

Pathways to Low Emission Technology Deployment

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Pathways to Low Emission Technology Deployment

1. Strong Forecast Electricity & Emissions Growth
2. Future Low Emission Options
3. The Current Policy Framework Is High Risk
4. Energy Policy - Positioning The Australian Economy For The Future

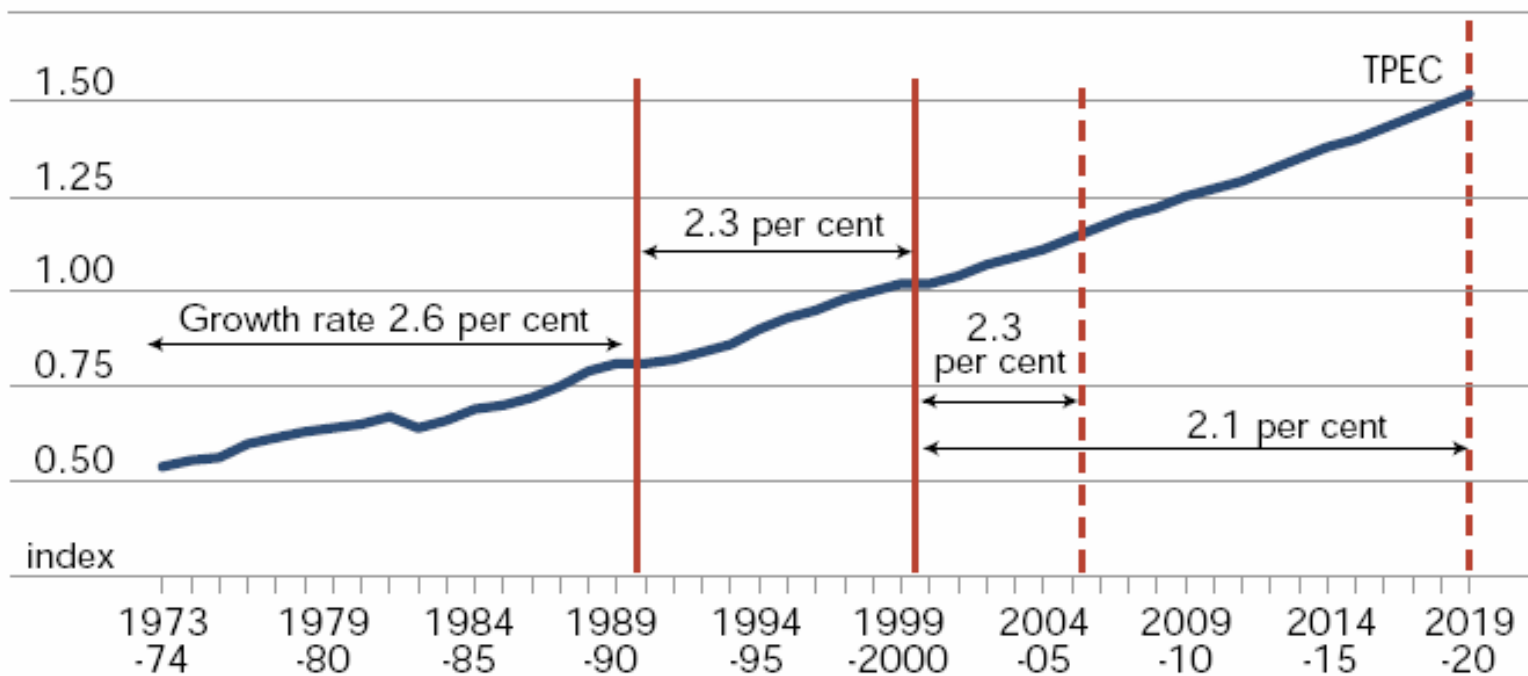


1. Forecast Strong Electricity & Emissions Growth

- ABARE forecast annual growth rate of 2.1% per year in gross Australian electricity generation:
 - 237 TWh in 2003-04
 - 409 TWh by 2029-30



Australian Energy Consumption, Historical And Projected



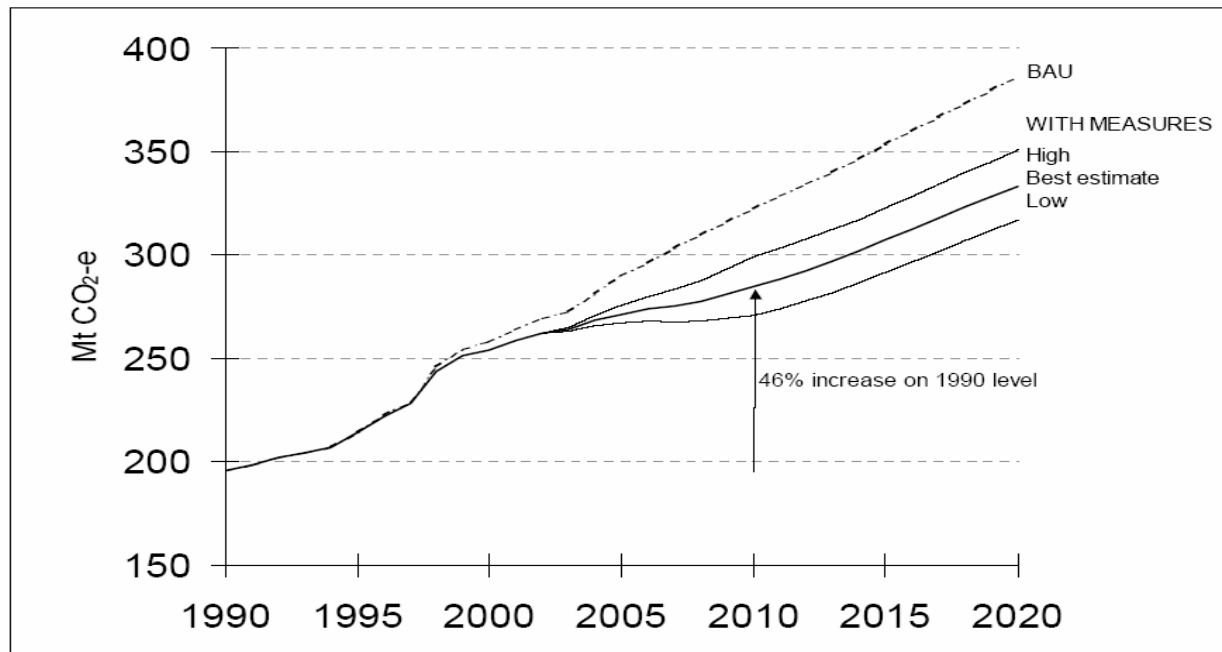
Source: ABARE, 2003



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Australian Emissions Growth

Greenhouse gas emissions from the stationary energy sector 1990 to 2020



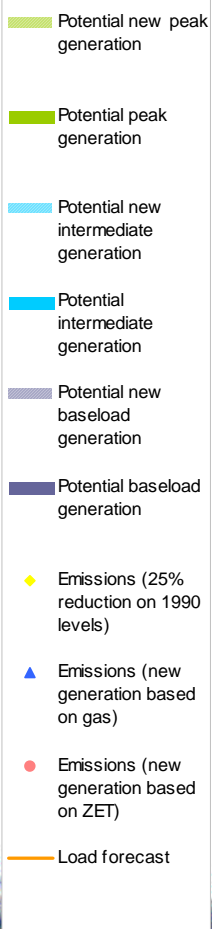
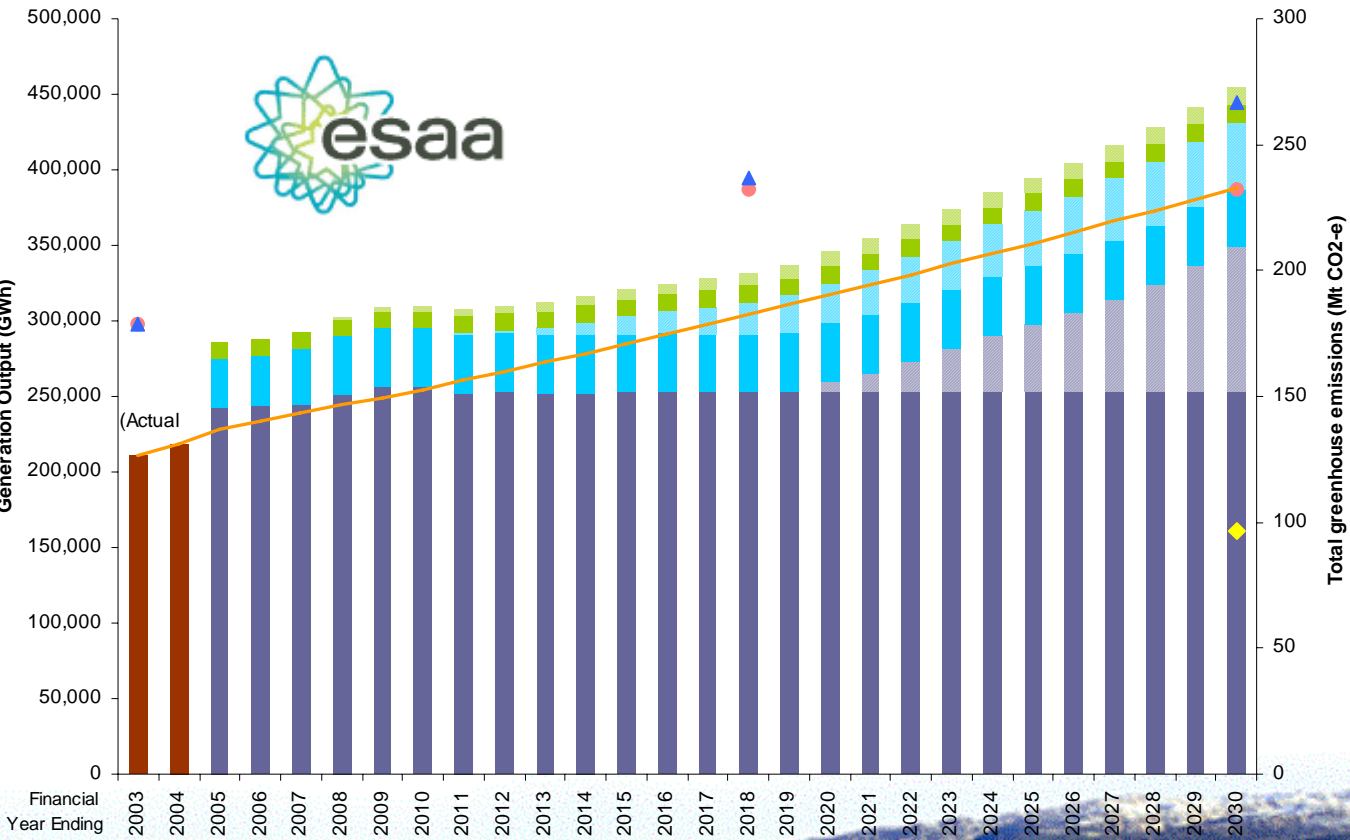
Source: AGO, 2005



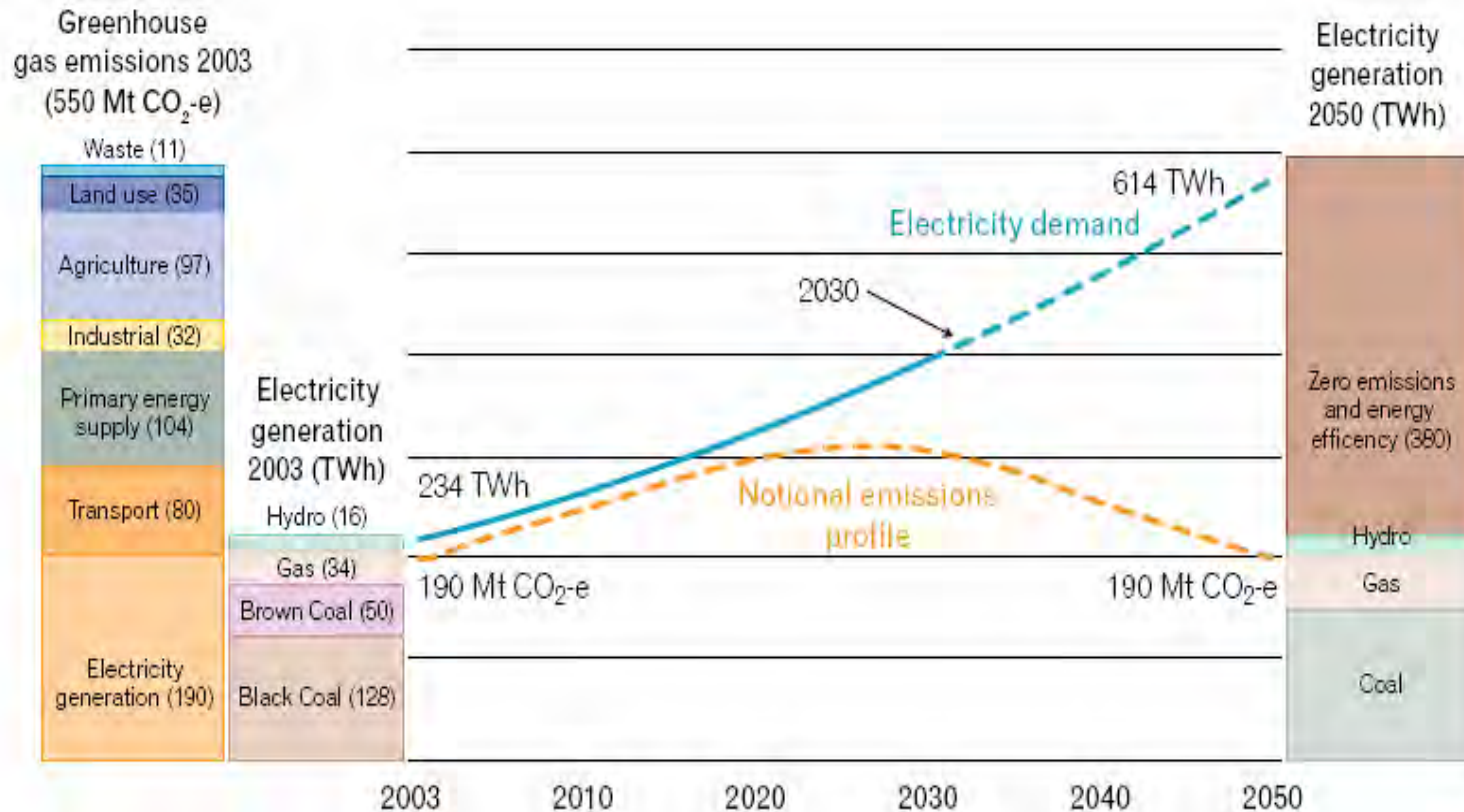
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New Generation & Emissions to 2030

Potential Generation Output vs System Load Projection
 (Total Australia, 10% POE Supply-Demand Balance, Static Capacity Factors)



Growing Demand – Reducing Emissions

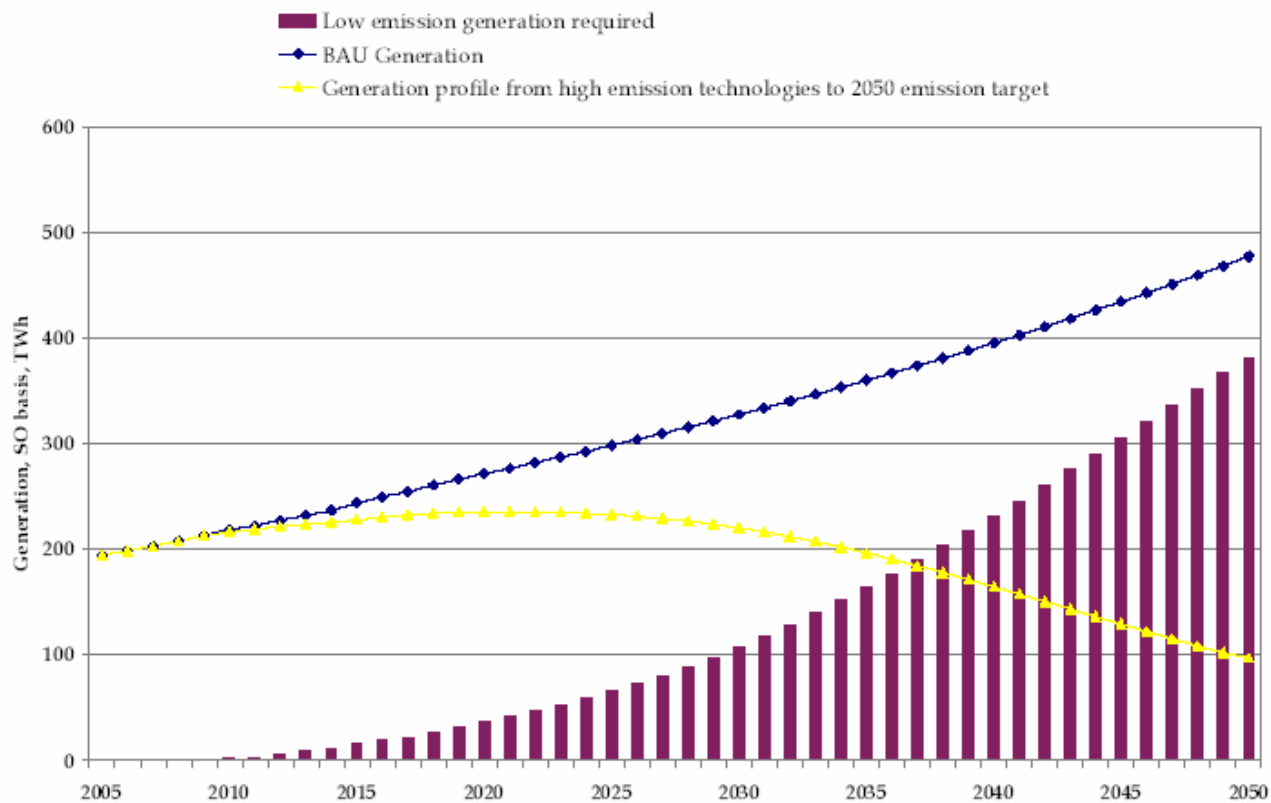


Source: DEH, 2005



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Growing Demand – Reducing Emissions



Source: MMA/REGA,
2006

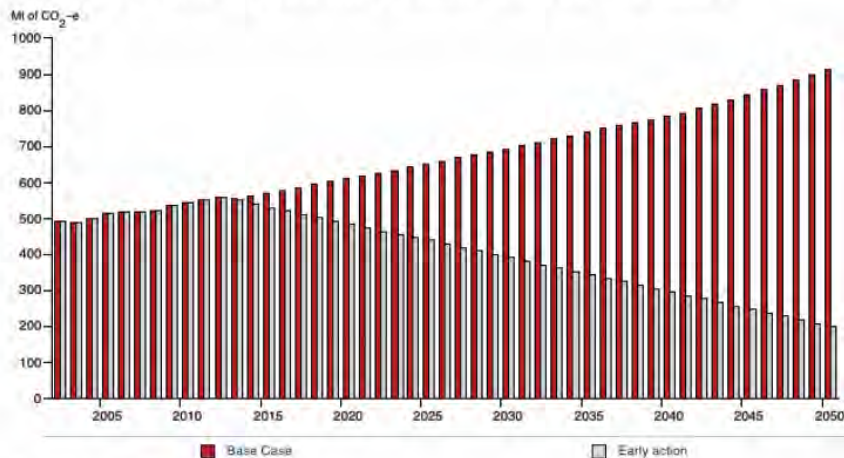


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Delayed Action Is Expensive

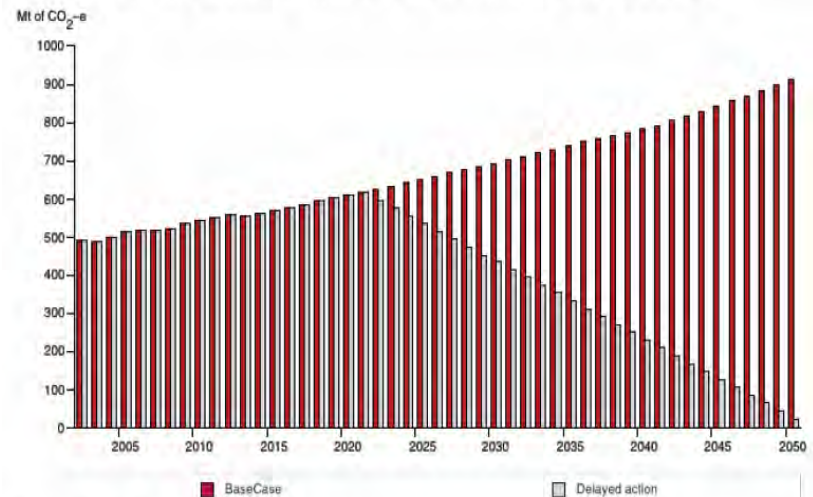
“The longer we delay acting, the more expensive it becomes for business and for the wider Australian economy”. Australian Business Roundtable on Climate Change, August 2006.

EARLY ACTION SCENARIO, PROJECTED GREENHOUSE GAS EMISSIONS



Source: MMRF-Green

DELAYED ACTION SCENARIO, PROJECTED GREENHOUSE GAS EMISSIONS



Source: MMRF-Green

Source: Business Roundtable



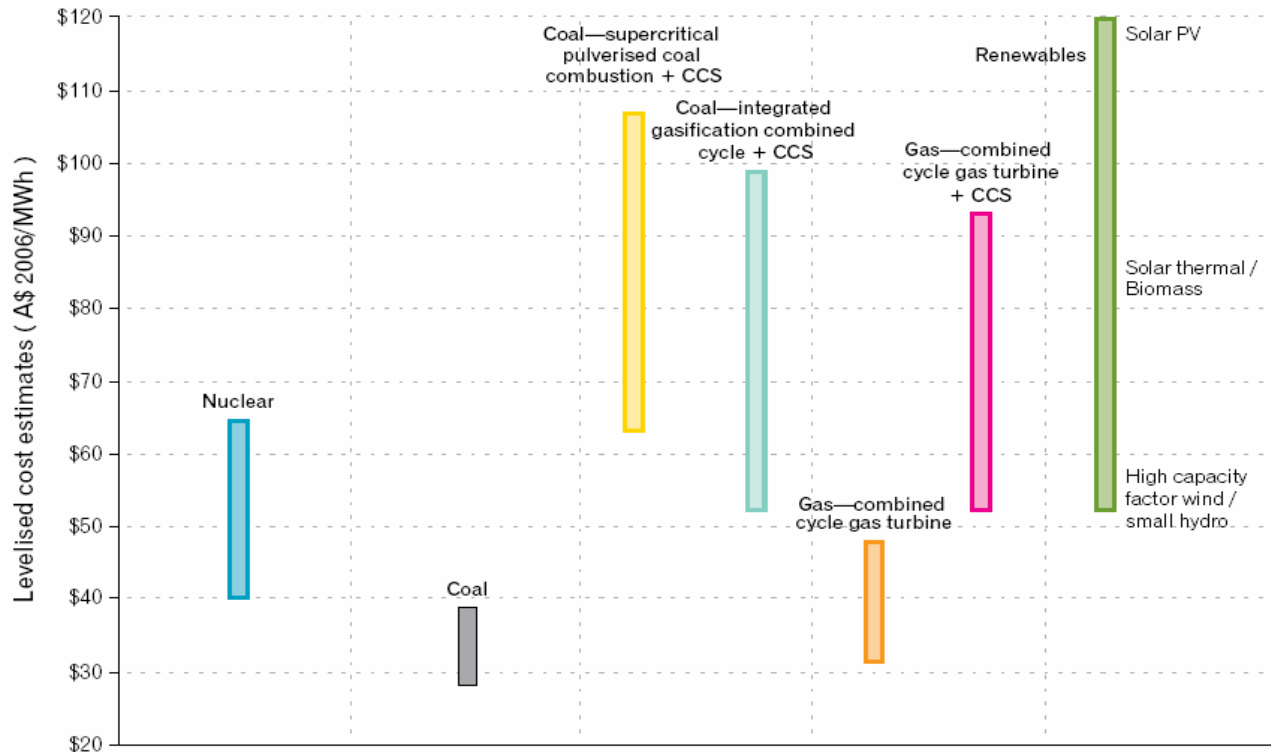
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2. Future Low Emission Options

- There are a range of views on future energy options for Australia including:
 - Nuclear Inquiry
 - MMA/REGA
 - ESAA
- These views are different in detail but a common message emerges



Clean Energy Costs

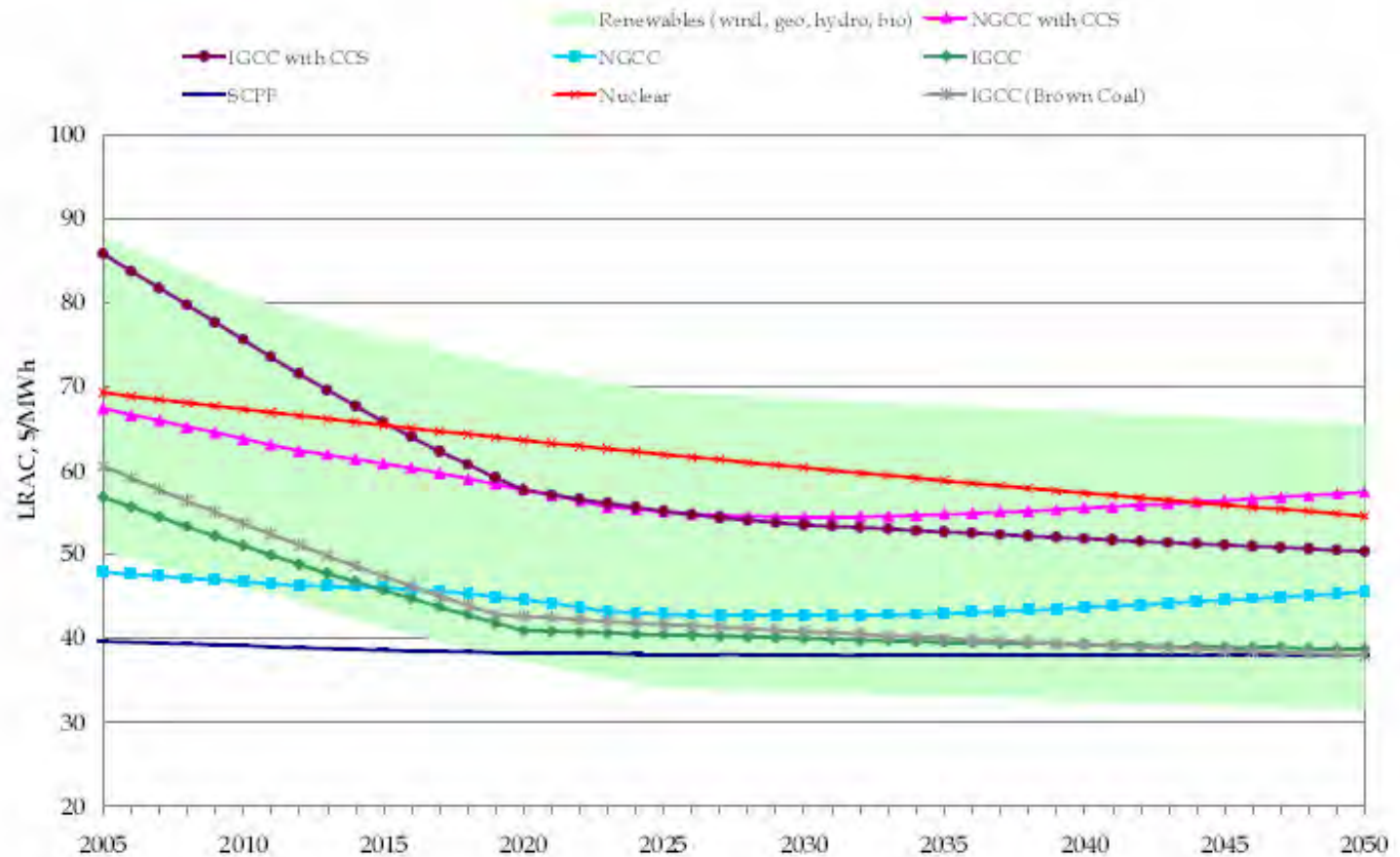


Source: Draft
Nuclear Inquiry, 2006



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Clean Energy Potential – Over Time



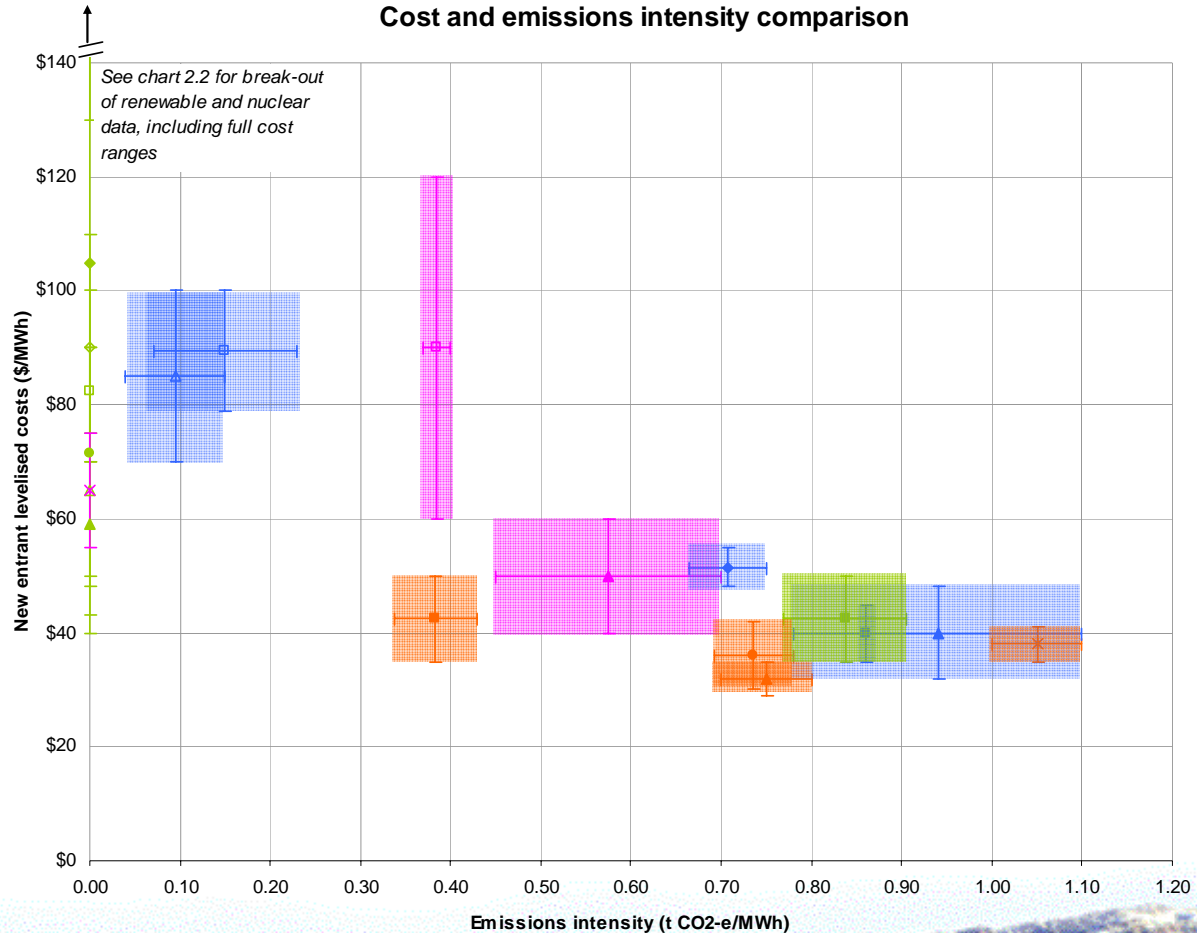
Source: MMA/REGA,
2006



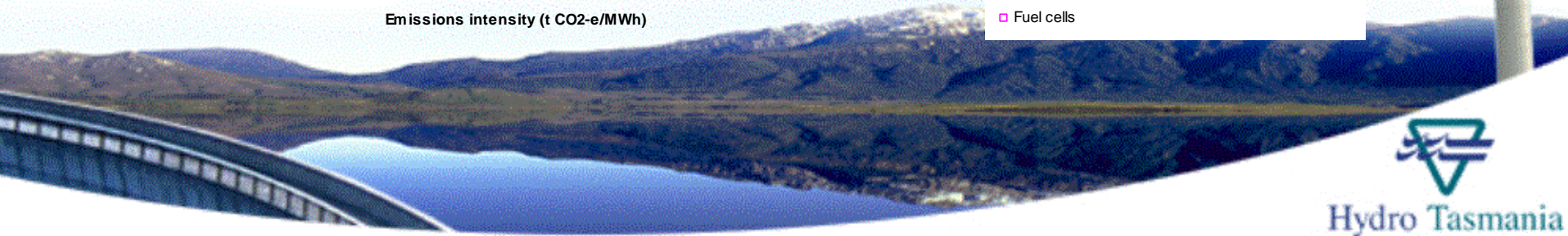
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Clean Energy Emissions vs Cost

Cost and emissions intensity comparison



- Combined Cycle Gas Turbine (CCGT)
- ▲ Supercritical (SC) black coal
- Ultra-supercritical (USC) (black coal)
- ✕ Supercritical (SC) brown coal
- ▲ Small hydro
- Solar hot water
- ✕ Solar PV
- ◆ Solar thermal (STE)
- ◇ Biomass
- Co-firing of pulverised fuel (PF) plant with biomass
- Wind power
- △ Geothermal (Hot Dry Rock)
- ◆ Integrated Gasification Combined Cycle (black coal)
- ▲ IGCC brown coal
- ZETs (coal-based)
- △ CCGT + CCS
- SC brown coal + drying/dewatering
- ✕ Nuclear fission
- ▲ Gas cogeneration
- Fuel cells



A Range Of Low Emission Technologies Have Potential

- Some available now
- Some expected to be available in future
- None appear ideal
- A mix should be the expected outcome



3. The Current Policy Framework Is High Risk

- Investment uncertainty impacts on energy security
- Australia is at greater risk under future international emissions constraints if we have continued steeply increasing emissions



Investment Uncertainty Impacts On Energy Security

- More than \$30 billion will be required to fund development of necessary generation.
 - (Energy Supply Association of Australia, 2006)
- Uncertainty about climate change policy and carbon imposts
- Discouraging investment in new low and zero emission generation
- Without a targeted policy framework:
 - greenhouse gas emissions continue to rise
 - limit secure and stable energy supply



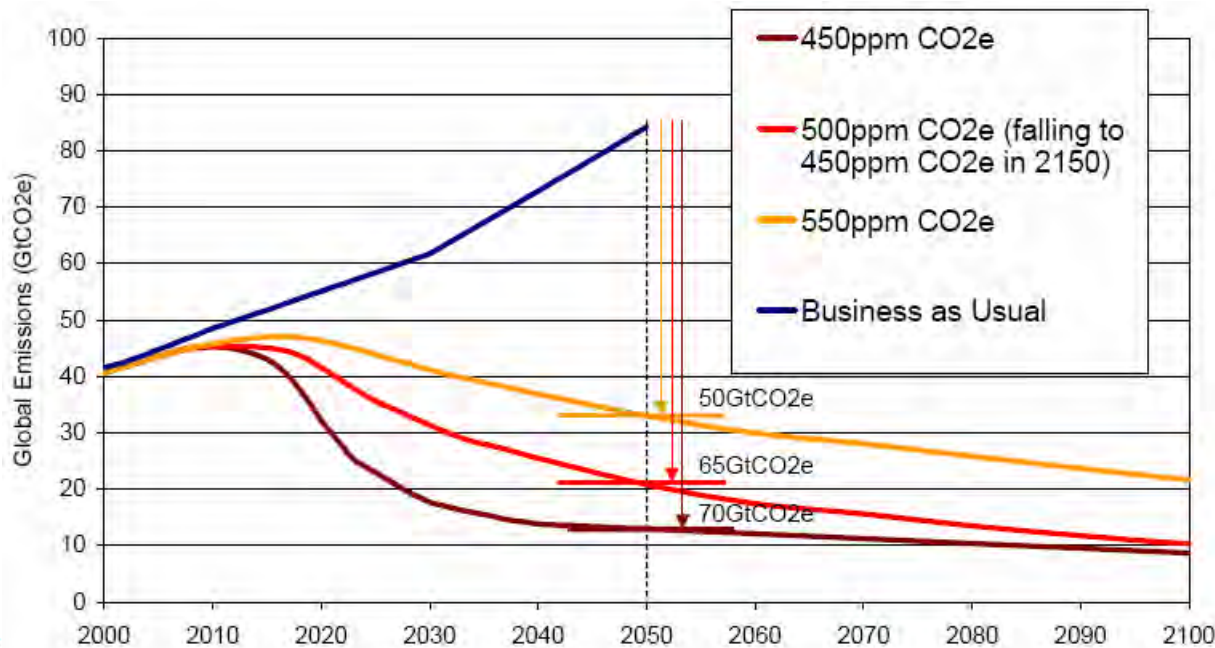
Risk Under Future International Emissions Constraints

- Any new emitting plant will exacerbate impact on incumbents in the context of a national emissions constraint
- Many measures already announced by Australia's major trading partners
- National and international policy developments – greenhouse gas emission constraints now inevitable



International Situation Will be Challenging

BAU emissions and stabilisation trajectories for 450 - 550 ppm CO₂e



Source: Stern Review



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4. Energy Policy - Positioning The Australian Economy For The Future

- Establish policy objectives
- Identify preferred outcomes
- Establish policy framework that support objectives and desired outcomes



Policy Objectives

- Sustained long-term competitiveness of Australian economy
- Transition economy to lower emission trajectory
- Reduce financial risks for existing asset owners
 - Reducing greenhouse intensity of economy
 - Don't lock economy into higher emission profile
 - Managing sovereign risk issues for existing asset owners
- Create a development pathway for breakthrough technologies

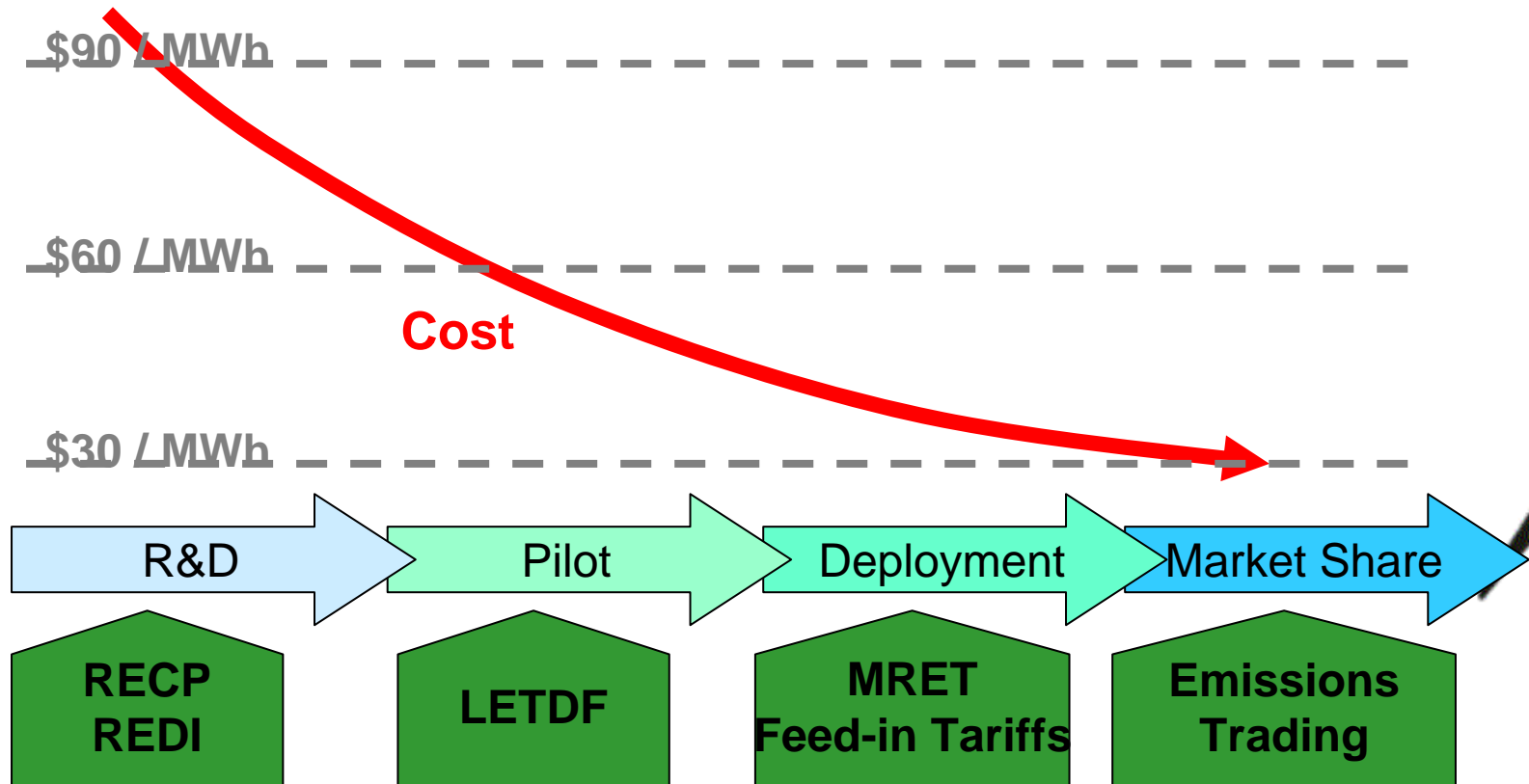


Identify Preferred Outcomes

- Australia should curtail emissions growth
- Meet all growth with CCGT or better emissions intensity plant
- Avoid un-mothballing existing old coal plant
 - low efficiency
 - low cost to deploy



Technology Deployment Pathways



Policy Framework That Support Objectives And Desired Outcomes

- Need specific measure to:
 - Ensure all new power generation is CCGT or better
 - Strong incentive for investors in low emission technology
 - Compete existing vs emerging options
 - Spread cost across emitters through certificate scheme
- Emissions Trading
 - ET is generally viewed as an economically efficient mechanism to drive emissions reductions



Emissions Trading

- Economic modelling by the National Generators Forum — a 60 per cent cut in emissions would require a carbon price of about \$37 a tonne. Source: Age, 15 Nov 2006.
 - Is it possible to introduce such a strong signal now?
 - Could ET be introduced in conjunction with a low emission technology deployment measure to limit the scale of price signal required?



Conclusion

- Carbon policy uncertainty impacts on investment and energy security.
- Significant low emission technology ready to be deployed.
- An effective policy framework for emissions abatement requires suite of measures:
 - R&D
 - Pilot
 - Deployment
 - Market Uptake

