



Centre for Energy and  
Environmental Markets

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## ***Some recent developments in Australian climate-related policy mechanisms***

- NSW Greenhouse Gas Abatement Scheme 2004 update
- Options for State-based renewables obligations

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## NSW GGA Scheme: Presentation overview

- GGAS summary
- IPART 2003 and 2004 reports, little specific details on
  - projects
  - organisations
  - formal assessment of additionality
- Manual search of IPART NGAC database
- NGACs created 1st Jan 2003 to 30th June 2005
  - What activities?
  - Who created them?
    - Market power
    - Additionality



## The NSW GHG Abatement Scheme

- Started in Jan 2003, underway for over 2.5 years
- Aims to reduce the per capita emissions for electricity sold in NSW
- Declining targets; from 8.65t/c in 2003 to 7.27t/c in 2007, 2012
- Liable parties are electricity retailers and some others
- NGACs used to audit compliance = imputed 1 tonne CO<sub>2</sub> avoided
- Can be created through low-emission generation, DSA and biosequestration
- LUACs created through on-site activities
- RECs directly into NGACs
- Penalty = \$10.50/t, up to \$11/t for 2005
- IPART released reports for 2003 and 2004 compliance periods
- Our analysis of the NGAC database for 2003 and 2004



## NGACs created for 2003 and 2004

- NGACs: 6,662,976 (2003); 7,655,384 (2004)  
(IPART 2004 Report 5,594,144; Database 7,652,470)
- Generation, DSA, biosequestration
- Surrendered: 1,167,392 (2003); 5,037,847 (2004)
- From RECs: 488,432 (2003); 762,122 (2004)
- No LUACs
- 93 accredited projects (17 DSA)



## Projects for 2003 and 2004

	2003			2004		
	NGACs registered	% of total registered	Cumulative % total	NGACs registered	% of total registered	Cumulative % total
Waste Coal Mine gas	2,478,611	37.2	37.2	2,622,891	34.3	34.3
Landfill gas	1,979,899	29.7	66.9	2,217,889	29.0	63.2
Natural gas	1,117,472	16.8	83.7	1,130,974	14.8	78.0
Coal-fired plant	538,184	8.1	91.8	716,469	9.4	87.4
Energy efficiency - DSA	66,744	1.0	99.0	410,347	5.4	92.7
DSA - Generation	278,939	4.2	96.0	180,753	2.4	95.1
Biosequestration				166,005	2.2	97.3
Hydro	132,869	2.0	98.0	123,844	1.6	98.9
Sewage gas	59,381	0.9	99.9	58,928	0.8	99.6
Bagasse cogen	10,895	0.2	100.0	14,901	0.2	99.8
Food waste cogen				11,060	0.1	100.0
Coal Seam Methane				970	0.01	100.0
Pulp & paper cogen				353	0.01	100.0
<b>Total</b>	<b>6,662,994<sup>a</sup></b>	<b>100</b>	<b>100</b>	<b>7,655,384<sup>b</sup></b>	<b>100</b>	<b>100</b>



## Market concentration

	2003		2004		
	NGACs	% of total	NGACs	% of total Cumulative NGACs	%
Integral Energy	3,048,880	45.8	2,896,299	37.8	37.8
Energy Developments	1,122,260	16.8	1,151,896	15.0	52.9
AGL	542,625	8.6	765,929	10.0	62.9
EnergyAustralia	173,970	2.6	374,454	4.9	67.8
CS Energy	228,718	3.4	359,674	4.7	72.5
Country Energy	173,664	2.6	355,508	4.6	77.1
Macquarie Generation	63,362	0.95	199,124	2.6	79.7
Forestry Commission	0	0	166,005	2.2	81.9

- Five largest - 79% (2003), 72.5% (2004) of market
- Herfindahl-Hirschman Index =  $s_1^2 + s_2^2 + s_3^2 + s_n^2$
- > 1,800 is highly concentrated
- NGAS HHI = 2,540 (2003), 1,862 (2004)



# Additionality assessment

- Abatement additionality
  - increased activity compared to before the scheme started
  - not transient ie. offset at a later date if the plant goes below its baseline and doesn't 'pay back' its NGACs
  - B&C scheme emissions can still increase if the baseline increases (Delta)
- BAU additionality
  - where the abatement activities would not have occurred in the scheme's absence (demand growth, technology improvements)
- Policy additionality
  - where the abatement activities would not have occurred because of some other government policy



## Abatement additionality - 1

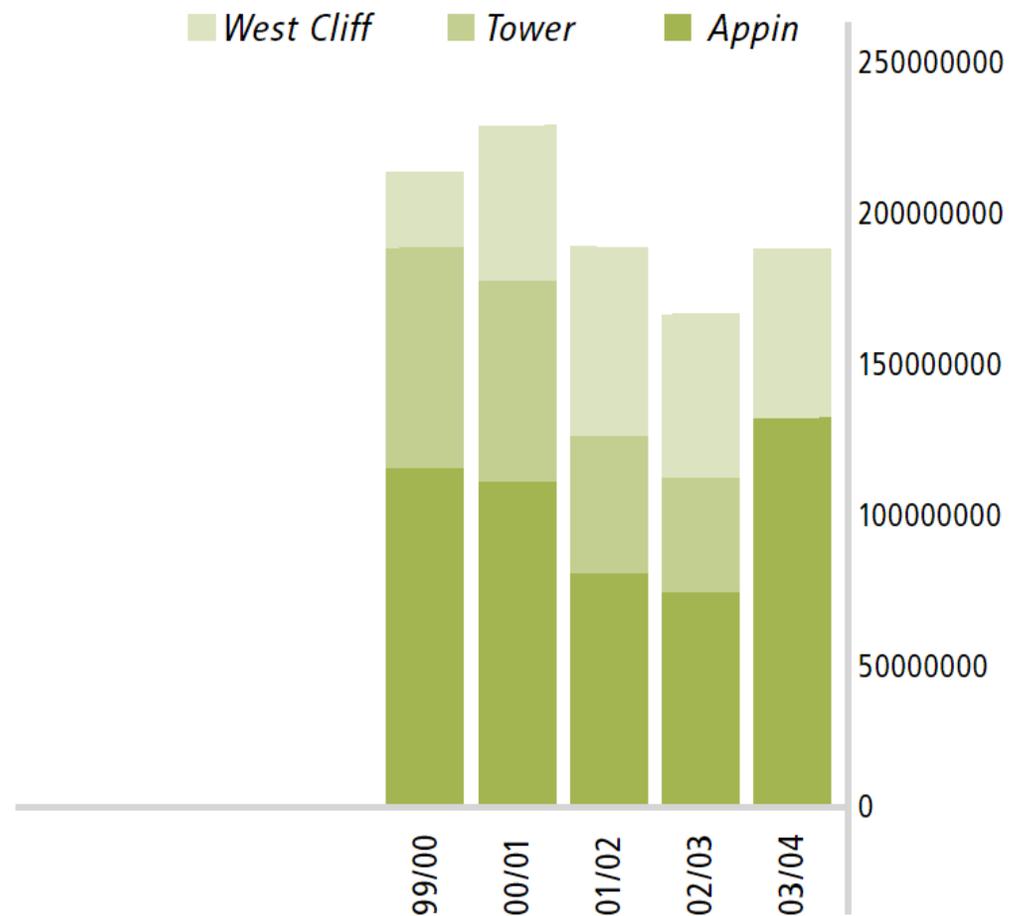
- **Category A fossil fuel plant (41.8% of 2003/04 total)**
  - Applies to Tower and Appin colliery waste coal mine gas plant (1996), Smithfield natural gas cogeneration plant (1997), Varnsdorf natural gas plant (~1994) and cogen plant in Melbourne hospitals.
  - Given that all generation is eligible to create NGACs;
    - BAU additionality: To what degree did the existence of NGAS contribute to the decision to build the plant, and to their final design?
    - Abatement additionality: Has generation from these plant increased since the Scheme started?
  - If not, no abatement compared to before the Scheme



## Additional?

- Little increase since 2002
- 30% decrease since 1999
- Actual contribution is to increase emissions intensity of elec sold in NSW

Figure 10: Mine methane used for power generation — cubic metres





## Abatement additionality - 2

- **Conversion of RECs into NGACs**

- Policy additionality?
- Made up just over 20% of NGACs used to meet liabilities for 2003/04
- 2003: 544,518 RECs, 488,432 NGACs, 29.5%
- 2004: 841,194 RECs, 762,122 NGACs, 13.2%
- Projected to reach 2.5 million by 2010 ~ 10% of total
- About 250,000 NGACs could have been created in 2002
  - These are non-additional for 2003 and 2004 etc
  - Abatement didn't happen compared to before scheme



## Abatement additionality - 3

- **Scheme's Pool Coefficient**

- NGACs created depends on difference between EI and SPC
- SPC average of the five previous year's Annual Pool Values, lagged by two years.
- APV based on Cat B generators and interconnectors
- APV is increasing, SPC is less than the current annual pool value
- This means;
  - Actual emissions are higher than stated
  - Are low emission generators offsetting more than are credited for?
- Also, assumes low emission plant offset Cat B, in fact displace higher up dispatch order eg gas peaking which are lower emissions than Cat B



## Abatement additionality - 4

- **Transient abatement (36.7% of 2003 and 2004 NGACs)**
  - Renewable energy plant and Cat C fossil fuel plant
  - Don't 'pay back' their NGACs if they go below their baseline
- **Efficiency improvements under the GES (538,184 NGACs, 8.1% of 2003 total)**
  - Policy additionality?
    - To what degree did the NGAS contribute to improvement beyond GES requirements, or to turbine upgrades?
  - Applies to coal-fired power stations at Hazelwood (1964), Eraring (1984), Mt Piper (1992/93), Vales Point (1978/9), Wallerawang (1957/80) and Liddell (1973)
  - Ratcheting
  - Emissions increase because baseline increases, yet NGACs created



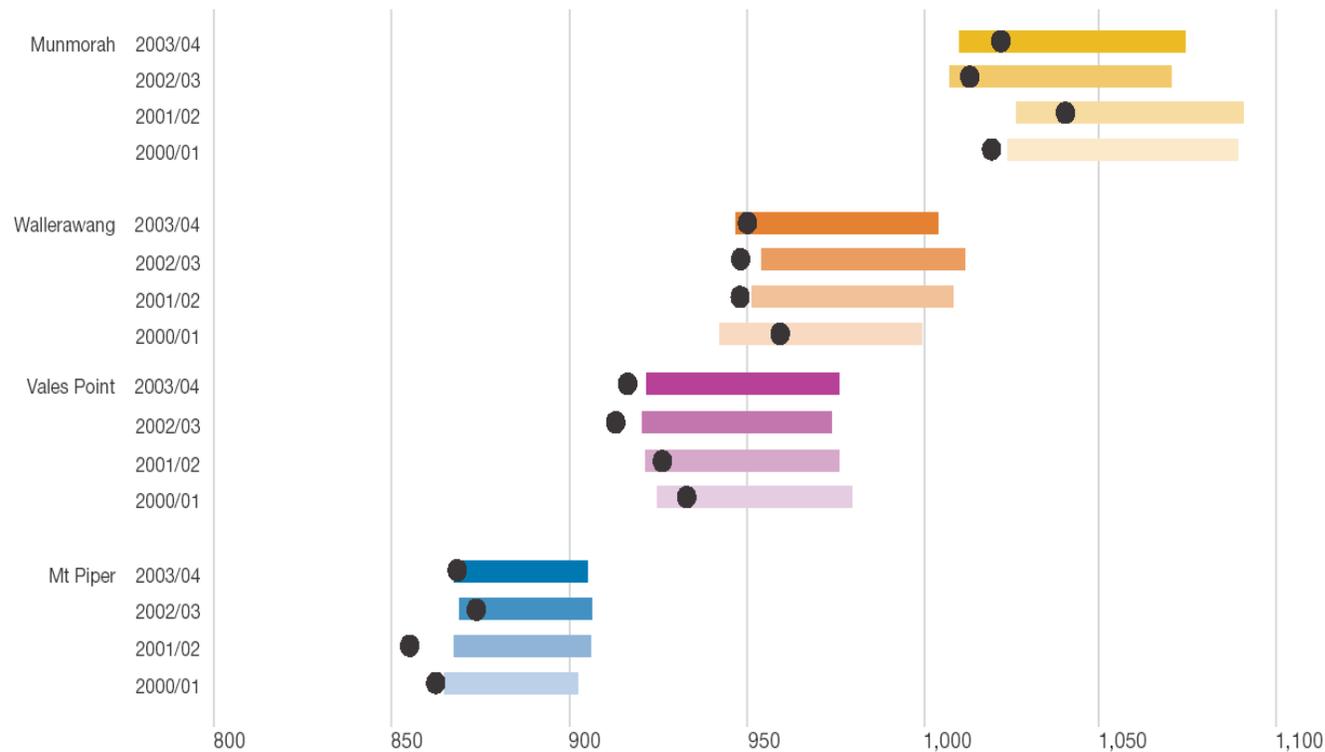
## IP Hazelwood Env Report 2003 - Ratcheting

Annual Abatement from Power Station Improvement's in Emission Intensity <sup>1</sup>	Annual Abatement <sup>2</sup> (t CO <sub>2</sub> e/year) <sup>#</sup>	Accumulative Abatement (t CO <sub>2</sub> e/year) <sup>#</sup>	Accumulative Abatement against a 1996 Base-line Year <sup>3</sup> (t CO <sub>2</sub> e/year) <sup>#</sup>
Annual Abatement 1997	446,031	446,031	446,031
Annual Abatement 1998	758,473	1,204,504	1,281,414
Annual Abatement 1999	-439,556	764,948	913,455
Annual Abatement 2000	535,723	1,300,671	1,425,948
Annual Abatement 2001	-235,516	1,065,154	1,263,522
Annual Abatement 2002	100,416	1,165,570	1,337,370
Total Accumulative abatement	1,165,571	5,946,878	6,667,740



## Delta's Env Report 2003/04 - increased GHG create NGACs

FIGURE FIVE: GES PERFORMANCE



Greenhouse gas emissions T/GWh CO<sub>2</sub>-e

■ Target Range ● Actual Value

Corrections to previously reported data:

- 1 2000/01 targets have been adjusted to 2005 target for consistency with other years
- 2 Munmorah 2002/03 data corrected following coal stockpile survey



## IPART Compliance Reports

- 2003 Compliance report
  - all liable parties met their NGAC obligations under the scheme for 2003, and so “have reduced their emissions to their Benchmark levels”.
- 2004 Compliance report
  - “With one exception, all electricity retailers and other benchmark participants reduced or offset their emissions through the surrender of abatement certificates to their benchmark levels or carried forward a small shortfall, within the permitted 10 per cent buffer”.
  
- In fact, overall per capita targets not met....



## On the positive side .....

- Placed a price on GHG emissions, experience, capacity building
- Increased financial viability of existing low emission generators...
- Promotes DSA?
- Possibly changed BAU - made baseload gas-fired plant more viable eg. Wambo Power Ventures, 2 x120MW gas-fired power plant at Bega and Cobar.

“We are also assuming that the NSW Government’s Greenhouse Gas Abatement Scheme will be extended beyond 2012, as this is an important element in having the project funded”, Trevor St Baker, Managing Director, Oct 26 2005.

But no commitment to actually build these yet





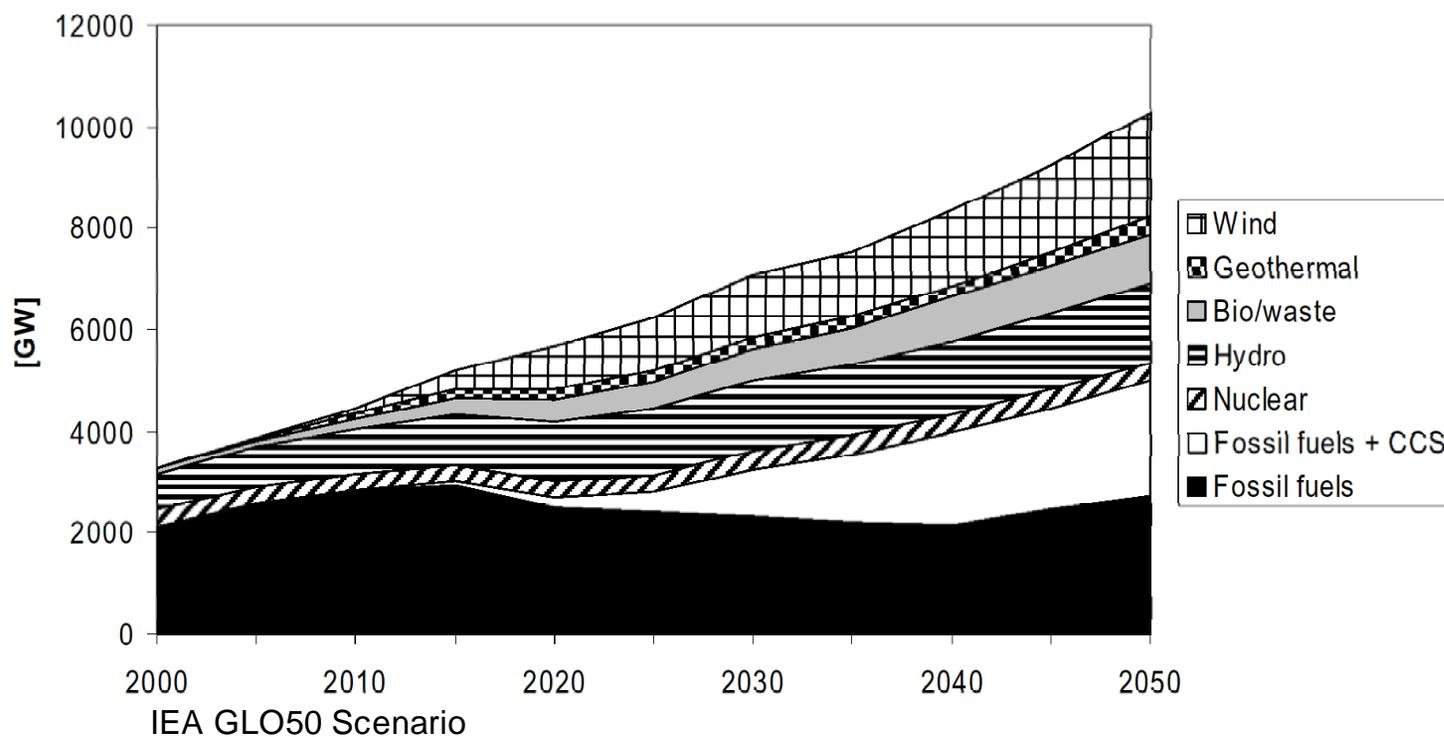
## State-based RO Scheme: Presentation overview

- Abatement portfolio required
- Support for ROs in Oz
- Possible designs
- Additional design issues
- MLET?



## Abatement portfolio required

- Australia's emissions projected to be 23% higher than 1990 levels by 2020
- Stationary energy emissions - almost half total, projected to increase by 70%
- Electricity generation makes up 71% of stationary energy
- Need portfolio - energy efficiency, low-emission FF, renewables, cogen





## Renewable obligation in Oz

- Oz RE projections - 10.5% (1997) to 10.9% (2010) and 8.7% (2020)
- Support required along the technology development pathway: Research, Development, Demonstration & Commercialisation
- Variety of types of market pull support: ROs, feed-in tariffs, capital grants etc
  
- MRET Review Panel
  - very large amount of investment prior to 2007
  - current target is insufficient to develop a domestic industry
  - recommended 20,000GWh by 2020, extend scheme to 2035
  
- EU Directive - 13.9% (1997) to 22.1% (2010)
- EU Parliament - adopted 33% by 2020
- US - 21 states have RE standards, most through RPS's
  - California - 20% by 2010 (was 2017) - 33% by 2020 proposal
  - Texas - 2,000MW (2009), 5,880MW, 5% (2015), 10,000MW (2025)
  - Colorado - from 2% to 10% by 2015



## Support for renewables targets in Australia

- Commonwealth - leave MRET unchanged, some support for PV
- States supported increases in MRET Review
  - SA, 4.5% above 1997 % level by 2010
  - Vic, increase to 19,000 GWh by 2010 (approx 5% target)
  - WA, ACT, Qld, 2% above 1997 % level by 2010
  - Tas, 4% above 1997 % level by 2010
- and have internal aspirational targets
  - SA, from 4% to 15% of total by 2014 (all?)
  - Vic, from 4% to 10% by 2010 (1/5)
  - WA, from 1% to 6% by 2010 for South West Interconnected System (2/3)
- MCE and NSW, Victorian, Western Australian, South Australian and Tasmanian governments all expressed interest in state-based support for RE



## Possible State-based RO scheme designs

- Based on MRET
  - Reduced complexity and establishment costs
  - RECs identified by technology, location and date
    - Exclude large hydro, SWH etc
    - State-specific
  - Current problems generally relate to settings that could be fixed by State scheme
    - size and nature of target
    - types of generation
    - baselines
    - boom/bust cycles
  - Expires in 2020, a problem unless
    - Commonwealth has extended MRET and increased target
    - A State government takes over MRET and incorporates it into the State scheme
    - Commonwealth has extended administrative arrangements, so State scheme can still operate through it.



## Possible State-based RO scheme designs (cont.)

- Based on MRET (cont.)
- Retailer licence conditions could set requirements:
  - Type A
    - Surrender X additional RECs for every REC into designated ORER account
    - ORER paid on contractual basis by States
    - Precedent set by Green Power scheme
  - Type B
    - Commonwealth may not allow ORER to establish additional accounts
    - Surrender X additional RECs for every REC to Jurisdictional Regulator
    - Depending on Rec 29, hold/extinguish
  - Type C
    - Levy could be used to fund JR purchase of RECs (hold/extinguish)
    - Precedent set by NSW Energy Savings Fund levy on DNSPs



## Possible State-based RO scheme designs (cont.)

- Based on Green Power-accredited generators
- Retailer licence conditions could set requirement:
  - enter into contractual obligations that include a certain amount of electricity from generators accredited under the GP scheme (or as described)
  - not Green Power as GP uses RECs for auditing
  - could use some form of tradeable certificate, not necessary
- GP is a State government scheme, increased political acceptability?



## Additional design issues

- Size of target
- Relative (%) or absolute (GWh) target
- Timeframe of operation
- Time limit for generators to participate
- Exclusion of generator types
- Size of penalty, indexation
- Restriction to a particular state



## Size of target

- 1997, 16,000 GWh from RE. 205,000 GWh total projected for 2010, additional 9,500 GWh required to increase from 10.5% to 12.5%.
- Current 2010 projection is 234,500 GWh, 25,500 GWh 10.9% RE
- Choice influenced by community expectations, short term cost and local industry development and employment

Table 1 Percentage and Corresponding GWh Targets in 2010

<b>Approx % MRET Target <sup>a</sup></b>	<b>Total percentage</b>	<b>GWh MRET</b>	<b>GWh total (includes 1997 existing)</b>
No MRET	6.8%	0	16,000
Current MRET 2010	10.9%	9,500	25,500
2%	12.5%	13,300	29,300
5%	15%	19,200	35,200
10%	20%	30,900	46,900
Current MRET 2020	8.7%	9,500	25,500 <sup>b</sup>
10% in 2020	20%	42,600	58,600
20% in 2020	30%	71,900	87,900

a: in terms of a percentage increase over the 1997 percentage

b: assumes 16,000 GWh in 1997 is maintained through to 2020



## Relative (%) or fixed (GWh) target

- Fixed target
  - Could underestimate future demand and result in a lower percentage
  - Could overestimate demand (energy efficiency measures, oil price impacts)
  - Greater investment certainty
- Relative target
  - Allows for changes in demand
  - Would need to be set as absolute target each year
  - Uncertainty offset by shortfall flexibility, assigned generation declarations

## Timeframe of operation

- Current 2020 end date is problematic for 15 year payback
- MRET Review recommended extension to 2035
- GP-generator scheme most amenable to extension beyond 2020



## Time limit for generators to participate

- Large hydro predicted to provide 27% of RECs to 2020
- MRET Review recommended new baseline after 15 years
- This would still allow fluctuation around new baseline, RECs created but not paid back
- Better to have absolute time limit
- Although old hydro soaked up by old scheme, and not relevant for GP-generators, time limit still encourages new plant
- Limit banking, otherwise effectively extends plant life

## Exclusion of generator types

- Could exclude large hydro, SWH, bioenergy types
- MRET-based scheme: up to Jurisdictional Regulators
- GP-based scheme: many excluded, SWH (RECs but not GPRs), now out



## Size of penalty, indexation?

- Size Current penalty \$40/MWh (\$57 after tax), not indexed
- 4% annual inflation halves penalty over 15 years
- State scheme
  - Indexing penalty alone isn't enough, as would just pay penalty for MRET
  - Could require an additional REC (or an additional MWh from GP generator) if penalty is paid
  - Include caveat that penalty could be paid for State scheme if is less than marginal cost of RE required to meet both schemes
  - Requires access to level of liable parties' shortfalls, MRET Review Panel recommended this information be publicly available



## Restriction to a particular state

- Result in
  - increased short term cost
  - greater employment
  - greater local industry development
  
- Possibly restricted by
  - Availability of RE resources
  - Ability of network to accept stochastic plant
  
- Legal issues
  - Can't duplicate Commonwealth scheme
  - Possible contravention of Constitutional requirement there be no barriers to free trade
  - NGAS: DSA and biosequestration must be in NSW
  - Qld 13% gas scheme: interstate generators can participate but only to the extent they contribute to meeting Qld load



## Comparison of MRET and GP-based approaches

- MRET-based
  - Uses existing mechanisms
  - Reduced complexity and establishment costs
- GP-based
  - No 2020 end point
  - If entirely through contracts - absence of trading on spot market reduces cost volatility and uncertainty
  - Price discovery could still occur through existing MRET?
  - Avoids creation of two types of RECs
  - More politically acceptable as is entirely State-based?



## MLET: Mandatory Low Emission Target

- Emissions intensity
- Certain amount of electricity with an average of 0.2tonnes/MWh
- Not technology specific
- Could be made up with mix of technologies
- Would support renewables and gas-fired now and other technologies (CCS) if and when they become available



## Also need ....

- Integrated policy framework
- Access to distribution network
- Integration of stochastic generators into NEM
- Appropriate planning guidelines
- Community acceptance



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