WESTERN AUSTRALIA
POLICY FORUM

West Australian Policy Forum Paper

Driving Deployment of Renewable Energy Technologies in the Western Australian Stationary Energy Sector

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September 2008

About CEEM and this report

The UNSW Centre for Energy and Environmental Markets (CEEM) undertakes interdisciplinary research in the design, analysis and performance monitoring of energy and environmental markets and their associated policy frameworks. CEEM brings together UNSW researchers from the Australian School of Business, the Faculty of Engineering, the Institute of Environmental Studies, and the Faculty of Arts and Social Sciences, working alongside a growing number of international partners. Its research areas include the design of spot, ancillary and forward electricity markets, market-based environmental regulation, the integration of stochastic renewable energy technologies into the electricity network, and the broader policy context in which all these markets operate.

This report briefly discusses the role for renewable energy in reducing greenhouse emissions in Western Australia, including some potential interactions with emissions trading schemes. It then outlines the current policy environment for renewable energy in WA, before proposing policies to drive additional deployment. This report is most relevant for small-scale renewable technologies and has a particular focus on feed-in tariffs, but also discusses the development of community support, the development of the commercial PV market and the removal of institutional barriers. It has been prepared for the WA Policy Forum, as a means of informing public discussion about renewable energy opportunities in WA. Nevertheless, the views expressed in this report remain those of the authors.

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Document navigation

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Executive Summary

The Western Australian stationary energy sector is facing significant pressures regarding rapid increases in demand, constraints on gas supplies, high diesel fuel prices, planned increases in electricity tariffs to cover increasing generation and network costs, and the imposition of a carbon price from 2010.

There is a clear need to reduce greenhouse emissions from energy supply and use, and it is likely that an array of different technologies, on both the supply and the demand side, will be required to do so. On the supply side, there is a range of renewable energy technologies that can contribute to immediate emissions reductions, however, because they are more expensive than conventional generation options, are unlikely to fulfil their potential in the absence of supportive policies.

Emissions Trading Schemes

While an Australian emissions trading scheme (ETS) should provide some support for renewable energy, at this stage its design and therefore outcomes are unknown. ETSs also drive short-term least-cost options. Renewable energy is not a short term least-cost abatement option, but is a part of a portfolio of options, some of which may be higher cost in the short term, but least-cost in the long term as the abatement task becomes more difficult. In order to provide significant amounts of renewable energy over the longer term, policies need to be put in place now that will result in the development of a renewable energy industry capable of doing so.

Current Support for renewable energy

Renewable energy is currently supported by a number of different policies in Western Australia. These include the Mandatory Renewable Energy Target (MRET), GreenPower, Solar Schools, the Solar Homes and Communities program, Green Loans, the Renewable Remote Power Generation Program (RRPGP), the Renewable Energy Buyback Scheme (REBS), Solar Cities, Green Precincts, the Low Emissions Technology and Abatement (LETA) program, possibly the Clean Business Australia Green Building Fund, and the Energy Innovation and Renewable Energy Funds.

In summary, although a variety of support mechanisms for renewable energy are available, all have restrictions of some kind, details of the various schemes are not easy to find, and renewables are still not treated as mainstream options by governments or the energy sector.

Market Support via Tradeable Certificates

The MRET provides by far the most support, although mainly for larger-scale developments, particularly wind, although a few bioenergy and solar systems have also benefited. The Commonwealth government has a stated intention to increase this from 9,500GWh to 45,000GWh in 2020. The extension of deeming arrangements to systems up to 100 kW and for 15 years has made MRET more attractive for higher-cost options such as photovoltaics. Details of the extended scheme are expected to be finalised following the current review process. GreenPower schemes have also tended to support wind in WA, although the Perth

Solar City, as well as projects supported under RRPGP on diesel grids may favour solar options in future.

Grant Programs

RRPGP remains a key capital grant program for WA and will continue to support PV, some wind and maybe other technologies in diesel areas for the next 2 years. There is no indication at present of any intention to extend the program once current funding runs out. By that time, the extended MRET and a preliminary emissions trading scheme will be commencing so, combined with rising diesel prices, they may be sufficient to support continued renewable energy uptake. The PVRP is now called the Solar Homes and Communities program and will provide grants for approximately 6 MW of PV over the coming year or two. Although uptake increased significantly in WA 2007, it remains to be seen what impact the new means test will have on WA sales.

Community Programs

The Solar Schools and Solar Cities programs will provide some targeted support for PV and solar water heaters, as well as water and energy efficiency measures over the next 7-8 years. It is hoped that the awareness and educational benefits of these programs will remove some of the remaining barriers to uptake, whilst the large-scale roll-out and associated financial and technical support arrangements will reduce costs and develop industry capacity for the long term.

Tariff Support

Some tariff support is provided to residential customers via the Renewable Energy Rebate Scheme, however this provides relatively low levels of income to system owners. REBS tariff support is not generally available for larger-scale or business investments. The WA Liberal Party has announced a 60c/kWh feed-in tariff (FiT) for residential systems as part of its election platform. This is discussed in more detail below.

Technology Development

A number of new relatively large R&D programs targeting renewables have been established by the Rudd Government, which add to existing smaller State funding programs. Until the details of these new programs are known, it is difficult to assess their likely implications for WA. However, WA has a number of key renewable energy research facilities at the Universities of Western Australia, Murdoch and Curtin, which will provide a good foundation for expanded research programs, as well as a profitable industry sector which can afford to provide the matching funds required in many of the programs.

Proposed policies to drive renewable energy in WA

Mandatory Renewable Energy Target

Increasing MRET to 45,000 GWh by 2020, and maintaining this to 2030 should see significant levels of support for current least-cost technologies, such as wind and bioenergy. Some additional improvements include:

1. The time over which a generator can create certificates could be reduced to 15 years. This would limit the number of RECs created by old hydro[1] and increase the demand for new renewable generation, while still allowing renewable energy developments to recover their costs.
2. Solar water heaters[2] could be excluded to increase the demand for new renewable electricity generation. SWHs should then be supported through other mechanisms such as capital grant subsidies and mandatory building requirements.
3. The penalty could be indexed to the Consumer Price Index from 2010 onwards to maintain the real price support levels and reduce the likelihood that retailers may pay the penalty rather than pay for renewables.

Feed-in Tariffs

FiTs are an alternative to tradeable certificate schemes such as MRET, and have been used with great success in Europe, especially Germany and Spain. They essentially provide generators with a guaranteed high buy-back rate for generated electricity for a given period (e.g. 15 to 20 years). In WA they could be used to drive deployment of technologies that receive little support from MRET, such as PV and residential-scale wind turbines. Some advantages of FiTs are:

(i) Price certainty: system owners receive a guaranteed rate of return, which increases investment certainty. The 'starting' FiT for each year can be adjusted as necessary.

(ii) Targeted technology support: A FiT can be used to support promising technologies by assigning them a higher FiT.

(iii) Targeted locational support: A FiT can also be use to drive installations in particular locations, for example, to drive PV in grid-constrained areas where its output matches demand.

(iv) A FiT encourages high quality installations and on-going maintenance, since payment is on the basis of electricity output rather than rated capacity.

Because FiTs require the level of the tariff to be reset each year, they can be subject to pressure from lobby groups, and so some predetermined mechanism to set each year's prices is advisable.

As for any financially-based measure, the design of a FiT is critical to its success. The following table briefly summarises some desirable characteristics of a FiT suitable for residential-scale distributed generation systems such as PV and micro-wind turbines.

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[1] Up to 2006, old hydro generators produced one third of the MRET certificates (CEC, 2007).

[2] Up to 2006, solar water heaters produced 20% of the MRET certificates (CEC, 2007).

Desirable FiT Design Features

Feature & Description
Size of tariff The tariff should be set so that at the end of it's warranty period, a system at least pays for a replacement, including connection costs. The tariff should be separate to the prevailing retail tariff so that energy market signals are not compromised and the value of the FiT cannot eroded as electricity tariffs increase.
Timeframe A FiT should guarantee payment to the system owner for the time required to pay off the system, and the programme should run for a minimum of 15 years.
Reducing tariffs The FiT should be fixed only for the systems installed in any one year and can be changed for the systems installed in successive years to drive cost reductions, and to account for the rate of uptake in the previous year as well as other factors such as changing electricity prices.
Payment on generation The FiT should be paid on all electricity generated by the system because there is no reason to distinguish between electricity exported to the grid and electricity used on-site. Such a FiT provides greater financial returns and greater certainty of what those returns will be, as well as greater certainty regarding the costs of the scheme.
New installations If the availability of the FiT is in some way limited, then to maximise new deployment, and to facilitate standard metering arrangements, the FiT should be provided to new and extended installations only. Where systems have been installed with no previous government support, there may be some justification for FiT eligibility.
Guaranteed connection and purchase Retailers and network providers should guarantee that systems which comply with technical connection requirements will be connected and all their generation purchased.
Grid connection agreements The application and approval processes for connection of DG systems to the grid should be streamlined, with the FiT arrangements incorporated directly into this process.
Monitoring Some form of monitoring/assessment program should be incorporated into any FiT program.

The ACT Government has introduced a gross FiT[3] of 3.88x the customer's tariff, with the aim of ensuring a system cost payback time of 10 years. Alice Springs Solar City has also introduced a gross FiT, set at 45 c/kWh, with annual payments restricted to the equivalent of output from a 2kW system. South Australia, Queensland and Victoria have recently introduced net export FiTs of 44 c/kWh (SA, QLD) and 60 c/kWh (Vic). The Commonwealth Government is undertaking a FiT review, with the stated aim of ensuring uniform schemes across Australia.

The recently elected WA Liberal Party promised, in its election platform, a FiT for residential systems. At this stage a number of design features are yet to be addressed and the above table should provide useful guidance.

The Liberal Party's policy statement also stated that a FiT for small-scale commercial PV systems will be investigated. Given that PV output matches the commercial load profile very well and so should help support networks that service commercial areas, the electricity produced is likely to have higher value than that produced by residential systems. Businesses are also ineligible for the Solar Homes and Communities program, making a decent FiT even more important for a PV system to be financially viable. They could also potentially install larger renewable energy systems and thus make a more significant contribution to RE growth in WA.

Additional policies

A range of issues face increased adoption of renewables, meaning that a simple price signal, such as that provided through MRET or a FiT, is not enough. These include the need for standardised, straightforward and low-cost grid integration procedures for distributed generation systems; extensive training and certification processes and opportunities for the range of new skills required; straightforward local government development and planning processes, including solar access guarantees; as well as development of new grid management strategies to deal with increased diversity of generating sources and technologies on the grid, with their associated range of generating profiles and intermittency issues. For long term progress, WA should pursue the many new research and development funding opportunities now available and develop research capability in key areas relevant to WA conditions.

[3] A gross FiT is paid on all electricity generated by the system. A net export FiT is paid only on electricity exported to the grid.

Contents

1 Introduction

The Western Australian stationary energy sector is facing significant pressures over the coming decade. These include rapid increases in demand, constraints on gas supplies, high and increasing diesel fuel prices, planned increases in electricity tariffs to cover increasing generation and network costs, and the imposition of a carbon price from 2010.

In the past, Western Australia has led the country in its adoption of solar water heaters and wind power. However, in recent years, renewable energy uptake through grant programs, GreenPower schemes and local government initiatives has been higher in other States. Nevertheless WA has great potential for wind and solar technologies, good regional potential for bioenergy and mini-hydro, and longer term opportunities for new technologies such as wave and tidal power.

This report examines the current energy situation in WA, and the opportunities for increased renewable energy deployment now available via market, grant and community support programs. It concludes with recommendations on actions which could be taken to capitalise on these opportunities and to develop a robust renewable energy sector in WA, with a particular focus on the residential market and the use of Feed-in Tariffs.

2 Electricity and Greenhouse Emissions in Western Australia

2.1 *The stationary energy sector in Western Australia*

Electricity in Western Australia is currently supplied mainly by natural gas and coal, with oil and renewable energy contributing much smaller amounts. Most of the renewable energy comes from wind power, with bioenergy and hydro each making up about 20%, and a very small amount from photovoltaics (PV) - see Figure 1 (SEDO, 2008).

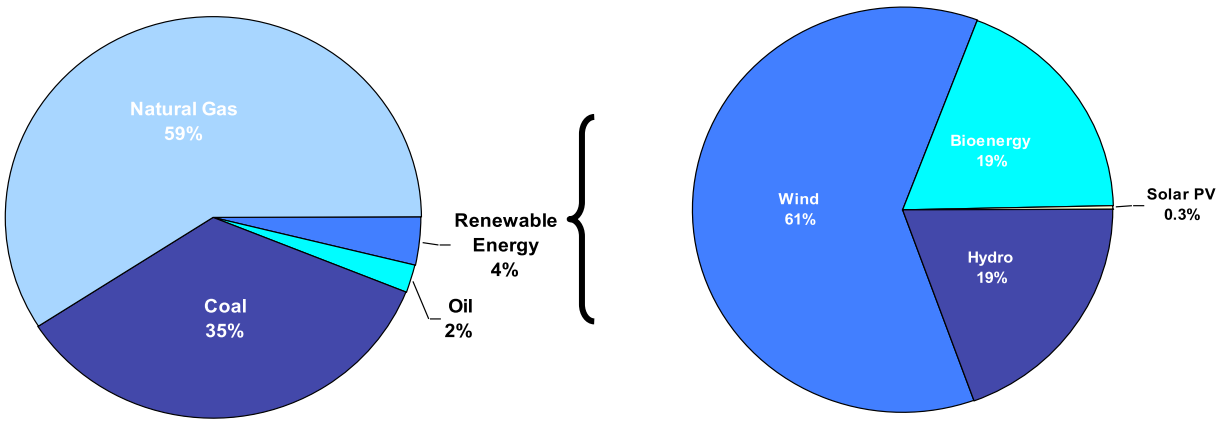

Figure 1 Types of electricity generation in Western Australia, 2006/07

From SEDO (2008)

Between 1990 and 2005, total greenhouse gas emissions in Western Australia increased by just over 17%, while those from electricity generation increased almost 50% (AGO, 2007). In the absence of new policies, these emissions are likely to continue increasing. Electricity demand in Western Australia is forecast to grow at 2.2% per year on average until 2016, with peak demand forecast to grow at 3.3% over this period – see Figure 2 (IMO, 2007).

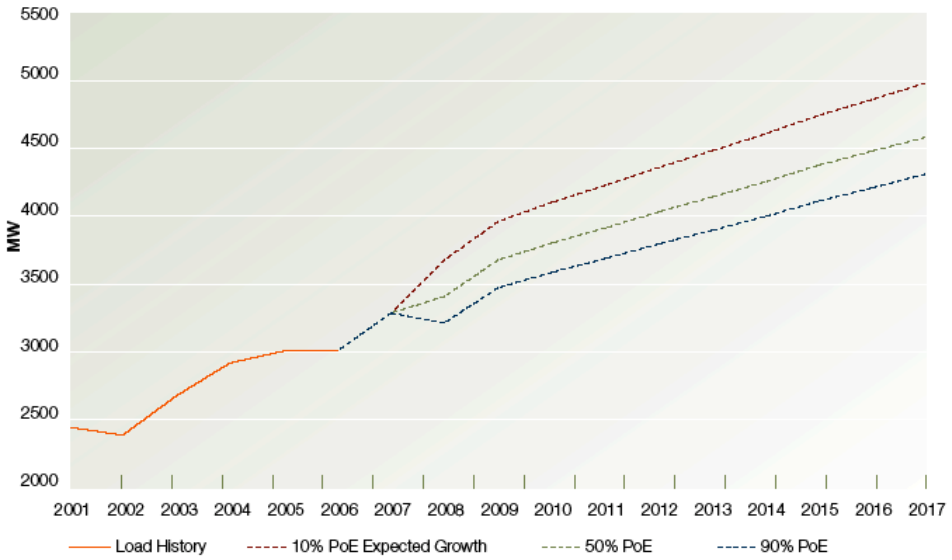

Figure 2 Energy Load Forecast for the SWIS to 2017

From Western Power (2008); PoE – Probability of Exceedence, thus, a 10% PoE means there is a 10% probability that growth will exceed this level.

2.2 *The role for renewable energy in reducing GHG emissions in WA*

To avoid the worst impacts of climate change, it is clear that emissions need to be reduced to well below 1990 levels, with the Garnaut Review recommending a greater than 60% reduction by 2050 (Garnaut, 2007). For the electricity sector, this can be done a number of ways. Energy efficiency is the lowest cost way because it reduces electricity use. Renewable energy has the lowest emissions of all types of electricity generation, however, it currently costs more than gas and coal-fired generation. Although gas-fired generators have much lower emissions than coal-fired generators, they still emit around 400 to 650kgCO_2/MWh, excluding any emissions during manufacture (Simshauser and Docwra, 2004). By way of comparison, PV modules emit between 20 and 55kgCO_2/MWh,[4] including manufacture then operation over 30 years (Fthenakis et al., 2008). The technology for carbon capture and storage of greenhouse gases from both gas-fired and coal-fired power plant is not expected to

[4] Actual life cycle emissions depend on their method and location of manufacture, as well as where they operate.

be commercially available until well after 2020, and in any case would still release about 20% of the emissions. Thus, for emissions to be reduced in the short to medium term, energy efficiency measures will be needed to reduce demand, with renewable energy generators playing a much larger role than they are currently projected to.

2.2.1 The potential impact of emissions trading schemes

Renewable energy can be made more cost-competitive with fossil fuel-based energy by reducing the costs of renewables or increasing the costs of fossil fuels. Considerable research effort is underway worldwide which, combined with increasing deployment, is reducing the costs of renewables. At the same time, for reasons of climate change, resource depletion, energy security and economic efficiency, efforts are now being made in some countries to reduce subsidies to fossil fuels and to ensure prices reflect the environmental and social costs associated with their use. Specifically, the use of carbon taxes or emissions trading schemes are now being considered as means of adding a environmental carbon emissions cost to fossil fuels. Emissions trading schemes (ETS), in theory, are the most efficient way to drive deployment of low emission electricity generation, however, in practice, this is not necessarily the case.

An ETS is a government-run scheme that places a price on greenhouse emissions and so provides an incentive for them to be reduced. The effectiveness of an ETS in reducing emissions is critically dependent on its design. In order to provide long-term support to the renewable energy industry, an ETS needs to result in a stable price signal that makes renewable energy cost-competitive with fossil fuel-based generation. However, ETSs are tradeable permit schemes, and all such schemes have inherent price volatility. This is because as soon as there is a perception in the market that there are more than enough permits to cover emissions, the price drops quite dramatically. The two major examples of ETSs in the world, the European Union ETS and the NSW Greenhouse Gas Reduction Scheme, have for this very reason, experienced price volatility ending in significant price corrections.[5] Price volatility also occurs because market participants never have perfect access to reliable information regarding current and future abatement costs and demand for permits. The design of the Australian National ETS (NETS) is undecided at this stage and so how it intends to deal with these causes of price volatility is unknown.

In addition, the price signal provided by an ETS reflects the current cost of emission reductions and so it drives the options that are least-cost in the short term. Unlike energy efficiency, renewable energy is not a short term least-cost abatement option, but is a necessary part of a portfolio of options, some of which may be higher cost in the short term, but least-cost in the long term as the abatement task becomes more difficult. In order to provide significant amounts of renewable energy over the longer term, policies need to be put in place now that will result in the development of a renewable energy industry capable of doing so. An ETS with a volatile and possibly low permit price (for example if the emissions cap is set too high or if cheap offset projects flood the market with permit), is unlikely to be an appropriate policy to drive development of the renewable energy industry in the near term.

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[5] The price for NGACs has stayed above zero, possibly because of uncertainty over the NSW Government's intentions regarding continuation of the scheme, with a recent announcement that the DSA component of the NSW scheme will be converted into the NSW Energy Efficiency Scheme (NEET).

Although futures markets that operate in conjunction with an ETS can be used to project prices in the future, they only do so based on the current understanding of the market. Changes to that understanding can result in sudden changes in prices – that give little time for industry development.

The (Mandatory) Renewable Energy Target (RET), which is described in the following section, is a tradeable certificate scheme,[6] and should interact well with an ETS. The price of the RET certificates are used to bridge the gap between the costs of renewable and fossil-fuel electricity. If the ETS is well designed, the cost of fossil-fuel electricity will become more expensive, and so the price of the RET certificate required to bridge the gap will decrease proportionately (MMA, 2007) until parity is reached. At present, the Government expects this to occur by 2030, when the RET will be phased out.

3 The current policy environment for renewable energy in WA

Renewable energy is currently supported by a number of different policies in Western Australia. The following briefly outlines the nature of these policies and their impact on deployment of different renewable energy technologies. Programs funded by the Commonwealth are listed on the Greenhouse Office website.[7]

Programs funded by both the Commonwealth and the WA Governments and administered through the WA Government are listed on the SEDO website.[8]

3.1 *Proposed Feed-in Tariff*

As part of its election platform, the WA Liberal Party promised a Feed-in Tariff (FiT) for residential systems as well as an assessment of the feasibility of a FiT for commercial systems (Liberal, 2008). This is discussed in more detail in Section 4.2 (which focuses on policies proposed to drive deployment of renewable energy in WA).

3.2 *The Renewable Energy Target*

A Renewable Energy Target (RET) is a government-run scheme that establishes a requirement for a certain amount of renewable energy to be produced by a certain time. By far the greatest support for renewable energy in WA is currently from the Mandatory Renewable Energy Target (MRET). The Commonwealth government has committed to increasing the target from the current 9,500GWh by 2010, to a Renewable Energy Target (RET) of 45,000GWh by 2020. This is predicted to increase the amount of renewable generation from current levels of around 10% of total generation to 20% by 2020.

However, there is currently mounting opposition from business and some sections of government to the RET, even at its current level, on the basis that an ETS on its own is

[6] Certificates are distinct to permits in that certificates can be considered to be associated with something considered ‘special’ ie. worth certifying, while permits give permission to take a particular action.

[7] http://www.greenhouse.gov.au/resources/renewable.html/

[8] http://www1.sedo.energy.wa.gov.au/pages/funding.asp

sufficient to drive least-cost abatement. Although an ETS is unlikely to be sufficient to drive renewable energy deployment (as discussed above), the final outcome for RET is at this stage uncertain. A consultation paper on the design of the expanded target has been prepared by COAG and is currently open for comment.

Little additional renewable energy is expected to be driven by the current RET in Western Australia.[9] Recently, the impacts of increasing the amount of renewable energy in Western Australia to 10%, 15% and 20% of demand in 2020 were modeled (MMA, 2007). However, the amount of renewable energy an expanded national RET would drive in Western Australia is unknown. To date, approximately 10% of the renewable energy driven by RET has been in WA and this proportion is predicted to be maintained under an expanded RET (CEC, 2007). This means the outcomes of the 20% target modeled for WA are likely to be relevant for a national 20% target. The MMA modelling found:

- The 20% target would be met predominantly by a mixture of wind and bioenergy (the model assumed solar water heaters would not be eligible).
- Under a low carbon price[10], a 20% target increased electricity prices for end-users by 1.7% by 2020, and by only 0.7% under a high carbon price.[11]
- The wholesale cost of electricity decreased if renewable energy certificate prices were not included. This means that any sectors that are excluded from the scheme (eg. energy intensive industries) and so don't have to pay for renewable energy certificates, the cost of electricity decreased.
- Under a 15% target, the WA economy still grew by between 3.8 and 4.1% per annum to 2030, and the achievement of projected levels of economic activity was delayed by around two weeks in 2020.

Note that these costs and changes to economic growth are modeled compared to a business-as-usual scenario where nothing is done to reduce greenhouse emissions, and so they don't include the cost impacts of climate change, nor the possible impacts of higher energy costs driven by the type of oil prices currently projected to occur.

3.3 *GreenPower*

The Australian GreenPower program[12] is a joint Government initiative which has been operating since 1997 and offers an opportunity for electricity users to make voluntary purchases of accredited renewable energy electricity, as a portion of their electricity usage and at a cost premium. Customers indicate their preferred percentage to their electricity retailer and the retailer must in turn purchase an equivalent amount of green electricity. Eligible generation is similar to that under the RET, although definitions tend to be stricter – for example, solar water heaters are not allowed. The REC mechanism is used to keep track of

[9] The main existing policy driver in this case would be the RRPGP, which is discussed below.

[10] Driven by an ETS, and reaching \$17/tonne CO_2-e in 2020

[11] Reaching \$31/tonne CO_2-e in 2020.

[12] www.greenpower.gov.au

GreenPower sales and to ensure there is no double counting against the mandatory target. Hence retailers can purchase RECs for both their RET obligation and their GreenPower customer obligation, but must surrender these to ORER separately.

A range of GreenPower products are available through different retailers, with some using this as one of their key marketing tools. Business customers are eligible to use the GreenPower logo if they purchase a sufficient fraction of green electricity. There were about 750,000 GreenPower customers at end March 2008, purchasing over 1,400 GWh of green electricity per year. Around 55% of green electricity sold is for commercial (business and government) customers (NGAP, 2008).

There are currently 267 renewable energy power stations accredited to sell GreenPower, with more being listed each quarter to keep up with the increasing demand there was an increase of 224,000 customers in 2007. There are currently 34 different GreenPower products offered by 24 different retailers. Some are available only to residential customers, others only to commercial (NGAP, 2008). They vary by percentage of renewable electricity and by electricity source. Costs also vary and tend to be specially negotiated for commercial customers, depending on their usage and current electricity contract.

In WA there are currently 3 bioenergy facilities, 1 solar plant and 9 wind farms, as well as a number of small household PV systems, accredited as post-1997 generators, and 4 bioenergy, 2 hydro, 1 solar and 1 wind farm supplying pre-1997 renewable electricity (NGAP, 2008). Large customers in WA can choose GreenPower from licensed providers outside their franchise area. The WA Government has a target of 20% GreenPower for its own use by 2010. Table 1 shows accredited GreenPower products available in WA at present.

GreenPower products are now also offered by some companies that are not licensed energy providers. In these cases, the GreenPower provider offers an accredited GreenPower product separate to a customer's electricity supply.

The three main types of GreenPower products offered are (ibid):

1. Consumption based products whereby customers nominate the level of GreenPower purchased according to a nominated percentage of their total electricity consumption;

2. 'Block' based products whereby customers purchase a kWh 'block' of GreenPower that is based on the average household electricity consumption and is not directly linked to an individual customer's consumption; and

3. Purchase of GreenPower to match consumption provided by another provider. This is available nationally using web interfaces and direct sales to customers. While customers continue to purchase electricity from their standard electricity supplier, the GreenPower provider will purchase and surrender the equivalent number of Renewable Energy Certificates (RECs) from eligible generation sources to meet the customer's elected electricity consumption.

Table I: Current GreenPower products on offer in WA (NGAP, 2008a)

Provider	Product	Type

ActewAGL	Greenchoice	Residential/Commercial
Alinta	Alinta GreenPower	Commercial
ARK	ARK Climate	Residential/Commercial
Climate Friendly	Climate Neutral	Residential/Commercial
COZero	GreenEnergy	Residential/Commercial
Energy Pacific	Pacific Hydro	Commercial
Global Green Plan	Green Switch	Residential/Commercial
Origin Energy	Green Earth	Commercial
Synergy	Easy Green	Residential
	Natural Power	Residential/Commercial
Viridor	Deep Green Renewable	Commercial

3.4 *Solar Schools*

3.4.1 WA Solar Schools Program

The $5.1 million WA Solar Schools Program supports the installation of PV systems in 350 metropolitan and regional State schools by 2010. Schools must contribute a minimum of $1,000 towards the cost of the system. The Sustainable Energy Development Office will contribute up to $12,500 in metropolitan areas and $13,000 in regional areas. The program complements the Energy Smart Government Program.[13]

Program Objectives

- Enable students to learn about sustainable energy
- Raise community awareness of sustainable energy
- Lead to the long-term reduction of greenhouse gas emissions
- Increase the uptake of renewable energy in rural and remote areas.

Key Eligibility Criteria

- Rebates are available to State Government primary, middle and high schools
- Rebates are available for new and complete solar power systems only
- The minimum size for an eligible solar power system is 950W
- Systems must be installed on a school building which receives a high level of sunshine and deters attempts of theft and vandalism
- Schools must agree to carry out a range of educational activities associated with the solar power system
- Solar power systems must meet relevant standards and regulations and must be designed and installed by suitable qualified personnel.

[13] http://www1.sedo.energy.wa.gov.au/pages/energy_smart_gov.asp

3.4.2 National Solar Schools Program

The Commonwealth Government has also allocated $480 million over 7 years to provide grants of up to $50,000 for each school to install a wide variety of renewable energy, energy efficiency and water saving measures. Schools need to install a PV system of at least 2kW to be eligible for the total amount.

The Program will replace the previous Green Voucher program and is expected to reduce school energy and water bills, raise awareness of clean energy technologies in the community and create new jobs and investment in Australia's sustainable industries and trades.

The State and Commonwealth programs will interact via the Australian Sustainable Schools Initiative.

3.5 *Solar Homes and Communities*

The Solar Homes and Communities program relaces the previous PV Rebate Program (PVRP) and is funded by the Australian Government. It provides PV capital cost rebates to householders to install photovoltaic systems in order to reduce greenhouse emissions, assist in the development of the Australian PV industry and increase public awareness of renewable energy. Rebates of up to AUD8/Wp for the first kWp are available for households with incomes up to $100,000.

2,900 systems were installed through the rebate program in 2007, amounting to 4.6 MWp, of which 93% were on grid connected buildings. Installations increased substantially in 2007, following a doubling of the rebate. However, the government introduced a means test in the 2008 budget and market activity has now declined. Since the start of the programme in 2000, more than 11,000 systems, using 16 MWp of PV, have been installed and rebates of over AUD 60 million have been provided. Approximately $45 million remains in the program budget for the next 2 years.

In WA 157 systems (268kW) were installed in 2007, up from 18 (27kW) the previous year. To end 2007, 329 systems (518 kW) had been installed. Uptake of grid-connected systems in WA has been slower than in other states and hindered by extra inspection requirements and installation charges. Streamlining of processes would assist uptake.

3.6 *Green Loans*

$300 million has been allocated for low interest Green Loans up to $10,000 for households wishing to install solar or water and energy efficiency products. This may assist households now impacted by the PV Rebate means test. The program is expected to be available from early 2009 and in addition to the low interest loans, will:

- Provide participating households with a Green Renovation Pack and a sustainability assessment identifying potential energy and water efficient actions, complete with estimated savings to electricity and water bills and environmental benefits.
- Increase awareness of the benefits of energy efficient technologies in Australian households.
- Deliver cost-effective greenhouse gas emissions reductions in up to 200,000 existing households.

- Strengthen the Australian community's contribution to energy efficiency and increase green inspired investment in households, which will benefit the small business sector.

3.7 *Renewable Remote Power Generation Programme (RRPGP)*

RRPGP is an Australian Government programme, administered by State and Territory Governments, which subsidises the use of renewable energy to displace the use of diesel for power generation in off-grid and fringe of grid areas. Thus, it aims to reduce diesel use, to assist the Australian renewable energy industry and the infrastructure needs of indigenous communities, and to reduce long-term greenhouse gas emissions. The target groups are indigenous and other small communities, commercial operations, including pastoral properties, tourist facilities and mining operations, water pumping and isolated households that operate within diesel grids, use direct diesel generation or are at the end of long grid lines. Grants of up to 50% of the capital cost of renewable generation and essential enabling equipment are available, with additional funding provided by some States, including WA.

The RRPGP also provides funding for industry support activities, such as test facilities, standards development, training, feasibility studies and demonstration projects, as well as support for the Bushlight programme to assist with deployment of renewable energy systems in small indigenous communities. RESLab at RISE, Murdoch University, is partly funded through RRPGP.

RRPGP grants significantly improve the cost-effectiveness of renewable energy systems, particularly at current diesel prices. At present, about $120 million in finding remains and the program will end in 2011. There is no indication of plans for extension.

3.8 *Net Metering and the WA Renewable Energy Buyback Scheme (REBS)*

Most electricity retailers in Australia now offer net metering[14] for small renewable energy generators connected to electricity distribution feeders. This facilitates distribution and rewards renewable energy investors for both energy and network savings. Both Horizon Power and Synergy operate buyback schemes for excess electricity generated by small grid-connected renewable energy systems, as required under their regulations. These are available to residential customers, non-profit organisations and educational institutions. They are essentially net metering schemes with buyback rates equal to the electricity purchase rate, less the GST. At present, REBS is not available for business customers, although individual contracts can be negotiated.

3.9 *Solar Cities*

$93.8 million has been allocated over 5 years to the Solar Cities program, to demonstrate high penetration uptake of solar technologies, energy efficiency and smart metering and to improve the market for distributed generation and demand side energy solutions. Consortia, comprising a mix of solar companies, banks, local governments, utilities, building companies and research groups, were formed to bid for the Solar Cities funding. 7 Solar Cities have been

[14] Net metering is essentially where the system owner is paid the same amount for electricity exported to the grid as they pay for electricity they use. In the past this occurred with a sungle meter that simply span backwards as electricity was exported. Now, it most commonly involves measurement of import and export separately.

announced – Adelaide, Townsville, Blacktown, Alice Springs, Central Victoria, Perth and Coburg.

The Perth Solar City is coordinated by the Eastern Metropolitan Regional Council and the Western Australian Government. It has a strong community focus and targets more than 6000 homes and businesses. It will include both new and existing homes - working with both owner occupier and rental properties, and will also include an education component, with funding for 20 schools to participate as "solar schools". The Perth Solar City is expected to deliver greenhouse gas emission reductions of more than 15,000 tonnes – equivalent to taking 3,500 large vehicles off the road – and cut energy use equivalent to the needs of 3,200 homes. The key elements include:

- Community engagement – social marketing, home energy assessments, smart metering;
- Access for a range of participants including owner occupiers, public and private tenants;
- Solar and energy efficiency technologies;
- Innovative financing and production subsidies;
- Demonstration projects – including commercial buildings and public facilities and schools;
- An expansion strategy to move to a self-funding second phase; and
- An ongoing monitoring strategy to monitor results through Murdoch University and Western Power's data management consultants.

3.10 *Green Precincts*

A Green Precinct program has been announced, providing $15 million for 10 high profile energy and water saving demonstration projects around Australia.

Projects are expected to demonstrate significant water savings and reductions in energy use, including substantial use of renewable energy, and be built in facilities used by thousands of people.

3.11 *Low Emissions Technology and Abatement (LETA) program*

LETA has $26.9 million to assist the uptake of low emission technologies by supporting the identification and implementation of cost-effective abatement opportunities and the uptake of small-scale low emission technologies in business, industry and local communities.

LETA has 4 sub-program areas:

Strategic Abatement - Identification of Opportunities – on an industry sector-wide basis to identify opportunities for emission reductions.

Strategic Abatement - Local Government and Communities - to achieve cost-effective abatement at the community level.

Renewables – to support broad industry development projects and national projects proposed by eligible State and Territory Government agencies, renewable energy industry associations or related institutions.

Geosequestration: Pilot Project - to demonstrate enhanced monitoring and verification technologies for geosequestration in Australia.

3.12 *Clean Business Australia Green Building Fund*

$90.0 million has been allocated over 4 years to reduce greenhouse gas emissions and improve energy efficiency in existing commercial buildings through refurbishment. Applications will be assessed on a competitive basis and on the basis of projected greenhouse savings for every dollar of Commonwealth funding contributed, with up to $200,000 per building available. Funding will be available for updating lighting, heating, ventilation, and air conditioning systems. Renewable energy technologies are not specified, but could potentially qualify.

3.13 *Energy Innovation and Renewable Energy Funds*

New funding of $150 million has been allocated for clean energy research and development, including a Solar Institute and funding for energy efficiency, storage and hydrogen transport fuels. A further $500 million is available for renewable energy research, development, commercialisation and deployment.

Details of the Funds are not yet available, but it is possible they will provide opportunities for joint research, development and demonstration between research institutes and product user organisations.

3.14 *Solar Water Heater Programs*

The Commonwealth Government has allocated $252.2 million over 5 years to provide rebates up to $1000 to households with incomes less than $100,000 for the installation of solar or heat-pump hot water systems.

In addition, $7.9 million has been allocated over four years to support the gradual phase-out of inefficient hot water systems used in Australian homes. The program will work with state and territory governments and industry to develop nationally consistent greenhouse performance standards for domestic hot water products to meet new performance requirements.

The WA Government also provides subsidies to households for gas boosted solar water heaters ($500 for natural gas and $700 for LPG in non-reticulated areas).

Both schemes apply to accredited systems only. Neither support the uptake of solar water heaters by businesses.

3.15 *Summary*

In summary, there are now a variety of support mechanisms for renewable energy, but all have restrictions of some kind, details of the various schemes are not easy to find, and renewables are still not treated as mainstream options by governments or the energy sector. Hence, in

order to make the most of opportunities available, and to develop a dynamic renewable energy sector in WA, a combination of the various support strategies will be needed. It would be useful for renewable energy proponents to familiarise themselves with the various programs so as to assist local communities and customers in their choices and decision making.

3.15.1 Market Support via Tradeable Certificates

Generic market support is provided for renewables via the Renewable Energy Target. In WA, this has mainly supported larger-scale developments, particularly wind, although a few bioenergy and solar systems have also benefited. The extended target has already increased Renewable Energy Certificate prices, while the extension of deeming arrangements to systems up to 100 kW and for 15 years has made the Target more attractive for higher cost options such as photovoltaics. Sales of solar water heaters have also been boosted by RET, although there is some support for removal of SWHs from the eligibility list under the extended target. Details of the extended scheme are expected to be finalised following the current review process.

GreenPower schemes have also tended to support wind in WA, although the Perth Solar City, as well as projects supported under RRPGP on diesel grids may favour solar options in future. In other States, some retailers offer technology-specific GreenPower options, for instance solar only. This can be a way to cover the costs of higher cost technologies, but does require an interested customer base.

3.15.2 Grant Programs

RRPGP remains a key capital grant program for WA and will continue to support PV, some wind and maybe other technologies in diesel areas for the next 2 years. There is no indication at present of any intention to extend the program once current funding runs out. By that time, the extended RET and a preliminary emissions trading scheme will be commencing so, combined with rising diesel prices, they may be sufficient to support continued renewable energy uptake.

Solar Water Heater uptake may slow if removed from RET, however both State and Commonwealth grant support is available, while local governments can also influence uptake via building regulations.

The Solar Homes and Communities program will provide grants for approximately 6 MW of PV over the coming year or two. Although uptake increased significantly in WA in 2007, it remains to be seen what impact the new means test will have on WA sales. The PV industry is lobbying for a Feed-in Tariff for PV and this is now being considered by COAG (see below).

3.15.3 Community Programs

The Solar Schools and Solar Cities programs will provide some targeted support for PV and solar water heaters, as well as water and energy efficiency measures over the next 7-8 years. It is hoped that the awareness and educational benefits of these programs will remove some of the remaining barriers to uptake, whilst the large-scale roll-out and associated financial and technical support arrangements will reduce costs and develop industry capacity for the long term.

3.15.4 Tariff Support

Some tariff support is provided to residential customers via the Renewable Energy Rebate Scheme, however this provides relatively low levels of income to system owners. REBS tariff support is not generally available for larger-scale or business investments. The business load profile is more likely to correlate with the output from a PV system, increasing local network benefits. This sector could also potentially install larger renewable energy systems and thus make a more significant contribution to RE growth in WA. The use of FiTs, where system owners are paid at a premium rate greater than the retail rate, is discussed in detail in Section 4.2.

3.15.5 Technology Development

A number of new relatively large R&D programs targeting Renewables have been established by the Rudd Government, which add to existing smaller State funding programs. Until the details of these new programs are known, it is difficult to assess their likely implications for WA. However, WA has a number of key renewable energy research facilities at the Universities of Western Australia, Murdoch and Curtin, which will provide a good foundation for expanded research programs, as well as a profitable industry sector which can afford to provide the matching funds required in many of the programs. Hence WA is well placed to capture a reasonable share of the funding.

It may be particularly useful for WA industries and researchers to agree on strategic research priority areas, which target issues and technologies best suited to local conditions, but with an eye to export potential. This would allow more focused and larger research programs which take best advantage of existing expertise and facilities, while minimising duplication.

4 Proposed Policies to Drive Additional Renewable Energy in Western Australia

4.1 *RET*

As discussed above, the current policy environment, without an expanded RET, is unlikely to drive significant levels of additional renewable energy in Western Australia. Increasing MRET to 45,000 GWh by 2020, and maintaining this to 2030 should see significant levels of support for current least-cost technologies, such as wind and bioenergy. Assuming the

currently proposed changes go ahead, a number of improvements could be made to the RET scheme. WA could propose some or all of these in a submission to the current enquiry.

1. The time over which a generator can create certificates could be reduced to 15 years. This would limit the number of RECs created by old hydro[15] and increase the demand for new renewable generation, while still allowing renewable energy developments to recover their costs.
2. Solar water heaters[16] could be excluded to increase the demand for new renewable electricity generation. SWHs should then be supported through other mechanisms such as capital grant subsidies and mandatory building requirements.
3. The penalty could be indexed to the Consumer Price Index from 2010 onwards to maintain the real price support levels and reduce the likelihood that retailers may pay the penalty rather than pay for renewables.

4.2 *Feed-in-Tariffs*

Feed-in-Tariffs (FiTs) are an alternative to tradeable certificate schemes, and have both disadvantages and advantages. They have been used with great success in Europe, especially Germany and Spain. They essentially provide generators with a guaranteed high buy-back rate for generated electricity for a given period (e.g. 15 to 20 years). Some advantages of FiTs are:

(i) Price certainty: For generators established in a given year, the FiT is set for a fixed period. The 'starting' FiT for each year can be adjusted to account for the rate of uptake in the previous year as well as other factors such as electricity prices.[17]

(ii) Targeted technology support: A FiT can be used to support particular technologies by assigning them a higher FiT. This can help development of technologies that may be high cost currently, but have the potential for low cost generation in the future.[18]

(iii) Targeted locational support: A FiT can also be use to drive installations in particular locations, for example, to drive PV in grid-constrained areas where its output matches demand.

(iv) Compared to a grant-based scheme (eg. Solar Homes and Communities), a FiT encourages high quality installations and on-going maintenance, since payment is on the basis of actual electricity output rather than rated capacity.

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[15] Up to 2006, old hydro generators produced one third of the MRET certificates (CEC, 2007).

[16] Up to 2006, solar water heaters produced 20% of the MRET certificates (CEC, 2007).

[17] This is one advantage that FiTs have over RET-style schemes. Being a tradeable certificate scheme, the RET has inherent price volatility, as seen since the scheme's inception.

[18] The current RET design provides broad support for the least-cost technologies. Another type of tradeable certificate scheme call a Renewable Portfolio Standard (RPS) can provide technology-specific support as it requires a certain proportion of the target to be met by particular technologies.

In Australia, FiTs were rejected in favour of MRET in 2000 on the basis that the latter would be more efficient. However, it has been argued that FiTs may be more effective in practice because they offer more investment and regulatory certainty, and are more efficient in the longer term because they drive innovation in a number of different technologies throughout their development pathway, not only those that are currently cheapest (Bechberger and Reiche, 2006; Butler and Neuhoff, 2005; van der Linden et al., 2005).

Some disadvantages of FiTs are:

(i) They can require the level of the tariff to be reset each year and so are likely to be more administratively complex - especially if lobby groups are involved in the process used to set tariff levels. This can be minimised if the rate of reduction is calculated according to a predetermined formula ie. that would help drive cost reductions but allow for inflation and changes to electricity prices.

(ii) They may shield renewable energy projects from energy market signals, such as those related to time or location of generation. This is really only important at high levels of deployment where the costs of integrating renewables (if output is only partially controllable and predictable) into the grid, become significant and so they need to be exposed to the wholesale market price signals. In this case, the FiT would need to be separate to these price signals.

Thus, assuming that the RET is expanded to 45,000 GWh, a FiT may be more suitable for smaller-scale distributed generation such as residential PV and wind turbines. A useful transition in market support for PV could be the gradual phase-out of up-front rebates (ie. the PV rebate or RRPGP grants) accompanied by a phase-in of tariff signals.

Internationally, FiTs have proven very effective for both large and small-scale technologies, from wind farms through to PV. They have overtaken grant support as the favoured mechanism for driving renewable energy uptake because they removes funding support from government election and budget cycles and can readily target different technologies and different applications. Although Governments can still make ad-hoc changes to the schemes, in general they remain a more stable and long-term support mechanism which facilitates industry development.

If the MRET is not expanded, or is even abolished, FiTs could be used as a replacement. The German feed-in tariffs have resulted in their PV market increasing from around 15 MWp per year in 1999 to 1095 MWp in 2007. The installed capacity has risen from 70 MWp in 1999 to 3635 MWp in 2007 (Greenpeace, 2006; IEA, 2008). The Australian market, in contrast, has seen PV installations increase from to 2.8 MW to 12.2 MW per year over the same timeframe, with installed capacity increasing from 25 MWp to 82 MWp (Watt, 2008).

Wind development has benefited most from FiTs in Europe with 2.2 GW of wind capacity added in Germany in 2007, resulting in an installed capacity of 20.6 GW, and 1.6 GW added in Spain, resulting in 11.6 GW installed capacity (REN21, 2008). Bioenergy and mini-hydro developments have also been assisted and FiTs of various sorts are now applied in 37 countries and 9 State jurisdictions (ibid).

Some countries have provided feed-in tariffs only until a specified capacity of PV has been installed (in Austria the set capacity was reached within months of the scheme starting); others have a built-in reduction in buy-back rates over time, and some link the programme to low interest rates or other strategies. The current German rates vary by size of installation and by application type but range from 45-62 eurocents/kWh (compared with typical retail electricity tariffs of ~16 eurocents). A summary of FiTs applying in various countries is shown in Table II.

Table II: Summary of International FiTs

Country	FiT Rates per kWh	Time Period	Comments
France	0,30 EUR BIPV - bonus of 0,25 EUR.	20 years	Revised every year in line with inflation
Germany	Rooftop systems < 30 kW = 0,4675 EUR. Larger systems receive lower tariffs Façade integrated systems - bonus of 0,05 EUR. Rooftop systems > 1 MW to be added.	20 years	Currently drop by 5 % each year. From 2009 decease will be 8-10% per year
Korea	677,38 KRW for systems > 30 kW 711,25 KRW for smaller systems	15 years for systems > 3 kW	Cap of 100 MW post October 2006 installations
Spain	Systems < 100 kW = 0,440381 EUR Systems > 100 kW = 0,229764 EUR		Revised scheme: BIPV = 0,44 EUR/kWh for ≤ 20 kW 0,39 EUR for 21 kW to 200 kW 0,33 EUR > 200 kW Free-standing installations of any size can earn 0,31 EUR

Source: IEA-PVPS (2008)

The ACT Government has introduced a gross FiT[19] of 3.88x the customer's tariff, with the aim of ensuring a system cost payback time of 10 years (ACT, 2008). This is the first tariff that is equivalent to the very successful models used in countries like Germany and Spain (EPIA, 2005, UK Carbon Trust, 2006, European Commission, 2006), so will be watched with interest across Australia, especially as it follows significant market slowdown in some regions after introduction of means testing for the PV rebate. Alice Springs Solar City has also introduced a gross FiT, set at 45 c/kWh, with annual payments restricted to the equivalent of output from a 2 kW system. South Australia, Queensland and Victoria have recently introduced net export FiTs[19] of 44 c/kWh (SA, QLD) and 60 c/kWh (Vic). The latter schemes rely on the PV rebate providing the main driver and small systems will have little export unless loads are very low.

The Commonwealth Government is undertaking a FiT review, with the stated aim of ensuring uniform schemes across Australia. This may mean a net export model. However, the schemes

[19] A gross FiT is paid on all electricity generated by the system. A net export FiT is paid only on electricity exported to the grid.

that have worked best internationally have been on gross generation and the PV industry is working hard to convince the Government to adopt this approach. A decision is likely to be made at the October COAG meeting.

As stated above, as part of its election platform, the WA Liberal Party promised a FiT for residential systems (Liberal, 2008). At this stage a number of the design features are yet to be addressed. These include:

i) whether the FiT is based on gross or net export[20]

ii) the lifetime of the scheme,

iii) whether the number of systems is capped each year,

iv) whether the tariffs offered to new systems are fixed, or decrease over time,

v) whether the scheme applies to all systems or only to new or extended systems.

Options for these design features, and their consequences, are discussed in the following section. A gross FiT is preferred to a net export FiT because there is no reason to distinguish between electricity exported to the grid and electricity used on-site, and a gross FiT provides greater financial returns as well as greater certainty of what those returns will be, as well as greater certainty of the costs of the scheme.

The Liberal Party's policy statement also stated that a FiT for small-scale commercial PV systems will be investigated. Given that PV output matches the commercial load profile very well and so should help support networks that service commercial areas, the electricity produced is likely to have higher value than that produced by residential systems. Businesses are also ineligible for the Solar Homes and Communities program, making a decent FiT even more important for a PV system to be financially viable. They could also potentially install larger renewable energy systems and thus make a more significant contribution to RE growth in WA.

4.2.1 FiT design features

As for any financially-based measure, the design of a FiT is critical to its success. The following briefly summarises some desirable characteristics of a FiT suitable for residential-scale distributed generation (DG) systems such as PV and micro-wind turbines. These design features are summarised in Table III.

Size of FiT:

The size of the FiT should be determined by the rate of uptake to be achieved and what other financial support is available. In general, the rate is calculated so that investors achieve at least a payback on their system cost within the period a FiT is available. In Germany and Spain the tariffs have been set such that investors actually get a good rate of return, not just cost payback. Given the recent changes to the Solar Homes and Communities (renamed from the PVRP), which has seen demand for PV systems drop significantly, a reasonably high FiT for PV would seem justified.

[20] A gross FiT is paid on all electricity generated by the system. A net export FiT is paid only on electricity exported to the grid.

Timeframe:

In order to create market certainty, attract investment and deliver meaningful economic and environmental dividends, a FiT should guarantee payment to the system owner for the time required to pay off the system, and the programme should run for minimum of 15 years (meaning systems installed in year 15 will still earn a FiT for long enough to pay off the system).

Reducing tariffs:

The FiT should be fixed only for the systems installed in any one year and can be changed for the systems installed in successive years. A predetermined system of reducing FiT price "tiers" over the scheme timeframe can provide predictability for investors and a known expense for government. The FiT for installations in successive years could decrease by say 5% per annum to capture and encourage cost reduction potential as the industry moves down the cost learning curve. This reduces profiteering and ensures the scheme drives cost reduction. It also ensures an end date.

Payment on generation:

The FiT should be paid on all electricity generated by the system and should be independent of the standard electricity tariff. Distributed generation provides value to the network in terms of offsetting conventional generation (and greenhouse gases), reducing line losses and possibly deferring network augmentation. These values are the same whether the electricity is used on-site by the system owner or exported to the grid and used by their neighbours. Thus there is no reason to discriminate between the two through the use of a FiT based only on net export to the grid. Use of a gross generation FiT also simplifies calculation of FiT payments, which provides certainty for both system owners and government. Under a net export FiT, customers have little scope to predict their likely FiT earnings, unless they have had time-of-use metering records for some years.

New installations only:

Ideally, to maximise new deployment, and to facilitate the introduction of standard metering arrangements, the FiT should be provided to new and extended installations only, where the latter receive the FiT only for the extension. This may cause political problems and, if current levels of uptake are low, and as a result the extra cost is not significant, it may be politically easier to allow the FiT to apply to existing installations as well. An interval meter with at least 2 channels should be used so as to enable metering of total generation.

Guaranteed connection and purchase:

Electricity retailers and network providers should guarantee that DG systems which comply with technical connection requirements imposed by Australian Standards and State or Territory regulators will be connected and all their generation purchased. At present, WA has the most restrictive connection processing arrangements in Australia.

Grid-connection agreements:

The application and approval processes for connection of DG systems to the grid should be streamlined. Ideally the FiT arrangements should be incorporated directly into this process.

Monitoring:

Some form of monitoring/assessment program should be incorporated into any FiT program to:

(i) assess DG's contribution to total generation and during times of peak demand,

(ii) collect demographic energy information, and

(iii) assess take-up rates, drivers, significant price points, customer preferences and any issues arising.

Table III Desirable FiT Design Features

Feature & Description
Size of tariff The tariff should be set so that at the end of it's warranty period, a system at least pays for a replacement, including connection costs. The tariff should be separate to the prevailing retail tariff so that energy market signals are not compromised and the value of the FiT is not eroded as electricity tariffs increase.
Timeframe A FiT should guarantee payment to the system owner for the time required to pay off the system, and the programme should run for a minimum of 15 years.
Reducing tariffs The FiT should be fixed only for the systems installed in any one year and can be changed for the systems installed in successive years to drive cost reductions, and to account for the rate of uptake in the previous year as well as other factors such as changing electricity prices.
Payment on generation The FiT should be paid on all electricity generated by the system because there is no reason to distinguish between electricity exported to the grid and electricity used on-site. Such a FiT provides greater financial returns and greater certainty of what those returns will be, as well as greater certainty regarding the costs of the scheme.
New installations If the availability of the FiT is in some way limited, then to maximise new deployment, and to facilitate standard metering arrangements, the FiT should be provided to new and extended installations only. Where systems have been installed with no previous government support, there may be some justification for FiT eligibility.
Guaranteed connection and purchase Retailers and network providers should guarantee that systems which comply with technical connection requirements will be connected and all their generation purchased.
Grid connection agreements The application and approval processes for connection of DG systems to the grid should be streamlined, with the FiT arrangements incorporated directly into this process.
Monitoring Some form of monitoring/assessment program should be incorporated into any FiT program.

4.3 *Development of Community Support*

The key requirement to gaining support for renewables from governments and the energy sector is community support. Without this, the status quo will be maintained and existing, mostly fossil fuel energy sources, will continue to be supported. The public is generally in favour of increased deployment of renewables but largely distanced from the decisionmaking required for this to occur. Opportunities for increased community awareness will come from the Perth Solar City, the Solar Schools and other programs. Nevertheless, the general community remains largely ignorant of renewable energy technologies, costs, availability or performance.

In the past, Energy Information Centres have provided a valuable service in this regard. A 'virtual' energy information centre is to be developed by the Commonwealth Government, based on information currently hosted by the Australian Greenhouse Office. This could be built on at State and Local Government levels, or in community centres and public events. Large-scale community uptake of technologies such as solar water heaters, residential PV and GreenPower may encourage Governments and utilities to increase their own uptake.

4.4 *Development of the Commercial and Small Industry Market for Renewables*

Many of the support programs for renewables currently target households or communities. This tends to drive small-scale systems and technologies, yet international markets have been driven more effectively by development of commercial and small industry markets servicing CBD businesses, governments, farms and light industry. These sectors allow for larger-scale developments and hence provide the volume sales necessary for cost decreases and industry establishment.

Internationally, a range of approaches have been used successfully, including enhanced FiTs, tax incentives and targeted grant programs. These have often been accompanied by manufacturing incentives to encourage local production, which in turn facilitates local uptake.

WA has a booming business sector at present, which could provide a ready focus for new deployment strategies.

4.5 *Removal of institutional barriers*

Support to reduce the relative cost of renewables, such as through a FiT, is not the only requirement for successful development of markets for new technologies. Technologies, techniques, standards and guidelines are need for technical integration into existing energy systems; education is needed for consumers, electricity industry personnel, electricians, builders and local and State government planners; entire support infrastructures must be developed to ensure timely and cost-effective installations and after-sales servicing.

Although the process for connection to the grid is now improving, there is still scope for streamlining the meter installation process to avoid unnecessary work for PV installers. In addition, the PV system owner has to pay for the cost of an appropriate meter. This could be avoided if, as is now occurring as standard practice in many parts of Australia, smart meters are installed in WA (as long as they are compatible with the use of a PV system). Some Local Governments require development applications, which can add significant cost and time

delays to the installation process. For systems meetings Australian standards and installed by accredited personnel, development applications should not be required.

The implications of inadequate attention to these issues can clearly be seen in the backlash against wind developments, the high integration costs charged for many solar water heater and PV systems, the litigation for loss of solar access for expensive PV systems which is now increasing, and the failure of many remote area power systems.

Any program aimed at increasing uptake rates of renewables must include these components as an integral part of the overall planning and expenditure.

5 Conclusions

Electricity prices in WA are set to increase significantly over the coming decade, while recent oil price increases and gas disruptions have highlighted the problems with high levels of dependence on any one energy source. There are therefore increasing opportunities for renewable energy deployment in WA, with good resource bases for wind and solar technologies, regional opportunities for small hydro and bioenergy, and prospects for wave and tidal power in future. The following summarises the main findings of this report.

Benefits of an expanded renewable energy sector

The development of a robust renewable energy sector in WA will:

a. add resilience and supply security to WA's energy supply
b. decrease diesel import costs
c. provide a range of new business and employment opportunities, and
d. result in lower prices in the longer term, as carbon prices are factored in.

The Renewable Energy Target

The planned increase in the Renewable Energy Target will boost larger-scale developments, with REC prices bridging the cost differences between renewables and fossil fuels over the next two decades, by which time price parity will be reached for many renewable technologies. Nevertheless, the RET is under severe pressure at present so that the WA community and State Government must actively support it if the planned extension is to go ahead.

Solar Homes and Communities (was **PVRP) and RRPGP**

These grant programs will provide valuable support over the next two years, but may not be extended after that. In the absence of a FiT, this would have a significant impact because they cover at least half of the up-front cost of PV.

Feed-in Tariffs

Throughout Australia, FiTs are being implemented in a range of formats. Serious consideration is now being given to the use of FiTs to replace grant-based support for small-scale renewables. There are good reasons for WA in particular to pursue this option, because of the high reliance on diesel in its regional grid networks, as well as the increased generation capacity required to meet rising demand. The current proposal by the WA Liberal Party is certainly a step in the right direction, although the design details are yet to be clarified. Our recommendations for FiT design are given in Table III.

The commercial and industrial sectors should be targeted

Strategies to develop renewable energy uptake in all sectors must be considered, rather than a heavy reliance on the residential sector alone. Hence programs targeting the commercial and industrial sectors should be developed. For example, the proposed FiT should be available to

small commercial systems because they do not have access to the same grants that residential systems do, their output is likely to better match the local network load, and commercial installations are likely to be larger than the average residential system – providing more of a boost to local industry

Solar Water Heaters

Support for solar water heaters is still available through State and Commonwealth grants, but should increasingly be built into local and State government building codes. Pro-active councils should work with others to progress this transition, perhaps through the Cities for Climate Protection Program.

Community Support

Community support and an active interest in renewable energy uptake is essential for governments to change current energy sector investment strategies and support.

A price signal is not enough

A range of issues face increased adoption of renewables. These include the need for standardised, straightforward and low-cost grid integration procedures for distributed generation systems; extensive training and certification processes and opportunities for the range of new skills required; straightforward local government development and planning processes, including solar access guarantees; as well as development of new grid management strategies to deal with increased diversity of generating sources and technologies on the grid, with their associated range of generating profiles and intermittency issues.

For long term progress, WA should pursue the many new research and development funding opportunities now available and develop research capability in key areas relevant to WA conditions.

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