

Biofuels in Australia: Policy, market place and opportunities

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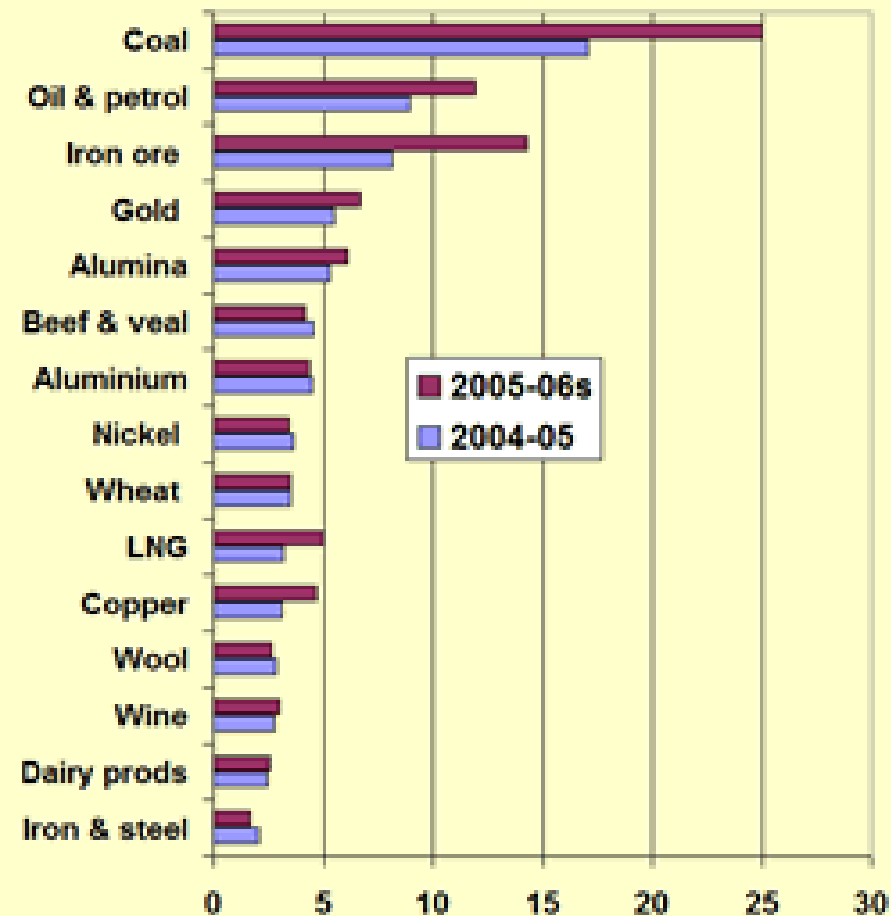
Federal election Nov 2007 - New Government

- Election promises
 - 20% renewable energy by 2020
 - 60% reduction in CO2 emissions (2000 levels) by 2050
- Australian Prime Minister, Kevin Rudd, ratified Kyoto in December, 2007
- **Commissioned Garnaut to report on economic impact of climate change & emissions reductions**
- **Australian economy built on coal**
- One of the world's lowest prices for electricity

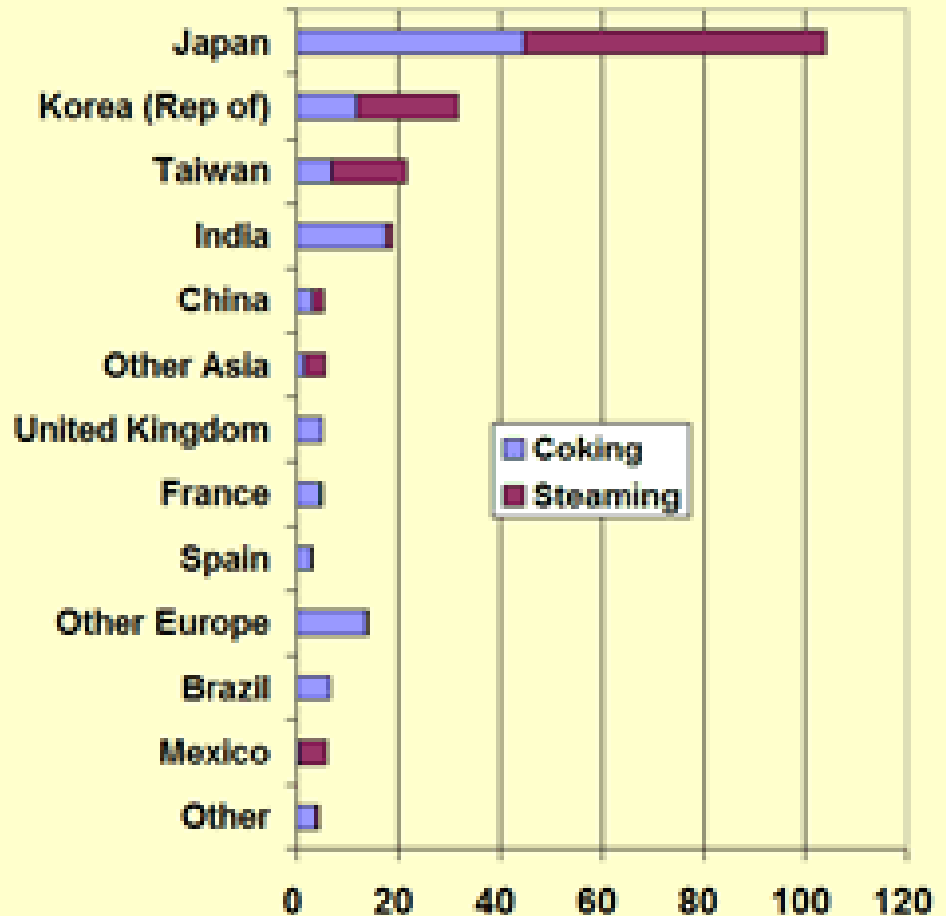


Coal is king

**Australia's Major Commodity Exports
(SA Billion)**



**Australian Coal Exports by Destination 2005
(Million tonnes)**



2005-06: 233 Mt – AU\$24.5 billion – 30% of world trade

Government biofuels policy

Australian Government:

- 350 Mℓ p.a. voluntary target by 2010 = <1% of the transport fuel supply
- Production capacity already exceeds the target (>600 Mℓ p.a. already available)
- Off take lags far behind – <40 Mℓ in 2006
- Alternative fuel excise exemption only becomes available upon presentation of evidence of the actual sale of ethanol and biodiesel into the transport fuel market. No fuel sale, no fuel excise benefit. Control of the biofuels market has shifted even further into the hands of the oil majors (>80% of the transport fuel market)

Government biofuels policy

State Governments:

- NSW - mandate 2% ethanol from September 2007, 10% by 2011
- Queensland - mandate 5% ethanol from 2010
- State-based regulations are impeded by constitutional rights

Federal grant scheme assistance

Dep. Climate Change (formerly AGO)

- Renewable Energy Showcase
 - 5 grants totaling \$10m, e.g. \$3m to Rocky Point
- Renewable Energy Commercialisation Program
 - Grants of up to \$5m (totaling \$50m between 1998 and 2001)
- Renewable Energy Industry Development
 - 49 grants totaling \$6m, mostly associations and not-for-profits for road maps, project development guides & biomass resource atlas
- Low Emissions Technology & Abatement
 - \$8m component supporting renewables
- Renewable Energy Development Initiative
 - \$100m over 7 years, targets R&D, proof of concept and early stage commercialisation, e.g. Strategic well location for landfill gas extraction, High yielding sugarcane for ethanol biofuel, Hydrocarbons from algae
- Gen 2 Scheme (soon to be announced)
 - \$15m for demonstration projects, probably in a single round of funding

Retailers

- BP: has contracts in place for 55 Mℓ of ethanol, and can produce >100 Mℓ p.a. of diesel from hydrogenated tallow. >100 retail outlets for biofuels blends
- Shell: has ca. 10 outlets in each of Melbourne, Sydney and Brisbane selling E10 blends
- Caltex: has E10 outlets in NSW and Queensland but number is uncertain. Sells a range of biodiesel blends to contract customers (B5 to B20)
- Total fuel consumption 2007:
 - Petrol – 18,869 Mℓ
 - Ethanol – 110 Mℓ (ca. 0.6%)
 - Diesel – 9,374 Mℓ
 - FAME – 60 Mℓ (ca. 0.6%)
 - LPG – 1,802 Mℓ

Producers - Ethanol

- CSR (cane molasses): 55 Mℓ p.a. (services the industrial solvent market). CSR has a 15 Mℓ p.a. contract with BP, and has received government assistance to install molecular sieve dehydration at their Sarina (Qld) ethanol distillery
- Manildra (Wheat): 50 Mℓ from waste starch, 50 Mℓ from grains. Manildra has recently contracted with BP for 40 Mℓ p.a.
- Heck Group (cane molasses): 3-9 Mℓ p.a., supplies some independent outlets in Brisbane
- Dalby Biorefinery (sorghum): Contract to supply Caltex, 100 Mℓ plant construction nearing completion
- Primary Energy (grains): Announced off take agreements with BP. First plant will be Kwinana in W.A. (160 Mℓ capacity), with 2 more intended for the eastern states - ??
- Agri-Energy (grains): Swan Hill plant postponed indefinitely after completing the engineering design. Now looking offshore - ??

Producers - Biodiesel

- BP: has installed production capacity for >100 Mℓ at Bulwer refinery in Brisbane (hydrogenation of tallow)
- Australian Renewable Fuels: 2 plants, both recently 'mothballed'
- Australian Biodiesel Group: largest producer has recently placed its Narangba, Brisbane factory (160 Mℓ) 'on standby', citing high input costs and no off take at profitable prices
- Natural Fuels Australia: Exports to EU have commenced from their Darwin factory, converting imported palm oil
- In July 2006 the Government introduced Energy Grants Credit Scheme
 - Hydrocarbon diesel received the same excise rebate as biodiesel when used for mining, agricultural, stationary power or other off-road use – no financial incentive for biodiesel
 - Some listed biofuels producers have had severe reductions in share price and market capitalisation

Australian Renewable Fuels

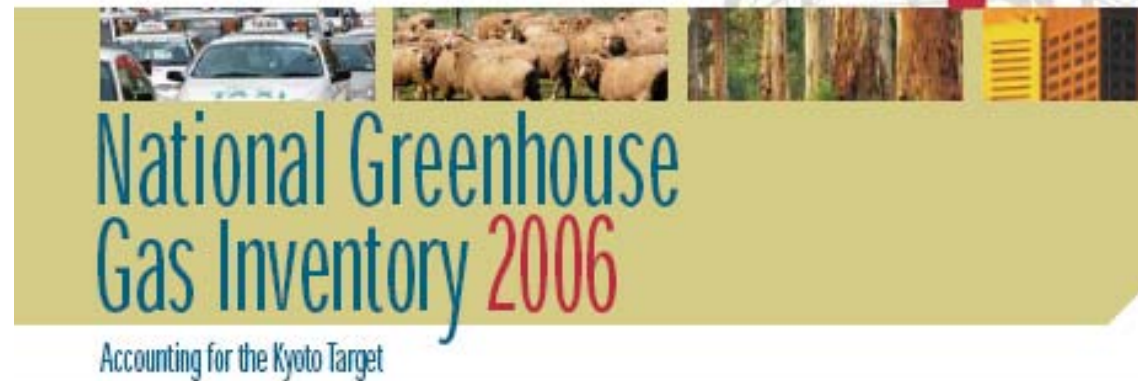


Similar trend for all Australian biodiesel companies producing for the domestic market



Published – June, 2008

<http://www.climatechange.gov.au/inventory>



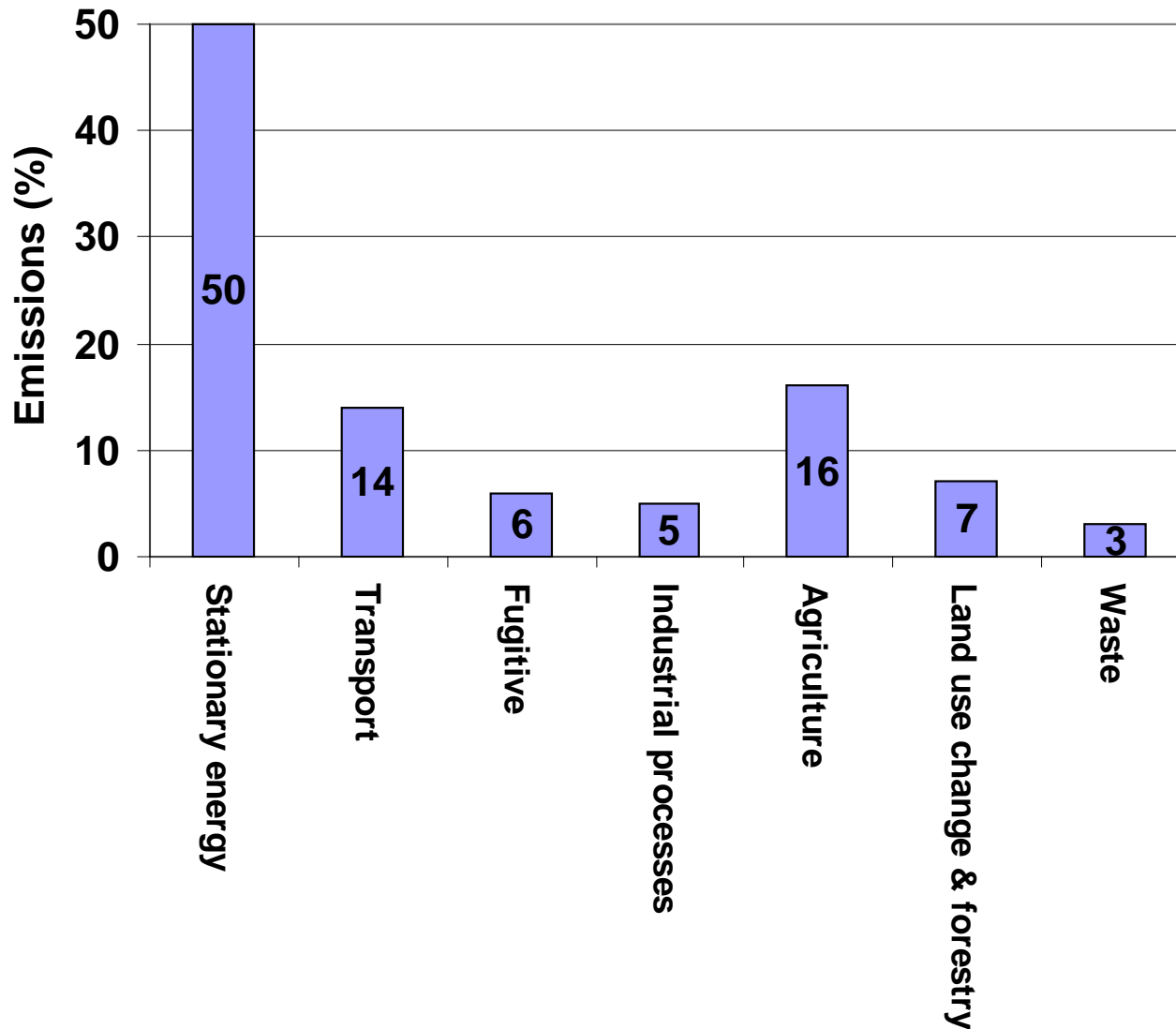
GHG inventory overview

- Australia's net greenhouse gas emissions across all sectors totalled 576.0 million tonnes of carbon dioxide equivalent in 2006
- Australia's Kyoto emissions target is 108% of 1990 levels
- Emissions in 2006 were 4.2% above 1990 levels.

Australia's GHG inventory

| Sector | Emissions | | Change in emissions |
|----------------------------------|-------------------------|------------|---------------------|
| | (Mt CO ₂ -e) | | (%) |
| | 1990 | 2006 | 1990-2006 |
| Energy | 286.4 | 400.9 | 40.00% |
| <i>Stationary Energy</i> | 195.1 | 287.4 | 47.30% |
| <i>Transport</i> | 62.1 | 79.1 | 27.40% |
| <i>Fugitive Emissions</i> | 29.2 | 34.5 | 18.10% |
| Industrial Processes | 24.1 | 28.4 | 17.70% |
| Agriculture | 86.8 | 90.1 | 3.80% |
| Waste | 18.8 | 16.6 | -11.40% |
| Land Use Change | 136.5 | 62.9 | -53.90% |
| Forestry | 0 | -23 | NA |
| Australia's Net Emissions | 552.6 | 576 | 4.20% |

Australia's emissions by sector in 2006



Carbon capture & storage

“Sweeping it under the rug”

“Australia's first trial of geosequestration in the Otways reached its first milestone last week — 10,000 tonnes of carbon dioxide was successfully stored two kilometres underground in a depleted natural gas field.

Scientists from the Co-operative Research Centre for Greenhouse Gas Technologies hope to increase that to 100,000 tonnes next year, while continuing to monitor the local geology.

The centre's chief executive, Dr Peter Cook, who is overseeing the \$40 million project, is confident that the day will come when much of the carbon dioxide produced from large industrial sources can be buried. He is hopeful that large-scale capture and storage, with at least one major power station using the technology, can be achieved within 10 years.”

The Age, July 7, 2008

Garnaut - Climate change review

- Draft report released on 4 July 2008. Final report due by end of September 2008.
 - methodology applied to the evaluation of the costs and benefits of climate change mitigation
 - application of the science of climate change to Australia
 - international context of Australian mitigation, and
 - Australian mitigation policy.

“Australia would be hurt more than other developed countries by unmitigated climate change, and we therefore have an interest in encouraging the strongest feasible global effort.”

- Generally does not make recommendations, although the tendency of policy analysis is clear.
- Recommendations on the design features of the emissions trading scheme.
 - full auctioning of emissions permits and the return of all revenue to households (50%), business (30%) and RD&C (20% - reaching \$3 billion pa).
- Stakeholder engagement on emissions trading scheme continuing.
 - will determine the future energy mix

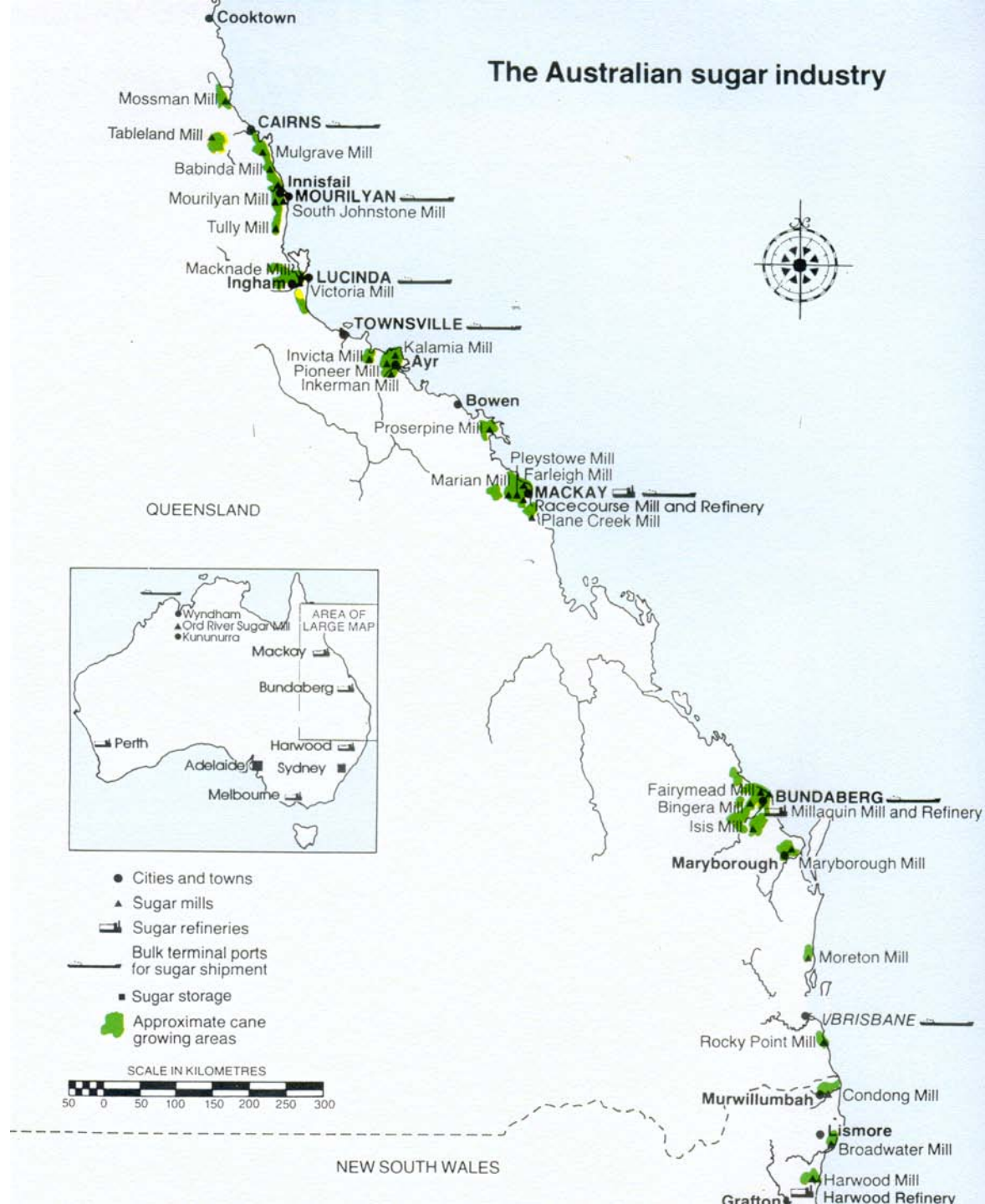
“In Australia’s interest to find out as soon as possible whether there can be a low-emissions future for coal, and to support rapid deployment of commercially promising technologies. This follows from Australia’s role as the world’s largest exporter of coal and the central place of coal in growth in emissions from Asian developing countries.”

<http://www.garnautreview.org.au>

Opportunity - resources for biofuels

- Australia has been in the grip of drought for 7 of the last 10 years
- Current grain crop is failing again, and grain prices are very high
- Australia is not a large producer of oilseeds (although 450,000 tonnes of canola are exported), tallow and waste cooking oils are generally less expensive but limited supply for biodiesel
- Dryland grain and oilseed production can vary by +/- 40% from mean values
- Drought increases demand and price of molasses
- Potentially large lignocellulosic resource, awaiting commercial technologies
 - Sugarcane bagasse
 - Woody weeds
 - Coppice eucalypt
 - Production on marginal land
 - Marine algae

The Australian sugar industry



The sugarcane biomass resource

- **Australia**

- 2005-06 – 38.2 million t harvested cane (0.415 million ha), 5.1 million t sugar, ~ 60 Mℓ ethanol
- Potential from C-molasses – 280 Mℓ
- Potential from B-molasses – 750 Mℓ
- 5.6 million t of surplus bagasse, 32 million t of field trash
- Likely future – mill closures & decrease in land under cane

- **Brazil**

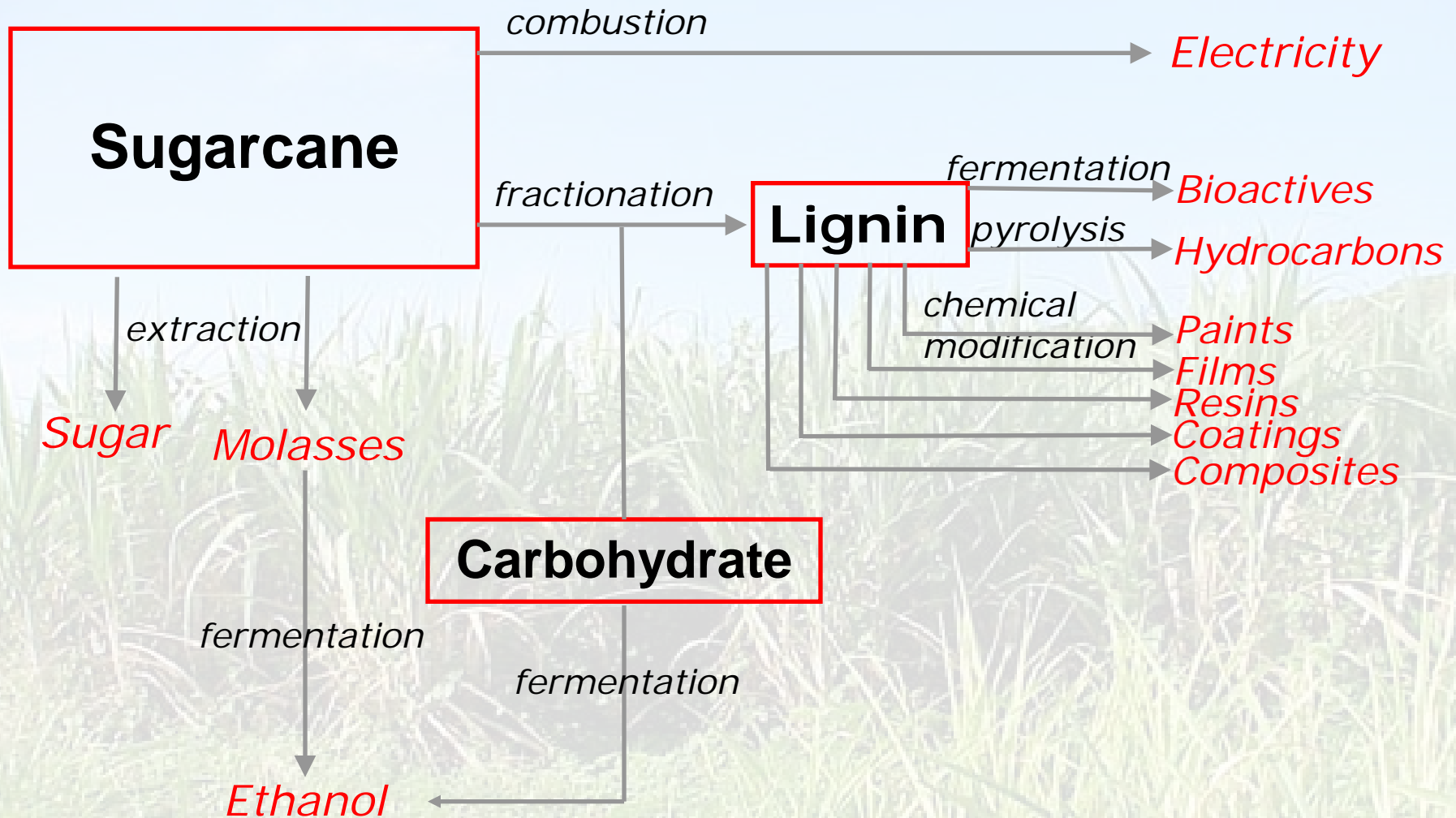
- 2005-06 - 450.2 million t cane (6.094 million ha), 27.2 million t sugar, 17.5 billion ℓ fuel alcohol
- Future - 600 million t of cane by 2013, driven by growing ethanol market
- Expected to remain the world's lowest cost producer into foreseeable future

****Sugarcane – 80-90 t/ha to Energy cane - 160-180 t/ha****

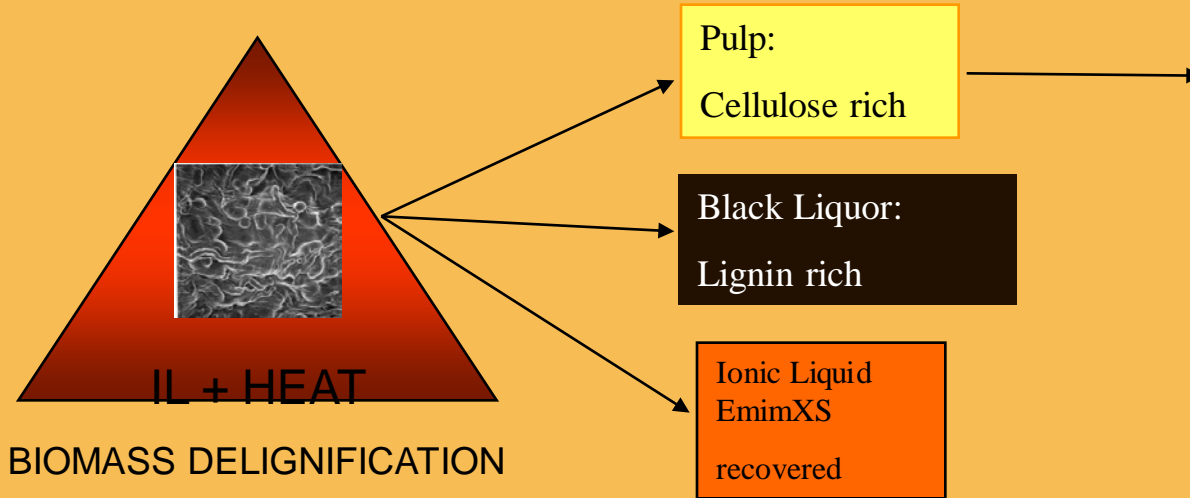




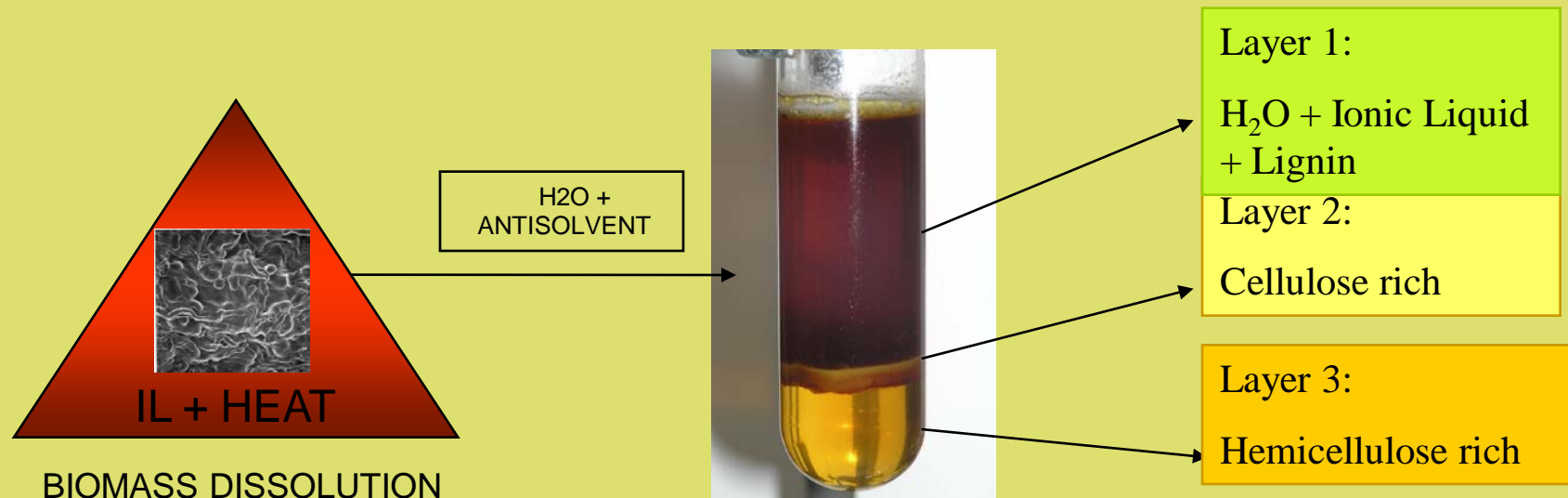
The sugarcane biorefinery...



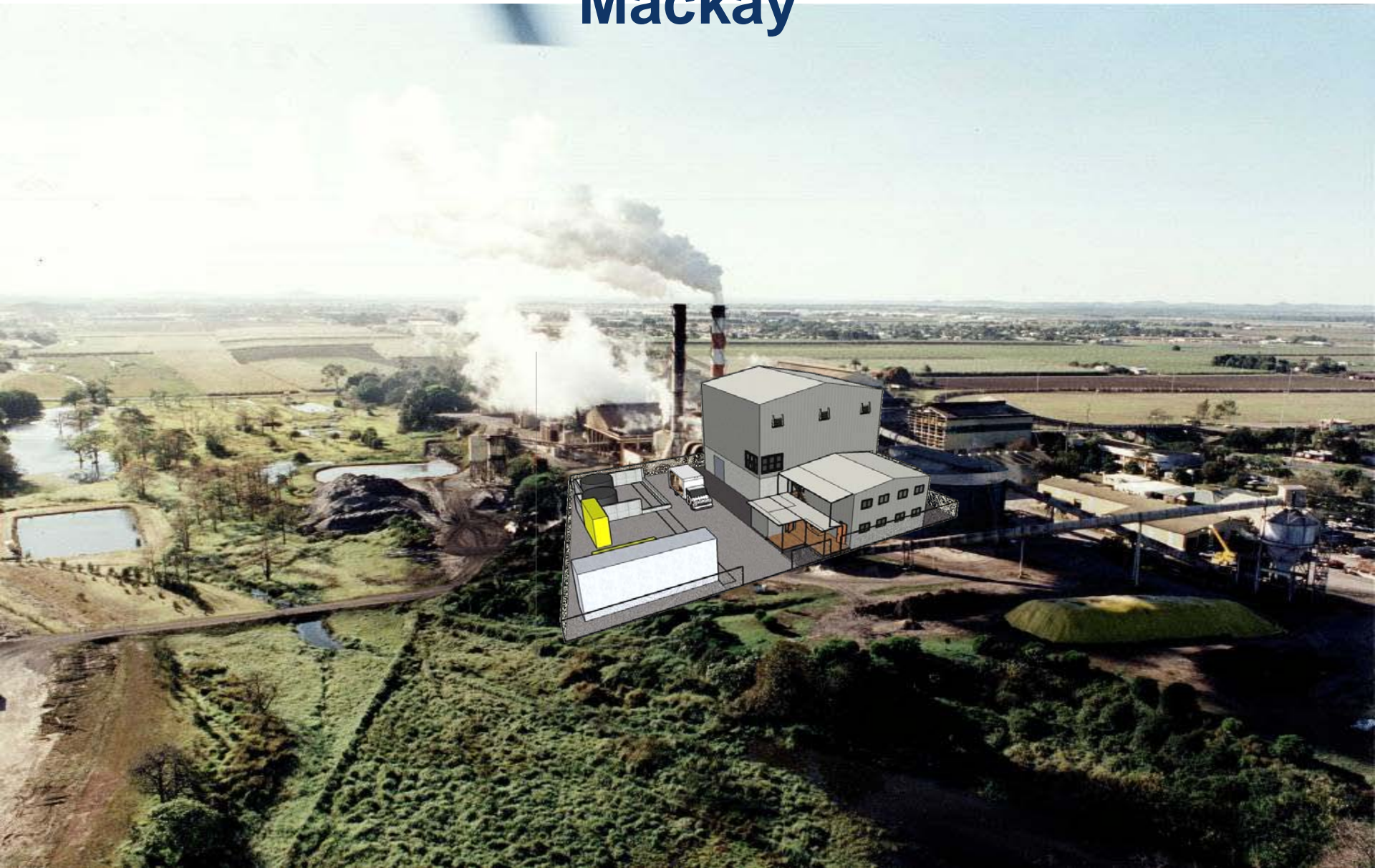
Biomass Delignification



Biomass Dissolution



Pilot plant location – Racecourse Mill, Mackay



Conclusions

- **The present situation –**
 - **bleak for biofuels production**
 - **improved since last federal election for policy**
 - **healthy considering level of funding for R&D**
- **The future looks bright**
 - **assuming full auctioning of emissions permits and the return of some revenue to RD&D**