



DEPARTMENT OF ENERGY, UTILITIES AND SUSTAINABILITY
NEW SOUTH WALES GOVERNMENT

New Markets, New Values

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Greenhouse & Renewable Policy

Leadership in energy and water sustainability for New South Wales



Outline

- The bioenergy story so far...
- What makes bioenergy viable?
- Opportunities with carbon
- Charcoal – markets & values



Who is DEUS?

- Department commenced 1 July 2004
- Merges 3 bodies
 - SEDA
 - MEU
 - CTWSS
- Promotes “the sustainable, safe, reliable and affordable supply and use of energy and urban water in NSW”



Bioenergy Potential in NSW

Feedstock	Current generation capacity	Estimated potential capacity
Agricultural residues	17.5 MW (bagasse)	740 MW
Energy crops	None	550 MW
Plantation residues (thinnings and sawmill wastes)	4 MW	105 MW
Sawmill wastes (from native forest sawlog production)	16 MW	42 MW
Wet wastes	23 MW	40 MW
Municipal, industrial and commercial wastes	29 MW (landfill gas)	100 MW
TOTAL	89.5 MW	1,577 MW

Source: NSW Bioenergy Handbook



Bioenergy Potential in NSW

- Conservative potential
 - Currently available residues/wastes
 - Only 15% of total straw
 - 500,000 ha tree plantations
- 16% of NSW electricity consumption



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The Story So Far...

Leadership in energy and water sustainability for New South Wales

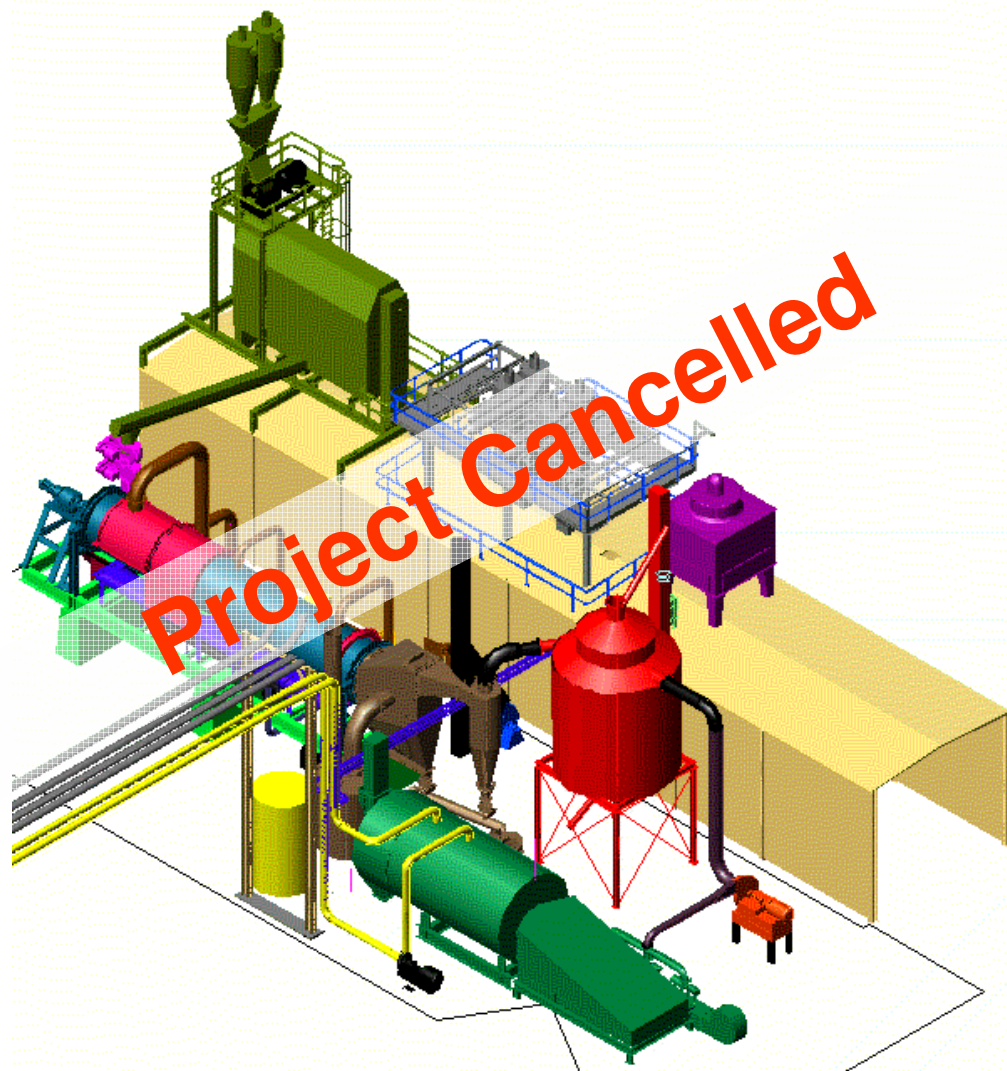


SWERF





Cotton Trash Gasifier





Orange City Beef Biogas Plant





NSW Sugar Mills





Barriers to Bioenergy

- Financial
 - Risk too high, returns too low
 - Up-front development cost for new technologies
- Technical
 - New technologies = high risk
 - Lack of experience
- Social
 - Lack of knowledge
 - Controversy



Barriers to Bioenergy

- Political
 - Low knowledge = lack of support
 - Mixed messages to bioenergy industry
- Regulatory
 - Uncertainty on accreditation, targets
 - Network connection
- Institutional
 - Conservatism of investment community
 - Lack of knowledge of opportunities



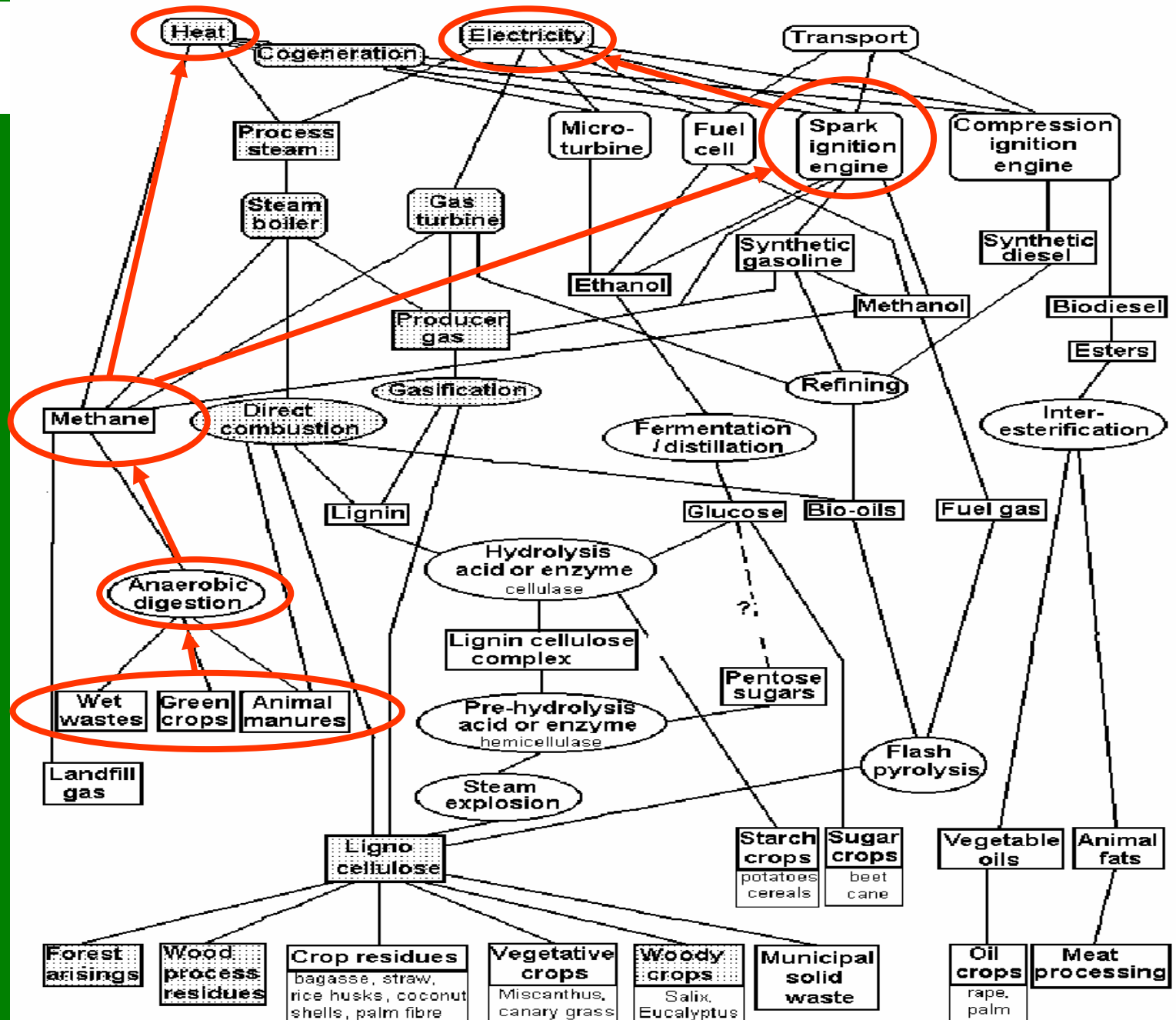
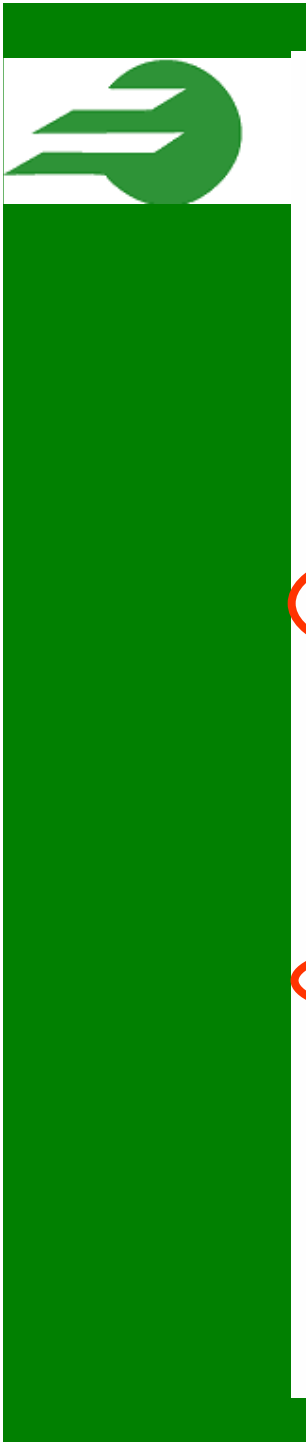
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Making Bioenergy Viable



Bioenergy is Unique...

- Different feedstocks
 - Solid, liquid
 - Waste, crops
- Different technologies
 - Thermal, chemical, biological
- Different outputs
 - Energy (electricity, fuel, heat)
 - Solid products (char, ash, fertiliser)
 - Environmental services



Source: Prof Ralph Sims

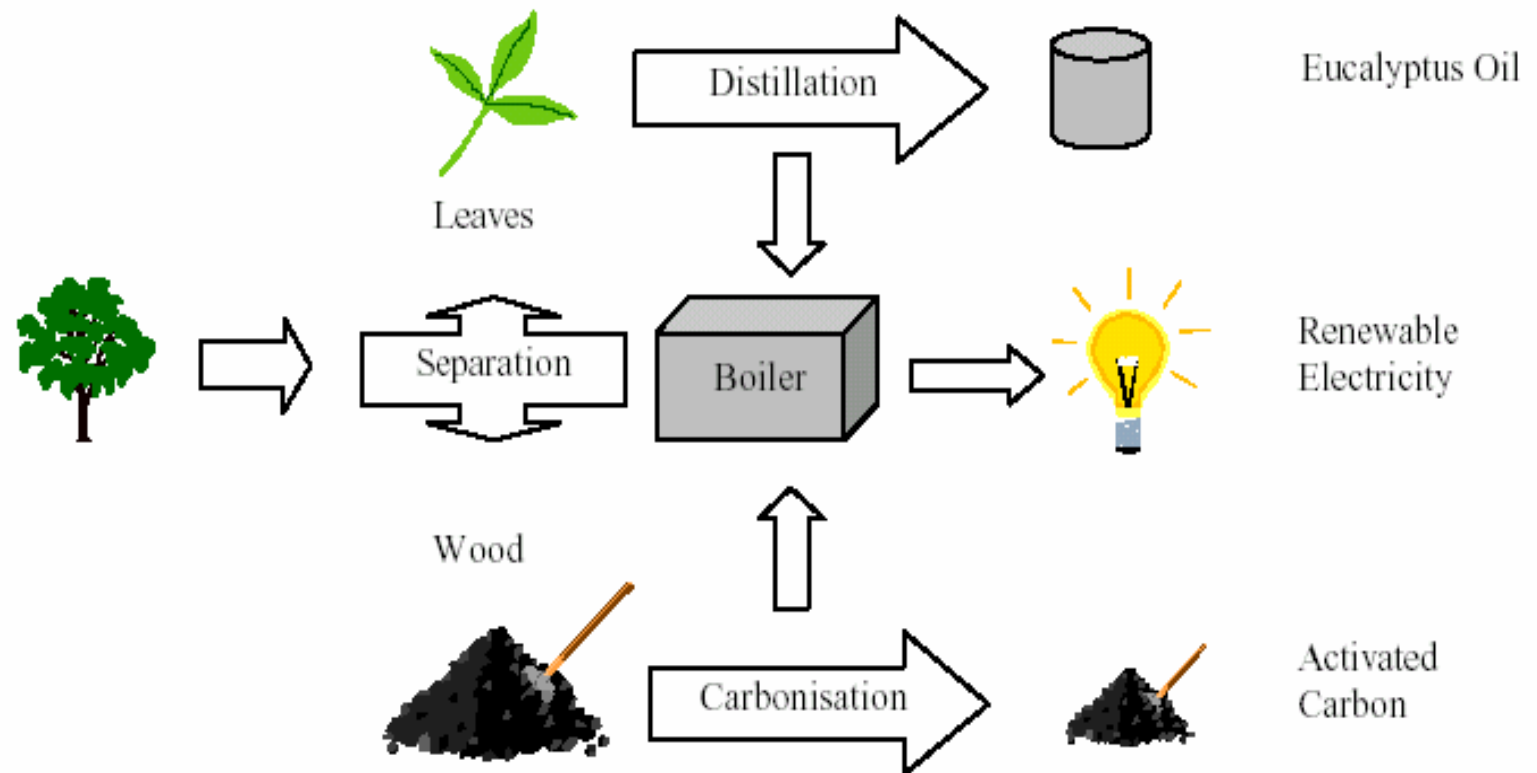


Multiple Outputs

- Charcoal
 - Pyrolysis with energy recovery
- Fertiliser
 - Anaerobic digestion
- Ash
 - Silicon from rice hulls
- Multiple markets
- Multiple complexity!



Multiple Outputs

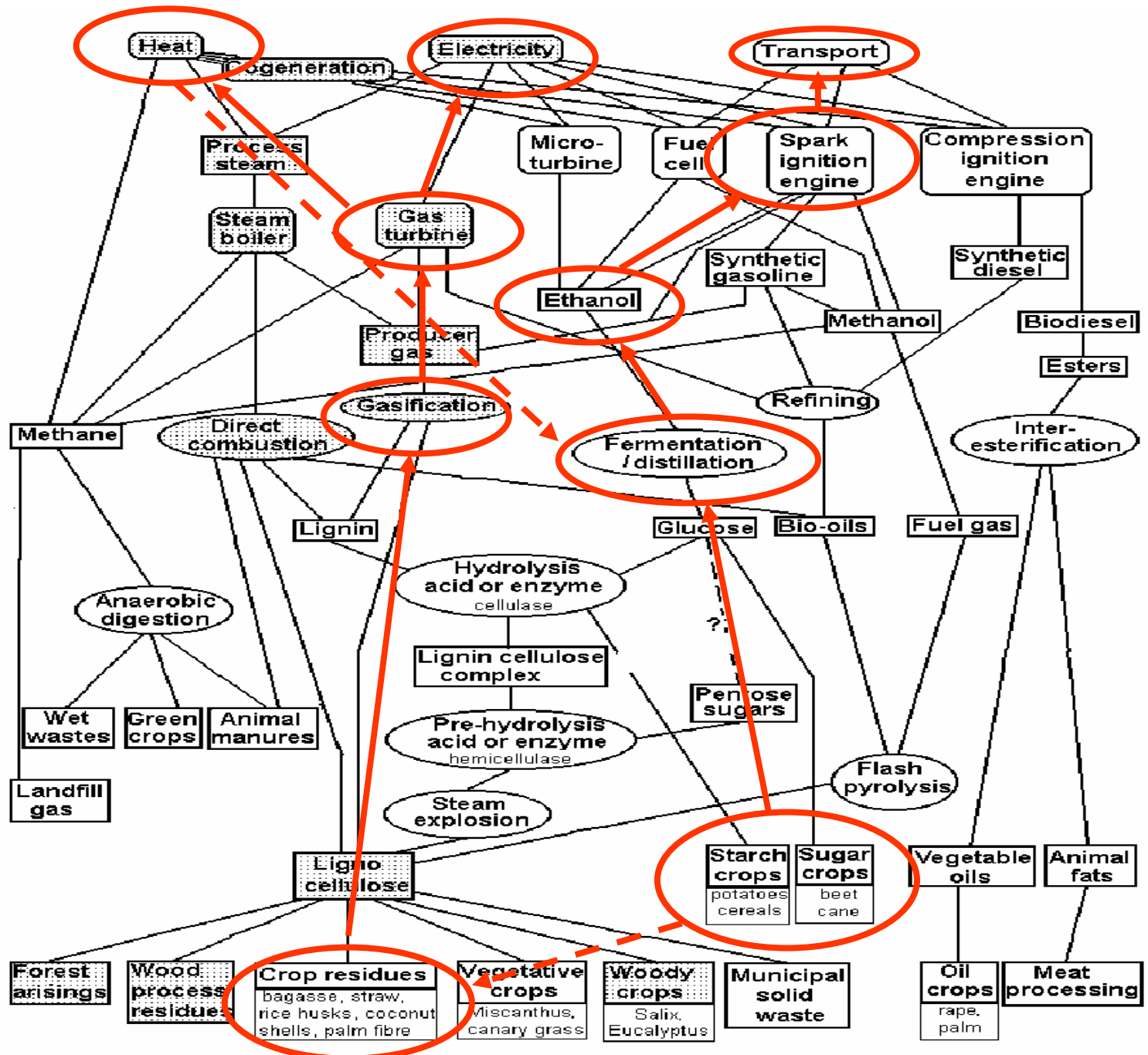
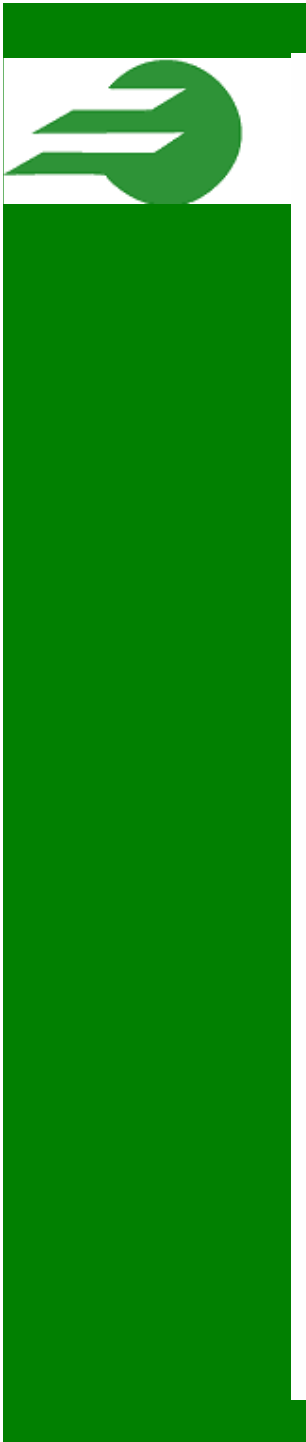


Source: Oil Mallee Company



Complementary Processes

- Complementary feedstocks
 - Process wastes
 - Co-existing resources
- Complementary outputs
 - Cogen heat for process
- Financial benefit
 - Shared infrastructure, development cost
 - Lower operating costs





Scale

- Benefits of Large Scale
 - Economies of scale
 - Efficiency
- Drawbacks
 - Resource security
 - Asset stranding
- Small scale
 - Modularity, flexibility
 - Decreased local impacts
 - More opportunities
 - Lower capital cost



Environmental benefits

- Tree planting
 - Salinity remediation
 - Biodiversity enhancement
- By-products for soil enhancement
 - Biogas digestate for fertiliser
 - Char for soil application
- Carbon Sequestration
 - Tree root stock
 - Charcoal



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Opportunities with Carbon...



What is Charcoal Good For?

- Fuel
- Chemical reductant
 - Steel & silicon smelting
- Building applications
 - Insulation
 - Concrete aggregate
- Activated Carbon
- Soil Amendment





My Dream Bioenergy Project...

- Generates renewable energy
- Produces carbon product
- Greenhouse gas reductions
- Environmental benefits



Energy

- By-product of charcoal production
- Relies on efficient plant design
 - off-gases to engine or turbine
 - capture of waste engine heat for charcoal process
- Ready market
 - RECS (for now...)



Current Markets for Charcoal

- Barbecue & domestic heating fuel
 - Small Aust market 10-15,000 t/yr
 - Much larger potential export market
- Metallurgical charcoal
 - Small Aust market 10-15,000 t/yr
- Silicon smelting
 - Simcoa smelter in WA – 25,000 t/yr
 - proposed new smelter in NSW – suspended
- Activated carbon
 - Large world market 700,000 t/yr
 - High value (\$1,500 – 4,000 /t)



Iron Smelting

- Huge potential market
 - Displacing coking coal
 - 100,000,000s tonnes/year
 - Low-medium value: \$150 – 800 /tonne
- Technical barriers
 - Much research done – SERDF study
 - Needs development, commercialisation
- Cost barriers
 - Low cost feedstocks
 - Low cost processes



Iron Smelting

- Sintering
 - Readiest application
 - Pulverised charcoal, fines
 - Research being done – CSIRO Minerals
- Huge greenhouse benefits
 - 1 tonne charcoal = 3.6 tonnes CO₂
- Emission reduction value
 - Under NSW GGAS
 - not NGACs, but LUACs



Sintering Iron Ore



CSIRO Minerals



Charcoal in Soil

- Carbon as a soil enhancer
 - Increase plant productivity
 - Reduce chemical fertiliser use
- Enhance sustainability
 - reduce impact of agriculture on the environment

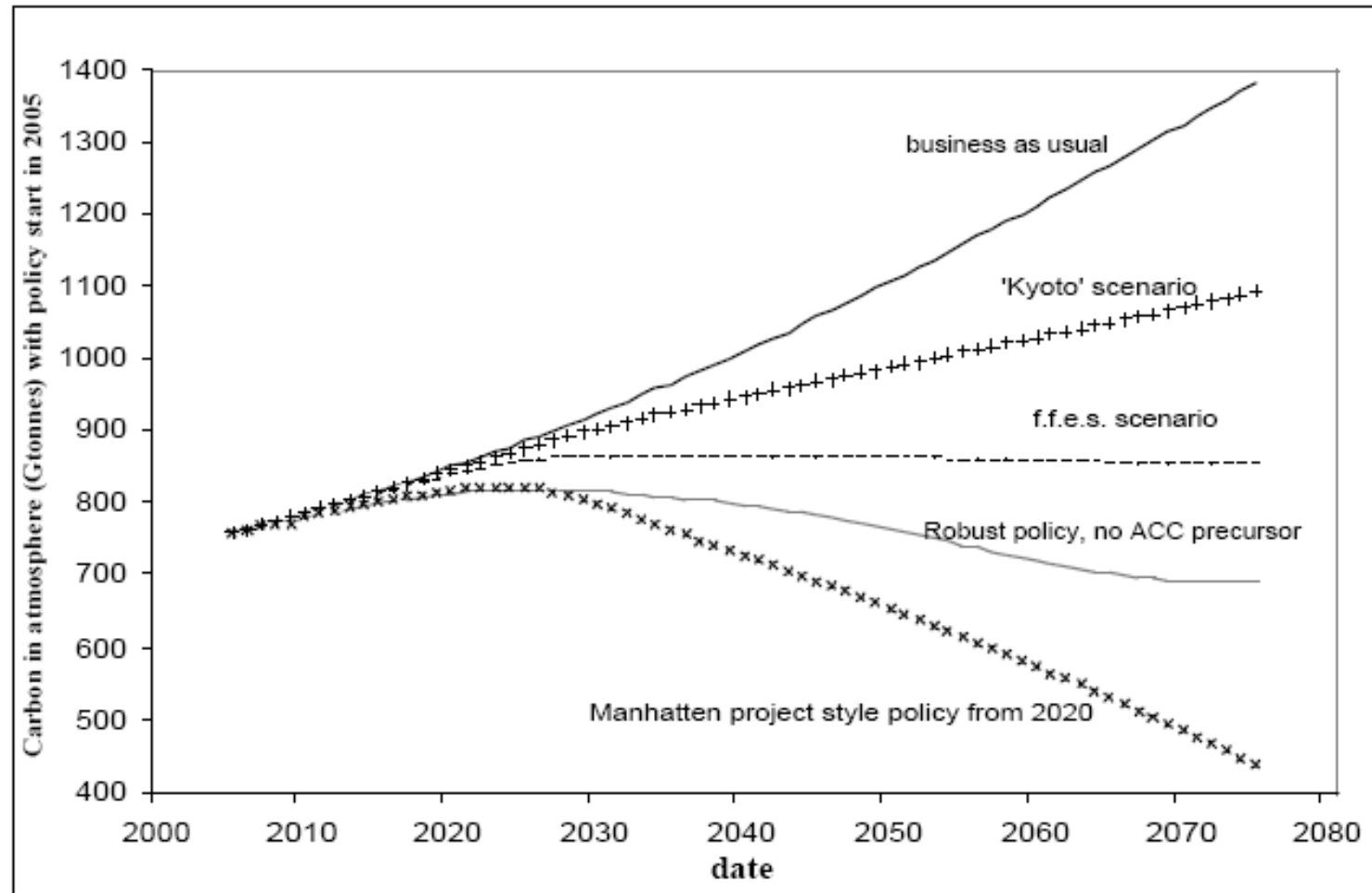


Charcoal in Soil

- Carbon sequestration
- Reduce atmospheric carbon
 - not just reduce CO2 emissions
- Strategy for “Abrupt Climate Change”
 - Conference held in Paris 2004
www.accstrategy.org
- “Bio-Energy with Carbon Storage” BECS
 - Renewable energy created in same process as sequestering carbon
 - Double benefit – negative emissions



Strategy for Abrupt Climate Change





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Thank You...

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