



independent competition and regulatory commission

Final Report
**Electricity Feed-in
Renewable Energy
Premium: Determination
of Premium Rate**

**Report 4 of 2010
March 2010**

The Independent Competition and Regulatory Commission (the Commission) was established by the *Independent Competition and Regulatory Commission Act 1997* to determine prices for regulated industries, advise government about industry matters, advise on access to infrastructure and determine access disputes. The Commission also has responsibilities under the Act for determining competitive neutrality complaints and providing advice about other government-regulated activities. Under the *Utilities Act 2000*, the Commission also has responsibility for licensing utility services and ensuring compliance with licence conditions.

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Foreword

The Minister for Energy has made a reference to the Independent Competition and Regulatory Commission (the Commission) to provide advice to assist with the determination of the premium rate to be paid for electricity generated under the provisions of the *Electricity Feed-in (Renewable Energy Premium) Act 2008* (the Electricity Feed-in Act). The Minister's reference, dated 30 October 2009, has been made under sections 15 and 16 of the *Independent Competition and Regulatory Commission Act 1997* (ICRC Act).

The Electricity Feed-in Act provides for payments from electricity retailers to 'occupiers' of premises with compliant renewable (solar and wind) electricity generators installed in residential and commercial premises and connected to the electricity network. These payments are made at a price known as the 'premium rate' for generators with a capacity of less than 10 kWh, and at 80% of the premium rate for generators with between 10 kWh and 30 kWh capacity.

The Commission has been asked to develop a model for determining the premium rate. The model provides guidance on the determination of the rate for the period from 1 July 2010 to 30 June 2011 and on a mechanism for annual adjustments of the rate for the following four years.

The Commission released an issues paper in November 2009 and received submissions from a range of individuals, businesses and government agencies, as well as the Minister for the Environment, Climate Change and Water. The Commission released a draft report in February 2010 which also elicited a number of submissions from stakeholders and interested parties. Following the draft the Commission also met, and entered into discussions with, a number of stakeholders and industry experts.

This final report presents the Commission's recommendation on the premium rate for 2010–11 and the manner in which it should be determined in subsequent years. I commend this report to the Minister.

Paul Baxter
Senior Commissioner
March 2010

Contents

Foreword	iii
1 Introduction	1
1.1 The Electricity Feed-in Act	1
1.1.1 Background	1
1.1.2 Details of the Act	1
1.1.3 The Electricity Feed-in Code	3
1.2 Terms of reference	3
1.3 Issues paper	4
1.4 Draft report	4
1.5 Timeline	4
1.6 Structure of the final report	5
2 Executive summary	7
2.1 Key issues and approach	7
2.2 Final recommendation on feed-in tariff for 2010–11	7
2.3 Final recommendation on model for determining future tariffs	9
3 Key background issues	11
3.1 ACT energy policy and other initiatives to reduce greenhouse gas	11
3.1.1 Weathering the Change—the ACT’s Climate Change Strategy 2007–2025	11
3.1.2 ACT Draft Sustainable Energy Policy	11
3.1.3 Legislative Assembly review of climate change	12
3.1.4 Carbon Pollution Reduction Scheme	13
3.1.5 GreenPower Scheme	13
3.1.6 The Solar Homes and Communities Plan	14
3.1.7 Renewable Energy Target scheme / Solar Credits	14
3.1.8 Enhanced Renewable Energy Target	15
3.1.9 Green Loans	15
3.1.10 ACT Greenhouse Gas Abatement Scheme	16
3.1.11 National Capital to Solar Capital Discussion Paper—options for an expanded ACT Electricity Feed-in Tariff Scheme	16
3.2 Feed-in tariff schemes in other jurisdictions	17
3.2.1 The South Australian scheme	18
3.2.2 The New South Wales scheme	18
3.2.3 Overseas schemes	18
3.3 The ACT feed-in scheme to date	20
3.3.1 Take-up	20

3.3.2	The effect of other incentives on take-up	22
3.4	Environmental and other impacts to date	23
4	The Commission’s issues paper and draft report	25
4.1	Issues paper	25
4.2	Draft report	25
4.3	Responses to the draft report	26
4.3.1	The level of the tariff	26
4.3.2	Modelling of costs and output	26
4.3.3	Equivalence with other investments	27
4.3.4	Other issues	27
4.4	Other consultations	27
5	Issues in modelling and determining the level of the feed-in tariff	29
5.1	Key considerations for setting the feed-in tariff rate	29
5.2	The feed-in tariff and the RET/Solar Credits scheme	30
5.3	The payback period and rate of return	30
5.4	Average energy output	32
5.5	Direct costs and benefits to occupiers of installing renewable energy generation units	33
5.5.1	Costs	33
5.5.2	Benefits	35
5.6	Forecasting future take-up	35
5.7	Other modelling issues	36
5.7.1	Taxation	36
5.7.2	Inflation	37
5.7.3	Other matters	37
5.7.4	Summary of model inputs	38
6	Modelling the 2010–11 feed-in tariff	39
6.1	Modelling scenarios	39
6.2	The base case—maintaining the current premium rate of 50.05 cents	39
6.2.1	Features of the current premium rate	40
6.3	A 37 cent premium rate	40
6.4	A 45.7 cent premium rate	41
6.5	The rate for large systems	42
6.6	Other effects of the premium feed-in rate	42
6.6.1	The effect on household electricity bills	42
6.6.2	The estimated effect on greenhouse gas reduction	46
6.6.3	The estimated effect on general price inflation and jobs	47
6.7	Conclusions and recommendation on feed-in tariff	47
6.7.1	Desirability of occupiers being able to recoup the cost of investment in renewable energy generation capacity within a reasonable time and the need to encourage the generation of electricity from renewable sources	48

6.7.2	Desirability of costs under the Electricity Feed-in Act impacting equitably on all electricity users	49
6.7.3	Need to reduce emissions from greenhouse gases and to reduce the likely effects of climate change	50
6.7.4	Conclusions	51
7	The feed-in tariff in future periods	53
7.1	Draft report	53
7.1.1	Submissions on the draft report	54
7.2	Key issues	54
7.2.1	Flexibility	54
7.2.2	Certainty	55
7.2.3	Simplicity and transparency	55
7.2.4	Feedback loops	56
7.2.5	Degression	56
7.2.6	Independent verification	57
7.3	Discussion and conclusions	57
Appendix 1	Terms of reference	59
Appendix 2	Approach to modelling	61
Appendix 3	Abbreviations and acronyms	63

1 Introduction

1.1 The Electricity Feed-in Act

1.1.1 Background

A large amount of greenhouse gas pollution is created by the burning of fossil fuels for energy generation. This pollution can be minimised by increasing the use of renewable forms of energy.

At present, renewable energy electricity generation is a relatively expensive alternative to coal-fired generation. Feed-in tariffs, which are currently in operation in more than 40 countries, provide an incentive for the take-up of renewable energy generation.

In December 2007, the ACT Government issued a discussion paper on the possible model for and operation of a feed-in tariff arrangement for the ACT. After public consultation, the government decided to adopt a feed-in scheme and gave effect to that decision through the *Electricity Feed-in (Renewable Energy Premium) Act 2008* (incorporating amendments made to the Act in 2009).¹ The purpose of the Electricity Feed-in Act is to provide the mechanisms required to encourage the take-up of renewable energy electricity generation. Specifically, it aims to:

- promote the generation of electricity from renewable energy sources
- reduce the ACT's contribution to human-induced climate change
- diversify the ACT's energy supply
- reduce the ACT's vulnerability to long-term volatility in fossil fuel prices.

1.1.2 Details of the Act

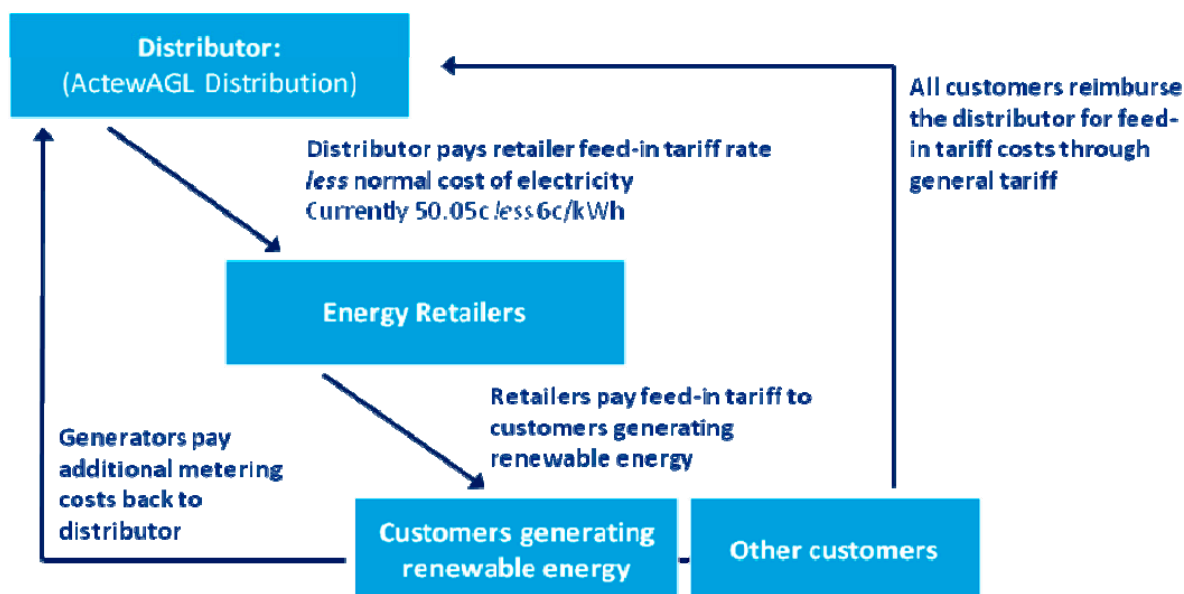
The Act provides a framework that enables capital investment in renewable energy electricity generation to be recouped by paying 'occupiers' a 'premium rate' for the gross amount of electricity they generate.²

The Act, which came into effect on 1 March 2009, requires electricity distributors (in the ACT, ActewAGL Distribution) to connect generators of renewable energy to the electricity network and to reimburse those generators' electricity suppliers (retailers) for the difference between the premium rate determined for renewable electricity and the normal cost of that electricity. The retailer is then required to pay the generator the premium rate (see figure 1).

¹ The Electricity Feed-in Act is available at <http://www.legislation.act.gov.au/a/2008-21/default.asp>.

² Under the Electricity Feed-in Act, payments are made to 'occupiers' (defined as "the retail electricity customer for the premises") of premises at which compliant renewable energy generators are installed. In most cases, the occupier will be the owner of the installation; however, to ensure consistency with the legislation, this report uses the term 'occupier' throughout.

Figure 1 Operation of the feed-in tariff scheme



The Act prescribes different rates of payment for electricity generated, according to the generator's capacity:

- generators of 10 kW or less receive 100% of the premium rate
- generators of between 10 kW and 30 kW receive 80% of the premium rate.³

Section 10 of the Act provides that the Minister must determine the premium rate each financial year. In February 2009, the Minister for Energy determined the premium rate to be 50.05c/kWh for the period from 1 March 2009 to 30 June 2010.⁴ The Act also requires the Minister to seek the advice of the Commission to assist in the determination. The rate for 2010–11 will be determined by the Minister following receipt and consideration of the Commission's advice in this report. The rate must be determined no later than 31 March 2010.

The premium rate for the financial year that the generator is connected to the grid is payable (in nominal terms) for electricity generated by the generator for a period of 20 years after the date of connection, with payments made quarterly in arrears. Importantly, the premium rate at the time the contract was entered into will be paid for the full 20 years, regardless of any subsequent changes in the rate. Furthermore, the premium rate attaches to the occupier of the premises, and not to the original owner of the generator. Thus, if a property with a generator is sold two years after it is installed, the new occupier will be entitled to the feed-in tariff payments under the arrangements established through the Electricity Feed-in Act, but only for the remaining 18 years.

On current rates, the ACT scheme is the most generous in Australia. While the equivalent New South Wales scheme features a feed-in tariff of 60c/kWh, payments are made for only seven years, compared with 20 years in the ACT.

³ Section 9 of the Electricity Feed-in Act provides that the percentages can be varied by the Minister.

⁴ Electricity Feed-in (Renewable Energy Premium) Rate Determination 2009 (No. 1) DI2009-22.

In addition, as discussed further in this report, a feature of the ACT scheme is that it is relatively more generous (in terms of payback periods and return on investment) for small-scale systems compared to larger ones. This is because:

- there is a relatively linear relationship between installed capacity and cost, with limited economies of scale
- Commonwealth arrangements (see chapter 3) effectively reduce the initial outlay required for smaller schemes (less than 1.5 kW) by a much greater percentage than for larger installations
- systems that are larger than 10 kW only receive 80% of the premium rate.

1.1.3 The Electricity Feed-in Code

The Electricity Feed-in Code, which supports the Act, was determined by the Commission in February 2009 under the *Utilities Act 2000*.⁵ The code applies to electricity distributors and retailers, and sets out the practices and standards for the operation of the renewable energy feed-in scheme. The code details the obligations of electricity distributors and retailers to each other and to generators of renewable electricity under the scheme.

The code also requires distributors and retailers to report quarterly to the Commission. Distributors are required to report:

- the numbers of connection applications, new connections and total connections
- the total installed capacity and total metered output.

Retailers are required to report:

- the number of customers receiving a feed-in tariff
- the total premium tariff paid out.

1.2 Terms of reference

The Commission's full terms of reference are set out in appendix 1. In summary, the Commission has been provided with a reference under section 15 of the ICRC Act to develop a model for determining the premium rate for the feed-in tariff to apply for the period from 1 July 2010 to 30 June 2011, and a mechanism to adjust the rate for the following four years. In doing so, the Commission is required to give priority to the following:

- the desirability of costs under the Electricity Feed-in Act impacting equitably on all electricity users
- the need to encourage the generation of electricity from renewable sources
- the need to reduce emissions from greenhouse gases
- the need to reduce the likely effects of climate change
- the desirability of occupiers being able to recoup investments in renewable energy generators within a reasonable time.

The Commission is also required to have regard to:

- the amounts payable under the Act by an electricity distributor or an electricity supplier

⁵ The Electricity Feed-in Code is available at <http://www.legislation.act.gov.au/di/2009-23/default.asp>.

- additional metering costs passed on to an occupier because of the installation of the generation equipment.

The amounts payable under the Act by an electricity supplier take into account the arrangement through which the ‘normal cost of electricity’—currently determined by the Minister to be 6c/kWh—is funded by retailers. That amount approximates the savings retailers are able to make by avoiding purchases of electricity from the National Electricity Market.⁶

The Commission has also been asked to identify other matters relevant to the determination of the premium rate. In doing so, the Commission has had regard to its objectives under section 20(2) of the ICRC Act. While those objectives specifically apply to price directions (rather than to references under section 15 of the Act), the Commission believes that several are particularly relevant to this review, including:

- (f) the principles of ecologically sustainable development mentioned in subsection (5)
- (g) the social impacts of the decision
- (j) the effect on general price inflation over the medium term.

The Commission also considers that it is relevant to have regard to the nature of the gross feed-in tariff scheme that was announced on 10 November 2009 by the New South Wales Government.

1.3 Issues paper

The Commission released an issues paper on 23 November 2009. The paper included discussion of:

- the Electricity Feed-in Act and other initiatives in the ACT to reduce carbon emissions
- gross feed-in tariffs in other jurisdictions
- some of the key issues associated with the determination of the premium rate
- the model that may be used to amend the premium rate in future years.

1.4 Draft report

The Commission released a draft report on 4 February 2010. The report considered a range of options for the rate of the feed-in tariff and formed the preliminary view that a premium rate of 37c/kWh was appropriate. Further detail on the draft report is provided in chapter 4.

1.5 Timeline

The Commission has followed the timeline below for the investigation.

⁶ The Electricity Feed-in (Renewable Energy Premium) (Normal Cost of Electricity) Determination 2009 (No. 1) NI2009–83 is available at <http://www.legislation.act.gov.au/ni/2009-83/default.asp>.

Activity	Date
Release of issues paper and call for submissions	23 November 2009
Submissions closed	23 December 2009
Release of draft report with a further call for submissions	4 February 2010
Submissions closed	4 March 2010
Final report released	15 March 2010

1.6 Structure of the final report

This final report is structured as follows:

- Chapter 2 provides an executive summary of the Commission’s advice.
- Chapter 3 provides further background to the Act and the operation of the feed-in tariff scheme to date.
- Chapter 4 provides an overview of the draft report, and responses to that report.
- Chapter 5 discusses key issues that will affect the level of the premium rate, and the position adopted by the Commission on those issues.
- Chapter 6 outlines the results of the Commission’s modelling and its recommendation regarding the feed-in tariff.
- Chapter 7 discusses the model to be used to determine the premium rate from 2011–12 to 2014–15.
- Appendix 1 reproduces the terms of reference.
- Appendix 2 provides a summary of the model used for the years 2012–13 to 2014–15.
- Appendix 3 lists abbreviations and acronyms.

2 Executive summary

2.1 Key issues and approach

In order to respond to its terms of reference to provide advice to the Minister on the ACT feed-in tariff in 2010–11, the Commission has, among other things:

- reviewed feed-in tariff arrangements in other jurisdictions
- considered the variety of other schemes, including those available from the Australian Government, that encourage the production and use of renewable energy
- made a number of assumptions about the costs and financial benefits of renewable generation in the ACT, based in many cases on advice from stakeholders
- modelled a number of different scenarios, including projections of price, take-up and the implications for electricity tariffs and greenhouse gas reductions.

2.2 Final recommendation on feed-in tariff for 2010–11

Ultimately the Minister's decision on the feed-in tariff represents a trade-off between the premium rate, the take-up rate, the level of greenhouse gas reductions and the impact on customers' electricity bills.

Having considered the matter, the Commission's position is that it is appropriate to set the premium rate at the amount that is required to provide sufficient incentive to make the installation of renewable generation attractive against other, similar relatively low-risk investments. In determining this rate, the Commission has had regard to the impact on the rest of the economy. The Commission acknowledges the policy initiatives that the government has foreshadowed to help alleviate any financial burden that the feed-in tariff scheme might place upon other electricity consumers, particularly those that are in a more financially vulnerable position as regards their public utility costs. However, the Commission also recognises that there are other consumers of electricity who choose not to, or cannot, invest in renewable generation for financial or technical reasons. Thus there is a need to maintain an appropriate balance in the level of the determined premium rate which is effectively paid for by all electricity users.

Not overcompensating the occupier is important because, despite the benefits of the feed-in tariff scheme, it is a relatively costly way of reducing greenhouse gas. As the ACT Government has noted in relation to the potential expansion of the scheme, the cost of abatement is in the range of \$195 to \$434 per tonne, which is significantly higher than the (untested) modelling of the CPRS package, which was based on \$23 per tonne. It is also more expensive than directly purchasing green energy; for example, ActewAGL promotes 100% green energy for an additional price of approximately 7.5c/kWh, or an abatement cost of \$70 per tonne.

The most difficult element of the Commission's recommendation is establishing a premium rate which provides a sufficiently attractive return for larger systems, but at the same time does not unduly overcompensate smaller systems. Given the structure of the scheme and Australian Government incentives, this is difficult to achieve, and ultimately a compromise needs to be found.

The Commission's view is that a premium rate of 45.7c/kWh in 2010–11 represents the most appropriate premium rate as it:

- enables all occupiers to be able to recoup the cost of investment in renewable energy generation capacity within a reasonable time
- provides the ability to encourage the generation of electricity from renewable sources
- minimises the impact of costs on all electricity users
- makes a contribution towards reducing emissions of greenhouse gases and the impact of climate change in the ACT, but at the same time recognises that the feed-in tariff scheme alone cannot resolve greenhouse gas and climate change problems.

A 45.7c/kWh premium tariff provides a 12-year payback and a 6% return for a 5 kW system. This return is slightly higher than the current 10-year Commonwealth bond rate of 5.3%, thereby giving participants an incentive to invest in renewable energy, and providing a small premium reflects the slightly higher risks of doing so.

Under a 45.7c/kWh premium rate an occupier with a 1.5 kW system will:

- be required to make a net outlay (after RECs) of approximately \$3,500
- recover this outlay, in nominal terms, in around 6 years (after making an allowance for maintenance costs and a contribution towards the cost of inverter replacement)
- receive a total of \$7,650 in feed-in tariff payments over 20 years
- earn a return of 16.9%.

Larger systems will still earn a positive return of around 2.5%. This falls short of a full commercial rate of return and the Commission acknowledges that this is the case. While some commercial occupiers may find other reasons to install renewable energy, and indeed some have already done so, the Commission accepts that widespread commercial-scale take-up of the scheme will be limited at this rate. The Commission therefore urges the Minister to consider increasing the percentage of the premium rate applying to large generators from its current 80% to 100%. This move would increase returns for these larger units to 6%, which is in line with the returns for the 5 kW units and a rate commensurate with Commonwealth bonds.

A 45.7c/kWh premium rate represents a reduction of around 9% from the existing premium rate. This reduction can effectively be attributed to changes in the external environment since the 2009–10 rate was established, and in particular:

- changes to the Commonwealth arrangements which encourage green energy
- reductions in the cost of renewable energy systems.

Arguably, a premium feed-in tariff rate of 45.7c/kWh guaranteed for 20 years, although less than the current rate of 50.05c/kWh, will still result in the ACT having the most generous feed-in tariff scheme in Australia. At the same time, the approach that the Commission has used to establish this rate provides a sound framework for considering any future determination decisions on the premium rate, thereby providing a degree of certainty for future investors who may decide to participate in the scheme at some future time.

2.3 Final recommendation on model for determining future tariffs

The Commission has undertaken a comprehensive and rigorous review of the premium rate for 2010–11 and has benefited from input from industry participants. Rather than undertake a similar review for 2011–12, and bearing in mind the benefits of certainty, the Commission’s view is that the premium rate of 45.7c/kWh that it has recommended for 2010–11 should also apply (in nominal terms) in 2011–12. However, should there be any material changes to Commonwealth arrangements prior to 2011–12, it will be necessary for the rate to be reviewed. Any review will need to have regard not only to changes to the Australian Government’s scheme but also to feed-in tariff arrangements in other jurisdictions, in order to ensure the ACT scheme does not move out of line with those schemes.

In terms of the premium rate for 2012–13 to 2014–15, the Commission recommends that a rate for each of these three years be determined by the Minister in early 2012. The Commission’s preference would be that the rate be determined in a relatively straight forward manner, simply by updating the cost and other related assumptions used by the Commission in this report. However, given the likely changes in renewable generation market between now and 2012, it is likely that there will also be a need to exercise some judgement in determining the premium rate.

Thus the premium rate for these three years will need to take into account and update the following ‘mechanistic’ factors which are currently reflected in the Commission’s model (and which is currently set out in appendix 2):

- the capital cost of installing renewable generation units, using the most up-to-date information available at the time, with cost information sourced from publicly available information where possible—strong consideration should be given to the likely change in capital costs across the period 2012–13 to 2014–15, and these should be factored into the calculation of the premium rate in each of the years
- the operating and maintenance costs associated with renewable generation units, including an allowance for the cost of replacing inverters—consideration should be given to whether it is reasonable to assume that inverter costs will reduce (‘degress’) across the period, and if so this should be built into the model
- the likely output from generation units, taking into account historic levels of output as well as any potential changes that may occur in future as a result of improvements in the efficiency of generators
- Australian Government incentives available at the time and forecast to be in place from 2012–13 to 2015–16
- the likely deterioration in output from renewable generation systems over time
- ensuring returns for a 5 kW generator which are slightly higher than the existing Commonwealth 10-year bond rate.

In addition to the ‘mechanistic’ matters listed above, judgement will need to be exercised in respect of the impact of the factors outlined below when determining the premium rate:

- outcomes of the scheme to 30 December 2011, including such things as total generation capacity installed, total output, the total amount of greenhouse gas avoided, and the existing and forecast impact on electricity prices
- the need to promote stability and certainty in the premium rate over time, particularly given the impact that changes in Commonwealth arrangements might have on financial returns

- feed-in tariff arrangements in other jurisdictions
- other developments in ACT Government or Australian Government policy, including any targets for renewable generation capacity in the ACT that have been established
- the outcomes of any extensions to feed-in tariff scheme to include generators with more than 30 kW capacity
- changes in any other factors that may influence an occupier's decision to install renewable generation.

Noting that the Act requires the Minister to seek advice from the Commission in determining the premium rate each year, there is merit in the Commission retaining responsibility for overseeing the calculation of the premium rate for 2012–13 to 2013–14 (and, if Commonwealth arrangements change materially, for 2011–12). Under this arrangement, the Commission would have to have regard to the mechanism that had been set and agreed by the Minister. Any discretion that is required, for example in making adjustments to the scheme to reflect changes to Commonwealth arrangements, could be applied by the Commission before a recommendation (along with the workings of the model) is given to the Minister and through the Minister to the Legislative Assembly. In this way, transparency and replicability would be assured, together with independent advice and administration of the premium rate determination model. This would be consistent with the intentions of the Act, and in particular with the intentions of the Legislative Assembly when it incorporated a role for the Commission in the determination of the premium rate.

3 Key background issues

This chapter provides further background on the feed-in tariff scheme and its operation to date. It also provides an overview of relevant renewable energy policies currently applying in the ACT, including Australian Government schemes, as well as those operating in other Australian jurisdictions and overseas.

3.1 ACT energy policy and other initiatives to reduce greenhouse gas

3.1.1 Weathering the Change—the ACT’s Climate Change Strategy 2007–2025

The ACT Climate Change Strategy, which was released in 2007, provides an overview of climate change science, the predicted impacts on the ACT, and the government’s approach in responding to climate change. The strategy has a target of reducing the ACT’s overall emissions by 60% of 2000 levels by 2050. The milestone goal is to limit greenhouse gas emissions to 2000 levels by 2025.⁷

The first action plan of the strategy (2007–11) contains 43 individual action items falling under four key objectives:

1. Being smarter with our use of resources
2. Designing and planning our city to be more sustainable
3. Adapting to current and future climate change
4. Improving our understanding of climate change.

The introduction of a feed-in tariff for renewable energy generation was one of the action items under the ‘Designing and planning our city to be more sustainable’ objective.

3.1.2 ACT Draft Sustainable Energy Policy

In December 2009, the ACT Government issued its Draft Sustainable Energy Policy 2010–2020, which aims to deliver tangible outcomes consistent with the overall objective of contributing to the territory’s carbon neutrality. The Draft Sustainable Energy Policy proposes that by 2020 the ACT should aim to achieve the following targets (reductions are relative to 2020 business-as-usual emissions levels):

- Energy efficiency measures will aim to reduce ACT greenhouse gas emissions by at least 10%.
- Increased distributed generation will aim to reduce ACT greenhouse gas emissions by 5%.
- Transport initiatives will aim to reduce ACT greenhouse gas emissions by up to 3%, representing a 10% reduction in transport-based emissions.
- Waste initiatives will aim to reduce ACT greenhouse gas emissions by up to 1%, representing a 25% reduction in waste-based emissions.

⁷ ACT Department of the Environment, Climate Change, Energy and Water, *Weathering the change—the ACT Climate Change Strategy 2007–2025*, available at http://www.environment.act.gov.au/climate_change/weathering_the_change.

- The ACT Government will aim to be carbon neutral, reducing ACT greenhouse gas emissions by up to 5%.
- The ACT will aim to use renewable energy for at least 25% of all electricity consumption (with an interim target of 15% by 2012).
- Customer information and choice will be significantly enhanced.
- Low-income and vulnerable energy customers will be assisted.
- Energy supply will be secure, reliable and diverse.
- Clean job growth and industry development will be promoted in a diverse low-carbon economy.

The final Sustainable Energy Policy 2010–2020 is due for release in mid-2010.

3.1.3 Legislative Assembly review of climate change

In late 2008, the ACT Legislative Assembly formed the Standing Committee on Climate Change, Environment and Water to examine matters related to climate change policy and programs, water and energy policy and programs, the provision of water and energy services, conservation, the environment and ecological sustainability. Soon afterwards, the committee received terms of reference to undertake the Inquiry into ACT Greenhouse Gas Reduction Targets.

The inquiry, which is ongoing, released an interim report in October 2009. The report contained a number of recommendations for the ACT's approach to climate change, including that a Climate Change (Greenhouse Gas Emissions Reductions Target) Bill be introduced into the Legislative Assembly by June 2010. The committee recommended that the proposed Bill contain targets, including:

- for the ACT's per capita emissions to peak in 2013
- a 5% reduction in the ACT's overall emissions by 2015
- consideration of a 40% reduction in the ACT's overall emissions by 2020
- an 80% reduction in the ACT's overall emissions by 2050
- for the ACT Government to have zero net emissions from its own operations by 2015.⁸

The ACT Government announced its response to the interim report on 17 November 2009. In that response, the government supported the introduction before June 2010 of a Bill legislating emissions reduction targets and mandating the reporting of progress against those targets. The targets include:

- a zero net emissions target for the ACT by 2060
- for the ACT's per capita emissions to peak in 2013.⁹

Interim targets are expected to be announced in 2010.

⁸ ACT Legislative Assembly, Standing Committee on Climate Change, Environment and Water, *Inquiry into ACT greenhouse gas reduction targets: interim report*, 2009, <http://www.legassembly.act.gov.au/downloads/reports/CCEW02%20Green%20Gas%20revised%20inclu%20errata.pdf>.

⁹ *Government response to the interim report of the Legislative Assembly inquiry on ACT greenhouse gas reduction targets*, 2009, <http://www.legassembly.act.gov.au/downloads/reports/7th%20CCEW02%20Green%20Gas.pdf>.

3.1.4 Carbon Pollution Reduction Scheme

The Australian Government has committed to taking action, in concert with other countries, to reduce Australian greenhouse gas emissions. The primary policy lever chosen for emissions mitigation is an emissions trading scheme, the Carbon Pollution Reduction Scheme (CPRS).

The CPRS is a comprehensive ‘cap and trade’ emissions trading system that is intended to cover around 70% of Australia’s emissions when it is introduced in 2011. It has been designed as a market-based measure aimed at delivering the cheapest possible greenhouse gas abatement.¹⁰

The CPRS legislative package was passed by the House of Representatives on 4 June 2009. However, on 13 August 2009, the Senate voted against the legislation. The government reintroduced the Bills in November 2009, but they were rejected by the Senate for the second time on 2 December 2009. Uncertainty therefore remains about the political fate of the CPRS. However, it is likely that a national emissions trading scheme will be part of the Australian policy landscape within the next three years.

Following the Copenhagen climate change discussions and accord, the Australian Government recently confirmed its position on the CPRS.¹¹ The government has committed to an unconditional 5% reduction in emissions, with 15% and 25% targets conditional on the extent of action by other countries.

The introduction of emissions trading at a national level would significantly change, and probably limit, the role of climate change policy at the state and territory level. The Council of Australian Governments has agreed on a ‘document of shared understanding’ aimed at rationalising government programs in the interests of efficiency and effectiveness from a national perspective. States and territories have agreed to review their range of programs to ensure that they are complementary to the CPRS and do not operate to distort the price signals sent by emissions trading. In particular, the Ministerial Council on Energy is currently progressing work designed to lead to greater harmonisation of jurisdictional feed-in tariff schemes, and a policy position is due to be developed for consideration by mid-2010.

Under the proposed CPRS legislation, ACT emissions savings from the installation of photovoltaic (PV) systems would have qualified for renewable energy certificates (RECs). In the absence of a finalised national emissions trading scheme, the ACT Government has made submissions to the Australian Government seeking to ensure that emissions savings arising from ACT feed-in tariffs would count as additional savings, rather than be adopted as a ‘business-as-usual’ factor. This matter has not yet been resolved.

3.1.5 GreenPower Scheme

The GreenPower Scheme has been designed to increase the number of customers in the ACT who take up green power and the amount of green power purchased in the territory.

The scheme requires all electricity retailers licensed in the ACT to have access to a green energy product accredited through the National GreenPower Accreditation Program. Compliance with the

¹⁰ For more information on the CPRS see <http://www.climatechange.gov.au/government/initiatives/cprs.aspx>.

¹¹ Wong, P (Minister for Climate Change and Water), *Australia’s submission to Copenhagen Accord*, media release, 27 January 2010, <http://www.climatechange.gov.au/~media/Files/minister/wong/2010/media-releases/january/mr20100127.ashx>.

scheme, which has been mandatory since 1 April 2009, requires electricity retailers to offer all classes of new and reconnecting customers access to an accredited green energy product. The GreenPower product must have a minimum of 10% accredited green power, calculated and applied as the equivalent percentage of the customer's electricity usage over a billing period or in some other manner permitted under the GreenPower Program.

3.1.6 The Solar Homes and Communities Plan

The Solar Homes and Communities Plan (SHCP) was an Australian Government program that encouraged the take-up of PV technology to generate electricity by providing rebates to homeowners who installed PV power systems. Grants were also available to community organisations that installed PV power systems for educational purposes. The objectives of the program were to:

- reduce greenhouse emissions
- assist in the development of the Australian PV industry
- increase public awareness of renewable energy.

The program began in 2000, offering \$4,000 rebates for the installation of PV systems. In November 2007, the maximum rebate was increased to \$8,000, resulting in a substantial increase in applications and the introduction of a means test of \$100,000 per household. Grants were also available for extensions to existing systems.¹²

The scale of the rebate played a substantial role in generating demand for solar installations. Before the increase in the maximum rebate, applications for rebates had been averaging 150 per week across the country. In May 2008, this had increased to 420 per week, and 6,050 applications per week were being received by May 2009. In June 2009, the Australian Government ceased receiving new applications for grants, having committed \$700 million to the program (four times its original commitment). However, a number of renewable energy generators currently being installed were the subject of applications before June 2009, so installation numbers in the ACT are still being strongly influenced by the \$8,000 rebate.

3.1.7 Renewable Energy Target scheme / Solar Credits

The SHCP was replaced by the Renewable Energy Target (RET) scheme, which provides a market for renewable energy generation in the form of RECs. Solar Credits are a mechanism inside the RET scheme to encourage small-scale renewable energy generation by multiplying the number of RECs received by eligible small-scale solar, wind and hydroelectric systems installed after 9 June 2009. Solar credits are applied to the first 1.5 kW of capacity of eligible systems.¹³

Owners of a solar micro generation scheme can choose to create and sell the RECs themselves, although the installer of the system will usually offer a discount on the installation of the system in exchange for the RECs. Historically the value of that discount has varied, depending on the

¹² Australian Government Department of the Environment, Water, Heritage and the Arts, *Solar Homes and Communities Plan: History and statistics*, DEWHA, Canberra, 2009, <http://www.environment.gov.au/settlements/renewable/pv/history.html>.

¹³ Australian Government Department of the Environment, Water, Heritage and the Arts, *Solar Homes and Communities Plan: Frequently asked questions—Solar Credits and other programs*, DEWHA, Canberra, 2009, <http://www.environment.gov.au/settlements/renewable/pv/faqs.html#programs>.

prevailing REC price, which have fluctuated between \$29 and \$42 between November 2009 and March 2010.

The level of support under the Solar Credits scheme is scheduled to be phased back. The Solar Credits multiplier will be five until June 2013, after which it will decrease each year. There will be no Solar Credits multiplier from June 2015.¹⁴

Table 1 Scheduled phase-back of Solar Credits scheme

Year	9 June 2009 – 30 June 2010	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16 onwards
Multiplier	5	5	5	4	3	2	0

Source: Department of Climate Change, <http://www.climatechange.gov.au/en/government/initiatives/renewable-target/need-ret/solar-ret.aspx>.

The SHCP and the RET / Solar Credits schemes' objectives are closely aligned with the objectives of a feed-in tariff. Rebates have the effect of lowering the initial cost of installing a PV system, while the premium rate paid for the electricity generated by the system provides a return on that initial investment.

3.1.8 Enhanced Renewable Energy Target

There have been considerable developments in Australian Government climate change policy since the release of the draft report. On 26 February 2010, the Minister for Climate Change announced that, from January 2011, the existing RET scheme will be divided into the Small-scale Renewable Energy Scheme (SRES) and the Large-scale Renewable Energy Target (LRET).

According to the Department of Climate Change, the new SRES will include PV systems up to 100 kW and wind systems up to 10 kW, although the final details of the scheme are still being confirmed. The REC price for SRES systems will be fixed at \$40 (this compares to the market price of \$33 quoted in the draft report). This results in an up-front subsidy of around \$6,200 on a 1.5 kW solar PV system,¹⁵ although this will reduce as the Solar Credits multiplier is phased back from 2012–13.

3.1.9 Green Loans

The Green Loans Program, an Australian Government initiative, provided subsidised loans for the installation of solar, water-saving and energy efficiency products. The program, which began on 1 July 2009, consisted of two components:

- a home sustainability assessment
- access to a Green Loans subsidy, which covered the interest on borrowings of up to \$10,000 for a period of four years.

¹⁴ Energy Matters, *Australian solar panel credits program*, <http://www.energymatters.com.au/government-rebates/solar-credits-australia.php>.

¹⁵ Department of Climate Change, 'Enhanced Renewable Energy Target', fact sheet, <http://www.climatechange.gov.au/government/initiatives/~media/publications/renewable-energy/enhanced-ret-fs-pdf.ashx>.

On 19 February 2010, the Federal Minister for the Environment Heritage and the Arts announced changes to the Green Loans scheme, which included removing the loans component of the scheme. home sustainability assessment re still available.

3.1.10 ACT Greenhouse Gas Abatement Scheme

The ACT's Greenhouse Gas Abatement Scheme (GGAS), which is modelled closely on the equivalent New South Wales scheme, has been in operation since 2005. GGAS imposes mandatory greenhouse gas benchmarks on electricity retailers in the ACT, as well as on other participants. The scheme sets a greenhouse gas benchmark expressed in tonnes of carbon dioxide equivalent (t CO₂-e) per capita. The benchmark was lowered from the 2005 level of 7.96 t CO₂-e per capita to 7.27 tonnes per capita in 2007, and will remain at that level until 2020.¹⁶

The scheme is overseen by the Commission, which sets the total annual amount of greenhouse gas emissions allowable for the consumption of electricity in the ACT, based on the ACT's population. Retailers and other participants are each allocated a proportion of this amount, referred to as a benchmark. They are required to reduce their level of greenhouse gas emissions by offsetting any emissions in excess of the benchmark.

GGAS participants submit an audited Greenhouse Gas Benchmark Statement to the Commission in March each year, and the Commission confirms whether or not the participant has achieved its benchmark. If a participant has failed to achieve its benchmark, a penalty is applied to the shortfall. The current penalty that applies for the 2009 compliance year is \$12/t CO₂-e.

3.1.11 National Capital to Solar Capital Discussion Paper—options for an expanded ACT Electricity Feed-in Tariff Scheme

In December 2009, the ACT Government issued a discussion paper examining whether, and on what basis, participation in the existing feed-in tariff should be opened to generators with a capacity of greater than 30 kW.¹⁷ The discussion paper assesses the potential benefits and risks of expanding the scheme; potential expansion models; the effectiveness of the scheme as a lever to attract solar investment; and the impact of an expansion on consumers, including low-income and disadvantaged consumers.

Two key elements are highlighted in the discussion paper:

- A formally mandated cap of some form is to be embedded in legislation as an appropriate mechanism to maintain investor certainty and encourage larger scale development.
- In recognition of economies of scale, the premium rate applicable to commercial-scale facilities should be less than the current 80% rate offered for facilities with capacities between 10 kW and 30 kW.

In addition to focusing on generators greater than 30 kW, the discussion paper examines the potential for the scheme to include the following classes of non-participants:

- occupiers of rental properties (private or public)

¹⁶ ICRC, *ACT Greenhouse Gas Abatement Scheme*, 2009, <http://www.icrc.act.gov.au/actgreenhousegasabatementscheme>.

¹⁷ The discussion paper may be downloaded from http://www.environment.act.gov.au/__data/assets/pdf_file/0006/174795/Electricity_Feed-in_tariff_WEB.pdf#Discussion%20Paper.

- occupiers of properties that are unsuitable for viable renewable generation for reasons including block orientation, dwelling size, shading, aesthetic considerations or structural integrity
- government agencies and business enterprises.

The discussion paper also provides estimates of the potential employment creation effects of an expanded feed-in tariff scheme. These estimates are provided for discussion purposes, and consider both the short term and longer term effects of the feed-in tariff scheme on job creation in the ACT

Submissions on the discussion paper closed on 28 February 2010.

3.2 Feed-in tariff schemes in other jurisdictions

Feed-in tariff schemes operate in Victoria, South Australia, Queensland, New South Wales and the Northern Territory; a scheme is due to commence in Western Australia on 1 July 2010.

The rate and design of feed-in tariff schemes are specific to local conditions, including the price of non-renewable energy, the cost of installing renewable energy systems and the energy output obtainable from those systems.

New South Wales and the ACT operate gross feed-in tariff models, in which generators are paid for each kilowatt of energy generated. Other Australian jurisdictions have adopted net feed-in tariff models, in which payments are based on energy generated less on-site use. Table 2 summarises jurisdictional arrangements.

Table 2 Feed-in tariff arrangements in Australian jurisdictions

State	Current status	Nature of scheme	Rate	Duration
ACT	Commenced 1 March 2009	Gross	50.05c/kWh	20 years
NSW	Commenced 1 January 2010	Gross	60c/kWh	7 years
Vic.	Commenced 1 November 2009	Net	60c/kWh	15 years
Qld	Commenced 1 July 2008	Net	44c/kWh	20 years (subject to review)
WA	Commencing 1 July 2010	Net	To be determined (submissions closed on 20 November 2009)	To be determined
SA	Commenced 1 July 2008	Net	44c/kWh	20 years
NT	Commenced 1 July 2009 in Alice Springs only	Net	45.76c/kWh. (capped at \$5 per day, then reverts to 23.11c/ kWh)	To be determined

The South Australian and New South Wales schemes provide some guidance to the Commission in relation to the ACT and are useful to consider in more detail.

3.2.1 The South Australian scheme

The South Australian feed-in tariff scheme was the first in Australia. It commenced on 1 July 2008, at which time there were approximately 1,500 renewable generators in the state. The scheme provides for a net feed-in tariff of 44c/kWh, which is approximately twice the cost of energy in South Australia. Payments apply for 20 years.

The average size of renewable generators in South Australia is 1.6 kW, producing around 2000 kWh, half of which is typically net of consumption. Financial benefits to owners are therefore approximately \$440 in feed-in tariff payments, plus a reduction in bills by around \$200. This results in a payback period of about seven years, which, as discussed in section 5.4 below, is similar to the current ACT payback period for small generators.

There was rapid take-up in South Australia, and in the 15 months to October 2009 an additional 7,000 generators were added to the system. Before then, in May 2009, South Australia reached 10 MW of generation capacity, which triggered a review of the feed-in scheme. Terms of reference and the formal announcement of the review were released on 31 October 2009. A report to the government was due by the end of 2009 but has not yet been released.

3.2.2 The New South Wales scheme

The New South Wales feed-in tariff scheme has some similarities with the ACT's scheme (notably, the use of a gross feed-in tariff). In November 2009, the New South Wales Government announced the introduction of the scheme, the details of which are contained in the Electricity Supply Amendment (Solar Bonus Scheme) Bill 2009, which was recently introduced into the New South Wales Legislative Council. The proposed scheme features:

- a gross feed-in rate of 60c/kWh
- a cap on generating capacity of 10 kW
- a seven-year duration, beginning on 1 January 2010 and concluding on 31 December 2016.

The New South Wales Department of Industry and Investment expects that the average generator will be paid \$1,496 per year under the scheme (based on an average generation capacity of 2,500 kWh). The most that an individual generator could receive in one year under the scheme is \$10,000, based on the expected electricity generation of a 10 kW system.¹⁸

Initial estimates suggest that approximately 10,000 New South Wales households are likely to install solar panels in the first year of the scheme, and over 60,000 units will be installed over the full seven years.¹⁹ However, data on actual take-up is not yet available.

3.2.3 Overseas schemes

Gross feed-in tariff systems operate in several European countries. The systems operating in Germany and Spain are considered among the most generous. The common aim of these systems is to increase the deployment of renewable energy sources by removing price barriers to their

¹⁸New South Wales Department of Industry and Investment, *Solar bonus scheme for NSW*, 2010, <http://www.industry.nsw.gov.au/energy/sustainable/renewable/solar/solar-scheme>.

¹⁹New South Wales Government, *NSW solar bonus scheme*, 2009, <http://more.nsw.gov.au/articles/nsw-solar-bonus-scheme>.

adoption. The design of the systems varies substantially according to local energy market conditions and local opportunities for renewable energy generation.

Germany

The German feed-in tariff scheme has been in operation since 1991 and is regarded as one of the most successful in the world. In Germany, feed-in tariff rates are differentiated according to the source of the renewable energy. Separate tariffs are determined for biogas, biomass, hydroelectric, geothermal, solar and wind energy sources. The tariff paid for solar generators varies between EUR 45.7c/kWh and EUR 57.4c/kWh, depending on the capacity of the system and other design features. The tariff is greater for generators that are attached to the roof of a building or structure and greater again for generators that are attached to another part of a building. In Germany, the feed-in tariff is paid for a period of 20 years.²⁰

According to the ACT Department of the Environment, Climate Change, Energy and Water (DECCEW), new industries have emerged in Germany and 117,000 new jobs were created between 2004 and 2008. This has been directly attributed to Germany's Renewable Energy Sources Act, of which a solar feed-in tariff is a component.²¹

The German scheme provides degression arrangements whereby the feed-in tariff falls annually as industry capacity increases and costs fall. However, in response to a surge in installed generation capacity and concerns about the impact on electricity prices, since the publication of the Commission's draft report legislation has been put before the German parliament to significantly reduce feed-in tariffs above the scheduled degression. Latest reports suggest there will be a 16% fall in the tariff in July 2010.²²

Spain

In Spain, the feed-in tariff system is established under Royal Decree 1578/2008.²³ The rate paid for building integrated installations is EUR 34c/kWh for systems up to 20 kW and EUR 31c/kWh for systems with a generation capacity greater than 20 kW but less than 2 MW. Systems which are not integrated as part of a building are paid a rate of EUR 32c/kWh up to 10 MW capacity. There are separate feed-in rates for other forms of renewable energy, including wind, geothermal, waste combustion, biomass and biogas, as well as solar thermoelectric. Spain is also a substantial manufacturer of solar technology, exporting a large proportion of its production to Germany.

Slovenia

Slovenia has a proposed feed-in tariff scheme, the details of which are currently being reviewed by the European Union. The proposed scheme is one of the most complex, with tariffs differentiated according to the source of the renewable energy and whether the generator is attached to a building or ground mounted, as well as by generation capacity. Proposed Slovenian tariffs differentiate between four levels of energy generation capacity:

- micro <50 kW

²⁰ Federal Ministry for the Environment, Nature, Conservation and Nuclear Safety (Germany), Renewable Energy Sources Act (2004), http://www.bmu.de/files/pdfs/allgemein/application/pdf/eeg_en.pdf.

²¹ ACT Department of the Environment, Climate Change, Energy and Water, *National capital to solar capital: Options for an expanded ACT electricity feed-in tariff scheme*, 2009, p. 20, http://www.environment.act.gov.au/_data/assets/pdf_file/0006/174795/Electricity_Feed-in_tariff_WEB.pdf#Discussion%20Paper.

²² BusinessGreen.com, *Germany edges towards feed-in tariff decision*, 2010, <http://www.businessgreen.com/business-green/news/2258415/germany-edges-towards-feed>.

²³ Royal decree number 1578/2008, available at <http://www.glin.gov/view.action?glinID=216478>.

- small 50–1,000 kW
- medium 1–10 MW
- large 10–125 MW.

Proposed tariffs for solar generators (micro) vary between EUR 39c/kWh and EUR 47.8c/kWh, with the higher rate proposed for building-integrated systems. Contracts are proposed to last for 15 years.²⁴

United Kingdom

Since the publication of the Commission’s draft report, the UK Department of Energy and Climate Change has announced the details of a feed-in tariff scheme, which is scheduled to begin in April 2010. The scheme combines elements of both a gross and a net scheme by paying a ‘generation tariff’ on the gross amount of electricity generated and a further ‘export tariff’ on any amounts generated in excess of usage.

The scheme is broader than those in Australia, covering a range of generators including wind, solar PV, hydro, anaerobic digestion and domestic scale microCHP up to 5 MW in capacity. Tariff rates vary depending on the type and size of the generators. The tariff to be paid for energy generated from PV systems decreases as system size increases. The highest tariff is to be paid for systems less than 4 kW, with declining rates for systems 4–10 kW, 10–100 kW and 100–5,000 kW. Systems with a capacity of less than 4 kW will receive a marginally higher tariff if they are retrofitted onto an existing building, as opposed to being installed as part of a new building. Other features of the scheme include:

- Timing—the tariffs are to be paid for 25 years for solar PV and 20 years for the other generation technologies
- Tariff—like the ACT scheme, the tariff is locked in at the rate in the year of instalment, but with tariffs to be adjusted annually by CPI
- Rate of return—the tariffs were determined so that a rate of return of 5–8% would be achieved for well-sited installations
- Degression—the tariff is scheduled to decrease as renewable energy generation costs decrease. Degression rates depend on the type of technology, with hydro having zero degression and PV up to 10% annually.²⁵

3.3 The ACT feed-in scheme to date

Electricity distributors and retailers are required to report quarterly on outcomes under the scheme. The latest data is available for the quarter ending 30 December 2009.

3.3.1 Take-up

Between 2000 and 2007, prior to the introduction of the feed-in tariff scheme, just 136 renewable energy generators were installed in the ACT. However, following the initial announcement of the

²⁴ P Gipe, ‘Slovenia to launch sophisticated system of feed-in tariffs in 2009’, Wind-Works.org, <http://www.wind-works.org/FeedLaws/Slovenia/SloveniatoLaunchesSophisticatedSystemof%20Feed-inTariffs.html>.

²⁵ Further details of the UK scheme can be found at http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/feedin_tariff/feedin_tariff.aspx.

concept of a feed-in tariff for the ACT in November 2007, combined with the Australian Government's SHCP scheme, 383 new installations occurred between November 2007 and February 2009.²⁶ This growth has accelerated since the commencement of the feed-in tariff scheme. ActewAGL Distribution reports that there were 1,280 renewable generators connected to the ACT distribution grid by the end of December 2009. The total generating capacity at 31 December 2009 was 2.73 MW, meaning that the average capacity of installed units was approximately 2.1 kW. All generators eligible to receive the feed-in tariff are solar: no wind generators have yet been installed.

Scheme take-up is summarised in table 3 and the figures below.

Table 3 Renewable generation in the ACT

	Pre-scheme	June quarter ^a	September quarter	December quarter ^b
No. of renewable generation units	568	731	905	1,280
No. of new units installed		163	191	375
No. of units receiving feed-in tariff		541	662	881
No. of applications for installation		247	187	458
Total supply capacity (W) ^c		1,559,042	1,918,647	2,731,665
Total output from renewable generation units (kWh) ^c		221,446	293,345	581,140
Total feed-in tariff premiums paid (\$)		103,060	148,712	313,852
kWh generated by units receiving feed-in tariff ^d		205,914	296,344	625,241

a June quarter is for a 4-month period (1 March to 30 June 2009).

b December quarter figures for premium paid include an estimate for one retailer, as data had not been received at the time of this report.

c Includes generators in place prior to the commencement of the feed-in tariff scheme, which are not eligible to receive the feed-in tariff.

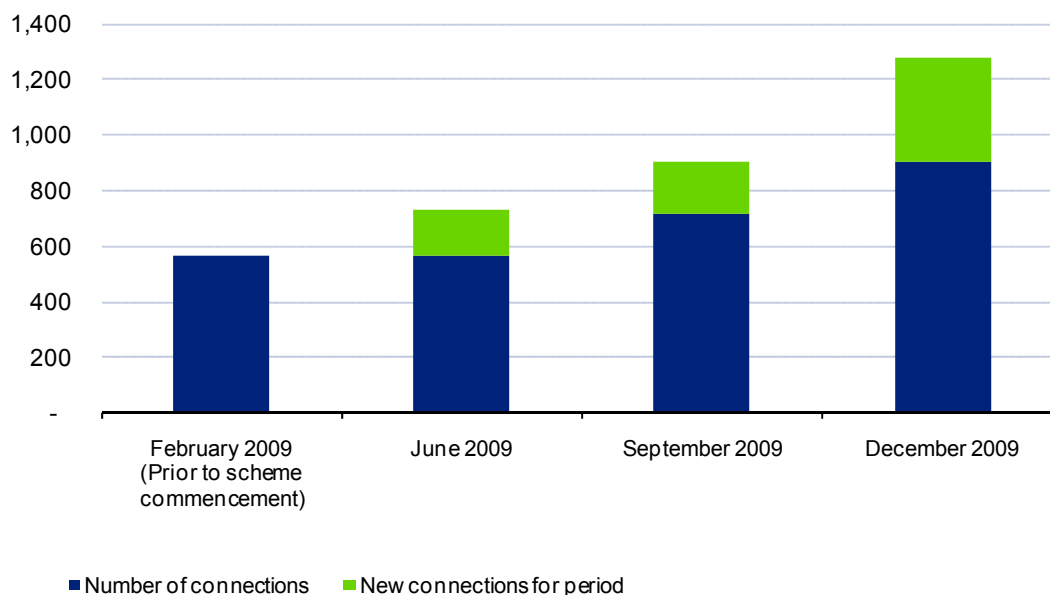
d Assumes all units are receiving 50.05c/kWh. In fact, some will only be receiving 40.04c/kWh, meaning that the figures in this row will be slightly understated. Also, it should be noted that there is a lag, associated with the billing cycle, between output and payment of the tariff.

Note: These figures have been revised slightly since the release of the draft report following updated information from retailers.

Figure 2 illustrates growth in the number of solar installations since the scheme's commencement in March 2009. It is also clear from table 3 that interest in installing generation units is still strong: applications for installations in the December quarter were greater than in the March and June quarters combined.

²⁶ ACT Department of the Environment, Climate Change, Energy and Water, *National capital to solar capital: Options for an expanded ACT electricity feed-in tariff scheme*, 2009.

Figure 2 Number of renewable generation installations in the ACT



The total amount of electricity generated by renewable generators increased substantially in the December quarter as more units came on line and seasonal weather conditions (including the number of daylight hours) improved.

3.3.2 The effect of other incentives on take-up

Information available to the Commission shows that the vast majority of generators installed to date have benefited from other incentive programs, such as the SHCP, Solar Credits or Green Loans programs. Therefore, not all of the recent increase in PV connections can be attributed solely to the existence of the feed-in tariff scheme.

For example, the SHCP program has clearly had a significant effect on take-up (see figure 3). By December 2009, 930 grid-connected systems in the ACT (equivalent to 72% of total ACT connections) had received SHCP rebates.²⁷ SHCP grants, despite ceasing in June 2009, are still having an ongoing effect on connections: of the 375 new connections in the December quarter, just under 200 received an SHCP grant, meaning that owners had made investment decisions and applied to install units sometime prior to June 2009—and possibly before the commencement of the feed-in tariff scheme.

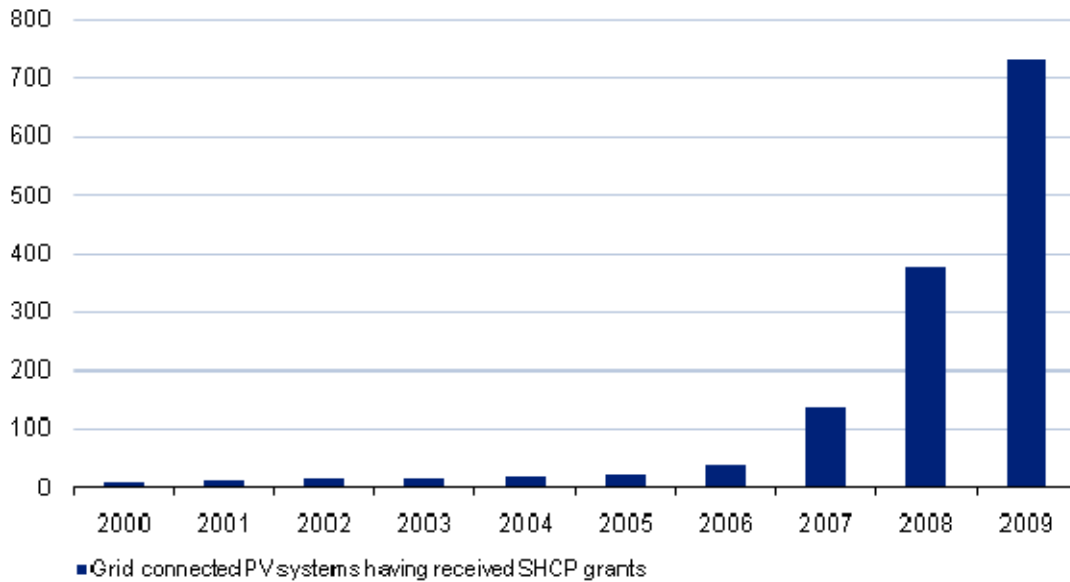
Installers of renewable generation units have also suggested to the Commission that there has been strong interest in the Green Loans program, which was only introduced in June 2009. The existence of this program may partly explain the strong increase in installation applications received during the December quarter.

The SHCP program's replacement with the less financially generous REC / Solar Credits programs and more recently the withdrawal of the Green Loans program and revisions to the REC scheme

²⁷ SHCP program statistics: <http://www.environment.gov.au/sustainability/renewable/pv/history.html>.

will have an effect on future take-up of the feed-in tariff program, although that effect is hard to quantify.

Figure 3 ACT grid connections receiving SHCP program grants



3.4 Environmental and other impacts to date

The feed-in tariff scheme contributes to greenhouse gas emissions savings by directly substituting renewable generation for coal-based generation. Because renewable generators feed directly into local electricity grids, energy losses associated with transmitting energy over long distances from the generation site to the end user are also avoided.

From 1 March 2009 to 31 December 2009 1,095,931 kWh of electricity was generated by renewable generators in the ACT (including those installed prior to commencement of the scheme).²⁸ This equates to a direct reduction in greenhouse gas emissions of approximately 1,203 tonnes, using an emission coefficient of 1.076 kg/kWh²⁹ and assuming savings of 2% through avoidance of transmission line losses.

The feed-in scheme is still in its early days, so benefits to date are still modest. Savings of 1,203 tonnes are small compared with the ACT’s total estimated annual greenhouse gas emissions of 4 million tonnes.³⁰

In the short term, the feed-in tariff scheme will create jobs. These will primarily be in the sale, supply, installation and connection of systems, although some will potentially be created in public administration; energy distribution and retail; education and training; and the component import and distribution areas. PV panels are currently imported from overseas, so there will not be any impact on manufacturing employment. The Alternative Technologies Association has provided data to suggest that if 1,000 generation units are installed per year (which is approximately the

²⁸ ICRC *ACT Electricity Feed-in Scheme Activity Summary: 1 March 2009 to 31 December 2009*, February 2010.

²⁹ As adopted in ACT Department of the Environment, Climate Change, Energy and Water, *National capital to solar capital: Options for an expanded ACT electricity feed-in tariff scheme*, 2009.

³⁰ ACT Government, *Draft Sustainable Energy Policy 2010–2020*, December 2009, p. 3.

current rate) then 25–30 jobs installing the units will be created and sustained.³¹ However, if households make expenditures on solar panel installations by substituting away from alternative investments on their houses or consumption of other goods and services, then the overall effect of the feed-in scheme on employment is indeterminate.

³¹ Discussions between the Alternative Technologies Association and the Commission’s consultants, including correspondence provided by Craig Memery, Energy Advocate, ATA, dated 18 January 2010.

4 The Commission's issues paper and draft report

4.1 Issues paper

In November 2009, the Commission released an issues paper setting out some of the key matters for consideration in determining the premium rate. The issues paper is available from the Commission's website.

In response to the issues paper, the Commission received a total of 14 submissions, which it used to inform the development of its draft report. Copies of submissions received are also on the Commission's website.

4.2 Draft report

The Commission released its draft report on 4 February 2010 following its consideration of matters including:

- feed-in tariff arrangements in other jurisdictions
- other schemes, including those available from the Australian Government, that encourage the production and use of renewable energy
- the costs and financial benefits of renewable generation in the ACT, based in many cases on advice from stakeholders.

The Commission also modelled a number of different scenarios, including projections of price, take-up and the implications for electricity tariffs and greenhouse gas reductions.

The Commission's draft position was that it was appropriate to set the premium rate at the minimum amount that is required to provide sufficient incentive to make the installation of renewable generation attractive against other similar risk-free investments. Based on the Commission's calculations at the time, this equated to a premium rate of 37c/kWh in 2010–11, which provided a 10-year payback period for a typical 1.5 kW generator. The Commission considered this rate would:

- enable occupiers to recoup the cost of investment in renewable energy generation capacity within a reasonable time and at a nominal rate of return commensurate with comparable investments
- provide the ability to encourage the generation of electricity from renewable sources
- minimise the impact of costs on all electricity users
- make a contribution towards reducing emissions of greenhouse gases and the impact of climate change in the ACT, but at the same time recognise that the feed-in tariff scheme cannot by itself resolve greenhouse gas or climate change problems.

The Commission noted that higher premium rates, including the current rate of 50.05c/kWh, would more strongly encourage the take-up of renewable energy generation and contribute to a reduction in greenhouse gases and the likely effects of climate change. However, the Commission considered that a 50.05c/kWh or higher tariff provided a rate of return that was higher than is

needed, and which will have a relatively greater impact on electricity bills and ultimately on economic activity in the ACT.

4.3 Responses to the draft report

The Commission received 10 submissions in response to the draft report, from:

- David Glynne Jones
- Dr Chris Klootwijk (two submissions)
- AGL Energy Limited
- Greg Hutchison
- Kevin Wilkinson
- Peter Campbell
- R. Neilson
- Shane Rattenbury MLA
- ACT Civil and Administrative Tribunal (ACAT).

In addition, the Commission received some advice from the ACT Planning and Land Authority relating to the effective life of inverters and the cost of replacing this piece of equipment.

A high-level summary of the submissions, grouped by issue, is below. More specific discussion of some of the issues raised is set out in chapters 5 to 7. Copies of the submissions can be found on the Commission's website.

4.3.1 The level of the tariff

Some submissions broadly supported the Commission's approach and noted that the feed-in tariff scheme was a relatively expensive way of reducing carbon emissions. However others criticised the Commission's proposed reduction in the premium rate and argued for retention of the existing 50.05 cents. These submissions generally emphasised the importance of providing price stability and certainty to customers and the renewables industry, particularly given uncertainties in other areas of the industry. One submission suggested that the current rate should remain until June 2011, at which time there would be opportunity to evaluate likely future demand and price sensitivity for renewable energy in the ACT.

4.3.2 Modelling of costs and output

A small number of submitters provided comment and data to the Commission on the costs of installing PV systems as well as other assumptions used by the Commission in its modelling. It was noted that:

- The Commission's assumption that 1 kW of installed capacity would generate 1.05 kWh of electricity annually was quite low.
- PV system inverters are likely to need replacing prior to the end of the 20-year feed-in tariff period, and this had not been reflected in the Commission's modelling.

4.3.3 Equivalence with other investments

One submission noted that PV systems are, rightly or wrongly, perceived to be relatively high risk, and that therefore it was not unreasonable for returns from the feed-in tariff scheme to be higher than government bond rates. Another submission pointed out that while the Commission's draft recommendation provided for a satisfactory return for small PV systems, the returns for larger systems were much poorer.

4.3.4 Other issues

A number of other issues were raised, including:

- the potential for electric vehicles to substantially increase demand for renewable energy
- whether there should be a limit or cap on the ACT feed-in tariff regime
- taxation treatment of feed-in tariff payments
- whether the 'normal cost of electricity', currently set at 6c/kWh, is appropriate.

Some other issues that were relevant to the feed-in tariff but outside the Commission's terms of reference were also raised in submissions. These included whether the manner in which ActewAGL passed through the costs of the scheme to customers through energy prices is appropriate.

The Commission has considered each of these comments and submissions made in the context of the draft report, and in its reconsideration of the appropriate premium tariff that should be applied for 2010–11, and in particular in the model that has been developed and used to calculate the proposed premium rate.

4.4 Other consultations

Since the release of the draft report the Commission has held discussions with a number of stakeholders, including:

- government representatives
- the Alternative Technology Association (ATA)
- Armada systems, a solar system installer
- owners and prospective owners of large PV systems.

5 Issues in modelling and determining the level of the feed-in tariff

5.1 Key considerations for setting the feed-in tariff rate

In considering the premium rate, the Commission's terms of reference require it to give priority to:

- the desirability of costs under the Act impacting equitably on all electricity users
- the need to encourage the generation of electricity from renewable sources
- the need to reduce emissions from greenhouse gases
- the need to reduce the likely effects of climate change
- the desirability of occupiers being able to recoup the cost of investment in renewable energy generation capacity within a reasonable time.

The Commission considers that there are two elements to the first point, which concerns the scheme affecting all electricity users 'equitably'. One element is in relation to the manner in which costs are passed through to electricity users. This is in effect mandated by section 8A of the Act, which requires that costs must be imposed on an electricity consumer in a way that is in proportion to the amount of electricity used by the consumer. The second element relates to the total quantum of costs imposed by the scheme (that is, by those who install renewable generation) on those electricity customers who choose not to, or are unable to, install renewable generation. Such costs would be passed on through higher electricity bills. This will ultimately depend on take-up of the scheme, which in turn will be influenced by the premium rate. The matter of increases in bills is discussed further below.

The need to encourage the generation of electricity from renewable sources, the need to reduce emissions of greenhouse gases and the need to reduce the likely effects of climate change can be assessed jointly. The last two are consequences of the first and will be determined by the level of take-up of the scheme.

The primary driver of the level of take-up is likely to be the degree to which occupiers can recoup the cost of their investment, although it is not the only driver—other reasons for installing renewable generation include improved security of supply or a desire to improve environmental outcomes despite financial cost. The existence of small-scale generation units prior to the introduction of recent national and state-based incentive schemes is evidence of this. Furthermore, almost one million Australian customers pay extra costs for their electricity by purchasing green energy. Nevertheless, the recent significant increase in installations of small-scale renewable generation has occurred after the introduction of programs that significantly reduce outlays and/or enable occupiers to make a positive financial return on their investments in those generation systems. The Commission therefore considers it reasonable to assume that financial considerations are a key driver in decisions to invest in renewable generation facilities.

A key element of the approach adopted by the Commission in preparing its draft report was to model the impact of the scheme and in particular the premium rate on occupiers and the subsequent impact on take-up and electricity prices. This was generally supported by submissions.

The desirability of being able to recoup the cost of investment in renewable energy generation capacity within a reasonable time has therefore been the focus of the Commission's modelling. It is affected by a range of factors, the most important ones being:

- the availability and value of other incentives to install renewable energy generation
- the time over which the cost of the investment is recouped (the payback period)
- the average amount of electricity generated
- the cost of installing and operating renewable energy generators
- forecasts of take-up.

These and other related issues are discussed below. Some are relevant to the calculation of feed-in tariffs for 2010–11, while others are relevant to the calculation of feed-in tariffs in future years.

5.2 The feed-in tariff and the RET/Solar Credits scheme

As discussed above, other than the feed-in tariff, the key additional incentive arrangement that currently applies in the ACT is the Australian Government's RET / Solar Credits scheme. While other schemes have previously been in place (notably, the Australian Government's SHCP, which is still influencing new installations), these have been discontinued.

As noted in chapter 3, the RET/ Solar Credits scheme was amended in February 2010; from January 2011, the existing RET scheme will be divided into a Small-scale Renewable Energy Scheme (SRES) and a Large-scale Renewable Energy Target (LRET). From this date the REC price for SRES systems will be fixed at \$40. This results in an up-front subsidy of around \$6,200 on a 1.5 kW solar PV system,³² although this will reduce as the Solar Credits multiplier is phased back from 2012–13.

Despite the new arrangements not applying until January 2011 the impact of the announcement was that the value of RECs immediately increased from around \$34 to approximately \$41.

It is yet to be determined whether there will be sufficient demand for RECs in 2011 to clear the market at a price of \$40. However, assuming that this will be case, the Commission considers it appropriate to adopt a REC value for modelling purposes of \$40. While the Australian Government scheme only commences halfway through the 2010–11 financial year, the fixed minimum rate of \$40 is likely to provide a benchmark for prices during the first half of 2010–11.

A REC price of \$40 represents an increase from the \$33 adopted in the draft report and has a material impact on the premium rate.

5.3 The payback period and rate of return

In its draft report, the Commission considered the financial aspects of the feed-in tariff in terms of the 'payback period' the tariff provided for occupiers. It expressed this payback period in terms of the length of time it takes to recoup the initial investment in nominal dollars, assuming no discount rate is applied.

³² Department of Climate Change, 'Enhanced Renewable Energy Target', fact sheet, <http://www.climatechange.gov.au/government/initiatives/~media/publications/renewable-energy/enhanced-ret-fs-pdf.ashx>.

The Commission’s draft decision considered payback periods in other jurisdictions, and noted that there was no consensus view on the appropriate payback period for government schemes of this nature. Furthermore, because payments under the ACT feed-in scheme are guaranteed for 20 years comparisons with examples in other areas were of limited value if they have different payment periods.

In the draft decision, the Commission also had regard to the rate of return³³ that various lengths of (nominal, undiscounted) payback period and premium rates provided.

The Commission’s draft report provided for a feed-in tariff with a payback period of 10 years for a 1.5 kW unit.

However, it is important to recognise that for a given premium rate the payback period and return will be significantly different for different occupiers, depending on the size of the installation. This is due to the impact of the RET / Solar Credits scheme and the fact that large generators receive only 80% of the premium rate under the current administrative arrangements for the feed-in tariff. This is illustrated in table 4, which calculates payback periods for various sizes of generators based on the current premium rate of 50.05 cents (and updated modelling assumptions discussed further below).

Table 4 Payback periods at 50.05c/kWh premium rate (based on updated modelling assumptions)

	Installation size				
	<1.5 kW	2.5 kW	5 kW	15 kW	30 kW
Payback period (years)	5	9	10	14	14
Rate of return (%)	20	10	8	4	4

A number of responses to the draft report³⁴ expressed concern about the Commission’s focus on payback and returns for smaller sized systems and noted that at the Commission’s recommended tariff the payback period for larger systems was more than 20 years and returns were negative.

While the majority of systems installed in the ACT to date have been small household systems, the Commission recognises that a tariff that focuses on smaller installations may be insufficient to drive uptake of larger systems. The Commission’s analysis in chapter 6 therefore gives stronger consideration to larger systems than in the draft report.

The Commission has not undertaken any detailed research into the rate of return required by occupiers to invest in the feed-in tariff scheme. However, it notes work in the UK which suggests that large-scale investors have a minimum hurdle rate of 8% (in post-tax nominal terms)³⁵ to invest in solar PV, while for small-scale (domestic) investors there is a much broader range of discount rates: from 3% to 20%.

It does not necessarily follow that large investors will only install solar systems if there is an appropriate financial return. The Commission has spoken to a small number of investors who have

³³ The ‘rate of return’ referred to by the Commission in this report is an internal rate of return—that is, the discount rate which results in the present value of outflows (including initial installation cost, maintenance and inverter replacement costs) being equal to inflows (revenue from the premium tariff).

³⁴ Including from David Glynn Jones, Peter Campbell and Shane Rattenbury MLA.

³⁵ Further details of the UK scheme can be found at http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/feedin_tariff/feedin_tariff.aspx.

installed, or are considering, the installation of larger scale (30 kW) solar systems in the ACT. These investors have indicated that their reasons for doing so are not financial—rather social and environmental reasons have been cited, as well as the ability to implement pilot schemes which could lead to a broader future rollout in additional sites in the event that financial attractiveness increased in future. Nevertheless, it is likely that only a limited number of entities would have the financial capacity to make such decisions and it is likely that many commercial entities will only be able to consider installing larger systems should the financial incentives improve.

Finally, it is worth noting that even for those customers that do make decisions primarily on financial grounds, there is substantial evidence that household consumers place disproportionately greater weight on short-term effects—in this case the installation costs—than on longer-term cash streams and returns. An example of this derives from purchasing preference studies undertaken by the Australian Bureau of Statistics (ABS) which show that for household consumers, the initial price of installing a heater was a more important factor than savings on energy bills.

In relation to the feed-in tariff scheme, this suggests that the level and availability of REC subsidies from the Australian Government may have a far greater impact on take-up than the level of the feed-in tariff itself.³⁶ Certainly, there is wide acceptance of the argument that consumers do not always act ‘rationally’ in the way usually posited by economists, but show a prevalence to value initial benefits or cost savings over longer-term benefits or financial returns that come from a program such as the feed-in tariff scheme. This behaviour is widely recognised and acted upon by the advertising and retail sector in the marketing of products and merchandise, particularly those with lives extending beyond 12 months.

5.4 Average energy output

Manufacturers and installers of small-scale generators often quote the level of energy output in terms of maximum daily output or peak capacity. In fact, the level of energy produced will vary between generators according to the amount of sunlight they are exposed to. Factors such as the pitch of the roof that the panels are installed on, the direction the panels face and the level of shading will affect the amount of energy produced. Seasonal variations are strong—in winter, when the days are shorter and there is less sunshine, the panels may produce less than half of their summer energy output. The quality of the panel will also affect output.

The ACT feed-in tariff scheme has been in operation for less than a year, so the actual average annual energy output per kilowatt of installed capacity in the ACT is difficult to estimate. In the draft report the Commission adopted the assumption that an average of 1,050 kWh will be produced per kilowatt of installed capacity for all system sizes.

However, the Commission now believes that this estimate may have been conservative. For example, a submission from Greg Hutchison noted that he had generated 1,318 kWh per kilowatt for his 1.29 kW system and that the Commission’s assumption of 1,050 kWh per kilowatt ‘seems very low’.

The Commission has discussed the issue of output with the ATA and Armada Solar, a major installer of solar systems, who have both confirmed that an assumed output of 1,050 kWh is low.

³⁶ Australian Bureau of Statistics, *Environmental issues: Energy use and conservation*, cat. no. 4602.0.55.001, March 2008.

Based on these discussions and its additional research, the Commission has revised its output assumption. In doing so it has sought to distinguish between output from small and large generation units. The Commission understands that output per kilowatt of installed capacity is likely to be similar for identically sited and maintained large and small generation units. However, in practice it is likely that some small domestic systems are likely to have a degree of shading, which is unlikely to be the case for larger installations. Further, small domestic systems may not be as well maintained as large commercial installations. The Commission has therefore adopted the following assumption for its modelling:

- Small units (>10 kW installed capacity) will generate 1,350 kWh per kilowatt of installed capacity.
- Larger units will generate 1,450 kWh per kilowatt of installed capacity.

Although most solar panels (although not inverters) can be expected to last for 25 years or more, the power output gradually diminishes over time. Consistent with advice from the ATA and the approach adopted in its draft report, the Commission has assumed that energy output will reduce by 0.5% per year over the 20 years that tariff payments are available.

5.5 Direct costs and benefits to occupiers of installing renewable energy generation units

5.5.1 Costs

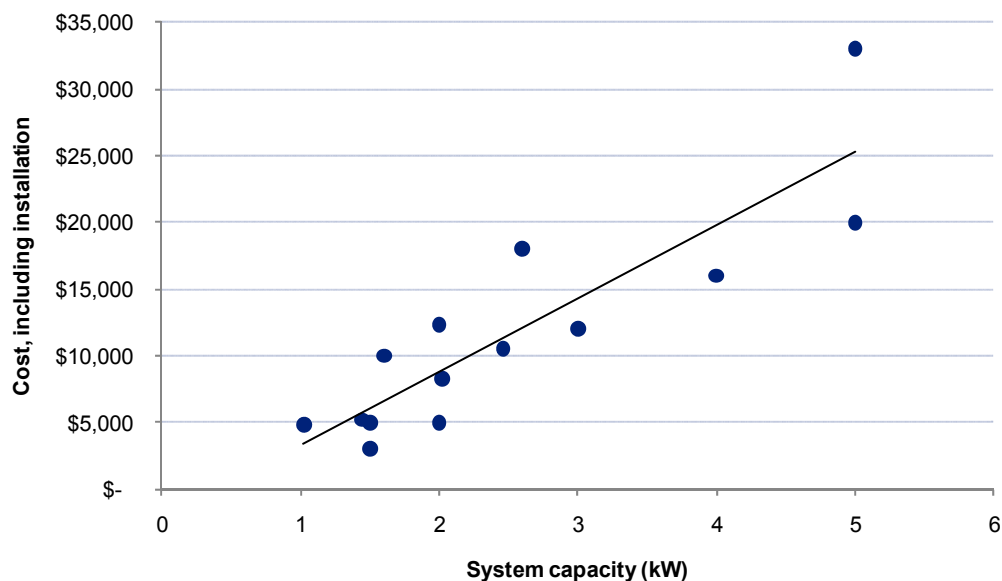
System costs

While the running costs of PV systems are low, installation costs are significant. To estimate the average cost of system installation in its draft report, the Commission obtained a number of quotes from ACT installers. The quotes were augmented by evidence of actual installation costs provided by submitters. It must be noted that actual costs may vary due to location-specific factors. This is particularly the case for larger generation units. Also, it has become more evident from additional material obtained by the Commission that there is a growing gap between the cost of the higher quality panels that were the primary source of supply when the original PV systems were installed in the ACT, and the cheaper panels that are now being imported and installed by some suppliers.

In general, the gross costs of purchase and installation increase relatively linearly with increased system capacity (see figure 4). However, because Solar Credits apply only to the first 1.5 kW of capacity, systems of that size and smaller are relatively cheaper on a net per kilowatt basis than larger systems.

As no wind-generation units have yet been installed in the ACT, the Commission has focused only on the cost of PV systems.

Figure 4 Quotes for PV system costs, including installation, value of RECs and Solar Credits



The Commission’s estimate of the average gross and net costs of various sized systems in the ACT is shown in table 5. Since releasing the draft report the Commission has contacted the installers, owners and prospective owners of several large PV systems (>20 kW) and considered the actual and quoted installation cost of these systems. The Commission’s estimated costs for 15 kW and 30 kW systems have been revised down slightly from the draft report as a result of this research. The table below also reflects the updated REC value of \$40.

Table 5 Average PV system costs in the ACT (including \$162 metering installation cost)

Installation size (kW)	Gross system cost (\$)	RECs available with Solar Credits (no.)	Value of RECs (\$)	Net consumer cost (inc. meter installation) (\$)
1.5	9,501	155	6,200	3,463
2.5	17,226	176	7,040	10,348
5.0	34,452	228	9,120	25,494
15.0	102,357	435	17,400	85,119
30.0	204,715	746	29,840	175,037

Inverter replacement

A solar PV system consists of two main elements:

- the panels, which convert sunlight into direct current (DC) electricity
- inverters, which convert the DC electricity into alternating current (AC) electricity for feeding into the grid.

In its draft report the Commission effectively assumed that the life of both elements of the PV system would be similar, and in excess of the 20-year life of the feed-in tariff arrangements. However advice from the ACT Department of the Environment, Climate Change, Energy and Water (DECCEW) indicated that ‘the inverters used on the solar systems to convert DC to AC are unlikely to last up to 10 years’.

Pursuant to the DECCEW submission the Commission has undertaken some research into inverters and their costs. Historically most of the world's PV inverters have been made in Germany; however, in recent years production capacity in other countries, including China, has expanded. The Commission agrees that it is unlikely that inverters will last for 20 years and notes that manufacturers tend to provide guarantees of only 5 or 10 years. However there is some uncertainty about their likely life and poorer quality inverters are likely to have shorter lives than better ones.

Inverter costs are proportional to system capacity. DECCEW has suggested that the current retail price of a 1 kW inverter is approximately \$2,500, and that of a 2.5 kW inverter is \$4,500. Based on the Commission's research, these estimates seem high. However, for the purposes of modelling, it is necessary for the Commission to estimate what it will cost to replace the inverters in 10 years, rather than their current price. This is difficult to do and the Commission notes that unlike the price of panels, the cost of inverters has remained relatively unchanged over recent years. Nevertheless, for the purposes of modelling and based on its own discussions with the industry, the Commission has included an allowance for the replacement of inverters of \$100 per year per kilowatt of installed capacity. This is equivalent to a once-off replacement cost of \$1,400 per kilowatt in 10 years time, using a discount rate of 6%. These costs need to be included in the total cost that the investor will need to recover over the life of the program.

Other costs

Occupiers are also responsible for ensuring that their meter boxes are able to accommodate the new metering arrangement. Once a system is installed, relatively little maintenance is required, although occasional cleaning will be needed. Depending on access to the unit, this may require professional assistance. For the purposes of modelling, the Commission has assumed an annual operating cost of \$100 per unit.

5.5.2 Benefits

Financial

The sole source of financial benefit from micro generation is the payment of the premium feed-in tariff rate for all of the electricity produced by the system at a fixed rate per kilowatt for 20 years.

Non-financial

A number of submissions cited the altruistic contribution of installing renewable generation— notably, the personal satisfaction from renewable electricity generation and the knowledge of creating an environmental benefit.

5.6 Forecasting future take-up

Actual take-up will of course vary according to the level of the premium rate and the initial cost of installing the system; however, there are a number of difficulties in forecasting take-up, even for a continuation of the current 50.05c/kWh premium rate. The scheme has been in place for only 11 months, so data points are limited. Anecdotal feedback from the ATA and installers indicates that customer awareness of the feed-in tariff scheme is still increasing. Furthermore, installation numbers are clearly being affected by changes to Australian Government incentive arrangements.

Estimating take-up at alternative premium rates is an even more difficult exercise.

An average of around 70 new units have been installed per month since the commencement of the scheme. Renewable generation units in the ACT have an average capacity of 2.13 kW.³⁷ Assuming that this rate of take-up and average size continue, there will be 5,654 units by the end of 2014 with a total capacity of around 12 MW.

It is also worth noting that the take-up of the feed-in tariff scheme in the ACT is around 0.04% of the customer base per month, which is similar to the take-up in South Australia (around 0.06% of the customer base), where there is a similar payback period for small generators. The slightly higher take-up rate for the South Australian scheme may be due to its correlation with the most generous phase of the Australian Government's SHCP scheme.

A 12 MW take-up by the end of 2014 is lower than the estimate in the ACT Government's Phase 2 discussion paper, which suggests that around 27 MW will be in place in 2014.³⁸ The Commission also notes that ActewAGL's distribution price submission to the Australian Energy Regulator (AER) appears to be based on an assumption that around 38 MW will be installed by that time. This highlights the uncertainty of forecasts at this early stage of the scheme.

Rather than attempt to specifically forecast take-up, the modelling in chapter 6 considers each of the three potential take-up outcomes outlined above.

5.7 Other modelling issues

5.7.1 Taxation

The Commission's analysis in the draft report was undertaken on a pre-tax basis.

The Commission adopted this approach on the basis that a pre-tax approach is simple, and also because different occupiers will have different taxation arrangements. It also allows comparisons to be made with other investment options, such as government bonds, which are also expressed in pre-tax terms.

The Commission has therefore elected to continue its modelling on a pre-tax basis.

Furthermore, the Commission notes that advice provided by the Australian Tax Office supports the view that the income received by way of the feed-in tariff payments would normally be considered to be non-taxable unless the recipient is carrying on a business.³⁹ While this advice is not binding on the ATO, it does provide a clear guide that for households and non-business participants in the feed-in tariff program at least, the income received will be non-taxable. However, where the recipient is conducting a 'business' in some form, it may be necessary to seek a private ruling on the tax status of the income. Thus for example, some of the potentially larger generators may in fact be undertaking a business, and in these circumstances may need further advice as to whether as a recipient of an income stream from a possibly non-related activity of operating a PV-based power generation facility at an existing business's office, showrooms, or place of business would constitute income for tax purposes.

³⁷ This average capacity includes units installed prior to the commencement of the scheme.

³⁸ ACT Department of the Environment, Climate Change, Energy and Water, *National capital to solar capital: Options for an expanded ACT electricity feed-in tariff scheme*, 2009

³⁹ Private advice received by Mick Gentleman, MLA for Brindabella, from the ATO dated 12 December 2007.

The other implication for the Commission is that the costs that the generator will incur by way of maintenance of the PV system, replacement of the inverter or depreciation of the system will also not be tax deductible. Thus, the Commission has not included any provision for depreciation in its modelling estimates. However, the Commission has factored into its modelling the full recovery of the initial investment and any further expenditure over the 20-year period of the scheme.

5.7.2 Inflation

The Commission's modelling also assumes that future inflation will be 2.5% per year, the mid-point of the Reserve Bank target range.

5.7.3 Other matters

The Commission is also required to have regard to:

- the amounts payable under the Electricity Feed-in Act by an electricity distributor or an electricity supplier
- additional metering costs passed on because of the installation of the generation equipment.

'Amounts payable under the Act' refers to the current arrangement, whereby 6c/kWh of the feed-in tariff is funded by retailers (referred to in the Act as the 'normal rate'). The amounts approximate the savings that retailers are able to make through avoiding purchases of electricity from the National Electricity Market (NEM). Where the costs of obtaining electricity from the NEM—which will include direct energy purchase costs, contracting costs, losses and green energy obligations (including the potential impact of the CPRS)—are higher than the premium rate, the retailer will be able to make an additional return. Where that is not the case, the retailer will be adversely affected; if the NEM price is significantly higher than the premium rate, that may endanger the financial health of retailers in the ACT.

The price of electricity in the NEM is volatile and, as discussed in the Commission's recent technical paper on franchise tariffs in the ACT, is a complex element to determine.⁴⁰ The approach to modelling wholesale markets and wholesale energy costs has been subject to significant debate. Reflecting the significance of this element for the electricity distribution and supply industry, ActewAGL has requested that the 'normal rate' be linked to the transitional franchise tariff determination. In addition, a submission to the draft report questioned whether the current rate of 6c/kWh reflected the value of the electricity avoided at peak energy demand times. It was argued in this submission that the rate appeared to be more in line with the average night rate.⁴¹

The normal rate, set at the time the legislation commenced, drew upon information relating to the average wholesale price of electricity in the NEM market. It was not set at a peak-time rate, or a night rate when there is little demand for electricity after the peak evening period. The normal rate was intended to represent an average cost that the supplier might incur for electricity purchased from the NEM, and accordingly has included allowance for various transaction costs which are incurred by a supplier when purchasing electricity from the NEM.⁴²

⁴⁰ ICRC, *Final technical paper—Model for determining the energy purchase cost component for the TFT*, 11 March 2010.

⁴¹ Dr Chris Klootwijk submission, 'Solar panels—Phantom charges'.

⁴² As a guide to the NEM market rate, see ICRC, Report 3, *Final decision—Retail prices for non-contestable electricity customers, 2009–10*, June 2009.

The Commission notes that the Minister for Energy has the power under the Electricity Feed-in Act to change the normal rate. It is understood that the Minister is examining this issue to ensure that the rate that is set is consistent with current market conditions.

At the same time, and noting that it is not within the Commission's terms of reference, the Commission has noted anecdotal evidence from installers of renewable equipment that smaller energy retailers are finding the additional administrative burden of the feed-in tariff scheme a discouragement to retaining customers with renewable generation units. This appears to be borne out in supply statistics provided by the retailers.

In relation to metering costs, the Commission notes that ActewAGL Distribution may pass on the additional metering costs associated with the installation and operation of generation equipment. ActewAGL Distribution has set a charge of \$162 in 2009–10. This cost has also been factored into the Commission's modelling through the assumed up-front installation cost.

5.7.4 Summary of model inputs

Table 6 summarises the modelling assumptions used by the Commission:

Table 6 Summary of modelling assumptions

	Annual output (kWh)	Cost (\$)
Installation size (kW)		
1.5	1,350	9,501
2.5	1,350	17,226
5.0	1,350	34,452
15.0	1,450	102,357
30.0	1,450	204,715
REC price	–	40
Annual maintenance cost (per generator)	–	100
Annual allowance for inverter replacement (per kilowatt installed capacity)	–	100
One-off grid connection cost	–	162
Annual loss of generation efficiency (%)	–	0.5%
Forecast inflation (%)	–	2.5%

Note: All figures are expressed in 2009–10 dollars.

6 Modelling the 2010–11 feed-in tariff

This chapter discusses a number of alternative values for the feed-in tariff based around the modelling assumptions discussed in chapter 5. It focuses on the ability of occupiers to recoup the cost of investment in renewable energy generation capacity. It then outlines the Commission’s preferred option, including the impact of that option on greenhouse gas emissions and electricity prices.

6.1 Modelling scenarios

The Commission has modelled a number of alternative scenarios for the premium rate, with three rates analysed in detail here. These are:

- the current rate of 50.05c/kWh
- the draft report recommendation of 37c/kWh
- a rate of 45.7c/kWh.

6.2 The base case—maintaining the current premium rate of 50.05 cents

Using the modelling assumptions described in chapter 5, the Commission has used the current premium feed-in tariff rate of 50.05c/kWh as the base case for modelling the average payback, nominal rate of return and nominal dollar return for a range of small system sizes (see Table 7).

Table 7 Outcomes for a 50.05 cent tariff

		Installation size				
		1.5 kW	2.5 kW	5 kW	15 kW	30 kW
Current premium payment levels	%	100	100	100	80	80
Initial net investment (after RECs)	\$	3,463	10,348	25,494	85,119	175,037
Energy generated in year 1	kWh	2,025	3,375	6,750	21,750	43,500
Feed-in tariff received in year 1	\$	1,014	1,689	3,378	8,709	17,417
Annual maintenance and inverter replacement costs	\$	250	350	600	1,600	3,100
Payback period	years	5	9	10	14	14
Rate of return	%	19.7	9.9	7.6	4.1	3.9
Nominal return over 20 years	\$	9,331	12,722	23,263	39,170	76,160

6.2.1 Features of the current premium rate

Payback period

The payback period for small generators under the current premium rate is short—around five years.⁴³ The payback period increases for larger systems, up to 14 years for 30 kW systems, as the up-front subsidy for those systems is a smaller proportion of the total purchase price. The short payback period and high level of returns were noted in a number of submissions.

Returns

The modelling shows that, for a 1.5 kW system installed in 2009–10, the expected average annual nominal rate of return is 19.7%. Over the 20-year period, an occupier with a system of this size would earn a nominal dollar return of around \$9,331 above the initial purchase price. The nominal dollar return on larger systems is greater due to their larger energy output. An occupier with a 5 kW system could expect to earn an additional \$23,263 above the purchase price of the system over the life of the scheme. The rate of return, however, is less for larger systems, due to the proportionally higher initial outlays associated with those systems. For 10 kW and 30 kW systems the return is around 4%, which is less than the current 10-year Commonwealth bond rate of 5.3%.

The Electricity Feed-in Act guarantees the premium feed-in tariff rate for a period of 20 years, making investment in energy generation a relatively risk-free proposition compared to alternative investment options. This is not to say that investing in renewable energy is risk free—for example, returns could be affected by equipment failure or damage, unforeseen weather, technological issues and future overshadowing by trees or property development. Further, as pointed out in a submission from Peter Campbell to the draft report, there also may be a perception that investment in PV systems is somewhat risky for technological reasons. If this is the case, it may be necessary to provide comparatively higher returns in order to overcome this perception.

6.3 A 37 cent premium rate

The Commission's draft recommendation was for a premium feed-in tariff of 37c/kWh which resulted in a payback period of 10 years for a 1.5 kW system. As discussed in chapter 5, the Commission has revised its modelling assumptions, resulting in different outcomes at this tariff. The revised outcomes for the 37c/kWh premium feed-in tariff are shown in table 8.

⁴³ In the draft report, the Commission estimated a payback period of around seven years. The new estimate is lower due to higher REC prices (increased from \$33 to \$40) and an increase in the estimated average electricity output per kilowatt of installed capacity (increased from 1,050 kWh to 1,350 kWh) based on advice from the industry.

Table 8 Outcomes for a 37 cent tariff

		Installation size				
		1.5 kW	2.5 kW	5 kW	15 kW	30 kW
Current premium payment levels	%	100	100	100	80	80
Initial net investment (after RECs)	\$	3,463	10,348	25,494	85,119	175,037
Energy generated in year 1	kWh	2,025	3,375	6,750	21,750	43,500
Feed-in tariff received in year 1	\$	749	1,249	2,498	6,438	12,876
Annual maintenance and inverter replacement costs	\$	250	350	600	1,600	3,100
Payback period (years)	years	8	14	16	–	–
Rate of return	%	10.6	3.9	2.4	–0.5	–0.6
Nominal return over 20 years (\$)	\$	4,288	4,317	6,454	–4,160	–10,500

A 37c/kWh premium feed-in tariff rate is now expected to allow a 1.5 kW renewable generator to recoup its investment cost in 8 years and earn a nominal dollar return of \$4,288 over the subsequent 12 years. This equates to an expected nominal rate of return of 10.6%, which is higher than other low-risk investments. The payback periods for 2.5 kW and 5 kW systems are 14 and 16 years respectively, with returns of 3.9% and 2.4%.

However a 37c/kWh premium will not enable occupiers to earn a return on large systems as the payback period of 21 years is longer than the 20-year length of the scheme.

6.4 A 45.7 cent premium rate

The Commission has modelled a scenario with a premium rate of 45.7/kWh which is the rate that provides a 12-year payback period and 6% nominal return for a 5 kW system (see table 9).

Table 9 Outcomes for a 45.7 cent tariff

		Installation size				
		1.5 kW	2.5 kW	5 kW	15 kW	30 kW
Current premium payment levels	%	100	100	100	80	80
Initial net investment (after RECs)	\$	3,463	10,348	25,494	85,119	175,037
Energy generated in year 1	kWh	2,025	3,375	6,750	21,750	43,500
Feed-in tariff received in year 1	\$	925	1,542	3,085	7,952	15,904
Annual maintenance and inverter replacement costs	\$	250	350	600	1,600	3,100
Payback period	years	6	10	12	15	16
Rate of return	%	16.9	8.1	6.0	2.7	2.5
Nominal return over 20 years	\$	7,650	9,920	17,660	24,726	47,273

This premium rate provides a relatively generous payback period and return of six years and 16.9% respectively for smaller systems. It also provides a positive return and payback period for larger systems, but with returns that are around half the Commonwealth bond rate.

6.5 The rate for large systems

As noted in several places in this report, for a given premium rate the return for smaller systems will be greater than for larger systems because:

- large (>10 kW) systems only receive 80% of the premium tariff
- Australian Government arrangements provide greater subsidies for small systems than larger systems, although these arrangements will be phased out by 2015.

This makes it difficult to set a single premium tariff that provides a ‘reasonable’ payback period for both small and large systems. However, one way of narrowing the gap between payback periods and returns would be to increase the 80% rate for large systems to 100%. This would provide the following payback periods and returns for the premium tariffs modelled above.

Table 10 Outcomes for 15 kW and 30 kW systems with alternative 100% tariff rate

Tariff	15 kW installation		30 kW installation	
	Payback (years)	Return (%)	Payback (years)	Return (%)
50.05 cent premium tariff				
80%	14	4.1	14	3.9
100%	10	7.8	10	7.5
37 cent premium tariff				
80%	–	–0.5	-	–0.6
100%	15	2.9	15	2.7
45.7 cent premium tariff				
80%	15	2.7	16	2.5
100%	11	6.3	12	6.0

6.6 Other effects of the premium feed-in rate

6.6.1 The effect on household electricity bills

The costs associated with the feed-in tariff scheme are passed on to all ACT electricity users. This additional cost consists of two components:

- a fixed cost to cover costs incurred by ActewAGL for network operations, meter inspection, depreciation and return on capital on metering assets
- a variable cost equal to the amount of electricity generated under the scheme, multiplied by the premium feed-in rate less the normal cost of electricity.

Fixed costs

The fixed costs for the feed-in tariff scheme were estimated in the AER’s 2009 final determination on electricity distribution tariffs in the ACT, and are approximately as shown in table 11.

Table 11 Feed-in tariff scheme fixed costs passed through to ACT electricity customers

	2009–10	2010–11	2011–12	2012–13	2013–14
Fixed costs (nominal \$m)	0.44	0.55	0.66	0.74	0.82

Section 3.3 of this report discusses take-up of the scheme to date, and section 5.6 notes the issues associated with forecasting take-up due to changes in Australian Government and territory subsidies and other factors. As indicated, it is difficult to estimate accurately future take-up at the current premium rate, let alone estimate changes that would occur due to different premium rates (that is, the elasticity of demand in response to the premium rate).

In response to the draft report there was concern expressed that the Commission's draft recommendation that the feed-in tariff should be altered from the current 50.05c/kWh would in fact result in a reduction in the current take-up rate under the scheme. The Commission noted at the time of its release that the draft recommendation was primarily focused upon the methodology and model used to derive a premium rate, and that even under the assumptions that the Commission had used at that time, there was evidence at the date of the report's release that the model used would produce a higher premium tariff rate than the 37c/kWh referenced in the draft. In this final report, with the inclusion of additional data on the costs that investors in PV systems are likely to encounter, it is evident that while a reduction in the premium rate is justified, the reduction proposed will be more consistent with the lower initial installation costs that participants in the scheme will need to incur (on a like-for-like equipment basis), and the higher performance outcomes that are evident from the additional data that the Commission has now acquired.

The Commission has had regard to the impact on the take-up rate of the direct subsidy schemes provided by the Australian Government, noting the anecdotal evidence of the response of the market to changes in the government's arrangements over the last nine months, and independent studies of the behaviour of consumers when considering longer-term investments which involve a trade-off between the initial investment cost and the returns that will be achieved over time. While the Commission is of the view that the proposed reduction in the premium rate from 50.05c/kWh to 45.7c/kWh will not dampen the take-up rate currently evident in the ACT, it is not possible to model accurately the likely behaviour at this time, particularly when there are still some issues in relation to the Australian Government's REC program that are unclear.

Therefore, rather than attempt to directly forecast take-up at alternative premium rates, the Commission has modelled three take-up scenarios and then assessed their implications for emissions and tariffs:

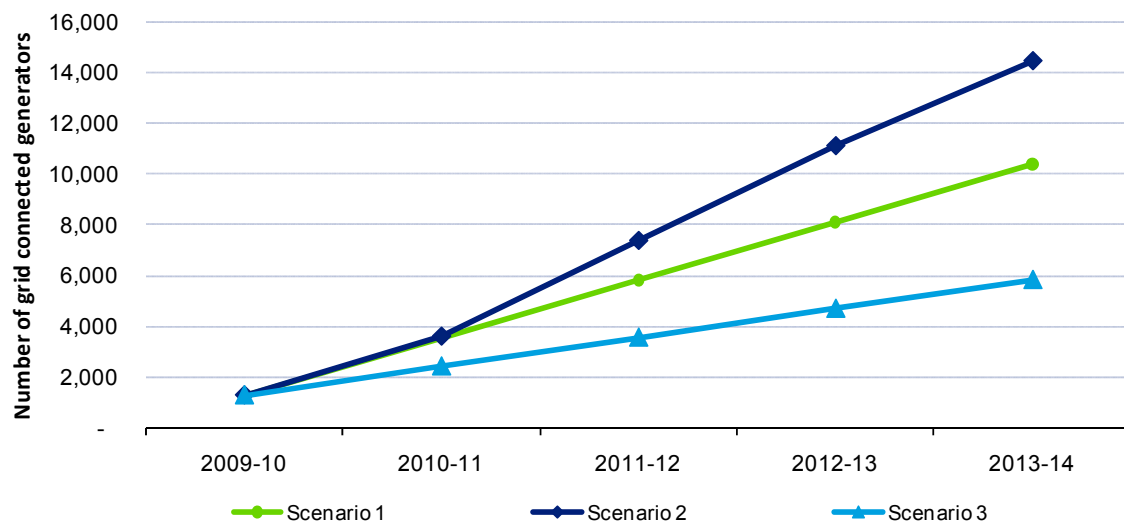
- Scenario 1—based on the ACT Government's forecast of scheme take-up, which expects a 27 MW capacity by the end of 2014⁴⁴
- Scenario 2—broadly based on ActewAGL's submissions to the AER, which imply an estimated total generation capacity of around 38 MW in 2014
- Scenario 3—based on the number of new connections in the six months to December 2009 continuing at a steady rate. The Commission has chosen this period because the first four months of the scheme are likely to be atypical due to relatively low public awareness, and because it understands that logistical problems resulted in a small backlog of installations during that time. This scenario results in installation capacity of approximately 12 MW by the end of 2014.

The estimated number of connections for each of the scenarios is shown in figure 5. Under the three take-up scenarios, the number of grid-connected renewable energy generators moves from

⁴⁴ ACT Department of the Environment, Climate Change, Energy and Water, *National capital to solar capital: Options for an expanded ACT electricity feed-in tariff scheme*, 2009, http://www.environment.act.gov.au/__data/assets/pdf_file/0006/174795/Electricity_Feed-in_tariff_WEB.pdf#Discussion%20Paper.

1,280 at the end of 2009–10 to 10,379, 14,461 and 5,808, respectively, by the end of 2013–14.

Figure 5 Potential feed-in tariff scheme take-up



To model the estimated effect on the average household electricity bill, the Commission has assumed that the size of the average generator remains constant at 2.13 kW and the average output is 1,350 kWh per year for each kilowatt of installed capacity for small generators, and 1,450 kWh for large ones. The estimated impacts of the scheme are shown for the 50.05/kWh (table 12) and 45.7/kWh (table 13) scenarios, assuming that the modelled rates apply to new installations for each year from 2010–11 to 2013–14. Note that in both scenarios a 50.05c/kWh premium rate applies in all years to installations made in 2009–10.

Table 12 Feed-in tariff scheme fixed costs passed through to ACT electricity customers (50.05c/kWh premium feed-in tariff rate)

	2009–10	2010–11	2011–12	2012–13	2013–14
Number of generators (mid-year)					
Scenario 1	1,280	3,555	5,830	8,104	10,379
Scenario 2	1,280	3,595	7,370	11,109	14,461
Scenario 3	1,280	2,412	3,544	4,676	5,808
Electricity generated (kWh)					
Scenario 1	3,687,086	10,239,669	16,792,252	23,344,835	29,897,417
Scenario 2	3,687,086	10,355,473	21,228,719	31,999,172	41,654,922
Scenario 3	3,687,086	6,947,853	10,208,620	13,469,387	16,730,154
Total scheme costs (\$m)					
Scenario 1	2.06	5.06	8.05	11.02	13.99
Scenario 2	2.06	5.12	10.01	14.83	19.17
Scenario 3	2.06	3.61	5.15	6.67	8.19
Increase to annual household bill (\$)					
Scenario 1	5.63	13.89	22.15	30.52	38.74
Scenario 2	5.63	14.03	27.53	41.08	53.08
Scenario 3	5.63	9.92	14.18	18.47	22.68
Increase to annual household bill (%)					
Scenario 1	0.40	0.94	1.43	1.87	2.26
Scenario 2	0.40	0.95	1.77	2.52	3.10
Scenario 3	0.40	0.67	0.91	1.13	1.32

Table 13 Feed-in tariff scheme fixed costs passed through to ACT electricity customers (45.7c/kWh premium feed-in tariff rate)

	2009–10	2010–11	2011–12	2012–13	2013–14
Number of generators (mid-year)					
Scenario 1	1,280	3,555	5,830	8,104	10,379
Scenario 2	1,280	3,595	7,370	11,109	14,461
Scenario 3	1,280	2,412	3,544	4,676	5,808
Electricity generated (kWh)					
Scenario 1	3,687,086	10,239,669	16,792,252	23,344,835	29,897,417
Scenario 2	3,687,086	10,355,473	21,228,719	31,999,172	41,654,922
Scenario 3	3,687,086	6,947,853	10,208,620	13,469,387	16,730,154
Total scheme costs (\$m)					
Scenario 1	2.06	4.78	7.48	10.17	12.85
Scenario 2	2.06	4.83	9.24	13.60	17.52
Scenario 3	2.06	3.47	4.87	6.25	7.62
Increase to annual household bill (\$)					
Scenario 1	5.63	13.11	20.59	28.15	35.58
Scenario 2	5.63	13.24	25.43	37.67	48.51
Scenario 3	5.63	9.53	13.40	17.30	21.11
Increase to annual household bill (%)					
Scenario 1	0.40	0.89	1.33	1.73	2.08
Scenario 2	0.40	0.89	1.64	2.31	2.83
Scenario 3	0.40	0.64	0.86	1.06	1.23

Under both the 50.05c/kWh and the 45.7c/kWh premium rates, the increase in bills by 2013–14 is relatively modest and will be in the range of 1% to 3%. The difference between the impact on household bills under each scenario is proportional to the difference in the premium feed-in tariff.

6.6.2 The estimated effect on greenhouse gas reduction

The estimated effect on greenhouse gas reduction is a direct function of the take-up of the feed-in tariff scheme (and its use to substitute for reliance on existing more higher carbon producing electricity generation), and the amount of energy produced by renewable generators connected to the grid.

The take-up scenarios have been discussed above, and the Commission notes that its proposed reduction in the premium rate is unlikely to have a material impact on the take-up rate for the scheme given the cost savings and higher efficient outcomes that are evident from the latest information.

To calculate this reduction, the Commission has assumed that 1.076 kilograms of greenhouse gas production is avoided for every 1 kilowatt of electricity generated from renewable sources.

Table 14 Estimated effect on greenhouse gas reduction

Scenario	Greenhouse gas reductions (tonnes)				
	2009–10	2010–11	2011–12	2012–13	2013–14
Scenario 1	3,673	10,202	16,730	23,258	29,787
Scenario 2	3,673	10,317	21,150	31,881	41,501
Scenario 3	3,673	6,922	10,171	13,420	16,668

Table 14 shows total greenhouse gas reductions in 2013–14 of between 17,000 tonnes and 41,000 tonnes. Such reductions, while material, are small compared to overall ACT greenhouse gas emissions of 4 million tonnes per year. Phase 1 of the feed-in tariff scheme will necessarily be a small contributor to any territory-wide reductions in emissions. This has been acknowledged in the government’s discussion paper on future energy policy.

6.6.3 The estimated effect on general price inflation and jobs

Based on the household bill impacts outlined above, the impact on inflation of the feed-in tariff at the 50.05c/kWh or 45.7c/kWh rate will be minimal. However, there will be implications for some electricity users for whom any increase in electricity charges, regardless of the cause, has an adverse impact upon their financial position. These issues are being addressed separately by the government through relevant financial support schemes targeted to those in need.

As noted in section 3.4, and subject to households not simply substituting investment in renewable energy in place of other alternatives, the feed-in scheme will have a positive impact on jobs in the short to medium term. The ATA has suggested that, if 1,000 generation units are installed per year (approximately equivalent to the current take-up rate—Scenario 3), 25–30 jobs will be created and sustained. Extrapolating, this means that under the high take-up option (Scenario 2) around 100–120 jobs will be created. These job creation figures are broadly consistent with modelling by the government of the potential impact of expanding the feed-in tariff scheme.

However, as the ACT Government’s modelling indicates in its discussion paper on the possible expansion of the feed-in tariff scheme,⁴⁵ in the longer term there will be an overall reduction in employment as a result of the feed-in tariff scheme due to the impact of the scheme on retail electricity tariffs. Over time, higher electricity costs will contribute to general price inflation and reduce disposable income levels, leading to diminished economic turnover, consumption and hence jobs. The government’s modelling suggests that a scheme which results in a \$50 increase in prices (that is, with take-up around 20% higher than the levels modelled in Scenario 3) would reduce employment by around 62 persons in the longer term (2020–2029).

6.7 Conclusions and recommendation on feed-in tariff

In considering a recommendation for the premium feed-in tariff rate, the Commission refers to the terms of reference, which require that priority be given to:

- the desirability of occupiers being able to recoup the cost of investment in renewable energy generation capacity within a reasonable time

⁴⁵ ACT Department of the Environment, Climate Change, Energy and Water, *National capital to solar capital: Options for an expanded ACT electricity feed-in tariff scheme*, 2009.

- the need to encourage the generation of electricity from renewable sources
- the desirability of costs under the Electricity Feed-in Act impacting equitably on all electricity users
- the need to reduce emissions from greenhouse gases
- the need to reduce the likely effects of climate change.

The Commission has modelled a number of scenarios based on the outcomes of the scheme so far and on the input and information received from stakeholders in response to the draft report and the earlier released issues paper. Based on that modelling and input, the Commission's consideration of the terms of reference is as set out in this section.

6.7.1 Desirability of occupiers being able to recoup the cost of investment in renewable energy generation capacity within a reasonable time and the need to encourage the generation of electricity from renewable sources

The Commission has modelled a number of potential premium rate scenarios to ascertain the ability of occupiers to recoup the cost of their investment and therefore the level to which they are encouraged to install generation equipment. It is apparent that at the current premium rate of 50.05c/kWh, and given the current price of RECs and the Australian Government's RET / Solar Credits scheme, installers of small generators are able to achieve a relatively early full recovery of their investment plus a rate of return on the investment that exceeds the risk-free market rate and the rate offered in other jurisdictions.

For a 1.5 kW installation, the payback period is around five years and returns average 19.7% per year over the 20 years of the scheme. This is much higher than alternative investment options with similar risk. Premium rates of more than 50.05c/kWh, such as the 60c/kWh in place in New South Wales, result in higher returns. At the 50.05c/kWh rate, returns for larger generation sizes are lower, with a 5 kW system featuring a payback period of 10 years and an average return of 7.6% and for 15 kW and 30 kW systems the return is around 4%, which is less than the current 10-year Commonwealth bond rate of 5.3%.

The Commission has also modelled a number of lower premium rates, including 37c/kWh and 45.7c/kWh. At the 37 cent rate, returns for small systems are still around double the Commonwealth bond rate of 5.3%; however, the 15 kW and 30 kW systems do not provide a payback of their initial investment within the 20-year period that the premium rate is guaranteed under the legislation. The Commission is not convinced that, based on its updated modelling assumptions, a premium rate at this level will provide sufficient incentive for an optimal level of investment in this form of renewable generation technology. At tariff levels materially below 37c/kWh, returns are lower and payback periods are longer than those available through other investment options.

At the 45.7 cents/kWh rate, the returns for smaller systems are still above the Commonwealth bond rate, with payback periods of 6 and 10 years for 1.5 kW and 2.5 kW systems respectively. However, for the larger systems, the returns are closer to the bond rate, with 6% on a 5 kW system, and a similar rate for 15 kW and 30 kW systems if the premium rate is paid out at 100% rather than the 80% as currently applies under the scheme. Without an adjustment to this payment percentage, the return for the larger systems of 15 kW and 30 kW would be around 2.5% to 2.7%. A 5 kW system would earn a return of 6% per year, just above the Commonwealth bond rate.

At 45.7c/kWh, occupiers would be able to recover the full cost of their investment well within the period that the scheme applies, with the smaller systems recovering their investment costs within 10 years for the up to 2.5 kW systems, and in 12 years for the 5 kW systems. Furthermore, at the 45.7c/kWh rate, and with an adjustment to the payment rate such that larger system operators received a 100% of the premium rate rather than 80%, these larger system operators would be able to receive a return commensurate with the Commonwealth bond rate. Based upon discussions that the Commission has had with large system suppliers and those few investors who are planning or have invested in a large system, this rate of return would prove attractive to investment in these larger systems which are potentially more effective and efficient in terms of generating capacity and therefore emissions reductions.

6.7.2 Desirability of costs under the Electricity Feed-in Act impacting equitably on all electricity users

As noted above, the Commission considers that there are two elements to the scheme impacting ‘equitably’ on all electricity users. One element is in relation to the manner in which costs are passed through to electricity users. This is, in effect, mandated by section 8A of the Act, which requires that costs must be imposed on an electricity consumer in a way that is in proportion to the amount of electricity used by the consumer.

The second element relates to the total quantum of costs, through higher electricity bills, imposed by the scheme (that is, by those who install renewable generation) on all electricity users, including those electricity customers who choose not to, or are unable to, install renewable generation.

Modelling of impacts on bills is difficult because overall take-up is uncertain and will continue to be heavily determined by external factors, such as the continuation of the guaranteed \$40 price for REC and related Australian Government programs including the five times multiplier on the RECs. However, the Commission’s modelling suggests that, based on current take-up rates, bill increases are likely to be modest (in the order of 1% of bills by 2013–14 at the current take-up and premium levels). Higher take-up rates, commensurate with those forecast by the ACT Government and ActewAGL, will increase bills by larger amounts but at this stage bill increases of more than 3% by 2013–14 due to the feed-in tariff appear unlikely. A 37c/kWh tariff will result in lower bill increases, particularly if a lower premium rate results in materially lower take-up levels. However, from an incentive for new investment in PV systems, a rate as low as 37c/kWh is not recommended by the Commission based on the costing and payback data that is now available.

The relatively modest bill increases do not suggest that the feed-in tariff should be over-generous; nor do they mean it is appropriate to ignore the likely impacts of the scheme on other customers or the economy as a whole. For example, in its issues paper, the Commission noted that it is likely that higher-income households and homeowners are more likely to install PV generating equipment and hence earn a financial reward, while lower-income households and tenants are less likely to participate in the scheme and hence are likely to pay a financial penalty. This was also noted by several respondents to the issues paper.

Following the release of the draft report the Commission undertook some preliminary work to identify whether installation of renewable energy generators was higher in suburbs with higher average income levels. However, such a trend was not apparent at this time from the available data. It may be that take-up is more closely related more to wealth than income, given the up-front capital required. This is an issue that can be explored at some future time when additional

information is available. For the moment, however, the proposed 45.7c/kWh rate does not raise issues pertaining to the equitable allocation of the cost of the scheme between electricity users.

Finally, the Commission notes that the ACT Government has indicated its intention to adopt a previous recommendation of the Commission—that the electricity community service obligation (CSO) provided by the government to eligible low-income households be adjusted to take into account any changes in the retail price of electricity in future years, which will include the pass-through of the feed-in tariff costs. Support for this approach was reflected in submissions on the draft report, and in particular in the submission from the ACT Civil and Administrative Tribunal, which repeated its earlier recommendation that an amount that fully offsets the cost passed on to customers as a consequence of the funding arrangements for the feed-in tariff scheme be included in the energy concession scheme implemented by the government.

6.7.3 Need to reduce emissions from greenhouse gases and to reduce the likely effects of climate change

The ACT Government has placed a strong policy priority on reducing emissions of greenhouse gases and the likely effects of climate change. Among other things, its Draft Sustainable Energy Policy proposes that by 2020 increased distributed generation will aim to reduce ACT greenhouse gas emissions by 5% relative to 2020 business-as-usual emissions levels. The feed-in tariff scheme will be a contributor to that target.

As with impacts on bills, at this early stage it is difficult to predict what level of reduction in greenhouse gases will occur as a result of the feed-in tariff scheme. It is even more difficult to predict the effect that a lower premium rate, such as 45.7c/kWh, might have on greenhouse gas emissions, although in association with the recommended changes to the payment rate for the above 10 kW capacity systems, it is not anticipated that there will be a significant impact on the overall level of installed generating capacity in the ACT. The question for the Commission has been how to form a view on the elasticity of demand by consumers for zero-emissions generation technologies and systems in response to changes in the premium rate. However, at this time, with little data available on the response of investors over time to different levels of premium rates, it is not possible to prepare a sound statistically based model of the likely take-up rates under different premium rate assumptions.

Using the AER's cost recovery estimates, the government has calculated that 107,402 tonnes of greenhouse gas emissions will be avoided over the first five years of the scheme, based on a 50.05c/kWh tariff.⁴⁶ Even this estimate of savings, which as discussed appears high at this time, is extremely modest compared to total annual ACT greenhouse gas emissions of 4 million tonnes. Thus, as acknowledged by the government, the feed-in tariff scheme will only be a contributor to the reduction of greenhouse gases in the ACT. It cannot by itself resolve the greenhouse gas emissions problem. In this context, the government has noted that the feed-in tariff scheme is just one of a number of programs and policies which, combined, can make a material difference to ACT greenhouse gas emissions.

On the basis of current take-up rates, the contribution of the feed-in tariff scheme may be less than originally anticipated, particularly given the potential impact of changes in Australian Government programs that can directly influence consumer take-up of small zero-emissions generation systems.

⁴⁶ ACT Department of the Environment, Climate Change, Energy and Water, *National capital to solar capital: Options for an expanded ACT electricity feed-in tariff scheme*, 2009, p. 8.

Therefore, the Commission is of the view that, while the reduction in the premium rate recommended by the Commission may reduce the current take-up rate for the feed-in tariff scheme, the overall impact on greenhouse gas emissions will be minor.

In support of this conclusion, the Commission notes that under its proposed revised premium rate and with the removal of the 80% cap on the level of payment to generators with 10 kW or greater capacity, there is a greater likelihood than under the current 50.05c/kWh rate that larger, more efficient systems will be installed in the ACT. This could have the desired effect of increasing the overall level of solar energy production in the ACT beyond that which is reliant solely upon the smaller systems which are more likely to be installed by householders, and are less efficient in their generating capabilities than the larger systems.

Thus, in meeting the overall requirements of the terms of reference, the Commission believes that the proposed reduced premium rate, coupled with the lifting of the 80% cap on payments made to systems with a capacity of 10 kW and above, represents an appropriate balance of all the requirements of the Act and still results in a program that compares well with other, similar schemes across Australia. In terms of the publicly stated work plan of the Ministerial Council on Energy, the various state and territory governments across Australia are currently working towards a program that will seek to achieve greater harmony across the various jurisdictional feed-in tariff schemes that are operative. The reduced premium rate recommendation is consistent with that objective while at the same time maintaining the essential features of the gross scheme that has been introduced into the ACT.

6.7.4 Conclusions

Ultimately the Minister's decision on the feed-in tariff represents a trade-off between the premium rate, the level of greenhouse gas reductions and the impact on customers' electricity bills.

Having considered the matter, the Commission's position is that it is appropriate to set the premium rate at the minimum amount that is required to provide sufficient incentive to make the installation of renewable generation attractive against other, similar relatively low-risk investments, but which minimises the impact on the rest of the economy, including those who choose not to, or cannot, invest in renewable generation for financial or technical reasons.

Not overcompensating the occupier is important because, despite the benefits of the feed-in tariff scheme, it is a relatively costly way of reducing greenhouse gas. As the ACT Government has noted in relation to the potential expansion of the scheme, the cost of abatement is in the range of \$195 to \$434 per tonne, which is significantly higher than the (untested) modelling of the CPRS package, which was based on \$23 per tonne. It is also more expensive than directly purchasing green energy; for example, ActewAGL promotes 100% green energy for approximately 7.5c/kWh, or an abatement cost of \$70 per tonne.

The most difficult element of the Commission's recommendation is establishing a premium rate which provides a sufficiently attractive return for larger systems, but at the same time does not unduly overcompensate smaller systems. Given the structure of the scheme and Australian Government incentives, this is difficult to achieve, and ultimately a compromise needs to be found.

The Commission's view is that a premium rate of 45.7c/kWh in 2010–11 represents the most appropriate premium rate as it:

- enables all occupiers to be able to recoup the cost of investment in renewable energy generation capacity within a reasonable time
- provides the ability to encourage the generation of electricity from renewable sources
- minimises the impact of costs on all electricity users
- makes a contribution towards reducing emissions of greenhouse gases and the impact of climate change in the ACT, but at the same time recognises that the feed-in tariff scheme alone cannot resolve greenhouse gas and climate change problems.

A 45.7c/kWh premium tariff provides a 12-year payback and a 6% return for a 5 kW system. This return is slightly higher than the current 10-year Commonwealth bond rate of 5.3%, thereby giving participants an incentive to invest in renewable energy, and providing a small premium reflects the slightly higher risks of doing so.

Under a 45.7 c/kWh premium rate, an occupier with a 1.5 kW system will:

- be required to make a net outlay (after RECs) of approximately \$3,500
- recover this outlay, in nominal terms, in around 6 years (after making an allowance for maintenance costs and a contribution towards the cost of inverter replacement)
- receive a total of \$7,650 in feed-in tariff payments over 20 years
- earn a return of 16.9%.

Larger systems will still earn a positive return of around 2.5%. This falls short of a full commercial rate of return and the Commission acknowledges that this is the case. While some commercial occupiers may find other reasons to install renewable energy, and indeed some have already done so, the Commission accepts that widespread commercial-scale take-up of the scheme will be limited at this rate. The Commission therefore urges the Minister to consider increasing the percentage of the premium rate applying to large generators from its current 80% to 100%. This move would increase returns for these larger units to 6%, which is in line with the returns for the 5 kW units and a rate commensurate with Commonwealth bonds.

A 45.7c/kWh premium rate represents a reduction of around 9% from the existing premium rate. This reduction can effectively be attributed to changes in the external environment since the 2009–10 rate was established and, in particular:

- changes to the Commonwealth arrangements which encourage green energy
- reductions in the cost of renewable energy systems.

Arguably, a premium feed-in tariff rate of 45.7c/kWh guaranteed for 20 years, although less than the current rate of 50.05c/kWh, will still result in the ACT having the most generous feed-in tariff scheme in Australia.

7 The feed-in tariff in future periods

In chapter 6 the Commission set out its view that the appropriate feed-in tariff for 2010–11 is 45.7c/kWh. This view was based on a number of modelling assumptions about the cost of renewable generation, as well as the incentives provided by other schemes to encourage renewable generation.

The assumptions that are relevant to the calculation of the feed-in tariff in 2010–11 will change over time. For example, the cost of solar panels will change, including as a result of exchange rate fluctuations and technological development. Commonwealth arrangements may be amended, and even if they remain as currently announced, the reducing REC multiplier will have a significant impact on the financial returns for smaller generation units in the years beyond 2011–12.

In addition, after a few years the impact and effectiveness of the feed-in tariff scheme will become clearer. Installation trends will become clearer, as will output and the impact of the scheme on electricity prices in the ACT. All of this additional information will help to inform future decisions on the setting of the premium rate.

Therefore, the appropriate feed-in tariff for 2010–11 is unlikely to be appropriate extending into the longer term. Thus, the Commission has been asked to provide guidance on a model and mechanism for annual adjustments of the premium rate for the four years following 2010–11.

7.1 Draft report

In the draft report, the Commission suggested that the model for determining the tariff in future years should have the following features:

- In the absence of significant reductions in financial incentives provided by other government schemes, including as a result of changes in the value of RECs, the premium rate should be set at that rate which provides a 10-year nominal undiscounted payback period for a 1.5 kW system.
- Where there are significant reductions in financial incentives provided by other government schemes, the payback period should be reviewed accordingly.
- The values for modelling parameters used to determine the premium rate for 2010–11 should be applied:
 - annual maintenance costs (\$100 per year)
 - annual average output per kilowatt of installed capacity (1,050 kWh will be produced for each 1 kW of installed capacity)
 - average degradation in output capacity over time (0.5%).
- Recent estimates of the financial costs of installing renewable generation, based on multiple and verifiable installer quotes, should be used for modelling purposes.
- Where a value for RECs needs to be adopted, the value at 1 January of the year in which the premium rate is to first apply should be used.
- The premium tariff announcement should be made at least three months before the commencement of the relevant financial year (as is required under the Act).

- The model used to calculate the premium rate should be made publicly available after the announcement of the premium tariff.

The Commission also proposed a process whereby the model would be administered by the Commission on an annual basis, and the results from the model, together with the workings of the model and all data used, would be made available to the Minister by no later than 15 March of each year. The Minister would then use discretion as to whether any adjustment in the premium rate should be applied, and in so doing would make available all relevant data and calculations to the Legislative Assembly and the wider community.

The Commission also proposed that prior to 2015–16 it would review the model and price determination arrangements in detail and to provide appropriate advice to the Minister about how the rate might be set, and at what level, for the next five years.

7.1.1 Submissions on the draft report

No submissions directly addressed the issue of determining the feed-in tariff in future years. However some submissions stressed the importance of providing certainty in the level of the tariff.

7.2 Key issues

There are a number of key issues in setting the premium rate in future years, including the appropriate balance between flexibility and certainty and the need for simplicity and transparency. The Commission has also considered the use of a degression approach—whereby specified reductions in the premium rate are built in to the premium-setting mechanism to reflect anticipated decreases in the cost of renewable energy generation equipment.

7.2.1 Flexibility

Flexibility is needed to ensure that the premium rate reflects up-to-date information on such matters as the costs of renewable generation and the impact of other incentive schemes. Most respondents to the issues paper considered it essential that this be the case.

Clearly, if Australian Government incentives for renewable energy change materially and if there is no change in the feed-in tariff, then potential investors in renewable generation may face either very high or very low returns from their investments. This would have the potential to create extremely high or low demand for renewable generation and could lead to a destabilising mini ‘booms’ or ‘busts’, in which markets become overheated or cold. Both outcomes are undesirable and in such circumstances it would be difficult for the Electricity Feed-in Act to achieve its policy objectives, including the aim of promoting the generation of electricity from renewable energy sources. Flexibility provides greater opportunity for the scheme to achieve its objectives and avoid any unintended or unforeseen consequences.

However, a key matter is the degree of flexibility and discretion that should be provided. To take a hypothetical example, if the Australian Government were to remove the RET / Solar Credits scheme in 2011–12 the premium rate would need to approximately double to achieve the same payback period for a 1.5 kW installation. Therefore, automatically adjusting the premium rate to compensate for changes in other schemes and to achieve the same payback period and rate of return on the investment made would have a significant impact on electricity prices. It could also

create a high level of volatility in the premium rate, which a number of submissions identified as undesirable. It would effectively mean that, in the example of the elimination of the RET / Solar Credits scheme, responsibility for funding part of the scheme in the ACT would transfer from the Australian Government to ACT electricity customers, which could result in significant welfare transfers.

Flexibility also increases the complexity and cost of annual tariff adjustments, and can mean that adjustment moves from being a relatively mechanistic process to one involving judgment and the need to forecast likely outcomes.

7.2.2 Certainty

Certainty can take two forms. First, there is a need for certainty about the **methodology and principles** underlying the determination of the feed-in tariff. There is no reason why a high level of certainty about the approach to determining the feed-in tariff for the next four years cannot be established, consistent with the approach adopted in this report

Certainty about the **level** of the premium rate is a different matter. The Commission appreciates that, at least conceptually, it is generally undesirable for the premium rate to change rapidly from year to year. There are advantages in ensuring a relatively stable rate from both industry stakeholder and customer viewpoints. If the premium rate fluctuates significantly, customers may have little confidence in the scheme and could potentially ‘speculate’ by delaying or bringing forward the installation of equipment based on their view of future movements in the rate. That may then cause demand for renewable generation to fluctuate significantly, creating overcapacity or shortages in this market.

As Origin Energy pointed out in its response to the issues paper, large fluctuations in the premium rate can also impose administrative and compliance burdens on retailers as well as on distributors. The Commission is also aware that rapidly changing renewable energy policies and outcomes at all levels of government have been a source of criticism.

At the same time, a feature of the ACT feed-in scheme is that, once a generator has been installed, the premium rate for that year is guaranteed for the 20-year period. This provides investors with a high degree of certainty and does not force them into making long-term expenditure decisions in the presence of uncertainty about income. Because generation units are relatively quick and easy to install, potential investors can make decisions with relative confidence about costs and income. Should the premium rate in a particular year not prove attractive to investors, it can always be increased in the subsequent year as an incentive for investors to enter the market and install a zero-emissions generating system.

7.2.3 Simplicity and transparency

The proposed principles of simplicity and transparency are useful for stakeholders involved in the feed-in tariff process or with an interest in its outcomes. This wider group of stakeholders will include the renewable generation industry, consumer representatives, electricity retailers (including potential new entrants) and distributors, as well as general electricity consumers.

As a general rule, information on most key inputs to the calculation of the premium rate (such as the value of RECs and the cost of installing generation equipment) is relatively widely available from public sources. Therefore, it should be possible to adopt a modelling approach that is able to

7.2.4 Feedback loops

It is possible for the premium rate to be adjusted in future based on the outcomes of the feed-in tariff scheme to that time—for example, if it became apparent after two years of the scheme that a certain payback period was not proving attractive to customers and that limited generation capacity had been installed. In such a case, the payback period could be reviewed and reduced and the premium rate recalculated. Similarly, if the impact of other schemes to encourage carbon emissions reductions ‘overtakes’ the feed-in tariff scheme, the premium rate could be adjusted accordingly. However, the difficulty with implementing such feedback loops on an annual basis is that they introduce a much larger element of uncertainty into the decision-making process.

7.2.5 Degression

A number of overseas feed-in tariff schemes set tariffs in advance for a number of years using a ‘degression’ approach. Degressions are designed to take into account the fact that technology improvements and the acquisition of economies of scale and scope as the renewable industry grows are likely to reduce the future costs of renewable systems. Degressions can take two forms:

- There is a sunset date beyond which payments will not be made. For example, a decision that feed-in tariffs would only be paid until 2019 would mean that as each year passes new generation units receive fewer years of payment. These reduced payments may be roughly consistent with reductions in costs of renewable energy
- For regimes (such as the ACT) where payments are made for a defined number of years, the feed-in tariff applicable to new installations in a particular year could be reduced each year by a defined rate which approximates the forecast reduction in the costs of installing renewable energy generating equipment.

Under both approaches, adjustments to the degression can apply depending on whether total scheme take-up exceeds or falls short of caps or benchmarks set by the government.

Future reductions in renewable energy generation equipment costs are difficult to estimate. In recent years the cost of solar panels (but not inverters) has fallen significantly both through technical evolution and supply improvements. The ATA has pointed to reasons including:

- an increase in silicon production capacity in Asia
- changes in demand in some larger European markets (for example, Spain and Germany)
- flow-on effects from the global financial crisis, including a higher Australian dollar.

There is a broad consensus that the price of solar systems (and system components such as inverters) will continue to decrease. Studies undertaken for the UK Government forecasts total cost reductions of 56% in 2020 compared to 2009 prices, an annual reduction of around 5%.⁴⁷

⁴⁷ Element Energy and Pöyry Energy Consulting, *Design of feed-in tariffs for sub-5MW electricity in Great Britain: Quantitative analysis for DECC—Final report*, July 2009.

7.2.6 Independent verification

The Act anticipates the Minister receiving advice from the Commission before a determination of the premium rate is made. The purpose of developing and using a model to adjust the premium rate (if required) over the four years from 2011–12 to 2014–15 would be to minimise the administrative cost of conducting inquiries and thus administering the feed-in tariff scheme. At the same time, the Commission can give credibility to the determination of the premium rate, as it can be demonstrated that an independent assessment has been made of the various factors that will ultimately determine the premium rate for the next period and these factors have been applied within a model that has been defined by the Commission following a public process.

7.3 Discussion and conclusions

The uncertainty of financial returns from investing in renewable generation has been highlighted since the release of the Commission's draft report with the changes announced to the Australian Government's Solar Credits / REC scheme. Discussions with stakeholders and submissions have also highlighted this uncertainty and stakeholders have emphasised the need for the ACT feed-in scheme to provide as much clarity and certainty as possible to the industry.

The Commission has undertaken a comprehensive and rigorous review of the premium rate for 2010–11 and has benefited from input from industry participants. Rather than undertake a similar review for 2011–12, and bearing in mind the benefits of certainty, the Commission's view is that the premium rate of 45.7c/kWh that it has recommended for 2010–11 should also apply (in nominal terms) in 2011–12. However, should there be any material changes to Commonwealth arrangements prior to 2011–12, it will be necessary for the rate to be reviewed. Any review will need to have regard not only to changes to the Australian Government's scheme but also to feed-in tariff arrangements in other jurisdictions, in order to ensure the ACT scheme does not move out of line with those schemes.

In terms of the premium rate for 2012–13 to 2014–15, the Commission recommends that a rate for each of these three years be determined by the Minister in early 2012. The Commission's preference is for the rate to be determined in a relatively straightforward manner, simply by updating the cost and other related assumptions used by the Commission in this report. However, given the likely changes in renewable generation market between now and 2012, it is likely that there will also be a need to exercise some judgement in determining the premium rate.

Thus the premium rate for these three years will need to take into account and update the following 'mechanistic' factors which are currently reflected in the Commission's model (and which is currently set out in appendix 2):

- the capital cost of installing renewable generation units, using the most up to date information available at the time, with cost information sourced from publicly available information where possible—strong consideration should be given to the likely change in capital costs across the period 2012–13 to 2014–15, and these should be factored into the calculation of the premium rate in each of the years
- the operating and maintenance costs associated with renewable generation units, including an allowance for the cost of replacing inverters—consideration should be given to whether it is reasonable to assume that that inverter costs will reduce ('degress') across the period, and if so this should be built into the model

- the likely output from generation units, taking into account historic levels of output as well as any potential changes that may occur in future as a result of improvements in the efficiency of generators going forward
- Australian Government incentives available at the time and forecast to be in place from 2012–13 to 2015–16
- the likely deterioration in output from renewable generation systems over time
- ensuring returns for a 5 kW generator which are slightly higher than the existing Commonwealth 10-year bond rate.

In addition to the ‘mechanistic’ matters listed above, judgement will need to be exercised in respect of the impact of the factors outlined below when determining the premium rate:

- outcomes of the scheme to 30 December 2011, including such things as total generation capacity installed, total output, the total amount of greenhouse gas avoided, and the existing and forecast impact on electricity prices
- the need to promote stability and certainty in the premium rate over time, particularly given the impact that changes in Commonwealth arrangements might have on financial returns
- feed-in tariff arrangements in other jurisdictions
- other developments in ACT Government or Australian Government policy, including any targets for renewable generation capacity in the ACT that have been established
- the outcomes of any extension to the feed-in tariff scheme to include generators with more than 30 kW capacity
- changes in any other factors that may influence an occupier’s decision to install renewable generation.

Noting that the Electricity Feed-in Act requires the Minister to seek advice from the Commission in determining the premium rate each year, there is merit in the Commission retaining responsibility for oversighting the calculation of the premium rate for 2012–13 to 2013–14 (and, if Commonwealth arrangements change materially, for 2011–12). Under this arrangement, the Commission would have to have regard to the mechanism that had been set and agreed by the Minister. Any discretion that is required, for example in making adjustments to the scheme to reflect changes to Commonwealth arrangements, could be applied by the Commission before a recommendation (along with the workings of the model) is given to the Minister and through the Minister to the Legislative Assembly. In this way, transparency and replicability would be assured, together with independent advice and administration of the premium rate determination model. This would be consistent with the intentions of the Act, and in particular with the intentions of the Legislative Assembly when it incorporated a role for the Commission in the determination of the premium rate.

Appendix 1 Terms of reference

Australian Capital Territory

Independent Competition and Regulatory Commission (Premium Rate—Electricity Feed-in) Terms of Reference Determination 2009

Disallowable instrument DI2009–225

made under the

Independent Competition and Regulatory Commission Act 1997, section 15 (Nature of industry references) and section 16 (Terms of industry references)

Reference for investigation under Section 15

Pursuant to section 15(1) of the *Independent Competition and Regulatory Commission Act 1997* (the ICRC Act) and having regard to the provisions of section 10(3) and section 11 of the *Electricity Feed-in (Renewable Energy Premium) Act 2008* (the Electricity Feed-in Act), I refer to the Independent Competition and Regulatory Commission (the Commission) the provision of advice to assist with the determination of the premium rate to be paid for electricity that is supplied by compliant renewable energy generators to the distribution network under the provisions of the Electricity Feed-in Act.

Terms of reference for investigation under Section 16

I require that the Commission consider the following matters in relation to the conduct of the investigation:

1. The Commission is to develop a model for determining the premium rate which provides guidance on the determination of the rate for the period 1 July 2010 to 30 June 2011, and on a mechanism for annual adjustments of the rate for the following four years.
2. In developing the model and preparing its advice, the Commission must give priority to the:
 - a. desirability of costs under the Electricity Feed-in Act impacting equitably on all electricity users;

- b. need to encourage the generation of electricity from renewable sources;
 - c. need to reduce emissions from greenhouse gases;
 - d. need to reduce the likely effects of climate change; and
 - e. desirability of occupiers being able to recoup the cost of investment in renewable energy generation capacity within a reasonable time.
3. The Commission must also have regard to:
- a. the amounts payable under the Electricity Feed-in Act by an electricity distributor or an electricity supplier; and
 - b. any additional metering costs passed on to an occupier because of Section 6(2)(c) of the Electricity Feed-in Act.
4. In conducting its investigation, the Commission should identify other matters relevant to the determination of the rate.
5. The Commission must produce its final report by 15 March 2010.

Simon Corbell MLA

Minister for Energy

30 October 2009

Appendix 2 Approach to modelling

The model adopted by the Commission to assess an occupier's financial incentive to install renewable generation calculates the internal rate of return of forecast net cash flows over the 20-year period of the feed-in tariff scheme for a particular size of generator.

Positive net cash flow in each year 1 to 20 are calculated as:

- Estimated output (in kilowatt hours) multiplied by the premium rate (in cents per kilowatt hour), where output is assumed to reduce by 0.5% per year from year 2 to year 20

Negative cash flows are:

- In year 0, the net capital cost of installing the generator, calculated as:
 - the gross installation cost (in dollars) less the revenue received from RECs (number of RECs multiplied by value per REC) plus
 - a connection cost
- In each of years 1 to 20, annual estimated maintenance costs plus an allowance for the cost of replacing inverters

All costs are initially expressed in base year dollars and multiplied by forecast inflation. The premium rate remains constant in nominal terms and is not multiplied by inflation.

The numerical values applied in the above model in determining the premium rate for 2009–10 are set out in table A2–1.

Table A2–1 Modelling assumptions

	Annual output (kWh)	Cost (\$)
System installed capacity (kW)		
1.5	1,350	9,501
2.5	1,350	17,226
5.0	1,350	34,452
15.0	1,450	102,357
30.0	1,450	204,715
REC price	–	40
Annual maintenance cost (per generator)	–	100
Annual allowance for inverter replacement (per kilowatt installed capacity)	–	100
One-off grid connection cost	–	162
Annual loss of generation efficiency (%)	–	0.5%
Forecast inflation (%)	–	2.5%

Note: All figures are expressed in 2009–10 dollars.

Appendix 3 Abbreviations and acronyms

ACT	Australian Capital Territory
AER	Australian Energy Regulator
ATA	Alternative Technology Association
Commission	Independent Competition and Regulatory Commission (ACT)
CPRS	Carbon Pollution Reduction Scheme
DECCEW	ACT Department of Environment, Climate Change, Energy and Water
GGAS	ACT Greenhouse Gas Abatement Scheme
kW, kWh	kilowatt, kilowatt hours
LRET	Large-scale Renewable Energy Target
MW, MWh	megawatt, megawatt hours
NEM	National Electricity Market
NSW	New South Wales
PV	photovoltaic
REC	renewable energy certificate
RET	Renewable Energy Target
SHCP	Solar Homes and Communities Plan
SRES	Small-scale Renewable Energy Scheme