

Making it Happen Bioenergy in Australia Lessons Learned

BANZ Seminar
28 February 2011



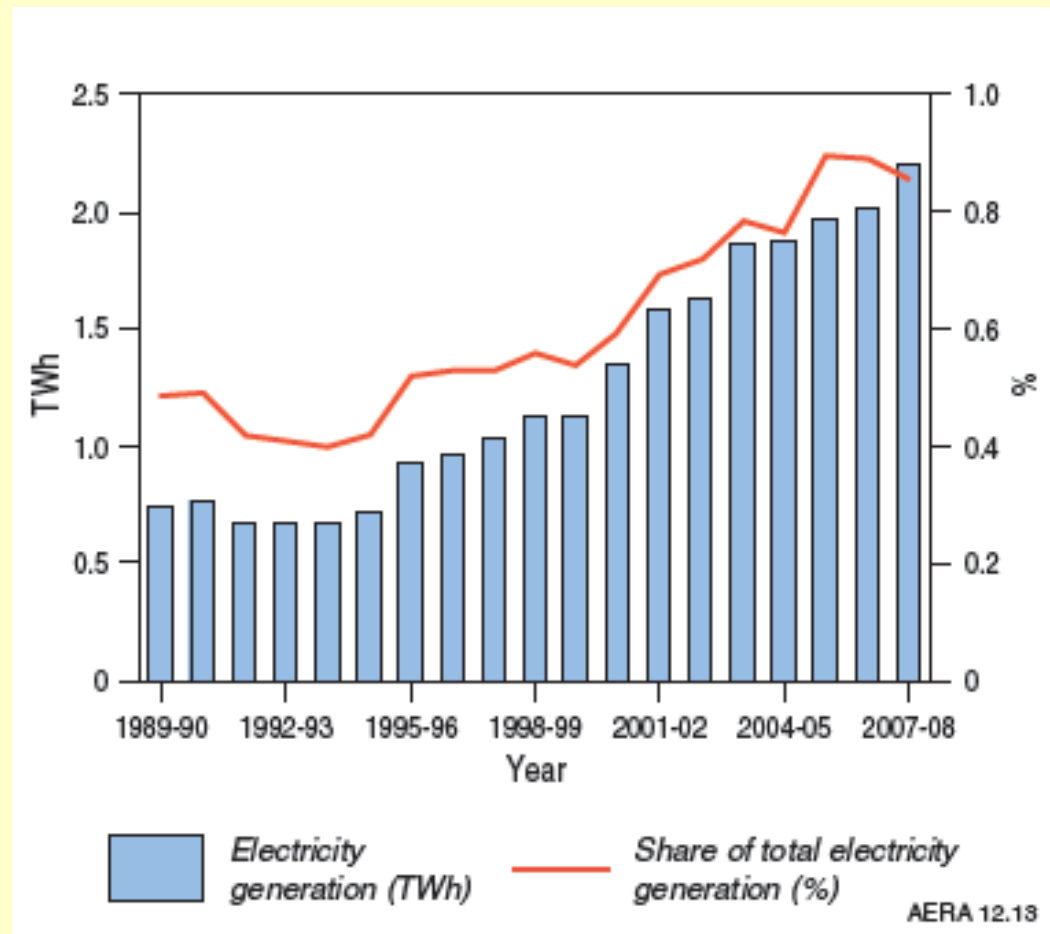
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Contents of Presentation

- Setting the scene for Bioenergy in Australia
- Bioenergy Australia and its Activities
- Regulatory framework for bioenergy
- Experiences in advancing bioenergy in Australia (good/bad) and what we would like to have seen done differently
- Working together with the BANZ/New Zealand

Australian Penetration - Biomass

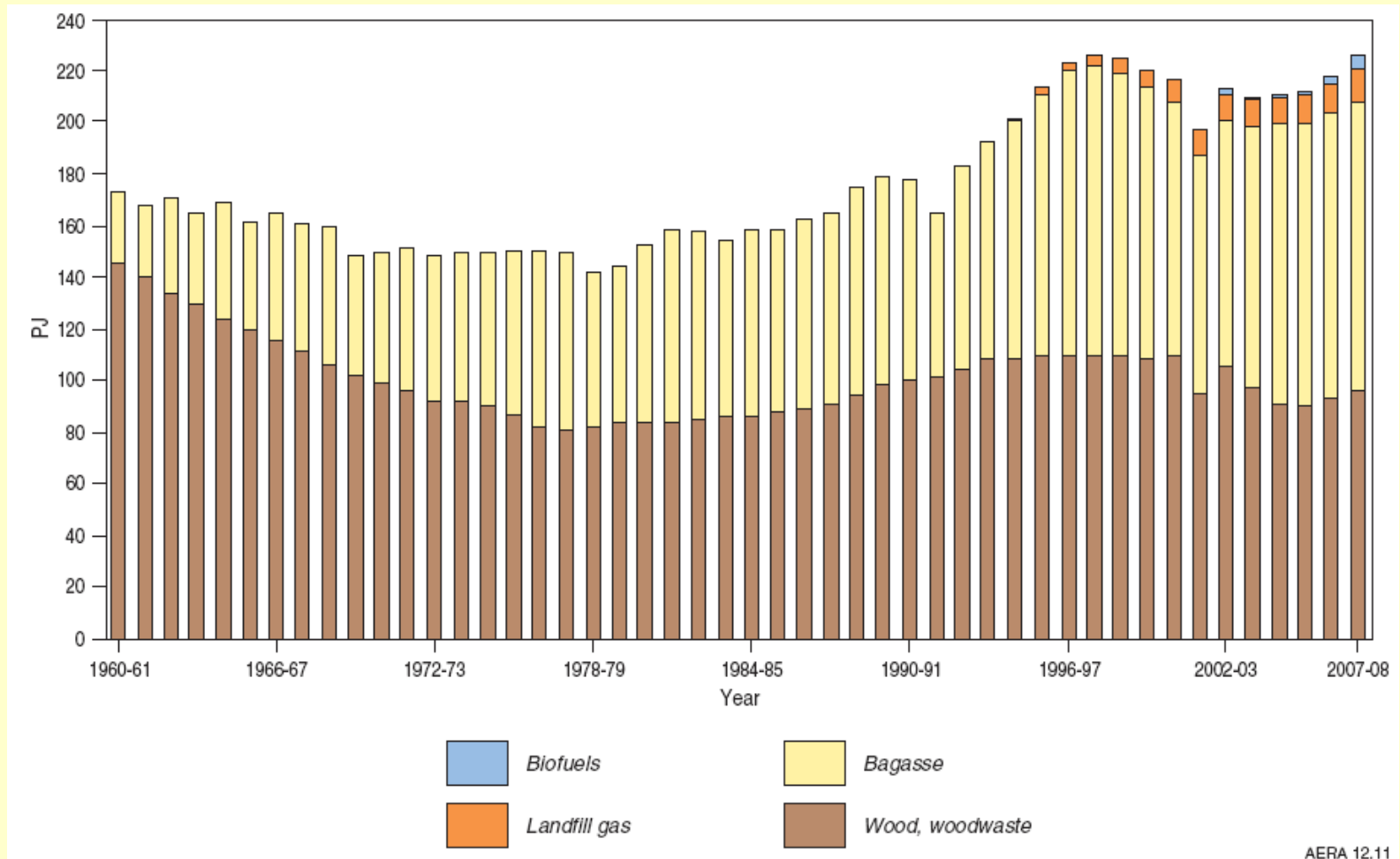
- Biomass 4% of TPES
- 78% to Australia's reported renewable energy
- Includes ~4 million tonnes of firewood
- 0.9 percent of Australia's electricity generation
- Slightly less than a quarter of cumulative RECs
- 867MW of dedicated installed bioelectricity capacity (excluding co-firing)



Australian Bioelectricity Production

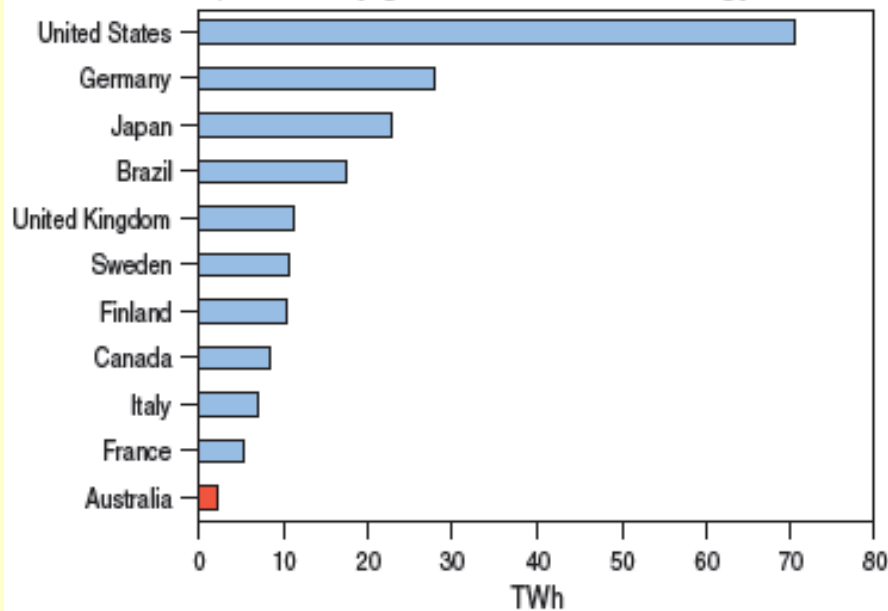
(source: ABARE)

Australia's Primary Consumption of Bioenergy

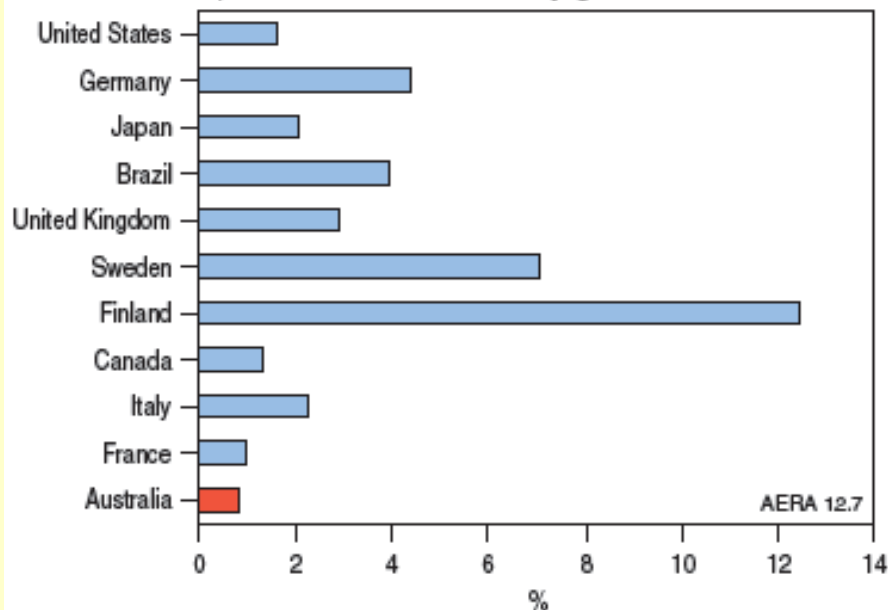


(source: Geoscience Australia)

a) Electricity generation from bioenergy



b) Share in total electricity generation



Bioelectricity by Country

(source: Geoscience Australia)

	Biogas	Bagasse	Wood Waste	Other bioenergy	Total bioenergy
New South Wales (incl. ACT)	73	81	42	3	199
Victoria	80	0	0	34	114
Queensland	19	377	15	4	415
South Australia	22	0	10	0	32
Western Australia	27	6	6	63	102
Tasmania	4	0	0	0	4
Northern Territory	1	0	0	0	1
Australia	226	464	73	104	867
Share of total renewable electricity capacity (%)	2.2	4.4	0.7	1.0	8.3

(source: Geoscience Australia)

Australian Bioelectricity Generation (MW) 2009

Project	Company	State	Type	Start Up	Capacity (MW)
Tumut	Visy Paper	NSW	Wood waste	2001	17.0
Rocky Point	National Power and Babcock and Brown Joint Venture	QLD	Bagasse	2001	30.0
South Cardup	Landfill Management Services Ltd	WA	Landfill methane	2005	3.3
Werribee (AGL)	AGL	VIC	Sewage methane	2005	7.8
Pioneer 2	CSR Sugar Mills	QLD	Bagasse	2005	63.0
Woodlawn	Woodlawn Bioreactor Energy Pty Ltd	NSW	Landfill methane	2006	25.6
Carrum Downs 1 & 2	Melbourne Water	VIC	Sewage methane	2007	17.0
Eastern Creek 2	LMS Generation Pty Ltd	NSW	Landfill methane	2008	8.8
Condong	Sunshine Electricity	NSW	Bagasse	2008	30.0
Broadwater	Sunshine Electricity	NSW	Bagasse	2008	30.0

Source: Geoscience Australia; ABARE

Recent Bioenergy Projects

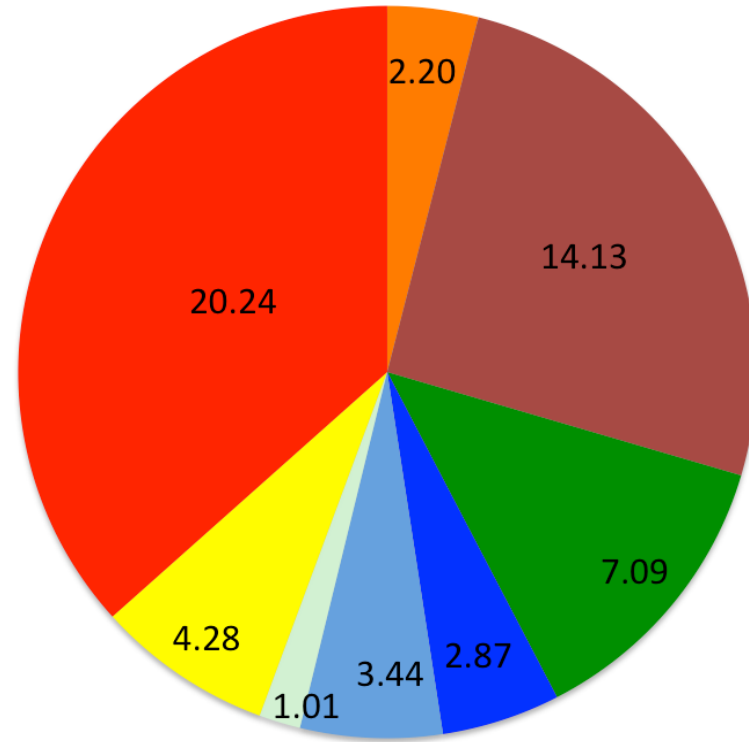
Biomass Source	Quantity	2010 (GWh/y)	2020 (GWh/y)	2050 (GWh/y)
Poultry	94 million	-	297	1055
Cattle – feedlots	870 thousand	-	112	442
Pigs	1.8 million	1	22	205
Dairy cows	1.4 million	-	22	89
Abattoirs	1.3 million tonnes		337	1773
Stubble – grain and cotton crops	24 million tonnes			47000
Bagasse	5 million tonnes	1200	3000	4600
Sugar cane trash, tops and leaves	4 million tonnes	-	165	3200
Oil mallees	-	-	112	484
Camphor laurel			83	20
Forest residues (native forests, plantations, processing residues)	~ 9 million tonnes	79	2442	4554
Black liquor	-	285	365	365
Other pulp and paper wastes	-	74	141	141
Urban food Wastes	2.9 million tonnes	29	267	754
Garden organics	2.3 million tonnes	29	121	461
Urban paper and cardboard	2.3 million tonnes	-	38	1749
Urban wood/timber wastes	1.6 million tonnes	45	295	1366
Landfill gas		772	1880	3420
Sewage gas		57	901	929

Source: CEC Bioenergy Roadmap 2008.

Bioelectricity Production at 2030

Annual bioelectricity generated at 2030 (TWh)

- Bagasse
- Stubble
- Native managed forest
- Plantation hardwood
- Plantation softwood
- Urban wood waste
- Plantation hardwood (extra to 2030)
- Short-rotation



Total = 55.2 TWh

55.2 TWh/yr ~20% current electricity production

Source: CSIRO, O'Connell et al, BEA10 Conference

Macadamia Nut Shell Project – Gympie Qld

1.5 MW pinhole grate unit



Source: Ergon Energy

Project Examples

Bioenergy Australia



Rocky Point Sugar Mill – Qld -30 MW

Australian Examples of Grate Boilers

28 sugar mills: 1,200 GWh in 2006 to 7,800 GWh in 2050.



Condong Sugar Mill – NSW - 30 MW

Co-Firing Biomass with Coal



Biogas at Swanbank Power Station, Queensland

Wood waste/sawdust – Wallerawang Power Station, NSW

Delta Electricity Cofiring Project

- \$200 million project planting 200,000 oil mallee eucalyptus trees launched March 2010
- Co-firing at high levels – 20 percent at Wallerawang Power Station
- Involves 10 farmers in central NSW
- Will use wood pellets
- Over 200 power station units world wide co-fire biomass with coal.



Small Gasifiers – e.g. Real Power Solutions

Small scale gasification

Tasman Gasifier - demonstrated at BEA09 conference



Bioenergy Australia



Ankur Gasifier dual firing a diesel genset - Huon Valley, Tasmania.

Biogas (including Landfill Gas >170 MW)



Carrum Downs Waste Water Treatment Plant, Melbourne



AJ Bush Digester and Gas Engine, Bromelton, Qld

Bioheat

- No RET type scheme in Australia
- Applications have still gone ahead
 - steam in sugar mills
 - thermal oil in plywood factories
 - steam for processing food
 - kiln drying of lumber at saw mills
 - steam at pulp and paper facilities.
 - Firewood for domestic and commercial space and water heating.



Geelong Cement
Factory where biomass
and wastes are part of
the fuel mix (Bioenergy
Australia 2005
conference tour)

*ResourceCo also supplying
Adelaide Brighton Cement
with renewable fuels*

Examples of Wood Fuelled Energy Systems

Client	Plant Location	Capacity MW(thermal)	Product	Fuel
Visy Pulp & Paper	Melbourne, Vic	30	Water tube boiler	Sludge & Wood waste
ITC	Launceston, TAS	3	Water tube boiler	Dry Chip / Shavings
Nestlé	Gympie, QLD	16	Water tube boiler	Coffee waste / Wood waste
FEA	Georgetown TAS	20	Water tube boiler	Wood waste
Hyne & Son	Tumbarumba, NSW	15	Thermal Oil Heater	Wood waste
Carter Holt Harvey	Oberon, NSW	12	Thermal Oil Heater/Fibre drying	Wood waste (MDF waste and sawmill waste)
AKD Sawmill	Colac, VIC	15	Thermal Oil Heater	Wood waste
Hyne & Son	Tuan, QLD	12.5	Thermal Oil Heater	Wood waste
Starwood Australia	TAS	22	Water tube boiler	Biomass
Laminex	Gympie, Qld	24	Thermal Oil Heater	Wood waste
Carter Holt Harvey	Gympie, Qld	10	Hot gas – dryer	Dust, fuel oil
Carter Holt Harvey	Tumut, NSW	20	Hot gas – tunnel dryer	Wood waste, dust

Wood Waste examples



Bega Cheese – 14 MW_{th},
Bega, NSW



McCain's - 2 x 6MW_{th}
Smithton, Tasmania

Emerging Bioenergy Technologies – Stirling engines and Organic Rankine Cycle plants



70 kW Stirling engine - electric efficiency of ~12%. BIOS BIOENERGIESYSTEME GmbH, Austria



PureCycle® Power System ~ 270 kW_e (Source: Pacific Heat and Power) – Project announced for Gympie Timber

Bioenergy Australia

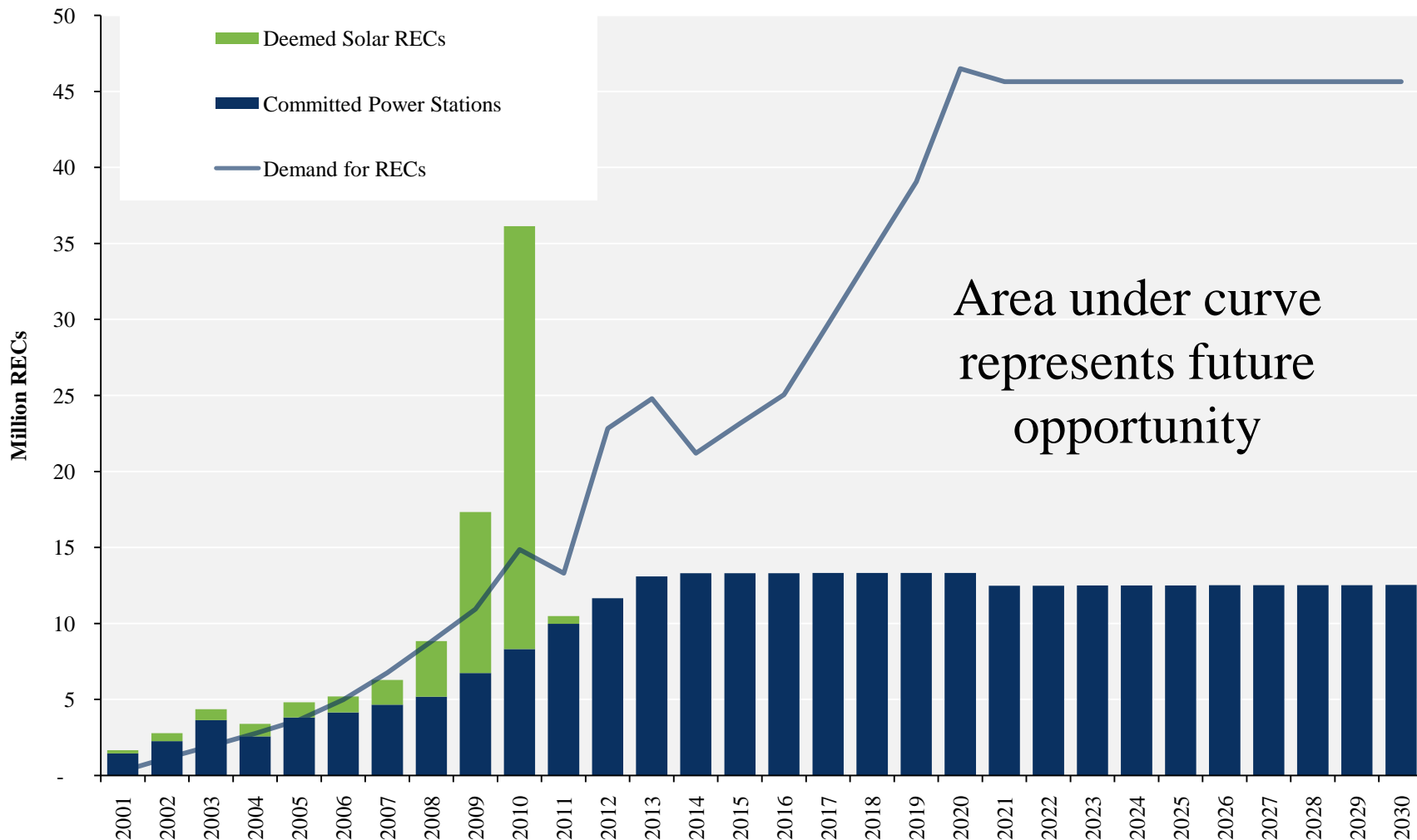
- Government-industry forum of 84 member organisations (not an industry association)
- Information and networking group – runs annual conference, quarterly meetings (~ 80 attendees), newsletters
- Vehicle for Australia's participation in IEA Bioenergy – already links with NZ
- Links into NCRIS Biofuels, RIRDC's Bioenergy, Bioproducts and Energy Portfolio

www.bioenergyaustralia.org

Implementing Bioenergy in Australia

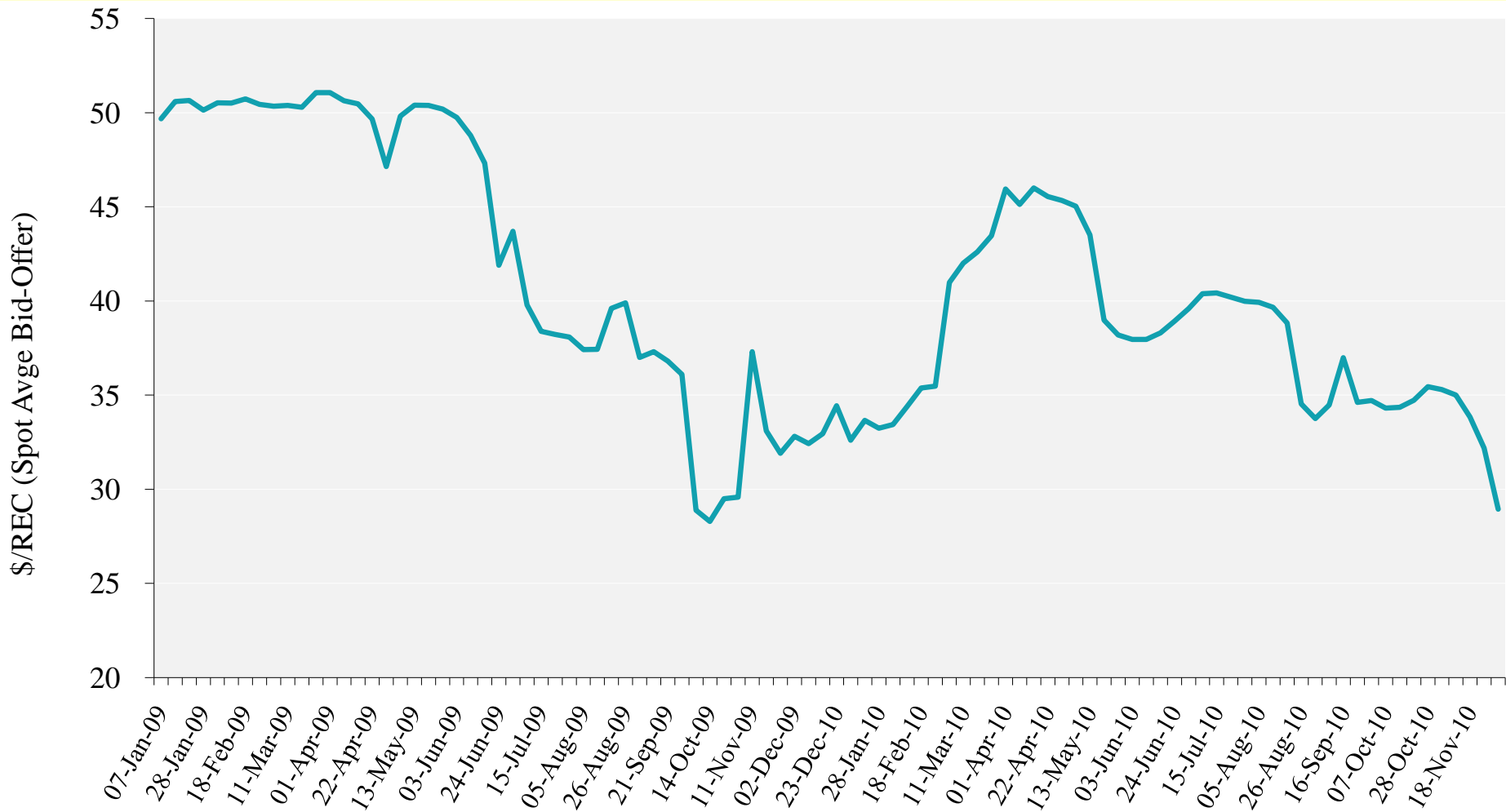
- Key Drivers for bioelectricity are the Large-scale Renewable Energy Target (41,000 GWh/a by 2020), and in the longer term a price on carbon (ETS?).
- ‘Clean Energy Future for Australia’ report led by WWF found that for a deep carbon cut scenario by 2040 bioenergy could provide 29 percent of the generation mix.
- Clean Energy Council stationary bioenergy roadmap indicates:
 - 2020 10,624 GWh per year (four-plus fold expansion)
 - 2050 ~72,629 GWh per year i.e.

40 times current level - requires growth of 10% p.a. for the next 40 years!



Source: Brazzale, BEA 10 conference

RET Market and Remaining Opportunity



Source: Brazzale – BEA 10

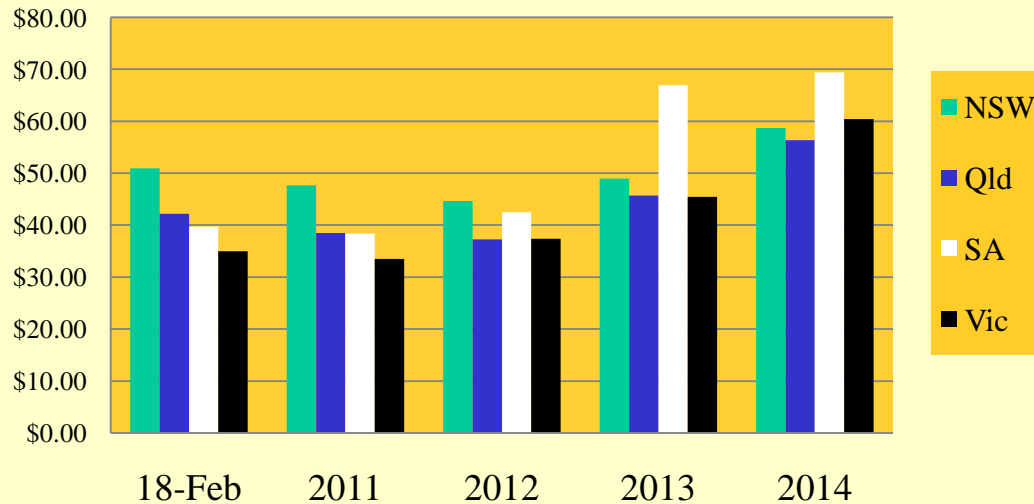
REC Price Trajectory 2009 - 2010

Wholesale Electricity Prices



Source: D-cyphatrade

Wholesale Price Indices Electricity (\$/MWh) – at 18 Feb 2011



Victorian Price Index – past year

REC spot price
~ \$30-\$35

Contrasting Policy Instruments Elsewhere

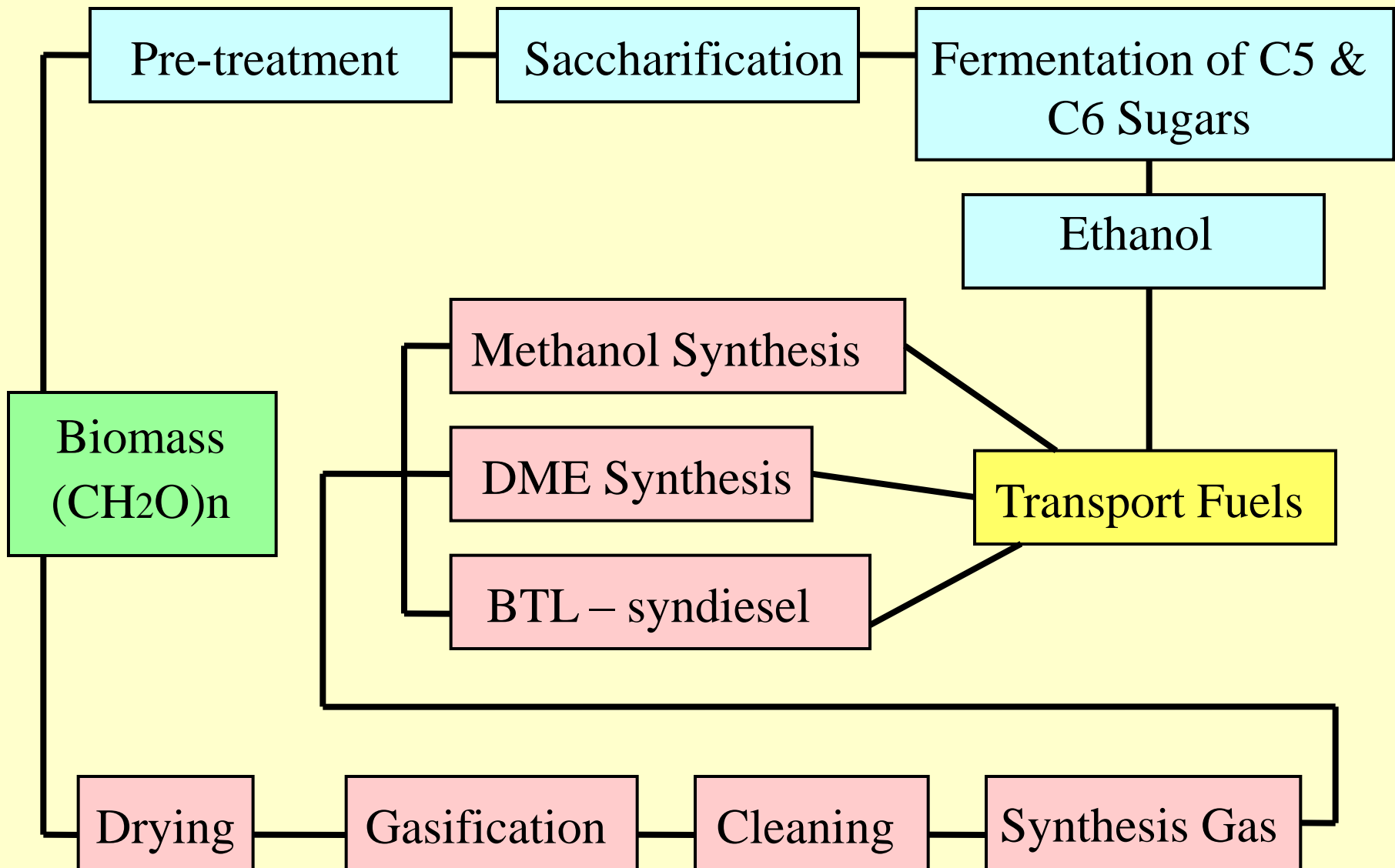
- Obligations and Renewable Portfolio Standards (33 US States)
- US Biomass Crop Assistance Program (BCAP) - USDA has approved 5,091 agreements for the delivery of more than 5 million tonnes of biomass and paid eligible biomass owners US\$242,985,210 in matching payments under BCAP.
- Feed-in tariffs for bioenergy - Netherlands, Ontario Canada, Germany, China, Thailand. Offer long term contracts, stable and attractive prices.
- By comparison Australia has no feed-in tariffs for bioenergy nor any biomass crop incentives.

Some Barriers to Implementation

- Low cost of fossil fuel (coals and gas for electricity, oil)
- Better recognition of bioenergy by policy makers and shapers – at intersection of several policy areas
- Concerns about using native forests for fuel. In some states logging residues are not permitted
- Broader sustainability issues – e.g. food vs. fuel and water
- Economics and security of fuel procurement
- Connection issues for electricity
- Lack of bioheat incentives. Feed-in Tariff for other solar, microhydro, small wind, but not bioenergy
- Need long term regulatory stability for projects with a life greater than 25 years.

First Generation Biofuels Plants

- Ethanol – Manildra, Sucrogen, Dalby Biorefinery
- Biodiesel – ARF, Biodiesel Industries, EcoTec, National Biofuels Group, others
- NSW has biofuels mandate. Some supply difficulties. Others may follow
- Contribution small – less than one percent.



Second Generation Biofuels

Advanced Biofuels Development in Australia

- NRCIS Biofuels \$16 million with nodes at SARDI, Mackay Sugar Mill, UNSW, USyd and Macquarie Generation
- Gen 2 Biofuels \$15 million with pyrolysis bio-oil (Curtin University of Tech.), Microbiogen, Licella, BSES, Uni Melb and SARDI.
- Ethtec at Harwood Sugar Mill
- Renewable Oil Corporation – bio-oil upgrading
- Coskata/Veolia/GM Holden/Caltex announcements
- Qantas/Solena aviation biofuels announcement

Experiences and what would do differently

- Native forest biomass – a seemingly intractable issue
- Bioenergy has seemingly been left out of national consideration – wind, solar, geothermal seem to have the high ground
- Food vs Fuel has muddied the waters for biofuels
- Excise consideration of biofuels
- Flagship projects – few and far between
- Some spectacular failures – e.g. Brightstar Environmental
- Market conditions have been difficult – e.g. AE&E, Willmott Forests, sugar industry bioenergy

Working Together

- Already some interaction via IEA Bioenergy
- Presentations/attendance at conferences and meetings
- Open Google list for notices of newsletters etc
- Open to suggestions!

Conclusions



- Australia has some 867 MW of all forms of bioelectricity capacity – could be a lot more
- Fledgling biofuels industry
- Opportunities for heat, power and fuels
- Large, unrealised potential in Australia – we have land
- Happy to work with BANZ/NZ
- www.bioenergyaustralia.org