



Centre for Energy and
Environmental Markets

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Market-based Policy Instruments for Climate Change

IEST5011: Managing the Greenhouse, *July 2005*

Iain MacGill



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’)
- *Our focus here is on climate change environmental externality regulation in the Aust. Electricity industry*



Environmental regulation in the EI

- Electricity industry poses particular challenges
 - Large climate changes impacts (32% of Aust. GHG)
 - Shared nature of EI operation + *hence decision making*
- General approaches
 - Technical ‘command and control’
 - Apply to industry participants physically causing impact
The generators
 - Financial
 - Pollution taxes, **markets in tradable pollution permits / credits**
 - Allows other industry participants to be made liable
*Eg. Retailers However, **Abstraction** is required*



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



The restructured Australian EI

- Environmental regulation in a restructured EI must be compatible with competition yet still effective in meeting environmental objectives
- EI restructuring in Australia underway for a decade, and continues (eg. CoAG Review)



Env. market-based regulation

- Schemes we will consider
 - The Mandatory Renewable Energy Target (MRET)
 - Queensland 13% Gas scheme
 - Green power
 - **The NSW Greenhouse Gas Scheme (NGAS)**
 - **EU Emissions Trading Scheme (ETS)**



Mandatory Renewable Energy Target



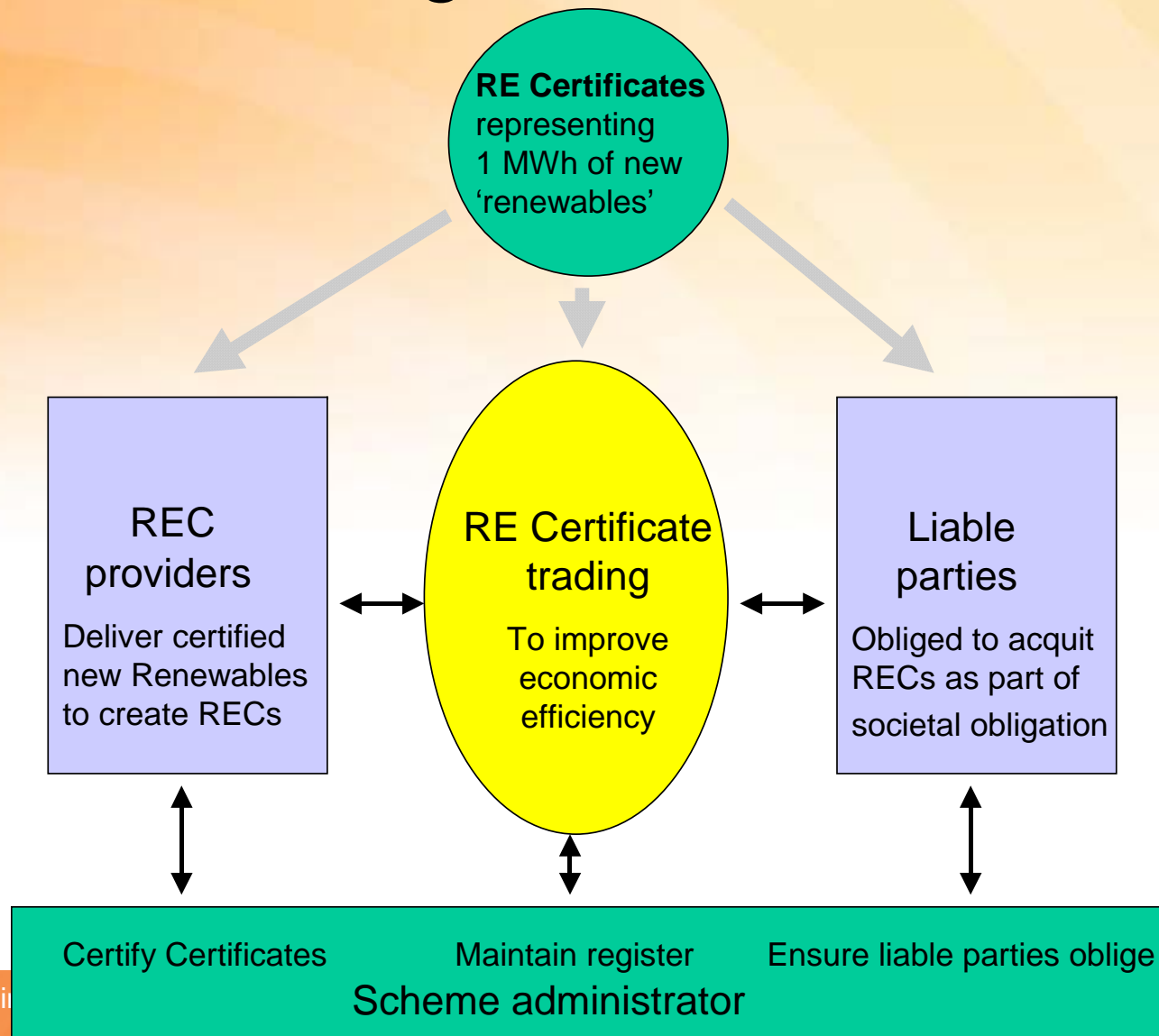
Renewable Energy (Electricity) Act 2000

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'

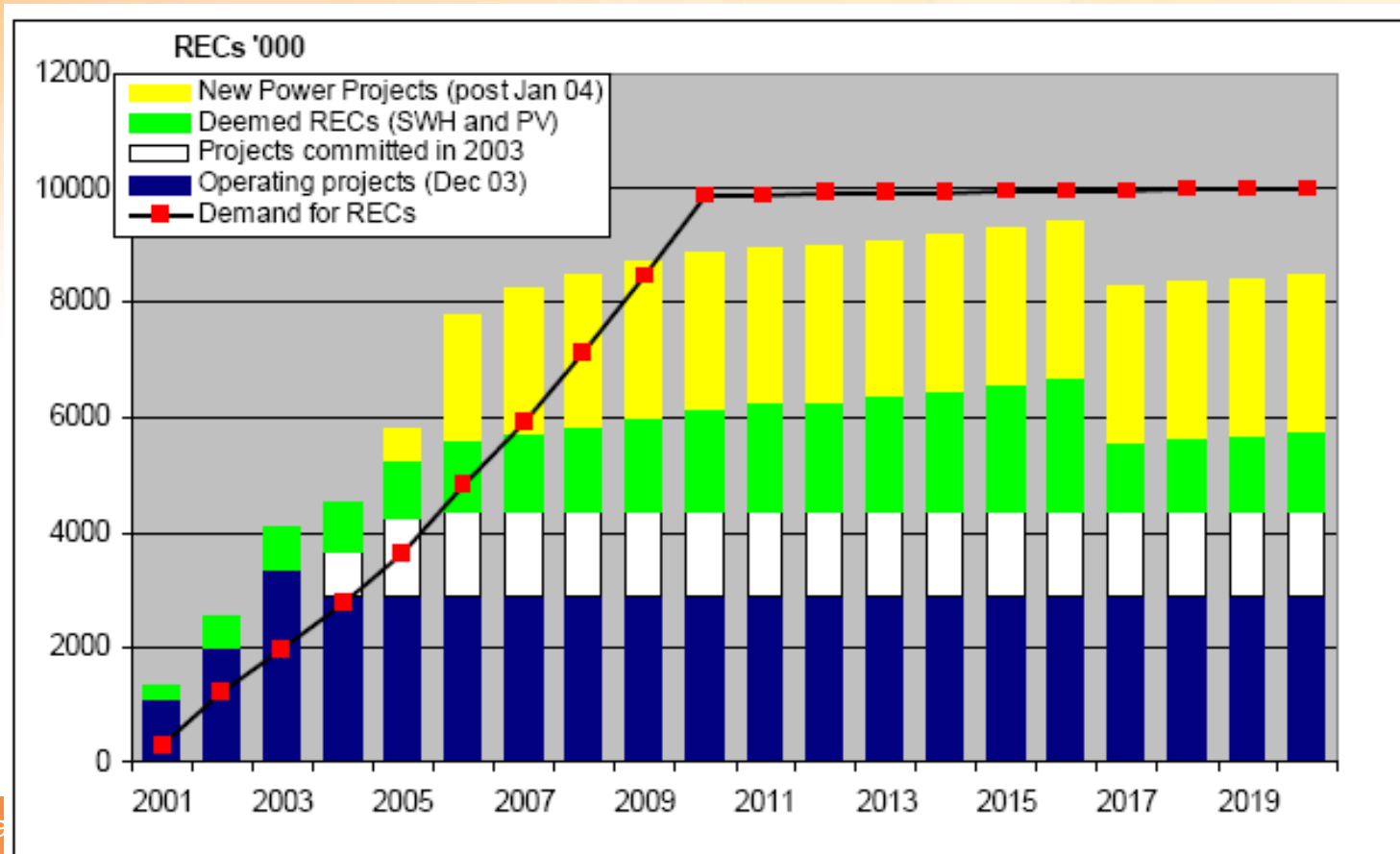
- +2% renewables target for 2010 => 9,500 GWh
- Eligible sources of 'renewable' energy
- Credits 'additional' renewable generation
 - Post 1997 projects
 - For pre-1997 projects => 'baseline' from which to establish *additionality*
 - 'deemed' new generation for small equipment

- **MRET problems**
 - Inappropriate baselines for old-hydro – 'free rider' RECs
 - Renewable generation from old-growth forest – 'dead koala RECs
 - An investment boom then crash?



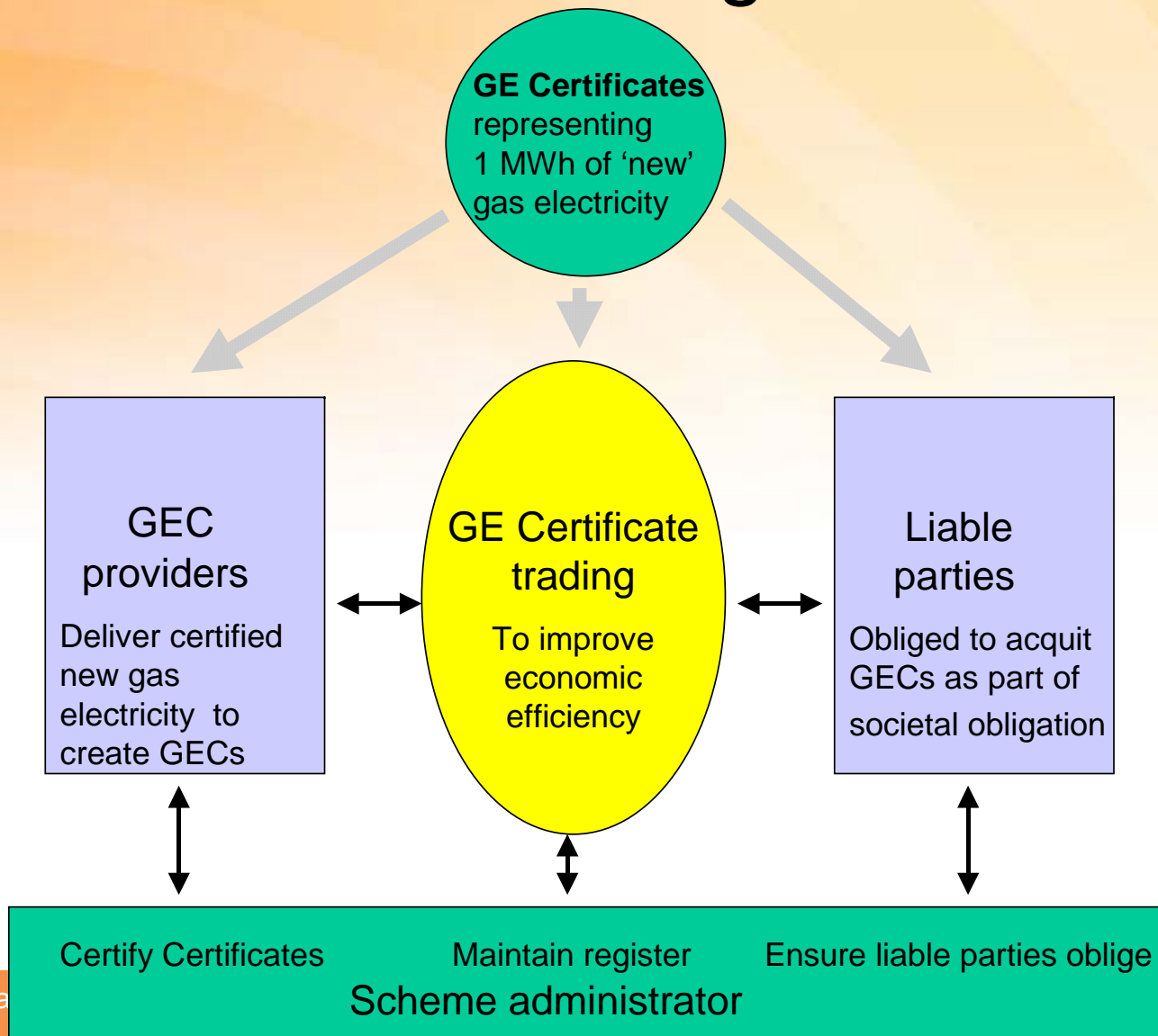
Present MRET is just about finished

- The Federal Govt. has rejected key review finding of a higher target to 2020
- BCSE estimates only approx. 700-800MW of new (post Jan04) projects required to meet existing target, and...
- ...project commitments > 500MW in 2004 leaves < 300MW new projects reqd





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
 - Customers and sales represent <1% of market
 - FRC questions; non-accredited products appearing



NSW Greenhouse Scheme

- Policy intent

- “reduce greenhouse gas emissions associated with the production and use of electricity...”

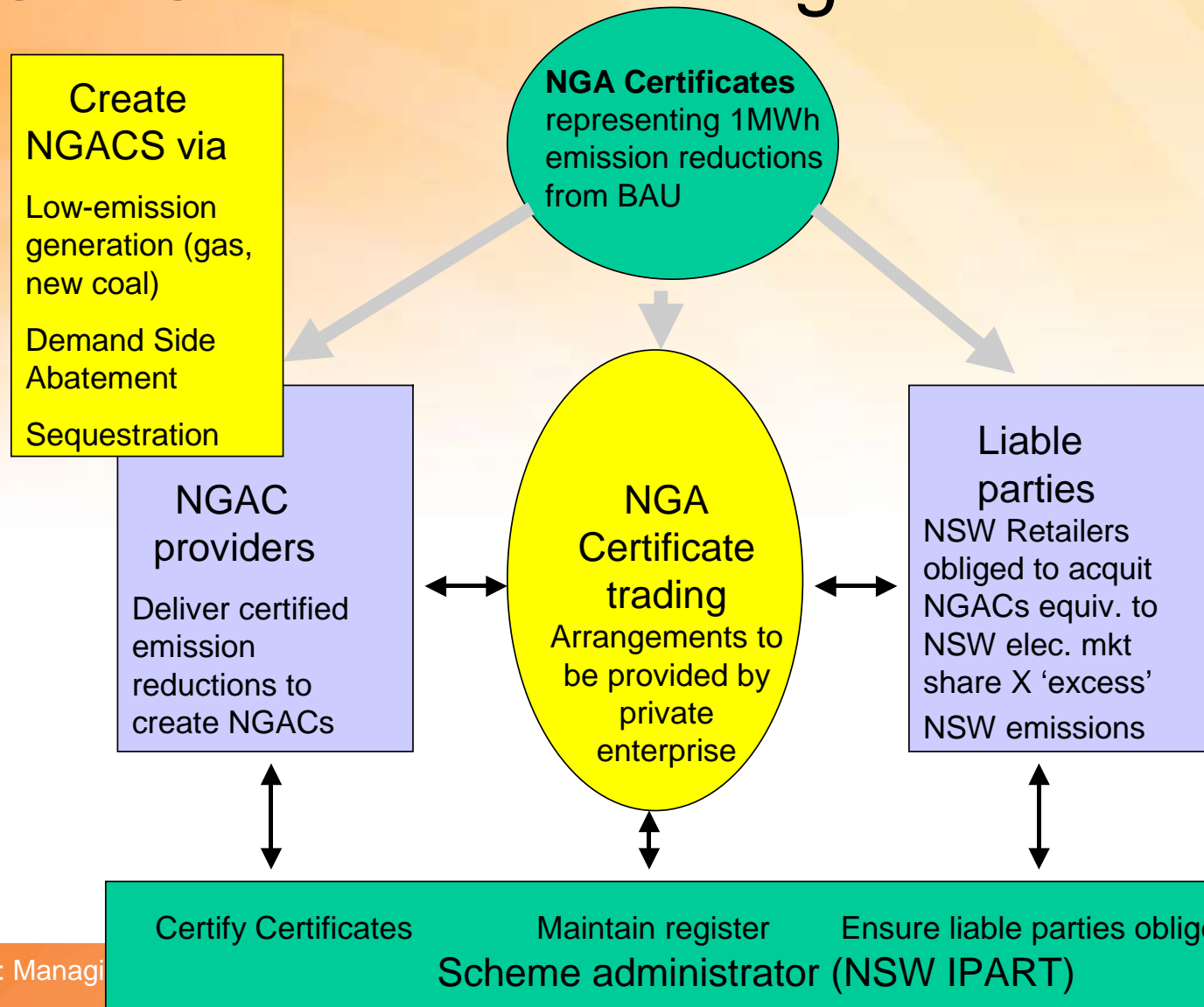
(Overview to the Electricity Supply Amendment Bill, 2002)

- 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



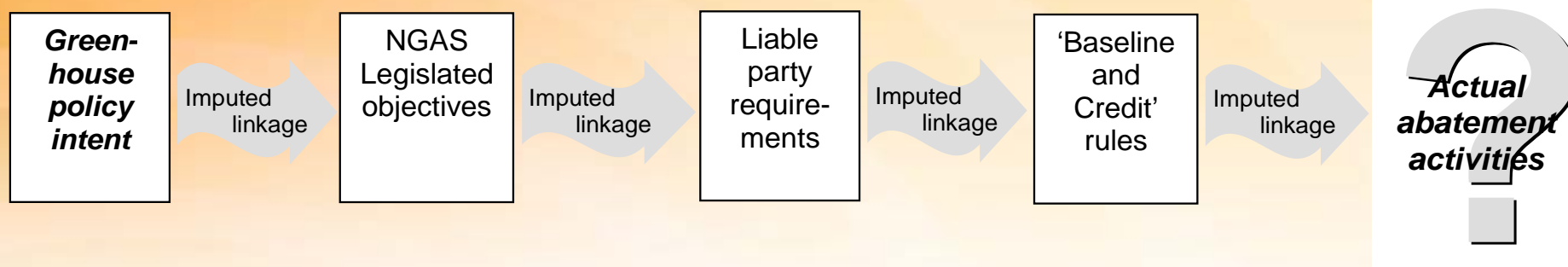


NGAS Abstractions

- Complex ‘imputed’ linkages between:
 - *policy intent* of reducing emissions created through NSW electricity consumption
 - climate responds to physical emissions, and these need to be reduced
 - eg. Kyoto Protocol sets physical caps on developed country emissions,
 - *legislated objectives* to “reduce emissions associated with production + use of electricity, + to encourage participation in activities to offset the production of emissions.”
 - based on estimated emissions from consumption, not physical emissions from generation.
 - credit for non-electricity related activities including sequestration
 - credit for interstate activities – indirect impacts on emissions, no multi-jurisdictional legal framework
 - liable parties are retailers who don’t create emissions, not NSW generators who do
 - *requirement that liable parties* “...meet mandatory targets for reducing the emission from the production of the electricity they supply or use.” and calculation of NGACs target
 - calculated from declining per-capita target, state electricity demand, ‘imputed’ pool coefficient etc: not intuitive or accurate, particularly with wrt pool coefficient, and NGAC calculations
 - ‘Emissions reductions’ an estimate of how emissions reduced from what otherwise happens
 - *‘Baseline and credit’ assessment of abatement:*
 - complex rules for eligibility + amount of abatement projects can claim



Impact of these design abstractions



- Some reasons why NGAS may have been designed with these imputed linkages
 - eg, State Government jurisdiction of NSW retailer licenses.
- Unfortunately, means physical electricity generation emissions in NSW can continue to climb even while NGAS declining State per-capita target is met



Considerable potential for confusion

News Article

NSW energy retailers reduce greenhouse gas emissions

9/2/05:

NSW energy retailers have reduced greenhouse gas pollution by more than eight million tonnes since 2003, the economic regulator said on Tuesday.

This has been done through an increased use of renewable energy, improved generator efficiency and avoiding methane emissions under pollution targets set by the NSW Greenhouse Gas Emissions Abatement Scheme.

The Independent Pricing and Regulatory Tribunal (IPART), which regulates the scheme, said NSW operated one of the world's leading greenhouse gas emission trading schemes.

"The NSW Greenhouse Gas Abatement Scheme was introduced in 2003. In the first 20 months, more than eight million tonnes of emission reductions were registered," IPART CEO James Cox said in a statement.

"The NSW scheme demonstrates that carbon trading is viable and businesses can benefit from participating in the scheme."

Cox's comments follow Tuesday's conference on the trading scheme, which aims to reduce greenhouse gases by making industries pay for the cost of their pollution.

Under the mandatory scheme, NSW electricity retailers, including AGL, Integral and EnergyAustralia, are limited on their pollution output, with annual reduction targets in place until 2012.

Companies can trade units of pollution: if a business reduces emissions, they can sell units or "certificates", but if the company increases pollution they must buy units to off-set the emissions attributable to their company.



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NGAS additionality

- Additionality problematic with ‘baseline and credit’ since counterfactual **However**, essential because if don’t actually change behavior, why implement?
- Key tests in assessing additionality:
 - Did project commence before scheme?
 - If yes, has scheme materially changed operating decisions from what otherwise would have been, and reduced emissions?
 - If project implemented after scheme, would it have happened regardless (BAU)?
 - If yes, materially changed operating decisions...?
 - Is project investment or operation being driven by other government programs?
 - If yes, how much of emission reductions can be attributed to your scheme?
- Additionality can be extremely difficult to calculate
 - Rejected for EU ETS and proposed National / multi-state Australian ETS
 - B+C schemes like CDM focus on investment, rigorous + transparent tests of additionality
- NGAS doesn’t *explicitly* discuss or attempt to assess additionality at all
 - avoids potential difficulties of actually making assessment
 - However, means performance of the scheme isn’t formally assessed



Additionality questions for NGAS

- Limited public data makes additionality of 2003 NGACs particularly difficult to assess
- However,
 - More than 95% came from projects built + operating well before 2003
 - Great majority of these projects were not required to make operational changes in order to earn NGACs

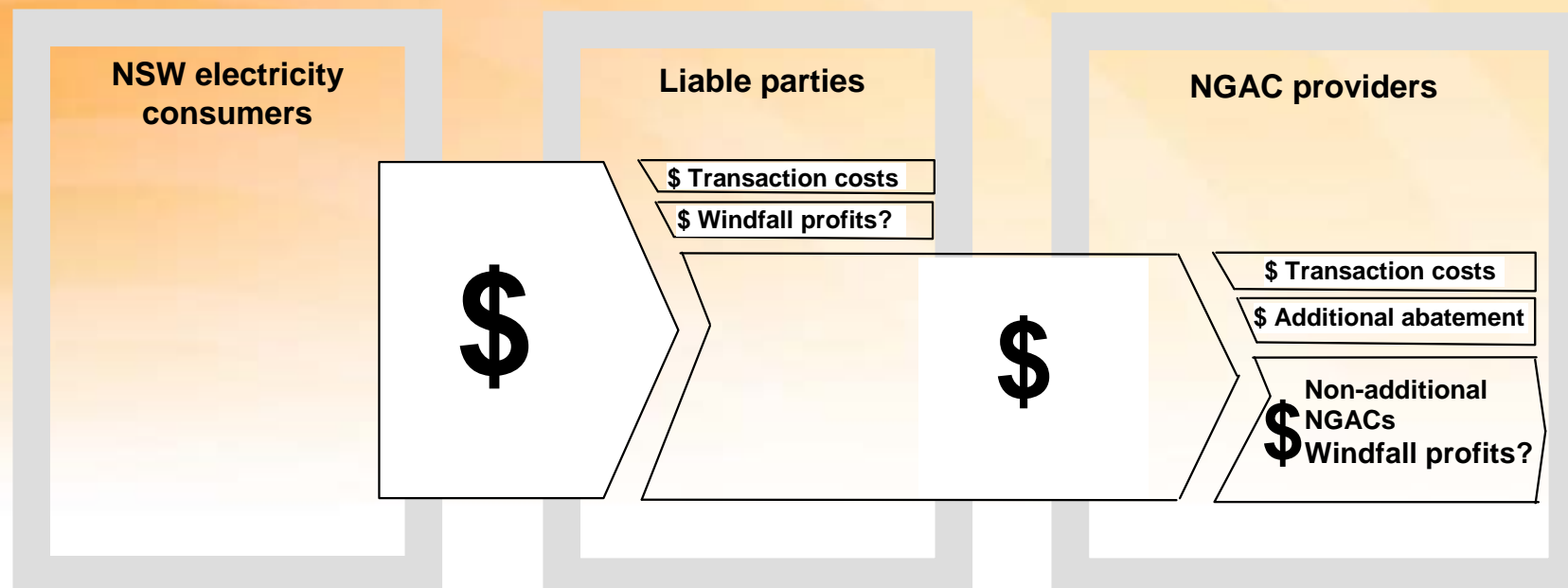


NGAS financial impacts

- NGAC costs
 - Costs of any additional action, if required
 - Transaction costs
 - IPART has rigorous accreditation, however many audits may ensure compliance with rules that don't require additionality
- NGAC prices
 - Generally commercial-in-confidence
 - Liable party transaction costs
- NGAC price pass through
 - Small customers on regulated tariffs have IPART price determination
 - Negotiation may be possible for negotiated contracts
 - Large customers may become direct participants, some may meet obligations with LUACs



Possible money flows through NGAS



- **Additionality and transaction costs matter, for example if:**
 - End users pay present spot price for all 2003 NGACS = A\$70 million
 - If transaction costs 10% of price = A\$7 million
 - If 10% of NGACs additional, abatement (investment + operational) = A\$7 million
 - Remaining A\$59 million represents windfall profits to NGAC creators and/or retailers.



Assessing future NGAS performance

- Key assessment for NGAS is performance over legislated life to 2012
 - good reasons to ramp up highly novel policy measures to allow participants to build up capacity

- However, “Prediction is very difficult, especially about the future.”
Niels Bohr

- We use scenario analysis to manage uncertainties
 - projected NGAC demand
 - the additional abatement delivered by existing projects
 - impact of other greenhouse policy measures on scheme performance
 - other BAU developments in the NEM that might also impact



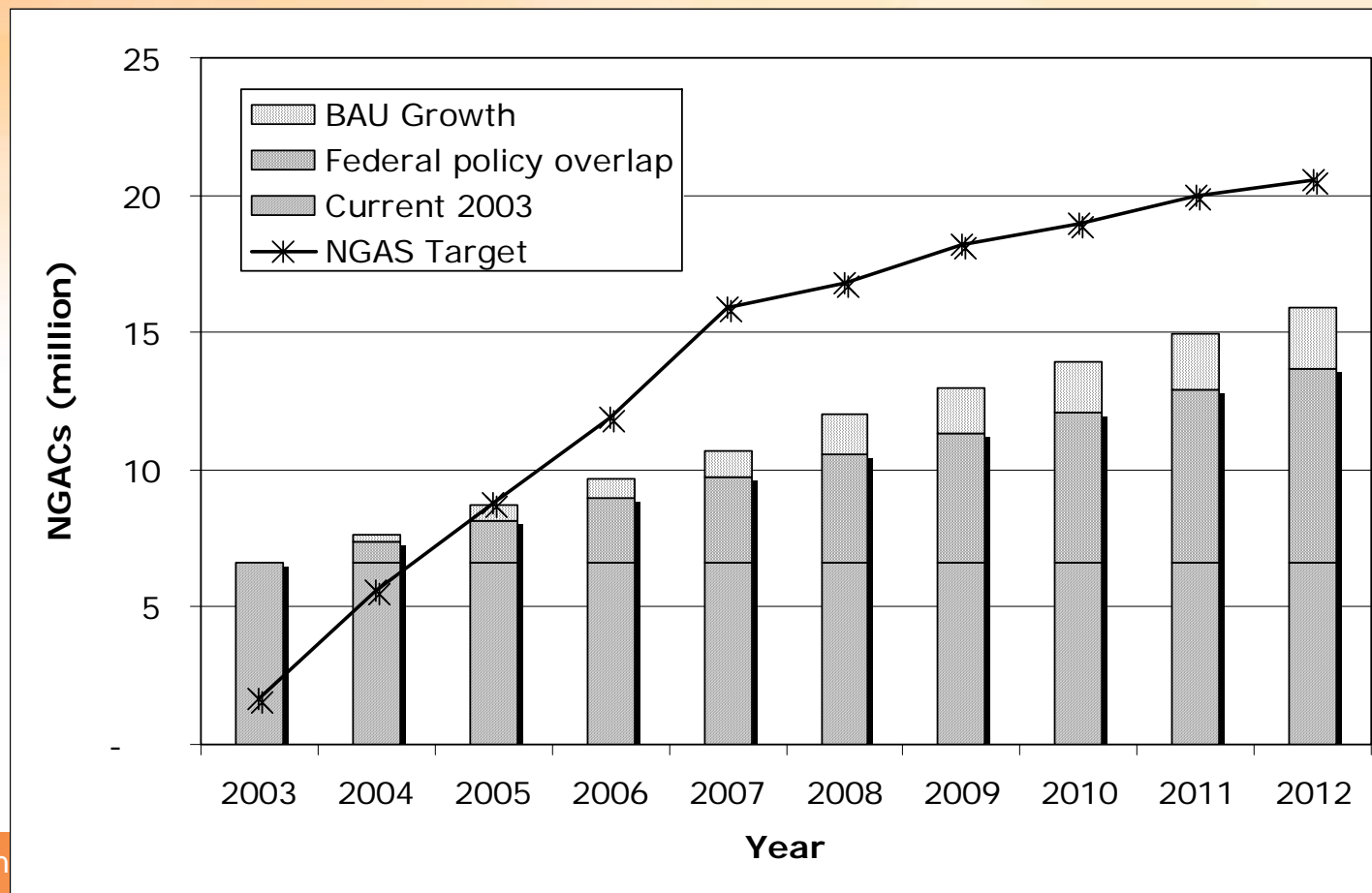
Scenario mixes + their possible non-additionality

| Scenario mix | ½ policy overlap + 60% BAU plant | ½ policy overlap + 90% BAU plant | policy overlap + 60% BAU plant | policy overlap + 90% BAU plant |
|---|-------------------------------------|-------------------------------------|-----------------------------------|-----------------------------------|
| 6 million non- additional NGACs from existing projects | 62% | 65% | 75% | 78% |
| 6.6 million non- additional NGACs from existing projects | 67% | 70% | 79% | 82% |
| 7.5 million non- additional NGACs from existing projects | 72% | 75% | 85% | 88% |



One scenario of future NGAS performance

- 6.6 million non-additional NGACs / year from current projects, policy overlap and non-additional BAU generation growth in the NEM
=> 80% non-additional NGACs over the life of the scheme





Some thoughts for the future of NGAS

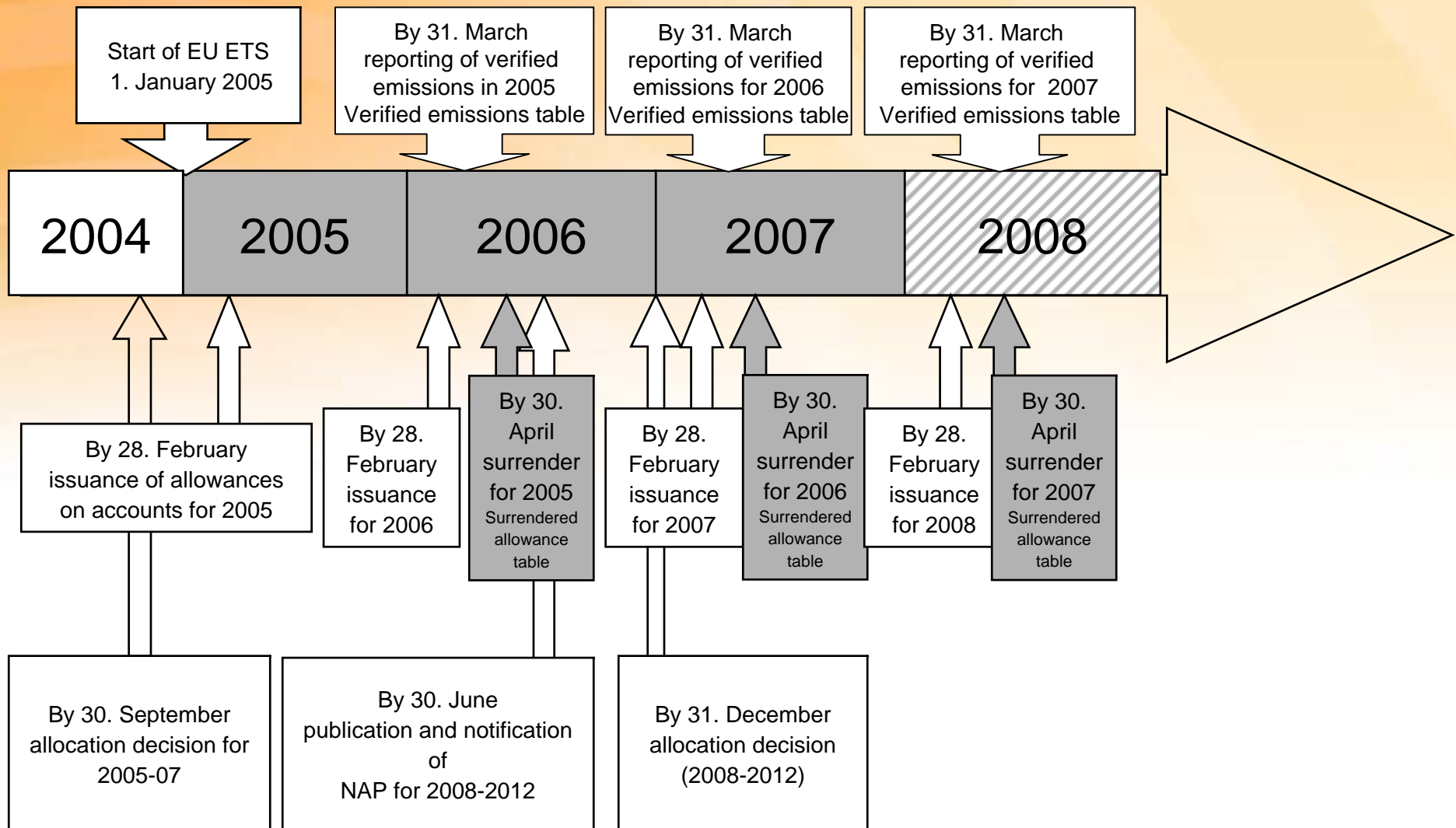
- Extending NGAS to 2020 (as raised in NSW Energy Directions paper)
 - Continuing efforts to strengthen energy-related climate change policy
 - eg, recently announced NSW Demand Management fund projected to reduce emissions by 800,000 tCO₂-e /year by 2011 (DEUS, 2005). Will earn NGACs?
 - BAU development of the NEM
 - Considerable gas plant projected to enter NEM post 2012 period (MMA, 2004)

- may still result in relatively low levels of additionality
 - physical increases in emissions from the NSW generation sector
 - considerable wealth transfer to NGAC providers, and perhaps retailers
 - **For example**, if average price for NGACs is A\$14 then electricity customers pay approx A\$2 billion over the life of the scheme.
 - If transaction costs are responsible for 10% of NGAC price = A\$190 million.
 - If 80% of NGACs are non-additional = A\$350 million on additional abatement
 - Possible windfall profits to NGAC providers and/or retailers = A\$1.4 billion



Brief overview on EU ETS

- A cap-and-trade type scheme ...
- Operated in phases: 2005-07, 2008-12 etc.
- Covers initially direct CO₂ emissions of major emitting sectors (close to half of CO₂ emissions of EU)
- Operators will need a permit for emitting CO₂
- Harmonized monitoring, reporting and verification of CO₂ emissions based on Monitoring Guidelines
- Harmonized financial sanctions for non-compliance (40 €/t in 2005-2007 / 100 €/t from 2008) + surrender missing allowances + public notification
- Links to project credits established
- Partially harmonized allocation rules:
95 % for free 2005-07 and 90 % in 2008-2012, rest to be auctioned





Possible lessons learned for an Australian ETS

- "Pilot phase" is necessary, phase-in advisable
- Banking restrictions might have reduced efficiency (should be harmonized) but prevent over allocation to be imported in 2nd phase
- Limitation of ex-ante assessment e.g. coverage
- Monitoring guidelines should be based on a balance of cost effective principles and accuracy
- Data collection for base period is time consuming, start early!
- Linking with project based mechanism might cause problems regarding additionality and double counting
- Centralized registry and parts of administration might decrease costs
- Political process showed main architecture should not be changed in later stages - stakeholder involvement from the beginning is important
- Interaction: Careful analysis of interaction of policies is important to avoid double regulation!



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