



Geoffrey Bell, CEO, Microbiogen Pty Ltd



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* Figures to be copied from "IEA Bioenergy Countries' Report" [ExCo 2016.03]; will be regularly updated

1. Total primary energy supply (TPES) and the role of bioenergy*

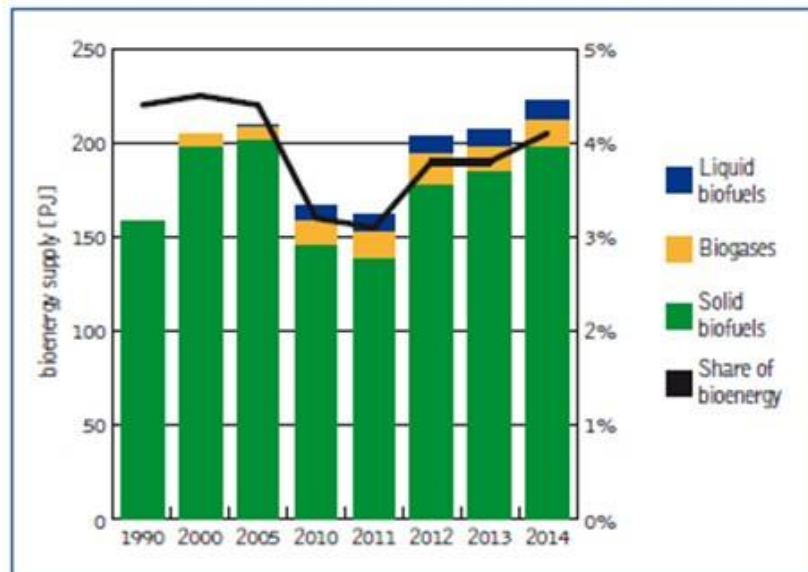
Bioenergy in Australia accounts for approximately 8% of renewable power and 1% of total Australian power generation

Technology	Generation (GWh)	Percent of renewable generation	Percent of total generation	Equivalent number of households powered over course of the year
Hydro	14,555	45.9%	6.19%	2,049,900
Wind	9777	30.9%	4.16%	1,377,000
Household and commercial solar <10 kW	4834	15.3%	2.06%	680,900
Bioenergy	2400	7.6%	1.02%	338,000
Large-scale solar	118	0.4%	0.05%	16,700
Geothermal	0.50	0.002%	0.00%	70
Marine	0.04	0%	0.00%	6
Total	31,684	100%	13.47%	4,462,600

(Source: <http://www.cleanenergycouncil.org.au/>)

2. TPES from bioenergy and trend in evolution*

Overall bioenergy supply in Australia has increased marginally over the last 15 years. The majority of power comes from solid biofuels with biogas and liquid biofuels increasing their share, but still only modest



3. Biomass use for non-energetic purposes

Biomass is used widely in Australia for non-energetic purposes. Industries that use biomass for non-energetic purposes include:

- Paper and Pulp manufacturing
- Grain food production
- Silage for animal feed
- Sugar cane to crystal sucrose. Note that the bagasse is typically converted into energy but often inefficiently
- Composting waste biomass to generate a soil enhancing product
- Biomass left on field for soil conditioning

4. Biorefinery targets, policies and legislation

Australia does not have a formal bio-refinery target. However, it does have policies and legislation to encourage bio-refinery development

- In January 2017, the Queensland Government introduced a “biofuel” mandate. That is, 3% of all unleaded fuel must have 3% bioethanol. The mandate will increase to 4% from July 2018.
- New South Wales has a 6% bio-ethanol mandate. However, it is currently not being achieved but the Government is looking towards policies that will help.
- The Federal Government did have a carbon pricing scheme but this was revoked in 2014 by the Abbott Government. There have been discussions since this time considering a Clean Energy Target as developed by Professor Kinkel.

5. Biorefinery related funding programmes

Australian funding for clean energy is primarily federally based and comes under two key programs

Clean Energy Finance Corporation: This is an independent Government owned corporation that focuses on investment and helping to secure investment in renewable energy, energy efficiency and emissions technologies. It can and has helped investment in developing bio-refineries in Australia. It has access to over A\$1B for funding.

Australian Renewable Development Agency: ARENA supports projects through early stage R+D to pre-commercial development. It was established in 2012 and is funded through to 2022.

6. Commercial biorefinery facilities

Currently the largest operating commercial bio-refineries include:

- **Manildra:** Location is in NSW and capacity is approximately 260,000 liters of bioethanol per year. Substrate is typically waste starch streams
- **Sarina:** Location is in Queensland and capacity is approximately 60,000 liters of bioethanol per year. Substrate is molasses and the company sells a nutrient rich dunder to local farmers as fertilizer.
- **Dalby:** Location is in Queensland and capacity is approximately 85,000 liters per year. The substrate is starch sorghum and a by-product is the protein enriched distillers grains.

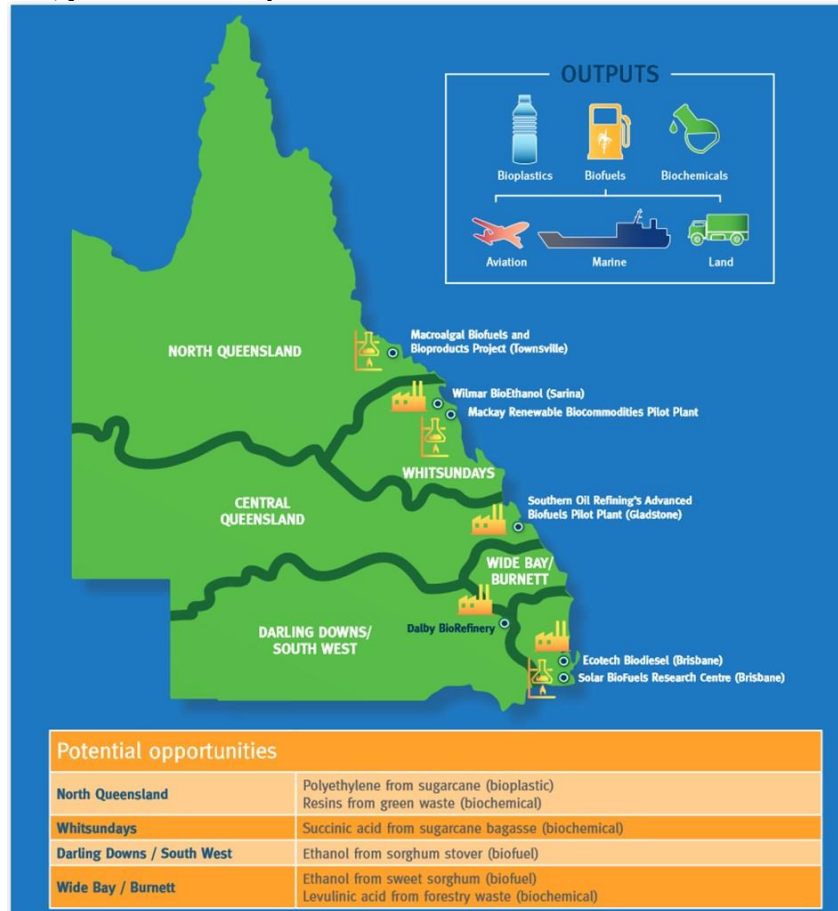
7. Regional initiatives

The Queensland Government is taking an aggressive approach to developing its future as a leading bio region in Australia.

- Queensland has a natural advantage as a bio hub with suitable climate, large areas of high biomass potential and regions ripe for further development.
- In June 2016, the Queensland Government released its “Queensland Bio-futures 10-year Roadmap and Action Plan”
- The action plan envisages a \$1 billion sustainable and export oriented industrial bio-technology and bio-products sector within 10 years.
- The Government envisages a wide range of products such as sustainable chemicals, fuels, cosmetics, detergents and textiles amongst others.

8. Demo and pilot plants

In Queensland where much of the pilot and demonstration work is being carried, there are a number of operations



9. Major innovation activities

There are a number of private and publicly supported innovation activities occurring in Australia at present. Some of these include

- **Southern Oil – Advanced Biofuel Plant.** An \$18M pilot plant that will convert biomass and waste material such as bagasse and Prickly Acacia as a feedstock for the production of bio-crude oil prior to refining to kerosene and diesel products. An aim of the project is to produce 1 million liters of fuel for field trials be the US Navy and its Great Green Fleet initiative.
- **Microbiogen – Optimised 2nd Generation Biofuel Yeast.** The Australian Government via ARENA is supporting Microbiogen in its collaboration with Novozymes A/S for a yeast that will significantly enhance the yields and economics of 2nd Gen biofuel facilities. Microbiogen alone will spend A\$8M on the project over 3 years.

10. Major stakeholders

Major stakeholders include:

- Australian Renewable Energy Agency
- Clean Energy Finance Corporation
- Manildra Group – Nowra Starch Bio-Refinery
- Wilmar – Sarina Bio-Refinery
- United Petroleum – Dalby Bio-Refinery
- Southern Oil Refining – Southern and Northern Refineries
- Microbiogen – Sydney Laboratories
- Queensland Government via Bio-Futures program
- Leaf Resources – Queensland based ASX listed company with unique glycerol pre-treatment technology
- Licella – Production of Bio-crude from waste biomass

Other issues

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IEA Bioenergy

Task42 Biorefining in a
Future BioEconomy



Contact Details

Geoffrey Bell

CEO Microbiogen PTY Ltd

geoff.bell@microbiogen.com

IEA Bioenergy Website
www.ieabioenergy.com

IEA Bioenergy Task42 Website
www.task42.ieabioenergy.com