Some options for State-based Renewable Obligations in Australia

R.J. Passey, I. F. MacGill and M.E. Watt
Centre for Energy and Environmental Markets
University of New South Wales
Sydney 2052
AUSTRALIA
E-mail: r.passey@unsw.edu.au

Abstract

Greenhouse emissions from Australia's electricity sector are projected to increase and inequitably contribute to global climate change emissions. Development of a least-cost abatement portfolio of technologies on both the supply and demand sides is necessary to reduce emissions. On the supply side, this portfolio will include a diverse range of technologies including a number of different types of renewables. The Mandatory Renewable Energy Target scheme is the most significant policy currently in place to encourage deployment of near-commercial renewable technologies. To provide the long-term support necessary for renewable energy industry development, the recent MRET Review Panel recommended the scheme's target be increased and its lifetime extended. The Commonwealth Government's refusal to do either of these presents the States and Territories with an opportunity to develop their own schemes to increase market pull support for renewables. In this paper we analyse and discuss two possible options for setting State-based renewable obligations: either using the MRET scheme directly or via Green Power-accredited generators independently of MRET.

1. INTRODUCTION

Australia has the world's highest per-capita greenhouse emissions – more than double the developed world average (Turton, 2004). Moreover, under the existing greenhouse-related policies and programs of Commonwealth, State, Territory, and Local governments, Australia's emissions are projected to be 23% higher than 1990 levels by 2020 (AGO, 2004a). IPCC scenarios suggest that global emissions need to be halved by 2050 in order to avoid dangerous climate change (IPCC, 2001), and Australia's current energy and climate change policy framework is clearly inadequate to deliver an equitable contribution to that goal. Emissions from the stationary energy sector, which make up nearly one half of Australia's total emissions, are projected to increase by 70% by 2020 (AGO, 2004a). Electricity generation makes up 71% of the stationary sector emissions (AGO, 2004b). Therefore, it is particularly important to develop and implement sound climate change policy for the electricity industry.

The Australian electricity industry is characterised on the demand-side by significant energy-intensive industrial loads and relatively low levels of energy efficiency by developed world standards, and on the supply-side by a heavy reliance on coal-fired generation (AG, 2004). Achieving major emissions reductions in a cost-effective manner will require a portfolio of approaches and technologies on both the supply and demand sides, including improved energy efficiency, lower-emission fossil-fuel generation and significant contributions from new renewables. The range of possible abatement technologies have very different characteristics and are at different stages of development, and so a coordinated package of policy measures is required to provide support throughout the different stages of research, development, demonstration and commercialisation. While some options can provide least-cost abatement in the short-term (for example energy efficiency), others will require government support now in order to provide least-cost abatement in the longer term. Some renewables fall into the latter category. Other abatement options require considerable R&D and demonstration to ascertain what future role they could play. Carbon Capture and Storage (CCS) for electricity generation is in this category. A portfolio approach is likely to provide the overall least-cost outcome in the long term, because a failure to identify and develop any one viable option would increase the marginal abatement cost and thus costs overall.

The challenge for governments lies in allocating its own limited resources most appropriately while developing a policy framework that drives energy industry development in a way that minimises long-term abatement costs. Renewable energy technologies are an important component of any mix, yet play a small and decreasing role in Australia's energy supply despite a high resource base. The

Mandatory Renewable Energy Target (MRET) scheme was developed to encourage market deployment of near-commercial renewable technologies. Other policy support mechanisms that currently provide similar "market pull support" for renewable electricity generation in Australia are Green Power and the Photovoltaic Rebate Program – both of which have limited scope because they are voluntary and target a specific customer group willing to pay a premium for their electricity. A recent review of the MRET scheme made a number of recommendations, including increasing the target and extending the scheme's timeframe. The Commonwealth rejected these recommendations despite support for them from a number of States.

In this paper we analyse and discuss two possible options by which State and Territory governments could increase market pull support for renewables: either setting renewable obligations using the MRET scheme directly, or via Green Power-accredited generators independently of MRET.

2. A PORTFOLIO APPROACH TO MINIMISE LONG-TERM ABATEMENT COSTS

The IPCC states that most greenhouse reductions must come through reduced fossil fuel emissions, and that a portfolio of technology options will be required on both the supply and demand sides of the energy mix (IPCC, 2001). What this mix will be is an area of considerable work, and debate, much of it built around scenarios of global primary energy supply for the period to 2050 and beyond. Such scenarios require assumptions of resource availability, costs, and technology innovation, both in terms of the changing costs of different technologies over time and the speed with which they can be introduced. For example, the International Energy Agency's (IEA) GLO50 scenario assumes the introduction of a $50 carbon tax over the coming decade, and in response, CCS contributes to abatement from 2015 through to 2050, yet still requires renewables to increase from 19% in 2000 to 45% in 2020, a share which is then maintained to 2050 (Gielen and Podkanski, 2004) - Figure 1.

Despite all the uncertainties, diversification of abatement options is clearly a valuable risk management strategy, not only in terms of abatement over the longer term but also because, for reasons of energy supply security and system diversity, a mix of technologies will likely provide the least-cost solution (Awerbuch, 2000).

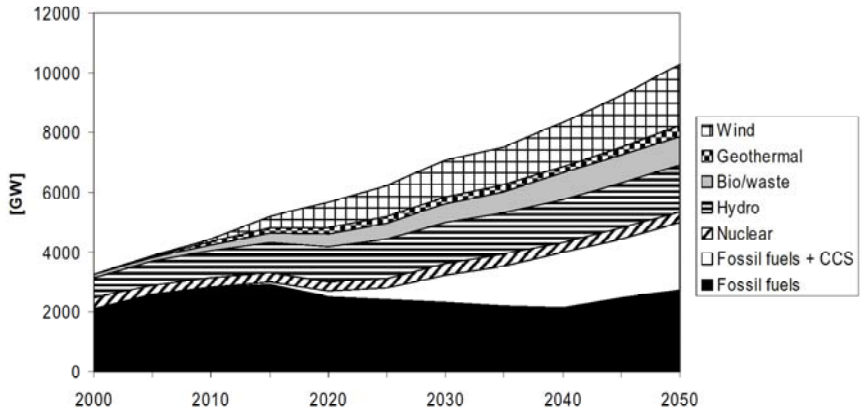

Figure 1 Global Electricity Production Under the IEA GLO50 Scenario

From (Gielen and Podkanski, 2004)

On the supply side, it is likely Australia's least-cost abatement portfolio will include significant contributions from renewables, gas-fired generation and possibly CCS.[1] All these have capacity constraints that restrict their contribution to generation: renewables because of limited availability of commercially viable resources, some of which are stochastic; gas through resource depletion and

[1] It is likely the total mix of technologies required to reduce greenhouse emissions from the supply side of the electricity sector will include advanced coal-fired generation (ultrasupercritical plant, integrated gasification combined cycle, integrated drying gasification combined cycle, and carbon capture and storage), gas-fired generation (open and closed combined cycle gas turbines), renewables (hydro, wind, bioenergy, photovoltaics, solar thermal, tidal and wave), and cogeneration.

likely increasing world prices over the next 10-20 years (Akmal et al., 2004); and CCS because of present technical uncertainties and the apparent limited availability of commercial geologic storage locations (Allinson et al., 2003).

In Australia, the cost of introducing an abatement technology into the electricity generation sector has traditionally been modelled with respect to a business-as-usual scenario. For example, up to and during the 2003 MRET Review, the price impacts of increased targets were modelled with respect to the projected cost of the existing generation mix, with or without the current MRET. However, since it is agreed Australia needs to reduce greenhouse emissions, the aim should be to achieve the lowest cost and lowest risk approach, not just compare the cost of one abatement technology against the cost of doing nothing. This applies to any of the abatement technologies, whether they are renewable, gas-fired generation or CCS. Renewable energy, and possibly CCS, are not short term least-cost abatement options, but part of a long-term least-cost abatement portfolio. What is economic in the future depends at least in part on previous patterns of investment (Neuhoff, 2004). Thus an appropriate basis for comparison is the cost of abatement without these technologies – the opportunity cost. For example, according to the IEA GLO50 modelling above, exclusion of CCS from the global abatement portfolio increased the marginal abatement cost in 2050 from US$50/tonne CO_2 to almost US$80 tonne/$CO_2$ (Podkanski and Gielen, 2005). Given the greater contribution that renewables are projected to make to the generation portfolio internationally (Figure 1), limiting their use in Australia would likely increase the marginal abatement cost even more.[2]

3. THE ROLE OF GOVERNMENT IN TECHNOLOGY INNOVATION

For technologies such as renewables, gas-fired generation and CCS to fulfil their abatement potential over the medium to long term, ongoing development of an evolving least-cost abatement portfolio is required. This needs government intervention because markets (i) generally fail to adequately support the research and development required to bring innovative technologies to the market, (ii) fail to internalise externalities, (iii) generally discount future costs and benefits and so overemphasise the present, and (iv) are unable to anticipate and so incorporate future impacts (for example those due to climate change). In addition, existing infrastructure, institutional processes and pricing policies centre around the energy sources, technologies and deployment choices of the mid 20th century and do not easily accommodate alternatives without clear policy directives. The role of policy makers in changing energy infrastructure and user behaviour within the complex social, cultural and technological structure is discussed in Rayner and Malone (1998).

Deployment of novel technologies into the market takes place along a research, development, demonstration and commercialisation (RDD&C) timeline. Government has a role to play throughout this timeline: R&D of promising socially beneficial yet unproven technologies; enabling demonstration of promising technically proven technologies; and aiding commercialisation of technically mature technologies with clear societal benefits. In countries like Australia, where most electricity infrastructure and industry is government-owned and regulated, it is reasonable that government plays a critical role in supporting the development and testing of new technologies.

As technologies move along the RDD&C timeline, the type of support required changes, with more market-based programs such as MRET becoming suitable. For example, as and when technologies such as IGCC and CCS are fully technically proven, market-based schemes equivalent to the 13% Gas Scheme or the MRET may be an appropriate way to for governments to promote commercial viability.

[2] Renewables, gas-fired generation and CCS abate CO_2 by offsetting conventional coal-fired generation. Because coal+CCS has higher emissions than renewables, as the average emissions intensity of the electricity mix decreases over time, very low emission technologies such as renewables become even more cost effective. Thus, gas-fired combined cycle generation may be the cheapest abatement option while the average emissions intensity is high but will become relatively more expensive as the emissions intensity decreases. As a result, a least-cost supply-side abatement strategy might include gas-fired generation as a short-term abatement technology and renewables as cheaper medium to long-term abatement technologies. CCS may play a role when and if it becomes available as a cost-effective option at a commercial scale. This evolving strategy would emerge as a preferred option in the presence of a carbon price that increased over time. The current price of CO_2 in the European Union emissions trading scheme is currently around €25/tonne CO_2 (Point Carbon, 2005), and projections range from US$4.50 to US$65/tonne CO_2 by 2020 (Birch, 2004).

4. CURRENT GOVERNMENT SUPPORT FOR RENEWABLE TECHNOLOGIES

The Energy White Paper *Securing Australia's Energy Future* sets the current direction of Commonwealth Government energy policy, and includes a number of measures to support a range of fossil fuel and renewable technologies. These focus largely on technological push through R&D and Demonstration, with little in the way of market pull through support for technically proven and near-commercial technologies. The programs available to renewables are the Low Emission Technology Fund (LETF), the Renewable Energy Development Initiative (REDI), wind forecasting and energy storage programs, and Solar Cities (AG, 2004). These programs focus on the research, development and demonstration phases, and while valuable for emerging renewable technologies, do not provide market pull assistance to technologies such as wind power and bioenergy that are currently proven and could meet a significant proportion of demand. It is already apparent that investment driven by MRET is slowing and seems likely to end within a year or two (BCSE, 2004). The Photovoltaic Rebate Program (PVRP) has just been extended for another two years and provides market pull support but only for photovoltaics.

The States and Territories administer Commonwealth schemes such as PVRP and the Renewable Remote Power Generation Programme (RRPGP), and provide general support in the form of planning guidelines. They also have a variety of their own mechanisms in place, supporting RD&D, but also providing market pull support through direct subsidies for solar water heaters, government Green Power purchases, the Victorian Wind Energy Support Package (WESP), the NSW Greenhouse Gas Abatement Scheme (NGAS), and co-funding through the WA Remote Area Power Supply Program. Unfortunately, over the medium term, these measures are unlikely to result in significant renewable energy above and beyond plant required to meet MRET liabilities: Green Power had resulted in the surrender of just over 3.4% as many RECs as the MRET scheme by end 2003, a percentage that is likely to decrease as the MRET increases; the WESP will only be useful to wind farms already viable because of MRET; given the low price of NGACs compared to RECs, it is unlikely the NGAS will result in significant renewable energy above and beyond plant required to meet MRET liabilities - it is more likely to just increase the proportion of the MRET met by landfill gas plant; the capacity of solar water heaters to offset coal-fired generation is limited; and the Remote Area Power Supply Program (RAPSP) only augments the RRPGP in off-grid areas of WA.

Thus, additional measures are required to drive uptake of mature renewables in Australia. A variety of policy options are used worldwide for this purpose, ranging from renewable obligations such as MRET, to feed-in tariffs, production tax-credits, and capital grants. Here we focus specifically on renewable obligations as they most readily build on existing Australian policy approaches. In future work we will be exploring the wider set of policy options for pulling renewables into the market.

5. RENEWABLE OBLIGATIONS

Renewable obligations specify that a given amount of renewable energy must be produced by a given date. They aim to promote renewable energy industry development by providing a revenue stream with some level of long-term certainty for investors wishing to build renewables projects. For example, in September 2001 the European Union adopted the 'Directive on the Promotion of Electricity produced from Renewable Energy Sources', which requires member nations to increase the amount of electricity generated from renewable sources from 13.9% in 1997 to 22.1% in 2010, an increase of 8.2% (EU, 2001). The British Energy White Paper targets 10.4% of electricity from renewable sources by 2010, and aims to double the 2010 target by 2020. It also estimated that to achieve the GHG reduction target of 60% by 2050, renewable energy would need to supply 30%-40% or more of demand at that time (BG, 2003). The United States is in a similar position to Australia in that some state governments are being more progressive than the national government with respect to climate change policies. For example, eighteen states have mandated renewable obligations. There is also a trend towards multi-state regional initiatives that address climate change (PC, 2004).

5.1. Australia's Mandatory Renewable Energy Target

The renewables obligation in Australia is set through MRET. Established by the Renewable Energy (Electricity) Act 2000 which came into force on 1st April 2001, the MRET requires electricity suppliers to source 9,500GWh of additional renewable energy by 2010 compared to 1997 levels. Liable parties must surrender tradeable Renewable Energy Certificates (where 1 REC = 1MWh of 'so-called' additional renewable energy) to the Office of the Renewable Energy Regulator (ORER) which

oversees the scheme. By the end of 2004 over 11 million RECs had been registered, with 5.8 million of these surrendered to meet liabilities. Large hydro and solar water heaters are the main sources of RECs, responsible for 32% and 25% respectively of those registered by 2004 (ORER, 2005).

In accordance with the requirements of the Act, a review of MRET was undertaken in 2003, after three years of operation. There were many submissions to the review, most arguing that the scheme's target had to be substantially increased in order to meet its stated objectives of industry development and greenhouse emissions reductions. Submissions also highlighted other design problems including excessively generous baselines for old hydro generation, and deeming arrangements for PV and Solar Hot Water systems. The Review Panel's report stated (AGO, 2003);

> "MRET's settings will see a very large amount of investment prior to 2007 followed by a rapid reduction. The current target is insufficient to underpin the critical mass of investment needed to develop a domestic industry and to move it sufficiently down the cost curve to be able to demonstrate commercial viability without ongoing government assistance."

The review panel made 30 recommendations, including that the target remain unchanged at 9,500 GWh by 2010, but be increased to 20,000 GWh by 2020, and that the scheme be extended to 2035. The Commonwealth Government accepted neither of these recommendations. As a result, the percentage of renewable energy in the electricity mix is projected to decline through to 2020 compared to 1997 (AGO, 2003). In addition, the REC price has recently begun to fall, as liable parties accumulate or forward purchase sufficient RECs to meet their likely future requirements, and as increasing numbers of RECs enter the market.

5.2. Green Power

Green Power enables electricity customers to voluntarily pay a premium for a certain percentage of their electricity to be generated from accredited renewable sources. Accreditation is used to ensure that products offered by energy suppliers comply with Green Power guidelines, and thereby increase consumer confidence in the Green Power product. The State-based National Green Power Accreditation Steering Group, coordinated by the NSW Department of Energy, Utilities and Sustainability, oversees the scheme. The scheme was established prior to MRET, however, its auditing requirements have now been integrated into MRET's accounting framework. Retailers must annually deposit into a dedicated account held by the ORER enough RECs created by Green Power-accredited generators to cover their Green Power sales.

According to the fourth Quarterly Green Power report for 2004, just over 1.1 million MWh of Green Power was purchased by retailers during 2004, with 0.84 million MWh of this being classified as 'new' (from plant commissioned after 1997). The main problem for Green Power is the relatively low level of uptake – Green Power accounts for less than 0.5% of electricity used in Australia. Although, in surveys, a relatively high percentage of customers say they would pay more for renewable energy, this generally hasn't translated into sales (Passey and Watt, 2002).

5.3. State and Territory positions on increasing MRET

Although MRET has some design problems, it has certainly achieved significant investment in new renewable energy plant. In their submissions to the MRET Review, the ACT, Queensland, South Australian, Tasmanian, Victorian, and Western Australian governments were in favour of increasing the target. The Northern Territory thought it should remain unchanged while the NSW government failed to make a submission[3]. Since the MRET Review process in 2003, a number of States have set aspirational renewable energy targets for their jurisdictions that are higher than those they recommended in the MRET Review (SA, from 4% to 15% of total by 2014; Vic, from 4% to 10% by 2010[4]; WA, from 1% to 6% by 2010 for South West Interconnected System[5]) (SA Gov, 2004; Vic Gov, 2004; WA Gov, 2004).

[3] Submissions downloaded from the ORER website
[4] Approximately 20% this could be met through the existing MRET
[5] Approximately two thirds of this could be met through the existing MRET

The Ministerial Council on Energy (MCE) and the NSW, Victorian, South Australian, Western Australian and Tasmanian governments have all expressed an interest in state-based renewable energy schemes to boost MRET. The MCE recommended that an Inter-jurisdictional Working Group be established to recommend ways to increase the MRET from the current level and time frame (MCE, 2004; Freehills, 2005). In the following section we explore this possibility further. Although we focus particularly on possible State/Territory approaches to increase the effective uptake of renewable generation, these proposals could also address other problems identified with the existing MRET – for example, placing a time limit on RECs eligibility for each plant, acquittal of liabilities throughout the year to stabilise the REC price, and restriction on banking provisions to avoid an early investment rush.

6. POSSIBLE STATE/TERRITORY-BASED RENEWABLE OBLIGATION SCHEME DESIGNS

Possible scheme designs can be broadly divided into those that are built upon the present MRET accreditation and auditing arrangements, and those that are not. A scheme built upon the present MRET accreditation framework may reduce complexity for stakeholders and transaction costs in establishing the scheme. However, under present Commonwealth Government policy, the MRET scheme expires in 2020, and the ORER and associated regulations that govern its operation as defined under the Act will then no longer exist. This is a significant problem if a State/Territory scheme is reliant on the ORER and regulations for its operation. An alternative approach would require retailers to purchase electricity from Green Power-accredited generators, but not Green Power itself, and so it would not use RECs, but would operate independently of the MRET scheme.

The following outlines the two basic scheme types – those based on MRET and a non-MRET scheme based on GP-accredited generators. It then discusses how different features of the scheme architecture could be addressed. The term 'architecture' relates to the design rules, such as how the obligation is acquitted, or whether a penalty is indexed. The key driver for these design choices is to maximise the scheme's effectiveness and efficiency at promoting market uptake of sustainable renewable generation, and so develop the industry and reduce greenhouse emissions, especially over the longer term.

6.1. MRET-based schemes

There are a number of possible advantages in basing a new scheme on the MRET framework. Despite its mixed success to date, many of its problems derive from the particular settings chosen by the Commonwealth Government, and State governments could improve on these. MRET's accreditation process provides a great deal of potential flexibility – every REC is clearly identified by technology, location and date. It is therefore possible for State schemes to specify that RECs surrendered by liable parties meet requirements with regard to any of these characteristics.

Because the existing MRET scheme ends in 2020, possible architectures for an MRET-based scheme that has a longer horizon than 2020 must assume that (i) by then the Commonwealth will have seen the value of an extended and expanded MRET and legislated accordingly, making the state scheme unnecessary, (ii) a State government takes over MRET and incorporates it into the MRET-based scheme, or (iii) agreement can be reached with the Commonwealth government on continuing the administrative arrangements beyond 2020, even if the MRET target stays the same. The main issue here is that orderly and sustainable renewable energy industry development requires a longer-term view and targets than that currently provided by a 9,500 GWh ceiling and a 2020 end point.

Assuming one or more of these options is likely, a number of MRET-based schemes are possible. The following outlines three possible designs that could be used to create an additional renewable energy obligation based on current MRET liabilities. For example, requiring one additional REC to be surrendered per REC currently surrendered to ORER would double the 2010 target to 19,000 GWh – approximately a 5% MRET. The first two schemes would be based on conditions set through retailer licences, while the third could be operated via either retailers or network service providers.

Type A: The retailer licence conditions would stipulate that a given number of RECs must be surrendered to a designated ORER account for every REC surrendered to meet existing MRET requirements, where that REC corresponds to electricity sold in the Jurisdiction covered by those licence conditions. ORER could operate the designated accounts on a contractual basis paid for by

the States/Territories in proportion to their electricity use. A precedent has been set for this by the designated ORER accounts currently used for the Green Power scheme.

Type B: Type A would not be possible if the Commonwealth government does not allow ORER to act beyond its legal obligations and establish additional designated accounts. In this case the Jurisdictional Regulator could hold the additional RECs until the MRET-based scheme terminates. Alternatively, recommendation 29 of the MRET Review Panel, which the Commonwealth government agreed to but has not yet passed, was that "The Act to be amended to allow any registered owner of a REC to surrender the REC to ORER, either voluntarily or against a registered liability" (AGO, 2003). In this case, a Jurisdictional Regulator could collect extra RECs themselves then submit them to ORER for extinguishment. The number of RECs surrendered to the Jurisdictional Regulator could either be in proportion to the number of RECs surrendered for electricity sold in that Jurisdiction (as for Type A), or, if this information is not available, in proportion to the electricity sold in that Jurisdiction.

Type C: This involves State/Territory governments applying a levy on electricity sold that would be used to fund Jurisdictional Regulators to purchase additional RECs. They could either hold the RECs until the MRET-based scheme terminates, or submit them to ORER for extinguishment if the Commonwealth accepts recommendation 29. The levy could be applied to electricity sales within a State, in a manner similar to, or as an extension of, that recently applied to electricity distributors within NSW to finance the State's Energy Savings Fund.

6.2. Green Power-based schemes

Jurisdictional Regulators could, through retailer licences, require retailers to enter into contractual obligations that include a certain amount of electricity from generators accredited under the Green Power scheme. Green Power is State Government-accredited so there is potentially greater flexibility in scheme arrangements than with an MRET-based scheme, and the potential to entirely bypass Commonwealth government legislation and the emerging problems with MRET. For example, Green Power accreditation and certification prior to the introduction of MRET was built around separate auditing processes under State Government direction.

The main reason for the lack of success with Green Power to date appears to have been its voluntary 'public good' nature. One reason for the low uptake in practice has surely been that those who do buy Green Power are effectively subsidising those that don't since they reduce greenhouse emissions and so provide benefits for society overall. Applying mandatory Green Power obligations on some, or all, electricity retailers would help avoid this problem. Hereafter this scheme is referred to as the GP-scheme. It is understood that the Victorian State Government has been exploring just such an approach.

An important design choice for the GP-scheme is whether to incorporate some form of tradeable certificate. It may be much simpler not to, and a Green Power Right could not be used as it ensures the purchase of 1 MWh of renewable energy only if combined with a REC. Some new type of certificate would be needed that on its own corresponded to 1 MWh of renewable energy purchased from a Green Power-accredited generator.

6.3. Additional design issues

For each of the four basic architectures described above, additional design issues include;

1. The size of the target
2. Whether the target is expressed as a percentage or in GWh
3. The timeframe over which the schemes might operate
4. The time limit over which a generator can participate
5. Exclusion of any particular source of renewable energy
6. The size of any penalty applied, and whether it is indexed
7. Treatment of sources from other States/Territories

6.3.1 Size of target

The current 9,500 GWh target was set in 1997, when about 16,000 GWh of electricity was generated from renewable sources, and electricity demand for 2010 was projected to be 205,000 GWh. At that

time, renewable energy made up about 10.5% of total electricity in Australia, and it was thought the 9,500 GWh target would result in 12.5% or electricity coming from renewables (AGO, 2003). However, due to increasing demand, now projected to be 234,500 GWh in 2010 and 293,000 GWh in 2020 (Akmal *et al.*, 2004), the 9,500 GWh target will result in only about 10.9% of electricity being from renewables in 2010 and 8.7% in 2020. The amounts of additional electricity from renewable sources required to achieve 2%, 5% and 10% increases over the 1997 percentage level (taken to be 10%) by 2010, and 10% and 20% increases by 2020, are shown in Table 1**Error! Reference source not found.**. It is clear the current MRET compares very poorly with the British, European and US targets outlined above.

Different jurisdictions may wish to have different targets based on a number of interacting factors, including resource availability and local industry development. According to the Renewable Energy Technology Roadmap, industry development facilitates a least cost abatement portfolio, acceptable levels of penetration into the NEM and industry ability to deliver the required projects (DITR, 2002). These considerations may also determine whether permissible generation must be from projects located within a particular State or Territory (see Section 6.3.7).

Table 1 Percentage and Corresponding GWh Targets in 2010

Approx % MRET Target [a]	Total percentage	GWh MRET	GWh total (includes 1997 existing)
No MRET	6.8%	0	16,000
Current MRET 2010	10.9%	9,500	25,500
2%	12.5%	13,300	29,300
5%	15%	19,200	35,200
10%	20%	30,900	46,900
Current MRET 2020	8.7%	9,500	25,500 [b]
10% in 2020	20%	42,600	58,600
20% in 2020	30%	71,900	87,900

a: in terms of a percentage increase over the 1997 percentage
b: assumes 16,000 GWh in 1997 is maintained through to 2020

6.3.2 Absolute or relative targets

There are arguments for and against the target being set in absolute (GWh) or relative (percentage) terms. With regard to electricity generation, a fixed target runs the risk of underestimating future demand and so resulting in a lower percentage of renewable energy than intended – as occurred with the current 9,500 GWh MRET target for 2010. On the other hand, if future demand is lower than projected, due for instance to energy efficiency measures or price increases, the resulting renewable energy percentage would be higher. This is not an issue in itself, but might reduce further investment and policy support on the basis that renewables had already captured the market share originally intended by the policy. A fixed target also has a tendency to create a ceiling for renewables which is then reflected in policy and in industry planning. A percentage target has the attraction of allowing renewable energy to maintain its level of contribution, regardless of demand movements. If the percentage is significant, this provides a useful signal to regulators about demand growth. However, a percentage target would need to be expressed as a GWh target in the acquittal year, and changes in electricity demand would result in this GWh target being adjusted each year, or over several years. From an investment viewpoint, a fixed GWh target may provide greater long-term certainty, perhaps making it easier to attract financial backing for projects and reducing cost. How significant this issue is for the Australian electricity industry, with its relatively stable growth rates, long lead times and long investment horizons, is difficult to judge. Further, banking arrangements, the size of the target as well as the timeframe of the scheme, as discussed below, also have strong impacts on investment certainty. All three MRET-based schemes and the GP-scheme are equally amenable to fixed or relative targets.

6.3.3 The timeframe over which the schemes might operate

The MRET Review Panel found that setting a target that increases beyond 2010, and extending the end-date beyond 2020 to 2035, would send a positive signal to industry far beyond 2010, increasing certainty, reducing risk and resulting in increased availability of finance (AGO, 2003). As above, a number of programs in the US, the UK and Europe mandate increasing annual renewable energy targets beyond 2010. Of the three MRET-based schemes and the GP-scheme, because of the current MRET time horizon, the GP-scheme is most amenable to extension beyond 2020.

Related to this is the need to avoid an investment rush at the early stage of the scheme (as has occurred with MRET). Project developers are driven to get projects up and running as soon as possible in order to lock in retailers against other projects, and to earn RECs for as many years of the scheme as possible. Unfortunately, such an investment rush does not support progressive and sustainable development of the renewable energy industry. Both MRET and Green Power obligations could be structured through longer-term targets, sunset clauses on how long projects are eligible to generate for the scheme and, for MRET-based schemes, allowing banking for only two or three years. The latter can reduce the value of certificates created now to meet a ramped target over numerous years.

6.3.4 A time limit in which a generator can be used to meet retailer obligations

Generators such as large-scale hydro built before 1997 have and continue to create large numbers of RECs and limit construction of new renewable plant (IES, 2002). This occurs largely because of annual fluctuations in output due to water flow, and the absence of a payback requirement if annual production falls below the generator's baseline and through increased generation to meet demand growth. To help overcome this problem the MRET Review Panel recommended that a 15 year time limit apply to all plant, after which a new baseline would be set (AGO, 2003). The review panel considered that fifteen years was sufficient to make a plant financially viable and for investment costs to be recouped, but the recommendation was rejected by the Commonwealth. If adopted by State/Territory schemes, the MRET Review Panel new baseline recommendation would still allow annual fluctuations above the new baseline to be used to meet retailer obligations. A better alternative would be to apply an absolute time limit of 15 years from the plant commissioning date. Because old hydro plant are not Green Power-accredited, this issue is not a problem for the GP-scheme.

For all three MRET-based schemes, REC creation by old hydro would not be as significant a problem because the MRET scheme 'soaks up' the majority of these RECs. However a time limit for REC creation is nevertheless valuable across the board in terms of limiting the scheme's benefits for any particular generator to 15 years and hence allowing continued construction of new plant throughout the scheme's operation. In principle, assuming generators remain on stream after the 15 year time period, this would also increase renewable energy contributions above the scheme target levels.

Banking of renewable generation in a particular year to meet targets in later years would need to be limited otherwise it effectively extends the plant life beyond 15 years. Banking may also help to reduce the investment boom and bust cycle seen in MRET.

6.3.5 Exclusion of any particular source of renewable energy

The MRET Review included recommendations regarding restrictions on certain bioenergy resources, some of which were accepted by the Commonwealth government. Exclusion of solar water heaters has also been discussed since they have very different characteristics to industrial-scale renewable energy projects and could be supported through other mechanisms, such as capital grant subsidies and mandatory building requirements. Exclusion of solar water heaters would have a significant impact on the industry and on the ultimate renewable energy portfolio, since they have accounted for 25% of RECs to date. For the three MRET-based schemes, exclusion of a particular source of renewable energy could be decided by the relevant Jurisdictional Regulator(s). Under current Green Power Accreditation guidelines a number of resources are not allowed (eg. materials from native forests, large hydro, and incineration of industrial, commercial or municipal solid wastes). Solar water heaters can create RECs for use under the Green Power scheme but not Green Power Rights. A Green Power Options Paper is currently canvassing exclusion of SWH from the scheme entirely.

6.3.6 The size of any penalty, and whether it is indexed

The application of a penalty serves to distinguish mandatory from voluntary programs. The penalty for

non-compliance under MRET is currently set at $40/MWh, and is not indexed to inflation. The MRET Review Panel recommended that the penalty be indexed to the Consumer Price Index between 2010 and 2020. The Commonwealth rejected this recommendation. Over time, the effectiveness of the penalty is being eroded by inflation – a 4% annual inflation rate over 15 years reduces the value of the penalty by one half in real terms. Without indexation it may be cheaper for retailers to pay the penalty and purchase electricity from fossil fuel generators than pay for renewables. This of course depends on a number of factors including the rate of cost decline for key technologies such as wind turbines as well as the importance to retailers of maintaining a green image. Nonetheless, indexing the penalty would help increase investor certainty regarding a project's payback time.

The effect of indexation for MRET-scheme types A, B and C, and the GP-scheme differs.

For Types A and B, because the MRET penalty won't be indexed, simply indexing the penalty of a State/Territory-based scheme won't necessarily result in a higher target being met. In a situation where the marginal cost of the renewable energy required to meet both targets is higher than the MRET penalty, the retailer would buy renewable energy to avoid the State/Territory-based penalty but pay the MRET penalty because it is cheaper to do so. Note that after 2020, this would no longer be a problem if the State/Territory-based scheme sets the entire target. One way to overcome this problem would be to stipulate that for every MWh the retailer fails to meet its MRET liability, it must place a REC in the dedicated MRET account. This would mean the retailer would be faced with not only paying the penalty but buying a REC as well. For the Type C MRET-based scheme, the penalty is less relevant in that the Jurisdictional Regulator will buy RECs regardless. However, if the State/Territory-based scheme wishes to boost renewable energy generation above the MRET scheme's intended target, it would need to use a similar punitive requirement to scheme Types A and B. For the GP-based scheme, the retailer could be required to buy an extra MWh of GP-accredited electricity for every MWh that it fails to meet its MRET liability.

All the above could include the caveat that the indexed penalty may be paid if it is less than the marginal cost of acceptable renewable energy. Ideally, any penalty monies collected should be reinvested into renewable energy projects or industry development.

Application of such penalties may have significant legal implications since they require access to information that may be commercial-in-confidence. Currently the names of liable parties that fail to meet their obligations under MRET are made public, however information on the extent of any shortfalls is not. The MRET Review Panel recommended the Act be amended to enable ORER to publish individual shortfalls and the proportion of those shortfalls relative to their liability. The Commonwealth agreed with this recommendation, however is yet to act. If it does then sufficient information should be publicly available for the above mechanisms to make indexation of the penalty effective.

6.3.7 Sourcing generation from other States/Territories

To reap the economic and employment benefits of an increased renewable energy requirement, States/Territories may wish to specify that eligible RECs must come from projects located within their jurisdiction. Alternatively, some States/Territories may have restricted renewable resources compared to others, and so allow projects to be located anywhere in Australia. In addition, regions differ in their ability to accept penetration of stochastic plant into their grids, thus limiting their ability to harness such renewable resources, even if they are available eg. wind penetration in South Australia.

A range of legal issues may need to be addressed that are beyond the scope of this paper – for example, because of problems with Constitutional prohibition of barriers to free trade. Note, however, that existing State-based schemes, such as NGAS and the Queensland 13% scheme effectively specify that some eligible electricity generation related-activities are restricted to within the State. The NGAS requires eligible demand side abatement and sequestration activities (unless otherwise approved by the Minister) to occur in NSW. The QLD 13% Gas Scheme specifies that interstate generators can participate in the scheme but only to a fraction of their output determined by the Queensland Usage Factor.

6.4. Comparison of MRET and GP-based approaches

The main problem for any scheme based on the current MRET is the latter's termination in 2020. Although there are a number of ways this could be overcome, it still adds considerable uncertainty. Of the other design issues discussed above, all are equally amenable to both scheme types, although different approaches may be required. The GP-scheme avoids the old hydro baseline issue, and solar water heaters would not be eligible if this was based on creation of Green Power Rights.

A key benefit of the current MRET scheme is that the use of tradeable certificates can (in principle) assist in efficient price discovery. If the GP-scheme were used, price discovery for renewable energy would still occur through the existing MRET. If the GP-scheme occurred entirely through contracts, with no certificates traded on the spot market, volatility and associated uncertainty should be reduced. The GP-scheme would also avoid the creation of two different types of RECs as could occur through an MRET-based scheme, if for example, it placed a 15 year time limit on eligible RECs. Although audits would be necessary to avoid double counting between MRET and the GP-scheme, this could be incorporated into the current Green Power annual audit. Like the current MRET, 10% of any shortfall in the GP-scheme could be made up in the next year. [6] A GP-scheme may also be more politically acceptable to the States/Territories given it is essentially entirely independent of the Commonwealth MRET scheme, and Green Power is run by the National Green Power Accreditation Steering Group which consists of representatives from State and Territory departments.

7. DISCUSSION

Renewable obligations appear to be effective market-pull mechanisms to achieve both industry development and to position countries for long-term least-cost reduction of greenhouse gas emissions. In Australia, the States and Territories could apply a renewable obligation to their own jurisdictions using a number of different scheme designs. Such obligations would be consistent with their positions on increasing MRET, and would result in the significant industry development required for a least-cost abatement portfolio. However, there may be problems with Constitutional prohibition of barriers to free trade.

A number of national governments have set much higher renewable energy targets than the present Australian MRET. It is worth noting that a recent evaluation of the EU Directive found that the policies and measures currently in place will probably achieve a renewable share of only 18%-19% in 2010, not the 22.1% target. One of the reasons for this was that a number of Member States had not yet introduced active policies in line with the targets they adopted (EU, 2004). Similarly, the aspirational targets set by some Australian states are unlikely to be met without appropriate supportive policy such as a renewable obligation.

Experience with MRET and the NGAS demonstrates the importance of careful market design, especially when introducing innovative and complex schemes of this kind. A wealth of information on international schemes is now available and can be used to inform market design in Australia - for example see van der Linden et al. (2005). A renewable obligation alone is insufficient to develop significant numbers of new renewable generation projects that are the most cost effective available and which minimise possible environmental and social harms. Any scheme should be developed in an integrated policy framework that addresses other possible barriers to renewables, such as access to the distribution network, integration of stochastic resources into the NEM, appropriate planning guidelines and community acceptance. Generic renewable obligations also typically favour the renewable technology that is currently least cost, and so other promising technologies such as photovoltaics require separate targeted support. Other market-pull mechanisms such as feed-in tariffs, taxation concessions and capital grants may also be effective, and deserve attention.

Although emissions trading schemes (ETS) are an important component of a policy mix that minimises greenhouse emissions, they are not sufficient for promotion of renewables. ETS focus on lower cost short-term options, not on technologies that may be higher-cost initially but least-cost in the longer term. Waiting until the carbon price is high enough for renewables to compete will result in distortions in other economic sectors and so increase the overall costs of climate policy (Neuhoff, 2004).

[6] The existing MRET flexibility measures allow up to a 10% shortfall with no penalty as long as the shortfall is made up in the following year. If the shortfall is greater than 10%, although the $40/MWh penalty must be paid, this can be reclaimed if the shortfall is made up within the next three years.

Likewise, a renewable obligation alone would not, for example, reduce demand for brown coal, and so other measures such as ETS are required.

8. REFERENCES

AG (2004) *Energy White Paper*, Australian Government, Commonwealth of Australia.

AGO (2003) *Renewable Opportunities: A Review of the Operation of the 'Renewable Energy (Electricity) Act 2000'*, by the MRET Review Panel for the Australian Greenhouse Office, Canberra.

AGO (2004a) *Tracking to the Kyoto Target 2004: Australia's Greenhouse Emissions Trends 1990 to 2008-2012 and 2020*. Australian Greenhouse Office, Commonwealth of Australia.

AGO (2004b) *National Greenhouse Gas Inventory: Analysis of Recent Trends and Greenhouse Indicators 1990 to 2002*. Australian Greenhouse Office, Commonwealth of Australia.

Akmal, M., Thorpe,, S. Dickson, A., Burg, G. and Klijn, N. (2004) *Australian Energy: National and State projections to 2019-20*, abare *e*Report 04.11, by the Australian Bureau of Agricultural and Resource Economics, for the Department of Tourism, Industry and Resources, Canberra.

Allinson, W.G., Nguyen, D.N. and Bradshaw, J. (2003) *The Economics of Geological Storage of CO_2 in Australia*, APPEA Journal, p623-35.

Awerbuch, S. (2000) *Getting it Right: The Real Cost Impacts of a Renewables Portfolio Standard*, "Public Utilities Fortnightly", Feb 15, 2000, 138, p45.

BCSE (2004) *2004 REC Report*, Australian Business Council for Sustainable Energy.

BG (2003) *Energy White Paper: Our energy future creating a low carbon economy*, British Government, United Kingdom.

Birch, A. (2004) *The Market Economic Cost of Electricity Generation and the Economic Viability of Photovoltaics*, MEngSc Thesis, Centre for PV Engineering, UNSW, 2004.

DITR (2002) *renewable Energy Technology Roadmap*, Department of Industry, Tourism and Resources, Canberra. October 2002.

EU (2001) *Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market*, Official Journal of the European Communities, 27th Oct 2001, Brussels.

Freehills (2005) *Renewable Energy and Greenhouse Update*, July 2004.

Gielen, D and Podkanski, J. (2004) *The Future Role of CO_2 Capture in the Electricity Sector*, International Energy Agency, Paris, France.

IES (2002) *Modelling the Price of Renewable Energy Certificates*, A report for the Office of the Renewable Energy Regulator by Intelligent Energy Systems, December, 2002.

IPCC (2001) *Third Assessment Report*, Intergovernmental Panel on Climate Change, Geneva.

MacGill, I., Outhred, H. and Passey, R. (2003) *The Australian Electricity Industry and Climate Change: What role for geosequestration?,* paper for the ANZSES Conference "Destination Renewables", in Melbourne, Australia, Nov. 2003.

MCE (2004) *Ministerial Council on Energy Communique, Adelaide, 27 August 2004.*

Neuhoff, K. (2004) *Large Scale Deployment of Renewables for Electricity Generation*, Cambridge Working papers in Economics CWPE 0460, Working Paper 59, University of Cambridge.

ORER (2005) *Annual Report 2004*, Office of the Renewable Energy Regulator, Canberra.

Passey, R and Watt, M. (2002) *Review of Australian Green Power Schemes - 2002*, Australian CRC for Renewable Energy, Murdoch University, Perth, WA. Development Authority, NSW.

PC (2004) *Innovative Policy Solutions to Global Climate Change: Learning from State action on climate change*, Pew Centre on Global Climate Change.

Podkanski, J. and Gielen, D. (2005) *Prospects for CO_2 Capture and Storage*, International Energy Agency, Paris, France, presentation at Coal 21 1st Annual Conference, April, Sydney.

Point Carbon (2005) EUA price assessment at the 18th July 2005 from the Point Carbon web site http://www.pointcarbon.com/

Rayner, S., and Malone, E.L. (eds) (1998) 'Energy and Social Systems', in *Human Choice and Climate Change*, Battelle Press, Columbus, Ohio.

SA Gov (2004) *South Australia's Strategic Plan: Creating Opportunity*, South Australian Government.

Turton, H. (2004) *Greenhouse gas emissions in industrialised countries: Where does Australia stand?* Discussion Paper Number 66, The Australia Institute, Canberra.

van der Linden, N.H., Uyterlinde, M.A., Vrolijk, C., Nilsson, L.J., Khan, J., Åstrand, K., Ericsson, K. and Wiser, R. (2005) *Review of International Experience with Renewable Energy Obligation Support Mechanisms*, commissioned by the Dutch Ministry of Economic Affairs, conducted jointly by the Energy research Centre of the Netherlands (ECN), IT Power, UK, Lawrence Berkeley National Laboratory, USA, and University of Lund, Sweden.

Vic Gov (2004) *The Greenhouse Challenge for Energy: Driving investment, creating jobs and reducing emissions*, Victorian Government.

WA Gov (2004) *Labor's plan for renewable energy*, Western Australian Government.