Market Based Environmental Regulation in the Restructured Australian Electricity Industry

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The challenge for environmental regulation in a restructured electricity industry is its need to be compatible with both the inherent complexities of power systems and competition based coordination of the industry, yet still effective in meeting environmental objectives. This paper outlines some recent developments in market-based environmental regulation of greenhouse emissions in the Australian electricity industry. In particular, we describe the objectives, design and outcomes of electricity industry restructuring, the Mandatory Renewable Energy Target, the NSW Greenhouse Benchmarks, the Queensland 13% Gas scheme and Government accredited Green Power. Key design issues are shown to include the necessary abstractions for implementing such market schemes, the moral hazards that can arise (particularly with 'baseline and credit' approaches) and the potential for measures to interact in ways that reduce their respective environmental effectiveness. The mixed performance of these Australian schemes to date illustrates the need for great care in designing such market-based approaches.

1 INTRODUCTION

Electricity industries worldwide are undergoing rapid and widespread change, driven by the market-oriented restructuring underway in many countries and, now, increasing concerns about climate change. Australia is no exception – electricity industry restructuring has been underway for a decade and the sector's major contribution to Australia's greenhouse emissions is of growing concern.

1.1 Energy market regulation and climate change

The role of regulation in markets is to ensure that imperfect market 'means' lead to desired societal 'policy' ends. Energy markets pose particular challenges for regulation given the 'essential public good' nature of many energy services, capital intensive and long-lived assets, generally concentrated ownership on the supply-side and very significant social and environmental externalities. All of these limit the power of competition by itself to effectively regulate market participant behaviour.

Climate change is one of the most urgent and fundamental problems facing energy market regulators. Beyond the prospect of highly damaging and perhaps irreversible global warming, this challenge is heightened by the:

- long time horizon over which concerted action is required,
- only recent – decade or less – widespread recognition of our need to reduce greenhouse emissions,
- fact that the most important greenhouse gases have not been regarded as pollutants until recently, and
- importance of fossil fuels to our economies yet apparent need to reduce their global usage by 50% or more over the coming century.

The electricity industry in many countries is one of the largest contributors to greenhouse emissions. Along with all of the challenges noted above, the shared nature of electricity industry operation poses particular problems. Electricity consumers receive a complex and opaque mix of energy from all operating power stations. Decision making – both investment and operational – by all generators, network operators and end-users contributes to overall industry operation over time. This creates particular difficulties in distinguishing participant responsibility for environmental impacts, and in inducing them to take actions to reduce these.

Approaches to environmental regulation can be classified broadly in two categories – *technical* (traditional 'command and control' regulation) and *financial*, using either pollution taxes or markets in tradable pollution permits or credits. Technical regulation is applied to the industry participants physically causing the environmental impact – the generators in the case of the electricity industry. Pollution taxes can also be levied directly on generators. The financial approach, however, also allows for other designated industry participants (usually retailers in the case of the electricity industry) to be held liable for their 'imputed' environmental impacts – particularly when tradeable permits or credits are used. Some level of 'abstraction' is necessary in such approaches.

Most environmental regulation in the electricity industry to date has focussed on air, water and solid waste pollutants as well as resource planning issues, but not greenhouse emissions. Many regulatory frameworks were originally implemented for traditional, vertically integrated and monopoly (often government) owned and operated power systems. Technical 'command and control' approaches have generally been favored.

Environmental regulation in a restructured electricity industry must be compatible with competition yet still be effective in meeting environmental objectives. This is not easy to achieve, as many environmental impacts appear as un-costed externalities to electricity industry participants, who may give them low priority compared to their primary objectives of surviving and prospering in a competitive industry. While some traditional regulatory approaches remain clearly appropriate, others may no longer be effective following the introduction of market-based competition. An example of this is the implicit regulation possible when a government owns a vertically integrated monopoly industry.

There might also be novel approaches that are particularly appropriate for restructured industries. For example, the last 30 years has seen growing interest in the concept of implementing environmental policy through use of market mechanisms to take advantage of the efficiency of the market process (Montgomery, 1972). Such 'environmental markets' would seem to be highly compatible with competition-based restructured electricity industries. They might also offer some advantages for the regulation of greenhouse emissions. We are certainly now seeing increasing interest in applying market-based schemes to reduce greenhouse emissions from the electricity industry.

1.2 Environmental regulation in the Australian Electricity Industry

The Australian electricity currently contributes over 32% of Australian greenhouse emissions and has shown the highest growth in emissions of any sector over the last decade (CoA, 2002). This rapid emissions growth is projected to continue. One of three agreed national energy policy objectives agreed by the Federal and State governments is 'Mitigating local and global environmental impacts, notably greenhouse impacts, of energy production, transformation and use" (CoAG, 2002).

Electricity restructuring in Australia has been underway for over a decade. The centrepiece of this restructured industry is a multi-region 'National Electricity Market' (NEM) now covering around 90% of the Australian population. This physical wholesale spot market has an associated ancillary services market, while there is active forward trading in financial instruments (NEMMCO, 2003).

The NEM is regulated at the Federal government level while retail electricity markets are implemented and regulated at the state government level. The operation of generators is subject to state-based environmental regulation of air (but not climate change), water and ground pollutants. Also, a

significant number of large generation companies within the NEM remain under state government ownership. These arrangements reflect the development of the electricity industry in Australia over the last century as state owned and operated, largely vertically integrated and state-based networks.

At least one Australian state has introduced financial regulations that apply to electricity generators. New South Wales (NSW) has introduced 'load based licensing' of various pollutants that operates somewhat like a pollution tax. NSW also has an innovative, Internet based, salinity trading scheme to regulate saline discharges from mines and power stations in the Hunter River catchment (EPA, 2003).

In terms of climate change, a number of states require environmental impact assessments (EIAs) for significant new projects including power stations that can include greenhouse emission estimates, and possible abatement options. Of greatest interest here, however, are a number of state government schemes for market-based environmental regulation relating to greenhouse emissions:

- the NSW Greenhouse Benchmarks Scheme,
- the Queensland 13% Gas scheme, and
- 'Government certified' Green Power.

There are some Federal programs regulating the technical performance of electrical end-use equipment (including Mandatory Equipment Performance Standards) as well as a number of voluntary schemes for both generators and energy consumers (AGO, 2003). Our focus here, however, is on:

- the market-based Mandatory Renewable Energy Target (MRET), and
- the likely impact of ongoing restructuring of the electricity and gas industries on environmental outcomes.

These five policy measures represent a range of possible approaches to promoting greenhouse emissions reductions. Most have a number of societal objectives beyond climate change including economic efficiency and industry development. In Section 2, we consider the effects of industry restructuring, MRET and the three state based initiatives in turn. The objectives, design and experience to date for each are described. In Section 3 we consider some of the key regulatory issues identified so far from the implementation and operation of the schemes. In Section 4 we discuss possible future developments in environmental regulation for the Australian electricity industry.

2 KEY AUSTRALIAN MARKET-BASED REGULATORY MEASURES

2.1 Electricity industry restructuring

Restructuring of the Australian stationary energy sector has been driven by economic objectives. For example, the National Electricity Code does not include any specific environmental objectives. There had, however, been an expectation by at least some government policy makers that these reforms would also contribute to climate change objectives by promoting (CoA, 1997, p. 4):

- efficient competition in supply by embedded cogeneration and renewable energy sources,
- more sensible patterns of energy use through incentives for investment in energy efficiency, and
- penetration of natural gas into the energy sector with consequent lowering of the average greenhouse gas intensity of energy.

Unfortunately, these outcomes have not materialised since the NEM commenced operation in 1998. Rather than the original estimate that energy market reform would drive a 14 Mt reduction from 'business-as-usual' greenhouse emissions by 2010, it is now projected to increase emissions by 0.1 Mt CO2-e (CoAG, 2002). Reasons include:

- the low cost of coal fired generation in Australia, and current failure to price greenhouse emissions,
- excess electricity capacity in the initial stages of the reform process that depressed market prices therefore favoring low operating cost and high emission incumbents, particularly brown coal units (CoA, 2002),
- a relatively immature and inflexible gas market (CoAG, 2002),

- a reduced emphasis on energy efficiency given lower industrial and commercial electricity prices (Pears, 2002),
- market design and regulation based in part on historical arrangements, that can therefore disadvantage new technologies; for example, wind energy (Outhred, 2003), and
- the supply-side orientation of market reforms to date that have not engaged end-use consumers to become active market participants (Outhred et al., 2002).

Some of these issues are now being addressed. Supply-demand balance has tightened considerably over the past several years, and new gas generation is coming on line (CoAG, 2002). However, new coal-fired power stations have also recently entered the NEM and there are plans for more.

The recent CoAG energy market review has proposed changes to the Australian gas market to foster competition and new supply (CoAG, 2002: 37). It also recommended increased demand-side participation (CoAG, 2002: 33) including the introduction of full retail competition (FRC) into all NEM state markets as soon as practical. The NEM has review arrangements for the National Electricity Code while State Governments also have review mechanisms for driving changes to the retail markets.

2.2 The Mandatory Renewable Energy Target

The Federal MRET scheme requires all Australian electricity retailers and wholesale electricity customers to source an increasing amount of their electricity from new renewable generation sources.

The stated objectives of the scheme are (CoA, 2000):

- "to accelerate the uptake of renewable energy in grid-based applications, so as to reduce greenhouse gas emissions;
- as part of the broader strategic package to stimulate renewables, provide an ongoing base for the development of commercially competitive renewable energy; and
- to contribute to the development of internationally competitive industries which could participate effectively in the burgeoning Asian energy market."

Scheme design: This 'baseline and credit' certificate scheme is built around Renewable Energy Certificates (RECs) that represent 1MWh of 'new renewable electricity' generation – from either new generators, or additional output from existing generators.

The liable parties are electricity retailers in NEM states, large consumers who purchase directly from the NEM, and the notionally equivalent electricity industry participants in non-NEM states. The 'new renewable electricity' liability that these parties are required to acquit was originally intended to be equivalent to 2% of their electricity purchases by 2010. To increase market certainty, however, electricity projections were used to translate this 2% target into a fixed national target of 9500GWh in 2010. The annual target ramps up to this 2010 target, which is then maintained until 2020.

Accredited generators can create RECs from 'new renewable electricity' following the commencement of the scheme in April 2001. Eligible sources include hydro, biomass, wind, solar and co-firing of biomass in large coal fired power stations. Domestic solar hot water and small generators can also earn RECs through deeming provisions.

MRET's requirement for increasing 'new renewable electricity' requires the establishment of baselines for existing generators. Renewable energy power stations that have entered service since January 1997 can earn RECs from their entire output. For generators commissioned prior to 1997, an annual baseline is established and only annual generation beyond this baseline each year earns RECs. This is to ensure that the scheme only rewards 'additional' generation beyond that prior to MRET's introduction. The default baseline is average annual generation over 1994, 1995 and 1996. Alternative baselines can be negotiated with ORER if this average doesn't represent 'normal' power station output. These baselines are confidential. A station that generates less than its baseline in a year is unable to create RECs but is not required to actually surrender RECs to make up this shortfall.

The Office of the Renewable Energy Regulator (ORER) administers the scheme. It accredits eligible generators, audits the creation of RECs, maintains a database for registration and trade of these RECs, determines the obligations of liable parties and retires their RECs for compliance (ORER, 2003).

Once accredited, generators are able to register RECs they have created at any time. ORER does not provide trading arrangements for RECs. An Internet based trading scheme known as the Green Electricity Market (GEM, 2003) was established by some of the major Australian energy companies. Purchase Agreements between renewable generators and liable parties are also in use, while there is also active OTC forward trading in RECs (AFMA, 2002).

Liable parties acquit their obligation by surrendering sufficient RECS annually to ORER. A penalty of A$40/MWh is charged for any shortfall beyond an allowed buffer that can be carried forward to the following year. The scheme therefore represents a hybrid trading and taxation measure.

Performance to date: The MRET scheme has now been operating for nearly two years. Liable parties have comfortably met the targets to date. However, some significant problems remain to be addressed, largely relating to the abstractions necessary when designing such a 'baseline and credit' measure.

Public opposition to the classification of some generation sources as renewable: There has been considerable controversy over the decision that biomass generation from native forest waste materials is eligible. RECs derived from these types of power stations are denoted as such ('dead koala' RECs according to environment groups) and are trading at a discount to those from other sources.

Inadequate target: More recent projections of Australian electricity consumption to 2020 suggest that the 9500GWh target for 2010 will fall well short of the 2% increase originally intended for the scheme (BCSE, 2003). Some stakeholders are campaigning for an increased GWh target on this basis. There is also a view that a much more substantial target will be required to significantly reduce emissions and develop the Australian renewable energy industry. The MRET target is low in comparison with some countries in Western Europe that also have renewable energy targets.

Baselines for existing large-scale hydro: This is perhaps the most significant problem with the scheme to date. Recent analysis including BCSE (2002) has identified that baselines for some of Australia's large-scale hydro generators appear to have been set at levels significantly below their long run average system yield. Ongoing growth in electricity demand in Tasmania's isolated, hydro-dominated and single owner electricity industry allows these generators to create significant number of RECs without undertaking any additional investment.

All hydro stations can also benefit from the variability in their annual energy generation as they are eligible to earn RECs in the years when their output is above the baseline but are not obliged to return RECs in years where their generation falls below it. By BCSE's estimation, some 35% of the summated MRET target to 2010 can be met by existing large-scale hydro in these two ways.

Future uncertainty: A number of factors contribute to uncertainty on RECs pricing, including only a single annual acquittal of RECs to ORER. Perhaps the most important contributor to this problem is that generators are permitted to register RECs that they have generated *at any time* within the life of the scheme. Unfortunately, there are some 'information asymmetry' advantages to generators, particularly large-scale hydro operators, in concealing their true RECs holdings. It obscures their baselines and creates uncertainty in future RECs pricing amongst other participants – a critical input into decisions on financing new projects. For example, Hydro Tasmania has revealed that it had generated more than three times as many RECs as it had registered for the first year of the scheme (CoA, 2002b).

The greatest challenge facing MRET at this time, however, is the recommendation of the recent CoAG (2002) Energy Market Review that the scheme (and a number of other measures) be replaced by an emissions trading scheme. This has created a great deal of uncertainty in the market and damaged the prospects of numerous proposed renewable generation projects (Outhred et al., 2002).

2.3 The NSW Greenhouse Benchmarks Scheme

The NSW Greenhouse Benchmarks Scheme is the most significant state based environmental regulation on climate change to date in Australia. The scheme set emissions reductions benchmarks for NSW electricity retailers based on 'imputed' NSW emissions from the electricity sector compared against a declining per-capita state emissions target. Retailers can demonstrate compliance through certified low-emission generation, energy efficiency and sequestration activities. The stated policy intent of the scheme is to reduce 'greenhouse gas emissions created through NSW electricity consumption' (NSW Government, 2001).

The original scheme failed to achieve these objectives over its legislated life of 1997-2001 (Nolles et al., 2002). Recent changes to the scheme have been made to introduce penalties for non-compliance, allow special arrangements for large consumers, amend the measurement of different types of actions under the scheme and introduce certificate based trading (IPART, 2003).

Scheme design: Operation of this 'baseline and credit' trading scheme is now built around NSW Greenhouse gas Abatement Certificates or NGACs, each representing a notional tC02-e of 'avoided' greenhouse emissions.

The scheme objective is defined in terms of a declining per-capita emissions target (tCO2-e/NSW resident) imputed from population estimates, state electricity consumption and an abstracted 'NSW pool coefficient' (average tCO2-e/MWh) for emissions from state-based electricity generators.

Liable parties include state electricity retailers, large consumers buying directly from the NEM, generators directly supplying customers, and other parties who request to directly participate (IPART, 2003). Liable parties are assigned shares of the overall target emissions volume based on their market shares of state electricity sales. Emissions above their assigned targets for each year must be offset by surrendering NGACs or by paying a penalty per tonne of emissions above their assigned targets.

Accredited NGAC providers can create NGACs through (IPART, 2003):

- "reduction in the greenhouse intensity of electricity generation,
- activities that result in reduced consumption of electricity,
- the capture of carbon from the atmosphere in forests, referred to as carbon sequestration."

All of these activities for creating 'avoided' emissions require the establishment of baselines. The arrangements for low-emission (largely gas-fired) generators are similar in some regards to the MRET approach although the eligibility date for a zero baseline is post-2001, and emission reductions are calculated by the annual generation output times the difference in tCO2-e/MWh between the notional NSW pool coefficient and the accredited generator. The baseline arrangements for demand-side abatement activities must attempt to cover the range of possible activities that reduce electricity consumption from what it would otherwise have been. Arrangements for this are still being finalised.

The NSW Independent Pricing and Regulatory Tribunal (IPART) administers the scheme in a similar manner to ORER's role for MRET. One difference with MRET is that NGAC providers are required to register NGACS within six months of the end of the calendar year in which they were created.

Scheme performance: The scheme only commenced in January 2003, and work continues on some aspects of the scheme including verification arrangements of NGAC creation. Nevertheless, observers including the authors have raised some concerns about the likely performance of the scheme. Again, many of these problems lie in the 'abstractions' chosen in the scheme's design.

'Imputed' emissions: The scheme uses 'attributable' emissions measures rather than 'physical' emissions from NSW electricity production, and these may diverge markedly. For example, the 'NSW pool coefficient' would in our opinion be more accurately described as a historical benchmark as the 'pool' is specified to contain a particular group of existing power stations (Outhred et al., 2002b)

Baseline calculations: The scheme requires that baselines be established for a wide range of 'low-emission' and demand-side abatement activities. It may be very difficult to ensure that only activities additional to 'business-as-usual' progress will be able to generate NGACs. For example, relatively efficient coal and all gas-fired generation anywhere in the NEM commissioned after January 2002 will be able to create NGACs calculated from their entire generation output. The challenge is even greater for demand-side abatement (DSA) and the present rules for such activities do not seem capable of ensuring additionality beyond BAU developments (MacGill et al., 2003).

Double counting across policy measures: Adding to the baseline challenge is the potential that the NSW Greenhouse Benchmarks scheme might 'free ride' off other existing Federal and State Government policy measures. For example, retailers can claim the emissions reduction associated with their RECs obligations on NSW electricity sales, against their NSW benchmark targets.

Fungibility of emissions reductions activities: The NSW scheme treats low emission generation, energy efficiency and sequestration activities as directly comparable and tradeable (fungible) through a single instrument, the NGAC. While this offers potential economic advantages in meeting scheme objectives at minimum cost, it is important to note that the 'costs' of these different activities will largely depend on the methodology (and baselines) by which they are measured.

Sequestration: Considerable uncertainties remain in the measurement of sequestration activities, and there are fundamental differences between emissions reductions through reduced use of fossil fuels and through increased uptake of atmospheric carbon in ecosystems. For example, the NSW scheme requires sequestration providers to 'guarantee' that sequestered carbon will be maintained for 100 years – a considerable ask even for the NSW State Forests agency.

Complexity: The 'imputed' measures of emissions and necessary baseline rules for the scheme have contributed to its unwieldy complexity – a problem for participants, the administrator and also for the transparency of the scheme's operation.

Jurisdiction: There are difficulties in implementing this type of measure at the State level. As indicated in the NSW Government's reform proposal, a consistent multi-state or national policy of this type would be preferable to a NSW scheme alone. In the absence of a multi-state scheme, it is questionable to allow a range of activities throughout the five states and territories participating in the NEM to be counted as contributing to reducing per-capita emissions in NSW alone. For example, what will happen if one or more of the other states introduce a similar scheme at a later date (Outhred et al., 2002b).

It will be interesting to see how the NSW scheme fares in practice. Some OTC forward trading of NGACs has commenced and prices are currently low – around US$2-3/tCO2-e. This might represent the low cost of actions to protect the climate, or the modest size of the scheme target and 'easy' baseline arrangements. Finally, the Victorian Government has committed to examining the experience of other states with emissions reduction schemes in order to implement a similar measure (ALP, 2002).

2.4 The Queensland 13% Gas Scheme

Currently, around 97% of Queensland's electricity is sourced from coal (Queensland Government, 2000). The Australian state of Queensland is implementing a scheme that will require electricity retailers and other liable parties to source at least 13% of their electricity from gas-fired generation from 1 January 2005 (Queensland Government, 2002).

The objective is to establish a demand for gas-fired electricity that will encourage the development of new gas sources and infrastructure. This will help meet Queensland's future energy requirements while reducing the growth in greenhouse gas emissions, and therefore "reduce the vulnerability of the State's economy to the introduction of any national and international greenhouse gas abatement measures (such as the introduction of emissions trading)" (Queensland Government, 2002,)

The 13% Gas Scheme is based on gas-electricity certificates or GECs, each representing one MWh of eligible gas generation. The participants are:

- Accredited Parties – generators of eligible gas-fired electricity who can create GECs, and trade them separately to the electricity from which they arise, and
- Liable Parties – largely electricity retailers, who are required to surrender GECs to the Regulator to acquit a liability set at 13% of their Queensland electricity sales.

The baseline for creating GECs is set at new or additional gas fired electricity from May 2000 that notionally contributes to supporting Queensland load. This latter requirement prevents GECs being earned from Queensland generation that is exported to NSW, but also allows GECs to be earned from NSW generators that export into Queensland. The stated intent of the chosen baseline is as "a device that essentially encourages and rewards a change in behaviour."

2.5 Green power

A number of electricity industries worldwide have voluntary schemes to allow electricity consumers to purchase 'Green Power', typically electricity generated from renewable energy sources. Because electricity industry networks 'mix' all generation, this green power can't physically be delivered to these environmentally minded consumers. All that an electricity retailer can actually do is to guarantee to enter into contracts with 'green' generators that cause the generators to produce enough 'green' electricity to cover the volume purchased by customers under the retailer's Green Power schemes.

This necessary 'abstraction' creates a challenge in counting and certifying premium priced green electricity sales against different types of renewable generation across an industry. Another issue is that most electricity industries already have some renewable component in their overall generation mix, generally large-scale hydro. Customers motivated by the desire to support increased use of renewables are unlikely to wish to pay a premium to merely have such existing generation 'allocated' to them.

National Green Power Accreditation Program External auditing may increase consumer confidence in such arrangements, creating a potential regulatory role for government. Such is the case in Australia, where a national accreditation scheme has been in place since 2001 under the auspices of the Sustainable Energy Development Authority of NSW. The stated purpose of the program is "to promote the installation of new green electricity generators by increasing consumer demand and confidence in Green Power products" (Greenpower, 2003).

One key element of this program is that retailers have been required to source increasing amounts of their green electricity from 'new' (post 1997) generators – 80% of total sales since mid 2001. Another is that the controversial use of materials (including wastes) from high conservation value native forests for renewable 'biomass' generation is not acceptable. This is not the case for MRET.

Outcomes: Over 95% of Australian electricity consumers now have access to accredited Green Power. Sales last year, however, represented only around 0.25% of total Australian electricity consumption while green power customers were less than 0.8% of total customer numbers.

Green Power schemes face an uncertain future with legislated retailer requirements for renewable generation under MRET and the NSW Benchmarks scheme, and the recent introduction of full retail competition in the two largest Australian states. For example, the accredited 100% Green Power product from Australia's largest retailer, Energy Australia, charges customers a premium of around 68% per MWh consumed (Energy Australia, 2003). Furthermore, this retailer has recently introduced non-accredited green power products that do not appear to stipulate that the product will be sourced from 'new' generation or prevent double counting across legislated requirements.

Sales for 2001-2 fell some 11% over the previous year although customer numbers were up 13% (Greenpower, 2003). This may be explained by the growing popularity of lower cost, partial green power offerings from some retailers.

3 KEY LESSONS

A number of important lessons have emerged from experience to date with these market-based environmental instruments in the Australian electricity industry.

Electricity industry restructuring: The Australian experience to date would seem to support world-wide evidence that restructuring electricity industries will not necessarily deliver improved environmental outcomes. One issue is that many environmental externalities are unpriced in competitive electricity markets and therefore unlikely to influence decision making.

Another key issue is that restructuring does not begin and end with the introduction of wholesale electricity markets. End-users must be motivated and able to participate, while design, regulatory and institutional choices should not favour incumbent centralised technologies and supply-side participants.

The perils of abstraction - baselines for 'baseline and credit' schemes: For all the Australian schemes discussed, there are design choices that require some level of abstraction. There are moral hazards in these choices. Appropriately defined baselines are vital to the effective and efficient operation of 'baseline and credit' schemes. Many types of renewable energy projects clearly represent additional effort and investment compared to BAU progress and would seem to be well suited to 'credit' certificate schemes. MRET, however, has faced problems in managing 'additional' generation from existing large-scale hydro schemes.

The baseline challenge is greater when promoting low-emission gas-fired generation such as in the NSW and Queensland schemes because unrelated developments in the NEM seem likely to facilitate a greater role for gas-fired generation.

The challenge of establishing baselines for the wide range of demand-side abatement (DSA) activities that could potentially respond to a credit scheme is more difficult yet, given technical progress and the wide range of motivations involved in decisions regarding end-use consumption. Worse, crediting DSA can effectively mean rewarding participants for 'doing something differently to what otherwise they haven't actually yet done.' It is likely to be difficult to establish effective, credible baselines for DSA.

The key concern here with abstractions such as baselines, is that these environmentally driven market-based policy schemes actually drive change. If a scheme's targeted outcomes will happen anyway there is little point, and much to argue against, going to the effort of implementing that policy measure.

Interactions between measures that reduce their effectiveness: A number of possible interactions between these schemes have been identified that threaten to reduce the environmental effectiveness of the measures. One clear example is that NSW retailer obligations under the Federal MRET legislation are permitted to contribute, in part, to meeting their NSW Benchmarks obligations. The effective change in industry behaviour driven by the two measures is therefore reduced, and the credibility of both schemes may be threatened.

Possible dangers with trading schemes: While trading has the potential to allow participants to meet greenhouse obligations in a way that reduces overall societal costs, effective trading schemes would seem to require accurate and credible measurement of 'additional actions' across the range of possible abatement activities. For example, the creation of large quantities of low cost (essentially BAU) RECs from existing hydro schemes would seem to threaten the viability of some other proposed renewable generation projects, as competitive pressures drives participants towards the lowest cost actions.

4 DISCUSSION

The Australian electricity industry's present greenhouse emissions levels and trajectory are alarming, and require immediate concerted attention. Current projections suggest that emissions will rise markedly even with the present 'climate change' measures in place (CoA, 2002).

The recent CoAG (2002) review of Australian energy markets has suggested sweeping changes to greenhouse measures in the Australian electricity industry. A national emissions trading scheme is proposed to replace existing measures including MRET, the NSW Benchmarks and the Queensland 13% Gas schemes. The stated reasons are that the existing measures are poorly targeted, attempt to pick technology 'winners and 'distort' each other through double counting and other adverse interactions. The MRET scheme is also now under independent review as required by its legislation.

Thus considerable uncertainty surrounds policy developments in market based environmental regulation of the Australian electricity industry over the next few years.

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