate 2200 tons/year of natural gas energy for use by local industry;
- generate over 5.8 billion litres/year of recycled water;
- produce biochar and vermicompost, compost and algal biofertilizer for agriculture.

# Feedstock Supply & Logistics

- Industrial Wastewater: 10000m<sup>3</sup> per day
- Residential Wastewater: 8000m<sup>3</sup> per day
- Waste Activated Sludge 2000m<sup>3</sup> per day
- Garden Refuse: 82 tons per day
- Food Waste: 17.5m<sup>3</sup> per day source separated (future option)

(Final Presentation to detail supply & logistics issues and costs of each)





# Central Anaerobic Digester at Queenstown

Processes: biogas digestion, biogas upgrading, CHP, biofertilizer production

Feedstock: Sewage sludge, food waste, abattoir waste, piggery manure slurry.



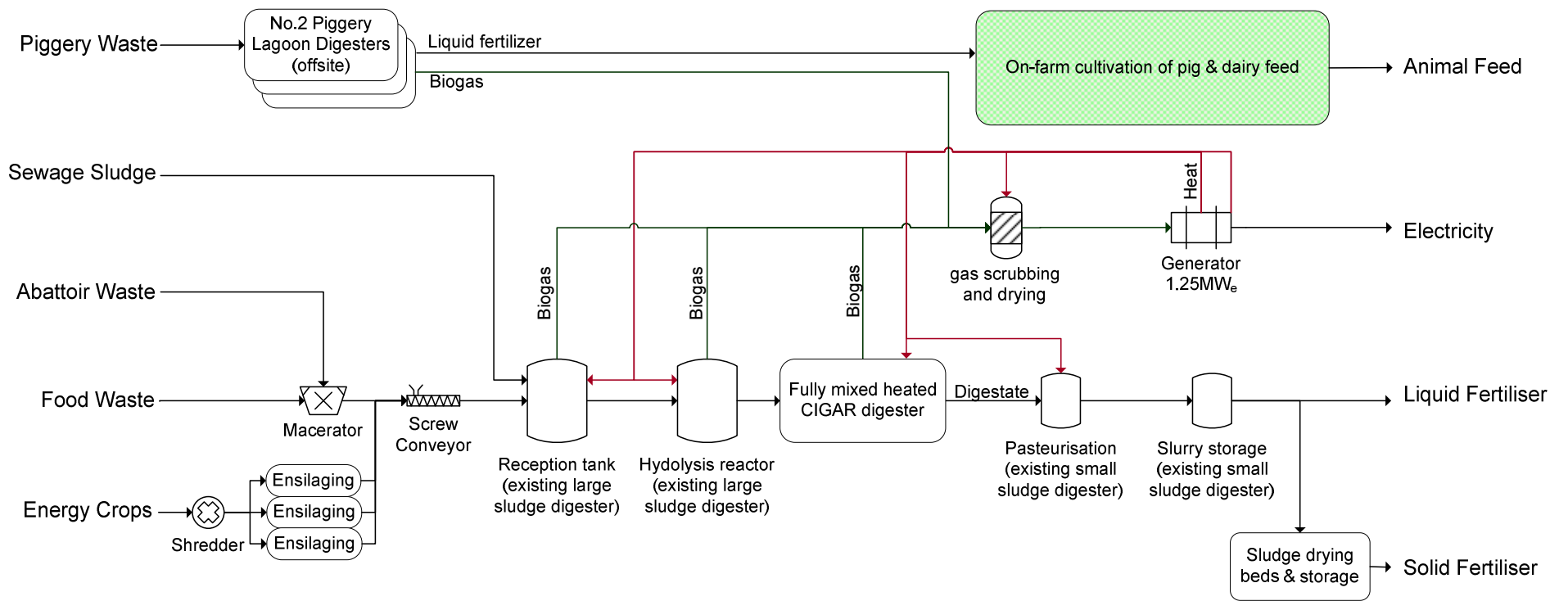
# Output of Queenstown CAD

- creation of 10 direct jobs and over 70 jobs in the downstream dry waste recycling sector;
- 1.2MWh 'green;' electricity generation capacity;
- the abatement of 8526 tCO<sub>2</sub>e of green house gases from the avoided Eskom coal fired power generation.
- the local production of over R1.6 million in biofertiliser to replace synthetic fertiliser imports;
- the reduction of valuable resource disposal to landfill & the associated the reduction in landfill airspace cost;
- the reduction of GHG emissions from landfill, existing uncapped, sewage sludge production, uncovered pig slurry ponds

# Feedstock Supply & Logistics

- Sewage Sludge 242m<sup>3</sup> per day
- Food Waste: 5.52 m<sup>3</sup> per day (source separated)
- Abattoir waste: 10.75m<sup>3</sup> per day
- Pigsty slurry: 280.9m<sup>3</sup> per day
- Energy crops: 25.2m<sup>3</sup> per day of ensilgaed sweetsorghum

(Final Presentation to detail supply & logistics issues and costs of each)



# Central Anaerobic Digester at Queenstown

Processes: biogas digestion, biogas upgrading, CHP, biofertilizer production

Feedstock: Sewage sludge, food waste, abattoir waste, piggery manure slurry.

# Ensilaged Sweet Sorghum Feedstock Production



# Rural Biomass CHP at Amabele

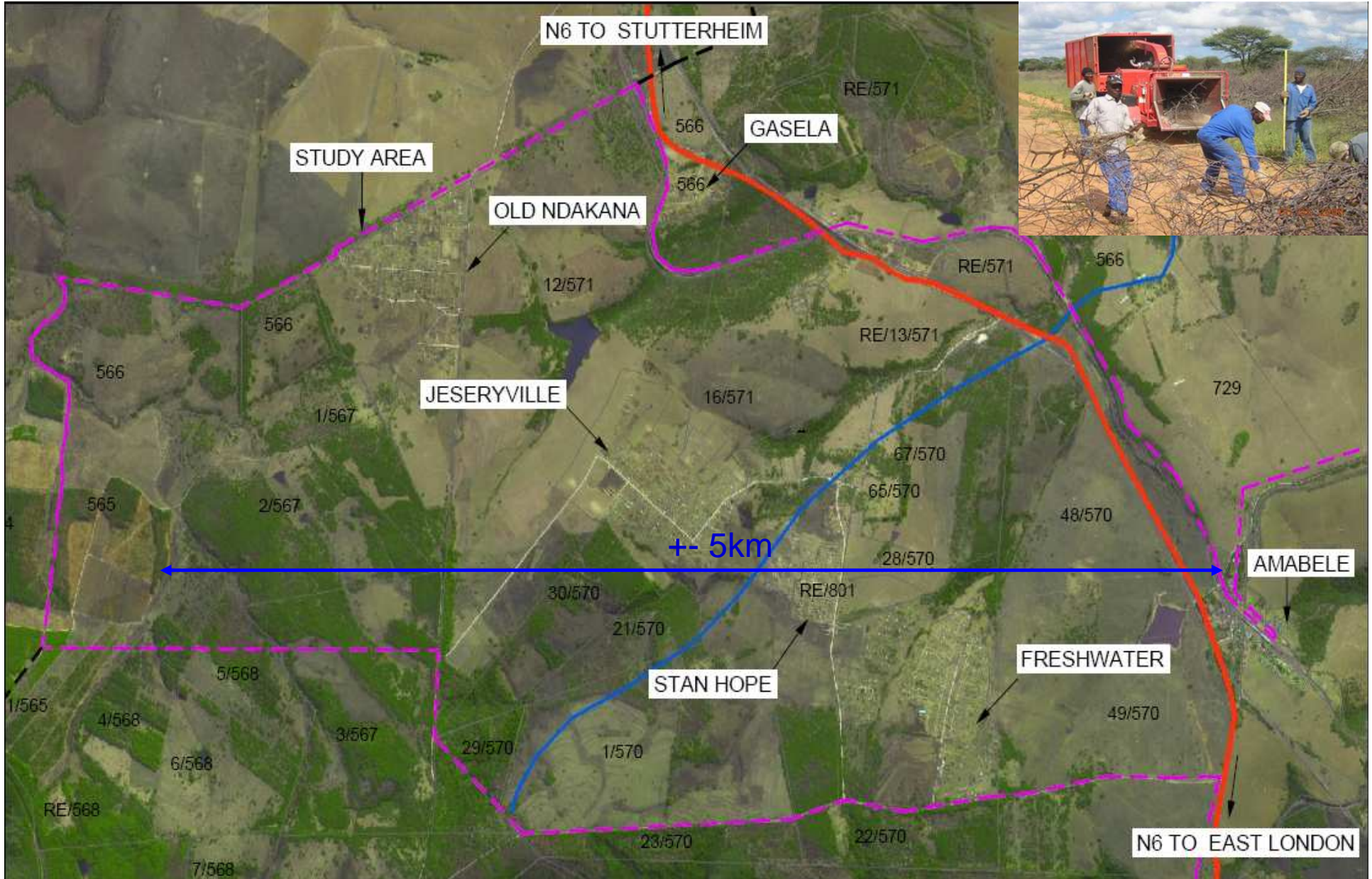
Processes: Clearing invasive wattle, forestry and bamboo plantation management, harvesting chipping, drying, gasification, CHP



Feedstock: Wattle, gum & bamboo from communal lands

# Output of Amabele Heat & Power

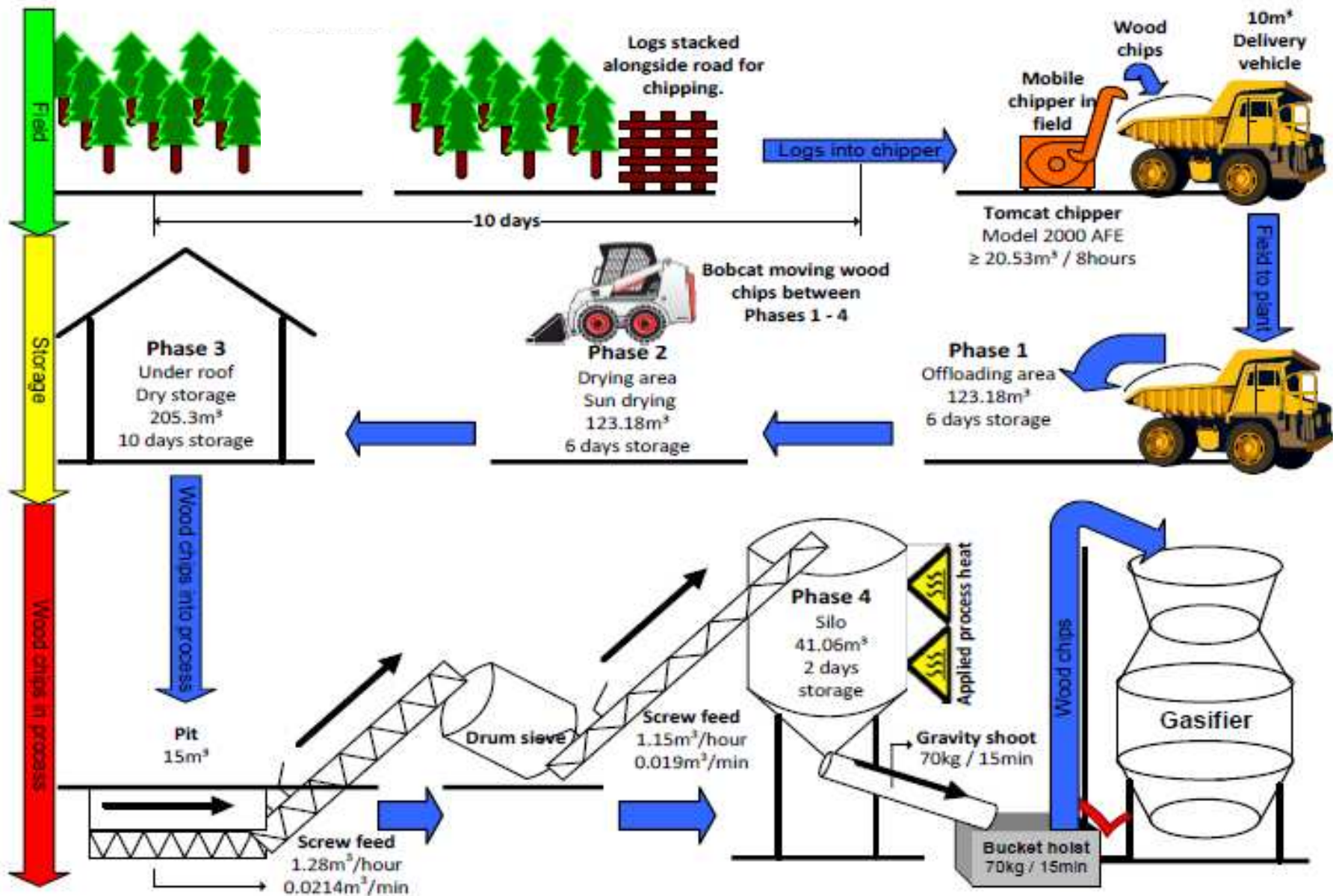
- Creation of 35 direct jobs;
- 250 kWhe 'green;' electricity generation capacity for energy security of local agriprocessing;
- 430kWh thermal for local agri-processing enterprises;
- Biochar for local agriculture production.





Year	Cumulative Area Managed per Year (ha)					Biomass Yielded per annum (tons)					Biomass Totals		CHP Biomass fuel Req. (tons)	Berry support compost req. (tons)	Total Biomass Req. (tons)	Surplus for other markets (tons)
	Wattle cleared	Wattle plantation	Gum Plantation Sustained	Gum Forest Sustained	Dry land Bamboo	Jungle Wattle	Plantation wattle	Gum Plantation Sustained	Gum Forest Sustained	Dryland bamboo	Per annum	Per Day				
2010			200	100										128		
2011	40	20	200	100	10	1600	0	2000	500		4100	11.2	2902	213	3114	986
2012	80	40	200	100	10	1600	0	2000	500		4100	11.2	2902	230	3131	969
2013	120	60	200	100	10	1600	0	2000	500	120	4220	11.6	2902	339	3240	980
2014	160	80	200	100	10	1600	0	2000	500	170	4270	11.7	2902	553	3455	815
2015	200	100	200	100	10	1600	0	2000	500	200	4300	11.8	2902	728	3630	670
2016	240	120	200	100	10	1600	0	2000	500	300	4400	12.1	2902	979	3881	519
2017	280	140	200	100	10	1600	0	2000	500	400	4500	12.3	2902	1330	4232	268
2018	320	160	200	100	10	1600	0	2000	500	400	4500	12.3	2902	1570	4472	28
2019	360	180	200	100	10	1600	0	2000	500	400	4500	12.3	2902	1572	4474	26
2020	360	180	200	100	10	0	2880	2000	500	400	5780	15.8	2902	1572	4474	1306
2021	360	180	200	100	10	0	2880	2000	500	400	5780	15.8	2902	1572	4474	1306
2022	360	180	200	100	10	0	2880	2000	500	400	5780	15.8	2902	1572	4474	1306
2023	360	180	200	100	10	0	2880	2000	500	400	5780	15.8	2902	1572	4474	1306
2024	360	180	200	100	10	0	2880	2000	500	400	5780	15.8	2902	1572	4474	1306
2025	360	180	200	100	10	0	2880	2000	500	400	5780	15.8	2902	1572	4474	1306
2026	360	180	200	100	10	0	2880	2000	500	400	5780	15.8	2902	1572	4474	1306
2027	360	180	200	100	10	0	2880	2000	500	400	5780	15.8	2902	1572	4474	1306
2028	360	180	200	100	10	0	2880	2000	500	400	5780	15.8	2902	1572	4474	1306
2029	360	180	200	100	10	0	2880	2000	500	400	5780	15.8	2902	1572	4474	1306
2030	360	180	200	100	10	0	2880	2000	500	400	5780	15.8	2902	1572	4474	1306
<b>Yield Assumptions for Forest &amp; Plantation Management</b>												<b>Assumptions for 250kWe CHP gassifier plant</b>				
Jungle Wattle			40 tons/ha		Wattle Plantation every 10years			120 tons/ha of timber >80mm diam			Wattle fuel requirement for 250kW gassifi			320 kg /hour		
Sustained gum plantation			10 tons/ha/year		Wattle Plantation every 10years			24 tons/ha of brush <80mm diam			Supply contingency			15%		
Sustained gum forest			5 tons/ha/year		Dryland Bamboo (from year 7+)			40 tons/ha/year			Number of hours in operation			7885 hours/year		

## Planning for long term feedstock security



Source: CBEND

Thank you

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