



CEEM Specialised Training Program

El Restructuring in Australia

Environmental regulation and the NEM

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Australian energy policy

- COAG has agreed to the following national energy policy objectives: (COAG ENERGY POLICY DETAILS: 8 JUNE 2001)
 - Encouraging efficient provision of reliable, competitively-priced energy services to Australians, underpinning wealth and job creation and improved quality of life, taking into account the needs of regional, rural and remote areas;
 - Encouraging responsible development of Australia's energy resources, technology and expertise, their efficient use by industries and households and their exploitation in export markets; and
 - **Mitigating local and global environmental impacts, notably greenhouse impacts, of energy production, transformation, supply and use.**

Energy market regulation

- Regulation to ensure imperfect market ‘means’ lead to desired societal ‘policy’ ends
 - *Energy* markets pose challenges
 - *Electricity* markets pose particular challenges
 - Shared nature of operation + hence decision making
 - *Externalities* pose particular challenges
 - Measurement, private cost – public benefit analysis
 - **Climate change** poses yet further challenges
 - Long time horizon of impacts and required actions
 - Only recent recognition that it’s a problem
 - The fundamental transformation of our fossil-fuel dependence that seems to be required (no easy technical ‘fix’)
- *Focus here is on climate change environmental externality regulation in the Aust. Electricity industry*

Env. regulation in the Australian EI

- Traditionally (state owned vertically integrated EI)
 - Air, water and solid waste pollutants; land use
 - Technical ‘command + control’ approaches favoured, generally directed at generators
 - Some financial approaches – eg. NSW Load based licensing
 - Growing interest in market based regulation – *arguably*:
 - Efficiency advantages
 - Highly compatible with ‘competitive’ restructured EIs
- => Some innovative *market* policy measures
- Tradeable permits (Hunter Salinity Trading Scheme)
 - Tradeable credits – climate change related schemes

Environmental market-based regulation

- Schemes we will consider
 - Electricity industry restructuring
 - The Mandatory Renewable Energy Target (MRET)
 - The NSW Greenhouse Benchmarks scheme
 - Queensland 13% Gas scheme
 - Green power
 - *Possible* implementation of a National Emissions Trading Scheme (ETS)

Electricity industry restructuring

- NEC doesn't include specific environmental 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

Electricity industry restructuring

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

Mandatory Renewable Energy Target

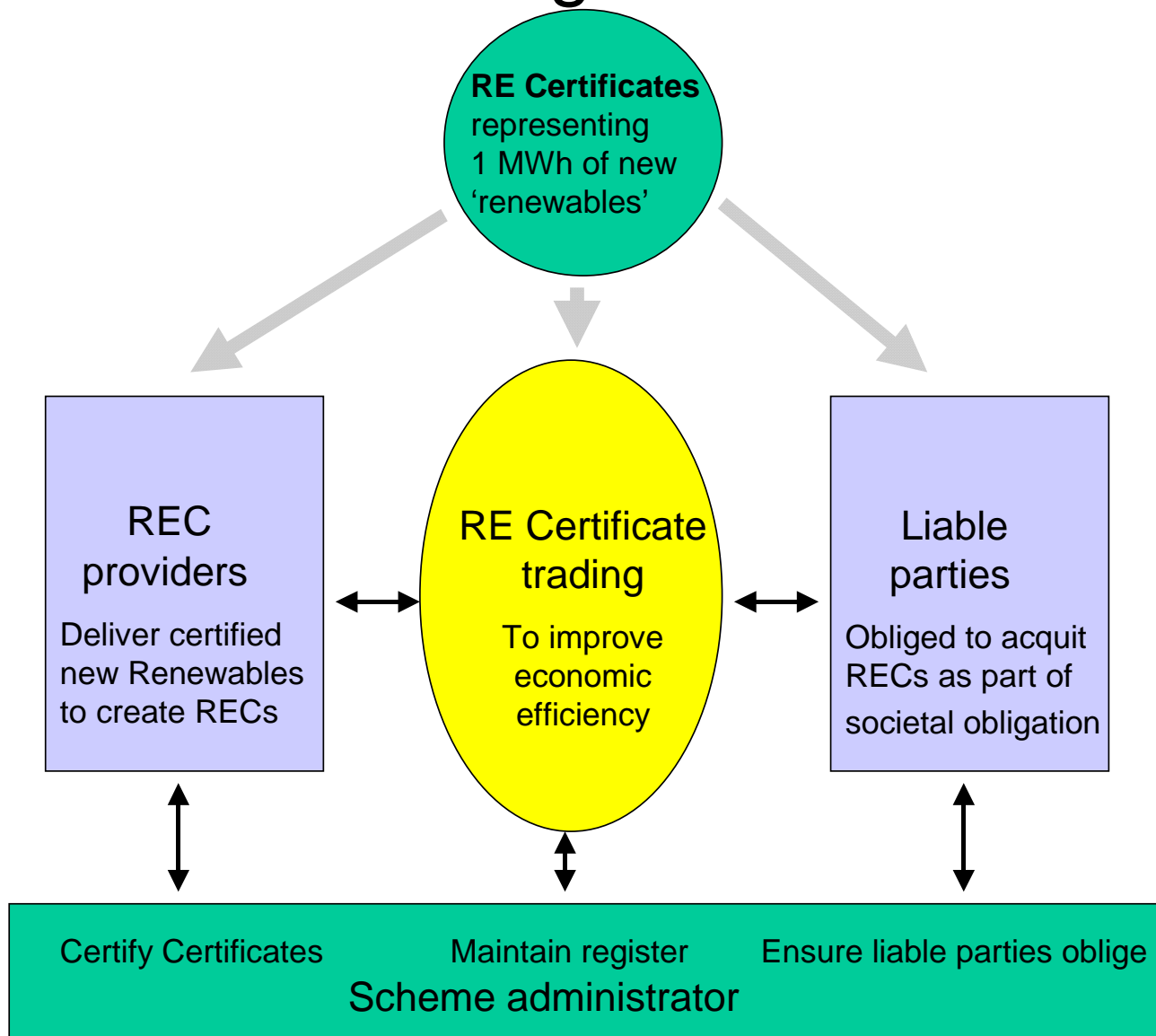


Renewable Energy (Electricity) Act 2000

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’ env. market



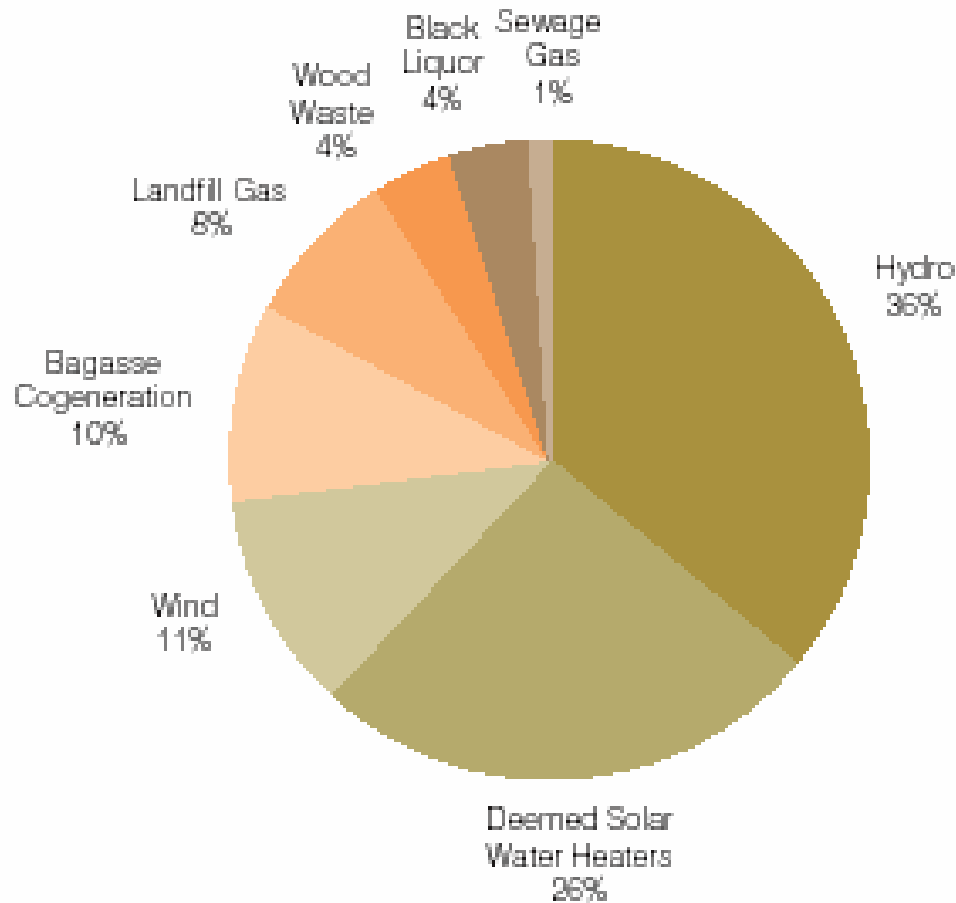
MRET 'settings'

- +2% renewables target for 2010 => 9,500 GWh
- Eligible sources of 'renewable' energy
- Credits 'additional' renewable generation
 - Post 1997 projects
 - For pre-1997 projects => a 'baseline' from which to establish *additionality*
 - 'deemed' new generation for small equipment

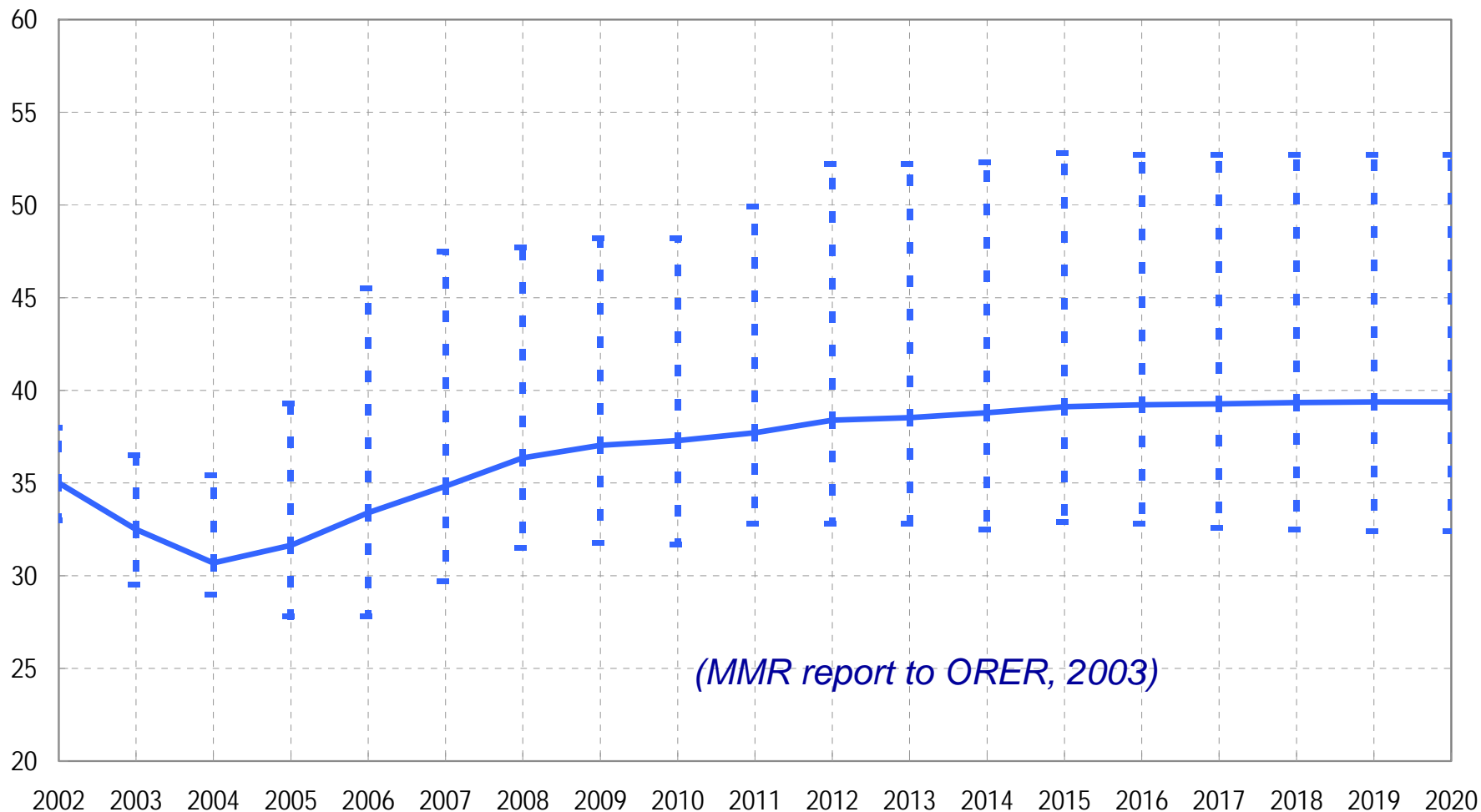
MRET performance to date

- Now operating for two years
 - Ramping target easily met
 - Some important 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’
- CEEM Training Program – *El Restructuring in Australia*

Actual installations – 17 August 2003



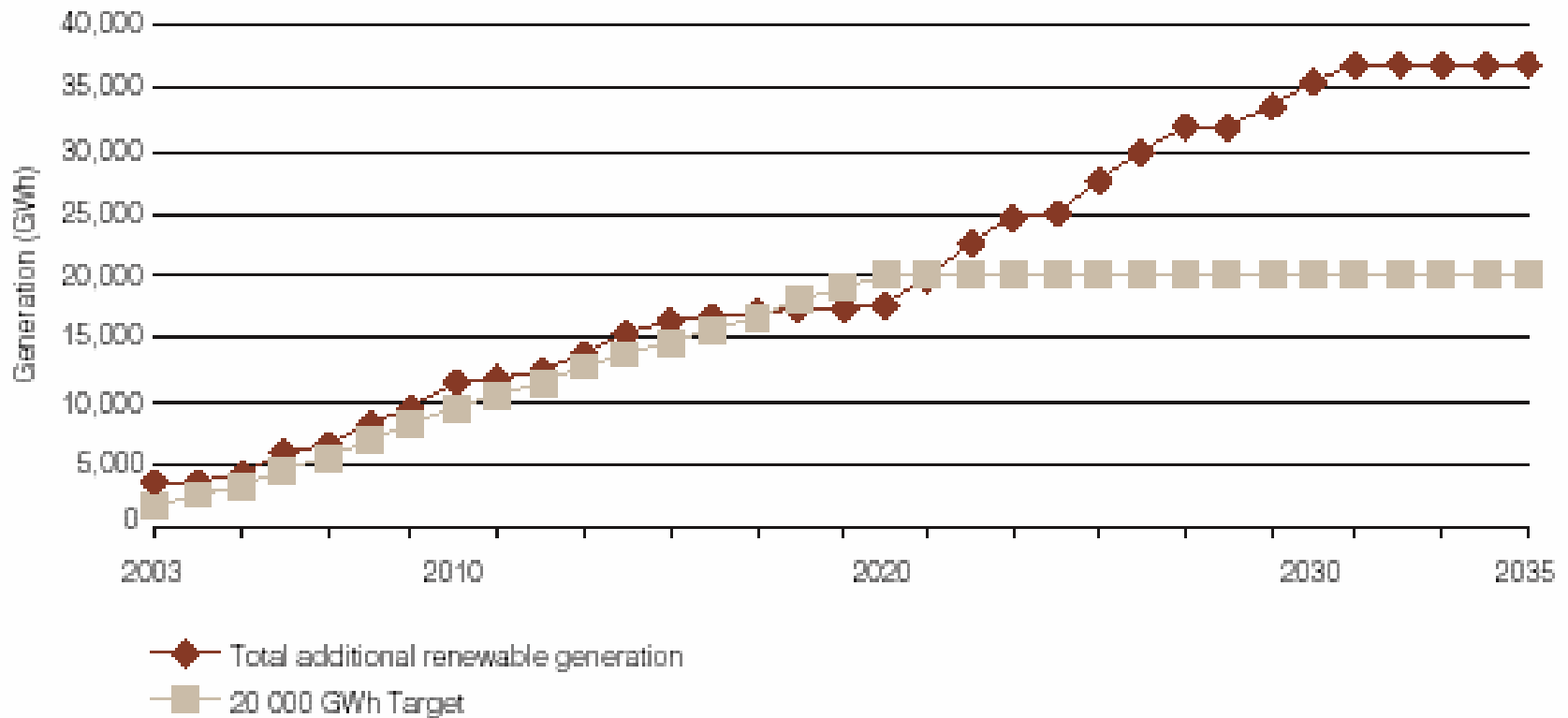
Renewable Energy Certificate price projections (A\$/MWH)



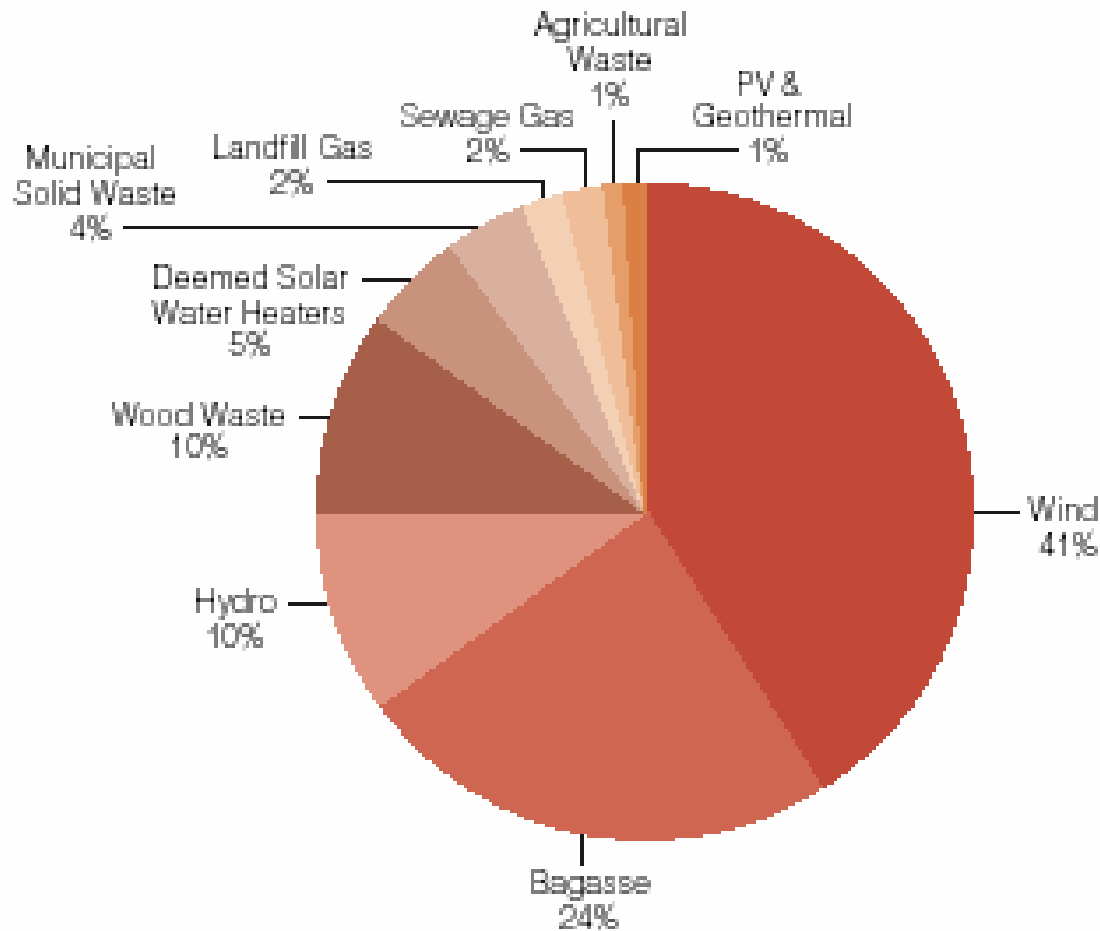
(MMR report to ORER, 2003)

MRET Review – proposed changes to present target

(proposed to extend 2010 target of 9500GWh through to target of 20,000GWh in 2020)



Projected mix of renewables in 2020 with proposed settings (MRET Review, 2003)



NEC categories of generators

- Market, non-market or exempt
- Scheduled or non scheduled:
 - Scheduled implies centrally dispatched:
 - Must then participate in the NEM processes of bidding, pre-dispatch & PASA
 - Default category for generation projects > 30 MW
 - **Not appropriate for “intermittent” generation eg wind**

Wind turbine installations in Australia: history & forecast

Summary of wind farm projects at February 2004.

(Approximate, based on www.auswea.com.au)

Completed	200 MW
Under Construction	140 MW
Tendering	540 MW
Approved	920 MW
Planning	1100 MW
Total	2900 MW

NEMMCO viewpoint on intermittent gen.

- “Intermittent Generation in the NEM” ‘issues’
 - Forecasting
 - Increased errors in price + reserve forecasts
 - => Have just released proposal on how to deal with this
 - Frequency control ancillary services
 - increase in usage + cost of these
 - => proponents need to know that ‘causer pays’ – stay ‘tuned’
 - Network management
 - impacts on V regulation, sub 5min flows on network may cause power quality + stability issues
 - => Proponents should be aware of conditions for permission to connect to network Currently under review - changes could impact on plant design

‘Readily acceptable’ wind in the NEM

- *“Readily accepted”* – technical solutions to any associated problems that are not prohibitively expensive
- NEM might be able to readily accept up to 8000MW *if*
 - Wind installed in progressive manner
 - Wind farms widely + evenly dispersed within NEM
 - Wind farms used advanced turbine technology + control systems with remote monitoring + control
 - Advanced wind forecasting techniques developed for regional projections up to 2 days ahead

(Outhred, 2004)

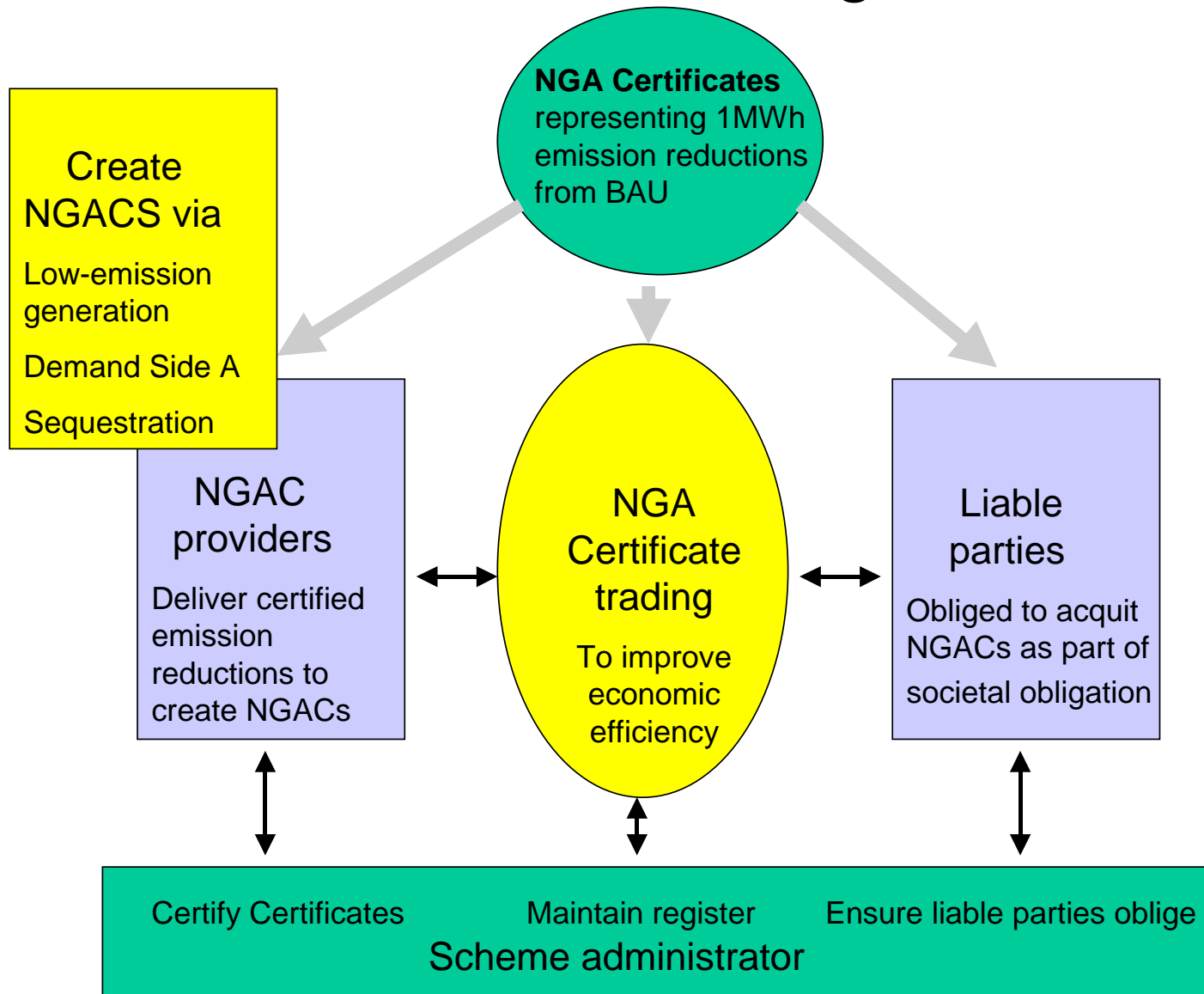
Possible responses: energy + frequency issues

- Improve management of short-term uncertainty, e.g:
 - Wind farm power forecasts - short & long term
 - Demand-side provision of ancillary services
- Improve management of system security:
 - Test ride-through capability of wind farms
 - Enhance demand-side participation
- Revisit broader NEM design philosophy:
 - FCAS, pre-dispatch, PASA

NSW Greenhouse Benchmarks Scheme

- Policy intent
 - “reduce greenhouse gas emissions associated with the production and use of electricity and to encourage participation in activities to offset the production of greenhouse gas emissions.”
(Overview to the Electricity Supply Amendment Bill, 2002)
- Implementation
 - 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



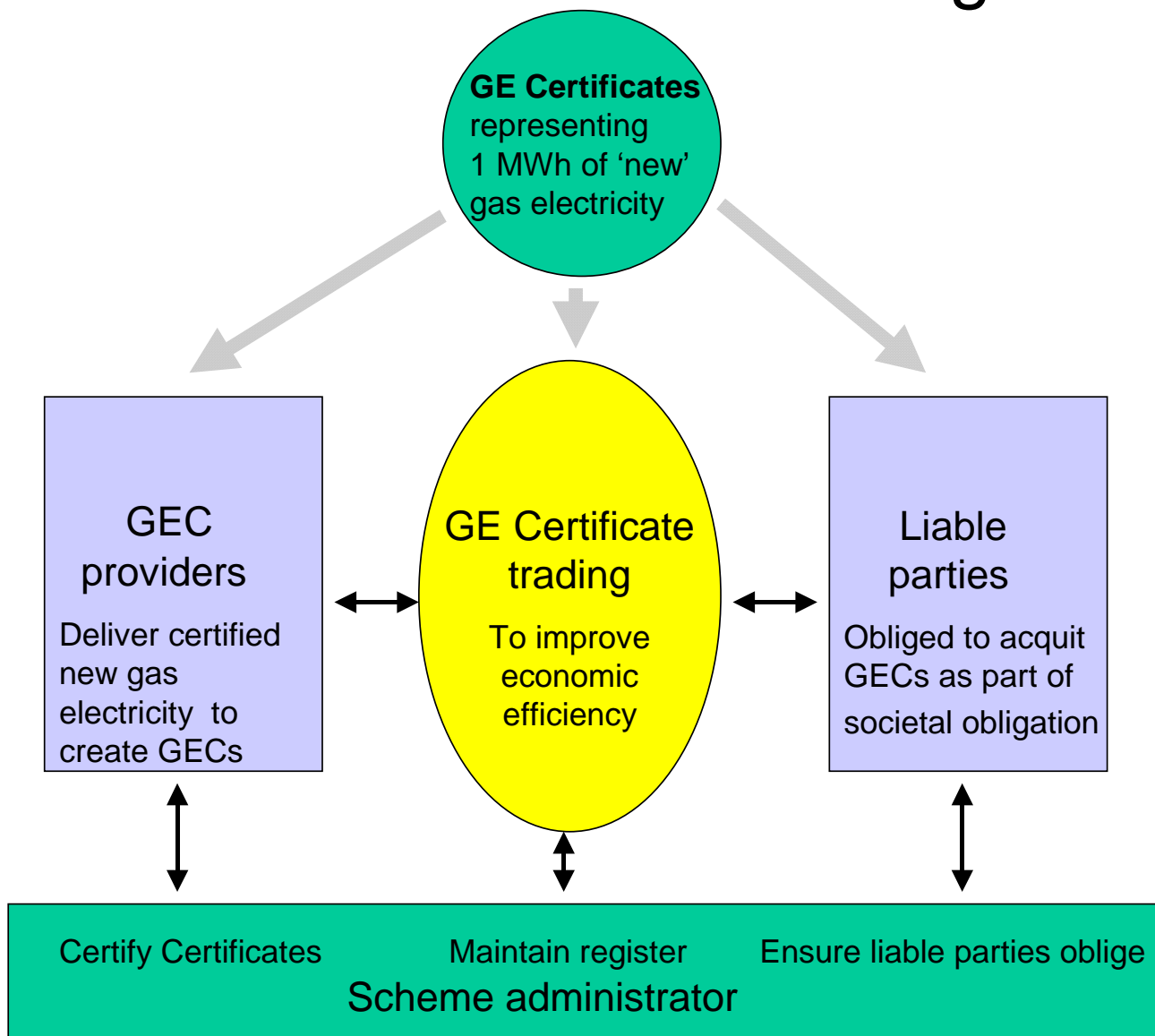
NSW Scheme - Challenges

- Jan 2003 start - still being finalised...
however
 - ‘Imputed’ emissions rather than physical emissions via pool coef.
 - Many baselines required, and for very different activities
 - Double counting across other policy measures: free-riders from MRET, GGAP, MEPS? etc
 - Fungibility of different emissions reduction activities: is planting trees equivalent to building wind farms
 - Sequestration: how to measure in a ‘credible’ way
 - Complexity
 - Jurisdiction: new low-emission generation anywhere in the NEM can contribute to NSW target

Queensland 13% Gas scheme

- >95% of Qld electricity from Coal
- Qld Government concerned about
 - “vulnerability of State’s economy to the introduction of any national and international greenhouse gas abatement measures (such as the introduction of emissions trading)
- Retailers obliged to source >13% of electricity from ‘new’ gas-fired generation in Jan. 2005
- Settings
 - Baseline is May 2002 for generation that ‘notionally’ supports Queensland load

13% Gas scheme design



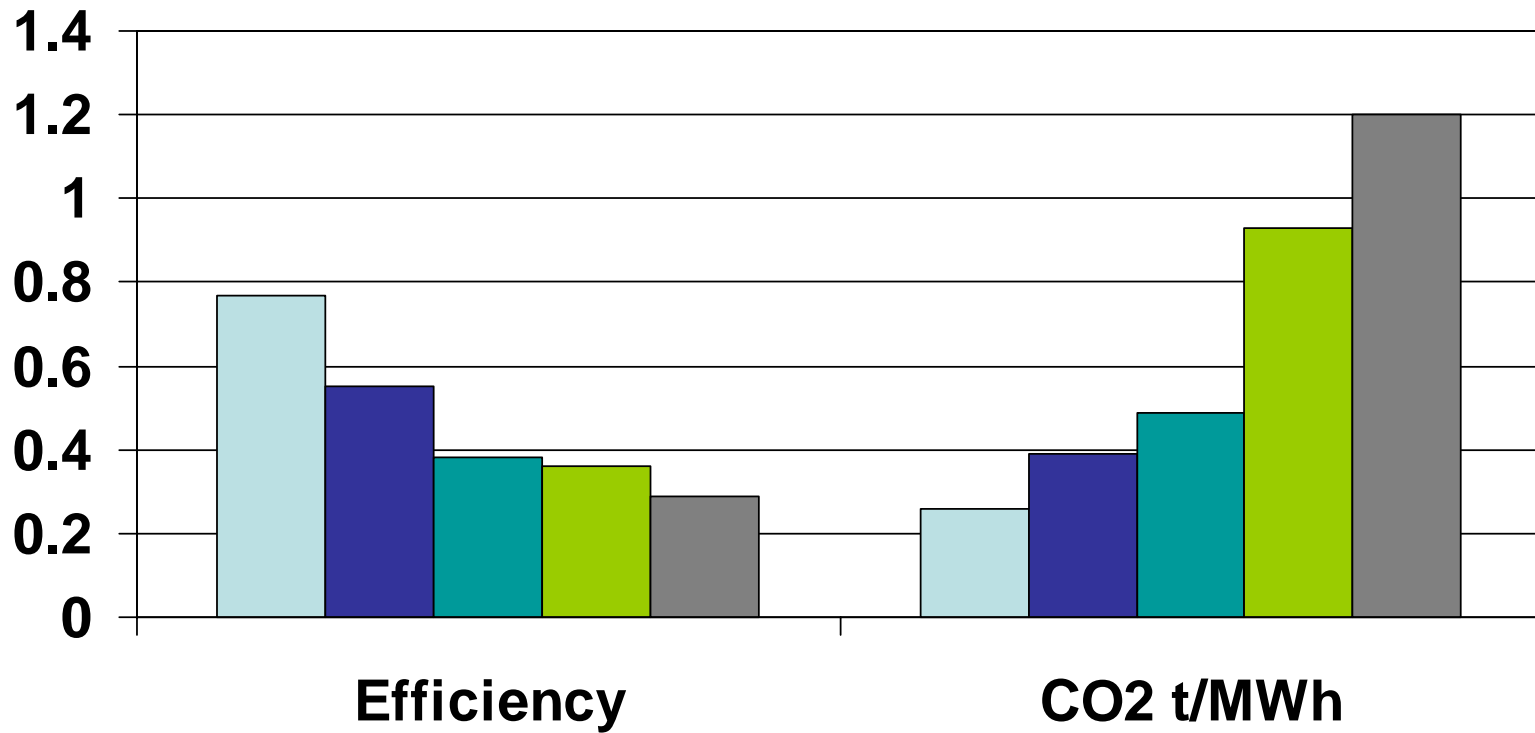
Greenpower

- Voluntary scheme for users to buy greenpower
- Design abstractions:
 - Can't physically deliver green e's => volume matching
 - Needs 'baselines' for existing renewables (large hydro)
- In Australia, national accreditation scheme
 - “to promote the installation of new green electricity generators by increasing consumer demand and confidence in Green Power products”
- Outcomes
 - Sales for 2001-2 fell 11% although customers up 13%
 - FRC questions; non-accredited products appearing

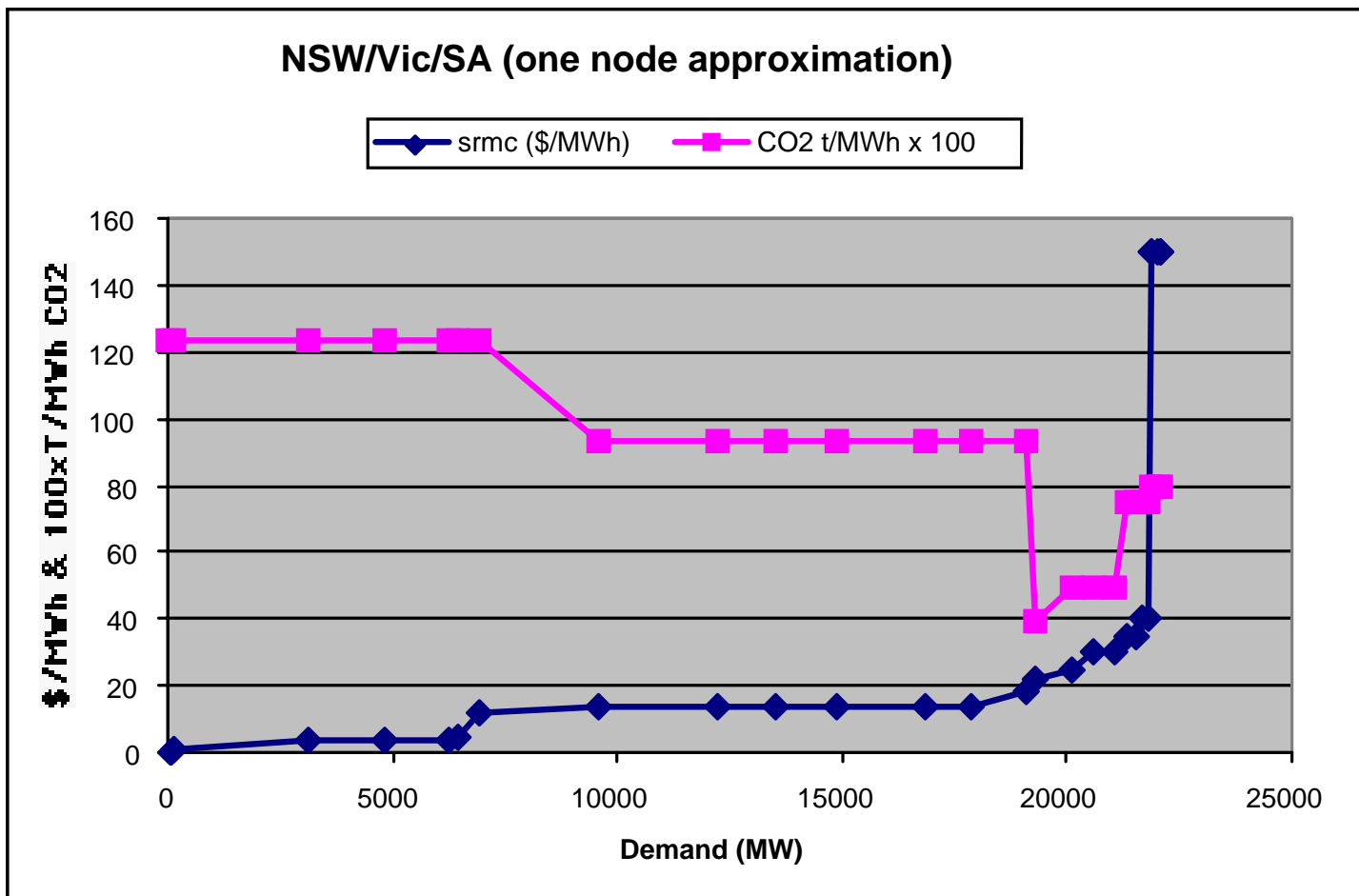
Emission trading - issues in implementation of an Australian scheme

- Emission trading options:
 - Cap & trade or baseline & credit
 - At point of emission or downstream
 - Sector-specific or economy-wide
- Best choice for electricity appears to be:
 - Stationary energy sector cap & trade at point of emission
 - Permit auctions rather than “grandfathering”, with recycling of revenue into facilitating transition
 - Price ceiling and/or floor possible
- Relationship with other schemes:
 - Compatible with MRET & carefully designed national energy efficiency certificate (EEC) scheme

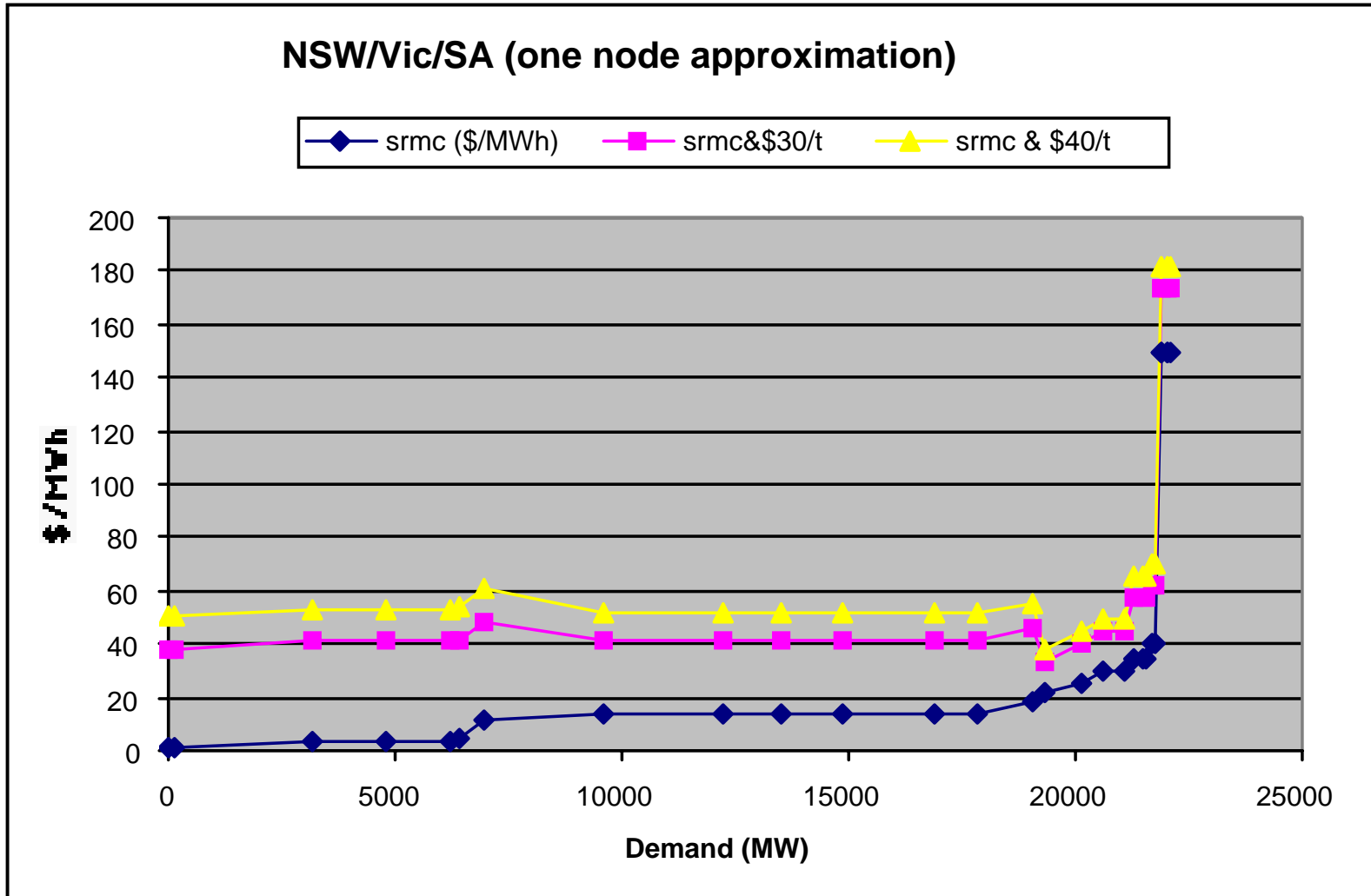
Fossil fuel plant efficiency & emission coefficients



NEM generators in order of operating cost (srmc) & generator CO2 coefficients



Effect of CO2 taxes (or permits) on merit order



Key lessons

- Elec. Industry restructuring:
 - Requires pricing externalities, and more
 - Motivation and ability for demand-side to participate
 - Design, regulatory and institutional choices should not favour centralised incumbents and supply-side players
- Perils of abstraction – especially baselines
 - Complexities, moral hazards
- Policy interactions that reduce effectiveness
 - Both unintended, and free-rider moral hazards
- Possible problems with trading schemes
 - ‘Market for lemons’ if tradeable commodity not credible