



Centre for Energy and
Environmental Markets

Australian Climate Change Policy and its Implications for AP6 Countries

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About CEEM and this paper:

The UNSW Centre for Energy and Environmental Markets (CEEM) seeks to provide Australian leadership in interdisciplinary research in the design and analysis of energy and environmental markets and their associated policy frameworks. CEEM brings together UNSW researchers from the Faculties of Engineering, Business and Arts and Social Sciences, working alongside a growing number of international partners. Its research areas include the design of spot, ancillary and forward electricity markets, market-based greenhouse regulation and the broader policy context in which all these markets operate. You can learn more of CEEM's work by visiting its website: www.ceem.unsw.edu.au.

Researchers with CEEM have been undertaking analysis of Australian and International Climate Change policy developments for the last decade. We welcome this invitation from the organisers of the China Energy Law International Symposium to prepare a summary paper on Australian Climate Change Policy and its implications for Asia-Pacific Partnership Countries.

Background papers relevant to this work can be found on the CEEM website including:

I.F. MacGill, T. Daly and R. Passey (2006) *Submission to the House of Representatives Standing Committee Inquiry into Geosequestration Technologies*, October.

I.F. MacGill, H.R. Outhred and K. Nolles (2006) "Some design lessons from market-based greenhouse-gas regulation in the restructured Australian electricity industry," *Energy Policy*, 34 (1).

I.F. MacGill, S. Healy and H.R. Outhred (2006) "Is there a sustainable future for nuclear power?" in *IEEE Power and Energy Magazine*, July/August.

Outhred H.R. and I.F. MacGill (2006) "Electricity Industry Restructuring for Efficiency and Sustainability – Lessons from the Australian Experience," in *Proc. ACEEE'06 Summer Study*, California, Aug. 13-18.

I.F. MacGill, H.R. Outhred and R. Passey (2006), International climate policy and the Asia Pacific Partnership, *CEEM discussion paper*, Available at www.ceem.unsw.edu.au. March.

MacGill I.F. and T. Daly (2006) "What role might CCS play in Australia's energy future," *Journal of the Australian Institute of Energy*, Vol. 24, No. 4, Dec. pp. 96-99.

Outhred H.R. and I.F. MacGill (2006) "Integrating wind energy in the Australian National Electricity Market," in *Proc. World Renewable Energy Congress IX*, 19-25 August 2006, Florence.

Betz R, I.F. MacGill and R. Passey (2006) *Submission to the NETT Discussion Paper on National Emissions Trading for Australia*, July.

Passey, R.J., I.F. MacGill and M.E. Watt (2005) "Some options for State-based Renewable Obligations in Australia," in *Proc. ANZSES'05*, Dunedin, December.

I.F. MacGill (2005) "Making markets that drive energy efficiency," in *Proc. USAEE Annual Conference*, Denver, September.

I.F. MacGill (2005) "Assessing the performance of emissions trading: some early experience on the possible effectiveness, efficiency and equity impacts of NSW's 'baseline and credit' scheme," in *Proc. BIEE Annual Conference*, Oxford, September.

Outhred H.R. and I.F. MacGill (2006) *CEEM Submission to the Productivity Commission Inquiry into Energy Efficiency*, March.

I.F. MacGill, H.R. Outhred and K. Nolles (2004) "National Emissions Trading for Australia: key design issues and complementary policies for promoting energy efficiency, infrastructure investment and innovation," *Australasian Journal of Env. Management*, Vol. 11(1), March.

This is an area of ongoing work for CEEM and we welcome your feedback and comments on this paper, and our climate policy work more generally.

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The Australian Context for Climate Policy

Australia is a relatively small wealthy nation of 20 million people that has large, low cost and high quality coal, gas and uranium reserves. As a result, Australia is a major energy exporter and has an energy intensive economy. Given its high domestic reliance on coal, Australia has amongst the world's highest per-capita emissions.¹

In particular, the last decade has seen considerable growth in GDP and energy consumption compared to many industrialised countries, and rapidly growing energy exports – Australia is now the world's largest coal exporter, second largest uranium exporter and a major LNG exporter.

This is a challenging context for developing an effective climate change policy framework. Energy-related emissions (representing around 70% of total emissions) rose by approximately 35% between 1990 and 2004 and are projected to rise 50% above 1990 levels by 2010.²

Australia is a Federation of six States and two national territories and the Federal Government has no specific energy or environmental powers under the constitution. Thus, energy and climate change policy is shared between Federal and State jurisdictions. Traditionally, most energy and environmental policy was developed and implemented by State Governments. They directed the development of largely state-owned and physically separate electricity and gas industries. Most Australian States established pollution and then environmental agencies in the 1980s and 1990s.

The Federal Government has taxation, corporate, international trade and external affairs powers including those relating to international environmental treaties. It also led the establishment of the Council of Australian Governments (CoAG) in the early 1990s. CoAG's role is to develop consistent Federal and State-level policies on matters of national significance that require cooperative action by all Federal and State governments. This includes energy industry restructuring and national environmental regulation. One of CoAG's three agreed energy policy objectives is "Mitigating local and global environmental impacts, notably greenhouse impacts, of energy production, transformation and use."

Governance arrangements in energy now include a CoAG Ministerial Council on Energy (MCE), comprising Federal and State Energy Ministers, that is responsible for setting overall policy objectives, an Australian Energy Market Commission (AEMC) responsible for rule development and an Australian Energy Regulator (AER) responsible for compliance.

The Australian Climate Policy Framework

The last decade has seen some divergence between the Federal and State Governments on climate policy. At the international level, the Federal government negotiated a 108% target under the Kyoto Protocol with respect to emissions changes from 1990 to 2008-12, as well as advantageous land-use provisions. It chose, however, not to ratify the Protocol on the basis that it did not provide an effective long-term response to climate change or a clear pathway for action by developing countries and because the United States did not ratify. Instead, the Federal government committed to meeting its Kyoto target while positioning Australia to contribute to the major global emission reductions that will be required over the coming century.³

The Federal Government established the Australian Greenhouse Office (AGO) in 1998 as the world's first government agency dedicated to reducing greenhouse gas emissions. It delivers the majority of programs associated with the government's climate change strategy. Australia's early and enthusiastic adoption of energy industry restructuring has markedly changed the regulatory context and led to the development of some innovative market-based climate change policy measures, for example, the Mandatory Renewable Energy Target (MRET) – a world first.

¹ IEA, *Key World Energy Statistics 2006*; BP, *Statistical Review of World Energy*.

² Australian Government, *Analysis and recent trends of greenhouse indicators 1990-2004*.

³ See the AGO website, www.greenhouse.gov.au



There are other AGO programs that regulate the technical performance of electrical end-use equipment, a number of voluntary schemes for both large emitters and energy consumers, and financial incentive (grant) schemes for technology demonstration and deployment.

State governments have a variety of regulatory roles in managing the environmental impacts of the energy industry. Electricity generators are subject to state-based environmental regulation of air, water and ground pollutants (but not specifically climate change emissions except as discussed below). In terms of climate change, State Governments require environmental impact assessments for significant new projects including power stations. The assessment may take into account greenhouse considerations. The focus of this paper, however, is a number of recent market-based state government schemes with primarily climate change objectives: the NSW Greenhouse Gas Abatement Scheme (GGAS), the Queensland 13% Gas Scheme and the Victorian Renewable Energy Target (VRET) (see CEEM references for more details).

Even with all these measures, energy-related emissions are expected to rise 50% from 1990 levels by 2010 – a reduction from the estimated 66% increase under BAU. Most of this abatement is expected to come from reductions in stationary energy and fugitive emissions. The major reduction in emissions is expected to be achieved from land use change. Unfortunately there is considerable uncertainty in current total emissions of the order of +/-5%. In particular, land use emissions estimates have an uncertainty of 20-60%, leading to estimates of 2010 emissions ranging from 102% to 118% of 1990 levels. There are also difficulties in estimating the emissions reductions achieved by different programs as they are inevitably counterfactual.⁴

The Australian Government also played a lead role in establishing the Asia Pacific Partnership (AP6) between the United States, Australia, Japan, South Korea, China and India. Its agreed purpose is to “Create a voluntary, non-legally binding framework for international cooperation to facilitate the development, diffusion, deployment and transfer of existing, emerging and longer term cost-effective, cleaner, more efficient technologies and practices among the Partners.”⁵

Australia has been a forceful advocate that climate policy’s principal emphasis should be on technology development through RD&D to develop new, low-cost, greenhouse abatement technologies. This is in contrast to the EU amongst others that are focussing on ‘market pull’ mechanisms for deploying existing abatement technologies. EU measures include the EU Emissions Trading Scheme and renewable energy targets – both support abatement technologies that currently have higher direct costs than conventional approaches and are intended to drive innovation through ‘learning by doing’ as well as achieving early abatement.

Experiences with key policy measures

Electricity Industry Restructuring

Although emission reductions are part of the agreed CoAG energy objectives, they have not been directly incorporated in the National Electricity and Gas Laws. There was, nevertheless, an expectation by at least some government policy makers that the electricity industry restructuring process would contribute to climate change objectives by promoting efficient competition by gas-fired plant, cogeneration and renewables and more incentives for energy efficiency.⁶

While restructuring has been considered a success in many regards, it has not led to reduced climate change emissions. It seems likely that restructuring has increased emissions from BAU⁷ for reasons including the low cost of Australian coal-fired generation (particularly Victorian brown coal), low market prices that reduced energy efficiency efforts, an immature gas market and the failure to ‘price’ emissions.

⁴ Australian Government, *Fourth Communication to the UNFCCC*.

⁵ See www.asiapacificpartnership.org for more information.

⁶ Australian Government, *Second Communication to the UNFCCC*.

⁷ CoAG, *Energy Market Review*, 2002.



A number of these factors are now being addressed. However, some of the reasons for the failure of Australian electricity restructuring to deliver reduced greenhouse emissions appear to be the as yet incomplete implementation of the restructuring process itself. Electricity is not a natural fit to commodity style competitive markets. Hence, electricity markets are 'designer markets' in attempting to match a manageable commercial model to the complex physical realities of electrical power systems. One problem for these market designers is that it is difficult to create a level playing field for new technologies and participants, for example to enhance end-use efficiency or adapt to high levels of embedded and/or renewable energy generation.

Market structures that unfairly disadvantage new generation technologies or focus largely on the supply-side of the electricity industry are examples of how such design choices can affect climate change outcomes. Again, some of these challenges are now receiving attention in Australia with a growing focus on embedded generation and demand-side participation from the MCE.

The Mandatory Renewable Energy Target (MRET)

The Federal MRET scheme has emissions reduction and industry development objectives. It requires all Australian electricity retailers and wholesale electricity customers to source a specified fraction of their electricity from new renewable energy generation. The design of this 'baseline and credit' scheme is based on tradeable renewable certificates, each representing 1MWh of eligible generation. It is implemented through the taxation powers of the Federal Government. Similar green certificate schemes have been implemented in a number of EU countries and US States, while other countries are preparing for their introduction.

The 'additional renewable electricity' liability that the liable parties are required to acquit was originally intended to be equivalent to 2% of their electricity purchases by 2010 which would then be maintained until 2020. This was translated into a fixed national target of 9500GWh per year from 2010 which, due to unexpectedly high load growth, now represents a target of less than 1%.

The scheme has now been operating for over five years. Liable parties have comfortably met the ramping target for RECs and driven considerable investment in new renewable energy projects. The relatively low price of RECs suggests a highly competitive environment for project developers – a more promising outcome than the experience of some European schemes to date. The flexibility of this technology-neutral approach has also proved valuable. Biomass projects were expected to dominate the market but have proved harder to develop than expected. The market has therefore brought forward other technologies, in particular wind farms.

Sufficient new renewable generation to meet the MRET lifetime target has already been committed and the price of RECs has recently fallen in response. There have been challenges in setting appropriate baselines for eligible generators that pre-existed the scheme, particularly hydro. Design features such as the lack of formal derivative market arrangements and deferrable creation of RECs detract from efficient investment decision making – a particular challenge given volatile spot REC prices and continuing regulatory uncertainty.

Many observers and a number of State Governments have argued that the scheme design flaws could be eliminated and that the major problem is that the target is too low. Arguably, the scheme is well suited to facilitating high renewable energy penetration as it exposes project developers to network connection costs and to locational and temporal energy market price signals – wholesale electricity sales represent around half of total revenue for most projects. Given Federal Government opposition to a higher target, a number of states are implementing State MRETs.

The State of Queensland implemented a scheme of similar design requiring electricity retailers and other liable parties to source at least 13% of their electricity from gas-fired generation from 2005. It is based around Gas Electricity Certificates (GECs) each representing 1 MWh of eligible gas generation. It was legislated through State retailer licensing conditions. This market appears to have operated successfully in driving gas generation and associated supply infrastructure, in particular, rapid development of coal seam methane in Queensland.



Energy Efficiency

The Australian economy enjoys low energy costs and, partly as a result, has low levels of energy efficiency compared with many other industrialised nations. CoAG's National Framework for Energy Efficiency has a number of elements but two key measures are Mandatory Equipment Performance Standards (MEPS) and Buildings Standards.

Work on appliance standards commenced in Australia in 1992 at the Federal level and involves MEPS and energy rating information on a growing range of appliances and equipment. This work is well regarded internationally. As with most MEPS programs, one of the major challenges is the time taken for transparent stakeholder consultation and staged implementation given rapid ongoing technical progress and a growing variety of equipment.

A number of States have led the introduction of mandatory energy performance standards for new residential buildings through their planning powers. There are now efforts to establish such standards nationally. Challenges include the wide climatic variability across Australia, which may require both winter heating and summer cooling, and some limitations in thermal modelling.

The Federal Greenhouse Challenge was announced in 1995 as a joint government-industry initiative for reducing greenhouse gas emissions by industry. It was a key plank in the Government's strategy for demonstrating Australia's early action on climate change and achieved significant industry participation. It involved government and industry negotiating confidential 'no or low regret' abatement plans with annual reporting. Unfortunately, a number of reviews brought the scheme's credibility into question by identifying poor transparency and questionable estimates of abatement beyond BAU. Recent changes include the introduction of independent verification and mandatory participation by large emitters, .⁸

Carbon pricing

The Federal Government gave early consideration to Emissions Trading Schemes (ETS), commissioning a series of influential reports from the Australian Greenhouse Office in 1998. The CoAG Energy Market Review in 2002 recommended implementation of a national ETS. The Federal Government still rejects implementation of such a measure in the absence of similar actions by Australia's trading partners.

The Federal Greenhouse Gas Abatement Program (GGAP) offers financial support to undertake abatement activities through a tendering process – effectively pricing greenhouse emissions at an individual project level. One challenge with this program has been the difficulty of establishing a credible and transparent BAU baseline from which to estimate abatement.

The State of NSW implemented the world's first ETS in 2003. The scheme sets emissions reductions benchmarks for NSW electricity retailers based on 'imputed' NSW emissions from the electricity sector. Retailers can demonstrate compliance through certified low-emission generation, energy efficiency and sequestration activities. Operation of this 'baseline and credit' trading scheme is built around NSW Greenhouse Gas Abatement Certificates or NGACs, each representing a notional tCO₂-e of 'avoided' greenhouse emissions. All activities for creating emissions reductions require the establishment of baselines. This has proven to be extremely complex, and highly problematic in terms of developing rules ensuring the additionality of activities earning NGACs, and hence maximising the scheme's effectiveness and efficiency.

It is widely accepted that 'cap and trade' national greenhouse trading schemes are preferable to 'baseline and credit' schemes because of the subjectivity of the baseline setting process. NSW acknowledged that it would be better to implement a consistent multi-State or national cap and trade scheme. In the absence of this, GGAS is implemented through licensing conditions on retailers that sell electricity in NSW rather than capping emissions from NSW generators participating in the multi-state NEM.

⁸ See www.greenhouse.gov.au/challenge for more information.



All States and Territory Governments are now calling upon the Federal Government to implement a National ETS, and have agreed to establish a multi-state scheme in 2010 under State jurisdiction should it fail to do so.⁹ The Federal government itself is now revisiting the issue through the recent formation of a joint government-business Task Group to report on the “nature of a workable global emissions trading system in which Australia would be able to participate and additional steps that might be taken in Australia consistent with the goal of establishing such a system.” A key driver is the growing call by Australian business for an emission reduction scheme that would provide greater certainty for energy investments.

Technology R&D and Demonstration

The Federal Government’s principal climate policy emphasis has been on technology development through R&D and demonstration of promising but still emerging greenhouse abatement technologies. Chief amongst these are a range of Carbon Capture and Storage (CCS) options. Funding support has included the establishment of a Research Centre for Greenhouse Technologies that is leading work to identify and categorise potential geological reservoirs.

The Low Emission Technology Demonstration Fund (LETDF) is intended to support the commercial demonstration of technologies that have the potential to deliver large-scale greenhouse gas emission reductions in the energy sector. The Fund’s \$500 million to be distributed between 2006 and 2012 is intended to leverage \$1billion of private investment while helping address the technical risk and capital costs of demonstrating low emissions technologies that are expected to be commercially available by 2020 to 2030.

Projects supported to date include a CCS project associated with a new gas field development, a brown (lignite) coal drying unit for an existing power station, a proposed 400MW Integrated brown coal drying and gasification plant, a 100MW gas-fired generation plant fuelled by Enhanced Coal Bed Methane extraction from CO₂ injection, a coal-fired oxy-fuel demonstration project and a 125MW PV concentrator system.

Although the LETDF scheme has only recently commenced, two lessons have already emerged. One is the time delay before significant emissions reductions may be achieved – a number of the projects will not be completed until 2015 with only modest emission reductions before 2020¹⁰. Another issue has been the growing calls by potential project proponents that their emerging technologies can only ever become commercial if there is a price on carbon.

Lessons for climate policy development and AP6 countries

Some useful lessons have emerged from experiences to date with Australian climate policy, generally supporting other international experience. Some are particularly relevant to AP6.

Greenhouse inventory: Australia’s inventory efforts are well regarded internationally but highlight ongoing measurement challenges. Uncertainties in emission estimates are less than 10% for CO₂ in stationary Energy and transport, 5-20% for fugitive emissions, 10-30% for industrial processes, 10-80% or more for agriculture and 20-60% for land use change. The overall uncertainty in the 2003 national inventory is +/-5%, a clear challenge for setting reduction targets.

Greenhouse emission projections: Projections have considerable uncertainty because of these measurement challenges as well as a wide range of unknowable factors where assumptions have to be made. Australia’s 2010 emissions may lie between 102-118% of 1990 levels.

Voluntary schemes: These can play an important role in capacity building and for encouraging early action. However, their contribution to emissions reductions is difficult to estimate and may well prove to be limited. Rigorous and transparent verification is key.

⁹ See www.emissionstrading.nsw.gov.au.

¹⁰ Australian Government, *Tracking Towards Kyoto – Stationary Energy Sector*, 2006.



Electricity industry restructuring: The Australian experience to date suggests that restructuring electricity industries will not necessarily deliver improved environmental outcomes. Much appears to depend on circumstances prior to restructuring including fuel mix, national endowment of resources and existing infrastructure. Another key issue, however, is that electricity markets are 'designer markets' and design choices can greatly impact on the restructured industry's greenhouse performance. In particular, restructuring must not begin and end with the introduction of wholesale electricity markets. End-users must be both motivated and able to participate. Also, design, regulatory and institutional choices should not favour incumbent centralised technologies and supply-side participants against new distributed generation technologies, renewable energy and possible 'new entrant' demand-side players. There is a key need for ESCOs.

Market-based environmental regulation: Market-based approaches have potential advantages, particularly in restructured energy industries. For example, MRET provides additional cashflow to renewable energy projects yet developers also see energy market price signals that support efficient integration of renewable energy.

One of the great strengths of market-based instruments is the flexibility they offer market 'designers'. However, flexibility also implies design choices and abstractions that can have a marked impact on scheme effectiveness and efficiency. It can be very difficult to project how complex 'designer' markets will behave in practice. Worse, there are potential moral hazards for policy makers when making these design choices.

Extremely rigorous and transparent policy design processes are required to implement effective and efficient emission reduction schemes. Stakeholder management is particularly important given information asymmetry and other advantages of incumbents. Policy makers have had mixed success to date in these regards.

Interactions between measures may reduce their effectiveness: Two strengths of market-based measures are the potential to give them broad (even economy-wide) reach, and their potential compatibility with other financial measures. However, broad reaching measures are likely to overlap other policy measures, and it is possible for interactions between them to reduce their respective environmental effectiveness.

Designing markets for 'environmental' instruments: considerable effort is required to help establish transparent, liquid and efficient markets for tradeable environmental instruments that allow efficient price discovery and risk management by participants. Issues include the potential variability and uncertainty in both supply and demand of these instruments and infrequent (eg annual) acquittal of instruments to regulators. Investment decision-making is the key to scheme success and such investments may have significant time lags. Derivative markets have a vital role to play in bridging short-term and longer-term decision making by participants.

Technology innovation: New technologies are almost certainly required to meet our climate change challenge. The key policy question is how to achieve the necessary technology innovation. Experience to date highlights the important role of both publicly supported R&D and demonstration of promising but still emerging technologies, and the complementary importance of 'market-pull' mechanisms that drive deployment of existing abatement technologies. Australian R&D and demonstration funding is now supporting the development of a range of promising technologies. In some ways, however, this has highlighted the need for a price on carbon if these emerging technologies are to become commercial. It has also highlighted the long time frames of such technology innovation.

AP6 is an important and potentially highly valuable multi-party, technology-focused, climate change partnership between six nations that all have critical roles to play in future international energy and climate policy efforts. While there are useful 'no and low regrets' outcomes to be achieved through this voluntary framework, the larger success of AP6 in protecting the climate will depend, as with all policy efforts in this area, on the eventual widespread adoption and diffusion of a wide range of existing and emerging abatement technologies.

