UNSW SCHOOL OF ELECTRICAL ENGINEERING + TELECOMMUNICATIONS
ELECTRICITY RESTRUCTURING GROUP

Markets for Ecosystem Services – Pre-Symposium Workshop

Experience with Market-based approaches to Climate Change Regulation in the Australian Electricity Industry

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UNSW **E**lectricity **R**estructuring **GrO**up

- Informal research collaboration group focussing on
  - Electricity restructuring; operation of Electricity markets in Australia + elsewhere
  - Emerging power technologies
  - **Electricity industry sustainability**
  - **Energy policy**
- Based at UNSW School of Electrical Engineering
  - Headed by Assoc./Professor Hugh Outhred
  - Includes links to Securities Industry Research Centre (SIRCA), Aust. Graduate School Management (AGSM), Key Centre for PV Engineering, Faculty of Commerce + Economics (FCE), more...
- *A work in progress…. www.ergo.ee.unsw.edu.au*

Recent market instruments work….

- Market-based environmental regulation in the Restructured Australian Electricity industry **IAEE, June 2003**
- Energy Efficiency Certificate Trading, **Discussion paper, April 2003**
- Wind Generation in the Australian NEM: market design issues for new entrant 'intermittent' generation, **IBC Wind Conf., April 2003**
- Some Strengths and Weaknesses of Electricity Industry Restructuring in Australia, **IEEE PowerTech03, June 2003**
- National Emissions Trading for Australia: key design issues and complementary policies for promoting energy efficiency, infrastructure investment and innovation, **AJEM, August 2003**
- Experimental Economics Workshop: Insights for the design of Australian electricity, gas and environmental markets with Vernon Smith and Stephen Rassenti of GMU, **UNSW, March 2003**

- ***See www.ergo.ee.unsw.edu.au for more details….***

Presentation outline

- The role of env. regulation in the electricity industry
- Key Australian market-based regulatory measures for climate change
  - Electricity industry 'reform'
  - Mandatory Renewable Energy Target (MRET)
  - NSW Greenhouse Benchmarks Scheme
- Key lessons from experience to date
- Where next?

Why regulate the electricity industry?

- A possible economist's (and Australian NCP) perspective
  - *For when the market does not provide efficient societal outcomes*
    - Monopolies
    - Public Goods
    - Incomplete markets
    - Information failures
    - The 'Business Cycle'
    - ***Externalities***
- *Electricity* markets
  - Would seem at risk of all these types of market failures
- *Externalities*
  - Pose particular challenges
    - Measurement, private cost – public benefit analysis
  - *Climate change* poses yet further challenges
    - Fundamental transformation that seems required (no easy 'fix')

Electricity markets and env. regulation

- Regulation to ensure imperfect market 'means' lead to desired environmental 'policy' ends

- Regulatory approaches
  - Technical 'command and control'
  - **Financial** – pollution taxes
    – markets in tradeable permits / credits

- *Market-based EI => must be effective yet compatible*

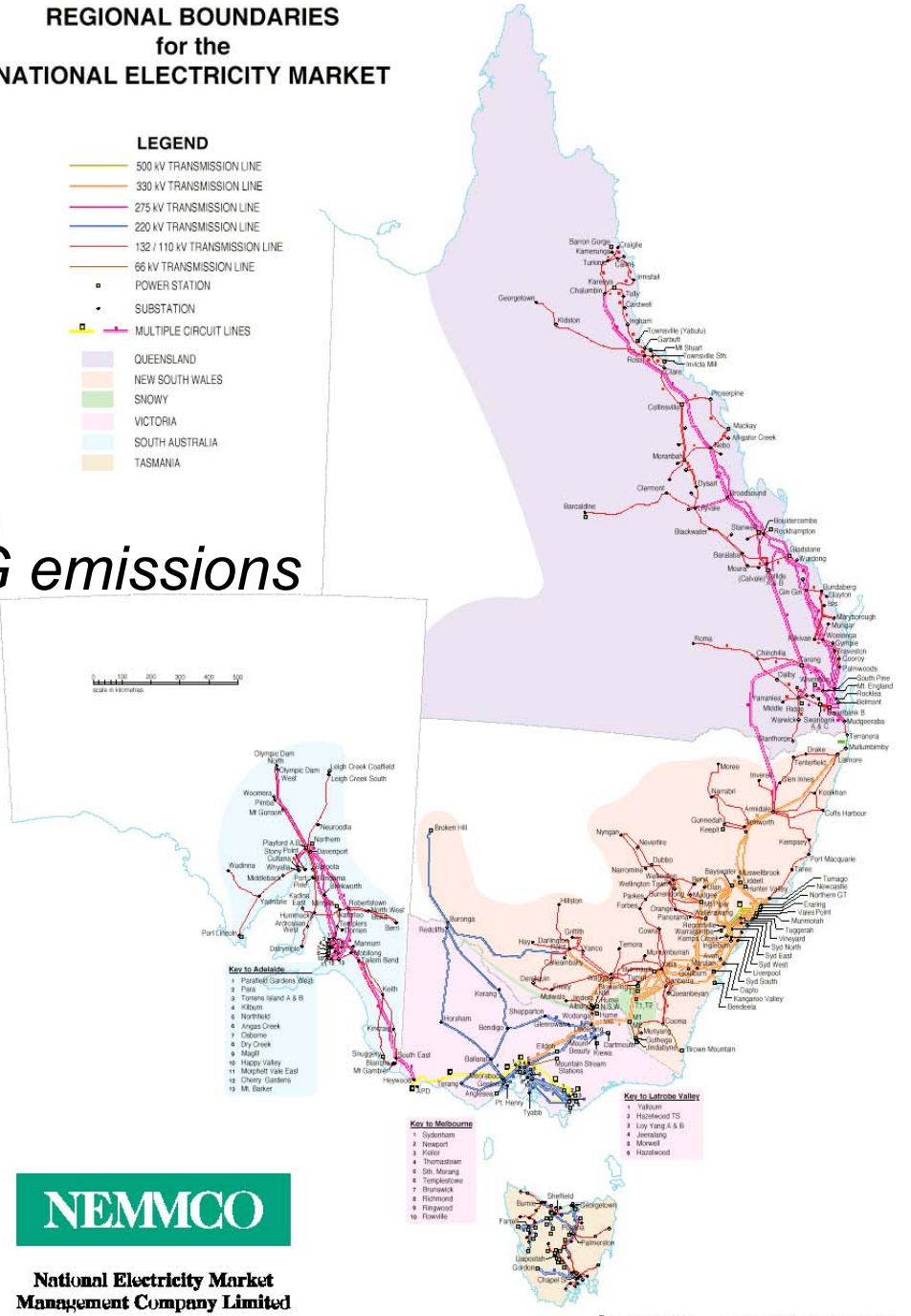
The restructured Australian EI

- Restructuring underway for decade + continues (eg. *CoAG Energy Market Review*)
- Centrepiece is a multi-region NEM
  - Wholesale spot market - 30 min bidding, 5 nodes
  - Active forward trading of financial instruments
  - Ancillary services markets for frequency control
  - Compulsory for all generators > 30MW, Network Service Providers + retailers

The NEM

- 5 States + territories
- covers ~90% of population

- *nearly 30% of national GHG emissions*



Greenhouse market-based regulation

- EI subject to a confusing mix of Federal and State govt. objectives + jurisdictions (+ ownership + …)

- We will consider
  - **Electricity industry restructuring to date**
  - **Mandatory Renewable Energy Target (MRET)**
  - **NSW Greenhouse Benchmarks scheme**
  - Queensland 13% Gas scheme
  - Green power

Impact of Australian EI restructuring

- CoAG national energy policy objectives include the need for action on climate change
- National Electricity Code (NEC) doesn't include specific env. objectives
- However, expectation by some that would help "14 MtCO2 reduction from BAU in 2010":
  (Commonwealth Govt, *Climate Change: 2nd Communication to IPCC,* 1997)
  - Efficient competition in supply by cogen + renews
  - More sensible patterns of energy use through incentives for investment in EE
  - Greater penetration of natural gas

Outcomes of Australian EI restructuring

- Instead, now projected to increase 0.1MtCO2 above BAU (CoAG, 2002)
  - Low cost of coal fired generation in Australia
  - Excess electricity capacity depressing prices
  - Relatively immature and inflexible gas market
  - Reduced emphasis on EE from lower prices
  - **Current failure to price greenhouse emissions**
  - **Market design and regulation that favours incumbents (eg. for wind)**
  - **Supply-side orientation of reforms to date**

Mandatory Renewable Energy Target

Renewable Energy (Electricity) Act 2000

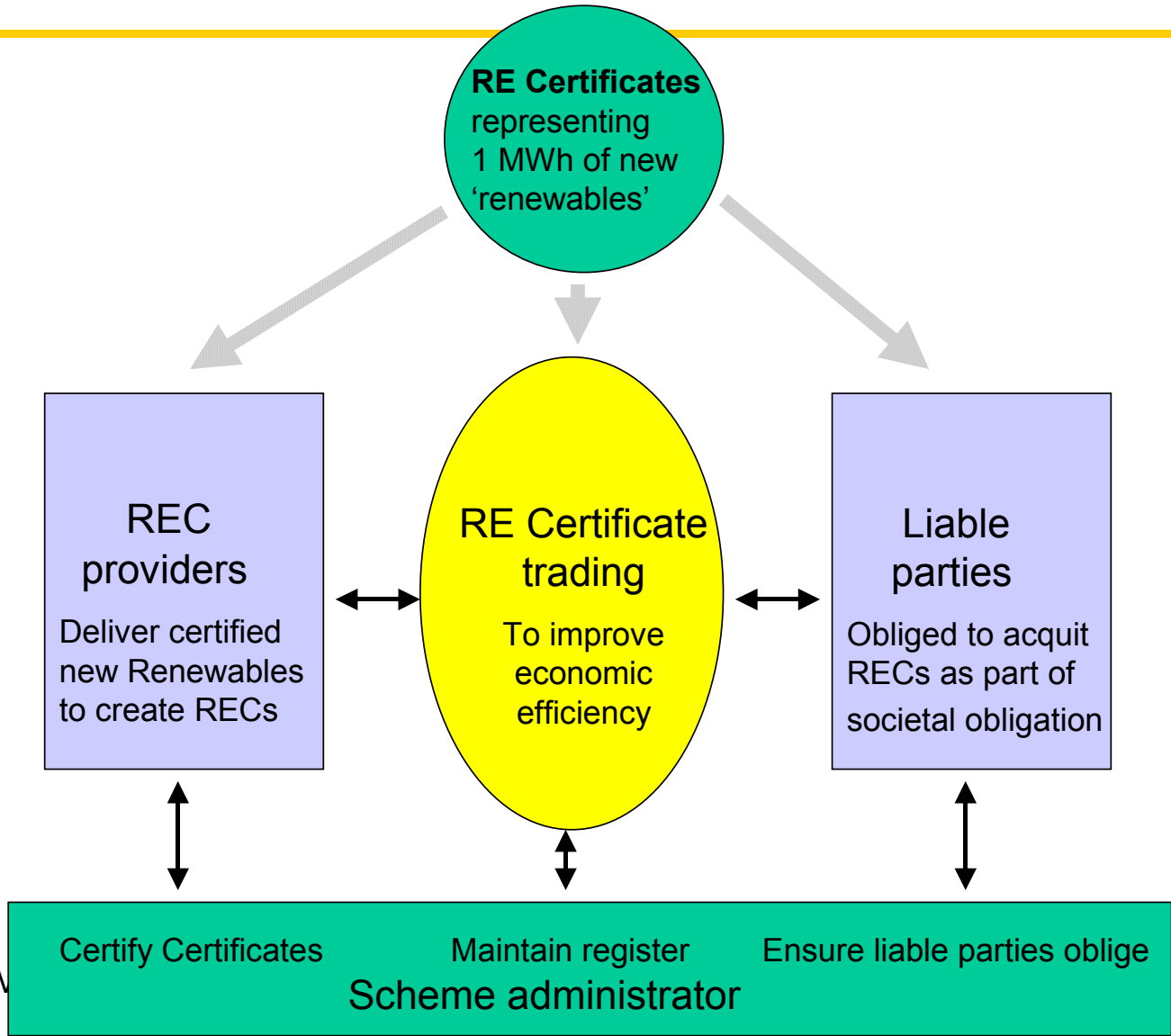
The objects of this Act are:

(a) to encourage the additional generation of electricity from renewable sources; and

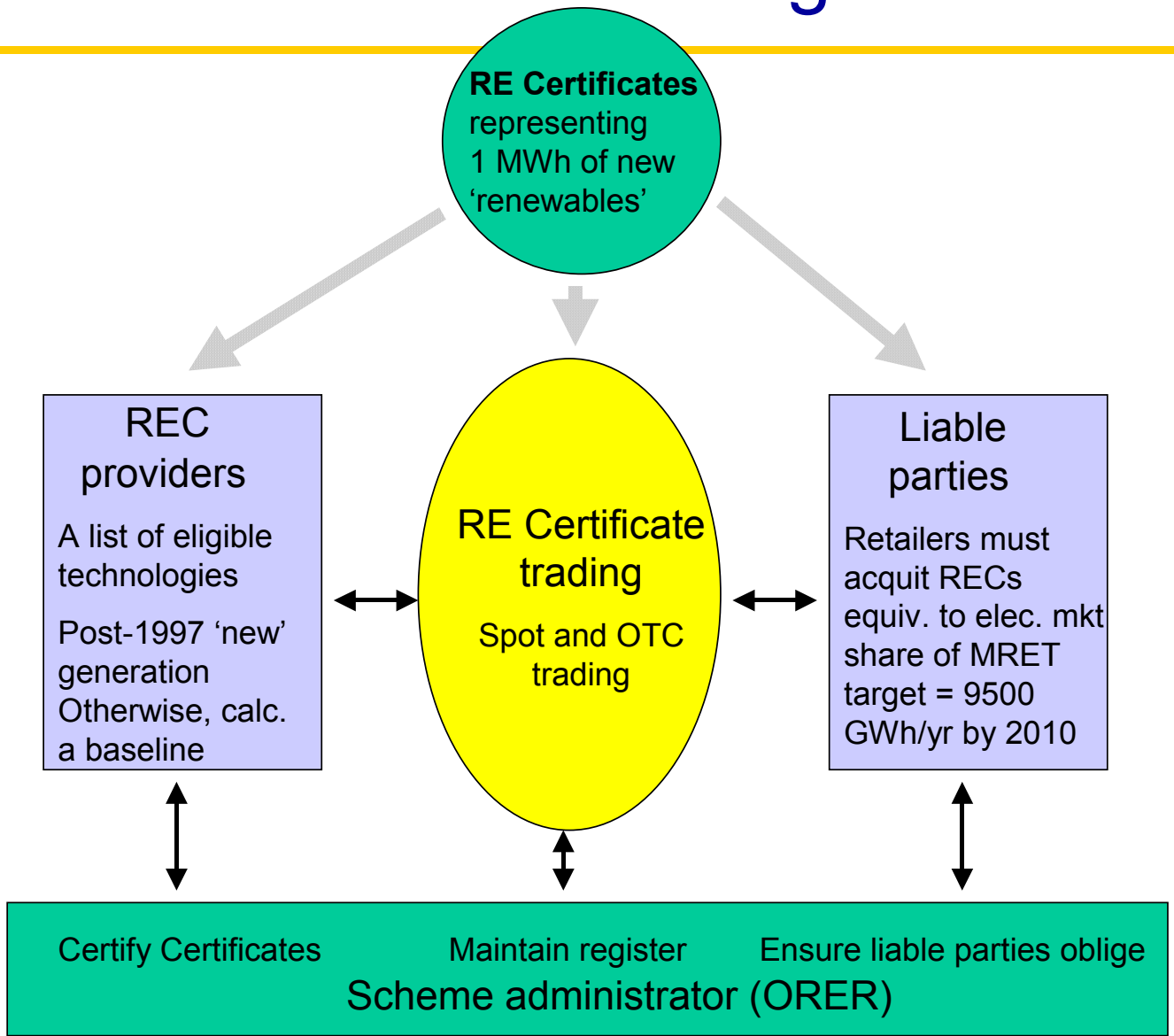
(b) to reduce emissions of greenhouse gases; and

(c) to ensure that renewable energy sources are ecologically sustainable.

MRET – a 'designer' market



MRET 'settings'



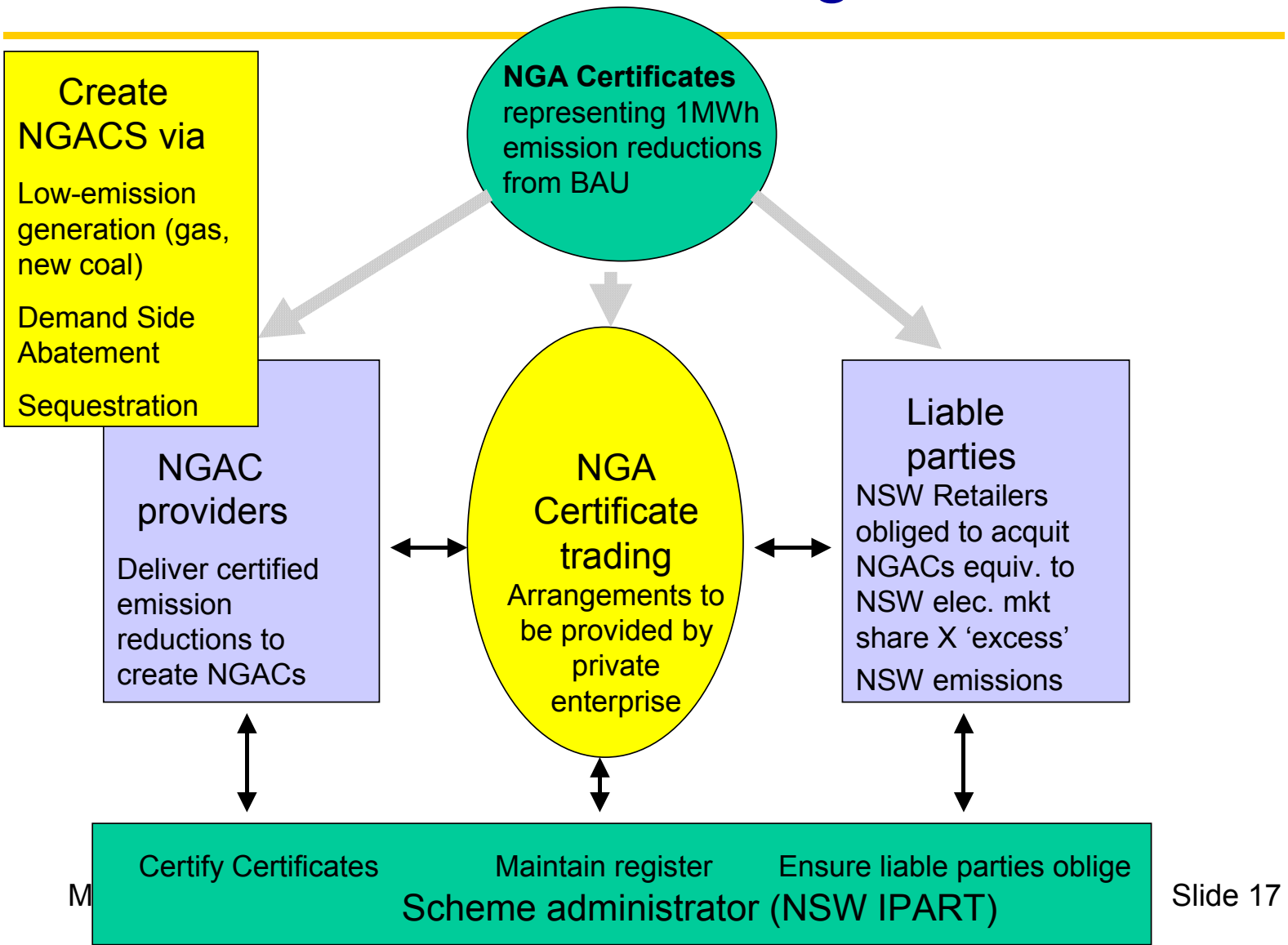
MRET performance to date

- Now operating for two years
- Ramping target easily met
- Challenges
  - Public opposition to some 'eligible' renewables
  - Inadequate target, in terms of settings (+2%) and objectives for greenhouse + industry development
  - Market information failures
    - Can register RECs any time => information asymmetry
    - Only annual acquittal => poor price discovery
- **Baselines**
  - **All BAU baselines are 'made up'**
  - **Large hydro particularly problematic**
    - Baselines for hydro scheme where output limited by demand
    - Variable renewable generation and 'The ratchet'

NSW Greenhouse Benchmarks Scheme

- Policy intent
  - "reduce greenhouse gas emissions associated with the production and use of electricity..."
    (Overview to the Electricity Supply Amendment Bill, 2002)
- Implementation
  - State per-capita greenhouse gas emissions targets for the NSW Electricity Industry via Retailer Licence Conditions
    (NSW Electricity Supply Act, 1995)
  - Baseline+credit 'emissions reductions' trading

NSW Scheme – a 'designer' market



NSW Scheme - Challenges

- Jan 2003 start - still being finalised…

  however

  – Fungibility of different emissions reduction activities: is planting trees equivalent to building wind farms …how do you measure planting trees in a 'credible' way
  – 'Imputed' emissions rather than physical emissions
  – Many baselines reqd, and for very different activities
  – Double counting (free-riding) other policy measures
  – Complexity
  – Jurisdiction: eg. new gas-fired generation anywhere in NEM can create GHG reductions for NSW target

Key lessons

- Electricity markets are 'designer markets'
  - Will not 'necessarily' deliver improved environmental outcomes
  - Require pricing externalities, *yet more*
    - Design, regulatory and institutional choices should not favour centralised incumbents and supply-side players
  - Clear roles for technical regulation
- Many abstractions and design choices required for MBIs
  - Can have marked impacts on effectiveness + efficiency
  - Potential for unwieldy complexity
- Setting appropriate baselines in 'baseline + credit' schemes to ensure effectiveness is problematic
  - and holds moral hazards for policy makers
- Broad reach of MBIs increase potential interactions with other policy measures that reduce effectiveness

Key lessons (cont.)

- Serious 'market for lemons' risks with tradeable instruments having measurement, verification and additionality difficulties
  - 'poor quality' yet low-cost projects can crowd out more expensive 'high quality' activities
- Creating transparent, liquid markets that allow efficient price discovery + risk management by participants can be challenging

What's next?

- Projected that emissions with present 'climate change' measures will still rise markedly
- CoAG Energy Market Review recommends *National emissions trading to replace MRET, NSW Benchmarks, and Qld 13% Gas scheme*

- Proving harder to design + implement effective MBIs for climate change regulation in the EI than many had hoped ….particularly because of complex framework required to effectively exploit their flexibility and efficiency