



Report No. 4 Environment and Resources Committee

May 2011



Growing Queensland's Renewable Energy Electricity Sector

GROWING QUEENSLAND'S RENEWABLE ENERGY ELECTRICITY SECTOR

Environment and Resources Committee of the 53rd Parliament

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Note: * On 15 February 2011, the House agreed to a motion moved by the Leader of the House that Mr Simon Finn MP, Member for Yeerongpilly, be discharged from the committee and that Hon Curtis Pitt MP, Member for Mulgrave, be appointed to the committee. Mr Finn had been a member of the committee since it was established on 23 April 2009.

Mr Pitt was appointed Minister for Disability Services, Mental Health and Aboriginal and Torres Strait Islander Partnerships on 21 February, and was discharged from the Environment and Resources Committee on 8 March 2011.

This report is available from the committee's website: www.parliament.qld.gov.au/erc

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Cover: Queensland's first 150 kilowatt solar farm was officially opened at the remote south-west Queensland town of Windorah in October 2009. The solar farm aims to reduce the town's reliance on diesel fuel, and therefore cut greenhouse gas emissions by approximately 300 tonnes a year. (Image courtesy of Solar Systems Pty Ltd)

FOREWORD

On a per capita basis, Australia produces more greenhouse gases than any other country. In fact, around 30 per cent of the nation's greenhouse gas emissions come from just one state, Queensland. This is a shocking statistic when you consider that Queenslanders only account for around a fifth of the nation's population.

The longer we delay acting to cut our greenhouse gas emissions, the more we are risking the future of our ecosystems, industries and communities. One of the most important areas to address is how we use energy. As our standard of living and quality of life have risen, so has our appetite for energy. We enjoy some of the cheapest electricity in the world, and Queensland electricity prices are among the nation's lowest. However, prices are certain to rise as long as demand for electricity grows and pressure on the network continues to spiral.

We are far too casual about electricity usage in our daily lives, and where that electricity comes from. At least four of every five hours of electricity that lights, heats, cools and powers our homes and businesses every day, comes from a coal-fired power station. This heavy reliance on the burning of coal is unsustainable. On a positive note, Queenslanders are also among the nation's strongest supporters of GreenPower.

The committee considers planning to meet more of Queensland's future electricity needs from renewable energy to be extremely important for the state's future. Switching to renewable energy sources will ensure that vital cuts to greenhouse gas emissions are achieved. The other key is using energy more efficiently with less wastage. **The greenest watt of electricity will always be the watt you don't have to produce.**

This report presents our findings from an inquiry that examined opportunities to grow a stronger renewable electricity generation sector. We have consciously avoided attempting to pick the winning technologies. Instead, we have recommended mechanisms that would allow market forces to shape the future and provide the right environment and infrastructure to support renewable energy sources.

I would like to acknowledge the invaluable assistance we received from the submitters, witnesses and other experts who shared their ideas with us in the course of this inquiry. I also thank my colleagues and the staff of the Environment and Resources Committee for their dedication during the inquiry and for helping to produce this report.

I commend this report to the House.



Carryn Sullivan MP
Chair

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RECOMMENDATIONS

Recommendation 1:

That the Queensland Government should encourage the Federal Government, through the Ministerial Council on Energy, to finalise the form of its proposed carbon price mechanism as soon as possible.

Minister responsible: Minister for Energy and Water Utilities

Recommendation 2:

That the government should continue to pursue energy efficiency improvements and efforts to minimise energy wastage as a priority to achieve GHG abatement targets.

Minister responsible: Minister for Energy and Water Utilities

Recommendation 3:

That the government should increase the prescribed percentage for the proportion of electricity to be sourced from gas-fired generation under the Queensland Gas Scheme to 20 per cent by 2020.

Minister responsible: Minister for Energy and Water Utilities

Recommendation 4:

That the government should set an aspirational target for Queensland of 20 per cent of the state's electricity needs to be generated from renewable energy sources by 2020, consistent with the Federal Government's national renewable energy target.

Minister responsible: Minister for Energy and Water Utilities

Recommendation 5:

As a further Queensland target, the government should aim to replace diesel generators with renewable energy systems as the primary source of electricity in all the state's remote Indigenous communities by 2020.

Minister responsible: Minister for Energy and Water Utilities

Recommendation 6:

That the government should consider options to mandate that GreenPower be used for recharging electric vehicles used on Queensland roads.

Minister responsible: Minister for Energy and Water Utilities

Recommendation 7:

That the government should review the existing net feed in tariff scheme for small scale solar photovoltaic installations to ensure the scheme provides appropriate outcomes for electricity consumers and promotes better, more efficient use of energy. This review should consider: the cost of the feed in tariff scheme to electricity consumers; whether the feed in tariff should be extended to other renewable energy technologies as well as solar photovoltaic systems larger than 10 KW; whether the tariffs should be reviewed and adjusted on an annual basis; and the specific tariff rates that should apply.

Minister responsible: Minister for Energy and Water Utilities

Recommendation 8:

That the government, through the Ministerial Council on Energy, should seek the establishment of a uniform, national feed in tariff regime for renewable energy generators.

Minister responsible: Minister for Energy and Water Utilities

Recommendation 9:

That the government should legislate to provide certainty to current and future participants of feed in tariff schemes and confirm that arrangements for existing scheme participants are grandfathered in the event of alterations to the scheme.

Minister responsible: Minister for Energy and Water Utilities

Recommendation 10:

That the government should consider whether upfront subsidies or interest free loans may provide electricity customers with greater incentives to participate in the renewable energy market than the current feed in tariff.

Minister responsible: Minister for Energy and Water Utilities

Recommendation 11:

That the government should examine the benefits and feasibility of allowing open tendering by renewable energy generators for long-term electricity supply contracts for government departments, buildings and other infrastructure.

Minister responsible: Minister for Energy and Water Utilities

Recommendation 12:

That the government should consider providing support for renters to purchase GreenPower by providing subsidies based on the Brisbane City Council EzyGreen scheme.

Minister responsible: Minister for Energy and Water Utilities

Recommendation 13:

That the government should consider a scheme to mandate the purchase of GreenPower by households to offset the electricity consumed by pool pumps and air conditioners.

Minister responsible: Minister for Energy and Water Utilities

Recommendation 14:

That the government provides the Parliament with a statement of the objectives, outcomes and value for money achieved from its renewable energy projects and initiatives.

Minister responsible: Minister for Energy and Water Utilities

ABBREVIATIONS

BAU	Business as usual
COAG	Council of Australian Governments
CCS	Carbon capture and storage
CSO	Community Service Obligation
EV	Electric vehicle
FiT	Feed-in tariff
GHG	Greenhouse gas
GW	One billion watts
KW	Kilowatt (one thousand watts)
KWh	Kilowatt-hour, a measure of electrical output
LRET	Large-scale Renewable Energy Target
MW	Megawatt (one million watts)
MRET	Mandatory Renewable Energy Target
PPA	Power purchase agreement
PPM	Parts per million
PV	Photovoltaic
RE	Renewable energy
REC	Renewable Energy Certificate
REE	Renewable energy electricity
RET	Renewable Energy Target
RPS	Renewable portfolio standards
SRET	Small-scale Renewable Energy Target
TWh	Terawatt-hour (one billion KWh)
W	Watt, a measure of electrical capacity

PART 1: INTRODUCTION

The Environment and Resources Committee

1. The Legislative Assembly appointed the Environment and Resources Committee on 23 April 2009 to monitor and report on issues in the policy areas of environmental protection, climate change, land management, water security and energy.¹ The motion agreed by the Assembly provided that the committee may:
 - investigate any matter referred to it by separate resolution of the Legislative Assembly;
 - investigate its own inquiries into legislative and policy issues with respect to the policy areas allocated to it. However, in carrying out its functions, the committee must give priority to those matters referred to it by any separate resolution of the Assembly; and
 - seek information from ministers of the Crown, directors-general of government departments, and commissioners and chief executive officers of statutory bodies, regarding current issues in the policy areas referred to it.

The inquiry

2. The committee's inquiry examined the opportunities and challenges for the Queensland Government associated with increasing the proportion of electricity generated from renewable energy (RE) sources. The inquiry focused on:
 - the value for money from the Queensland Government's investments in RE projects for electricity generation;
 - whether the Queensland Government should adopt a target for increasing the proportion of the state's electricity generated from RE sources, and if so, what form the target should take; and
 - actions the Queensland Government should take to encourage investment by government-owned energy companies and the private sector in producing more electricity from RE sources.

Defining renewable energy electricity

3. The committee applied the Queensland Government's definition of 'renewable energy' for the inquiry which is:

... energy harvested from inexhaustible resources such as wind, tide, solar, biomass, geothermal and hydro energy as opposed to non-renewable energy from fossil fuels (eg coal, oil, natural gas, petroleum, and uranium for nuclear energy). Renewable energy sources are naturally replenishing.²
4. The committee considered opportunities to generate and co-generate³ electricity from all forms of renewable energy. Table 1 presents a summary of RE technology groupings, their reliability and indicative costs per megawatt hour (MWh) of electricity produced. The RE technologies that are being used, or are under consideration to produce electricity in Queensland, include hydro power, biomass,

¹ The full motion is reported in the Record of Proceedings, First Session of the 53rd Parliament, Thursday 23 April 2009 at http://www.parliament.qld.gov.au/view/legislativeAssembly/hansard/documents/2009.pdf/2009_04_23_WEEKLY.pdf.

² This definition is used by the Queensland Government in *The Queensland Renewable Energy Plan* (see Office of Clean Energy, Department of Employment, Economic Development and Innovation, *The Queensland Renewable Energy Plan*, 2009, p. 7, retrieved 10 December 2010 from <http://www.cleanenergy.qld.gov.au>).

³ 'Co-generation' or 'combined heat and power' are terms used to describe the joint production of heat (often in the form of steam) and power (usually electricity).

wind, photovoltaic, solar thermal, geothermal, wave/ocean power and co-generation.⁴

Table1: Renewable energy technologies, reliability and costs of electricity.

Technology	Description	Reliability	Cost of electricity (\$/MWh)*
Solar thermal energy	Concentrates solar radiation on to a receiver where it is converted into heat which can be used directly to boil a liquid to produce steam to drive turbines. This includes: hot water, chimneys, ponds, parabolic troughs and dishes, towers and photovoltaics.	Medium-high, intermittent	135-185 (60)
Solar chimneys	Harness energy from hot air. Solar radiation heats air under a large translucent canopy. The heated air rises through a very tall hollow structure – the chimney effect causes a continuous thermal updraft and drives turbines to generate electricity.	Medium-high, intermittent	
Solar ponds	Solar radiation enters a salt water pond several metres deep. The heat up to 80 deg C is stored in the lower layer of water. Low grade heat is available around the clock for heating applications – can be used with a Stirling engine to produce electricity.		
Parabolic troughs, dishes and Fresnel collectors	Long trough shaped mirrors are used to concentrate and reflect sunlight onto a horizontal tube above each mirror that is filled with fluid. The heated fluid turns to steam which drives a central turbine. Fresnel collectors are a variation and have a number of curved mirrors to focus sunlight onto a single collector tube.		
Solar photovoltaics	Photovoltaic (PV) technology transforms the energy of sunlight (solar photons) into direct electric current using semiconductor material.	Medium-high, intermittent	180-220
Geothermal energy	Involves tapping the energy within the Earth's crust using an aquifer or hot rocks. In parts of Australia, hot fractured rocks (HFR) occur within five kilometres of the surface at temperatures of 250 degrees C or higher. Water is pumped into the hot rocks and extracted as high pressure steam to run conventional steam turbine generators. Preliminary surveys by Geoscience Australia suggest a potential HFR resource equivalent to 26,000 years of Australia's energy use at 2005 levels. ⁵	Aquifer - high Hot rocks – high	1.40-1.70 (1.40-1.70) 50-60 (50-60)
Wind energy	Wind turbines operate on a simple principle that is effectively the opposite of an electric fan. Turbines may rotate about a horizontal or vertical axis. Horizontal axis turbines mounted on towers are more common.	Low, intermittent	70 (40-45)
Tidal power	Can be generated either from the energy contained in the water due to the difference in height between low and high tide, or from the energy of strong tidal currents that occur in narrow passages as the tide rises and or falls. A tidal range of at least 5 metres is needed for large installations.	High, intermittent	410
Wave energy	Wave energy systems use the swell that occurs in deeper coastal waters.	Medium-high	50/50
Marine currents	Harness the energy in marine currents using rotors. Marine currents represent a major potential energy resource, although deep water construction and connection to a grid from remote ocean installations may present a significant cost barrier.		
Thermal layering	This technology, still in developmental stages, uses the differences in water temperature at different depths to heat and cool a fluid such as ammonia and create sufficient gas pressure to drive a turbine to produce electricity.		
Salt gradients	Still at the theoretical state, salt gradient technologies utilise a membrane to separate salt and fresh water at river mouths and then harnesses the differences in potential energy in the water levels to drive a turbine.		
Hydro power	The largest exploited renewable energy source by far accounting for around 90 per cent of renewable energy production worldwide.		
Biomass (Bioenergy)	Covers the burning of plant material to produce heat and generate electricity. It also covers harvesting methane from the natural breakdown of organic material such as human or animal sewerage, municipal rubbish (landfill sites), and waste from food processing or biochemical processing. Bioenergy also covers biofuels such as ethanol and biodiesel made from sugarcane or other crops or animal fats.	High	80/50

Note*: The second cost in brackets where is an estimate of future cost.

Source: Based on information in S Needham, *Renewable Technologies Update*, Department of Parliamentary Services, Parliament of Australia, Canberra, 2009.

- Most RE electricity (REE) generators harness kinetic energy as in wind or water driven turbines, or indirectly as steam heated by a renewable energy heat source or fuel stock, to spin a rotary generator which produces electricity. Solar photovoltaic

⁴ Fact sheets on these technologies are available from the Clean Energy Council at <http://www.cleanenergycouncil.org.au>.

⁵ BA Goldstein, AJ Hill, AR Budd, FL Holgate and M Malazos, 'The national outlook – Australia's hot rocks', proceedings of the Sir Mark Oliphant International Frontiers of Science and Technology Australian Geothermal Energy Conference, Geoscience Australia Record 2008/18, 2008, p. 13.

(PV) cells produce electricity directly. The committee has considered grid connected systems designed to export electricity back to the grid as well as stand-alone, off grid systems.

6. Solar water heating and other uses of RE that produce no electricity are outside the scope of this inquiry and have not been considered.

Inquiry process

7. To provide background information for the inquiry and encourage submissions, the committee published and distributed an issues paper, *Issues paper No. 2: Growing Queensland's Renewable Energy Electricity Sector*.
8. The committee invited submissions from Australian governments, renewable energy companies, electricity generators and retailers as well as peak business, industry and community organisations. To encourage submissions from other stakeholders, the committee advertised the inquiry through *Queensland Country Life* on 3 June 2010, and through the Queensland Government's *Consult Queensland* website. A list of groups and individuals who provided written submissions is at Appendix A.
9. The committee received expert briefings throughout the inquiry. A list of groups and individuals who provided these briefings is at Appendix B.
10. The committee held public hearings in the Parliamentary Annexe in Brisbane on 26 July and 17 September 2010. A list of witnesses who gave evidence is at Appendix C.
11. As part of its research, the committee sought information from other state governments on their policies to support REE. The table at Appendix D summarises the information received.

Responsibility of Ministers

12. This report makes recommendations for the Queensland Government to implement. Section 107 of the *Parliament of Queensland Act 2001* requires the responsible ministers to respond to these recommendations within three to six months of this report being tabled. A copy of this section of the Act is included in this report at Appendix E.

PART 2: CONTEXT FOR THE INQUIRY

13. This inquiry complements the committee's first inquiry into energy efficiency improvements completed in February 2010. From that work, the committee identified the enormous potential for Queensland households, businesses and industry to realise savings in energy costs and associated greenhouse emissions through energy efficiency improvements.
14. The following section discusses key issues that impact on the role of renewable energy in the state's electricity market.

Climate change and energy

15. In Australia, the push for greater use of renewable energy sources to produce electricity is being driven predominantly by concerns about climate change.
16. There is a growing body of scientific evidence of the global climate change⁶ risks posed by accumulated carbon emissions in the atmosphere and the flow-on affects on weather patterns, sea and land temperatures, rainfall and ecosystems. The Intergovernmental Panel of Climate Change (IPCC), established by the United Nations Environment Programme (UNEP) and the World Meteorological Organisation (WMO), have concluded that:⁷

...warming of the climate system is unequivocal and that there is a higher than 90 per cent chance that it is due to human activities.
17. On a per capita basis, Australia produced more greenhouse gas (GHG) emissions than any other country. Figure 1⁸ from a World Bank report compares Australia's emissions with emissions from 38 other nations including the United States, China and India.
18. Despite having only 20 per cent of Australia's population, Queensland is responsible for 30 per cent of the nation's GHG emissions, and has the highest per capita emissions of any state.⁹ In 2007 more than half (54 per cent) of the GHGs emitted in Queensland were from the energy sector. The quantity of these emissions has almost doubled (growing more than 94 per cent) since 1990.

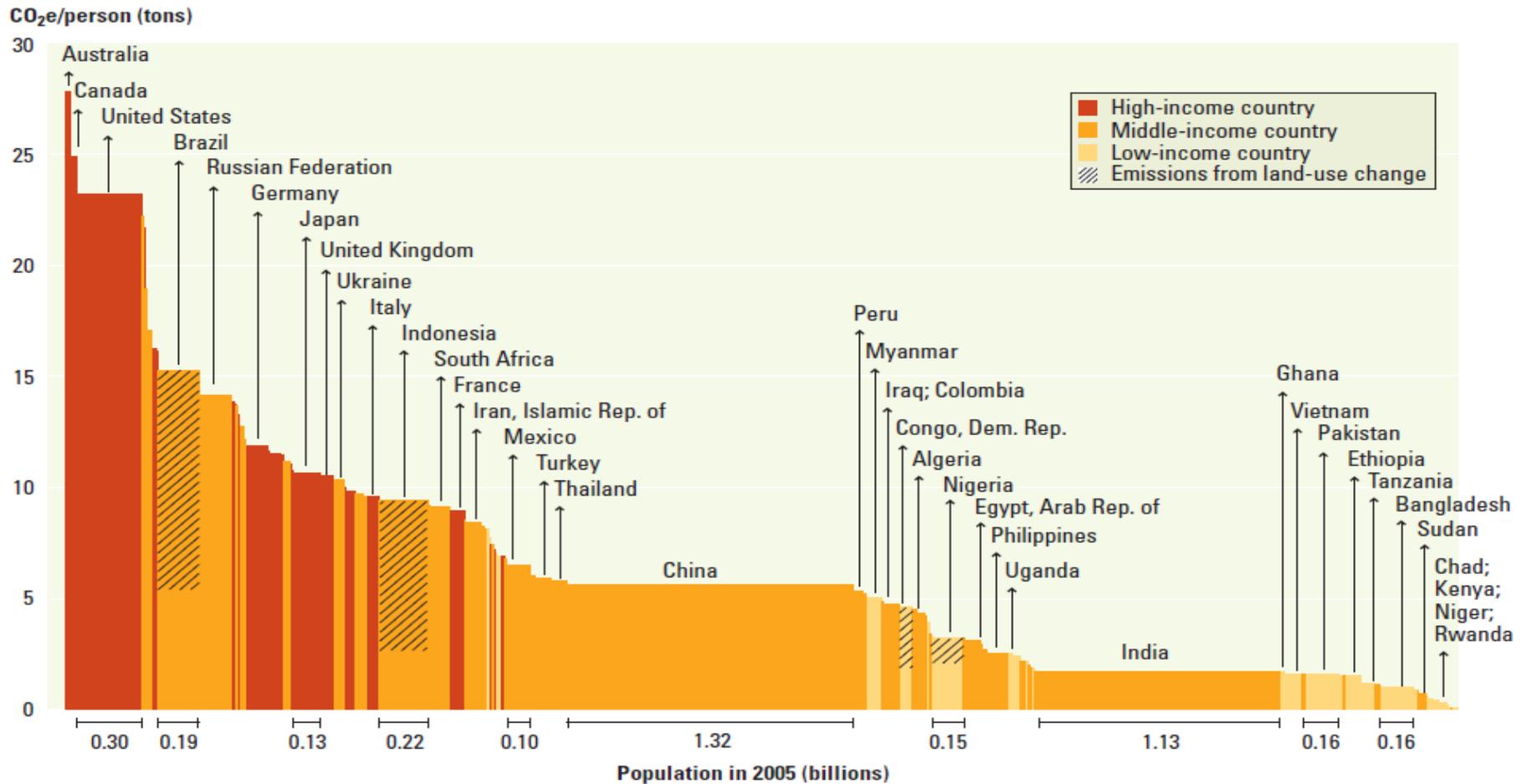
⁶ The United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as '...a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods.' Climate change is also often referred to as global warming. See UNFCCC fact sheet http://unfccc.int/press/fact_sheets/items/4987.php.

⁷ RK Pachauri and A Reisinger (eds.) [Core Writing Team], IPCC, *Climate Change 2007: Synthesis Report*, Contribution of Working Groups I, II and III to the Fourth Assessment Report of the IPCC, Geneva, Switzerland, 2007, p. 30.

⁸ Cited in R Garnaut, *Progress towards effective global action on climate change – Update Paper 2*, Garnaut Climate Change Review Update, Department of Climate Change and Energy Efficiency, Canberra, 2011, p. 18.

⁹ Department of the Premier and Cabinet, *Towards Q2: Tomorrow's Queensland*, Brisbane, 2008, p. 22.

Figure 1: Comparative greenhouse gas emissions per capita, 2005



Sources: Emissions of greenhouse gases in 2005 from WRI 2008, augmented with land-use change emissions from Houghton 2009; population from World Bank 2009c.

Note: The width of each column depicts population and the height depicts per capita emissions, so the area represents total emissions. Per capita emissions of Qatar (55.5 tons of carbon dioxide equivalent per capita), UAE (38.8), and Bahrain (25.4)—greater than the height of the y-axis—are not shown. Among the larger countries, Brazil, Indonesia, the Democratic Republic of Congo, and Nigeria have low energy-related emissions but significant emissions from land-use change; therefore, the share from land-use change is indicated by the hatching.

Source: World Bank, *World Development Report*, Washington DC, 2011, p. 39.

19. Australia is vulnerable to the risks of climate change. On current trends, average temperatures in Australia are predicted to rise by between 0.6°C and 1.5°C by 2030.
20. Queensland is particularly vulnerable to the risks of climate change with higher predicted temperature increases of between 1°C and 2.2°C and the likelihood of:
 - more days that experience temperatures over 35°C;¹⁰
 - an increase in the frequency, intensity, variability and southern extension of storms;
 - a rise in sea levels of around 50 centimetres by 2070;
 - changes in rainfall patterns with more rain in the north and less rain in Southern Queensland;
 - a rise in temperatures in South East Queensland of between 0.5°C and 1.5°C by 2030; and
 - a significant loss of biodiversity. An increase of just 1.0°C could lead to the loss of half of the high-altitude Wet Tropics rainforest. A 2.0°C increase in average sea temperatures is predicted to lead to annual bleaching of up to 97 per cent of the Great Barrier Reef.¹¹
21. Despite some uncertainties, there is general scientific and political agreement that global GHG emission levels need to stabilise at atmospheric concentrations between 450 and 500 parts per million to avoid serious, if not catastrophic, effects on life and property.¹² To achieve this, the level of global GHG emissions needs to peak by 2015 and decline sharply thereafter to avoid warming of the planet that exceeds 2.5°C above pre-industrial levels.¹³

Government responses to climate change

22. Governments around the world have committed to aggressive policy reforms to address climate change risks, including reductions in carbon emissions from their energy sectors. Between 50 and 80 per cent of the reductions in GHG emissions to mitigate the climate change risks need to come from energy supply and use.¹⁴
23. In 2007, the Federal Government ratified the Kyoto protocol¹⁵ and committed to limiting the rate of growth of the nation's greenhouse gas emissions for the years 2008-2012. It also committed to a long term goal of reducing Australia's emissions by 60 per cent by the year 2050. To achieve these cuts, the federal, state and territory governments agreed to develop a set of climate change measures to complement a national emissions trading scheme, and to expand the renewable energy sector.

¹⁰ Department of Environment and Resource Management, *Climate Change in Queensland: What the Science is Telling Us*, Office of Climate Change, Brisbane, 2010, pp.27-36.

¹¹ Australian Academy of Science, *The Science of Climate Change: Questions and Answers*, Canberra, August 2010, p.14.

¹² Other studies suggest atmospheric CO₂ levels such as a maximum of 350 ppm or lower will be needed in order to prevent irreversible, dangerous climate change. They also warn that, if there is an extended overshoot of that target there is a possibility of generating irreversible catastrophic effects. J. Hansen, M. Sato, P. Kharecha, D. Beerling, R. Berner, V. Masson-Delmotte, M. Pagani, M. Raymo, D. L. Royer, J. C. Zachos NASA GISS, Columbia Univ. Earth Institute, Univ. Sheffield, Yale Univ., LSCE/IPSL, Boston Univ., Wesleyan Univ., Univ. California Santa Cruz.

¹³ Office of Climate Change, *International response to climate change*, Factsheet, Department of Environment and Resource Management, Brisbane, October 2010.

¹⁴ RK Pachauri and A Reisinger (eds.) [Core Writing Team], Intergovernmental Panel of Climate Change, *Climate Change 2007: Synthesis Report, Summary for Policy Makers*, United Nations Environment Programme, Geneva, Switzerland, 2007.

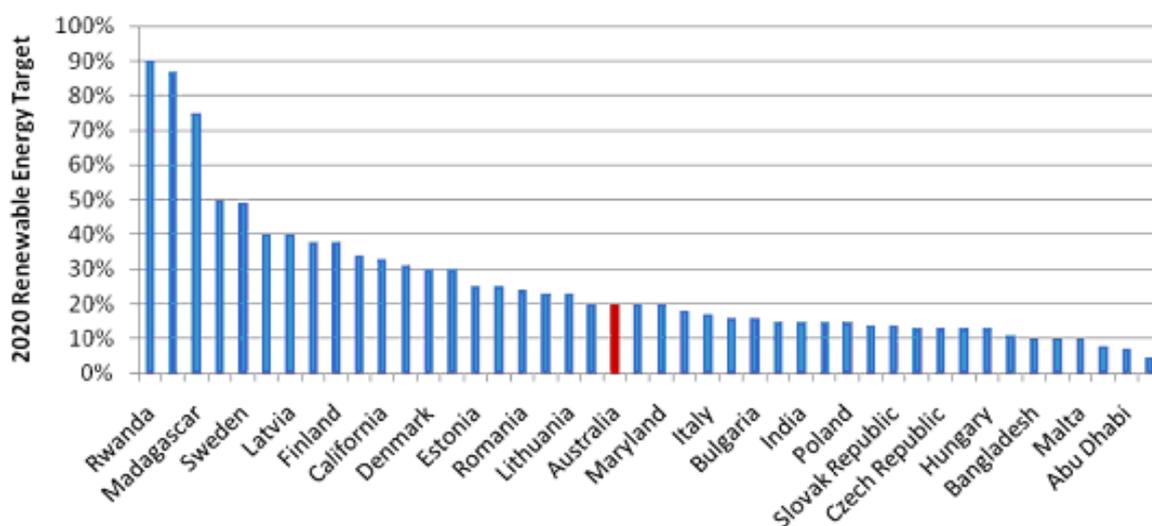
¹⁵ The Kyoto protocol was written in 1997. Australia was the 176th country to ratify the agreement. By the beginning of 2011, a total of 191 countries had ratified the agreement. The United States have signed the agreement but not ratified it.

24. The committee examined the first key strategy, improving energy efficiency, in its previous inquiry. The report from that work, *Report No.2 Energy Efficiency: Queensland's First Energy Resource*, acknowledged the importance of investing in energy efficiency ahead of other GHG abatement opportunities such as renewable energy. Energy efficiency improvements offer the lowest cost options, sometimes at nil or negative net costs to the economy, to reduce GHG emissions.
25. Investing in RE is the second key strategy to reduce the energy intensity and cut GHG emissions from the electricity sector.

The Federal Government's Renewable Energy Target Scheme

26. The principal policy to expand the use of RE to generate electricity In Australia is the Federal Government's Renewable Energy Target (RET) scheme. Established in August 2009, the RET scheme was designed to deliver on the government's commitment to achieving a 20 per cent share of renewables in Australia's electricity supply by 2020. The 20 per cent target is modest by international standards. Figure 2 lists the equivalent renewable energy electricity targets for a selection of countries including Australia.

Figure 2: 2020 renewable energy targets in selected jurisdictions



Source: Senate Economics Legislation Committee, *Renewable Energy (Electricity) Amendment Bill 2009* and a related bill [Provisions], 2010, p.10.

27. The RET scheme aims to stimulate \$12 billion of investment in renewable energy across Australia by 2020 by providing a financial incentive to renewable energy power stations and owners of solar water heaters and small generation unit installations (small-scale solar PV panels, wind and hydro electricity systems). This is through the creation and trading of renewable energy certificates (RECs) via the REC Registry. Each REC created from an eligible energy source can be sold for a negotiated price and transferred to liable parties (usually wholesale purchasers of electricity). The RET legislation:
 - placed a legal liability on wholesale purchasers of electricity to proportionally contribute to an additional 45,000 GWh of renewable energy per year by 2020; and
 - set the framework for both the supply and demand of RECs via a REC market.
28. In June 2010, the Federal Parliament passed the Renewable Energy (Electricity) Amendment Bill 2010 to significantly amend the RET scheme. The bill amended the *Renewable Energy (Electricity) Act 2000* to separate the RET scheme into two parts - the Large-scale Renewable Energy Target and the Small-scale Renewable Energy

Scheme. Changes to the RET scheme to preserve a component of RECs and funding support for large scale RE projects came into effect on 1 January 2011.

The Queensland Renewable Energy Plan

29. As a signatory to the Federal Government's RET scheme, the Queensland Government has sought to leverage \$3.5 billion of the \$12 billion investment pool offered for RE projects. The key strategy document for securing this investment and diversifying the state's stationary energy sector is *The Queensland Renewable Energy Plan* (QREP) launched in June 2009 and administered by the government's Office of Clean Energy.
30. According to the government, the primary objective of QREP is to increase the deployment of RE infrastructure in Queensland to create 3,500 jobs in renewable energy industries, generate 9,000 GWh or approximately 2,500 MW of Queensland-based renewable energy by 2020 and reduce GHG emissions by more than 40 million tonnes by 2020.¹⁶ The 2,500 MW output target in QREP is more than three times the current REE output for Queensland. The initiatives listed in QREP are:
- Queensland: The Solar Hot Water State – a Solar hot water program to accelerate the installation of up to 200,000 solar hot water systems over three years;
 - Solar thermal options for regional Queensland:
 - a) Multiple small-scale solar thermal plants – encourage the creation of consortia to deploy multiple solar thermal plants (of between 5-20 megawatts) throughout regional Queensland, and
 - b) Large-scale solar thermal feasibility study;
 - Queensland's hot dry rocks – investigate commencing a pilot geothermal project by 2014;
 - Renewable energy options for Queensland's Isolated Networks;
 - Government owned generators partnering with industry to identify renewable energy solutions;
 - *Clean Energy Communities*;
 - Best practice renewable energy regulation for Queensland;
 - Agricultural lease holders able to sublease to wind farms and other renewable energy technologies;
 - Resource mapping; and
 - Designate renewable energy as a Queensland priority Industry Sector, including:
 - a) *The Renewable Energy Jobs Policy* - up to 3,500 jobs by 2020,
 - b) Pilot renewable energy zones,
 - c) *Renewable Energy Incentives Package*, and
 - d) *Applying technology and innovation*.¹⁷

¹⁶ Department of Employment, Economic Development and Innovation, *Queensland Renewable Energy Report*, 2009, p.1.

¹⁷ DEEDI, 2009, pp. 19-27.

Pricing carbon emissions

31. In February 2011, the Federal Government announced a proposal to price carbon emissions in the economy to address climate change. If implemented, this proposal would have a profound impact on the cost of carbon intensive electricity and improve the attractiveness of renewable energy sources for generating electricity. While the details of the mechanism weren't included in the announcement, the Prime Minister did release a framework of principles outlining the mechanism's broad architecture. The eleven principles are: environmental effectiveness; economic efficiency; budget neutrality; competitiveness of Australian industries; energy security; investment certainty; fairness; flexibility; administrative simplicity; clear accountabilities; and supports Australia's international objectives and obligations. The mechanism could take effect as early as 1 July 2012, provided the Federal Parliament passes the legislation in 2012.¹⁸
32. The Federal Government also signalled its intention that funds collected through the proposed carbon price mechanism would be used to assist families with household bills, to help businesses make the transition to a clean energy economy and to tackle climate change.¹⁹
33. A number of submissions taken by the committee commented on the potential benefits of pricing carbon in the economy. The Queensland Resources Council (QRC) submission suggested that a clear, predictable and long-term carbon price signal will provide clear, predictable and long-term incentives to invest in low emissions technologies and abatement measures. The submission also noted that in both the global and domestic contexts, a carbon price alone (delivered via a tax or some form of market based trading), at least in its early implementation, is unlikely to be a sufficient policy response to tackle the array of national, sectoral and technology circumstances and challenges. In particular the QRC notes there will be the need to stimulate research, development and deployment (RD&D) beyond that which would be delivered by the private sector alone. They note that, even with a carbon price, proponents may still be unable to capture all the economic rent from their investments inhibiting a socially optimal level of investment in RD&D.²⁰
34. The Stanwell Corporation submission noted the importance of a carbon price to providing certainty for the private sector to attract investment. The submission notes that, without any future Australian carbon price, the mandatory RET scheme will be an insufficient incentive for large investment in new renewable technologies suitable for Queensland (for example solar). This is because the private sector is unable to manage the long-term policy risk in this area.²¹

¹⁸ Hon. J Gillard MP, Prime Minister of Australia and Hon G Combet MP, Minister for Climate Change and Energy Efficiency, *Climate Change Framework Announced*, joint media release, 24 February 2011, retrieved on 28 February 2011 from www.climatechange.gov.au.

¹⁹ Hon. J Gillard MP, Prime Minister of Australia and Hon G Combet MP, Minister for Climate Change and Energy Efficiency, *Climate Change Framework Announced*, joint media release, 24 February 2011, retrieved on 28 February 2011 from www.climatechange.gov.au.

²⁰ See, for example, DW Montgomery and AE Smith, *Price, Quantity and Technology Strategies for Climate Change Policy*, CRA International, 2005, at www.crai.com; and Queensland Resources Council, *Submission No.36*, 2010, p. 3.

²¹ Stanwell Corporation Limited, *Submission No. 46*, 2010, p. 3.

Committee view

35. There is a plethora of scientific evidence that emissions from the burning of fossil fuels to generate electricity are a key contributor to global warming and climate change risks. It is prudent and vital for governments to act to reduce greenhouse gas emissions to mitigate climate change risks. Cutting emissions from electricity generation, through energy efficiency improvements and switching to renewable energy sources, are central to meeting Australian and Queensland greenhouse gas abatement targets.
36. The Federal Government's RET scheme provides the central framework for expanding Australia's REE generating capacity to achieve greenhouse gas emissions in line with international obligations. The objectives of QREP are consistent with the Federal Government RET and, if fully implemented, could help to bring significant investment and employment to the state and its regional economies.
37. While the details have not been released, the Federal Government's proposal to implement a carbon price mechanism from July 2012 has the potential to provide further incentives to invest in low emissions technologies such as renewable energy and greenhouse gas abatement measures.
38. Until the details of the carbon price mechanism are finalised, the proponents of renewable energy projects and other energy projects in Australia will be plagued by continuing uncertainty. In our view, the Queensland Government should encourage the Federal Government, through the Ministerial Council on Energy, to move to finalise the form of its proposed carbon price mechanism as quickly as possible.

Recommendation 1:

That the Queensland Government should encourage the Federal Government, through the Ministerial Council on Energy, to finalise the form of its proposed carbon price mechanism as soon as possible.

Minister responsible: Minister for Energy and Water Utilities

PART 3: ELECTRICITY AND RENEWABLE ENERGY IN QUEENSLAND

The Queensland electricity market

39. Most of the 1.6 million residential customers and 200,000 business customers in the Queensland electricity market receive their electricity from the electricity grid.
40. The Queensland network, shown in Figure 3, comprises 6,500 km of transmission line and 176,000 km of distribution lines, and is the largest and most diverse component of the Australian National Electricity Market (NEM).²² As a consequence of the vast transmission distances, Queensland has the highest transmission losses²³ in Australia.²⁴
41. The NEM is the world's longest interconnected power system and spans a distance of around 5,000 km from Port Douglas in North Queensland to Port Lincoln in South Australia. The NEM is operated through a pool system where the output from all generators is aggregated and scheduled to meet demand. The system balances supply with demand, maintains reserve requirements, selects which components operate at any one time, determines the spot price and facilitates the financial settlement of the physical market.²⁵
42. Queensland is a net exporter of electricity to the national grid, principally to New South Wales consumers. In 2009, Queensland generators exported 4.7 terawatt hours (TWh) of electricity which represented 12-13 per cent of total Queensland generation output that year.²⁶
43. Approximately 81 per cent of Queensland's electricity is produced from coal-fired power stations²⁷, located mainly in central and southern parts of the state. Since 2000, Queensland has seen significant investment in efficient coal-fired generators utilising supercritical boiler technology. Seven out of the top ten lowest emission coal-fired generators in the NEM are now in Queensland.²⁸ Gas-fired generators also produce a significant component of the state's electricity needs. Under the Queensland Gas Scheme, electricity retailers are required to purchase 15 per cent of their electricity from gas-fired generation.²⁹

²² Transport and Regional Services Committee, *Inquiry the Economic Social Impacts of the Privatisation of Regional Infrastructure and Government Business Enterprises*, House of Representatives, Canberra.

²³ As electricity flows through the transmission and distribution networks, energy is lost due to electrical resistance and the heating of conductors. The losses are equivalent to approximately 10 per cent of the total electricity transported between power stations and market customers. Retrieved from www.aemo.com.au on 7 March 2011.

²⁴ SL Denny, Manager, Industry Development and Government Relations, Australian Sugar Milling Council, *Hearing Transcript*, 26 July 2010, p. 2.

²⁵ S Needham, *The potential for renewable energy to provide base load power in Australia*, Queensland Parliament Library research paper, 23 September 2008, p. 3.

²⁶ Queensland Government, *GOC Report*, p. 8.

²⁷ DEEDI, *Queensland's Energy Futures - Coal and energy*, Queensland, 2011, retrieved from http://www.energyfutures.qld.gov.au/coal_and_energy.cfm on 24 January 2011.

²⁸ Hon S Robertson MP, *Correspondence*, 15 November 2011.

²⁹ Department of Mines and Energy, *Queensland Gas Scheme, 2010*, retrieved on 24 January 2011 from <http://www.dme.qld.gov.au/Energy/gasscheme.cfm>.

Figure 3: The Queensland Electricity Transmission Network



Source: Powerlink, 2010

The Queensland electricity supply industry

44. The Queensland electricity supply industry is made up of a number of key players:

- **Powerlink Queensland** - which owns and maintains the high voltage transmission grid;
- **Two distribution businesses** - ENERGEX, which services south east Queensland, and Ergon Energy which services the rest of the state. These distributors have an effective monopoly over the distribution network within their territories;
- **Generators** - which compete and operate independently. There are three publicly owned generators (Tarong Energy, Stanwell & CS Energy) and several privately owned generators;
- **Ergon Energy Queensland** - a subsidiary of Ergon Energy, which provides retail services to non-market customers that have not entered a negotiated contract; and
- **Independent retailers** - at the beginning of 2011, the Queensland Competition Authority listed the government-owned Ergon Energy Queensland and ten independent electricity retailers as providing retail services to small customers in Queensland.³⁰

³⁰ Queensland Competition Authority, *Electricity Retailers Offering Retail Services to Small Customers in Queensland*, Queensland, 2010, retrieved from www.qcqa.gov.au on 7 January 2011.

45. In addition to generators connected to the transmission network, Ergon Energy owns and operates 33 isolated power stations and networks as part of the Queensland distribution area.³¹ These are predominantly off-grid diesel generators and separate to the east coast and Mt Isa networks. Ergon Energy owns, operates and maintains stand-alone power stations and associated networks to supply 12 communities on Cape York Peninsula, three in the Gulf of Carpentaria and 16 on islands in the Torres Strait.³² The state's remote communities remain almost entirely dependent on diesel fuel for generating their electricity.³³

The role of renewables in Queensland's electricity mix

46. In 2008, Queensland's installed electricity capacity from RE totalled 750 MW out of 12,500 MW.³⁴ Queensland has a number of RE resources and is particularly well placed for solar energy generation. Potential geothermal resources exist in central-western Queensland (Longreach, Winton, Barcaldine) and south of the north-west minerals province.³⁵
47. Biomass co-generation (primarily using bagasse, sugarcane waste) is the main RE source in Queensland and provided 415 MW of the state's RE capacity, hydroelectricity provided 169 MW, solar hot water systems provided 144 MW³⁶, wind energy provided 12 MW, geothermal provided only 80 KW and landfill gas operators across Queensland are generating 30 MW of electricity. In May 2010 Ergon Energy had nearly 6 500 solar PV systems connected with a maximum generating capacity of around 10 MW. In 2010 Queensland's RE capacity rose to 871 MW, up approximately 17 per cent from 745 MW in 2008.³⁷ Figure 4 shows RE generating capacity by technology for Queensland in 2008, 2010 and projected capacity for 2020.

Should Queensland generate more electricity from renewables?

48. Eighty per cent of submissions to the inquiry supported the expansion of the state's RE electricity sector. One submission argued firmly against expanding the use of RE for electricity. This was on the basis that renewable energy performs poorly as a greenhouse abatement measure, and that Queensland would experience net negative employment impacts even under the most favourable conditions.³⁸
49. The Queensland Government, in its submission, noted a number of benefits of RE in addition to reducing GHG emissions from the electricity sector. They include employment, industry development, rural and regional economic development and demand management.

³¹ T McConnell, Business and Industry Relationship Manager, Energex, *Transcript of Briefing*, 6 July 2010, pp. 50-1.

³² Ergon Energy, *Far North Remote Communities, Northern Region Report 2005/06*, Queensland, 2006.

³³ DEEDI, *ClimateQ: toward a greener Queensland Fact Sheet - Clean Energy for Remote Communities*, Brisbane, 2009.

³⁴ DEEDI, *The Queensland Renewable Energy Plan*, Brisbane, 2009, p. 9.

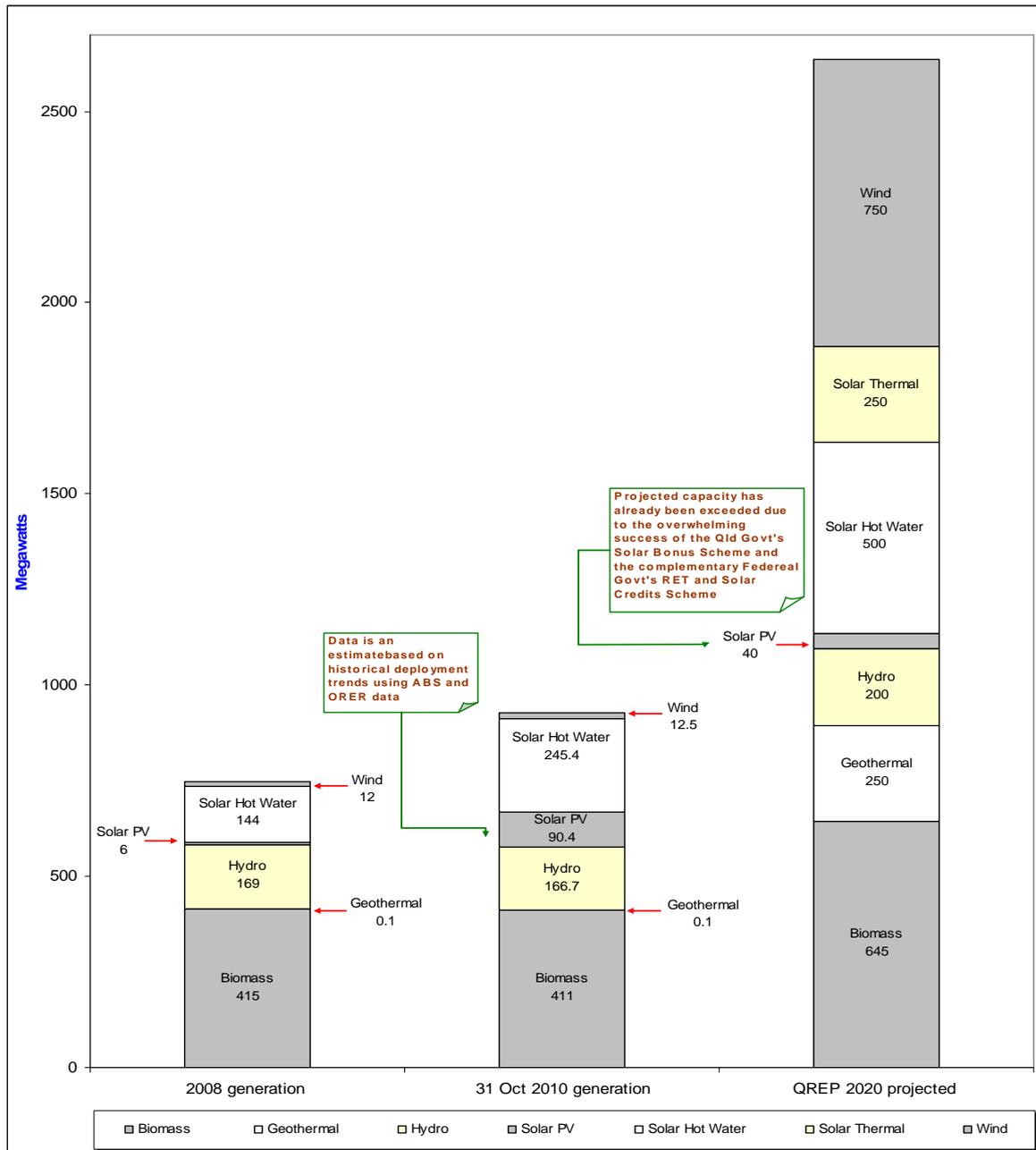
³⁵ J Reichman, RAPAD Consultant, Clean Energy Australasia, *Hearing Transcript*, 17 September 2010, p. 11.

³⁶ DEEDI, *The Queensland Renewable Energy Plan*, Brisbane, 2009, p. 10.

³⁷ Queensland Government, *Submission No.63*, 2010, p. 2.

³⁸ Queensland Resources Council, *Submission No. 36*, 2010.

Figure 4: Queensland's renewable energy electricity generating capacity



Source: Based on information contained in Hon S Robertson MP, *Correspondence*, 15 November 2010.

Employment benefits

50. A number of independent reports support the case for mid-term growth in green jobs such as RE installers and energy efficiency advisors. The Climate Institute calculated that committed and planned clean energy projects will result in more than 1,000 new jobs in Queensland by 2020.³⁹ The CSIRO report 'Growing the Green Collar Economy' predicts up to 340,000 jobs Australia-wide in emerging industries such as renewable energy, energy efficiency, green building and construction and waste and recycling over the next ten years.⁴⁰

³⁹ McLennan Magasanik Associates, *Regional Employment and Income Opportunities Provided by Renewable Energy Generation*, Report to The Climate Institute, 2009: MMA, J1742 Report..

⁴⁰ CSIRO, 2008, *Growing the Green Collar Economy: Skills and labour challenges in reducing our greenhouse emissions and national environmental footprint*, Report to the Dusseldorp Skills Forum.

Industry and regional development opportunities

51. A key benefit of harnessing Queensland's renewable energy potential will be the development of a strong RE industry. Industry development is being driven in Queensland by a range of initiatives in QREP which are designed to attract investment and support research, manufacturing and supply chain development.
52. The benefits of employing RE solutions are not limited to large-scale generation projects. In the short term at least, small-scale generation may be more economically feasible than large-scale generation. The Queensland Solar Bonus Scheme pays households and other small customers 44 cents per KWh for the surplus electricity generated from roof-top solar PV systems, that is exported to the Queensland electricity grid. Since its commencement in July 2008 to the end of June 2010, more than 30,000 households had taken part in the scheme.⁴¹
53. Most of Queensland's optimal RE resources are located outside of major population centres. According to the government's submission, exploiting these resources will stimulate regional economies by bringing investment to regional areas and supporting jobs.⁴²

Demand management

54. In densely populated urban areas, RE can reduce the need for costly upgrades to electricity transmission and distribution network by alleviating demand on these networks. As a form of distributed energy, renewable generation will play a key role in addressing the challenge of providing a reliable supply of electricity to remote and sparsely populated regions.⁴³

Popular support for renewable energy

55. A number of sources provide an indication of the level of public support for renewable energy and RE investment. For grid-connected electricity consumers, one of the simplest options to support renewable energy is to purchase GreenPower. GreenPower is electricity sourced from accredited RE generators. It accounts for 0.2 per cent or 523 MWh of Australia's electricity purchases. Queensland consumers are among the strongest supporters of GreenPower and accounted for around 252,000 or 30 per cent of the nation's 841,000 GreenPower during the April-June 2010 quarter.⁴⁴
56. A recent survey by the independent community advocacy organisation, GetUp, found that 83 per cent of its 33,000 membership strongly support investing in renewable energy. Of the top ten issues from the survey, RE was number one and ahead of issues such as 'securing Australia's water supplies', 'improving public transport' and 'a price on carbon'.⁴⁵
57. The committee was told of strong support for RE in North Queensland given the uncertainty about pricing, the future of energy in the region and the high transmission losses associated with grid supply.⁴⁶
58. The Queensland Youth Environment Council (QYEC) submission provides an insight into the views of young people about renewable energy.⁴⁷ The QYEC is a

⁴¹ Queensland Government, *Submission No. 63*, pp. 5-6.

⁴² Queensland Government, p. 6.

⁴³ Queensland Government, p. 6.

⁴⁴ GreenPower Australia 2010 *National GreenPower Accreditation Program Status Report – Qtr 2: 1 April to 30 June, 2010*, retrieved from <http://www.greenpower.com.au> on 15 November 2010.

⁴⁵ GETUP Blog <http://blog.getup.org.au/2010/09/18/your-voice-your-vision/>.

⁴⁶ A McGuire, Urban Sustainability Project Officer, Cairns and Far North Environment Centre Inc. and the Cairns Climate Action Network, *Hearing Transcript*, 17 September 2010, p. 11.

⁴⁷ Queensland Youth Environment Council, *Submission No. 25*, p. 2.

broad-based advisory committee of Queensland youths. It was formed in May 2007 to provide advice to the Queensland Government on key environmental and sustainability issues. The QYEC submission noted the findings of the Youth and the Environment Survey conducted in 2008 by the QYEC with the University of Queensland and the Department of the Environment and Resource Management.⁴⁸ A total of 4,540 young people from schools across Queensland participated in the survey. The survey report noted that 57 per cent of 12-17 year olds and 72 per cent of 18-24 year old participants were 'quite a bit' or 'very concerned' about protecting the environment. Both the 12 to 17 and 18 to 24 year old respondents nominated 'increasing the supply of renewable energy' and 'creating laws that prevent actions that damage the environment' as the most important actions that governments can take to help the environment. 'Increasing renewable energy generation' was nominated by participants as one of the three most important actions for the government to take in aiding the environment.⁴⁹

Committee view

59. The committee supports the efforts of the Federal and Queensland Governments to expand the use of RE sources to generate electricity in Queensland. Expansion of the state's REE generating capacity will have particular benefits for regional areas and create jobs.
60. There is strong support in Queensland for an expanded RE electricity generation sector as a measure to cut GHG emissions and reduce climate change risks. Expansion of the REE sector also offers opportunities to diversify the state's electricity generation portfolio.
61. Given the inherent imperfections of energy markets, governments will need to play a key role in providing conditions and support to encourage and manage the expansion of the REE sector in a cost-effective and sustainable manner whilst avoiding adverse impacts on electricity costs for all users. They will also need to seek to ensure that existing fossil-fuelled electricity generating resources owned by the Queensland Government continue to be utilised efficiently.

⁴⁸ KS Fielding, *Youth and the environment survey - A report on the environmental attitudes, knowledge and practices of 12 to 24 year old Queenslanders*, Institute for Social Science Research, The University of Queensland, Brisbane, 2009.

⁴⁹ KS Fielding, 2009, p. 3.

PART 4: BARRIERS TO EXPANDING QUEENSLAND'S RENEWABLE ENERGY ELECTRICITY SECTOR

62. In its issues paper for the inquiry, the committee invited comments on the barriers to expanding the state's renewable energy electricity sector. A table summarising the barriers raised in submissions to the inquiry is at Appendix G.
63. The following sections discuss the key economic and non-economic barriers.

The higher cost of electricity from renewables

64. The higher cost of REE compared to electricity produced from coal or gas-fired power stations was identified as a barrier in 26 submissions to the inquiry.⁵⁰ Cost remains a fundamental obstacle for REE in a price-sensitive electricity market.
65. Depending on the technology used, electricity generated from renewable energy sources may cost 1.6 – 6 times the cost of electricity generated from the state's coal or gas-fired power stations. The Queensland Government submission noted that electricity derived from renewable energy sources can range in price from \$80 to \$90 per MWh for wind and hydroelectricity to more than \$300 per MWh for solar PV.⁵¹ In comparison, traditional coal-fired generation is much less expensive, costing approximately \$50 per MWh.⁵²

Capital costs

66. RE projects can have very high capital costs per unit of electricity generated, but generally have lower on-going operating costs due to lower or non-existent fuel costs. To date, wholesale electricity market revenue has been insufficient to service capital expenditure for most renewable generation, as acknowledged by the Queensland Government in their submission.⁵³ The higher cost relative to electricity from coal or gas-fired plants makes it difficult for REE projects to compete with the current low cost of purchasing energy through the centralised grid.⁵⁴
67. Transfield Holdings noted in their submission that the initial capital investment associated with establishing renewable energy infrastructure is substantial, especially in the absence of a carbon tax. In addition, without appropriate partner funding models and/or sustainable incentives (e.g. feed-in tariff regulations) investment in projects capable of delivering electricity from RE sources will be limited.⁵⁵
68. The Australia Sugar Milling Council (ASMC) submission noted that escalating capital cost has been, and will continue to be, a major hurdle to investment in renewable energy projects. These external market forces, including high international demand for materials and equipment, and national demand for labour, result in inflated costs per megawatt hour (MWh).⁵⁶

⁵⁰ Submission Nos: 5, 6, 7, 9, 13, 14, 22, 23, 25, 28, 30, 31, 33, 37, 38, 39, 42, 44, 45, 46, 47, 49, 53, 59, 60, and 63.

⁵¹ Reference quoted in Queensland Government, *Submission No. 63*, 2010, p. 3. (Source: McLennan Magasanik Associates, *Report to Federal Treasury: Impacts of the Carbon Pollution Reduction Scheme on Australia's Electricity Markets*, 11 December 2008.)

⁵² Reference quoted in Queensland Government, *Submission No. 63*, 2010, p. 3. (Source: ACIL Tasman, Report prepared for the Inter-Regional Planning Committee: Fuel resource, new entry and generation costs in the NEM, April 2009.)

⁵³ Queensland Government, *Submission No. 63*, p. 4.

⁵⁴ Queensland Government, *Submission No. 63*, p. 4.

⁵⁵ Transfield Holdings, *Submission No. 49*, p. 5.

⁵⁶ Australian Sugar Milling Council, *Submission No. 38*, p. 4.

69. Mackay Sugar noted in their submission that construction costs have increased on average by seven per cent per annum for each of the last 20 years, and have doubled in real terms over that period. They also suggested that it is becoming increasingly difficult to compete with the large coal and gas projects for material and skilled personnel with a skilled labour shortage in Queensland, and that this is adding significant costs to non-resource projects.⁵⁷
70. According to Rio Tinto, the cost of low emission electricity will remain significantly higher than wholesale power prices until 2030. The submission noted capital cost for a number of new entrant plants in 2008 from the Electric Power Research Institute (EPRI) Technology Status Data (2010), as cited in the ABARE Report 'Australian Energy Resource Assessment 2010'.⁵⁸ There are, however, distorting influences on these price comparisons. The prices charged for coal and gas-fired electricity do not reflect the full environmental, social and economic costs of their greenhouse emissions or other pollutants they release. In contrast, as noted by Ergon Energy, most of the externalities of renewable energy generation are reflected in the price.⁵⁹
71. The carbon pricing mechanism proposed by the Federal Government, as discussed in Part 2, is designed to address this market defect. Other price distortions are caused by government subsidies for electricity generated from non-renewable sources and the exclusion of life-cycle costs from the calculation of comparative electricity prices.

Project costs in Queensland relative to other states

72. The committee also heard that Queensland REE projects are more expensive and less viable than projects in other states. Sucrogen Energy told the committee that Queensland projects typically receive lower wholesale electricity revenues than projects in other regions of the NEM. Furthermore, the cost per MWh of generating renewable electricity in Queensland is higher than the costs for projects in southern states (due to either higher technology costs or lower quality renewable resources and resulting capacity factors).⁶⁰
73. Figure 5 from the Sucrogen submission shows the gap which must be covered by the sale of RECs for a sample of projects across different states. These are essentially 'generic' projects, with marginal loss factors of 1.0 and generic capital costs, and do not represent specific developments.⁶¹ They further submitted that the REC prices required by Queensland projects are not competitive with those required by projects in other states, and, based on the 2009-10 average pool prices and costs in the model, the REC prices required by the Queensland projects exceed the effective scheme cap of \$93/REC.⁶²

⁵⁷ Mackay Sugar Limited, *Submission No. 33*, p. 2.

⁵⁸ Rio Tinto Alcan Primary Metals Pacific and Rio Tinto Coal Australia, *Submission No. 9*, p. 2.

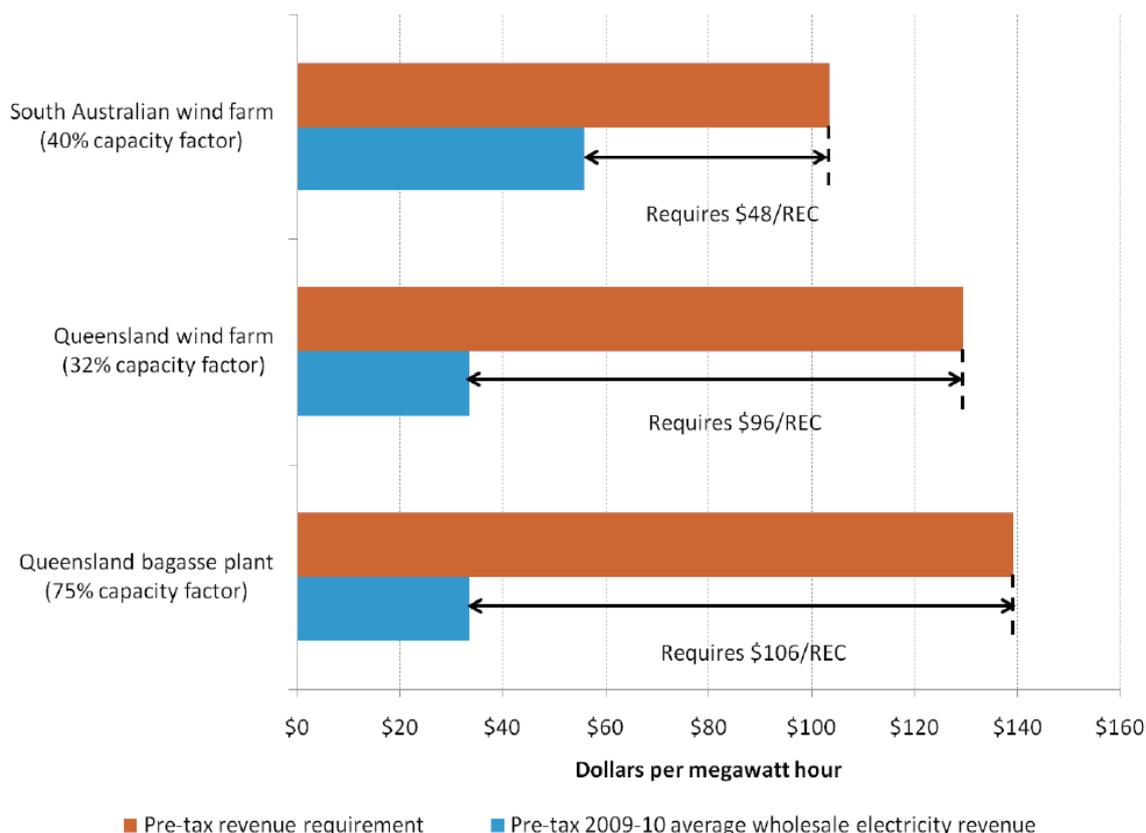
⁵⁹ Ergon Energy, *Submission No. 45*, p.7.

⁶⁰ Sucrogen Australia Pty Ltd, *Submission No. 43*, pp. 1, 17.

⁶¹ Sucrogen Australia Pty Ltd, *Submission No. 43*, p. 18.

⁶² Sucrogen Australia Pty Ltd, *Submission No. 43*, p. 18.

Figure 5: Required Renewable Energy Certificate Prices



Source: Sucrogen Australia Pty Ltd, *Submission No. 43*

74. According to Sucrogen, the two wind projects in Figure 5 have identical total cost. However, the Queensland project utilises a lower quality wind resource and has a correspondingly lower capacity factor. This means the Queensland project has a higher cost per MWh generated (accounting for the difference in pre-tax long run marginal costs). The lower Queensland pool price adds to the 'gap' between pool revenue and costs.⁶³
75. Infigen Energy told the committee that while there are some areas in Queensland with suitably high wind speeds for wind farms, these areas are fewer in number, and often times more remote, than are typically found in South Australia, Tasmania, or Victoria. This represents a challenge for renewable energy development in Queensland, as wind energy is generally the lowest cost option for REE. Queensland's solar resource, on the other hand, is considerably better than many areas in the southern states which is to Queensland's advantage.⁶⁴

Queensland's relatively low electricity prices

76. Infigen Energy submitted that another significant barrier is Queensland's low average wholesale electricity prices in the NEM. While this is a benefit for Queensland's electricity consumers, it makes the economics of new electricity generation plants more challenging in Queensland.⁶⁵
77. Australian electricity consumers enjoy some of the cheapest electricity in the world, and Queensland electricity prices are among the nation's lowest. Figure 3 compares industrial and residential electricity prices in a selection of countries, including

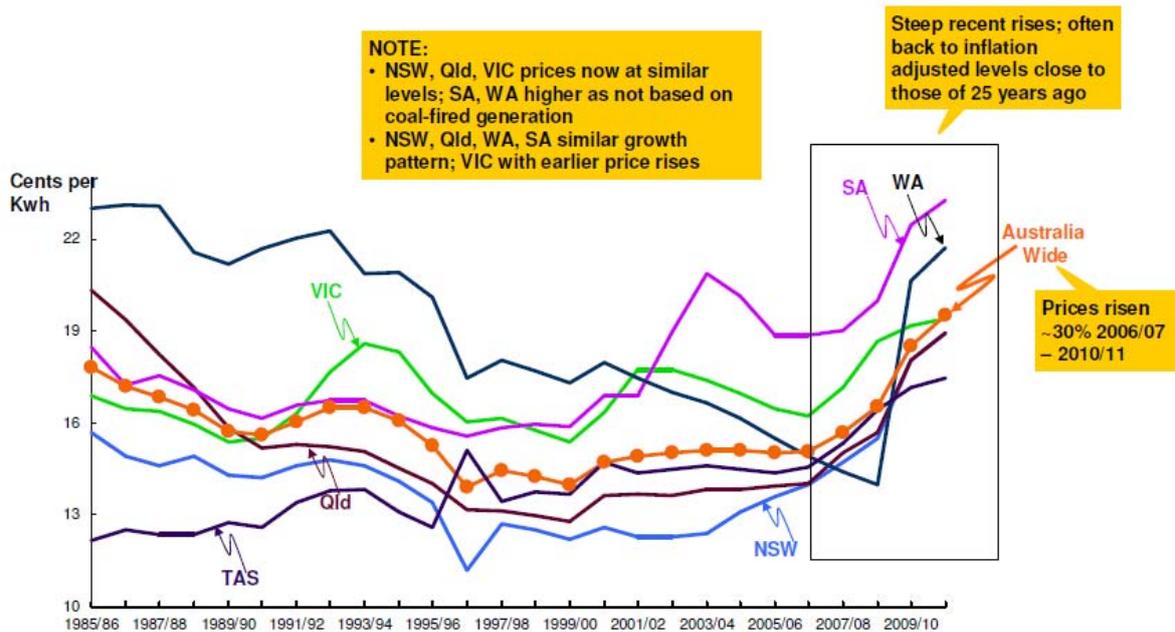
⁶³ Sucrogen Australia Pty Ltd, *Submission No. 43*, p. 17.

⁶⁴ Infigen Energy Limited, *Submission No. 44*, p. 3.

⁶⁵ Infigen Energy Limited, *Submission No. 44*, p. 3.

Australia. Figure 3 charts the movements in state electricity prices, adjusted for inflation, over the last twenty-five years. When adjusted for inflation, electricity prices in 2009-10 were similar to the 1985-6 prices in most states. In Queensland, electricity prices fell in real terms over the period. Over the five years since 2006-07, Australian electricity prices have risen around 30 per cent on average, and are predicted to rise substantially over the coming decades. These price rises are being driven by a number of factors including increases in network costs, as discussed above, rising fuel costs and the impact of the Federal Government's Renewable Energy Target (RET) scheme.

Figure 6: Inflation-adjusted electricity prices, 1985-2010, by state and year



Source: R Sims, 'Energy market outlook', presented to the Multi-Party Climate Change Committee, 10 November 2010, retrieved from <http://www.climatechange.gov.au> on 21 February 2011

78. Infigen contrasted the revenues for generators in Queensland with revenues in South Australia where electricity prices are 50-65 per cent higher.⁶⁶ Table 2 is from the Infigen submission.

Table 2: Average Annual Wholesale Electricity prices (\$/MW-hr)

Year	NSW	Qld	SA	Tas	Vic
2008-09	38.85	34.00	50.98	58.48	41.82
2009-10	44.14	33.45	55.68	29.38	36.36

Source: Infigen Energy Limited, *Submission No. 44*, p. 3

⁶⁶ Infigen Energy Limited, *Submission No. 44*, p. 3.

79. The provision of subsidies for competing energy sources places REE at a distinct disadvantage and makes it less price-competitive. A number of submissions alluded to government subsidies of fossil fuels.⁶⁷
80. The Queensland Government provides financial assistance to subsidise the retail cost of electricity for pensioners and other groups. The most significant subsidy for electricity consumers in Queensland is the community service obligation (CSO) payment to Ergon Energy. This subsidy ensures that all Queensland consumers pay equivalent electricity tariffs, and represents the difference between the regulated prices that Ergon Energy is allowed to charge and the higher cost of supplying electricity in regional and remote parts of the state. In 2009-10, the CSO payments totalled \$250 million.⁶⁸ The submission by Windlab noted that CSO payments, that are designed to equalise electricity pricing in areas where it would otherwise be higher, create a distorted market for competitors.⁶⁹
81. The committee sought advice from the Queensland Government on the level of subsidies it provides the fossil fuel industry. In its advice, the government stated:
- It's our understanding that a number of the submissions refer to a report by the University of Technology Sydney, which indicates that the Australian fossil fuel industry is subsidised to the sum of approximately \$9 billion annually. This report, published in 2007, mostly refers to Australian Government subsidies or indirect subsidies from the Queensland Government, some of which ceased operation since the report was published.
- Any coal infrastructure is planned and provided for and on a fully commercial basis by the private sector and government owned corporate entities, such as Queensland Rail, the Gladstone Ports Corporation and North Queensland Bulk Ports Corporation – so it is not what is commonly understood as 'subsidised'.⁷⁰
82. The committee also considered the government's support for gas-fired electricity which has the same effect as a subsidy. Tarong Energy Corporation Limited told the committee that the Queensland Gas Incentive Scheme (QGIC), while extremely successful in promoting the development of the coal seam gas market in Queensland through support for gas-fired generation, has had a number of significant implications for the broader Queensland energy market. Tarong Energy stated:
- The QGIC in essence provides a 'subsidy' in favour of comparatively higher cost gas generation plants in Queensland. The result of the Scheme is an 'out of merit' operating regime with gas-fired generators acting to optimise a short run bidding strategy which, has the impact of depressing electricity spot prices.⁷¹
83. They also warned that increasing or extending the QGIC scheme would impact negatively on the profitability and dividends of GOC generators and lead to higher prices to consumers⁷², and, if combined with an emissions trading scheme, has the potential to create a significant market distortion.⁷³ This effect, they said, should be considered with any form of technology subsidy, including renewable generation.⁷⁴

⁶⁷ Submission Nos. 22,23,37,42 and 51.

⁶⁸ DEEDI, *Ergon Energy's role in a competitive Queensland electricity market*, 2010, retrieved from www.dme.qld.gov.au on 9 November 2010.

⁶⁹ Windlab, *Submission No. 18*, p. 2.

⁷⁰ Hon S Robertson MP, Correspondence, p. 3.

⁷¹ Tarong Energy Corporation Limited, *Submission No. 10*, p. 5.

⁷² Tarong Energy Corporation Limited, *Submission No. 10*, p. 5.

⁷³ Tarong Energy Corporation Limited, *Submission No. 10*, p. 5.

⁷⁴ Tarong Energy Corporation Limited, *Submission No. 10*, p. 5.

Costs for electricity distributors

84. Ergon Energy, Energex⁷⁵ and the Energy Supply Association of Australia⁷⁶ identified a further cost barrier for REE due to the additional network augmentation costs borne by distributors. Although there is no direct cost for owners of a small-scale PV systems to connect to the grid, network upgrades will be required as the level of penetration increases in certain areas to ensure the safety and quality of electricity supply can be maintained. This is a cost that is ultimately borne by all customers without any direct benefits. This issue is a significant one for Ergon Energy in relation to its 33 isolated networks.⁷⁷

Grid connection issues

85. Eighteen submissions identified the lack of access to the grid as a key impediment to REE projects.⁷⁸ Queensland's optimal renewable energy resources are located outside of major population centres, in regional and remote areas away from the grid and major load centres.⁷⁹ This presents barriers in the form of higher distribution costs for the electricity generated. In addition, the cost of connecting renewable energy generators into the electricity network poses a significant barrier to entry. The grid connection costs could dwarf the costs of the REE generating asset. According to Powerlink, each additional kilometre of network costs approximately \$1 million.⁸⁰
86. The Queensland Government submission noted that generators pay for connections to substations, where electricity is supplied into transmission or distribution networks, with this connection priced under the National Electricity Rules. In addition, the generator may be required to pay for the augmentation of existing transmission infrastructure to support the additional generation supply.⁸¹
87. Infigen Energy told the committee that negotiating and constructing a cost-effective grid connection is one of the major challenges to successfully building and operating a renewable energy project. The further stated that while the National Electricity Rules, Frameworks and Regulations frequently mention bilateral negotiations between potential generators and Network Service Providers (NSPs), such bilateral negotiations rarely occur in practice.
- As a proposed generation project can only connect to the one NSP operating in the region (or the entire State), grid connection negotiations with NSPs can often more accurately be described as effectively unilateral in nature. If an NSP makes unreasonable demands of the potential generator, there is very little recourse for the potential generation project owner. The project developer either has to agree to the unreasonable demand(s) or abandon the project.⁸²
88. In their submission, Windlab noted that in many cases it is the grid connection availability or the cost of grid connection that makes a wind farm unviable.⁸³
89. Similarly, Vestas noted that one of the biggest issues for Queensland, despite its rich wind resources, is its lack of transmission assets in a number of areas where the best wind energy sites are:

⁷⁵ ENERGEX Limited, *Submission No. 28*, p. 2.

⁷⁶ Energy Supply Association of Australia, *Submission No. 50*, p. 3.

⁷⁷ Ergon Energy, *Submission No.45*, p. 8.

⁷⁸ Submission Nos: 3, 9, 11, 17, 18, 19, 25, 29, 33, 38, 47, 48, 50, 51, 53, 57, 59, and 63.

⁷⁹ Queensland Government, *Submission No. 63*, pp. 3, 6.

⁸⁰ Powerlink Queensland, *Hearing Transcript*, Environment and Resources Committee, 26 July 2010, p. 35.

⁸¹ Queensland Government, *Submission No. 63*, pp.4-5.

⁸² Infigen Energy Limited, *Submission No. 44*, pp. 7-8.

⁸³ Windlab, *Submission No. 18*, p. 2.

This is not a problem unique to Queensland, but it is one that needs to be addressed if Queensland is to reach its full potential in relation to wind energy generation.⁸⁴

90. The Clean Energy Council submitted that realising the full potential of Queensland's renewable energy sources will require a shift in the locations where electricity is generated and the transmission capacity of such areas. They added:

The Queensland Government must do more to address barriers to the deployment of both small (sub-megawatt systems) and large scale renewable energy projects and transmission planning plays a large role in overcoming some of these barriers.⁸⁵

91. Ergon Energy noted that Queensland is fortunate to receive excellent solar radiation and has other strong potential renewable generation options. However, some of those options, such as geothermal and tidal, are great distances from the Powerlink transmission network, or the Ergon Energy distribution network. They also noted that the large land areas required for many solar technologies may make major developments marginal except in remote areas where land is cheaper, flatter and available.
92. The Gold Coast City Council suggested in its submission that electricity distribution organisations charge disproportionate fees for connection of distributed energy into the network. This factor, combined with authority approval delays, results in less investment in this sector than in other more mature industries.⁸⁶

Intermittency

93. A key issue with most renewable energy technologies, like the wind and solar radiation they depend on, is their inconsistent or intermittent generation output, typified by solar PV systems and wind turbines. A related issue is that REE may not be viable at daily and seasonal peak demand periods. The inability of REE to provide dispatchable, or controlled, energy at times of peak demand creates trading uncertainty that must be factored into Power Purchase Agreements that retailers enter into with RE generators, ultimately impacting on the financial viability of the development.⁸⁷
94. The Gold Coast City Council told the committee that electricity generators and network entities regard renewable energy as unreliable. Consequently when REE capacity is installed, an equivalent volume of shadow generating capacity by base load capable fuel sources is connected to the network as a backup.⁸⁸
95. Ergon Energy explained that high levels of renewable energy generation in any electricity network can destabilise the network and cause reliability and quality of supply issues for connected customers. Due to the small size of the isolated systems that Ergon Energy operates, a relatively small amount of renewable generation (as low as 10 to 20kW for some stations) in a single system can cause stability issues.⁸⁹ They suggested that if storage capacity and cost-effectiveness was improved, it would greatly enhance the financial attractiveness of solar and other technologies.⁹⁰
96. Ergon suggested that much work needs to be done in exploring and developing technical solutions to these stability issues and will need to include energy storage and other options along with their associated control systems, integrated with the

84 Vestas Australian Wind Technology Pty Ltd, *Submission No. 48*, p. 4.

85 Clean Energy Council, *Submission No. 19*, p. 3.

86 Gold Coast City Council, *Submission No. 3*, p. 3.

87 Ergon Energy, *Submission No. 45*, p. 7.

88 Gold Coast City Council, *Submission No.3*, p. 3.

89 Ergon Energy, *Submission No.45*, p. 9.

90 Ergon Energy, *Submission No. 45*, p. 10.

existing diesel power station control systems to deliver the required outcomes. At present, many of the proposed solutions are still in development stages and have high costs. Current storage technologies are, as a generalisation, relatively expensive, inefficient and have lifecycle environmental impacts.⁹¹

97. Ergon Energy also suggests that technological advances in this area will largely come from overseas developers (RedFlow being one exception), meaning the Queensland Government is likely to have little capacity to influence the speed and nature of developments in this area.⁹²
98. Powerlink advised the committee that the intermittent nature of REE reduces its effectiveness for deferring grid upgrades:

In this regard, the daily solar energy profile in south-east Queensland shows that solar generation output is relatively low in the late afternoon/early evening when the summer peak demand occurs. Most energy generated from sugar mill biomass aligns with the sugar cane crushing season, which also ends before summer peak demand months. Several key renewable sources are also of an intermittent nature (eg. wind generation relies on the wind actually blowing, etc), thus requiring alternative 'back up' power sources to ensure reliability of electricity supply for customers. These are often very costly.⁹³

Difficulties accessing power purchase agreements

99. Power purchase agreements (PPAs) are contracts entered into by electricity generators and distributors to secure electricity supplies. The commitment to purchase output provides the REE generators with the commercial terms and confidence to invest in, secure capital for projects and ultimately to build their generators.
100. In their submission, the Brisbane City Council noted that PPAs allowed project developers to secure capital for projects. However, the current regulatory environment has seen a decrease in the use of long term PPAs and correspondingly, a decrease in the number of new renewable projects proceeding. This trend has led to alternative mechanisms to PPAs being used including corporate finance (in the case of large integrated retailer/generators like Origin, AGL and TruEnergy) and partnering with investment banks.⁹⁴
101. Ergon Energy told the committee that building a financially sound business case, even though projects can deliver emission-free electricity, regional jobs, and other benefits, is a key barrier for many smaller generation projects between 10kW and 1000kW (1MW).⁹⁵
102. Capital risk is a major barrier to renewable projects going ahead. Mackay Sugar told the committee that renewable projects require long-term power and REC purchasing agreements to satisfy financiers. This is becoming increasingly difficult to secure with wildly fluctuating prices for both the black and green components of project outputs. They also submitted that this problem has been exacerbated by the Federal Government allowing solar hot water and small scale PV (already subsidised) to trade in the 20 per cent RET, while the uncertainty of the CPRS has created much volatility in the NEM market.⁹⁶

⁹¹ Ergon Energy, *Submission No. 45*, p. 10.
⁹² Ergon Energy, *Submission No. 45*, p. 11.
⁹³ Powerlink Queensland, *Submission No. 17*, p. 4.
⁹⁴ Brisbane City Council, *Submission No.5*, p. 2.
⁹⁵ Ergon Energy, *Submission No. 45*, p. 9.
⁹⁶ Mackay Sugar Limited, *Submission No. 33*, p. 2.

Delays due to government approval processes

103. Renewable energy developers must negotiate a range of planning approvals and agreements before they can build their infrastructure, generate electricity and begin to produce an income. This can include federal, state and local government requirements as well as the demands imposed by the electricity transmission company or electricity distributor, electricity retailers, landholders, Indigenous land owners, and others.⁹⁷ According to Vestas, one of the key issues impacting on renewable energy investment is a lack of coordination between government departments and other relevant agencies, which adds complexity and time to the planning process.⁹⁸
104. Rio Tinto also noted that there are significant local planning and environmental implications and constraints on the use of new technologies such as renewables, adding to costs and introducing impediments to their successful introduction.⁹⁹
105. An important consideration for RE developers and owners is the planning and regulatory environment of the different states. Whether the planning authority is the shire (local) or state government, infrastructure developers will favour jurisdictions with clear planning requirements as well as reasonable and defined timelines for planning decisions.¹⁰⁰ For example, Windlab in their submission noted that a local council planning permit is required for the construction of a wind monitoring tower in Queensland. This can cause unnecessary delays in resource verification.¹⁰¹ They suggested that exemption from obtaining planning permission for the installation of wind monitoring towers (or wind monitoring masts) up to turbine hub height should be considered; noting exemptions are already in place in Victoria and New South Wales.¹⁰² Infigen made a similar point in their submission. They suggested that the towers have inconsequential amenity impacts on neighbouring properties, and any potential aviation concerns are already addressed by existing Civil Aviation Safety Authority guidelines and requirements.¹⁰³
106. Vestas provided a detailed account of the problems facing wind farm developers and the need for some flexibility on the part of councils in dealing for minor amendments to the proposal to minimise project costs and delays:
- ...during the planning process the proponent is required to submit its design for the wind farm, including the locations for the placement of the individual wind turbines. Sometimes, as the planning application makes its way through the process under the legislation, new and more relevant data becomes available to the proponent, making it desirable to change the location of some of the wind turbines.
- Assuming such siting changes take place within the overall boundary of the wind farm itself, it would assist the development of these wind energy projects if the developer was allowed a degree of flexibility to respond to such data without having to re-submit the planning application or go through a further round of consultation.¹⁰⁴
107. Infigen raised the issue of the removal of low value, regrowth and/or non-indigenous vegetation in conjunction with renewable energy projects, and whether this is acceptable. They stated:

For example, construction of a wind farm typically affects only 2-3 per cent of the project's land area, however, if the project site is vegetated with native scrub, it is not

⁹⁷ Ergon Energy, *Submission No. 45*, p. 8.

⁹⁸ Vestas Australian Wind Technology Pty Ltd, *Submission No. 48*, p. 7.

⁹⁹ Rio Tinto Alcan Primary Metals Pacific and Rio Tinto Coal Australia, *Submission No. 9*, p. 6.

¹⁰⁰ Infigen Energy Limited, *Submission No. 44*, p. 6.

¹⁰¹ Windlab, *Submission No. 18*, p. 1.

¹⁰² Windlab, *Submission No. 18*, p. 3.

¹⁰³ Infigen Energy Limited, *Submission No. 44*, p. 6.

¹⁰⁴ Vestas Australian Wind Technology Pty Ltd, *Submission No. 48*, p. 7.

clear whether disturbing or removing 2-3 per cent of this vegetation represents a significant constraint for the project.¹⁰⁵

108. In its submission, the Queensland Government acknowledged that local government planning schemes that reflect historical community, environmental and economic needs can be an impediment to renewable energy generation or the long-term viability of projects, and can increase project costs because of complex assessment processes.¹⁰⁶ Origin Energy recommended that current planning processes are strategically reviewed to ensure they are well defined, effective and expeditious, including:

- harmonisation and clearly defined lines of responsibility amongst local, state and federal approval and regulatory bodies;
- streamlining of processes where practicable, particularly network connection agreements; and
- simplified and clearly defined guidelines for environmental and technical assessments.¹⁰⁷

109. Origin Energy also recommended that the Queensland Government considers ways to expedite the release of land for geothermal exploration.¹⁰⁸

110. The Queensland Government's Renewable Energy Regulatory Reform Taskforce is considering improving advice to local governments via the *Sustainable Planning Act 2009* regarding the design of planning schemes and assessment methods to recognise the need for renewable energy generation projects and the need to link areas with RE resources to network infrastructure.¹⁰⁹

111. Vestas also submitted that the Office of Clean Energy could play a significant role to ensure investors are given timely advice and assistance to work their way through all the steps in order to obtain a planning permit and other relevant requirements.¹¹⁰

112. Finally, Infigen cautioned against the use of state call-in powers for large renewable energy projects which would make the Queensland Government the responsible planning authority. They noted that the states which have done this have the slowest planning approval processes for renewable energy projects, whilst shires in West Australia and South Australia have proven themselves to be very efficient and successful as the responsible authorities for wind farms:

Wind energy facilities in SA and WA have been assessed, constructed and operated with little or no controversy and enjoy overwhelming community support including our Lake Bonney and Alinta wind farms which were approved by shire councils.¹¹¹

¹⁰⁵ Infigen Energy Limited, *Submission No. 44*, p. 6.

¹⁰⁶ Queensland Government, *Submission No. 63*, p. 5.

¹⁰⁷ Origin Energy Limited, *Submission No. 32*, p. 7.

¹⁰⁸ Origin Energy Limited, *Submission No. 32*, p. 7.

¹⁰⁹ Queensland Government, *Submission No. 63*, p. 5.

¹¹⁰ Vestas Australian Wind Technology Pty Ltd, *Submission No. 48*, p. 7.

¹¹¹ Infigen Energy Limited, *Submission No. 44*, p. 6

PART 5: POLICY OPTIONS FOR THE GOVERNMENT

Setting the priorities for energy policy in Queensland

113. The future of REE in Queensland and the options to assist its development need to be considered in the context of other energy issues and reforms, and their objectives. Queensland is at a juncture in regard to future energy policy. Historically, Queensland has been a coal and gas state. This strategy has delivered, and will continue to deliver, high quality electricity supply and strong economic growth, with excess power exported to other states via the national electricity grid. Looking ahead, it is imperative that the energy intensity of the Queensland economy is reduced through energy efficiency improvements whilst the state's future electricity generating mix is expanded to include renewable energy. It is also imperative that a strategy for the state's coal and gas-fired generators is included to preserve the state's economic position whilst meeting the demands for lower carbon emissions, and ensuring that existing generating assets are not stranded.
114. The need to provide certainty is crucial. As noted in a submission by one renewable energy systems retailer:

While ever government policy keeps changing every six months no real investment will occur in renewable energy. Uncertainty kills investment.¹¹²

Reliance on coal and gas-fired electricity

115. Irrespective of the extent of growth that can be achieved in the REE sector, it will fall on fossil fuelled generators to make up the gap in electricity demand. The importance of the coal industry to Australia, and Queensland in particular, should not be understated. Australia is the world's largest coal exporter shipping 259 million tonnes in 2009.¹¹³ In advice to the committee, the Queensland Government advised:

Coal plays a vital role in Australia's energy security, economy and community. It is Australia's largest export earner (valued at \$55 billion in 2008-09), employs over 37,000 Australians directly and a further 100,000 indirectly, mainly in regional Australia. It also underpins the security, reliability and comparative low-cost of Australia's electricity generated from black coal. Approximately 81 per cent of Queensland's electricity is generated by coal-fired power stations.

Every year, the coal industry pays billions to Commonwealth and state governments in the form of corporate taxes, natural resource royalties, and payment of freight charges. In 2008-09 coal royalties were worth \$3.1 billion to the Queensland Government... This flows back into the community in the form of state funding for hospitals, schools and roads.¹¹⁴

116. With more than 30 billion tonnes of identified resources (in situ) of black coal in the state, the coal industry is a major contributor to Queensland's economy, and Queensland is the largest exporter of seaborne coal in the world. Queensland's coal production reached a record 190 million tonnes in 2008-09 of which 159 million tonnes was exported to 38 countries.
117. Stanwell noted in their submission Queensland's substantial investment in existing coal-fired generation assets and suggested that new policy initiatives should be mindful of their impact on asset values:

Transitioning our existing generation fleet to a lower carbon environment should be a key policy objective of the Queensland Government. It should therefore promote renewable technology breakthroughs such as solar thermal hybrids (e.g. the recent

¹¹² The Solar Guys, *Submission No. 14*, p. 2.

¹¹³ World Coal Association, *World Coal Statistics*, 2010, retrieved from <http://www.worldcoal.org/resources/coal-statistics/> on 21 March 2011.

¹¹⁴ Hon S Robertson MP, *Correspondence*, November 2010, pp. 4-5.

budget announcement for Kogan Creek Power Station is consistent with this position).¹¹⁵

118. They also submitted that 'transitioning' the existing generation fleet to a lower carbon environment should be a key policy objective of the Queensland Government, and that it should promote renewable technology breakthroughs such as solar thermal hybrids.¹¹⁶ The government is investing \$98 million in a solar boost project at the Kogan Creek power station, in what will be the largest solar thermal project in the southern hemisphere. The solar thermal addition is expected to increase the station's capacity by up to 44 MW under peak solar conditions, and improve the plant's fuel efficiency.
119. While coal-fired power will continue to supply most of Queensland's future electricity needs, the proportion of electricity demand that is met by gas-fired power stations is likely to increase. Since September 2010 gas-fired generators¹¹⁷ have generated more than 27 million MWh of electricity in Queensland as a result of the Queensland Gas Scheme.¹¹⁸ Under the scheme, Queensland electricity retailers and other liable parties are required to source a prescribed percentage (increased from 13 to 15 per cent in 2010) of their electricity from gas-fired generation. The mandatory target will remain at 15 per cent for 2011 with the facility to increase the target to 18 per cent by 2020.¹¹⁹ Since the scheme's commencement in 2005 the regulator has registered a total of 27,354,372 Gas Energy Certificates¹²⁰, which equates to a total of 27,354,372 MWh of gas-fired electricity.¹²¹
120. The developing liquid natural gas (LNG) industry will have a further impact on gas fired generating. This LNG industry is expected to impact the Queensland electricity market in two stages. In the short to medium term, LNG proponents will look for options to deal with 'ramp-up' gas. The need to prove up reserves to support LNG plant investments means that there will be surplus gas prior to the commencement of each LNG production facility. This ramp-up gas will continue to increase the domestic supply of gas in the short to medium term.¹²²

Energy efficiency improvements

121. Energy efficiency improvements continue to offer the lowest cost option for reducing GHG emissions and reducing the risks of climate change. The committee's previous inquiry examined the economic and environmental potential of energy efficiency improvements for households, communities, industry and government in Queensland. The report from that inquiry, '*Energy efficiency – Queensland's first energy resource*' noted research by leading energy researchers, McKinsey and Company, in their paper on an Australian carbon emissions abatement cost curve. The paper identified energy efficiency improvements as offering the best carbon abatement returns for the Australian economy per dollar spent – the 'low hanging

¹¹⁵ Stanwell Corporation Limited, *Submission No. 46*, p. 3.

¹¹⁶ Stanwell Corporation Limited, *Submission No. 46*, p. 3.

¹¹⁷ "Gas-fired generation" is electricity generated from eligible fuels such as: natural gas (e.g. liquefied natural gas or compressed natural gas), coal seam gas (including waste coal mine gas), liquefied petroleum gas and waste gases associated with conventional petroleum refining.

¹¹⁸ DEEDI *Queensland Gas Scheme 2009 liable year Annual Report*, 2010, p. 1.

¹¹⁹ DEEDI, 'Queensland Gas Scheme', 2011, retrieved from http://www.dme.qld.gov.au/Energy/electricity_generation_from_gas.cfm on 21 March 2011.

¹²⁰ A Gas Electricity Certificate (GEC) is an electronic certificate created by accredited generators for each whole MWh of eligible gas-fired electricity generated. GECs are a mechanism for providing an incentive to the power stations to generate electricity using eligible fuels. The accredited parties can trade GECs to other registered scheme participants through the GEC market. Retrieved from http://www.dme.qld.gov.au/Energy/gas_electricity_certificates.cfm on 21 March 2011.

¹²¹ DEEDI, *Queensland Gas Scheme 2009 liable year Annual Report*, 2010, p. 1.

¹²² Queensland Treasury, *Shareholder Review of Queensland Government Owned Corporation Generators – November 2010*, Office of Government Owned Corporations, 2010, p.7.

fruit' that actually achieve net savings, enough to pay for additional, more costly, carbon reduction measures.¹²³ Of particular note, McKinsey and Company suggested that investing in energy efficiency improvements reduces carbon emissions more cost-effectively than investing in renewable energy.

122. Comparable audits of other programmes have found that the deployment of renewable technologies in order to achieve emissions abatement delivers expensive abatement. For example, using a Federal Government programme, the recent Australian National Audit Office Performance Audit Report estimated the cost of greenhouse gas abatement achieved through the deployment of solar PV generation under the Solar Homes and Communities Plan programme to be around \$447 per tonne CO₂-e.¹²⁴
123. Individual energy efficiency improvements have been shown to be cost-effective for reducing energy usage and costs, while also reducing GHG emissions. Just one of the energy efficiency programs, the E3 Equipment Energy Improvement Program targeted at commercial and industrial equipment and household appliances and equipment, had a projected net benefit of \$5.83 billion over the fifteen years to 2024, with a benefit cost ratio of 2.8:1 using a five per cent discount rate. In other work, modelling by Powerlink, Ergon Energy and ENERGEX in January 2008 which focused on Queensland initiatives relating to air conditioning load control and the management of commercial and industrial demand, reported a potential reduction of up to 1121 MW of peak demand; \$4.05 billion in utility capital expenditure reductions; and greenhouse gas emissions reductions of 23.2 million tonnes by 2020.¹²⁵
124. More efficient use of energy by consumers helps smooth the 'peaks' of energy demand, alleviating the need for expensive peak generation capacity, which otherwise sits idle most of the time. This means that the need for expensive electricity network augmentation and plant construction necessary for carrying more energy loads can be postponed or even avoided.¹²⁶ It also means that a lesser amount of electricity is required to be generated from coal and gas fired power stations. This has the same effect as increasing the generating output from RE sources.

Committee view

125. As noted in the committee's first inquiry, energy efficiency improvements remain the lowest cost option for reducing the state's energy intensity and meeting GHG emission reduction targets. The cheapest and greenest watt of electricity remains the watt that is not used. Changing energy use behaviours to reduce wasteful energy use and improving the efficiency of appliances and equipment are key prerequisites for an affordable and sustainable switch to cleaner energy sources. Energy efficiency improvements should therefore be pursued as the first priority.
126. In the foreseeable future, Queensland will continue to generate the bulk of its electricity needs from its coal-fired power stations and gas-fired generators which

¹²³ McKinsey and Company, 2008, *An Australian Cost Curve for Greenhouse Gas Reduction*, available at http://www.mckinseyquarterly.com/A_cost_curve_for_greenhouse_gas_reduction_1911.

¹²⁴ Australian National Audit Office Performance Audit Report No 26 2009-10, pp. 5-6; Rio Tinto Alcan Primary Metals Pacific and Rio Tinto Coal Australia, *Submission No. 9*, pp. 4-5.

¹²⁵ Queensland Government, *Submission No. 42*, Inquiry into the economic and environmental potential of energy efficiency improvements, p. 11.

¹²⁶ Queensland Government, *Submission No. 42*, Inquiry into the economic and environmental potential of energy efficiency improvements, p. 11; Robyn Kruk AM, Secretary of the Department of the Environment, Water, Heritage and the Arts, 'Encouraging greater energy efficiency', *Speech to Australian Economic Forum*, Sydney, 20 August 2009, Canberra, retrieved from <http://www.environment.gov.au/about/media/secretary/2009/sp20090820.html> on 12 October 2009.

have lower greenhouse gas emissions. Supplementing coal-fired generators with gas-fired generators and other hybrid systems offers significant and affordable savings in GHG emissions for the future. Generating more of the state's power needs from gas-fired power stations should be the second priority after energy efficiency improvements.

127. The committee also notes that the emerging LNG industry and the resulting availability of large supplies of 'ramp up' gas will significantly increase gas supplies that could be used for electricity generation. In our view, the prescribed percentage of electricity to be sourced from gas-fired generation under the Queensland Gas Scheme should be increased to 20 per cent by 2020.

Recommendation 2:

That the government should continue to pursue energy efficiency improvements and efforts to minimise energy wastage as a priority to achieve GHG abatement targets.

Minister responsible: Minister for Energy and Water Utilities

Recommendation 3:

That the government should increase the prescribed percentage for the proportion of electricity to be sourced from gas-fired generation under the Queensland Gas Scheme to 20 per cent by 2020.

Minister responsible: Minister for Energy and Water Utilities

Setting a Queensland target for renewable energy electricity

128. A key feature of the Federal Government's approach to renewable energy policy is its target of 20 per cent of electricity sourced from renewable energy sources nationally by 2020. Governments in over 73 countries have set similar renewable energy policy targets. Targets have been used to set objectives in many areas of government policy to drive key reforms and galvanise agencies into action. These targets have proved useful for strengthening political resolve and stakeholder accountability, encouraging better designed and managed programs, improved performance (especially when targets are ambitious), better use of public resources and increased motivation of stakeholders. In road safety, for example, the value of setting national targets to improve road safety performance is widely acknowledged. Countries with quantitative targets have been found to perform better than countries without targets.¹²⁷
129. Four other Australian states have adopted state-based RE targets. The Victorian Government, prompted by the failure of the then Federal Government to expand the existing MRET scheme, set a target in 2009 of 10 per cent of electricity to be generated from renewables by 2016. This target was subsequently amended to be part of the national RE target when it was established. The New South Wales government in 2006 set targets of 10 per cent renewable energy consumption by 2010 and 15 per cent by 2020. In the 2009 State Plan, the target was revised up to 20 per cent renewable energy consumption by 2020 in light of the Federal Government's expanded RET. South Australia has committed to 20 per cent by 2014. These targets reflect a number of factors that determine energy demand and the energy mix such as population and population density, the presence of energy intensive industries and the close proximity of renewable energy resources.

127 See OECD, *Towards Zero: Ambitious Road Safety Targets and the Safe System Approach - Summary Document*, Paris, 2008 p.10; and European Road Safety Observatory, *Quantitative road safety targets*, 2006, retrieved from http://ec.europa.eu/transport/road_safety/index_en.htm on February 13, 2008.

130. Within the energy sector, the Queensland Government has used a target approach over the last decade to expand the gas-fired electricity sector. The Queensland Gas Scheme, introduced under the *Cleaner Energy Strategy 2000*, provided the impetus for a multi-billion dollar industry. The scheme was designed to diversify the state's energy mix towards the greater use of gas, and reduce the greenhouse gas emissions intensity of Queensland's electricity sector. It requires electricity retailers and other major users to source 15 per cent of electricity from gas-fired generators.¹²⁸ Over a seven year period, the scheme has guided investment decisions by industry and boosted Queensland's gas-fired generation capacity from 900 MW to over 3500 MW.¹²⁹
131. Whilst the Queensland Government is signatory to the national renewable energy target, it has not agreed to an explicit state REE target. The government has, instead, committed to securing a 20 per cent share of federal funding for investment in REE. While a significant and worthy target of itself, securing federal funding does not directly add to the state's REE generating capacity.
132. According to the Queensland Government, renewable energy accounted for seven per cent of Queensland's total energy generation capacity in 2010, and will need to reach 16.7 per cent of total energy generation to achieve the aim of QREP.¹³⁰ The committee notes that these figures include solar water heating.

Support for a Queensland REE target

133. Almost half (48 per cent) of submission to the inquiry supported the establishment of a state REE target. As noted by the Queensland Conservation Council:

Good business planning is based upon the identification of goals and aspirations. Setting these provides a context and reference point for subsequent direction. Establishing a goal for the uptake and growth of renewable energy in this state makes strategic sense and provides a clear direction for state agencies and other stakeholders.¹³¹

134. Similarly, the Clean Energy Council noted that the introduction of a state-wide REE target which is complementary to the national RET will help the Queensland Government to drive the corresponding policy measures required to achieve a higher proportion of renewable energy in its energy mix.¹³² Other submissions argued that a state REE target would demonstrate the government's commitment to RE, provide greater certainty for investors in an uncertain environment and help attract investment.
135. Three further submissions gave qualified support for a state REE target.¹³³ The Australian Sugar Milling Council supported a state target, but not a separate scheme to the Federal Government's RET scheme.¹³⁴ Transfield Holdings argued in their submission that imposing a single target is problematic, and that an 'RE mix' target suite should be explored:

This approach would aggregate measures that combine regions with suitable, region-specific RE types. These targets could include standalone and hybrid energy solutions.¹³⁵

¹²⁸ The target increased to 15 per cent in 2010.

¹²⁹ DEEDI, *Gas – Queensland's Energy Futures*, retrieved from www.energyfutures.qld.gov.au on 24 February 2011.

¹³⁰ Hon S Robertson MP, *Correspondence*, 15 November 2010, p. 2.

¹³¹ Queensland Conservation, *Submission No. 52*, p. 5.

¹³² Clean Energy Council, *Submission No. 19*, p. 3.

¹³³ Ergon Energy, *Submission No.45*; Transfield Holdings, *Submission No.49*; GE Energy Australia and New Zealand, *Submission No.56*.

¹³⁴ Australian Sugar Milling Council, *Submission No.38*, p.8.

¹³⁵ Transfield Holdings, *Submission No.49*, pp. 6-7.

Arguments against a state REE target

136. Just over a quarter of submissions (27 per cent) argued against having a state REE target.¹³⁶ A further 17 submissions (28 per cent) did not address the target issue.
137. The Queensland Resources Council argued that there should be no state target as the benefits of REE, in terms of cost effectiveness, industry development and employment are largely unproven. The council also suggested that interventionist policies will be more costly than market-based solutions and that there should be a clear, predictable and long-term carbon price signal. A state REE target would, they added, create additional distortions and drive up costs further, and mandating additional REE supply may have cost impacts on trade-exposed resources.¹³⁷
138. Reasons cited in other submissions for not having a state target include: that the benefits of a state target are unproven; it may encourage a watering down of current checks and balances on REE projects; it could distort the state's energy market; it could expose Queensland energy consumers to higher energy costs and affect the cost competitiveness of businesses; it could duplicate the federal REE target; and existing interstate REE targets (Vic, SA, WA and NSW) are being subsumed by the national target or cancelled.
139. Ergon Energy recommended that the Queensland Government consider working closely with the Federal Government's expanded RET scheme, rather than duplicating it, to avoid additional administrative costs for generation developers and electricity entities. They further added that any state target above the expanded RET could be considered 'aspirational' rather than a mandatory target, and one that builds on the national scheme to encourage renewable energy investment in Queensland and measure Queensland's relative performance to the rest of Australia.¹³⁸ Ergon also rejected the option of a regional industry-based target, as canvassed in the committee's issues paper for comment. This, they argued, could be inequitable, difficult to set and monitor, and would create an unwarranted administrative burden on commercial and industrial customers.¹³⁹
140. In their submission, GE Energy supported a national target rather than separate state RETs and suggested that the national RET should be the prime driver for RE projects in Australia. However, they supported an investigation into the feasibility of a state-based energy efficiency target.¹⁴⁰
141. The Queensland Government, in supplementary advice to the committee, clarified that mandatory state-based targets are unenforceable under the RET legislation. This is due to a head of power in the Commonwealth *Renewable Energy (Electricity) Act 2000* that ensures corporations need not comply with any state laws for a scheme that substantially corresponds to the Commonwealth's RET.¹⁴¹

¹³⁶ Submission Nos: 6, 7, 9, 24, 32, 36, 39, 45, 46, 47, 48, 49, 50, 51, 56, and 63.

¹³⁷ Queensland Resources Council, *Submission No. 36*, p. 6.

¹³⁸ Ergon Energy, *Submission No. 45*, p. 9.

¹³⁹ Ergon Energy, *Submission No. 45*, p. 9.

¹⁴⁰ GE Energy Australia and New Zealand, *Submission No. 56*, pp. 4-5.

¹⁴¹ Hon S Robertson MP, *Correspondence*, 15 November 2010.

Committee view

142. There is a role for the Queensland Government to set an aspirational target, or targets, for the incremental expansion of the state's renewable energy electricity generating capacity consistent with the Federal Government's target. A mandatory target would be unenforceable and impractical given the provisions contained in the Commonwealth *Renewable Energy (Electricity) Act 2000*. However, having a Queensland-specific aspirational target or targets in addition to the goal of securing a 20 per cent share of federal funding for investment in renewable energy electricity generating capacity, would provide clear, unambiguous evidence of the government's commitment and resolve to support a vibrant renewable energy electricity sector. This would provide greater certainty and help to attract and secure future investment.

The quantum and form of a Queensland REE target

143. The committee's issues paper sought comment on the shape and form that a Queensland REE target should take.

144. Fifteen submissions¹⁴² called for a Queensland REE target that is higher than the federal RE Target. They included three submissions that supported a target of 50 per cent of electricity to be REE by 2020. Five submissions supported a target of 100 per cent renewable by 2020.¹⁴³

145. The submissions that supported a 100 per cent target cited a 2010 report titled *Zero Carbon Australia Stationary Energy Plan* by Beyond Zero Emissions and the University of Melbourne's Energy Research Institute.¹⁴⁴ The report sets out a comprehensive strategy to meet 100 per cent of Australia's energy needs from renewable energy sources by 2020. This would be achieved by utilising energy efficiency and using concentrated solar thermal power towers, wind power, crop-waste biomass and hydroelectricity (as a back-up power-source to provide for periods of wind and solar shortfalls), and by creating a national grid in order to assist with smoothing out the differences in outputs. The report costs the plan at \$370 billion (\$37 billion per annum over ten years, approximately three per cent of GDP). If repaid from electricity sales from 2011-2040, the cost is calculated to equate to \$8 per household per week.

146. The committee sought advice on the plan from the Queensland Government. In his response, Hon Robertson MP praised the plan but raised concerns about its viability:

While the Queensland Government encourages the move towards a renewable energy future, I am informed the plan fails to fully account for many of the costs and other implementation issues associated with transitioning to renewable technologies.

The ten-year timeframe for implementing the plan appears to be extremely ambitious, as it requires the construction of extensive and costly new generation and transmission infrastructure.

The plan states that more jobs would be created with the construction of a 100 per cent renewable energy grid than would be lost through the phase out of fossil fuel industries. However, the economic models do not consider transition costs for the fossil fuel industry, for example the cost of stranded assets.

...

¹⁴² Submissions Nos: 1, 12, 22, 23, 25, 27, 37, 38, 40, 41, 42, 52, 53, 54, and 55.

¹⁴³ Submissions Nos: 12, 23, 52, 54, and 55.

¹⁴⁴ Beyond Zero Emissions and the University of Melbourne's Energy Research Institute, *Australian Sustainable Energy Zero Carbon Australia Stationary Energy Plan*. University of Melbourne, July 2010.

The plan's consideration of factors such as population growth is not clearly articulated, nor does it discuss the opportunities presented for energy savings through energy efficiency, energy conservation and distributed generation.¹⁴⁵

147. Four submissions¹⁴⁶ called for a state target equivalent to the national REE target, and two submissions advocated a lesser target of only six per cent by 2020.¹⁴⁷ The committee notes that this level of REE output has already been achieved in Queensland.
148. The Brisbane City Council submitted that a Queensland target should at least be an equitable (by population) share of the 20 per cent RET, and that a single output target would allow the most cost-effective technologies to roll out in the most favourable locations. Technological and/or regional targets, they submitted, could potentially distort the market.¹⁴⁸
149. The committee also noted a proposal for a state solar energy target flagged by the former Victorian Government. The target was canvassed in a white paper released in 2010. The target proposed would require that five per cent of the state's electricity would be generated from solar energy by 2020. However, Queensland is on track to be well ahead of Victoria in terms of solar electricity generated by 2020. Queensland is predicted to have 290 MW of solar thermal and solar PV electricity generating capacity. This would represent 13.6 per cent of the 2020 projected electricity output for Queensland of 2135 MW.¹⁴⁹
150. Powerlink's submission noted that local energy generation (including from renewable sources) is expected to have application for some remote communities where REE may prove an economic substitute to a very long, costly network extension. These areas tend to fall outside Powerlink's grid territory, and are in regions serviced by Ergon Energy's distribution network or other local generation (i.e. diesel).¹⁵⁰ The committee notes that QREP lists supporting renewable energy in rural and remote areas-to reduce costs and dependence on oil (for locations still using diesel generators) as a priority for the future.¹⁵¹
151. There may also be potential for some smaller scale localised generation using solar and other renewables connected to distribution networks to delay the need for upgrades. However, this is likely to be affected by the time of day at which the summer peak demand occurs in various geographical regions around the state.¹⁵²
152. The committee noted Ergon Energy's renewable energy generation projects, and goal to have a diesel-free isolated generation portfolio by 2050. Ergon Energy stated in its submission that its 33 diesel-fired generators in isolated communities pose a financial risk to the organisation, as factors outside its control could see operating costs skyrocket, with few short-term alternatives to paying higher prices for diesel. Ergon Energy has a target to replace all diesel generators with renewable energy generation by 2050. Ergon also suggested that additional government support to accelerate this program of work would represent a prudent and, in the long term, cost-saving strategy.¹⁵³

¹⁴⁵ Hon S Robertson MP, *Correspondence*, 14 October 2010.

¹⁴⁶ Submissions Nos: 5, 11, 14 and 18.

¹⁴⁷ Submissions Nos: 13 and 44.

¹⁴⁸ Brisbane City Council, *Submission No. 5*, p. 2.

¹⁴⁹ Based on figures provided by Hon S Robertson MP, *Correspondence*, 15 November 2010.

¹⁵⁰ Powerlink Queensland, *Submission No. 17*, p. 4.

¹⁵¹ Queensland Government, *Submission No. 63*, p. 12.

¹⁵² Powerlink Queensland, *Submission No. 17*, p. 4.

¹⁵³ Ergon Energy, *Submission No. 45*, p. 10.

153. They further advised that the value of RE generation to electricity network operators is, as a rule, greater in remote but still grid-connected areas and isolated communities than in urban or semi-urban areas. Isolated communities have few or no alternatives to diesel-fired base load generation. Additional government support to accelerate achievement of a diesel-free isolated generation portfolio would be a prudent investment.¹⁵⁴ According to the Centre for Appropriate Technology submission, much of the housing in remote communities is government-owned and households are not in a position to explore small generation units or access rebates.¹⁵⁵

Committee view

154. As noted in Part 2, the Federal Government's programs to assist and drive investment in REE and its target of 20 per cent of electricity sourced from renewable by 2020 are the primary drivers of the growth of the RE sector in all states and territories. Having a Queensland state REE target in place, consistent with the national target, will help to drive the expansion of the state's REE sector and show unequivocally that the government is committed to achieving it.

155. The committee does not recommend that the government sets arbitrary regional or industry-specific targets. Similarly, targets for specific RE technologies, rather than an aggregate target for REE output, are problematic. With RE technologies still evolving, it is impossible to make long-term projections with any certainty about future advances and investments in particular RE generating technologies.

156. There are, however, other worthy objectives for REE generation that could be assisted by a state aspirational target. One is to seek to end the reliance on diesel generators for providing primary electricity supplies in towns and communities that are remote from the electricity grid, particularly the state's remote indigenous communities. This would provide a significant boost to the development of REE generating capacity in remote areas of the state. Logically, this is where renewables have a natural advantage.

Recommendation 4:

That the government should set an aspirational target for Queensland of 20 per cent of the state's electricity needs to be generated from renewable energy sources by 2020, consistent with the Federal Government's national renewable energy target.

Minister responsible: Minister for Energy and Water Utilities

Recommendation 5:

As a further Queensland target, the government should aim to replace diesel generators with renewable energy systems as the primary source of electricity in all the state's remote Indigenous communities by 2020.

Minister responsible: Minister for Energy and Water Utilities

Preparing the electricity network for renewables

157. The development of REE in Queensland will in many ways be shaped by the design and coverage of the state's electricity grid operated by Powerlink. As noted earlier, the proximity of RE resources to the grid and the grid's ability to accommodate intermittent loads have a major bearing on the viability of RE generating projects. The design of the grid also influences the way that generating capacity is utilised.

¹⁵⁴ Ergon Energy, *Submission No. 45*, p. 12.

¹⁵⁵ Centre for Appropriate Technology, *Submission No. 59*, p. 2.

158. Powerlink submitted that some of the most pressing barriers to the development of the state's REE sector relate to the transmission grid. The 20 per cent renewable energy target will require the grid to be further developed in Queensland to accommodate the connection of remote, large-scale renewable generators.¹⁵⁶ Significant investment in the Queensland grid to ensure its integrity has already been foreshadowed by the Premier's Council on Climate Change. In a 2009 study, the council reported that approximately \$15 billion of energy infrastructure investment would be required by 2020 to maintain peak demand at current levels.¹⁵⁷
159. The Queensland Government is already considering expanding the grid in north Queensland. Its *Northern Economic Triangle Infrastructure Plan 2007-2012* recognises the importance of secure and competitively-priced energy to the North West Minerals Province and of harnessing emerging renewable energy opportunities between Mount Isa and Townsville. In August 2009, the Queensland Government accepted the recommendations of an independent review of North West Queensland energy options and commenced a 12 month, customer-driven competitive process to determine a long-term energy solution for the region.¹⁵⁸
160. As one outcome of this process, the CopperString Project was selected by major energy customers to progress to a detailed feasibility study. This project proposes the construction of a high-voltage transmission line connecting the national electricity grid near Townsville, to Mount Isa. If successful, the transmission line has the potential to open the door to large-scale investment in known RE resources along the Townsville to Mount Isa corridor, significantly addressing the cost of connecting RE generators and barriers to entry.¹⁵⁹
161. The Clean Energy Council argued that an analysis to determine the current and potential constraints on the transmission network for distributed generation and for larger scale projects would be of great benefit to address connection barriers. The CEC noted that there is significant potential for co-ordinating the planning of transmission lines with generators and between the states to capture the co-location and economy of scale benefits of building energy transmission infrastructure. This is particularly important with regard to the remoteness of some of Queensland's RE resources. The council's submission included a paper on issues to be addressed to improve the efficiency of transmission development.¹⁶⁰

Developing renewable energy zones

162. An alternative approach to solving grid access barriers for REE projects is to co-locate projects that can share grid access costs.
163. The Australian Energy Market Commission's (AEMC) *Review of Energy Market Frameworks in light of Climate Change Policies* (September 2009) recognised that, due to the characteristics of resources for renewable generation, this new generation is likely to develop in clusters around fuel sources in certain (remote) geographic areas. The review concluded that there were opportunities for improvements to the existing energy market framework to overcome potential hurdles facing investment to connect some new areas of generation. It also found that these changes should promote the efficient connection of clusters of this new generation to the electricity network as it connects over time, so as to take

¹⁵⁶ Powerlink Queensland, *Submission No. 17*, p. 4.

¹⁵⁷ Department of Environment and Resource Management, 'Building ClimateSmart in Queensland – Building and regulatory reform', *A Premier's Council on Climate Change Report*, Queensland, 2009, p. 8.

¹⁵⁸ Queensland Government, *Submission No. 63*, p. 7.

¹⁵⁹ Queensland Government, *Submission No. 63*, p. 7.

¹⁶⁰ Clean Energy Council, *Submission No. 19, 2010*, p. 3; Attachment A (MMA, 'Transmission Issues for Remote Renewable Energy Generation', *Report to Clean Energy Council*, 2010).

advantage of scale economies. The AEMC is currently consulting on the changes to the rules that will be required to achieve this objective.¹⁶¹

164. Infigen submitted that the Queensland Government should consider changes to the planning scheme to encourage renewable energy generation plants in appropriate locations, as has been done in Victoria. Such changes provide the necessary planning guidance to encourage renewable energy developers to initiate and progress renewable energy projects.¹⁶²
165. The Queensland Government is creating RE zones - initially in Mt Isa, Surat Basin and central Queensland areas. The government has also committed, through the *South East Queensland Regional Plan 2009-2031*, to 'Identify and protect optimal locations for low emission, RE resources, taking into consideration needs and constraints arising from market mechanisms, infrastructure and growth'.¹⁶³

Smart Grid technology

166. There are promising opportunities to improve the efficiency of the electricity grid for the deployment of renewables and better use of electricity through investment in Smart Grid technology.
167. A smart grid uses information and communications to improve the efficiency and effectiveness of power generation, transmission, distribution and usage. Its applications can be categorised broadly as grid-side, customer-side and enabling applications. The potential societal benefits for Australian from smart grids encompass:
- Direct financial impact, including operating and capital cost savings and potential to lower bills for consumers;
 - Reliability, including fewer outages and injuries and improved power quality;
 - Environmental, assisting customers to adapt to a carbon-constrained future through, for example, energy efficiency and supporting increased use of renewable energy; and
 - Customer empowerment, including greater transparency and choice, and distributed generation.¹⁶⁴
168. Smart grid technology has particular benefits for RE and electric vehicles (EVs) by enabling distributed storage (which may include electrical vehicle elements); distributed generation (e.g. solar photovoltaic on residential roof tops); and electric vehicle support.¹⁶⁵
169. The Federal Government announced in the 2009 Federal Budget the availability of up to \$100 million for the implementation of a fully integrated smart grid at commercial scale, through the National Energy Efficiency Initiative (NEEI). This will be an important trial of the technology on a commercial scale.
170. The Federal Government's investment in Smart Grid, Smart City was subject to a pre-deployment study. Preliminary analysis carried out in the course of this study indicates that implementing smart grid technologies across Australia could deliver at

¹⁶¹ Powerlink Queensland, *Submission No. 17*, p. 5.

¹⁶² Infigen Energy Limited, *Submission No. 44*, p. 6.

¹⁶³ Department of Infrastructure and Planning, *South East Queensland Regional Plan 2009-2031*, 2009, p. 127 cited in GE Energy Australia and New Zealand, *Submission No. 56*, p. 7.

¹⁶⁴ Department of the Environment, Water, Heritage and the Arts, *Smart Grid, Smart City A new direction for a new energy era*, Canberra, 2009, p. 13.

¹⁶⁵ Department of the Environment, Water, Heritage and the Arts, 2009, p. 18.

least \$5 billion of gross annual benefit to Australian society.¹⁶⁶ While the Queensland bid for this demonstration project funding was unsuccessful, the project still holds enormous potential value to Queensland.

171. Electric vehicles have emerged globally as a favoured technology option for combating oil dependency, petroleum price volatility, air pollution and GHG emissions from the transport sector.¹⁶⁷ It appears that every major car maker in the world is intending to have production plug-in vehicles launched by 2014. A study by Deutsche Bank estimated that 51 EV models will be in production by 2012.¹⁶⁸ The potential market penetration of EVs in Australia could be as high as 15-20 per cent by 2020.¹⁶⁹
172. Compared to petrol vehicles, EVs produce almost no emissions of carbon monoxide, non-methane volatile organic compounds or particulate matter. Electric vehicles draw around 3kW of power whilst being recharged which is similar to the electricity consumption of three small single-room wall-mounted air-conditioner.¹⁷⁰
173. Simpson (2009) examined the GHG savings of EVs compared to petrol vehicles and concluded that the GHG savings of EVs are highly dependent on vehicle efficiency and the source of electricity used to charge the EVs. In most cases (including the national average grid), the relative GHG emissions of EVs are lower than conventional petrol vehicles.¹⁷¹ Depending on when and how they are charged and the extent that the resultant loads on the electricity grid are managed, the widespread take-up of EVs could also add to peak demand and significant new pressures on critical electricity infrastructure.
174. Better Place Australia in their submission proposed that the Queensland Government mandates the use of renewable energy for EVs to maximise the benefits for the RE sector. They argued that electric vehicles powered by 100 per cent renewable energy, directly displace carbon emissions in the road transport sector and that switching to EVs powered by RE sources such as wind power is considered to be one of the most effective options to reduce carbon dioxide emissions at the rate of four tons of carbon emissions displaced annually from the atmosphere for each EV.¹⁷² This could be achieved by requiring EV owners to utilise GreenPower for charging.

Committee view

175. The expansion of renewable energy electricity in Queensland will depend on the proximity of the grid to high quality renewable energy resources, and the ability of the grid to handle intermittent power sources. Investment in the grid will be needed to exploit the state's best renewable energy resources and ensure the reliability of electricity supply. The arrival of electric vehicles and the added demand for electricity for charging will likely place additional pressures on the grid.

¹⁶⁶ Department of the Environment, Water, Heritage and the Arts, *Smart Grid, Smart City A new direction for a new energy era*, Canberra, 2009, p. 7.

¹⁶⁷ A. Simpson, *Environmental Attributes of Electric Vehicles in Australia*, Curtin University Sustainability Policy Institute, July 2009.

¹⁶⁸ Deutsche Bank, *Electric Vehicles: Plugged-In 2*, Deutsche Bank, Frankfurt, 2009 (cited in Better Place Australia, Submission No. 58, 2010, p. 6).

¹⁶⁹ Better Place Australia, *Submission No. 58*, 2010, p. 4.

¹⁷⁰ This analogy is from a Better Place Australia fact sheet (*Can Australia's electricity grid cope with electric vehicles?*, retrieved from www.australia.betterplace.com on 16 February 2011). The unit example cited is a three star-rated reverse cycle, single split system air conditioner with output range of 3kW to 4kW and a power input of 0.9 kW.

¹⁷¹ A. Simpson, *Environmental Attributes of Electric Vehicles in Australia*, Curtin University Sustainability Policy Institute, July 2009.

¹⁷² Better Place Australia, *Submission No. 58*, 2010, p.2.

176. The committee supports the government's work to explore options for the CopperString Project to extend the grid from Townsville to Mt Isa for the dual purpose of meeting the needs of the Western Minerals province and communities in the region and providing grid access points for future renewable energy generators. In our view, this approach provides a good model for expanding the grid into other areas where there are high quality renewable energy resources as well as large scale electricity users to share the costs of the grid extension.
177. The committee welcomes the government's proposal in *The Queensland Renewable Energy Plan* to establish renewable energy zones. The committee also notes the potential benefits of smart grid technology, and the Federal Government's Smart Grid Smart City trial in Newcastle. We encourage the Queensland Government to monitor the outcomes of this smart grid trial with a view to its suitability and feasibility for Queensland.
178. The committee noted the potential impact of electric vehicles in Queensland on the electricity network and for significant reductions in carbon emissions to be achieved if charged using electricity from renewable energy sources.

Feed in tariffs

179. A feed-in tariff (FiT) scheme is one policy option available to encourage RE with grid-connection.¹⁷³ FiT laws place an obligation on energy companies to purchase electricity from renewable sources at a premium price. In Australia there are two types of FiT systems - a gross and a net model. A gross FiT provides a payment for all the energy produced by a system.¹⁷⁴ A net FiT only provides a payment for the excess energy produced.¹⁷⁵
180. Germany, for example, has demonstrated that FiTs can be used as a powerful policy tool to drive RE deployment and help meet emissions reductions objectives. In 1991, Germany introduced a national gross FiT which provided access to the grid, set a premium price per kWh, and was guaranteed for 20 years. The objective was to provide security for RE investments for producers, manufacturers, investors and suppliers. In 2010 the share of electricity generated in Germany from RE sources increased to 17 per cent. The contribution of electricity from solar power almost doubled to around 2 per cent of total electricity demand.¹⁷⁶
181. Queensland has a net FiT scheme. The Queensland Government Solar Bonus Scheme (QGSBS), which commenced on 1 July 2008, provides owners of solar PV systems up to 10 kW (open to residential, business and community buildings) with a minimum payment of \$0.44 per kWh over 20 years for surplus electricity fed back into the electricity grid.
182. Submitters raised a number of issues with the committee about FiTs. Key issues included: the design and type of FiT; expanding the FiT to other renewable technologies; and support for a national FiT regime.
183. A number of submitters argued against premium FiT arrangements.¹⁷⁷ The Energy Supply Association of Australia (ESAA) argued that such mechanisms are:¹⁷⁸

¹⁷³ R Kuwahata and C Rodríguez Monroy, *Market stimulation of renewable-based power generation in Australia*, Department of Business Administration, School of Industrial Engineering, Technical University of Madrid, Madrid, Spain, 2010.

¹⁷⁴ This tariff is available in ACT, NSW.

¹⁷⁵ This tariff is available in VIC, QLD, SA, TAS, WA.

¹⁷⁶ Media release issued 16 March 2011 by Germany's Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. Retrieved from Ministry <http://www.erneuerbare-energien.de/inhalt/47124/3860/> on 26 March 2011.

¹⁷⁷ Submission No's: 5, 14, 34, 41, 45, 50 and 59.

¹⁷⁸ Energy Supply Association of Australia, *Submission No. 50*, pp. 3-4.

- *Market distorting*: as FITs are recovered from other energy consumers they result in increased network and/or retail prices.
- *Inequitable*: FITs are socially regressive, in that those with the financial resources to own a home and afford the initial capital outlay for solar photo voltaic systems are cross subsidised by other users through increased energy costs.¹⁷⁹
- *Expensive abatement*: Given the high capital cost of solar PV the cost of abatement can also be significant. Recent studies show the cost of abatement can range from \$484 per tonne of carbon to \$1,500 per tonne per tonne of carbon.¹⁸⁰ This compares unfavourably in comparison with Certified Emission Reductions under the Kyoto Protocol's Clean Development Mechanism currently trade at around \$17 per tonne of CO₂e, and offset credits under Australian programs including the NSW Greenhouse Gas Reduction Scheme have typically ranged between \$3 and \$15 per tonne of CO₂e.
- *Inflexible*: FITs are inflexible in that they constrain the price of certain types of electricity for long periods and must be subject to review and administration, the costs of which are ultimately borne elsewhere in the system.

184. Conergy in their submission told the committee that the current Queensland FiT scheme is a barrier to increasing the use of RE for generating electricity for further investment in the industry. Together with other submitters, they advocated that it be replaced with a gross FiT scheme for both small and large scale RE.¹⁸¹

185. The Centre for Appropriate Technology argued that a net FiT provided less financial incentives. They explained that:¹⁸²

...this is especially true for indigenous households with energy use patterns spread more evenly throughout the day and in particularly peak solar hours. This contrast with a working family in suburban Brisbane who would be out of the house for most peak solar hours and maximise benefit from a net FiT.

186. The committee was also told that some 'savvy' solar customers are delaying their electricity usage from the middle of the day to the early evening, maximising their FiT earnings whilst increasing their peak electricity demand.¹⁸³

187. Ergon Energy, on the other hand, argued that solar PV systems provide the most accessible REE for residential and other small customers. They further suggested that FiTs combined with Federal Government rebates offer customers an acceptable pay-back period for their investment. Ergon Energy advised the committee that:¹⁸⁴

As at May 2010, Ergon Energy had nearly 6,500 solar PV systems connected to its network under the Solar Bonus Scheme, with a combined maximum generating capacity of around 10 MW. Over the six months prior to May, Ergon Energy facilitated credits of around \$140,000 per month on average under the FiT within the scheme.

188. Ergon Energy acknowledged that the initial cost is still a barrier for some customers, though did not advocate an increase in the FiT, or a change to a gross FiT, especially in the context of the cost of the FiT being borne by entities such as

¹⁷⁹ This point was recently substantiated by the Australian Bureau of Statistics which found that Victorian higher income households were more likely to have more environmentally sustainable sources of energy than lower income households. See media release 23 June 2010 on www.abs.gov.au for further information.

¹⁸⁰ See for example the ACT Government Discussion Paper 'National Capital to Solar Capital: Options for an Expanded ACT Electricity Feed-in Tariff Scheme' and Tasmania Department of Infrastructure, Energy and Resources 'Feed-in Tariffs Discussion Paper'.

¹⁸¹ Submission Nos: 3, 12, 23, 41, 42, 45 and 59.

¹⁸² A Centre for Appropriate Technology, *Submission No. 59*, p. 3.

¹⁸³ The Solar Guys, Submission No. 14, p. 2; Ergon Energy, *Submission No. 45*, p. 6.

¹⁸⁴ Ergon Energy, *Submission No. 45*, p. 5.

itself.¹⁸⁵ Their rationale is that the current and future predicted annual rises in electricity prices, as well as energy conservation initiatives, are already providing an incentive for customers to invest in solar PV systems.¹⁸⁶

189. In a response to a question from the committee, the Queensland Government advised that the cost of FiTs to government and consumers has a minimal impact on electricity prices. They further advised:

...Ergon Energy predicts that the network tariff component of the annual electricity bill for the 573,000 customers who consume less than 26 MWhs per annum will increase by approximately 0.03 cents per KWh. In addition, ENERGEX has forecast an increase in network tariffs of approximately 0.02 cents per KWh, attributable to the solar bonus payments. For customers on notified prices, there is not a one-to-one relationship between an increase in the network tariffs and an increase in the notified prices.¹⁸⁷

190. A report prepared by ROAM Consulting for the Clean Energy Council titled *Impact of renewable energy policies on retail electricity prices* concluded that the combined cost of large and small scale renewable energy schemes and state-based FiTs from 2011-2020 would make up 4-7 per cent of electricity bills.¹⁸⁸ According to the report:

Even in the most aggressive scenarios the combined renewable schemes are likely to contribute less than 10 per cent of retail electricity tariffs. Sharp rises in household power bills are being driven by rising network costs and retailer margins not renewable energy.¹⁸⁹

191. If FiTs are to be implemented successfully, ongoing review and monitoring is required to ensure they are cost-effective. Some are not. The NSW FiT scheme, for example which offered a gross tariff of \$0.60 per KWh, had been shown to be costing between \$520 and \$640 for each tonne of carbon dioxide reduced, compared to the proposed \$23/tonne of carbon dioxide for in the proposed Federal Government carbon pollution reduction scheme.¹⁹⁰ In NSW, owners of small scale PV systems were being paid \$600 per MWh for electricity generated, compared to the \$52 per MWh being paid to conventional electricity providers.¹⁹¹ The NSW Government has since reduced the tariff to \$0.20 per KWh which is considerably less than the Queensland tariff of \$0.44 per KWh.

192. One option to improve the cost-effectiveness of FiTs is to extend coverage to other RE technologies. The committee heard from a number of submitters who argued in support of a FiT for other forms of RE generation to encourage a more distributed generation of RE.¹⁹² Timber Queensland commented in their submission that the introduction of appropriate FiT rates for biomass energy would help to grow the industry, explaining that:¹⁹³

...the capital costs associated with constructing a biomass facility requires that the power achieve a premium in the market, and even with the current RECs it is very difficult to achieve a hurdle rate of return. Additional support for FiT rates, even if temporary, could assist the industry to develop.

185 Ergon Energy, *Submission No. 45*, pp. 8, 11

186 Ergon Energy, *Submission No. 45*, pp. 10,11

187 Hon S Robertson MP, Correspondence, 17 September 2010.

188 The Clean Energy Council engaged ROAM Consulting to provide a quantitative estimate of future retail electricity prices, particularly identifying the proportion of a residential consumer's electricity bill that is likely to be due to renewable schemes such as the LRET, SRES and state-based FiTs.

189 ROAM Consulting Energy Modelling Expertise report to Clean Energy Council, *Impact of renewable energy policies on retail electricity prices*, 11 March 2011, p 52.

190 National Generators Forum, *Submission to the NSW Solar Bonus Scheme Review*, 2010, p.5.

191 National Generators Forum, 2010, p.5.

192 Submission Nos: 7, 19, 43 and 44.

193 Timber Queensland Limited, *Submission No. 7*, p. 3.

193. Other enhancements to the current FiT proposed in submissions include establishing a separate FiT regime for remote small grids in regional areas, and extension of the FiT coverage to include medium and large scale RE generators.¹⁹⁴ At present, only small scale RE systems up to 10 kW in size are eligible and there is a significant lack of incentive for the installation of medium and large scale systems. The Brisbane City Council argued that this has led to a proliferation of small-scale installations at the expense of large-scale developments.¹⁹⁵ This, they suggest, is distorting the market and small ineffective projects are being deployed in preference to larger, more economically viable projects.¹⁹⁶
194. Ergon Energy told the committee that distributors cannot bear the added costs of introducing RE without an appropriate funding or cost recovery mechanism, as the national framework for the economic regulation of electricity supply limits their scope to recover costs.¹⁹⁷
195. Submissions also called for a national approach to FiTs.¹⁹⁸ The Clean Energy Council supported a national FiT scheme as it would promote harmonisation and easier delivery of measures between states.¹⁹⁹ Origin Energy argued that a national FiT scheme would provide a range of benefits, many of which can be passed onto Queensland households and businesses.²⁰⁰ A nationally consistent approach would, according to Sucrogen Australia, be of substantial benefit to renewable generators, as their income stream is dependent on the value of the FiT, not the more volatile, market-based price of RECs.²⁰¹ The committee notes that the Council of Australian Governments and the Ministerial Council on Energy are committed to the harmonisation of approaches to feed-in tariffs across Australia.
196. Clean Energy Australasia submission called for more debate on how appropriate and at what level the adoption of various renewable technologies matches the requirements of the Queensland community, or how the relative costs compare.²⁰²

Committee view

197. FiTs are a key option for accelerating the deployment of renewable energy electricity systems. The committee acknowledges concerns raised by submitters about the design and limited coverage of the Queensland net feed in tariff system. We also acknowledge that there may be opportunities to expand the scheme to other renewable energy systems and technologies. These opportunities need to be carefully examined together with the likely costs and benefits. The committee also acknowledges the importance of a consistent approach across all states through a national feed in tariff.

¹⁹⁴ Submission Nos: 5, 14, 41, 43 and 44.

¹⁹⁵ Brisbane City Council, *Submission No. 5*, p. 3.

¹⁹⁶ Brisbane City Council, *Submission No. 5*, p. 3.

¹⁹⁷ Ergon Energy, *Submission No. 45*, p. 5.

¹⁹⁸ Submission Nos: 32, 43, and 44.

¹⁹⁹ Clean Energy Council, *Submission No. 19*, 2010, p. 3.

²⁰⁰ Origin Energy Limited, *Submission No. 32*, p. 7.

²⁰¹ Sucrogen Australia Pty Ltd, *Submission No. 43*, p. 36.

²⁰² Clean Energy Australasia Pty Ltd, *Submission No. 34*, p. 11.

Recommendation 6:

That the government should consider options to mandate that GreenPower be used for recharging electric vehicles used on Queensland roads.

Minister responsible: Minister for Energy and Water Utilities

Recommendation 7:

That the government should review the existing net feed in tariff scheme for small scale solar photovoltaic installations to ensure the scheme provides appropriate outcomes for electricity consumers and promotes better, more efficient use of energy. This review should consider: the cost of the feed in tariff scheme to electricity consumers; whether the feed in tariff should be extended to other renewable energy technologies as well as solar photovoltaic systems larger than 10 KW; whether the tariffs should be reviewed and adjusted on an annual basis; and the specific tariff rates that should apply.

Minister responsible: Minister for Energy and Water Utilities

Recommendation 8:

That the government, through the Ministerial Council on Energy, should seek the establishment of a uniform, national feed in tariff regime for renewable energy generators.

Minister responsible: Minister for Energy and Water Utilities

Recommendation 9:

That the government should legislate to provide certainty to current and future participants of feed in tariff schemes and confirm that arrangements for existing scheme participants are grandfathered in the event of alterations to the scheme.

Minister responsible: Minister for Energy and Water Utilities

Recommendation 10:

That the government should consider whether upfront subsidies or interest free loans may provide electricity customers with greater incentives to participate in the renewable energy market than the current feed in tariff.

Minister responsible: Minister for Energy and Water Utilities

Tendering for electricity supply agreements

198. Open tendering, also known as competitive bidding, is an effective method for securing REE supply for specific departments, buildings or other facilities at a competitive price. It involves the government deciding on the level of electricity that is desired from each RE source, their growth over time and the level of long-term price security offered to RE generators.²⁰³ Supply contracts are then issued to the successful tenderer. Tendering enables the most cost-effective REE sources to be found.²⁰⁴ Competitive bidding has been used in Ireland, France, the United Kingdom, Denmark and China.²⁰⁵ Tendering has been shown to be effective for encouraging large scale projects, and provides a further avenue for REE generators to secure long-term supply contracts that are crucial to their viability.
199. Competitive bidding is not without its problems. These include the tendency for companies to submit artificially low bids that do not reflect their costs. Low-bidders

²⁰³ AL van Dijk, LWM Beurskens, MG Boots, MBT Kaal, TJ de Lange, EJW van Sambeek & MA Uyterlinde, *Renewable Energy Policies and Market Developments*, 2003, p. 12.

²⁰⁴ van Dijk et al, 2004, p. 12.

²⁰⁵ Greenpeace, *The energy [r]evolution report: a sustainable global energy outlook*, 2008, p. 187.

have not been able to meet their contractual obligations.²⁰⁶ This problem can be avoided by good tender design that includes long contract periods, a clear link to planning consent and a minimum electricity price.²⁰⁷

Recommendation 11:

That the government should examine the benefits and feasibility of allowing open tendering by renewable energy generators for long-term electricity supply contracts for government departments, buildings and other infrastructure.

Minister responsible: Minister for Energy and Water Utilities

GreenPower

200. GreenPower is a joint scheme run by ACT, NSW, SA, QLD, VIC and WA government agencies.²⁰⁸ GreenPower works by offsetting traditional electricity generation with REE.

201. For people in rented premises or who are otherwise unable to invest in solar PV or other RE systems, GreenPower provides the next best option. Within Australia, Queensland is the state with the highest proportion of GreenPower contributors.²⁰⁹ Currently around 250,000 Queenslanders are purchasing GreenPower.²¹⁰ An increase in demand for RE via the GreenPower scheme would enhance the financial business case for renewable energy generation projects across Australia. However, the higher cost of GreenPower compared to non-renewable electricity remains a key barrier for many potential customers.

202. GreenPower costs the customer an average of \$50 a MG/hr (FiTs cost \$400-\$600 per MWh). GreenPower costs are borne by the individual customer, whereas FiT rates are subsidised by the whole community.²¹¹ On this basis, GreenPower is a more cost-effective option for encouraging the growth of REE compared to FiTs.

Recommendation 12:

That the government should consider providing support for renters to purchase GreenPower by providing subsidies based on the Brisbane City Council EzyGreen scheme.

Minister responsible: Minister for Energy and Water Utilities

Recommendation 13:

That the government should consider a scheme to mandate the purchase of GreenPower by households to offset the electricity consumed by pool pumps and air conditioners.

Minister responsible: Minister for Energy and Water Utilities

²⁰⁶ F Beck, and E Martinot, *Renewable energy policies and barriers*, 2004, p. 8; and R Wiser, M Bolinger, L Milford, K Porter, R Clark, *Innovation, Renewable Energy, and State Investment: Case Studies of Leading Clean Energy Funds*, Lawrence Berkeley National Laboratory, Berkeley, CA, 2002, p. 8.

²⁰⁷ Greenpeace, *The energy [r]evolution report: a sustainable global energy outlook*, 2008, p. 187.

²⁰⁸ GreenPower Accredited Renewable Energy, *How GreenPower Works*, retrieved from <http://www.greenpower.gov.au/how-greenpower-works.aspx> on 18 September 2010.

²⁰⁹ National GreenPower Accreditation Program, *Status Report Quarter 4: 1, October to 31 December 2009* 2009.

²¹⁰ Mr Greg Neilsen, Office of Clean Energy, Department of Employment, Economic Development and Innovation, *Briefing Transcript*, p. 59.

²¹¹ P John, Manager, Natural Environment and Sustainability Branch, Brisbane City Council, *Hearing Transcript*, 26 July 2010, p. 32.

What have the Queensland Government's own investments in renewable energy projects for the generation of electricity achieved, and at what cost?

203. One of the key tasks for this inquiry was to consider and make recommendations on the value for money from the Queensland Government's investments in RE projects for electricity generation. This question was also listed for comment in the committee's issues paper for the inquiry.
204. The submissions provided mixed comments on the achievements and outcomes of the government's RE investments. Nine submissions²¹² were supportive of the government-funded RE initiatives. Three submitters²¹³ stated they weren't aware of the initiatives/outcomes to comment. Others were critical suggesting the funding was inadequate²¹⁴, not competitive with funding for REE in other states²¹⁵, has added costs to the generation and transmission network²¹⁶ and has provided mainly non-peak and non-base load power at very high costs.²¹⁷
205. Issues were also raised about the Queensland Solar Hot Water Scheme^{218, 219}, but this is not a project for the generation of electricity and is outside the scope of this inquiry.
206. Powerlink offered a more positive assessment of the achievements of the government's investments:
- We are observing that government policies are already driving a shift in the electricity generation mix to lower emission generation. Powerlink's network already transports significant quantities of electricity from gas-fired generators, and some electricity generated from renewable sources. In the future, our grid will play an increasing role in transporting electricity generated from large scale renewable sources to the major population centres as the generation fuel mix changes.²²⁰
207. Sucrogen submitted that government intervention should aim to maximise efficiency to ensure that the greatest possible benefits and smallest possible costs on the basis that efficient policy intervention will minimise the risk for harmful disruption of NEM operations.²²¹ They also submitted that, generally, the most efficient outcomes arise when the policy instrument places as few constraints as possible on market participants as to how best to meet the policy goal, thereby encouraging the widest and most innovative responses (noting that the desire for retailers to pursue vertical integration in renewable generation could itself seriously limit the development of the most efficient renewals opportunities). In addition, restricting the coverage of a policy option to particular sectors or industries removes the opportunity to access innovative responses from those sectors or industries excluded.²²²
208. Others raised issues about the broader impacts of REE policies. Tarong Energy suggests that any policy framework needs to be fully cognisant of its consequences across the market and for electricity consumers in Queensland. They also stated

212 Submission Nos: 3, 9, 10, 11, 18, 33, 45 and 47.

213 Submission Nos: 9, 13 and 22.

214 Submission Nos: 37 and 42.

215 Sucrogen Australia Pty Ltd, *Submission No. 43*.

216 ENERGEX Limited, *Submission No. 28*.

217 Queensland Resources Council, *Submission No. 36*.

218 The Solar Guys, *Submission No. 14*, p. 2.

219 The Solar Guys, *Submission No. 14*, p. 2.

220 Powerlink Queensland, *Submission No. 17*, p. 3.

221 Sucrogen Australia Pty Ltd, *Submission No. 43*, p. 40.

222 Sucrogen Australia Pty Ltd, *Submission No. 43*, p. 40.

that the Queensland Gas Incentive Scheme as well as the potential state-based renewable scheme are, examples where policy can have broader market implications and result in higher costs to Queensland consumers.²²³

209. InterGen Australia suggested as a principle that future initiatives should not disadvantage existing generators. According to the submission, InterGen had in the past been affected by changes to policy.²²⁴
210. The committee asked the government for advice on its investment in RE and the outcomes/returns achieved. The government subsequently provided a table listing 43 projects and initiatives since January 2005 with a brief description and statement about their outcomes.²²⁵ This table is at Appendix B. The funding amounts were provided total \$278.63 million. The projects and initiatives include: the Queensland Solar Bonus Scheme, designed to provide a financial incentive to encourage households and small businesses to invest in solar PV systems; amendments to the *Land Act 1994* to allow additional purposes to be added to agricultural and grazing leases for renewable projects; funding for specific renewable energy projects such as the Windorah Solar Farm at Windorah; and a whole of government bulk purchase of renewable energy. The table does not specify the objectives of each initiative.
211. The committee sought further advice from the government on achieving better returns on its investments in future. The government advised that:

The QREP will be reviewed in 2011 as part of the agreed two-year review cycle. This review will evaluate returns on investment and set the investment priorities for the future.

In the interim, the operation of all programs, both federal and state, will continue to be monitored to ensure the most appropriate mix of incentives is provided for Queenslanders.²²⁶

Committee view

212. The information provided by the Queensland Government does not identify whether the projects and initiatives it has pursued have achieved their objectives or whether they represent sound returns on the investments made.
213. As in other areas of government, it is fundamental to good renewable energy policy that initiatives are well designed, implemented and then evaluated to inform future policy development work.
214. The committee welcomes the government's forthcoming review of returns on investments in its renewable energy electricity initiatives as part of its review of *The Queensland renewable Energy Plan*. The committee also notes that investment priorities for the future will be set as part of this review.
215. In our view, the government should clarify the actual outcomes and value for money from its initiatives from 2005 to date before embarking on further initiatives and policies. This information would be of interest to all Members of Parliament and their constituents and we would welcome its tabling in the House.

²²³ Tarong Energy Corporation Limited, *Submission No. 10*, p. 5.

²²⁴ InterGen (Australia) Pty Ltd, *Submission No. 51*, p. 2.

²²⁵ Hon S Robertson MP, *Correspondence*, 15 November 2010.

²²⁶ Hon S Robertson MP, *Correspondence*, 15 November 2010.

Recommendation 14:

That the government provides the Parliament with a statement of the objectives, outcomes and value for money achieved from its renewable energy projects and initiatives.

Minister responsible: Minister for Energy and Water Utilities

Appendix A ~ List of submissions received

- 1 Mr Phil Browne
- 2 Mr Geoff Andrews
- 3 Gold Coast City Council
- 4 Mr Dick Howard
- 5 Brisbane City Council
- 6 Growcom
- 7 Timber Queensland Limited
- 8 Council of Mayors (South East Queensland)
- 9 Rio Tinto Alcan Primary Metals Pacific and Rio Tinto Coal Australia
- 10 Tarong Energy Corporation Limited
- 11 Mr Dorin Preda
- 12 Sustainable Jamboree
- 13 Mrs Jocelyn Clarkson
- 14 The Solar Guys
- 15 SmartGrid Partners
- 16 Mayor Clarke, Gold Coast City Council
- 17 Powerlink Queensland
- 18 Windlab
- 19 Clean Energy Council
- 20 Coast to Coast Pacific
- 21 Gulf Savannah Development
- 22 Queensland Murray-Darling Committee Inc
- 23 Cairns and Far North Environment Centre Inc (CAFNEC) and the Cairns Climate Action Network
- 24 Mr Doon McColl
- 25 Queensland Youth Environment Council
- 26 Seqwater
- 27 Bioenergy
- 28 ENERGEX Limited
- 29 AGL Energy Limited
- 30 Mr David Weddell
- 31 Transition Town Kenmore
- 32 Origin Energy Limited
- 33 Mackay Sugar Limited
- 34 Clean Energy Australasia Pty Ltd
- 35 Australian Solar Cooling Interest Group
- 36 Queensland Resources Council
- 37 empower Team
- 38 Australian Sugar Milling Council
- 39 Energy Retailers Association of Australia
- 40 Fraser Coast Regional Council
- 41 Conergy Pty Ltd
- 42 Tropical Green Building Network
- 43 Sucrogen Australia Pty Ltd
- 44 Infigen Energy Limited
- 45 Ergon Energy
- 46 Stanwell Corporation Limited
- 47 United Northern Queensland Regional Development Organisations
- 48 Vestas Australian Wind Technology Pty Ltd
- 49 Transfield Holdings
- 50 Energy Supply Association of Australia
- 51 InterGen (Australia) Pty Ltd
- 52 Queensland Conservation
- 53 Sustainable Energy Policy Queensland (SEPM)
- 54 Sunshine Coast Environment Council
- 55 Hon Dean Wells MP, Member for Murrumba
- 56 GE Energy Australia and New Zealand
- 57 Energy Skills Queensland
- 58 Better Place Australia
- 59 Centre for Appropriate Technology
- 60 Remote Area Planning and Development Board (RAPAD)
- 61 NSW Department of Planning
- 62 Darwalla Milling Co Pty Ltd
- 63 Queensland Government
- 64 Rocky Point Green Power
- 65 Wind Power Queensland Pty Ltd

Appendix B ~ Briefings

Thursday, 25 March 2010

- Office of Clean Energy, Department of Employment, Economic Development and Innovation

Wednesday, 7 April 2010

- Clean Energy Council

Tuesday, 6 July 2010

- Office of Clean Energy, Department of Employment, Economic Development and Innovation
- Energy Transformed Flagship, CSIRO
- Professor Paul Meredith, Smart State Senior Fellow, Centre for Organic Photonics and Electronics and School of Mathematics and Physics, University of Queensland, and Member, Premier's Council on Climate Change
- Sunshine Coast Environment Council
- Queensland Conservation Council
- CS Energy Ltd
- Energex Ltd
- Ergon Energy Corporation Ltd

Tuesday, 31 August 2010

- Rocky Point Green Power
- Alternative Energy Branch, Office of Clean Energy, Department of Employment, Economic Development and Innovation

Tuesday, 5 October 2010

- AGL Energy Limited

Wednesday, 6 October 2010

- Smart State Council Working Group on Evolving Energy Policy

Appendix C ~ Witnesses at public hearings

Monday, 26 July 2010

- ARNOLD, Mr David, General Manager, Remote Area Planning and Development Board
- ANDERSON, Mr Kirby, Policy Leader—Energy Infrastructure, General Electric
- BARR, Mr Benn, Executive Director, Office of Clean Energy, Department of Employment, Economic Development and Innovation
- BERRILL, Mr Trevor, Sustainable Energy Policy Queensland
- BURGESS, Mr James Stanton, Resource and Environment Manager, Timber Queensland
- CHERRY, Mr John, Executive Director, Council of Mayors (SEQ)
- CONTI, Mr Marco, Essence Energy Group
- CRADDOCK, Mr John, Director, Clean Energy Australasia
- DAVIS, Dr Georgina, Renewable Energy Workforce Planner, Energy Skills Queensland
- DENNY, Mrs Sharon Leanne, Manager, Industry Development and Government Relations, Australian Sugar Milling Council
- DONNELLY, Mr David, Bushlight Program Coordinator, Centre for Appropriate Technology
- DYER, Mr Sid, Clean Energy Australasia
- FLINT, Mr Andrew, Policy Manager, Energy Retailers Association of Australia
- GEORGE, Mr Andrew, General Manager, Energy Markets, Infigen Energy Ltd
- GRANT, Mr Andre, Senior Technology and Project Manager, Centre for Appropriate Technology
- GURGENCI, Professor Halim, Member, Australian Geothermal Energy Association; and Director, Queensland Geothermal Energy Centre of Excellence
- HAYES-ST CLAIR, Mr Phil, General Manager, Corporate Affairs, Transfield Holdings
- HODGSON, Mr John Joseph, Business Development Manager, Mackay Sugar Ltd
- JARDINE, Mr Gordon, Chief Executive, Powerlink Queensland
- JORDAN, Mr John Patrick, Manager, Natural Environment and Sustainability Branch, Brisbane City Council
- KIPPIN, Mr Calum, Queensland Youth Environment Council
- LIVINGSTONE, Mr Alex, Chief Executive Officer, Growcom
- LONGDEN, Mr Gary Frederick, Board Director, Australian Sugar Milling Council
- McALPINE, Mr Ken, Director, Policy and Government Relations, Vestas Australian Wind Technology Pty Ltd
- McGUIRE, Ms Anna, Urban Sustainability Project Officer, Cairns and Far North Environment Centre Inc. and the Cairns Climate Action Network

- MILLER, Mr Terry, Manager, Network Development, Powerlink Queensland
- MORIARTY, Mr Mark Robert, Manager, Business Development, Sucrogen
- MORTON, Mr Euan Pye, Principal, Synergies Economic Consulting
- NIELSEN, Mr Greg, Chief Officer, Office of Clean Energy, Department of Employment, Economic Development and Innovation
- NOLAN, Mr Dominic Victor, Chief Executive Officer, Australian Sugar Milling Council
- O'REILLY, Mr Cameron, Executive Director, Energy Retailers Association of Australia
- PRESTIPINO, Ms Cheryl, Queensland Regional Manager, Centre for Appropriate Technology
- PUTLAND, Mr David Alan, Climate Change Officer, Growcom
- REICHMAN, Mr Joe, RAPAD Consultant and Managing Director, Clean Energy Australasia
- REICHMAN, Mr Joe, Clean Energy Australasia
- RIESZ, Dr Jenny, Energy Analyst, ROAM Consulting Pty Ltd
- RUTHERFORD, Mr Shayne, Executive General Manager, Strategy and Business Development, Sucrogen
- RYNNE, Mr David, Chief Economist, Queensland Resources Council
- SAXBY, Mr Don, Chairman, Brisbane Branch, Australian Electric Vehicle Association
- SCHUCK, Dr Stephen, Manager, Bioenergy Australia
- SLATTER, Mr Paul, General Manager, Rocky Point Green Power
- STUMER, Mr Lloyd, Wind Power Queensland Pty Ltd
- UPSON, Mr Jonathan, Senior Development Manager, Infigen Energy Ltd
- WALLACE, Miss Michéle Kara, Project Manager, Council of Mayors (SEQ)
- WINTER, Mr Christopher, Chief Technology Officer, RedFlow Technologies Ltd
- WYBORN, Dr Doone, Member, Australian Geothermal Energy Association; and Chief Scientist, Geodynamics Ltd
- YOUSSEF, Mr Jon Arkel, Convenor, Northern Territory and New South Wales Chapters, and Member, Australian Geothermal Energy Association

Appendix D ~ Renewable energy policies in other Australian states

	Victoria	Western Australia	New South Wales	South Australia
Electricity from renewable energy (RE)				
What proportion of electricity generated in your state/territory is being sourced from renewable energy (RE) sources? Please provide a breakdown by RE technologies if possible.	<p>The amount varies each year – as influenced by drought, and more recently by the growth in wind.</p> <p>Recently, the amount has been between 2 and 4% the lower number due to reduced output from hydro in drought years.</p> <p>The proportion of wind is now increasing due to investment to meet renewable energy targets.</p> <p>At February 2010, Victoria had a cumulative capacity of 428 megawatts (MW), generating about 1,125 gigawatt hours (GWh) of electricity per year (almost 2 per cent of all electricity generation).</p>	3% (5% within the State's main electricity grid.)	In 2009, over 7% of energy consumed in NSW was from renewable sources, up from 5.9% in 2008 (Source: NSW State Plan). Hydro accounted for 5.6%, Biomass 0.2% and Biogas 1.2% (Source: ABS 1338 NSW State and Regional Indicators, Dec 2010).	<p>Wind-generation capacity provides 18 per cent of the State's electricity supply within an estimated 19% of the State's production coming from renewables. (Pages 18 and 19 of http://www.southaustralia.biz/library/South%20Australia%20-%20A%20Green%20Future%20Brochure.pdf as well as page Table 3-9 of http://www.aemo.com.au/planning/0400-0013.pdf).</p> <p>The balance of renewable energy sources include mini-hydro and biomass. For historical generation of electricity from these sources see Table 2-8 of http://www.aemo.com.au/planning/e400-0003.pdf</p> <p>It is also estimated there is over 25 MW of residential grid-connected solar in South Australia (page 20 of http://www.southaustralia.biz/library/South%20Australia%20-%20A%20Green%20Future%20Brochure.pdf).</p>
RE targets				
Does your state/territory have an aspirational target for the proportion of electricity generated from RE? If so, please provide details:	<p>Victoria did have a legislated renewable energy target of 10% by 2016. But this has now been amended to be part of the national renewable energy target.</p> <p>Arrangements have been made to transfer state certificates to national certificates.</p>	The State Government has not made any additional commitments over and above meeting its share of the Commonwealth Government expanded Renewable Energy Target.	Target of 20% of electricity consumption from renewable sources by 2020.	SA has a target for 33% of electricity to be generated from renewable energy sources by 2020. SA also has a target for 20% of electricity to be generated from renewable energy sources by 2014 and for 20% of electricity consumption to be derived from renewable energy sources by 2014.
Where is the target stated? ie in legislation, a report, an energy strategy document.	In legislation – <i>Victorian Renewable Energy Amendment Act 2009</i> <i>Victorian Renewable Energy Act 2006</i>	-	NSW State Plan (available at http://www.stateplan.nsw.gov.au/sites/default/files/Perf%20ReportNov2010_GreenState.pdf).	The <i>Climate Change and Greenhouse Emissions Reduction Act, 2007</i> states the renewable electricity generation and consumption targets and of 20% by 2014. The target of 33% by 2020 was announced by the Premier on 2 June 2009.

Growing Queensland's Renewable Energy Electricity Sector

	Victoria	Western Australia	New South Wales	South Australia
When and why was the target introduced?	Because the then Federal Government had refused to expand the existing MRET scheme.	-	The 2006 State Plan established a NSW Renewable Energy Target (RET) of 10% renewable energy consumption by 2010 and 15% by 2020. In the 2009 State Plan the target was adjusted to 20% renewable energy consumption by 2020, in light of the Federal Government's expanded RET.	The target was announced to help foster innovation and investment in renewable energy in the state. See media release http://www.renewablessa.sa.gov.au/files/news-release---budget-2009---renewables.pdf
What have been the benefits or disadvantages of having a state/territory RE target?	VRET stimulated investment in wind at a time when there were no alternative incentives. Current investment is driven by the national scheme.	-	Consumption target rather than generation target – so the target supports least cost generation which does not necessarily have to be located in NSW.	The target has enabled specific initiatives to grow the renewable energy industry in SA. One such initiative was the formation of RenewablesSA as single point of contact for renewable energy in the State. The agency was formed to increase investment and create more jobs in clean, green industries, and to act as a test bed for pioneering technologies as well as disseminate the knowledge and expertise developed. South Australia's efforts to constrain carbon are also working to the state's economic advantage. The International Climate Group's most recent Greenhouse Indicator Annual Report confirms that South Australia is a national leader in carbon emission reductions. Of the States examined in the report, SA was the only one to last year record emissions levels below those of 2000. Not only did the emissions drop by 3.2 per cent in 2009 compared to nine years earlier, the economy also grew by 24 per cent over that period. See link for Premier's speech: http://www.renewablessa.sa.gov.au/files/speech-2010-ceda-address.pdf
Does the target include individual targets for each RE technology eg wind, bioenergy, solar PV, hydro, tidal, wave?	No – it is a renewable energy target. Any accredited generator could create Renewable Energy Certificates	-	No, target is technology neutral.	No

Growing Queensland's Renewable Energy Electricity Sector

	Victoria	Western Australia	New South Wales	South Australia
How is performance against the target measured and reported, and by whom?	The Essential Services Commission monitored and administered the scheme. There was a shortfall penalty. This is now dealt with national nationally.	-	Performance against the target is reported annually in the State Plan Performance report.	Progress against targets made under Section 5 of the <i>Climate Change and Greenhouse Emissions reduction Act 2007</i> is reviewed by the CSIRO (or like body) every four years with the first report in 2009 (see http://www.climatechange.sa.gov.au/uploads/AttachmentD.pdf for an overview and report on progress). As described in the report the targets under Section 5 include the renewable energy generation targets
Do you envisage future amendments to the target? If so please provide details.	No – the VRET scheme has already transitioned to the national	-	No changes are currently proposed.	The Legislation allows for the Premier to adjust the target.
What affect if any will the federal government's implementation of its mandatory RE target have on your state/territory target?	It has overtaken the state based scheme.	N/A	NSW considers the large RET (LRET) the main driver of all renewable energy generation investment nationally. The State Plan target is a mechanism to increase the proportion of NSW renewable generation under the LRET	The Federal Government's RET is used as part of the State's modelling to determine likely growth in this sector.
RE legislation and policies				
Please list key legislation that regulates the use of RE to generate electricity in your state/territory.	<i>Victorian Renewable Energy Amendment Act 2009</i> <i>Victorian Renewable Energy Act 2006</i> There are no regulations	Western Australia does not have specific legislation relating to the development of renewable energy projects. Such projects are developed in accordance with legislation and approvals applied to all forms of electricity generation.	Proposals for renewable generation over \$30m are assessed as major projects with a 4-month turnaround. Project proposals with 30MW or more of capacity are declared 'Critical Infrastructure', and assessed under Part 3A of the <i>Environmental Planning and Assessment Act 1979</i> . In addition associated critical infrastructure fees are being waived until 30 June 2011. Small scale renewable generation systems require registered and accredited service providers for connection to the electricity network. The accreditation and registration process is administered by the NSW Department of Fair Trading.	Feed in Tariff legislation as part of the Electricity Act http://www.legislation.sa.gov.au/LZ/C/A/ELECTRICITY%20ACT%201996.aspx
RE strategic plans				
Is a long-range plan in place to signal future RE priorities in your state/territory?	The previous Government completed 2 major policy statements: Victoria's Energy Future (http://new.dpi.vic.gov.au/energy-future/home) and The Climate Change White Paper (http://www.premier.vic.gov.au/climate-change) The status of these will be reviewed by the incoming Government.	The Western Australian Government is in the process of developing and articulating a long term vision for energy policy in the State through the Strategic Energy Initiative: Energy 2031. A Draft Directions Paper is scheduled to be released for public consultation shortly.	Yes, the State Plan.	It is an obligation under the <i>Climate Change and Greenhouse Emissions Reduction Act, 2007</i> to produce a Renewable Energy Plan.

Growing Queensland's Renewable Energy Electricity Sector

	Victoria	Western Australia	New South Wales	South Australia
What are the key policies, strategies or action plans in your jurisdiction to expand or support the use of RE to generate electricity?	<p>eRET (national) A new large scale solar feed-in tariff (LSSFiT) (see Climate Change White Paper) The Government will increase Victoria's electricity supply from large-scale solar power to approximately 5% by 2020. This will involve the establishment of multiple large-scale solar facilities with the capacity to generate 2,500 GWh per annum by 2020. An interim target of 500 GWh per annum by 2014 will be achieved through a feed-in tariff, which will be outside the eRET to ensure additional emissions abatement.</p> <p>A premium feed-in tariff (FiT) for small scale renewable energy Introduced in 2009, the Victorian premium feed-in tariff for small-scale solar makes it more affordable for Victorian households to install solar power at home. Installations have been growing at over 1 MW per month and are expected to reach 40 MW by 2014. The Victorian Competition and Efficiency Commission will review this policy.</p> <p>A standard FiT for other small scale generators – like cogeneration Victoria's standard feed-in tariff is available to households, community organisations and small businesses generating up to 100 kilowatts of clean electricity from wind, solar, hydro and biomass sources.</p>	<p>Clean energy was a recurrent theme in the public consultation on the Strategic Energy Initiative. The Office of Energy is developing a Clean Energy Initiative which is intended to outline the strategies required to give effect to the actions to be outlined in the Strategic Energy Initiative Directions Paper.</p>	<p>Renewable Energy Precincts - One of the key components of the NSW Government's renewable energy agenda is the establishment of six renewable energy precincts in the New England Tablelands, Upper Hunter, Central Tablelands, NSW/ACT Cross Border Region, Snowy-Monaro and the South Coast. The precincts are a community partnership initiative in areas where significant future renewable energy development is expected – especially wind farms. Solar Flagships - The NSW Government has pledged to provide up to \$120 million to a NSW-based solar photovoltaic (PV) project that successfully secures funding through the Australian Government's Solar Flagships Program. Three of the four solar PV projects seeking round one Australian Government funding are in NSW and – if successful in securing Solar Flagships funding – will build 150 megawatts of solar PV in regional NSW. Renewable Energy Demonstration Program – Competitive grants programs for matched funding of pilot demonstration of renewable technologies. To date the program has contributed \$24.8m in funding to the demonstration of geothermal, battery storage, wind and bio-energy projects in NSW. GreenPower purchases – The NSW Government purchases a minimum of 6% of budget dependent agencies' electricity through GreenPower.</p>	<p>Key policies will be outlined in the Renewable Energy Plan. Policies that have already been announced are:</p> <ul style="list-style-type: none"> o Payroll Tax rebates for scale solar and wind facilities greater than 30 MW in capacity. \$5 million for solar and \$1 million for wind until June 2014 o \$200,000 grant for the development of a solar thermal air conditioning system o \$20 million renewable energy fund that companies can access over 2 years. Details: http://www.renewablessa.sa.gov.au/about-us/renewable-energy-fund o \$800,000 over two years for South Australian Centre for Geothermal Research o commitment to purchase 50% of the government's electricity consumption from green power o solar panels mandated on all new and substantially refurbished government buildings from July 2010. o Consultation with industry on setting an emissions intensity limit for all new electricity generation o The provision of \$1 million to a consortium led by Macquarie Capital to establish the business case for wind farm development on the Eyre Peninsula: http://www.renewablessa.sa.gov.au/investor-information/green-grid/ <p>The provision of \$1 million for tendering grants to develop community owned solar projects of a minimum 30kW capacity</p>
Do these strategies/plans promote specific RE technologies?	In some cases (e.g proposed. LSSFiT)	As the above strategies are still under development the Office is unable to comment on this question at this time.	The Renewable Energy Precincts and Renewable Energy Demonstration Program are both technology neutral. Solar Flagships is specific to solar technologies in line with the Federal Government's requirements.	yes

Growing Queensland's Renewable Energy Electricity Sector

	Victoria	Western Australia	New South Wales	South Australia
Do you have policies and strategies in place to expand the use of electricity generated from RE in remote locations, other areas or within specific industries? If so, please provide details. What tangible benefits have the policies/plans provided?	No <i>There is a rebate scheme for regional installation of solar hot water</i>	These policies and strategies are under development as part of the Clean Energy Initiative.	Not currently, the NSW Department of Industry and Investment administered the Commonwealth Renewable Remote Power Generation Program in NSW. The program which closed to new applications in 2009 provided financial support in remote parts of Australia.	The Government has a Remote Area Electricity Scheme that ensures households and businesses in remote off-grid communities have access to safe, reliable and affordable electricity supplies. Whilst the scheme isn't specifically targeted at renewable energy production, it is encouraged if cost effective and there have been examples of solar hybrid schemes. http://www.energy.sa.gov.au/rebates_and_grants/remote_areas_energy_supplies
Has your government reviewed the efficacy of its policies and programs to encourage the generation of electricity from RE? If so, what were the findings?	<i>Policies are meeting their milestones</i>	N/A	Regular reports on progress towards State plan are published at http://www.stateplan.nsw.gov.au/index.php . A review report of the Solar Bonus Scheme is available at http://www.industry.nsw.gov.au/_data/assets/pdf_file/0015/360141/Solar-Bonus-Scheme-Review-Report.pdf .	Not specifically but the State is tracking well against its targets
RE resource mapping				
Which RE resources have been mapped in your jurisdiction and in which year?	<i>Wind atlas</i> The Victorian Wind Atlas provides detailed information about the States wind resource in individual local government areas. It contains data and analysis about the wind resource in Victoria, proximity to electricity transmission systems. To order the Wind Atlas, email  info@sustainability.vic.gov.au <i>Solar atlas – being prepared</i> <i>Geothermal atlas – being considered</i> <i>High level information is available for Wave; Bioenergy and Hydro (see http://www.sustainability.vic.gov.au/www/html/2119-interactive-maps.asp)</i>	The State has not undertaken any specific mapping of renewable energy resources.	High-level renewable resource mapping for wind and solar in the renewable energy precincts has been completed. The Solar Precincts study is available here http://www.environment.nsw.gov.au/resources/climatechange/PreFeasibilityStudy.pdf More detailed wind modeling within the precincts is currently being carried out with the aim to support the development of community wind farm activity.	In 2010, solar resources were mapped and specific datasets prepared in 4 locations: http://www.renewablesa.sa.gov.au/investor-information/resources#Solar
Is this data made readily available to the RE industry and other stakeholders, and what does it cost?	Yes - free	Access to renewable energy resource information is a matter to be considered under the Clean Energy Initiative.	The <i>Prefeasibility Study for a Solar Power Precinct</i> study by AECOM is publicly available. Wind mapping is also available.	It is made available for free.

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	Victoria	Western Australia	New South Wales	South Australia
Standards for RE				
Are mandatory guidelines/standards in place to ensure RE equipment and projects meet minimum performance, environmental and safety standards? If so, please provide details.	<i>Safety standards – yes Electricity Safety Act 1998 No specific performance requirements</i>	Renewable energy projects and equipment in Western Australia remain subject to similar standards to those applicable to other forms of electricity generation, giving due account to the nature of this generation output.	Mandatory guidelines and standards are set at the national level through the Renewable Energy (Electricity) Amendment Regulations 2010 (No. 5) and Australian Standards (AS 4777 Grid connection of energy systems via inverters; and AS/NZS 5033 Installation of photovoltaic (PV) arrays) The Office of the Renewable Energy Regulator (ORER) requires that electrical power systems must be designed and installed by industry accredited personnel to be eligible to claim Renewable Energy Certificates (RECs). In 2010, additional safety and compliance regulations for both equipment and installers were passed. Installers must have accreditation from the Clean Energy Council and abide by their Code of Conduct. Updated guidelines are available at http://www.cleanenergycouncil.org.au/cec/accreditation/Solar-PV-accreditation/compliance/New-CEC-guidelines.html . Connecting and disconnecting to the electricity network is also governed in NSW by the <i>Electricity Supply Act 1995</i> . All connections and disconnections (described as contestable works) must be completed by a registered accredited service provider. Accreditation and registration is administered by the NSW Department of Fair Trading.	All projects need to go through development approval and in doing so need to assess environmental impact. The EPA has set mandatory guidelines for performance. Accreditation is required through the Clean Energy Council.
Support for RE research and development				
What grants or subsidies does your state/territory offer to support RE research and development or the commercialisation of new RE technologies?	<i>ETIS Through the Energy Technology Innovation Strategy, \$70 million is committed for large-scale demonstrations of sustainable energy projects and grants for research and development into sustainable energy technologies. See - http://new.dpi.vic.gov.au/energy/projects-research-development/etis/sustainable-technologies</i>	The Low Emissions Energy Development Fund is operated by the Western Australian Department of Environment and Conservation (DEC) and supports technological developments in both renewable energy and energy efficiency. The Fund will invest a total of \$30 million in technologies which are suited to the West Australian environment, including geothermal, bioenergy, wind, wave, tidal and solar. Projects which have received funding thus far include an algal fuel demonstration facility near Karratha and a commercial geothermal demonstration project at the University of Western Australia. Further information is available at http://www.dec.wa.gov.au/content/view/3550/2283/	The NSW Renewable Energy Demonstration Program is a competitive grants program providing matched funding of pilot demonstration of renewable technologies. To date the program has contributed \$24.8m in funding to the demonstration of geothermal, battery storage, wind and bio-energy projects in NSW. The NSW Science Leverage Fund is also available to leverage individual applications for Commonwealth funding through the provision of seed or % matched funding for Australian Research Council, Australian Centre for Renewable Energy (ACRE) Cooperative Research Centres (CRCs) and similar competitive grant programs.	\$20 million renewable energy fund for two years: http://www.renewablessa.sa.gov.au/about-us/renewable-energy-fund

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	Victoria	Western Australia	New South Wales	South Australia
Does your government have strategies in place to encourage and promote the use of Australian-made RE equipment?	<i>ETIS is only available to Victorian projects</i>	No	None with this specific aim.	Funding of Solar Thermal Air conditioning. The Industry Capability Network identifies local suppliers: http://www.renewablesa.sa.gov.au/about-south-australia/industry-suppliers-and-providers
Feed in tariffs (FIT)				
Is a FIT offered to exporters of RE electricity? If so please provide details including types of generators and output capacities that are eligible.	<i>Yes – see above</i>	<p>The Scheme Design Parameters for the Residential Feed in Tariff are outlined below:</p> <ul style="list-style-type: none"> • Rate - 40 c/kWh for net electricity exported to the grid. This rate is in addition to the Renewable Energy Buyback Schemes (REBS) offered through Synergy and Horizon Power. • Payments are made for 10 years or until the property is sold or leased, in which case the new owner or tenant receives the payments for the remainder of the duration. • System size must be consistent with REBS which is 5kW for Synergy customers and 10kW per phase (30kW in total) for Horizon Power customers. • The scheme is to be reviewed every 3 years or 10MW of new generation to assess the ongoing level of support required in light of changing economics and technologies. • Includes photovoltaic, wind and micro-hydro energy technologies. Emerging technologies may be included upon review. • The scheme is open to residential applicants only and the system must be owned by the home owner (includes tenanted properties where the home owner also owns the system). <p>The Office of Energy has investigated the merits of a feed-in tariff for commercial premises and the Government is considering this advice.</p> <p>The Renewable Energy Buyback Scheme offered by Synergy and Horizon Power is operated in accordance with the obligations of the <i>Electricity Industry (Licence Conditions) Regulations 2005</i>, which require these organisations to purchase renewable sourced electricity from eligible customers under fair and reasonable terms and conditions, including the rate. Eligible customers are defined as non-contestable residential customers, schools, universities and other educational institutions and non-profit organisations.</p>	The NSW Solar Bonus Scheme provided a 60c/kWh gross (later reduced to a 20c/kWh gross) tariff to the home owners of small PV systems (and small wind turbines) of 10Kw or less and using 160MWh or less of electricity per year. The Scheme was in place until 300MW of installed capacity. 300MW of applications have now been received.	<p>South Australia's feed-in scheme pays a premium guaranteed tariff of 44 cents per unit of electricity (kilowatt-hour, kWh), to households and small customers who feed solar electricity into the grid. The scheme commenced on 1 July 2008 and will extend for 20 years.</p> <p>The SA scheme is a net-metering scheme. The tariff applies to grid connected PV systems with capacity up to 10kVA for a single phase connection and up to 30kVA for a three phase connection, operated by small consumers that consume less than 160 MWh of electricity per annum.</p> <p>Following review of the scheme, in 2010, the Government announced its intention to increase the bonus, from 44 cents to 54 cents per kilowatt hour;</p> <p>obligate retailers who choose to contract with solar customers to pay a minimum rate for the power that they receive from the owners of solar panels;</p> <p>limit eligibility for payment of the bonus to the first 45 kilowatt hours exported to the grid per day;</p> <p>limit eligibility to one generator per customer or entity;</p> <p>specifically exclude generators operated primarily for the purpose of generating a profit from the scheme; and</p> <p>close the scheme to new connections when an installed capacity of 60MW is reached.</p> <p>The intention of the proposed changes is to make the feed-in benefit available to as many consumers as possible. Legislation is expected to be tabled in parliament in early 2011.</p> <p>More information about the scheme is available from http://www.climatechange.sa.gov.au/index.php?page=sa-s-solar-feed-in-scheme</p>

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	Victoria	Western Australia	New South Wales	South Australia
Assistance to encourage investment in generating electricity from RE				
Does your government meet or subsidise network connection costs for RE electricity generators?	No	No	No	Generally no, but there is a commitment to fund half the transmission costs for the geothermal company Geodynamics.
Does your government own or invest directly in RE generation infrastructure?	No	The Western Australian Government has State owned Government Trading Enterprises Verve Energy and Horizon Power that are actively involved in investment in generation facilities using both renewable and non-renewable energy fuel sources.	Sydney Water, a State-owned corporation, sources renewable energy (wind power) from a purpose-built 67-turbine wind farm at Bungendore in NSW, to offset energy use at the desalination plant. The State-owned energy corporations own several renewable plants including: <ul style="list-style-type: none"> • Broadwater and Condong Bagasse plants both 30MW owned by Delta Electricity • Crookwell (4.8MW) and Blayney (>MW) wind farm owned by Eraring Electricity • Queanbeyan Solar farm (50kW capacity) owned by Country Energy 	No
What grants, subsidies or other incentives does your government provide to encourage investment in the generation of electricity from RE sources, or their export of electricity to the grid?	eRET and FIT	The programs offered in Western Australia are largely linked to those funding programs promoted by the Commonwealth Government. Details of these programs are shown on the Office of Energy website at the attached link. http://www.energy.wa.gov.au/1/3578/64/grants_and_rebates.pm In addition to these programs the Exploration Incentive Program is an \$80 million program, administered by the Western Australian Department of Mines and Petroleum, aimed at stimulating private sector resource exploration and ultimately leading to new mineral and energy discoveries. Geothermal drilling activities can receive funding as part of this program. Further details are shown at the attached link: http://www.dmp.wa.gov.au/7743.aspx	Apart from the already mentioned feed-in tariff, demonstration and solar flagship grants no further financial incentives are offered. The Renewable Energy Precincts program provides an information and coordination role to encourage renewable energy investment.	As previous.

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	Victoria	Western Australia	New South Wales	South Australia
Does your government put to public tender any long-term supply contracts for its agencies or buildings for electricity to be sourced exclusively from RE generators?	<p>25% of government power is GreenPower – this will increase to 50% by 2020</p> <p>The Government has been a proud supporter of the scheme. In 2010, the Government purchased 25% of its electricity from renewable sources and will now increase this commitment by 2.5 percentage points per year from 25% in 2010/11 to 50% in 2020/21.</p>	No	<p>NSW currently purchases a minimum of 6% of budget dependent agencies' electricity as GreenPower under the NSW Government Sustainability Policy. This is sourced through the agencies' electricity contracts.</p> <p>Sydney Water, a state-owned corporation offsets all electricity usage from the Desalination Plant from a purpose built wind farm at Bungendore in NSW. This source of renewable energy is secured through a long term purchase-pricing agreement (PPA).</p>	<p>Since 1 January 2008 the South Australian Government has procured 20% GreenPower™ with this becoming 50% from 1 July 2014 (see below). The South Australian Government utilises a centralised procurement and contract management model to achieve this policy objective through open tender processes.</p> <p>In addition the Adelaide Desalination Plant meet its electricity needs through an open tender process http://www.southaustralia.biz/News/2009/09/11/Green-power-for-Adelaide-desal-plant-.aspx.</p>
Planning and approval processes				
What legislation in your jurisdiction sets out the planning and approval requirements for RE projects (including major RE projects of state/territory significance)?		Renewable energy projects and equipment in Western Australia remain subject to similar standards to those applicable to other forms of electricity generation, giving due account to the nature of this generation output.	See previous planning responses	The Development Act, 1993 http://www.legislation.sa.gov.au/LZ/C/A/DEVELOPMENT%20ACT%201993.aspx

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	Victoria	Western Australia	New South Wales	South Australia
What specific regulatory reforms have been implemented to streamline approval processes for RE projects?	<p><i>Green Door</i> (see p 20 of <i>Jobs for Future Economy</i>) http://www.business.vic.gov.au/busvicwr/assets/main/lib60254/jobs%20for%20the%20future%20economy.pdf</p> <p>The Green Door is a one-stop shop to facilitate investment in and streamline approvals processes for renewable and low-emissions energy projects that meet an emissions threshold of 0.5 tCO₂/MWh. The Green Door includes:</p> <ul style="list-style-type: none"> • A single point of entry through <i>Invest Assist</i> to ensure that the proponents of renewable energy projects can access information and support for project development • An Integrated Major Project Assessment, Approval and Delivery (IMPAAD) initiative for projects 'of State significance' – developed as part of the Government's response to the Victorian Competition and Efficiency Commission's report <i>A Sustainable Future for Victoria: Getting Environmental Regulation Right</i> – under which the Minister for Planning becomes the responsible authority for planning approval • Improved community and stakeholder access to reliable and relevant information about renewable energy proposals. 	<p>No specific reforms have been implemented addressing these matters. The Office of Energy has produced a Renewable Energy Handbook that contains information in regards to approval processes and background material of relevance to the renewable energy industry.</p>	<p>As above.</p>	<p>Guide for Wind Farm Development http://www.planning.sa.gov.au/index.cfm?objectid=CDCD7159-96B8-CC2B-633D6465E5542C4D Each Council has a renewable energy section in their Development Plans.</p>
Strategies to support RE skills and employment				
What proportion of jobs in your state/territory are in the RE electricity generation industry?	<p><i>No specific numbers – policy details here:</i> http://www.business.vic.gov.au/BUSVIC/STANDARD/PC_63848.html</p>	<p>Data not available.</p>	<p>Employment associated with renewable energy generation is not readily available through official statistical sources such as the ABS. However, the Clean Energy Council, the peak industry body for the renewable industry, estimates in their 2010 Clean Energy Australia report that NSW has 2300 full-time equivalent employees in the renewable energy industry. This report is available at www.cleanenergycouncil.org.au/.</p>	

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	Victoria	Western Australia	New South Wales	South Australia
What net jobs growth is expected in your state/territory through expansion of the RE electricity sector?	<p><u><i>Note this is not Victorian Government policy / These figures are not endorsed by the Victorian Government.</i></u></p> <p><i>A Carbon Markets report for the Clean Energy Council suggested:</i></p> <p>Around 650 new jobs each year through to 2016 will be created in the construction and operation of renewable electricity production (in Victoria).</p>	Data not available.	Net job growth from the RE sector is currently not able to be calculated from available data.	
Does your government have an RE skills/training strategy in place? If so please provide details.	See <i>Jobs for Future Economy p24.</i>	No	<p>A component of the NSW Government's Energy Savings Scheme is the Energy Efficiency Training Program. This program provides energy efficiency training to technical, trade and professional occupations in those sectors where a skilled workforce will result in significant energy savings. Although the training program is focused on energy efficiency, renewables for electricity generation is incorporated into the training package. The program runs for four years (2010-2014) and is administered in partnership between the Department of Environment, Climate Change and Water and the Department of Education and Training.</p> <p>The program has five elements:</p> <ul style="list-style-type: none"> • Delivery of vocational short courses for technical, trade and professional occupations in the sectors of resources and utilities; financial, property and transactional services; building and construction; manufacturing and engineering; transport and logistics; health, community services and government; tourism, hospitality and retail. • Higher education courses and graduate training program. • Professional development for VET trainers. • Industry partnership projects. • Research and evaluation. 	A \$125 million Sustainable Industries Education Centre. A partnership between TAFE SA and SA universities and industry to train 8,000 people per year in new green technologies associated with the building and construction industry in areas such as design plumbing bricklaying and carpentry
RE marketing and education				
What strategies are in place to promote the benefits of, and encourage investment in, electricity generated from RE?	<i>DPI communications material</i>	Promotional material is available on the Office of Energy website.	The Renewable Energy Precincts program is the primary vehicle for marketing and education of renewable energy. The program includes renewable energy coordinators located in each of the precincts and the creation and collation of a number of information resources including a wind farm greenhouse gas savings tool.	See RenewablesSA website: http://www.renewablesa.sa.gov.au/

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	Victoria	Western Australia	New South Wales	South Australia
Has your government established a single access point for information on RE and subsidies/rebates?	Yes – <i>Sustainability Victoria</i>	This information is available on the Office of Energy website.	Information is available on Department of Environment, Climate Change and Water's website (http://www.environment.nsw.gov.au/). Further information on renewable electricity generation is available on the Department of Industry and Investment website at http://www.industry.nsw.gov.au/energy/sustainable .	Yes, RenewablesSA
Has your state/territory government or local governments committed to purchasing GreenPower to meet part of their electricity needs? If so please provide details.	Yes – <i>see above</i>	No	NSW currently purchases a minimum of 6% of budget dependent agencies' electricity as GreenPower under the NSW Government Sustainability Policy.	Yes, as above
Does your government offer subsidies/rebates to households and businesses that purchase GreenPower? Please provide details.	No	No	The NSW Government created and administers the GreenPower program. The program allows households and businesses to buy renewable electricity through their electricity retailer from accredited sources. The Government provides no further subsidy or rebate for GreenPower purchases beyond this.	no

Appendix E ~ s107, *Parliament of Queensland Act 2001*

107 Ministerial response to committee report

- (1) This section applies if—
 - (a) a report of a committee, other than the Scrutiny of Legislation Committee, recommends the Government or a Minister should take particular action, or not take particular action, about an issue; or
 - (b) a report of the Members' Ethics and Parliamentary Privileges Committee recommends a motion be moved in the Assembly to implement a recommendation of the committee.
- (2) The following Minister must provide the Assembly with a response—
 - (a) for a report mentioned in subsection (1)(a)—the Minister who is responsible for the issue that is the subject of the report;
 - (b) for a report mentioned in subsection (1)(b)—the Premier or a Minister nominated by the Premier.
- (3) The response must set out—
 - (a) any recommendations to be adopted, and the way and time within which they will be carried out; and
 - (b) any recommendations not to be adopted and the reasons for not adopting them.
- (4) The Minister must table the response within 3 months after the report is tabled.
- (5) If a Minister can not comply with subsection (4), the Minister must—
 - (a) within 3 months after the report is tabled, table an interim response and the Minister's reasons for not complying within 3 months; and
 - (b) within 6 months after the report is tabled, table the response.
- (6) If the Assembly is not sitting, the Minister must give the response, or interim response and reasons, to the Clerk.
- (7) The response, or interim response and reasons, is taken to have been tabled on the day they are received by the Clerk.
- (8) The receipt of the response, or interim response and reasons, by the Clerk, and the day of the receipt, must be recorded in the Assembly's Votes and Proceedings for the next sitting day after the day of receipt.
- (9) The response, or interim response and reasons, is a response, or interim response and reasons, tabled in the Assembly.
- (10) Subsection (1) does not prevent a Minister providing a response to a recommendation in a report of the Scrutiny of Legislation Committee if it is practicable for the Minister to provide the response having regard to the nature of the recommendation and the time when the report is made.

Example—

If the committee recommends that a Bill be amended because, in the committee's opinion, it does not have sufficient regard to fundamental legislative principles and the Bill has not been passed by the Assembly, it may be practicable for the Minister to provide a response.
- (11) Subsection (6) does not limit the Assembly's power by resolution or order to provide for the tabling of a response, or interim response and reasons, when the Assembly is not sitting.
- (12) This section does not apply to an annual report of a committee.

Appendix F ~ Renewable energy in Queensland – projects/initiatives, January 2005 – 15 November 2010

Project / Initiative	Dates	Description	Outcome (e.g. generation capacity, megawatt hours, installations, savings, etc)
Innovation Projects Fund	2005-2009	The Innovation Projects Food is a strategic investment by the Queensland Government to support collaborative research, development and innovation projects that are of importance to Queensland. In excess of \$3.85 million in direct funding to support the development of Queensland based renewable energy technology solutions.	Funding has supported international research collaboration between Queensland and China on nanomaterials for clean energy technologies as well as research into developing next generation organic solar cells. More details are available at www.industry.qld.gov.au
Queensland Sustainable Energy Innovation Fund (QSEIF)	2005-2009	In excess of \$0.4 million in direct funding to support proof of concept renewable energy technologies.	Funding has supported research and development of promising renewable energy generation and enabling technologies such as tidal and wave power, and anti reflective coatings to improve the efficiency of PV modules.
Isolated Communities PV Project	Installations to be completed end 2010	\$1.1 million in funding to trial small scale flat plate solar PV systems in isolated networks on Thursday Island, Bamaga and Horne Island to determine the effectiveness of renewable energy options in helping isolated communities transition from diesel generation to less emissions intensive alternatives.	The aim of the project is to improve the quality and reliability of electricity supply ⁷ and decrease diesel use, resulting in savings to Government and on-going reductions in greenhouse gas emissions.
Queensland Solar Hot Water Program	Funded April 2009	The Program was closed in March 2010 and replaced with \$60 million Queensland Solar Hot Water Rebate Program.	The new Queensland Solar Hot Water Program enjoyed a high level of interest since its commencement with rebates paid to eligible households of \$600 and \$1000 for low income earners or pensions.
Cloncurry Solar Thermal Trial	Funded Nov 2007	\$13 million over two years for the Cloncurry solar thermal power station trial.	The trial is providing critical learnings to inform the development of future solar thermal project in Queensland.
Birdsville Geothermal Upgrade	Funded Dec 2008	\$4.3 million for Ergon Energy to upgrade Australia's only producing geothermal power station at Birdsville. The plant currently has 80 kW of capacity.	Ongoing.
Wind Mapping	Funded September 2008 Released in February 2010	Areas around Atherton, Cooktown and through to Cairns are shown to have higher wind renewable energy potential. \$0.25 million over two years has been committed under the QREF.	Mapping opens these areas to prospective wind energy projects and investment.
Solar Mapping	Funded September 2008 Mapping is ongoing	\$0.7 million has been committed over three years to map Queensland's high quality solar resources. The atlas will collect data over a 365 day continuous period from ground observation stations in three separate project centres in the Roma, Cloncurry and Charter Towers regions.	The solar atlas will identify the best potential sites to develop large-scale commercial solar energy plants, providing companies interested in developing such projects with the key information required to assess project feasibility.
Coastal Geothermal Initiative	Funded September 2008 Mapping is ongoing	\$5 million for the mapping of coastal geothermal resources near existing electricity infrastructure is underway and is anticipated to lead to exploration and projects longer term.	The aim is to facilitate large scale utilisation of geothermal energy.
Geothermal Centre of Excellence	Funded September 2007 Ongoing	\$15 million provided over five years to the University of Queensland to pursue research into power conversion, heat exchangers, transmission, and reservoirs.	The aim is to lead to large scale utilisation of geothermal energy.
Geothermal Energy Act 2010	Assented to on 1 September 2010	The Act provides the next important step required to develop the geothermal industry by providing a framework for geothermal production.	The Act will provide certainty to potential geothermal proponents which will foster investment in the geothermal industry and facilitate exploration efforts.
Agricultural leaseholders able to sublease to wind farms and other renewable energy technologies	Completed	The Land Act 1994 was amended to allow additional purposes to be added to agricultural and grazing leases for renewable projects.	Amendments to provide increased flexibility to leaseholders to sub-lease land to renewable energy projects and benefit form an additional income stream to support the primary land use.

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Project / Initiative	Dates	Description	Outcome (e.g. generation capacity, megawatt hours, installations, savings, etc)
Mackay Sugar Cogenerations Project	Funded 2009 To be commissioned in 2013	Replacement of existing plant at the Racecourse Mill to generate enough clean power each year to achieve energy self-sufficiency and export electricity to the local grid. The new steam turbine generator to be installed at the mill will use bagasse more productively than its traditional use in lower efficiency boilers. The Queensland Government is investing \$9 million in this project.	65 megawatts of thermal power to the Racecourse sugar mill and a co-located refinery. Energy self-sufficiency for the facility. Approximately 27MW exported to the Mackay district's electricity network per year. Reduction in greenhouse gas emissions by approximately 200,000 tonnes each year.
Queensland Solar Bonus Scheme	Began July 2008 Ongoing Legislation will end on 1 July 2028	The Queensland Solar Bonus Scheme (the SBS) pays small electricity customers a net feed-in tariff of 44 cents per kilowatt hour (kWh) for surplus electricity generated from their roof-top solar photovoltaic systems that is exported into the Queensland electricity grid.	From its commencement at the end of July 2008, through to the September 2010, the scheme has more than 42,000 participating Queensland households and businesses, with over 78MW of installed solar capacity.
Ipswich Hospital: Solar air conditioning system	Installation 2008	A solar powered air conditioning system – powered by a roof-top solar thermal trough system with absorption chiller – was installed at the Ipswich Hospital.	Daily output of 986 kWh thermal.
Logan Hospital: Solar PV installation	Installation 2009	A 20 kW rooftop solar photovoltaic array.	Produces 50 kWh per day during winter and up to 90 kWh during summer.
Solar PV technology trial by DPW	April 2009 to Mar 2010	DPW established a 12-month trial of three (3) different types of fixed solar PV panels installed on the roof of the 80 George St building: <ul style="list-style-type: none"> • Monocrystalline • Polycrystalline • Amorphous Total rated capacity of the panels is 7.2kw	12.6 megawatt-hours generated over a twelve-month period.
Renewable Energy Purchase	2005-2006 to 2009-2010	\$7 million investment to undertake a centralised whole-of-government bulk purchase of renewable energy. (Note: for the last three years accredited Qld-based RECs have been purchased)	663,404 megawatt-hours spread over the last five (5) years- using a range of different renewable energy products offered in the market by energy retailers.
Solar and Energy Efficiency in State Schools Program	Program commenced July 2008 Main rollout commenced April 2009 Program completion June 2011	The Queensland Government has invested \$60 million in the Solar and Energy Efficiency in State Schools Program. This program is building on a partnership agreement with the National Solar Schools Program to deliver solar, energy efficient lighting, an energy data monitoring system and a curriculum package to all Queensland state schools. The aims of the program are to reduce energy use in schools and to build community support and understanding for renewable energy and energy efficiency.	More than 1250 schools will have solar PV installed under the program, with most schools receiving 4 kW. In total these are expected to generate approximately 9 GWh of renewable electricity per annum, saving more than 8 kilo tonnes of greenhouse gas emissions (ktCO _{2e}) per annum. Further savings are expected from the energy efficient lighting and from positive behaviour change in schools.
Queensland Solar Homes Program	2008-2010	Facilitate the installation of 1kW solar power systems for 1,000 households in south-east Queensland and the regional council areas of Cairns, Rockhampton, Toowoomba and Fraser Coast.	1000 1kW solar energy systems installed.
Windorah Solar Farm	Commissioned October 2009	A 150 kW solar farm, featuring 5 concentrated PV parabolic dishes. The solar farm aims to reduce the town's reliance on diesel fuel. Funded by Ergon Energy.	Generation capacity of 150 kW. Estimated 3000 000 kilowatt hours of electricity produced per year. Savings of up to 100,000 litres of diesel fuel and 300 tonnes of greenhouse gas emissions a year.
Townsville Solar City	Funded September 2006	\$5 million to support the delivery of the Ergon Energy led, Townsville: Queensland Solar City initiative under the Australian Government's \$94 million Solar Cities Program.	The project aims to install 500 solar power systems on selected homes and businesses. Estimated to reduce greenhouse gas emissions by approximately 50,000 tonnes.
Solar Cities art project	Funded June 2008 Completed 24 September 2010	\$130 000 in funding for a piece of solar artwork was granted to the Office of Clean Energy from art+place , the Queensland Government's public art fund. The art work will be built on Magnetic Island to commemorate the Townsville Solar City Project.	The solar artwork will promote the benefits of solar power to the wider community.

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Project / Initiative	Dates	Description	Outcome (e.g. generation capacity, megawatt hours, installations, savings, etc)
Large Scale Solar Prefeasibility Study	Expected completion in late 2010	The OCE, in partnership with the Clinton Foundation, is conducting a prefeasibility study on concentrated solar power in a number of sites throughout Queensland. \$1 million committed through the SESF towards the study.	Aimed at attracting large scale solar projects to Queensland. The outcomes of the study will inform Queensland bids to attract Federal funding for development of a large-scale solar project under Round 1 of the Solar Flagships Program.
Solar Flagships	A Federal Government decision on Round One of funding is expected mid 2011	Solar Flagships is a Commonwealth fund of more than \$ billion to support the construction of up to four large-scale solar power plants in Australia. The program aims to establish 1000MW of grid connected solar power plants nationally.	Eight projects have been shortlisted by the Federal Government under Round One of the Program, comprising four solar PV and four solar thermal projects. The Queensland Government is committed to supporting a Queensland based Solar Flagships project. Under the stewardship of the Queensland Government, five of the eight shortlisted Round One projects are proposing sites in Queensland, including all four of the shortlisted solar thermal projects.
University of Queensland Solar Array	Installation in late 2010	The Queensland Government is contributing \$1.5 million towards a \$7.75 million, 1.2 MW roof-top flat panel solar PV power system and research facility at the University of Queensland's St Lucia campus.	The solar array will save around 1750 tonnes of greenhouse gas emissions annually. The project will also facilitate research, providing valuable data regarding commercial and industrial scale solar power infrastructure.
Bright Thing advertising campaign	April to October 2010	The campaign is calling on families, schools, sporting groups, and whole towns and cities to invest in solar to help double Queensland's use of solar energy by 2015. It seeks to educate Queenslanders about the initiatives available to help them invest in solar PV and solar hot water.	The campaign has used television, radio, print, online, billboard advertising and a website to spread the message about solar energy. With the assistance of the Bright thing campaign, Queenslanders added more than 70MW of installed solar energy between March and September 2010.
Carrara Solar Stadium	Construction expected to be completed by the end of 2010.	The Queensland Government is investing \$4.4 million to install solar power on the new Carrara stadium facility. The solar roof will be the centrepiece of the development.	The solar roof will produce enough capacity to power around 20 per cent of the stadium's energy requirements over the course of a year.
Kogan Creek Carbon Reduction Project	Operational in 2012	To reduce carbon emissions from the Kogan Creek Power Station. The Queensland Government committed \$35.4 million to the project in February 2010. The key deliverables include: reducing carbon emissions and greenhouse intensity of the Kogan Creek Power Station understanding the technology that can be deployed as carbon footprint reducing technology; and understand the benefits of integrating renewable energy into existing infrastructure. This project aligns with the objectives of the Kogan Creek Solar Boost Project.	Increase the station's capacity by 44MW under peak solar conditions and improve plant fuel efficiency. Avoid around 35,600 tonnes of greenhouse gas emissions/annum.
Virtual Solar Power Station (VSPS)	Completion: End of 2015	This proposal sets a non-mandatory solar target for the community with the aim of creating a 500 MW VSPS by the end of 2015.	Aims to create a 500 MW solar VSPS by the end of 2015. This would save 750,000 tonnes of greenhouse gas emissions. Queensland is well on the way to meeting its 500MW goal, with 322MW of installed solar energy at the end of September 2010.
Solar Sports and Communities	From 1 June 2010	Up to \$3.3 million a year over three years will be prioritised through the Gambling Community Benefit Fund to support the installation of solar PV or solar hot water systems on sporting and community facilities across the State.	Estimated electricity savings of up \$2345,000 cumulatively each year to Queensland community organisations. Avoided electricity consumption of approximately 1,200 MWh and greenhouse gas emissions reductions of approximately 1,300 tonnes per annum.
Queensland Solar Hot water Rebate Program.	From March 2010	\$60 million in funding for the Queensland Solar Hot Water Rebate Program, which replaced the Queensland Solar Hot Water Program in March 2010. The Rebate Scheme will provide \$1000 rebates for pensioners/low income earners and \$600 for other Queenslanders for solar hot water systems or heat pumps.	Solar water heaters contribute to the renewable energy target by displacing conventional energy use. 5200 rebates worth \$3.7 million were paid in the first 3 months of processing payments. \$39% of these recipients were pensioners or low income households.

Growing Queensland's Renewable Energy Electricity Sector

Project / Initiative	Dates	Description	Outcome (e.g. generation capacity, megawatt hours, installations, savings, etc)
Solar Kindergartens	June 2010 – June 2014	This program will install solar PV systems in new and existing kindergartens throughout the state.	Up to 420 kindergartens will have 1.5kW of solar PV installed through the program, including 240 new kindergartens built under the DET Extra Kindergarten Services Initiative, and 180 existing community kindergartens through a competitive grant process. In total these are expected to generate approximately 920 MWh of renewable electricity per year, saving more than 820 tonnes of greenhouse gas emissions (tCO _{2e}) per annum.
Clean Energy Communities	First workshop held October 2009	The QREP Clean Energy Communities initiative involves encouraging all new and refurbished master planned communities, large scale commercial developments and government infrastructure services to develop a Clean Energy Plan encompassing demand side management, energy conservation and renewable energy options.	The projects aims to speed up the deployment of clean energy technologies in major population growth hot spots in South East Queensland; attract local investment in the clean energy industry; and provide affordable, reliable, clean energy to local master planned communities and large scales commercial developments.
The Prince Charles Hospital: Cogeneration System	Commissioned 2010	1.6 MW cogeneration system	Daily output 24,800 kWh plus hot water and steam
Amendments to Queensland Development Code 4.1 'Sustainable buildings', to increase the penetration of photovoltaic (PV) solar energy systems in new housing stock.	from 1 May 2010	This initiative renders all existing and new covenants and body corporate by-laws that prohibit or restrict the installation of solar PV and solar hot water systems merely for the purposes of preserving the external appearance of a building.	Removal of the barriers to installation of solar PV and solar hot water systems gives homeowners the freedom to install these systems and improve the energy efficiency of their home where they may have previously been restricted.
'Ban the barriers' Amendment to the <i>Building Act 1975</i> and <i>Body Corporate and Community Management Act 1997</i> to ban covenants and body corporate by-laws that restrict the installation of sustainable features including solar PV energy systems and solar hot water systems.	From 1 January 2010	This initiative renders all existing and new covenants and body corporate by-laws that prohibit or restrict the installation of solar PV and solar hot water systems merely for the purposes of preserving the external appearance of a building.	Removal of the barriers to installation of solar PV and solar hot water systems gives homeowners the freedom to install these systems and improve the energy efficiency of their home where they may have previously been restricted.
Electric hot water system phase-out	Stage 1 – 1 March 2006 Stage 2 – 1 January 2010	From 1 March 2006, all new houses and townhouses in Queensland can not install an electric hot water system. A solar, gas or heat pump system must be installed. From 1 January 2010, all existing houses and townhouses in Queensland must install a solar, gas or heat pump system if their electric systems needs replacing and they are located in a natural gas-reticulated area.	Hot water makes up approximately 27 per cent of household energy consumption. By mandating that homeowners install either gas, solar or heat pump, this will help direct an increase in solar hot water systems and in turn reduce demand on the electricity grid and subsequent greenhouse gas emissions.
Codification and/or low emission energy generation targets for new commercial and industrial estates.	Research is ongoing	Buildings Codes Queensland is investigating possibilities for encouraging low emission energy generation systems (such as PV systems) to be installed on or adjacent to new commercial buildings through measures such as codification of design solutions or setting low emission energy generation targets for new industrial estates and shopping complexes for energy generated on site by commercial tenants.	Encouraging low emission energy generation systems (such as PV systems) in commercial and industrial estates

Growing Queensland's Renewable Energy Electricity Sector

Project / Initiative	Dates	Description	Outcome <i>(e.g. generation capacity, megawatt hours, installations, savings, etc)</i>
Statutory Regional Plans	SEQ Regional Plan Far North Queensland Regional Plan Whitsunday, Hinterland and Mackay Regional Plan Wide Bay Burnett Regional Plan North West Regional Plan Maranoa Balonne Regional Plan South West Regional Plan	Principles and policies of most Statutory Regional Plans will require local governments to provide for infrastructure and services that will increase the use of renewable energy in new urban developments and reduce greenhouse gas emissions.	Future local government planning policies will include provisions to encourage the generation and uptake of renewable energy.
North West Queensland Energy Delivery Project	Commenced in August 2009 with a possible resolution by early 2011	A government facilitated 12-month competitive process to resolve the long-term energy requirements of the mining industry located in North West Queensland.	The possible construction of a 720km electrical transmission line from the National Electricity grid near Townsville to Mount Isa. If the project is successful, it would create the catalyst for significant investment in know renewable energy resources and assist to commercialise an identified pilot Renewable Energy Priority Zone near Mount Isa.
Installation of additional solar PV array at Zillmere Joint Contact Centre building	2010	Installation of large 370kW solar PV array at Zillmere Joint Contact Centre building (over the carpark – additional to the 80kW array on the main building roof)	Estimated capacity approximately 635 megawatt-hours per year. <i>(based on capacity x 365 days x 4.7)</i>
Installation of solar PVs at various DPW office buildings	2010-2011	Installation of small/medium scale solar PVs at various new DPW office buildings being constructed. <ul style="list-style-type: none"> • Zillmere Joint Contact Centre (roof) – 80kW • William McCormack Place Stage 2 (Cairns) – 64kW • Maroochydore Govt Office building – 58kW • Thursday Island Office Building – 30kW (proposed) • Mareeba Govt Office Building – 30kW (proposed) 	Estimated capacity approximately 450 megawatt-hours per year <i>(based on capacity x 365 days x 4.7)</i>

Appendix G ~ Barriers to generating more electricity in Queensland from renewable energy raised in submissions

Barriers	Submissions
Cost – high capital cost/ higher electricity cost (raised in 26 subs)	5, 6, 7, 9, 13, 14, 22, 23, 25, 28, 30, 31, 33, 37, 38, 39, 42, 44, 45, 46, 47, 49, 53, 59, 60, 63
Grid connection access/transmission issues/proximity to grid (18)	3, 9, 11, 17, 18, 19, 25, 29, 33, 38, 47, 48, 50, 51, 53, 57, 59, 63
Problems due to government energy policies/rebates/subsidies offered, uncertainty, inconsistencies (16)	7, 10, 14, 15, 16, 18, 22, 23, 25, 29, 32, 37, 39, 42, 51, 64
Unreliability/intermittent nature of RE (12)	3, 4, 9, 10, 14, 17, 25, 45, 49, 51, 60, 63
Uncertainty in the energy market (10)	8, 15, 19, 31, 33, 37, 38, 39, 45, 64
Lack of/problems with feed in tariffs (10)	11, 14, 19, 23, 27, 32, 37, 41, 42, 59
Lack of incentives for RE (9)	11, 13, 23, 27, 33, 37, 42, 47, 52
Poor marketing of RE & green power, difficulty accessing advice (7)	5, 19, 25, 28, 30, 41, 53
Technological issues/lack of R & D, failure to trial smart meters (7)	2, 6, 9, 29, 31, 32, 39
Absence of a price on carbon (5)	23, 37, 39, 49, 51
Local government approvals process (5)	3, 9, 18, 62, 63
Perceived resistance by opposition from existing fossil fuel electricity providers (5)	31, 37, 42, 54, 65
Lack of skilled workers/training (5)	19, 33, 53, 57, 63(a)
Fuel access/availability issues (5)	7, 20, 27, 33, 44
Land use issues (4)	18, 22, 44, 53
Problems with RE standards and guidelines (4)	24, 30, 37, 42
Problems with resource mapping (3)	3, 30, 53
Split incentive (3)	25, 39, 59
Structural issues in the electricity industry /lack of level playing field (2)	21, 43
Lack of economic viability modelling (2)	3, 53
Lack of economies of scale (2)	19, 31
Lack of govt support for green energy (1)	5
Lack of Australian manufacturing capacity (1)	2