New South Wales Government

NSW Renewable Energy Target

Explanatory Paper

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Contents

Introduction

The NSW Government has implemented a broad range of complementary measures designed to play NSW's part in addressing climate change. The Greenhouse Plan, released by the Premier the Hon. Morris Iemma MP in November 2005, includes a wide range of Government initiatives to address greenhouse emissions, including from energy generation, energy efficiency, buildings, transport, waste, industrial processes, fugitive emissions, agriculture, natural resources, land management and Government leadership and energy management policy.

The Plan reaffirms the NSW Government's commitment to reduce greenhouse gas emissions to 2000 levels by 2025, and by 60 per cent by 2050. The energy sector's contribution to meeting these targets is likely to arise from natural gas powered generation, efficiency gains from existing generators and end-use efficiency in the medium term. Renewable energy generation is a longer term strategy and development of a robust industry will be essential if renewable energy is to have a significant future role in reducing greenhouse gas emissions. Renewable energy represents one of only a few technology classes able to achieve deep cuts in greenhouse gas emissions.

A major impediment to the deployment of renewable generation has been its higher cost compared to conventional generation. However, past cost reductions due to industry development and technological advancement indicate that continued industry support measures are likely to further reduce costs. Such support has been provided, for example, through the Commonwealth's Mandatory Renewable Energy Target (MRET). However, the Commonwealth Government has declined to extend the target and as a result many proposed projects were not likely to proceed.

In order to provide long term greenhouse benefits, the NSW Government's response will include the introduction of a mandatory NSW Renewable Energy Target (NRET), relating to all electricity consumed in NSW. This will also provide ongoing support to the renewable energy industry. The scheme will impose a target on electricity retailers and will include renewable energy certificate trading and an enforceable penalty for non-compliance where retailers fail to meet their targets. Trade-exposed, energy-intensive users will be exempt from bearing the costs of the scheme.

Without such stimulation, renewable electricity generation is unlikely to penetrate the competitive National Electricity Market in the near term. Other measures will continue to support renewable energy generation resulting in reductions in renewable generation costs and technological improvements over time. These include the Greenhouse Gas Abatement Scheme (GGAS) and the GreenPower program. GGAS is designed to attract the lowest cost abatement which has

included some renewable generation such as small scale biogas and landfill gas projects. While it is growing strongly, GreenPower is a voluntary scheme that complements the mandatory target on energy retailers in order to provide significant support for renewable energy generation. Under the NSW Government's Greenhouse Plan, electricity retailers will be required to offer at least 10 per cent GreenPower to all new (or moving) residential customers. GreenPower will be additional to the mandatory renewable energy that must be supplied to electricity consumers under the NSW target.

NRET will require a proportion of electricity consumed by NSW consumers to be sourced from renewable electricity generation anywhere in the National Electricity Market. It is important to note that the target refers to electricity consumed in NSW, not electricity generated in NSW. NSW is part of the National Electricity Market and therefore can draw electricity from any of the participating jurisdictions – Queensland, ACT, Victoria, South Australia and Tasmania. This will assist in reducing the costs of the renewable energy target.

The renewable energy target levels will be 10 per cent of NSW end use consumption by 2010 and 15 per cent by 2020.

In the absence of the Commonwealth Government extending MRET, several jurisdictions have developed their own renewable energy targets. The NSW Government believes that a coherent state-based national approach is preferable to individual uncoordinated state action and will seek to align the NSW renewable energy scheme with the Victorian scheme as a possible precursor to a potential national state-based renewable energy target. The Government is keen to have the schemes function as consistently as possible in order to reduce the costs of compliance for the industry. This sits within the NSW Government's broader policy on reducing red tape, and so the NSW Government will initiate discussions with the Victorian Government with this objective in mind.

This Explanatory Paper describes the proposed design, implementation and administration of NRET.

Background

Generators in NSW supplying to the National Electricity Market (NEM) produced a total 65,489 GWh in 2005, with about 90 per cent of this coming from coal. The greenhouse gas emissions from electricity generation contribute about a third of total greenhouse emissions in NSW.

Of the total electricity from the NEM consumed in NSW, 6.1 per cent is from renewable generation.

The major impediment to the deployment of renewable generation has been higher costs compared to conventional generation. The support of the Commonwealth's Mandatory Renewable Energy Target (MRET) has assisted in stimulating industry development and technological advancement, indicating that continued industry support will reduce costs further. However, with sufficient capacity to meet the Commonwealth's target almost in place, the value of renewable energy certificates has fallen and many proposed renewable generator projects have stalled due to reduced financial viability. The Commonwealth Government has declined to extend the target and many proposed projects are not likely to proceed without further action.

Without further stimulation renewable generation is unlikely to penetrate the competitive NEM at the rate required to provide a significant contribution to meeting the NSW Government's environmental objectives, including its greenhouse gas reduction targets, in competition with established energy sources.

The renewable electricity purchased by NSW retailers through NRET will provide the signal for future investment and is the key issue this policy is designed to effect.

Benefits of a Renewable Energy Target

The establishment of NRET will help to provide policy certainty for the renewable energy industry. Support for renewable energy generation technologies will provide, at levels varying with technology and location:

- zero or low greenhouse gas emissions from generation activities, reducing dependence on fossil fuel electricity generation (an important element in reducing greenhouse emissions particularly in the longer term);
- minimal particulate and other emissions (eg, SO_x and NO_x);
- reduction of electricity network losses as many renewable generation plants are "embedded" in the network and are situated closer to customer demand centres;
- potential savings in network enhancements due to distributed renewable generation easing network loads; and

- benefits from installations in regional areas for the local economy including increased employment, use of local materials and lease payments for land use, which is significant for drought affected farmers.

Target Level

The NSW mandatory renewable energy target level is 10 per cent by 2010 and 15 per cent by 2020 of end use consumption based on TransGrid's medium end-use projections for NSW[1]. The amount of renewable energy required less the amount from existing measures means that the additional renewable energy required to meet the target is 1,317 GWh by 2010 and 7,250 GWh by 2020.

To provide certainty to the market and consistency with VRET and MRET, these quantities of additional renewable energy will be legislated.

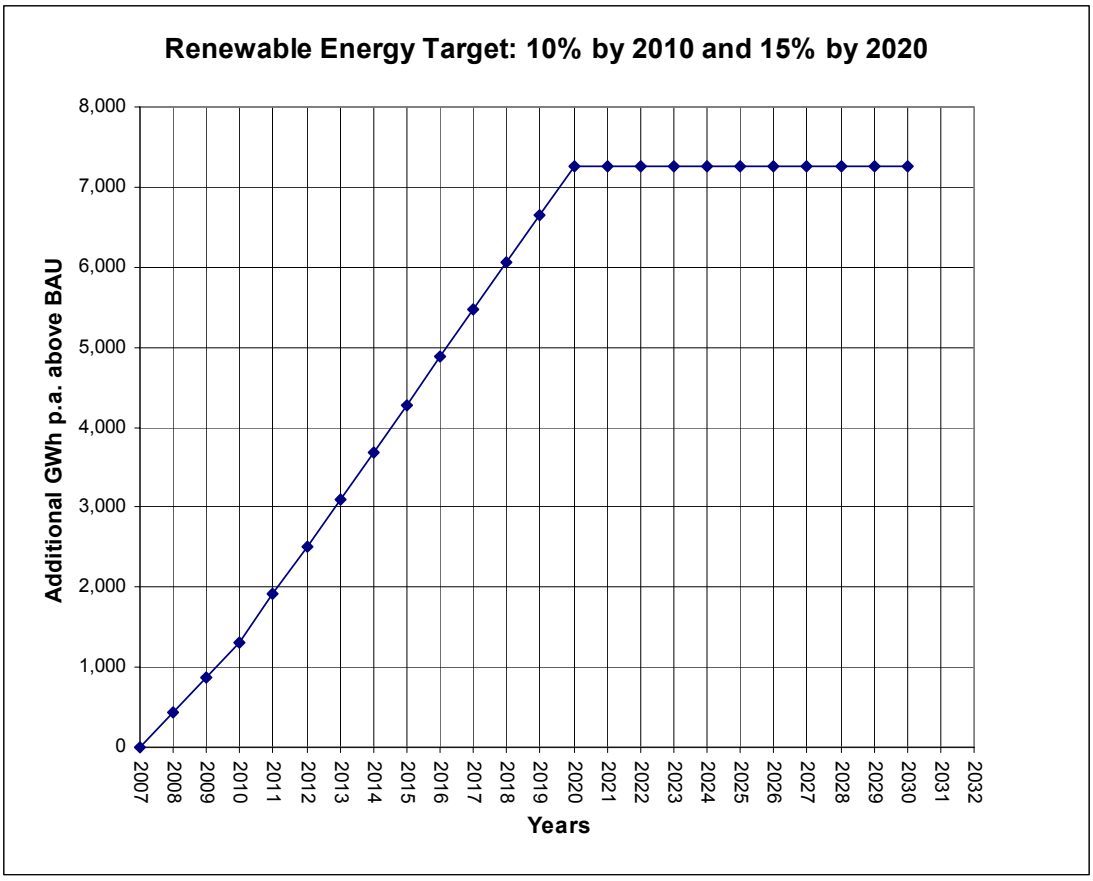
Renewable energy from existing measures is based on that effectively consumed in NSW including imported net of Snowy Hydro, the NSW obligation under MRET and from renewable generators existing prior to MRET.

The target is to be increased annually in a linear manner until 2020 when it reaches 7,250 GWh, and then held at this level for each year until 2030, as indicated in Figure 1 below. The continuation to 2030 is to ensure that renewable investments that may be made on the basis of the NRET policy have an appropriate payback period.

Over the life of the scheme (to 2030) the amount of renewable energy generated will accumulate to 120,929 GWh. Displacing fossil fuel generation with a carbon intensity of 0.95 tonnes/MWh (pool coefficient) will result in greenhouse gas emission savings of about 115 million tonnes. This is equivalent to taking over 25 million cars off the road for a period of 12 months.

The target is to be imposed on all electricity retailers and requires that they purchase the target proportion of their electricity supply from accredited renewable generation sources.

[1] NSW Annual Planning Report 2006.



This is a substantial target in terms of the amount of additional renewable generation required compared to targets proposed by other jurisdictions. The Victorian target (VRET) is 3,274 GWh per annum in 2016, which is to be increased annually from 2007 and held at that level until 2022, then diminished to 2030. The MRET national target is 9,500 GWh per annum in 2010, increased from 2001 and to be maintained at that level to 2020.

Relationship to Other Renewable Energy Policies

The design of NRET is consistent with the Commonwealth mandatory renewable energy target (MRET) and the Victorian renewable energy target (which is largely based on MRET).

GreenPower

While it is growing strongly, GreenPower is a voluntary scheme that will work best when part of a broader package. In 2005 GreenPower purchases in NSW were about 200 GWh. It is not expected that NRET would have an adverse effect as GreenPower already operates in addition to the existing mandatory target regime (MRET).

In order to ensure that consumers choosing to pay a premium for GreenPower maintain confidence in the GreenPower product, GreenPower purchases will not be able to be used by retailers to meet obligations under NRET.

Greenhouse Gas Abatement Scheme
GGAS was specifically designed to attract the lowest cost abatement which has included some renewable electricity generation including small scale biogas and landfill gas projects. Due to higher generation costs the majority of renewable generation technologies have not been able to compete with other abatement options to date. However, reductions in renewable generation costs through technological developments and increased scale of deployment will mean that renewable energy would be better placed to participate in GGAS. Like MRET, the proposed NRET scheme can co-exist with GGAS quite easily. There is to be no double dipping.

Relationship to VRET and MRET
There is potential for mutual recognition and complementarity of NRET with VRET and MRET. Modelling of the effects of competition for renewable generation sources by co-existing schemes has been undertaken to include the potential impact on renewable energy certificate prices. Details of the modelling results are provided in Appendix A.

The NSW Government will initiate discussions with the Victorian Government to determine whether the Victorian Renewable Energy Target (VRET) scheme administrator (the Essential Services Commission) is also able to administer the NRET scheme. This would entail the two schemes operating together as a single scheme or the two schemes remaining separate but as closely aligned as possible. If it is not possible for the Essential Services Commission to administer the NSW scheme, then IPART will take on the administration role, while still maintaining as close a relationship as possible to the Victorian scheme.

Liable Parties and Penalty for Non-Compliance

Holders of NSW electricity retail licences will be liable parties under NRET. Consultation with retailers will be undertaken as part of the fine tuning of the NRET scheme. Retailers will be assigned individual targets based on their level of supply to customers.

An enforceable penalty for non-compliance will be established under the NRET scheme legislation. The penalty will be set at a level to encourage compliance. The level will be set above the generation cost of the majority of renewable generation technologies, and will effectively act as a cap on the cost of the scheme.

In order for the penalty to keep pace with increasing costs, it will include an automatic Consumer Price Index (CPI) escalator. The CPI escalation would occur at the end of each regulatory or compliance year.

Trade exposed, energy intensive users will be exempt from meeting the costs of the scheme, although their electricity use will be included for the purposes of measuring compliance with the mandatory renewable energy targets. This is consistent with the approach taken in the "*Possible Design for a National Emissions Trading Scheme"* Discussion Paper released in August 2006.

Certificate Trading

Establishing a market where renewable energy certificates can be traded is an important mechanism for reducing the costs of compliance.

Certificates would be created by new accredited renewable electricity generators and for all additional generation from existing renewable generation over and above a baseline that represents current renewable purchases. Any generation over that baseline for an individual generator will generate tradable certificates. For instance, an existing wind farm currently generating 100 GWh per annum, that increases output to 120 GWh per annum, will be able to create certificates for 20 GWh per annum. For a new renewable generator, it will be able to create certificates for 100 per cent of its generation.

The baseline would be set to establish the existing level of renewable energy being purchased in NSW to ensure that there is no double counting. The baseline calculation would be set in the same way as VRET.

Renewable energy certificates under NRET will not be able to be created as well as certificates under MRET or VRET for the same MWh generated.

The NRET scheme administrator would inform the retailer how many certificates need to be surrendered each year for the retailer to meet its target, which will be based on customer demand. If the retailer does not surrender sufficient certificates a penalty will be imposed.

Each renewable energy certificate will be equivalent to one MWh of eligible renewable energy, consistent with VRET and MRET.

Source of renewable generation

In order to minimise the costs of compliance to retailers and consumers renewable generators in any part of the National Electricity Market will be able to contribute to the target. This will enable NSW retailers to take advantage of the most efficient renewable generation.

NSW will also enter into discussions with the Victorian Government to seek recognition of NSW renewable energy projects for the Victorian scheme, but NSW recognition for projects in Victoria or in other States will not be dependent on reciprocal recognition.

Eligible renewable energy technologies under NRET will be those generating electricity and will be similar to those eligible under the VRET. These are:

- hydro;
- wave;
- tide;
- ocean;
- wind;
- solar thermal and photovoltaic power;
- geothermal aquifer;
- hot dry rock;
- energy crops;
- agricultural waste;
- waste from processing agricultural products;
- food waste;
- food processing waste;
- bagasse;
- black liquor;
- biomass-based components of municipal solid waste;
- landfill gas;
- sewage gas and biomass-based components of sewage; and
- other renewable energy sources may be considered.

The NRET scheme will be flexible enough to recognise new technologies.

Exclusions from NRET will include GreenPower, demand management measures and solar water heaters.

Scheme Administration

The NSW Government will consult with the Victorian Government on the possibility of the NRET and VRET schemes operating together as either a single scheme or closely aligned complementary schemes.

If the Victorian Government is willing to agree to a single scheme (with some NSW-specific conditions including accommodating the different target) the scheme administrator may be the same as for VRET (Victorian Essential Services Commission).

In the event a single scheme is not possible and there are two closely aligned parallel schemes, then it is preferable for the Essential Services Commission to administer the NSW scheme. If this is not possible, then administrator of the NSW scheme should be the Independent Pricing and Regulatory Tribunal (IPART). If this were to occur it would build on IPART's existing GGAS administrator role.

The cost of administering the scheme would be met by participants through a small fee, possibly imposed on each certificate surrendered (for example there is a 15 cent fee on each certificate surrendered under GGAS).

Commencement Date and Review

It is proposed to have legislation in place and commence the NRET scheme in 2007. The first target level to be met is in 2008 and will be consistent with the calendar year targets of VRET.

A review of the scheme will be undertaken at the halfway point in 2013, in order to determine whether the target is to be revised upwards. The review will not result in a reduction of the target. This will ensure that the Government's strategy of supporting the development of a robust renewable energy industry, which is essential for significant future deep cuts in greenhouse gas emissions, is maintained.

Next Steps

The Government will:

- consult with liable parties and other stakeholders;
- have discussions with the Victorian Government; and
- introduce legislation in the first session of Parliament in 2007.

Appendix A Modelling Results

Impacts of the NSW Renewable Energy Target Scheme

Introduction

DEUS and Frontier Economics have undertaken modelling to evaluate the economic costs of introducing a NSW Renewable Energy Target (NRET) which is similar in design to the recent Victorian Renewable Energy Target (VRET). This Appendix briefly describes the key features of the model and methodology, the key assumptions used in this modelling, and the main cost results.

The modelling takes into account the costs of the NRET, operationalised through the National Electricity Market (NEM), and its interactions with the Mandatory Renewable Energy Target (MRET), GGAS, VRET and the Queensland Gas scheme (QldGas).

Key Conclusions

At a maximum, the NRET scheme is expected to increase the annual electricity bill for the average NSW household customer by about a dollar a week in 2020 and much lower before and after 2020. The efficient average cost for average households is estimated to be approximately 30 cents each week, or $16 each year, over the full modelling period to 2030. It must be noted that this estimate assumes that the most efficient renewable generation is purchased by retailers. These costs are after exempting the energy intensive and trade exposed consumers.

Key Assumptions

NSW renewable energy target

The modelling has investigated the cost of meeting a target of 10 per cent renewable generation by 2010 and 15 per cent renewable generation by 2020.

In between these milestones the annual target rises linearly to meet these targets. This case is compared against a Base Case that does not include the NRET scheme. This comparison is used to estimate the additional economic costs associated with the scheme.

Frontier Economic's long term investment model, WHIRLYGIG, has been used to determine the effect of implementing these two targets. WHIRLYGIG assesses the least cost mix of (supply and demand) options to simultaneously meet the reliability and greenhouse targets (along with numerous other power system requirements).

General assumptions

The key assumptions used in the modelling are summarised in Table 1 below.

Table 1: Assumptions

Assumption	Source
Demand	Medium, 50 per cent Probability of Exceedance (PoE) or average weather profile assumed from NEMMCO's 2006 demand forecast. Summer and winter peaks under one in ten year weather conditions added to meet the required reliability criteria requirements by NEMMCO.
Supply	For existing and new standard thermal options the fixed and variable costs, capacity and other characteristics have been sourced from NEMMCO, NIEIR, TransGrid, generators and ACIL Tasman's "Report on NEM Generator Costs". Renewable costs will be discussed in greater detail below.
Reserve	The reserve margins and reliability constraints used in the 2005 supply-demand balance calculator were included in the model.
Greenhouse	The extended GGAS, QldGas, MRET and Victorian Renewable Energy schemes were included in the modelling.

Cost of renewable generation

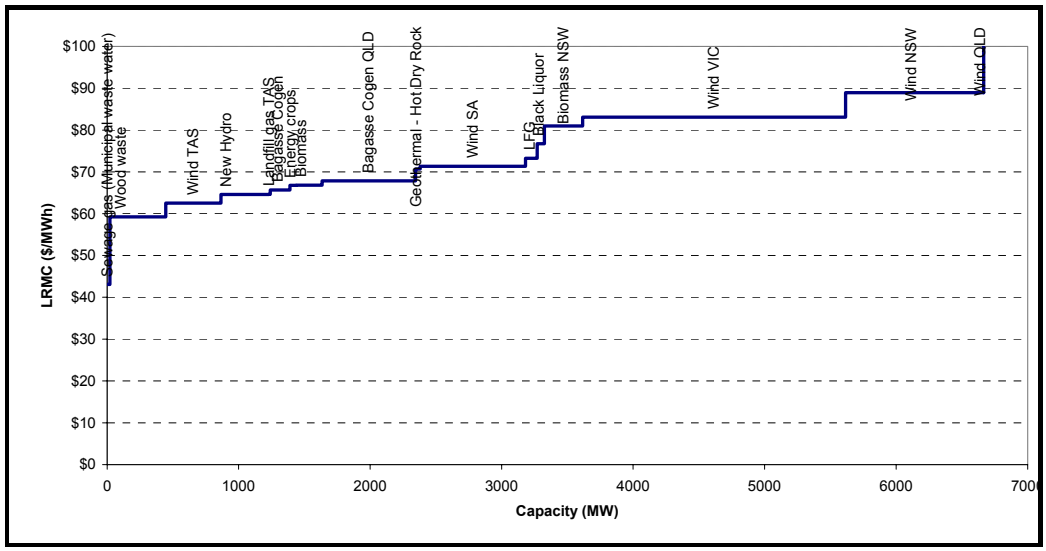
New renewable plant costs were sourced from two public documents: the Intelligent Energy Systems (IES) report to the Office of the Renewable Energy Regulator (ORER)[2] and the document recently produced by McLennan Magasanik Associates (MMA) for the National Emissions Trading Scheme (NETS) report[3]. The MMA data for wind, hydro, biomass and geothermal options were used, as the report was more recent. The IES report, which contains a greater range of options, was used for the other options included in the modelling (adjusted for the same reference year). Both reports were consistent in their assumptions and data.

[2] IES, "Modelling the Price of Renewable Energy Certificates", report to ORER, December 2002.

[3] MMA, "Impacts of a National Emissions Trading Scheme on Australia's Electricity Markets", report to NETTS, July 2006.

Figure 1 below shows the merit order for the new renewable options included in the modelling.

Figure 1: Merit order of new renewable options



Modelling Methodology

The WHIRLYGIG model optimises (minimises) the total fixed and variable costs of meeting demand for electricity in the NEM subject to various greenhouse and other constraints. This approach is analogous to a simplified central planning style “least-cost expansion” analysis. The model is a mixed integer linear programming model used to optimise investment and dispatch decisions in the NEM over the modelling period from 2006-07 to 2029-30.

Specifically, it seeks to minimise the NPV of meeting electricity demand in the NEM, subject to a number of constraints, including:

- supply must exactly meet demand at all demand points;
- minimum reserve requirements in each region must be met;
- generators cannot run more than their physical capacity factors;
- generators that must run for particular periods are taken into account;
- flows over interconnects cannot exceed their capacity; and
- any additional policy constraints including the MRET scheme, GGAS, QldGas and VRET must be met, with each scheme meeting the required targets from eligible supply only.

The model chooses from an array of investment and dispatch options over time. These include options to run existing plant (whose capital costs are assumed to be irrelevant to future decision making, and for which only variable costs are taken into account), or to invest in new plant (where capital as well as operating costs are an important element in this decision).

In relation to new plant, assumptions are made regarding:

- committed plant;
- the fixed and variable costs associated with different technologies;
- minimum investment block size;
- the timing of when different technologies are available; and
- the lead times for new plant (for example, it is impossible to have a fully operational new gas fired plant in the market by the start of 2007, unless this plant had been planned and approved some time ago).

Model inputs and outputs

All model inputs are updated for the latest economic and electricity market information from various sources including from NEMMCO, TransGrid, the Independent Pricing and Regulatory Tribunal (IPART), the Australian Bureau of Statistics (ABS), ACIL Tasman, the National Institute of Economic and Industry Research (NIEIR) and generators.

The inputs to the models include:

- demand in each NEM region for each year of the modelling period;
- interconnection capacities and loss factor equations;
- minimum reserve margins;
- existing and potential generation capacities, including variable costs, fixed costs, carbon rates, maximum capacity factors, expected outage rates, and in and out dates; and
- constraints for existing MRET, GGAS and QldGas programs and other constraints for specific scenarios.

The outputs generated by the model include:

- size and type of new investment in each region, in each year;
- output by generator and by region in each year;
- flows over interconnects between regions;
- marginal cost of producing electricity in each region, in each period;

- emissions and emission coefficients by each generator, and by region or the NEM as a whole;
- actual capacity factors of each generator dispatched in the NEM;
- total cost to electricity sector by region and for total NEM; and
- marginal cost of achieving each of the greenhouse policy constraints (equivalent to the estimated certificate price for the scheme).

This Appendix presents a summary of cost related outputs.

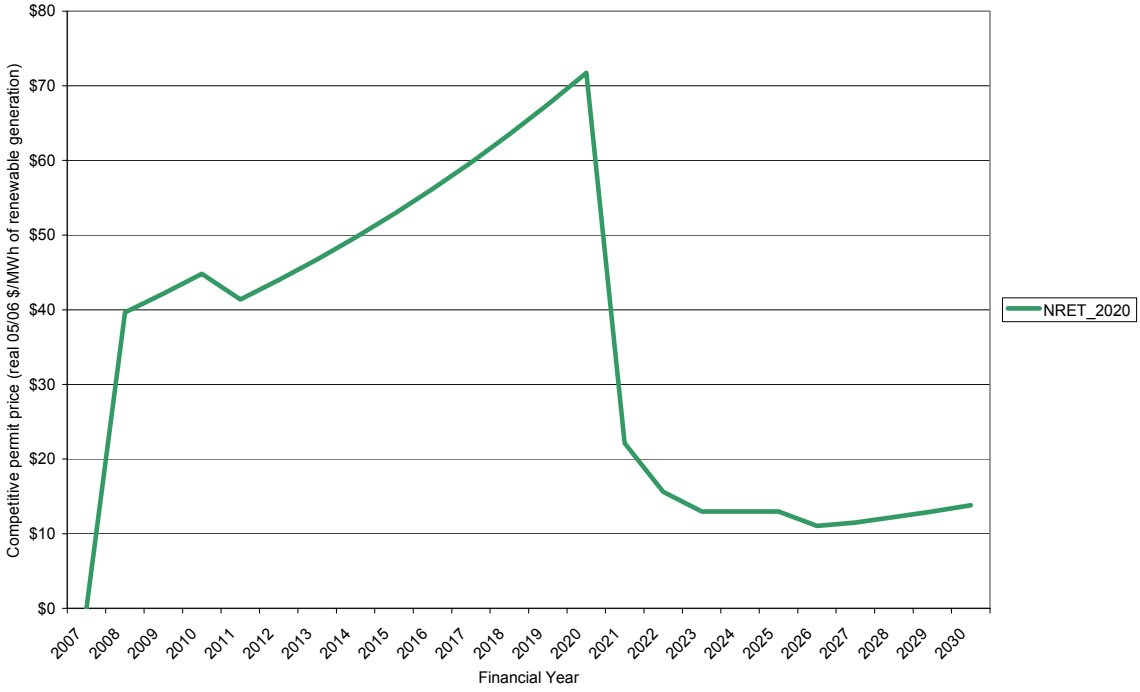
Costs of the Scheme

Competitive permit price

The competitive permit price is expected to be about $45/MWh (in 2005/06 dollars) by 2010 and steadily rise to about $70/MWh by 2020 after which the price is expected to fall following the termination of the Commonwealth MRET scheme in 2020. The fall in price will be due to some renewable generation under MRET installed after the commencement of NRET in 2007 becoming eligible for NRET from 2020. The termination of the MRET effectively expands the range of supply relative to demand and price falls.

The maximum permit price of $70/MWh indicated by the model is slightly higher than that of the effective cap of about $57 for MRET ($40/MWh MRET penalty plus tax effects) but lower than that for VRET which will be about $90 in 2020 ($60 VRET penalty in 2020 including CPI escalation and tax effects).

Figure 2: Competitive NRET prices



Customer effects

If competitive permit prices are passed through to customers, the following figure shows the $/MWh effect on liable customers. In summary the price rises from $0/Wh to a maximum of about $7MWh in 2020 (in 2005/06 dollars) as shown in Figure 3. The average household in NSW uses about 7.5 MWh per annum. Based on this, the cost to an average household will be less than $4 per annum in 2008 and 2009, rising to around $52.50 per annum in 2020. This is equivalent to an increase in the annual electricity bill for NSW household customers by about a dollar a week in 2020 but less than a dollar before and after 2020. After 2020 the price falls dramatically following termination of the Commonwealth MRET scheme. The average cost per annum over the life of the scheme for an average household is $16 or just over 30 cents each week.

The exemption of energy intensive, trade exposed consumers from the scheme has the effect of spreading the cost of the scheme to all other energy consumers. An amount of about 13,700 GWh (or 19 per cent of the current use), reflective of the energy intensive, trade exposed user's energy demand, has been deducted from the liable demand when calculating these customer effects. The cost after

exemption of these users is calculated outside the model rather than as part of the modelling input assumptions.

Figure 3: Customer price effects

Model Limitations

The economic costs presented in this Appendix are expected to be reflected in prices assuming there are no material restrictions in the market's ability to source the supply of renewable technologies within the given timeframe.

Also, it is important to understand that adding more generation capacity to the system than is strictly required to meet any other commercial or system reliability obligation is likely to affect the NEM price. In general, the proposed renewable scheme tends to suppress the NEM pool price because existing generators face greater competition from this additional plant. This decline in the wholesale NEM price could partly offset the extra costs borne by the retailers who have to buy electricity from the additional renewable plant. Energy intensive, trade exposed consumers who are not part of the scheme are therefore likely to receive lower electricity prices with the scheme than without the scheme.