



Small-scale Technology Certificates Data Modelling

Projected take-up of small-scale
renewable technologies over
calendar years 2011 to 2013

Prepared for the Office of the Renewable Energy
Regulator

15 November 2010



ACIL Tasman

Economics Policy Strategy

Reliance and Disclaimer

The professional analysis and advice in this report has been prepared by ACIL Tasman for the exclusive use of the party or parties to whom it is addressed (the addressee) and for the purposes specified in it. This report is supplied in good faith and reflects the knowledge, expertise and experience of the consultants involved. The report must not be published, quoted or disseminated to any other party without ACIL Tasman's prior written consent. ACIL Tasman accepts no responsibility whatsoever for any loss occasioned by any person acting or refraining from action as a result of reliance on the report, other than the addressee.

In conducting the analysis in this report ACIL Tasman has endeavoured to use what it considers is the best information available at the date of publication, including information supplied by the addressee. Unless stated otherwise, ACIL Tasman does not warrant the accuracy of any forecast or prediction in the report. Although ACIL Tasman exercises reasonable care when making forecasts or predictions, factors in the process, such as future market behaviour, are inherently uncertain and cannot be forecast or predicted reliably.

ACIL Tasman shall not be liable in respect of any claim arising out of the failure of a client investment to perform to the advantage of the client or to the advantage of the client to the degree suggested or assumed in any advice or forecast given by ACIL Tasman.

ACIL Tasman Pty Ltd

ABN 68 102 652 148

Internet www.aciltasman.com.au

Melbourne (Head Office)

Level 4, 114 William Street
Melbourne VIC 3000

Telephone (+61 3) 9604 4400
Facsimile (+61 3) 9604 4455
Email melbourne@aciltasman.com.au

Brisbane

Level 15, 127 Creek Street
Brisbane QLD 4000
GPO Box 32
Brisbane QLD 4001

Telephone (+61 7) 3009 8700
Facsimile (+61 7) 3009 8799
Email brisbane@aciltasman.com.au

Canberra

Level 1, 33 Ainslie Place
Canberra City ACT 2600
GPO Box 1322
Canberra ACT 2601

Telephone (+61 2) 6103 8200
Facsimile (+61 2) 6103 8233
Email canberra@aciltasman.com.au

Darwin

GPO Box 908
Darwin NT 0801

Email darwin@aciltasman.com.au

Perth

Centa Building C2, 118 Railway Street
West Perth WA 6005

Telephone (+61 8) 9449 9600
Facsimile (+61 8) 9322 3955
Email perth@aciltasman.com.au

Sydney

PO Box 1554
Double Bay NSW 1360

Telephone (+61 2) 9389 7842
Facsimile (+61 2) 8080 8142
Email sydney@aciltasman.com.au

For information on this report

Please contact:

Guy Dundas

Telephone (02) 6103 8213
Mobile 0405 169 116
Email g.dundas@aciltasman.com.au

Contributing team members:

Jessica Crombie
Owen Kelp
John Soderbaum
Sally Lee



Contents

1	Introduction	1
2	Methodology overview	3
2.1	Analysis of historical trends	3
2.2	Analysis of government policies	4
2.3	Survey	5
2.4	Estimation of STC creation rates	6
2.4.1	REC prices vs STC price	6
2.4.2	Transition to SRES	7
3	Take up of SGUs	9
3.1	Assistance to SGUs	9
3.1.1	Commonwealth assistance to solar PV	9
3.1.2	State and territory feed-in tariffs	10
3.2	Key historical trends	12
3.2.1	Installation rates	13
3.2.2	System size	16
3.2.3	Uptake of Solar Credits	17
3.2.4	Deeming periods	18
3.2.5	Location of installations	18
3.2.6	Overall trends	18
3.3	Projection assumptions	20
3.3.1	Changes to SRES policy settings	20
3.3.2	Changes to feed-in tariffs	21
3.3.3	Feed-in tariffs ‘capping out’	22
3.3.4	Change in underlying cost	24
3.3.5	Labour constraints	25
3.3.6	Saturation	26
3.4	Projection results	27
3.4.1	Assumed installation rates	28
3.4.2	System size	32
3.4.3	Solar Credits policy settings	32
3.4.4	Deeming periods	33
3.4.5	Location of installations	33
3.4.6	Results	33
4	Take-up of SWHs	37
4.1	Assistance to SWHs	37
4.2	Key historical trends	38

4.3	Projection assumptions	40
4.3.1	RECs/STCs per install	40
4.3.2	Installations in new buildings	41
4.3.3	Installations of replacement water heaters	42
4.4	Projection results	43
5	Conclusion	46
A	SGU assistance	A-1
B	SWH assistance	B-1
C	Summary of survey outcomes	C-1

List of figures

Figure 1	Historic REC prices 2006-2010	6
Figure 2	SGU installation rates	15
Figure 3	System size trends	16
Figure 4	Installations receiving Solar Credits (by installation date)	17
Figure 5	Likelihood of reaching Victorian feed-in tariff cap	23
Figure 6	Likelihood of reaching South Australian feed-in tariff cap	23
Figure 7	Likelihood of reaching ACT feed-in tariff cap	24
Figure 8	Impact of feed-in tariffs on installation rates	29
Figure 9	Assumed installation rates (units/month) in major jurisdictions	31
Figure 10	SWH installation rates (less than 60 RECs/installation and RECs created within 60 days)	39
Figure 11	Assistance to 1.5 kilowatt PV systems	A-7
Figure 12	Assistance to 2.5 kilowatt PV systems	A-8

List of tables

Table 1	Micro-wind, micro-hydro and solar PV comparison	9
Table 2	Major Australian solar PV feed-in tariffs	11
Table 3	SGU installations rates	14
Table 4	System size trends - 2010	17
Table 5	Indicative rate of REC creation: June-August 2009 vs June-August 2010	19
Table 6	Assumed Solar Credits multiplier	21
Table 7	Assumptions in relation to capped feed-in tariffs	24
Table 8	Potential for saturation of potential PV market	27
Table 9	Location of 2010 solar PV installations	33
Table 10	Projected STC creation by SGUs – based on year of physical installation	34
Table 11	Assumed lag in STC creation over projection period	35
Table 12	Projected STC creation by SGUs – based on year of certificate creation	35
Table 13	Best estimate of STC creation for 2011 (million STCs)	36
Table 14	Best estimate of STC creation for 2012 and 2013 (million STCs)	36
Table 15	Portion of SWH installations in new buildings	40



ACIL Tasman

Economics Policy Strategy

Small-scale Technology Certificates Data Modelling

Table 16	Assumed STCs/SWH installation	40
Table 17	Assumed SWH penetration in new separate houses	41
Table 18	Assumed monthly housing completions	42
Table 19	Assumed replacement installations/month	43
Table 20	Projected STC creation by SWHs – based on year of physical installation	44
Table 21	Assumed lag in STC creation over projection period	44
Table 22	Projected STC creation by SWHs – based on year of certificate creation	45
Table 23	Summary of STC creation projections	46
Table 24	State/territory SWH incentives and rebates	B-3
Table 25	Change in cost – 2011 (question 2b)	C-2
Table 26	Change in cost – 2012 & 2013 (question 2e)	C-2
Table 27	Reason for cost change – 2011 (question 2c)	C-3
Table 28	Reason for cost change – 2012 & 2013 (question 2f)	C-3
Table 29	Likely to experience supply difficulty (question 3b)	C-4
Table 30	Reasons for supply difficulty (question 3c)	C-4
Table 31	Change in demand – all years (question 4c)	C-4
Table 32	Reasons for demand change – increasing demand (question 4d)	C-5
Table 33	Reasons for demand change – decreasing demand (question 4d)	C-6

1 Introduction

ACIL Tasman was commissioned by the Office of the Renewable Energy Regulator (ORER) to analyse the likely rate of creation of ‘Small-scale Technology Certificates’, or STCs, in the years 2011, 2012 and 2013 (the ‘projection period’) under the Commonwealth Government’s new Small-scale Renewable Energy Scheme (SRES).

The SRES is one of two successor schemes of the Commonwealth’s earlier Renewable Energy Target (RET) scheme, which was implemented to encourage the take-up of renewable energy technologies. The other successor scheme is known as the Large-scale Renewable Energy Target or LRET.

The SRES encourages two forms of renewable energy: Small Generation Units, or SGUs, which consist of solar photovoltaic (PV) systems with a generating capacity of less than 100 kilowatts, ‘micro-hydro’ generators with capacity of less than 6.4 kilowatts and ‘micro-wind’ generators with capacity of less than 10 kilowatts; and Solar Water Heaters (SWHs) of certain types. SWHs are of two main types: heat-pump water heaters, or HPWHs, which draw heat from the ambient temperature of the air to heat water, and systems that heat water through direct contact with sunlight. We refer to SGUs and SWHs as ‘STC-eligible technologies’ within this report.

The SRES and LRET will commence on 1 January 2011. The SRES supports the take up of SGUs and SWHs by households and businesses by requiring wholesale purchasers of electricity to purchase and surrender STCs, which can only be created by owners of SGUs and SWHs or agents assigned STC creation rights by the owner. Historically most RECs from SGUs and SWHs have been created by agents, and so we use the generic term ‘agents’ throughout this report to refer to persons that create RECS/STCs in respect of SGU and SWH installations.

SGUs receive a specific form of support through the SRES (and the preceding RET scheme) through what are known as ‘Solar Credits’. Solar Credits are additional RECs/STCs that SGUs of a certain size can create, and which therefore increase the effective rate of assistance to SGUs.

The SRES is an ‘uncapped’ scheme, which means that it does not target a particular number of SGUs and SWHs that should be installed in a given year. Rather, the Government has provided that any appropriately registered liable entity can purchase STCs from a Government-run clearing house at the price of \$40, effectively fixing the price of STCs at this level. The quantity of STCs created is uncertain and will depend on the market’s response to the incentive

created by the effectively fixed STC price (and other factors that affect supply and demand for STC-eligible technologies).

To ensure that liable entities purchase an appropriate amount of STCs each quarter, the responsible Minister must publish a ‘small-scale technology percentage’ in advance that represents the likely rate of STC creation as a proportion of all sales of electricity that are treated as ‘relevant acquisitions’ under the SRES. ORER will provide advice to the Minister in support of this decision, and this STC data modelling will in turn support ORER’s consideration of the issue.

SGUs and SWHs could also create certificates under the earlier RET scheme. These certificates were known as Renewable Energy Certificates, or RECs. RECs are different to STCs in that their price fluctuates in response to their supply and demand: there is no Government-run clearing house offering a fixed price for RECs, and the amount of RECs that were created and acquitted each year varied for a range of reasons.

The number of RECs that a given SGU or SWH will be able to create on 31 December 2010 is same as the number of STCs that the same system would create if it were installed on or after 1 January 2011. While rules for eligibility and for calculating the correct rate of REC creation have changed over time, the rules currently in force will effectively underpin the SRES, ensuring continuity in the market for SGUs and SWHs.

Accordingly, recent history of the rate of REC creation can provide important insights into the likely rate of STC creation in 2011 and beyond. ORER has provided ACIL Tasman with a detailed database of such information to support this projection. ACIL Tasman has also considered a range of other factors in developing its projection, as set out in section 2.

The projection for SGUs is set out in section 3, and the projection for SWHs is set out in section 4. Some key conclusions and issues to note are highlighted in section 5.

2 Methodology overview

The overall rate of take-up of STC-eligible technologies is heavily dependent on decisions by many thousands of individual households to spend the time and effort to research the opportunity to purchase such systems. As a result, access to information and transaction costs can affect patterns of take-up just as much as the underlying economics of an investment in these technologies. This characteristic complicates an analysis of this type when compared to, say, an analysis of the take-up of large-scale renewable sources such as wind farms.

Consequently, we have not sought to provide a precise microeconomic estimate of take-up rates. Indeed, to do so would offer a ‘false precision’. Rather, the authors have adopted an approach of analysing recent history in considerable detail to:

- discern key ‘first-order’ trends
- assess the effect of government subsidies and incentives, including recent and potential future changes to these (such as changes to the NSW Government’s Solar Bonus Scheme announced on 27 October 2010)
- test these trends against the views of industry participants through an industry survey.

Our methodology is outlined in more detail below.

2.1 Analysis of historical trends

ORER provided ACIL Tasman with a detailed database of historic REC creation by SGUs and SWHs. This database included information on each SGU/SWH installation including, amongst other things:

- The date of the installation
- The date on which RECs were created in respect of the installation
- The state in the installation occurred
- The number of RECs created by the installation
- For SGUs, the installation’s generating capacity
- For SGUs, whether the installation received additional RECs known as ‘Solar Credits’ (see section 3.1.1 for more detail).

Whilst publicly available information on ORER’s ‘REC Registry’ can allow analysis of REC creation rates, the data is not sufficiently disaggregated to allow a close comparison of the underlying installation rates. Since RECs can be created up to a year after installation, raw REC creation data includes a lag that masks trends occurring on the ground.

This extra layer of detail has been critical to this projection, as outlined in section 2.4.2.

For solar PV, the primary period of comparison has been the period since the introduction of the Solar Credits policy, namely from June 2009 to the most recent data available (to September 2010). However, given the substantial rate of change in this industry even over this period, comparisons with average trends over the entire period could be misleading. Instead comparisons tend to focus either on prevailing trends in recent months (often focusing on May-August 2010), or on the state of play towards the start of this period (i.e. June-August 2009).

For SWHs, the primary period of comparison has been from January 2008 to the most recent data available, with the lower rate of change in this sector allowing a longer period of valid comparison.

2.2 Analysis of government policies

Governments at both the national and state/territory level provide significant assistance to STC-eligible technologies. In addition to the subsidy offered to these technologies through the ability to create RECs/STCs (and particularly Solar Credits), the Commonwealth Government offers a rebate to owners of SWHs and almost all states and territories offer what is known as a ‘feed-in tariff’ to support the uptake of solar PV systems.

Changes to these assistance policies have had a material effect on installation rates for these technologies in the past, and therefore on REC/STC creation rates. ACIL Tasman expects that further changes to assistance policies will have the largest impact on STC creation rates over the projection period.

For example, the number of RECs created by SWHs has declined significantly since mid 2009 as Commonwealth and state subsidies have been reduced. Conversely, over the same period the rate of REC creation from SGUs has increased dramatically as consumers have taken advantage of the assistance made available from the Solar Credits policy, and as feed-in tariffs in New South Wales and Victoria have come into effect. (These two phenomena are likely to be related, as increasing assistance to solar PV has turned the attention of households to this technology in preference to SWHs).

Accordingly, the projections in this report have required both an analysis of existing policy settings and a high-level assessment of the potential for recent and potential future policy changes to cause STC creation rates over the projection period to diverge from recent REC creation history.

For example, whilst the introduction of the Solar Credits policy has supported increased installation rates for solar PV, the Solar Credits ‘multiplier’

(effectively the number of additional RECs/STCs that SGUs can create) is set to reduce over time under existing regulations. Further, draft regulations propose to give ORER the power to reduce the Solar Credits multiplier earlier under certain circumstances.

Similarly, whilst the introduction of feed-in tariffs has supported increased installation rates for solar PV, recent changes announced by the NSW Government are likely to see installation rates fall below recent highs during the projection period. Further, several feed-in tariffs have pre-specified capacity ‘caps’ above which new applications may not be accepted: if this caps are reached and enforced as announced, installation rates can be reasonably expected to reduce further.

The inherent uncertainty when assessing changes of this kind leads to a broad range of projected outcomes from this analysis.

2.3 Survey

In addition to a review of the ORER data and public information on government assistance policies and other factors relevant to the take-up of STC-eligible technologies, ACIL Tasman has undertaken a brief survey of industry participants to assess their views on key supply-side factors that could affect STC creation rates.

The issues on which the survey sought participants’ views were broadly:

- Changes in the underlying (wholesale) cost of solar PV systems and SWHs
- The causes of any changes in wholesale cost
- Whether suppliers felt that particular constraints would affect their ability to respond to a significant increase in demand if one were to occur
- The supplier’s outlook for demand for their products.

The small size and low response level of the survey (25 businesses were approached, with seven responses received reflecting nine different companies) has meant that ACIL Tasman has placed only limited weight on the survey findings in developing this projection (with much greater weight placed on the analysis of historical data and our assessments of the effect of policy changes). However, qualitatively the responses were helpful for testing whether there were issues that ACIL Tasman was not aware of that were likely to materially affect take-up rates and ‘sense-checking’ our projections.

The methodology of the survey and an overview of outcomes are set out in Appendix C.

2.4 Estimation of STC creation rates

Although the drivers of take-up rates for SGUs and SWHs are quite different and REC creation rates for these two groupings have diverged quite significantly in recent times, some common methodological issues arise.

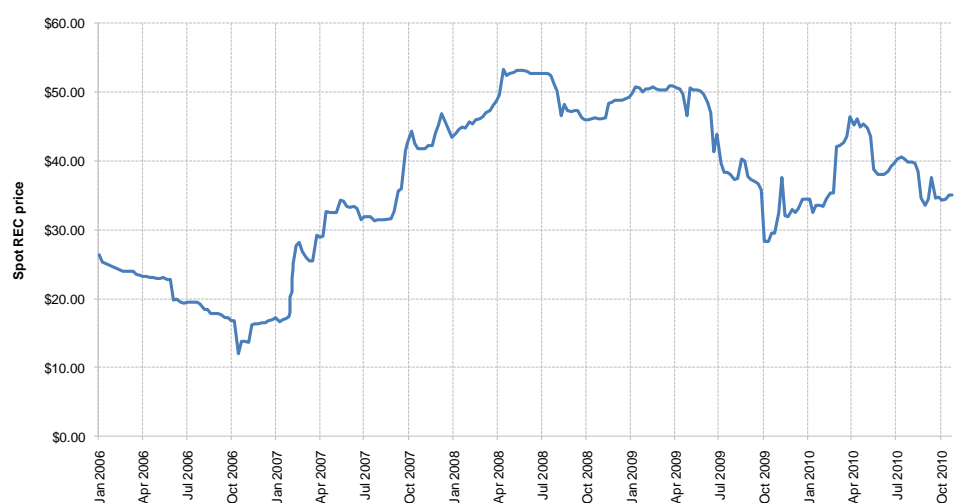
2.4.1 REC prices vs STC price

In transitioning from the RET to the SRES on 1 January 2011, STC-eligible technologies will no longer create RECs with a variable and uncertain price, but will now create STCs that can be sold to buyers for a fixed price of \$40 (\$44 including GST) through the Government clearing house (subject to the operating conditions of the clearing house). Market participants will also have the option of buying and selling STCs outside of the clearing house, which will likely occur at or just below a price of \$40 due to this 'default' price being available to buyers through the clearing house.

This transition has the potential to affect take-up rates, particularly in circumstances where traded REC prices are materially different to the \$40 STC clearing house price.

Current REC prices are quite close to \$40, with the Australian Financial Markets Association's Environmental Products Curve quoting a spot price for RECs of \$35.09 as of 28 October 2010. A longer history of REC prices is presented in Figure 1, illustrating that over the benchmarking period of this analysis REC prices have tended to vary either side of \$40.

Figure 1 **Historic REC prices 2006-2010**



Data source: AFMA Environmental Products Curve (mean of mids, excluding outliers).

The potential for a small step-change in assistance to STC-eligible technologies on 1 January 2011 has been considered in this analysis, but given the significant

changes to other assistance policies occurring at present and the recent history of REC prices varying both above and below \$40, ACIL Tasman considers that the effect of this change is likely to be fairly minimal.

To illustrate the magnitude of the change from a REC price of \$35 to the clearing house STC price of \$40, this would increase REC/STC assistance to a 1.5 kilowatt PV system in Sydney by around \$775 (from \$5,425 to \$6,200) and to an average sized SWH by around \$155 (from \$1,085 to \$1,240). However, this assistance for these hypothetical NSW systems is additional to other sources of assistance (described more fully below), in the order of \$900 for SWHs and potentially \$5,000 to solar PV (under the NSW Government's original 'Solar Bonus Scheme').

2.4.2 Transition to SRES

ACIL Tasman has had to consider the effect of the transition from the RET to the SRES in this projection. STC-eligible technologies that are installed up to and including 31 December 2010 will create RECs prior to 1 January 2011 and 'Large-scale Generation Certificates' or LGCs after 1 January 2011. LGCs are the equivalent of RECs in the current RET scheme, and all RECs in existence will become LGCs as of 1 January 2011. By contrast, when the same systems are installed after 1 January 2011 they will create STCs. Although it is beyond the scope of this analysis, transitional rules do 'blur the boundaries' of this distinction to some extent: where contracts for the supply of RECs are in place and extend into 2011, agents will have the option of creating LGCs rather than STCs.

Both RECs/LGCs and STCs can be created up to one year after installation. Accordingly, during 2011 both LGCs and STCs will be created in parallel, depending on the date of the installation in question: systems installed in 2010 will create LGCs, whilst those installed in 2011 will create STCs. However, the creation of LGCs from STC-eligible technologies is beyond the scope of this analysis even when it occurs in 2011: this projection focuses exclusively on STC creation rates for 2011, 2012 and 2013. ACIL Tasman was also requested by ORER to ignore the potential for contracts to lead to the creation of LGCs by installations that physically occur in 2011. ORER will consider this issue in its estimate of the small-scale technology percentage, rather it being captured through this projection.

Further, this transition makes historical REC creation rates difficult to use to discern likely STC creation rates early in 2011. The typical lag present in REC creation data will not be present in STC creation data in the first instance: it will take some months for STC creation rates to 'ramp up' as there will be no backlog of installations that are eligible to create STCs but for which the paperwork has not yet been processed.

Accordingly, to properly use historic REC creation records to discern likely STC creation rates, ACIL Tasman has focused on physical installation rates (i.e. the date on which installations occur) rather than historic REC creation rates (i.e. the date on which RECs are created).

This methodology allows us to ‘see through’ the REC creation data to look at the underlying installation rate (which more directly reflects market conditions at a given time). We can also look at the size and other characteristics of these installations to see the ‘REC/STC creation potential’ of activity in a given period, regardless of when the RECs/STCs for that period were actually created.

Once the underlying installation rates are discerned and projected, further assumptions about the likely lag in STC creation rates are then laid over the installation to pick up the once-off effect of transitioning to the SRES. The broad effect is that 2011 STC creation rates will be lower than implied by that year’s installation rates, as installations from late 2010 will create LGCs rather than STCs. This is not true of 2012 and 2013: installations physically occurring late in the preceding years will create STCs in 2012 and 2013 and be captured in our STC creation projection for those years.

One final point is relevant: because of recent and significant changes in installation rates for SGUs in particular, it is necessary to look at as recent a data set as possible. However, looking at underlying installation rates is problematic up until one year after a given period is finished, as RECs/STCs can be created up to a year after the physical installation occurs.

Accordingly, ACIL Tasman has often focused on the number of installations that create RECs within a certain number of days, generally 30 or 60: this data allows historic data to be meaningfully compared to data from months as recent as July or August 2010. Whilst this complicates an analysis of underlying installation rates, the rapid underlying changes occurring in the SGU market in particular make this complication both necessary and fruitful.

3 Take up of SGUs

Although this projection is of STC creation by all SGUs, the historic portion of REC creation by micro-hydro and micro-wind generators is sufficiently small that one can focus entirely on trends in the solar PV sector to discern likely future rates of STC creation.

This is illustrated by comparing the total rate of installations, REC creation and capacity installed by the three SGU types, as set out in Table 1.

Table 1 **Micro-wind, micro-hydro and solar PV comparison**

Technology	Installations	RECs created	Capacity installed (kW)
Micro-hydro	12	575	20
Micro-wind	293	10,997	769
Solar PV	183,029	13,213,979	298,390

Data source: ORER.

Accordingly, the discussion below generally uses the terms SGU and solar PV interchangeably, and trends analysed are exclusively through reference to solar PV policy settings.

3.1 Assistance to SGUs

Government assistance available to SGUs, particularly solar PV, has increased rapidly over the past two or three years, and is now reaching a point where reductions in the level of assistance are occurring or highly likely to occur. In ACIL Tasman's opinion, the changing level of support available is the single largest factor affecting the rate of take-up of STC-eligible technologies, and we expect this will remain the case over the projection period. Not surprisingly, the inherent uncertainty surrounding potential changes to government policies, as well as the difficulty in isolating the impacts of recent changes, contributes significantly to the large uncertainty bounds on our estimate of STC-creation rates for 2011, 2012 and 2013.

A detailed description of the various Commonwealth and state/territory level subsidies to SGUs is provided in Appendix A.

The key changes and their relevance for this analysis are highlighted below.

3.1.1 Commonwealth assistance to solar PV

Commonwealth Government assistance to small-scale solar PV has changed materially in the last 18-36 months.

Following the November 2007 federal election, the new Commonwealth Government implemented its election commitment to increase the assistance available to solar PV from a maximum of \$4000 to \$8000. The rebate was available for installed capacity of up to 1 kilowatt (meaning that installations of 1 kilowatt or more received the maximum rebate). The rebate was delivered through a program known as the Solar Homes and Communities Plan (SHCP).

From 13 May 2008 the rebate was subject to a means-test preventing households with an annual taxable income of \$100,000 or more from taking the rebate. The increasing popularity of this rebate and associated budgetary cost led to its cancellation as of 9 June 2009. The rebate was replaced with a new form of assistance delivered through the existing RET scheme known as 'Solar Credits'.

Since the inception of the RET scheme, solar PV units have been able to create RECs to reflect their expected generation over their operating life, thereby offsetting some of the cost of installing the unit. The Solar Credits scheme allowed the first 1.5 kilowatts of capacity of each SGU installation to create five RECs, known as 'Solar Credits', in place of every one REC those units of capacity would previously have been able to create. Importantly, access to Solar Credits was not means-tested.

In the context of this analysis, the transition from the SHCP to the Solar Credits policy has had three primary effects:

- System size has increased reflecting that the SHCP rebate was only available for capacity up to 1 kilowatt, whereas Solar Credits are available for capacity up to 1.5 kilowatts
- The removal of means-testing has expanded access to the subsidy
- The SHCP delivered assistance through budget-funded rebates, whilst Solar Credits delivers assistance in the form of RECs or, in the future, STCs: accordingly, the change from the SHCP to Solar Credits will have a larger impact on REC/STC creation than it will have on installation rates as it directly multiplies the number of RECs/STCs created by a given number of installations. These two reinforcing impacts must be considered and combined for this projection.

3.1.2 State and territory feed-in tariffs

All state and territory governments in Australia have implemented or are considering 'feed-in tariffs' for small scale solar PV units.

A feed-in tariff entitles a household or business that installs a small-scale PV unit to earn a premium rate for the electricity they export to the grid (i.e. 'feed in' to the grid). This premium rate subsidises the installation of PV units by offsetting the owner's up-front cost of purchasing a system more rapidly than

if they were simply being paid the standard retail rate for electricity for their exported electricity. Notwithstanding their name, some feed-in tariffs work on a ‘gross’ basis, where all electricity generated by the unit receives the premium rate, not just that which is fed in to the grid. This is a more generous arrangement for the owner and results in the unit’s up-front capital cost being paid back faster. More typically feed-in tariffs operate on a ‘net’ basis where the unit owner only receives the feed-in tariff on the amount of electricity exported to the grid (i.e. not including household consumption).

A summary of major state and territory feed-in tariffs is provided in Table 2 below.

Table 2 **Major Australian solar PV feed-in tariffs**

Jurisdiction	Basis	Rate (cents/kWh nominal)	Scheme start	Tariff paid until	Availability to new applicants
NSW	Gross	60	1 January 2010	December 2016	Closed
	Gross	20	28/10/2010	December 2016	Applications capped at 300 MW
Victoria	Net	60	1 November 2009	October 2024	Applications capped at 100 MW
Queensland	Net	44	1 July 2008	June 2028	Uncapped
South Australia	Net	54	1 July 2008	June 2028	Applications capped at 60 MW
Western Australia	Net	47 or 58.94*	1 August 2010	10 years from installation	Uncapped
ACT	Gross	45.7	1 March 2009	20 years from installation	Applications capped at 15 MW

* 47 cents/kWh applies for customers in the Synergy supply area; 58.94 cents/kWh applies in the Horizon supply area. These rates are subject to change.

Note: Scheme settings as of 22 October 2010, i.e. prior to NSW changes to the Solar Bonus Scheme, but incorporating SA and ACT scheme changes

Key recent changes include the establishment of a gross feed-in tariff in New South Wales on 1 January 2010, and its subsequent scaling back to a 20 cents/kWh rate as of 27 October 2010; the introduction of net feed-in tariffs in Victoria (as of 1 November 2009) and Western Australia (as of 1 August 2010); an increase to the South Australian feed-in tariff premium as of 31 August 2010; and a change to the ACT feed-in tariff rate as of 1 July 2010.

ACIL Tasman’s analysis indicates that the effective level of assistance provided to owners of household-scale PV units (e.g. 1.5-2.5 kilowatts) is generally less than that presently available under the Solar Credits scheme. However, in combination the two assistance policies both reduce the up-front cost and enhance the ongoing return of a solar PV system, and our analysis indicates

that take-up rates are far higher where feed-in tariff arrangements work in combination with the Solar Credits assistance. In other words, whilst the Solar Credits policy is usually more generous in absolute terms, feed-in tariffs are the ‘icing on the cake’ that support rapid increases in take-up rates. This is detailed more fully in section 3.2.1 and Appendix A (Section A.3).

Feed-in tariffs also appear to have contributed to an average increase in the size of PV installations. Whilst the level of assistance under Solar Credits, per kilowatt, decreases significantly above the 1.5 kilowatt level, a constant feed-in tariffs is generally available for installations of up to 5 kilowatts or more (depending on the scheme in question): given the economies of scale in installation, this gives households a significant incentive to install additional panels and increase the overall size of their PV system.

3.2 Key historical trends

ACIL Tasman’s primary data source for analysing historical trends has been a comprehensive database of REC creation by SGUs since 2001 provided by ORER. The data provided was current as of 30 September 2010.

Based on this data, ACIL Tasman considers that the level of government subsidies available to households installing solar PV systems has had and will continue to have the single largest impact on the take-up rate of STC-eligible technologies.

However, our analysis of the historical data provided by ORER indicates that the effect of policy changes is quite lagged and interacts with other factors in a complex manner. In most states, the absolute level of subsidy has not changed since January 2010, but installation rates have increased substantially since that time, reflecting a general trend towards lower system costs and other factors.

For example, a key reason for this lagged effect is likely to be the time taken for system suppliers to overcome logistical issues and ramp-up installation rates to meet the underlying increase in demand (for example, increasing unit orders, recruiting and training staff to undertake installations and improving back-office processes to handle higher installation rates). Another contributing factor is likely to be the gradual increase in consumer awareness of the subsidies available, reinforced by a combination of advertising (reflecting the ramp-up of the supply-side) and word of mouth (for example as neighbours and friends have had systems installed).

A further underlying factor may be increasing public awareness of climate change as an issue (including as a result of political and media discussion) and a corresponding desire of individuals to make a personal contribution to reducing greenhouse gas emissions.

Whilst these high level trends have significantly impacted installation rates in recent times, the level of REC/STC creation is ultimately a product of five variables:

- Installation rates
- Installation size
- Solar Credits multipliers and eligibility limits
- Deeming periods¹
- Location of installations.

ACIL Tasman has looked at each of these components in isolation to build a bottom up picture of REC creation rates. This is important because, for example, REC creation rates have increased at a much higher rate than installation rates because of increasing take up of Solar Credits (as eligibility for the SHCP phases out): understanding the movements of the different components is critical to understanding the underlying trend.

3.2.1 Installation rates

ACIL Tasman's analysis indicates that installation rates of PV units have increased strongly right up until, and including, the most recent data available.

However, given the lag between when a unit is installed and when RECs are first created for a unit, the underlying data must be analysed carefully to correctly discern underlying trends. RECs are able to be created up to one year after the installation of an eligible SGU system. Accordingly, ORER's REC creation data is not able to give a complete picture of 'on the ground' installations rates in a given period until a year after the end of that period. Given the changes that have occurred in the last year, relying on data from mid to late 2009 is not likely to give an accurate picture of what is occurring now, and what is likely to occur in 2011.

To allow for a meaningful analysis of the most recent data available, ACIL Tasman has focused on the number of installations where RECs have been created within 30 or 60 days of installation. This allows reasonably robust comparisons to be made between data from July and August 2010 and data from earlier months. However, this comparison could be misleading if there has been an underlying change in the speed with which agents process the paperwork to create RECs.

Table 3 shows national installation rates for each month since January 2009, both in absolute terms, and comparing installations where RECs were created

¹ RECs/STCs for SGUs and SWHs can be created up-front by 'deeming' in advance the likely level of output of the system over a future period. This period can be 1, 5 or 15 years.

within 30 and 60 days (to allow comparison with more recent months). The reader may note that the percentage of installations creating RECs within 30 or 60 days tends to increase in recent periods: this is because more recent installations that will ultimately create RECs more than, say, 150 days after installation have, by definition, not yet done so. Put another way, when looking at a period of time that started less than 60 days ago, 100% of observed REC creation will occur within 60 days. As further REC creation occurs, this percentage will fall to the true level. Accordingly, the reader should note that the numbers in red in the table below can be misleading: these percentages must decrease as further RECs are created by installations undertaken in those months.

Table 3 SGU installations rates

Month	Installs (total)	Installs (RECs created within 60 days)	% of installs with RECs created within 60 days	Installs (RECs created within 30 days)	% of installs with RECs created within 30 days
January 2009	2,173	1,714	79%	1,374	63%
February 2009	2,991	2,276	76%	1,850	62%
March 2009	3,580	2,810	78%	2,287	64%
April 2009	3,431	2,653	77%	2,161	63%
May 2009	4,086	3,159	77%	2,456	60%
June 2009	4,351	3,310	76%	2,307	53%
July 2009	5,172	3,581	69%	2,461	48%
August 2009	5,725	3,828	67%	2,843	50%
September 2009	6,264	3,945	63%	2,700	43%
October 2009	7,760	5,289	68%	3,256	42%
November 2009	9,165	5,808	63%	4,020	44%
December 2009	7,939	4,975	63%	2,672	34%
January 2010	8,220	6,053	74%	3,979	48%
February 2010	10,000	7,753	78%	5,650	57%
March 2010	12,633	10,124	80%	7,310	58%
April 2010	12,361	10,676	86%	8,157	66%
May 2010	14,627	13,209	90%	10,333	71%
June 2010	15,268	14,421	94%	10,932	72%
July 2010	-	13,843	-	10,894	-
August 2010	-	-	-	10,635	-

Note: The red figures for 'Installs (RECs created within 60 days)' and 'Installs (RECs created within 30 days)' are potentially misleading, as the full year of REC creation data is not available.

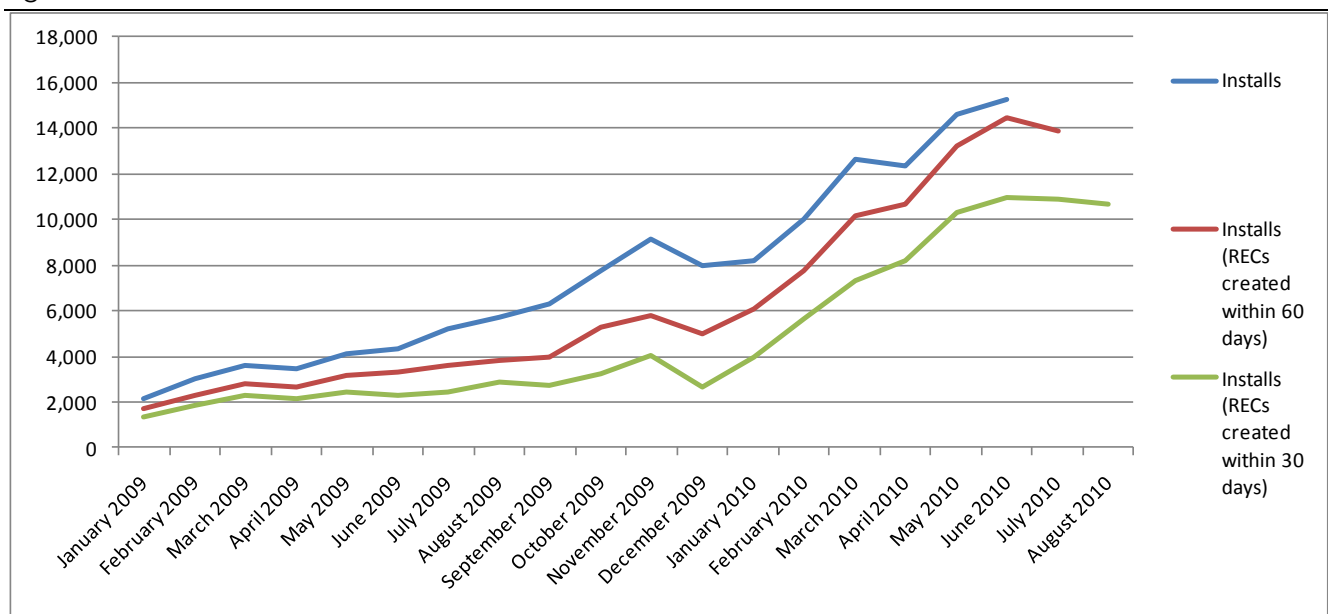
Note: Total installations data for July and August 2010, and data on 'Installs (RECs created within 60 days)' for August 2010, has been removed as it could be misleading to compare this data with the same data from earlier months.

Data source: ORER.

The data in Table 3 suggests that the percentage of installations that have RECs created within 60 days in recent months could be as low as 60%: the figures for September, November and December 2009 of 63% must decrease further as REC creation occurs during the corresponding months of 2010. The underlying trend appears to be one of an increased lag between installation and REC creation as installation rates have increased. Similarly, the portion of installations where RECs are created within 30 days appears to be falling even faster, and could be as low as 30% or less based on observations from December 2009.

This same data is shown graphically in Figure 2 below, illustrating how comparing absolute installation rates tends to underestimate the recent acceleration of up-take: the number of installations where RECs are created within 30 or 60 days has accelerated extremely rapidly since the start of 2010.

Figure 2 **SGU installation rates**



Note: Total installations data for July and August 2010, and data on 'Installs (RECs created within 60 days)' for August 2010, has been removed as it could be misleading to compare this data with the same data from earlier months.

Data source: ORER

As discussed above, data from late 2009 suggests that, if anything, processing of REC creation paperwork by agents is slowing: this would tend to further exacerbate the trend beyond that suggested by Figure 2. Given this, there is clear evidence of a significant acceleration in installation rates since January 2010. For example, the number of installations where RECs are being created within 60 days is higher for every single month between March and August 2010 inclusive than the absolute rate of REC creation for every month prior to and including February 2010.

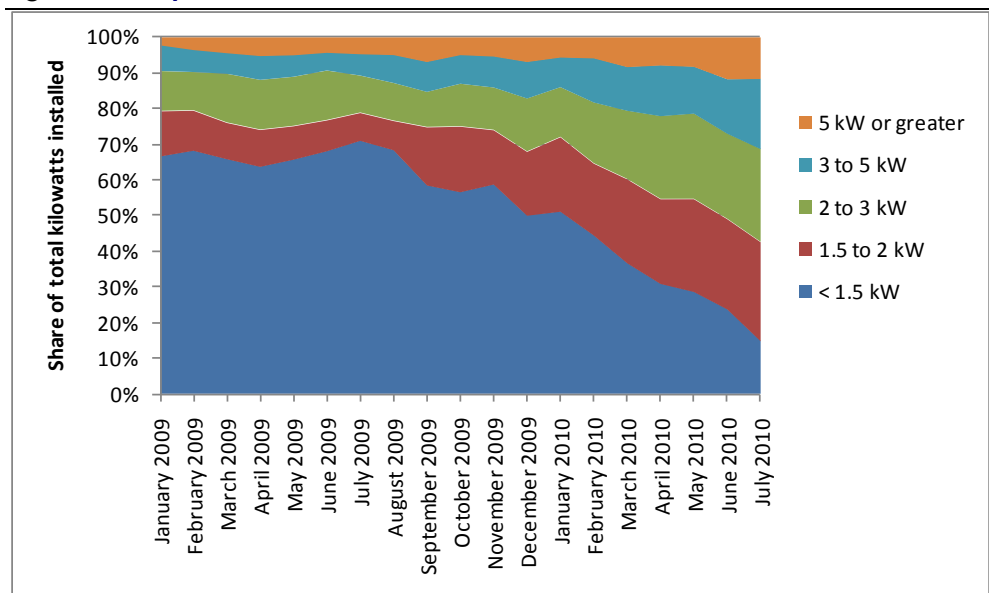
While the level of uncertainty is high, there is evidence of a levelling off of installation rates over the period May-August 2010 although this must be treated with caution given the incomplete data set available for these more recent periods. Installations with RECs created within 30 days, which is almost fully comparable over this period, has levelled off at around 10,000/month. It is relevant to note, however, that, given the portion of installations where RECs are created within 30 days could be as low as 30%, this rate could imply a total installation rate of up to 25,000/month depending on the underlying speed with which RECs are being created after installation (which cannot be fully assessed until a year has passed).

3.2.2 System size

A distinct change in PV system size has emerged since the middle of 2009. The change from the SHCP to the Solar Credits policy has seen a strong increase in the rate of installation of systems of 1.5 kilowatts or more. As the maximum SHCP rebate was available for all systems of 1 kilowatt or more (i.e. increasing system size above 1 kilowatt did not attract a higher rebate), a higher portion of installations had previously been around 1.1-1.2 kilowatts in capacity.

There have been steady increases in the total capacity installed coming from all systems sizes above the 1.5 kilowatts level, as illustrated in Figure 3.

Figure 3 **System size trends**



Data source: ORER

However, the average size of all systems above 1.5 kilowatts has not changed materially: the dominant trend appears to be a reduction in systems of less than 1.5 kilowatts, rather than a disproportionate increase in the number of very large systems. These results are set out in Table 4

Table 4 **System size trends - 2010**

Month	Average system size	Systems above 1.5 kW	Average size of systems above 1.5 kW
	(kW)	(%)	(kW)
January 2010	1.4	27%	2.3
February 2010	1.5	33%	2.4
March 2010	1.6	40%	2.4
April 2010	1.7	49%	2.3
May 2010	1.7	53%	2.3
June 2010	1.9	57%	2.4
July 2010	2.1	70%	2.4
August 2010	2.2	78%	2.4

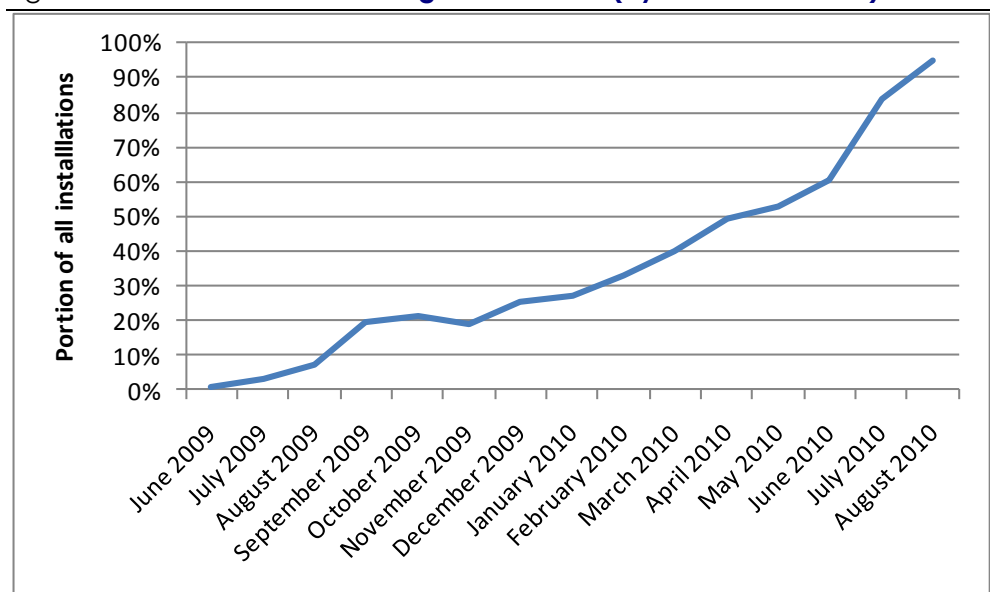
Data source: ORER.

3.2.3 Uptake of Solar Credits

As set out in Appendix A, transitional arrangements for the SHCP provided that applications for that program that were received by the Government on or before 9 June 2009 were processed. These installations are not eligible to also create Solar Credits.

As a result, physical installations were occurring up to 31 July 2010 and still receiving the SHCP rebate rather than Solar Credits. As these pre-approved SHCP installations have been completed, the portion of solar PV installations receiving Solar Credits has steadily increased, as shown in Figure 4.

Figure 4 **Installations receiving Solar Credits (by installation date)**



Data source: ORER.

3.2.4 Deeming periods

Solar Credits are only able to be created once, whether for a deemed period of one year, five years or 15 years, strongly discouraging the use of one year and five year deeming periods. This is reflected in the historical data: since the start of 2010, the portion of all SGUs opting for 15 year deeming periods has averaged 99% in each month.

3.2.5 Location of installations

Over time the RET has seen a gradual increase in the take-up of SGUs in areas with lower solar irradiation (Zones 3 and 4 as provided by the *Renewable Energy (Electricity) Regulations 2001*, rather than the sunnier Zones 1 and 2).

Increases in subsidies also appear to be supporting an increased drift of installations to regions where the solar conditions are less favourable. However, the effect of this trend on the analysis is likely to be fairly minor and is best accounted for by looking at trends on a state by state basis: most states have over 95% of their installations in a single zone.

3.2.6 Overall trends

In combination, these key trends have resulted in a significant increase in REC creation rates over June-August 2010 when compared with the same period a year earlier. Whilst installation rates have increased strongly (the number of installations creating RECs within 30 days has increased around four-fold), the increasing take-up of Solar Credits and the increasing size of installations has seen REC creation increase to a far higher extent again, as is shown in Table 5 (this is an 'implied' rate of REC creation for June-August 2010, as complete data is not yet available due to the lag in REC creation).

Table 5 also demonstrates the variation in trends at the state level, reflecting the different assistance measures in each jurisdiction.



Table 5 Indicative rate of REC creation: June-August 2009 vs June-August 2010

Jurisdiction	Period (June to August)	Installs/ month	% installs creating RECs within 30 days	Installs creating RECs within 30 days/month	Average install size (kW)	Solar Credits take-up	Zone breakdown	RECs/ install	RECs/month (implied totals for 2010)
New South Wales	2009	1,128	52%	584	1.3	5%	97% Zone 3	31	34,908
	2010	N/A	N/A	4,158	2.3	86%	98% Zone 3	153	1,223,283
Queensland	2009	1,673	40%	665	1.2	4%	100% Zone 3	29	48,312
	2010	N/A	N/A	2,812	1.9	81%	98% Zone 3	135	948,978
Victoria	2009	622	40%	248	1.2	5%	84% Zone 4	25	15,457
	2010	N/A	N/A	1,512	1.6	58%	96% Zone 4	90	340,294
Western Australia	2009	872	69%	605	1.3	1%	96% Zone 3	27	23,391
	2010	N/A	N/A	1,358	2.0	81%	96% Zone 3	140	275,624
South Australia	2009	623	62%	385	1.4	6%	97% Zone 3	34	21,063
	2010	N/A	N/A	799	2.0	70%	98% Zone 3	127	163,758
Tasmania	2009	95	27%	25	1.2	1%	100% Zone 4	22	2,036
	2010	N/A	N/A	75	1.5	29%	100% Zone 4	57	15,809
ACT	2009	58	34%	20	1.6	13%	100% Zone 3	47	2,739
	2010	N/A	N/A	90	2.2	74%	100% Zone 3	137	36,123
Northern Territory	2009	12	39%	5	3.5	28%	78% Zone 2	120	1,436
	2010	N/A	N/A	16	1.9	52%	85% Zone 2	117	4,746
AUSTRALIA TOTAL	2009	5,083	50%	2,537	1.3	4%	86% Zone 3, 13% Zone 4	29	149,341
	2010	N/A	N/A	10,820	2.0	77%	82% Zone 3, 16% Zone 4	134	3,008,615

Note: "Implied" REC creation was estimated by scaling up the number of 2010 installs in which RECs had been created within 30 days by the % of such installs in the equivalent 2009 period, and then multiplying the implied number of installs by the 2010 average number of RECs per install.

Data source: ORER; ACIL Tasman analysis

3.3 Projection assumptions

The state level variations in installation and REC creation trends demonstrates the potential for changes in the operation of government assistance policies over the projection period, including new policy announcements and the implementation of pre-announced limits on the scope of some policies, to affect this projection.

However, historical installation and REC creation rates have also been affected by a range of factors other than changes to government assistance schemes, and these factors will continue to affect take-up rates over the projection period.

Other factors considered by ACIL Tasman in this analysis are:

- Changes in the underlying cost of solar PV systems
- The impact of labour availability and other supply-side constraints on installation rates
- The potential for saturation of the market segment of households most likely to install solar PV systems (i.e. owner-occupied detached dwellings, with a willingness and ability to invest money upfront to save money over time).

3.3.1 Changes to SRES policy settings

For the purpose of this analysis, ORER requested ACIL Tasman to consider two broad scenarios in relation to SRES policy settings:

- Under one scenario, representing ACIL Tasman's upper estimate of STC creation, the Solar Credits multiplier was applied as provided by the current *Renewable Energy (Electricity) Regulations 2001*
- Under the lower STC-creation scenario, ACIL Tasman was requested to assume that ORER would exercise the power it is proposed to be afforded under draft regulations², whereby it can make a determination under defined 'reduction circumstances' that triggers a reduction in the Solar Credits multiplier from 1 July 2011 (although the draft regulations afford ORER the power to change the multiplier earlier than this).

The assumed multipliers under the various time periods are set out below.

² Consultation draft, Renewable Energy (Electricity) Amendment Regulations 2010; <http://www.climatechange.gov.au/government/submissions/renewable-energy-target/consultation-ret-regulations.aspx>

Table 6 **Assumed Solar Credits multiplier**

Scenario	To 30 June 2011	1 July 2011 to 30 June 2012	1 July 2012 to 30 June 2013	1 July 2013 onwards
Upper estimate	5	5	4	3
Lower estimate	5	4	3	2

Data source: ORER.

3.3.2 Changes to feed-in tariffs

The NSW Government's announcement of changes to its Solar Bonus Scheme on 27 October 2010 illustrates the potential for changes in government policy on feed-in tariffs and other assistance measures to materially affect this projection.

The NSW Government has provided that consumers who have purchased or leased a PV system, or entered into a binding agreement to do so, before 27 October 2010 are able to apply to receive the 60 cents/kWh gross feed-in tariff by 18 November 2010. ACIL Tasman has assumed that an elevated rate of installations will continue to physically occur for sometime after the deadline for applications, reflecting that binding agreements to purchase a system may take some time to be effected.

Therefore, it is likely that installation rates in NSW may remain at elevated levels into the early part of the projection period as these installations physically occur.

ACIL Tasman has assumed for both its upper and lower estimates that the NSW Government makes no further material changes to its Solar Bonus Scheme.

Reflecting the drivers of the NSW Government's announcement, particularly budgetary pressures, ACIL Tasman has factored in the possibility of similar policy changes in other jurisdictions. Reflecting the uncapped nature of the schemes in Queensland and Western Australia, ACIL Tasman has considered the possibility that these jurisdictions could also close their schemes at some point in the projection period. Noting the inherent uncertainty of this issue, ACIL Tasman assumed that eligibility for both schemes would not cease until the middle of 2011 at the earliest, and this assumption is reflected in our lower estimate (our upper estimate assumes that these schemes continue unchanged).

3.3.3 Feed-in tariffs 'capping out'

The Victorian, South Australian and ACT feed-in tariffs have announced capacity caps for their schemes: once this cap is reached, the feed-in tariff may no longer be available for new applicants³.

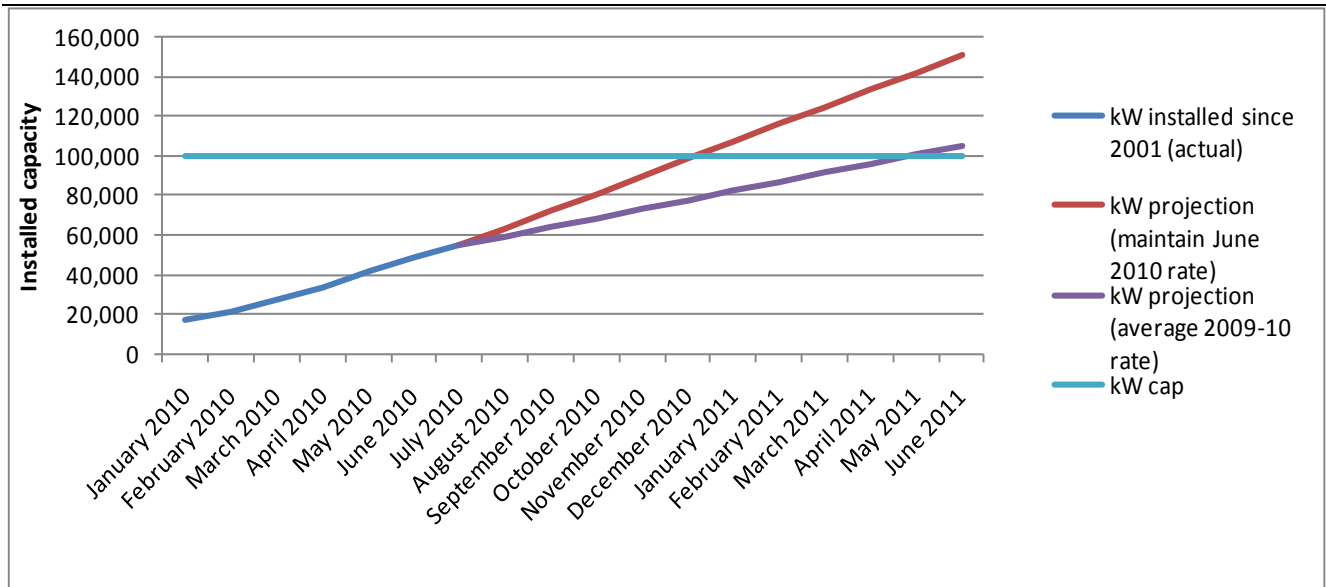
ACIL Tasman has analysed the likely timing of these caps being reached in the absence of policy changes from those governments. For the purpose of this analysis, average 2009-10 and June 2010 installation rates were calculated by assuming that 60% of all installations create RECs within 60 days. The Victorian and SA feed-in tariffs are available to installations undertaken before the schemes started: accordingly we have assumed that all eligible system owners have signed up to the feed-in tariff. Average capacity per installation has been maintained at June 2010 levels for the projection period.

Notwithstanding these simplifying assumptions, our analysis indicates that it is highly likely that the Victorian scheme will 'cap out' at some point in the first half of calendar 2011: if the average 2009-10 installation rate is maintained, the cap is reached around May 2011, whilst if the June 2010 installation rate is maintained the cap would be likely to be reached by January 2011. It should also be noted that applications may actually be closed before this date as our analysis focuses on when installations physically occur, not on when commitments to purchase or applications to join feed-in tariff schemes are made: applications to enter the feed-in tariff scheme are likely to exceed 100 MW before actual installed capacity reaches that level, due to the lag between commitment to purchase and installation. The likelihood of total installations reaching the cap is illustrated in Figure 5.

³ In the case of Victoria, the Minister has discretion to declare a 'scheme capacity day', but may choose not to do so. South Australia and the ACT have not yet passed legislation implementing scheme caps.



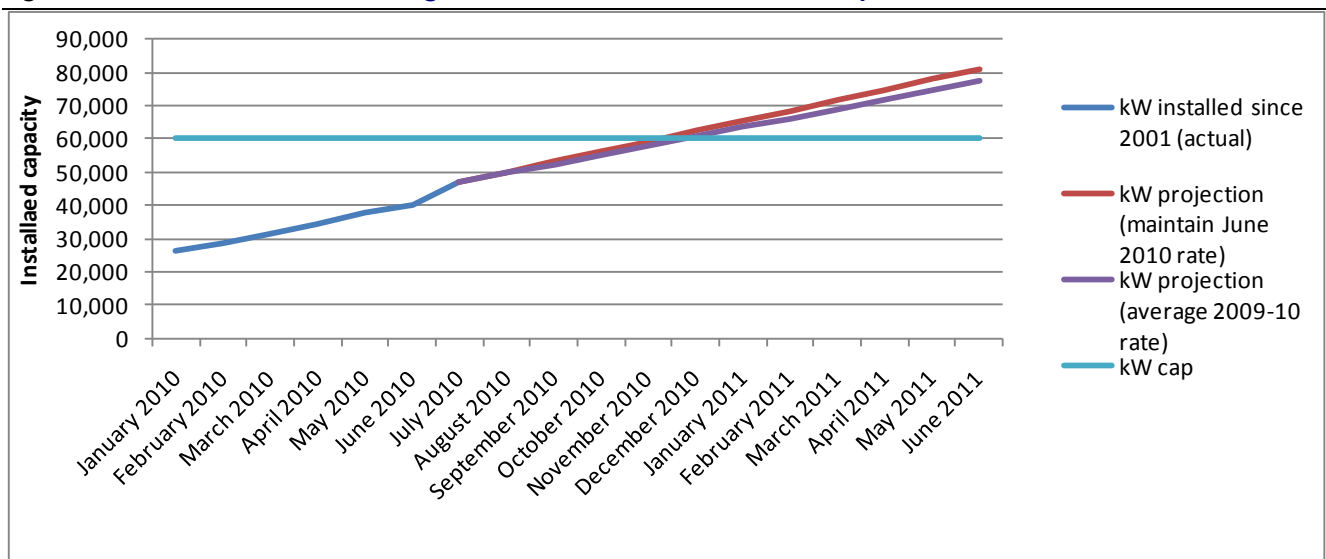
Figure 5 **Likelihood of reaching Victorian feed-in tariff cap**



Source: ACIL Tasman analysis

There is an even greater likelihood of the South Australian cap being reached in the near-term. Our analysis suggests that the June 2010 installation rate in South Australia is similar to the average over 2009-10, and under either of these assumed installation rates the cap is likely to be reached around December 2010 (i.e. before the projection period commences).

Figure 6 **Likelihood of reaching South Australian feed-in tariff cap**

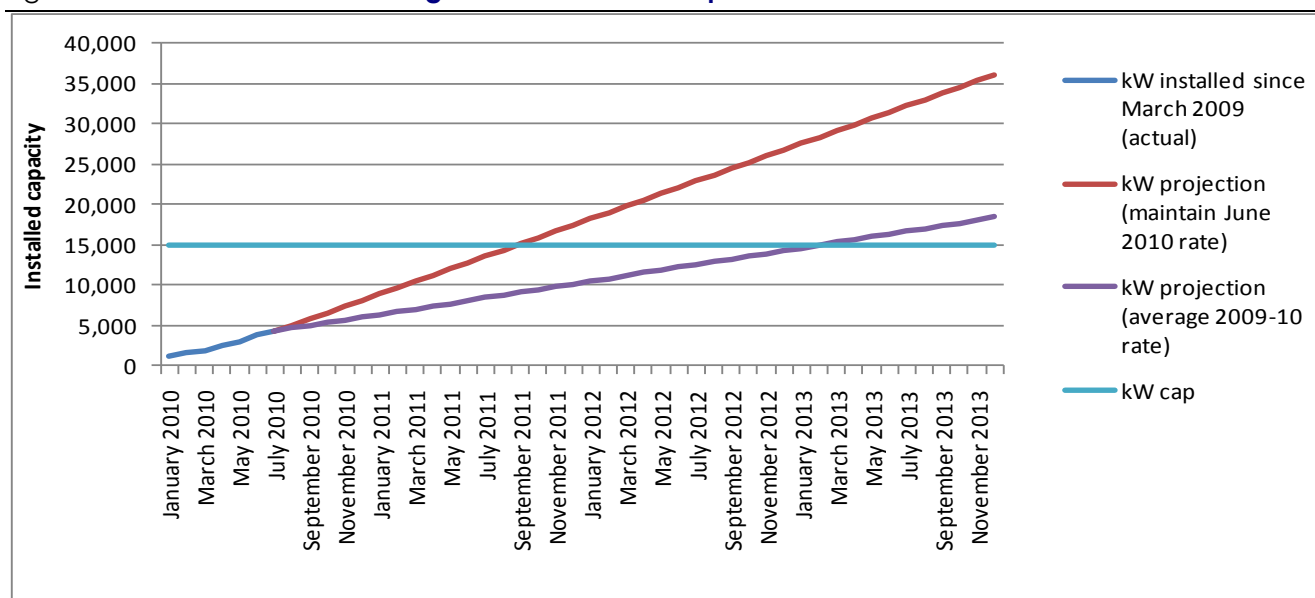


Source: ACIL Tasman analysis

Whilst our analysis suggests that the ACT feed-in tariff has more 'headroom' than the Victorian and South Australian schemes, continuation of present

installation rates will see the cap reached around the middle of 2011. This is illustrated in Figure 7.

Figure 7 **Likelihood of reaching ACT feed-in tariff cap**



Source: ACIL Tasman analysis

Given the uncertainty in how governments will react to the reaching of their pre-specified caps, ACIL Tasman has made the following assumptions in relation to each jurisdiction:

Table 7 **Assumptions in relation to capped feed-in tariffs**

Jurisdiction	Upper estimate assumption	Lower estimate assumption
Victoria	Cap relaxed to 150 MW	100 MW cap enforced
South Australia	Cap relaxed to 90 MW	60 MW cap enforced as announced
ACT	15 MW cap enforced as announced	15 MW cap enforced as announced

Data source: ACIL Tasman analysis.

3.3.4 Change in underlying cost

Whilst PV systems have reduced in cost significantly since mid 2008, the extent of reduction since mid 2009 is not as pronounced in US dollar terms⁴. However, since early 2009 the Australian dollar has strengthened considerably, contributing to further underlying reductions in the cost of imported solar PV systems to Australian wholesalers and consumers. The combination of

⁴ AGL submission to the Queensland Competition Authority, 13 October 2010, p.10: <http://www.qca.org.au/files/ER-NEP1112-AGL-Submission-1010.PDF>.

lowering US dollar costs through late 2008 and early 2009, and the weakening Australian dollar through the same period, means that Australian consumers only experienced a step-change reduction in cost of solar PV systems from around mid 2009 onwards, which has supported an underlying increase in installations since that time.

ACIL Tasman's survey of industry participants supported a general view that reducing material costs and economies of scale would see solar PV costs continue to reduce. However, the survey also identified several competing cost trends, which could result in either increases or decreases in underlying system costs over the projection period.

In particular, survey results suggested that exchange rates could affect costs and installation rates in either direction: two suppliers considered that exchange rate movements would support reductions in system cost, whilst two suppliers considered the opposite. Given the inherent uncertainty in this area, the current strength of the Australian dollar and the fact that data from the 2009-10 benchmark period largely captures the effect on system cost of an AUD/USD exchange rate of around 0.9, ACIL Tasman considers that it would be difficult to attribute significant upside to solar PV installation rates as a result of further exchange rate movements. Further, one supplier noted the re-emergence of tightness in the international market for PV systems: this could cause increases in the wholesale purchase cost of systems.

Given these uncertainties, ACIL Tasman's projections are based on an assumption of modest underlying reductions in system costs from present levels as a result of continuing economies of scale and manufacturing enhancements being partially offset by the risk of supply tightness at the wholesale level. This modest rate of decline in system costs supports take-up rates being maintained at high levels compared to mid 2009 and earlier, but does not suggest that further step-change increases in installation rates are likely as a result of dramatic cost reductions.

3.3.5 Labour constraints

The success of the industry in ramping up installation rates to meet underlying demand and the trend towards reducing government assistance for solar PV systems suggests that labour availability or other supply-side constraints are not likely to constrain or reduce projected installation rates in this analysis. In fact, given the investment by suppliers in ramping-up their capacity, the short-term story (e.g. in NSW) is more likely to be one of over-capacity reflecting the response of suppliers to ramp-up to meet demand from previous policies, rather than one of under-capacity. This may increase competition amongst suppliers and installers, resulting in lower profit margins and lower costs to consumers.

This conclusion was supported by the industry survey: only two of seven solar PV considered that supply constraints could affect their ability to meet growth in demand, and the two that did acknowledge this risk considered the prospect of low to moderate likelihood.

3.3.6 Saturation

ACIL Tasman has also analysed the potential for saturation of the entire household market for solar panels. This potential can be considered in a fairly simple way by assuming that only households living in owner-occupied detached dwellings would consider installing solar panels⁵. A comparison of the number of such households with the total number of solar PV installations since the commencement of the original MRET scheme can give a high level indication of this potential (whilst this ignores the installation of solar PV on commercial buildings, analysing this issue at this further level of detail is only necessary if the preliminary analysis indicates a real potential for saturation to occur over the projection period).

As the data in Table 8 shows, this analysis indicates a very limited potential for saturation of the potential PV market over the projection period. Throughout Australia it is likely that less than 4% of all households living in owner-occupied separated houses have installed solar PV. The actual level is likely to be significantly lower than the 4.1% estimate calculated in Table 8, as some installations will be on commercial buildings rather than private dwellings., Further, our methodology is likely to under-estimate of the number of owner-occupier households in separate houses as we implicitly assume that separate houses are equally likely to be owner-occupied as other dwellings, whereas in practice renters are more likely to live in semi-detached dwellings or apartments.

⁵ There are limited incentives for installations to occur on investment properties (as tenants receive the benefit of reduced electricity bills and feed-in tariffs) and practical limitations upon installations with townhouses/units.

Table 8 **Potential for saturation of potential PV market**

Jurisdiction	Occupied private dwellings	Separate houses	Owner-occupied	ACIL Tasman estimate of owner-occupied separate houses	Total solar PV installations since 1/1/2001	Solar PV installs as a % of owner-occupied separate houses
	(000s)	(%)	(%)	(000s)	(000s)	(%)
NSW	2,724	71.4%	67.5%	1,313	46.9	3.6%
Victoria	2,036	82.2%	71.0%	1,188	32.8	2.8%
Queensland	1,662	80.4%	65.4%	874	46.4	5.3%
SA	653	80.9%	70.3%	371	22.5	6.0%
WA	840	80.9%	67.8%	461	26.7	5.8%
Tasmania	202	89.9%	71.3%	130	3.1	2.4%
NT	70	73.2%	56.0%	29	0.8	2.6%
ACT	134	78.6%	70.9%	75	2.4	3.2%
Australia	8,320	78.1%	68.2%	4,439	181.6	4.1%

Data source: Australian Bureau of Statistics, Australian Social Trends (Housing), catalogue number 4102.0, December 2009; ORER.

Whilst the number of households that have the personal commitment and financial means to invest in solar PV systems is likely to be only a sub-set of the estimated 4,439,000 households identified above, the authors consider that the portion is likely to be sufficiently higher than 4% so as to not materially affect this analysis. However, ACIL Tasman has assumed that the gradual saturation of high-income and environmentally conscious households will contribute to a gradual decline in system size over the projection period.

3.4 Projection results

Given the uncertainty and potential for changes over even a short projection period, ACIL Tasman has considered an upper and lower estimate of the level of STC-creation over 2011.

As discussed in section 2.4.2, our methodology has required two steps to fully account for both the lag in STC creation after the actual installation of units, and for the transition from the creation of LGCs (for installations physically occurring up to and including 31 December 2010) to the creation of STCs (for installations occurring after that date).

As noted above, the transition from creating LGCs to STCs supports a focus initially on physical installation rates rather than on certificate creation rates because a portion of the certificates created in, say, January 2011 will be RECs (and therefore outside the scope of this analysis), whilst a portion will be STCs. We have focused purely on STC creation by looking at likely physical

installation rates in January 2011 and beyond, and then adjusting for the lag in STC creation.

3.4.1 Assumed installation rates

Projected installation rates for SGUs change significantly between our upper and lower estimates, with the extent of variation assumed for each state depending on the assumed changes to and generosity of various feed-in tariff schemes (as set out in sections 3.3.2 and 3.1.2 respectively).

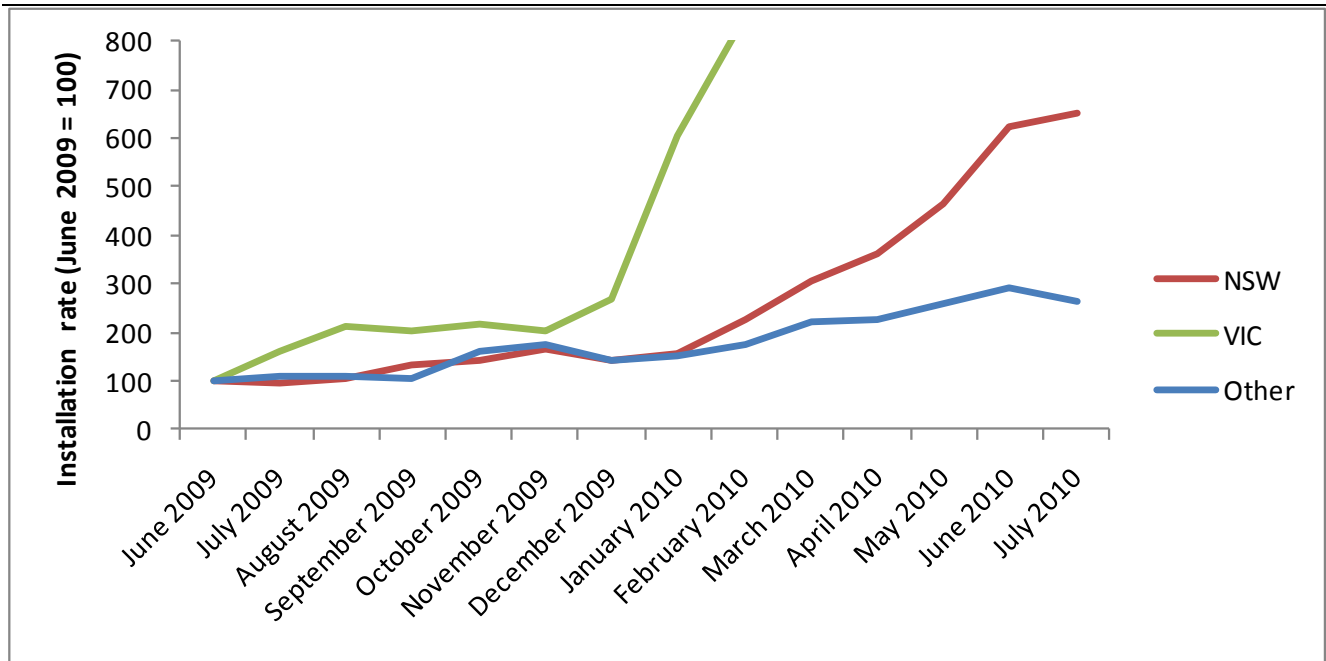
Our analysis of the historic REC creation data indicates that, when NSW and Victoria are excluded, the rate of installations in all other Australian states have increased around three-fold from June 2009 to July 2010 inclusive. For these jurisdictions, this increase has occurred in the absence of significant changes to their feed-in tariff regimes (the Queensland and SA feed-in tariffs were in operation but unchanged over this entire period, whilst WA, Tasmania and the NT had no significant feed-in tariffs over the same period). The ACT's tariff experienced a minor change in July 2010, but not sufficient to materially change the validity of the above observation.

This tripling of installations is in contrast to the significant increases in NSW and Victoria, which both introduced feed-in tariffs over this period. Around November 2009, the time its feed-in tariff was introduced, Victoria's take-up rate diverges strongly from the trend, peaking at around sixteen times the June 2009 rate of installation before reducing to be just over eight times that level. Similarly, around January 2010, NSW's take-up rate diverges strongly, exceeding six times the June 2009 take-up rate in June and July 2010.

These observations, illustrated in Figure 8 below, suggest that changes to feed-in tariff schemes can have material impacts on take-up rates.



Figure 8 Impact of feed-in tariffs on installation rates



Data source: ORER.

This analysis also indicates that when the impact of changes to feed-in tariff policy settings are set aside, a range of other factors including reducing underlying unit costs (particularly in Australian dollar terms), increasing prices of conventional grid-supplied electricity, increasing consumer awareness of pre-existing subsidies, increased advertising, supplier 'ramp up' to meet demand and increasing willingness of consumers to purchase solar PV units (potentially as a result of public concerns on the issue of climate change) has resulted in an underlying approximate three-fold increase in the take-up of solar PV units.

Significant increases beyond this rate appear to result from the introduction of feed-in tariffs on top of these underlying drivers.

This insight substantially informed ACIL Tasman's assumptions when assessing the level of installation that would be likely to remain sustainable once feed-in tariffs are removed or reach their caps, as is anticipated over the projection period for NSW, Victoria, South Australia and the ACT, or when this is assumed to occur in Queensland and Western Australia.

To illustrate, for jurisdictions where feed-in tariffs were not in place in June-August 2009 (e.g. New South Wales, Victoria and Western Australia) ACIL Tasman has assumed an installation rate that is slightly higher than three times the May-July 2009 average installation rate for the period when the Solar

Credits multiplier remains at 5 but when feed-in tariffs have ceased to be available for new applicants.

Once the Solar Credits multiplier has reduced to 4, 3 or 2, the average installation rate in these jurisdictions is assumed to be around the same as, or lower than, three times the May-June 2009 level.

However, in the case of South Australia and Queensland the pattern is rather different, reflecting the existence of feed-in tariffs in those jurisdictions prior to and during May-June 2009. Once South Australia's feed-in tariff is assumed to have reached its cap, installation rates reduce to less than May-June 2009 levels: effectively the loss of the feed-in tariff has been partly, but not fully, offset by ongoing reductions in system cost, increasing grid-supplied electricity prices and changes in consumer preference over the intervening period.

Similarly, in our lower estimate, where Queensland's feed-in tariff is assumed to be removed due to budgetary pressure, installation rates reduce to just under May-June 2009 levels.

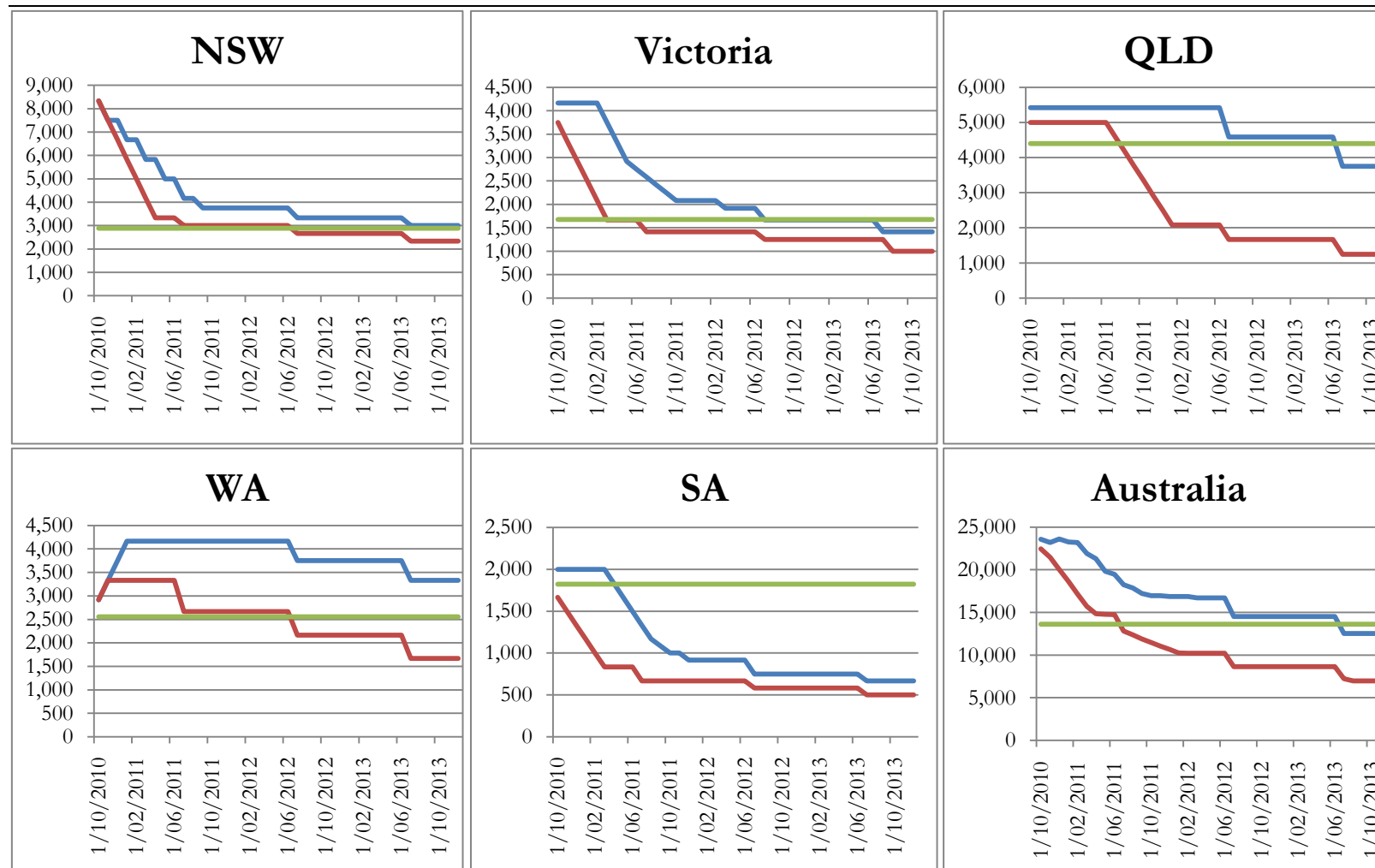
In each instance that the Solar Credits multiplier is reduced, installation rates are assumed to reduce (i.e. the decrease in the level of assistance is assumed to predominate over any potential reductions in wholesale system cost).

It is worth noting that solar PV suppliers generally considered that demand for their systems would increase through the projection period, in contrast to our assumptions. However, two points are relevant here. Firstly, the NSW Government's changes to its Solar Bonus Scheme were announced during the survey period. The last solar PV response received nominated changes to government assistance as leading to a reduction in demand, in contrast to two other responses. It is unclear whether the earlier respondents would have changed their responses in light of more recent information.

Secondly, respondents were asked to compare future demand levels with the period 2009-10. ACIL Tasman's assumed installation levels are low in comparison to the historically high installation rates of recent months, including the very end of 2009-10, but are high when compared with average 2009-10 levels. ACIL Tasman considers that the factors identified by respondents, including reducing system costs, rising electricity prices and increasing environmental consciousness will support these historically high ongoing installation rates, but are unlikely to result in further step-change increases in installation rates in the face of generally declining levels of government assistance. Assumed installation rates for key states and Australia as a whole are set out in Figure 9 below.



Figure 9 Assumed installation rates (units/month) in major jurisdictions



Note: Green lines on each chart mark the 'benchmark' of three times each region's average installation rate in May-July 2009. Blue lines mark ACIL Tasman's upper estimate, and red lines mark ACIL Tasman's lower estimate of installation rates. Periods displayed are October 2010-December 2013 inclusive, i.e. they include the three months prior to the projection period.

Data source: ACIL Tasman analysis.

3.4.2 System size

ACIL Tasman's observations from the historical data suggested that the proportion of installations above 1.5 kilowatts is strongly linked to the level of support available under the Solar Credits policy. Therefore, as multipliers were reduced over the projection period, ACIL Tasman also assumed that the proportion of systems of 1.5 kilowatts or greater would reduce, reflecting a drift back towards systems of 1-1.2 kilowatts.

Average system size for systems above 1.5 kilowatts appears to be primarily linked to the availability and generosity of feed-in tariff regimes. Accordingly, where feed-in tariffs were assumed to reach their caps or be discontinued, ACIL Tasman assumed that the average size of systems 1.5 kilowatts or greater would tend to reduce (generally to around 2 kilowatts).

This assumption could be seen to be in contrast to most survey respondents, who generally expected system size to continue to increase. As mentioned in relation to installation rates, however, recent changes to government policies may not be fully taken into account in the survey responses. Further, our assumptions imply system sizes that are high when compared with average 2009-10 levels, but lower than recent historic highs, as so are still broadly consistent with survey responses.

3.4.3 Solar Credits policy settings

Solar Credits policy settings affect STC creation rates in several ways:

- The multiplier affects the number of STCs each installation can create, directly affecting STC creation rates
- The multiplier also affects the level of assistance available to consumers and therefore installation rates, indirectly affecting STC creation rates
- Solar Credits eligibility and other policy settings can also affect installation and STC creation rates.

As described in section 3.4.1, ACIL Tasman has factored in the effect of changes to the Solar Credits policy on installation rates. Our calculations of likely STC creation rates also pick up the direct effect of the chosen multiplier in any given period.

In terms of eligibility, the analysis in section 3.2.3 suggests that close to 100% of SGU installations will receive Solar Credits over the projection period. The portion of systems ruled to be ineligible (e.g. due to participation in the National Solar Schools Program or the Renewable Remote Power Generation Program) is sufficiently small to be within the bounds of error of the overall projection. Nevertheless, an assumption of 95% take-up was made to reflect

the potential for some reduction in STC creation as a result of over-lapping programs.

3.4.4 Deeming periods

Our analysis in section 3.2.4 has led the authors to assume 100% use of the 15-year deeming period throughout the projection period.

3.4.5 Location of installations

For the purpose of this analysis ACIL Tasman has assumed that the zonal location of installations in each state remain constant at the 2010 level over the projection period. These assumptions are set out below.

Table 9 **Location of 2010 solar PV installations**

Jurisdiction	Zone 1 installations	Zone 2 installations	Zone 3 installations	Zone 4 installations
	(%)	(%)	(%)	(%)
New South Wales	-	1	96	3
Victoria	-	-	5	95
Queensland	-	1	99	-
South Australia	-	1	98	1
Western Australia	-	3	96	1
Tasmania	-	-	-	100
Northern Territory	17	83	-	-
ACT	-	-	100	-

Data source: ORER

3.4.6 Results

These assumptions allow a direct calculation of the total pool of STCs that is likely to be created from installations physically occurring in each year of the projection period. However, some of the STCs from 2011 installations will not be created until 2012, some from 2012 installations will be created in 2013 and some from 2013 installations will be created beyond this projection period.

In the first instance, we set out in Table 10 our projections of the number of STCs that will ultimately be created by installations that will physically occur in each of the projection years (rounded to the nearest 10,000 STCs).



Table 10 **Projected STC creation by SGUs – based on year of physical installation**

	2011		2012		2013	
Jurisdiction	Upper estimate	Lower estimate	Upper estimate	Lower estimate	Upper estimate	Lower estimate
NSW	9,210,000	6,240,000	5,900,000	3,700,000	4,160,000	2,390,000
Victoria	4,590,000	2,410,000	2,640,000	1,510,000	1,760,000	950,000
Queensland	10,200,000	7,400,000	8,580,000	2,470,000	5,700,000	1,410,000
SA	2,670,000	1,330,000	1,380,000	810,000	920,000	510,000
WA	8,150,000	5,370,000	7,040,000	3,270,000	5,040,000	1,900,000
Tasmania	460,000	330,000	380,000	210,000	260,000	120,000
NT	180,000	150,000	150,000	90,000	90,000	50,000
ACT	520,000	460,000	250,000	120,000	150,000	70,000
Australia	35,980,000	23,690,000	26,320,000	12,180,000	18,080,000	7,400,000

Data source: ACIL Tasman analysis.

To adjust for lag in STC creation, ACIL Tasman has adopted lag factors based on the portion of installations that created RECs within a certain number of months over the period September 2008 to August 2009 (the most recent 12 month period of complete REC creation data). These lag factors were further adjusted (downwards) to reflect the apparent underlying slowing in REC creation rates evident during the period September-December 2009: these months do not have complete REC creation data available yet have a portion of RECs created within 60 days that is significantly lower than preceding months. As further RECs are created from installations in the September-December 2009 months, this portion will reduce further.

The lag factors adopted and comparisons with lag factors observed from historical data are set out in Table 11 below.

Table 11 **Assumed lag in STC creation over projection period**

Months (n)	Installations creating RECs/STCs in the n th month after installation			
	September 2008 – August 2009	September 2009 – January 2010	Assumed lag	Assumed lag (cumulative)
1	57.3%	42.3%	40%	40%
2	17.8%	24.0%	20%	60%
3	8.7%	12.7%	12%	72%
4	5.2%	7.9%	9%	81%
5	3.2%	5.3%	6%	87%
6	2.1%	3.1%	4%	91%
7	1.4%	1.9%	3%	94%
8	1.0%	1.1%	2%	96%
9	0.7%	0.8%	1%	97%
10	0.6%	0.4%	1%	98%
11	0.5%	0.3%	1%	99%
12	1.6%	0.2%	1%	100%

Data source: ORER; ACIL Tasman assumptions.

Allowing for lag has two major effects: the number of STCs created in 2011 is significantly lower than the amount that will ultimately be created by installations that occur in 2011; and given the declining underlying rate of installation, the amount of STC creation is higher in 2012 and 2013 than would be implied by the rate of installation in those years (reflecting a hangover from the higher rate of installation in 2011).

The end result of the calculated STC creation rates by installation date and the lag assumptions is set out in Table 12 below.

Table 12 **Projected STC creation by SGUs – based on year of certificate creation**

Jurisdiction	2011		2012		2013	
	Upper estimate	Lower estimate	Upper estimate	Lower estimate	Upper estimate	Lower estimate
NSW	8,080,000	5,520,000	6,250,000	3,950,000	4,400,000	2,570,000
Victoria	4,040,000	2,110,000	2,850,000	1,610,000	1,880,000	1,040,000
Queensland	8,630,000	6,610,000	9,040,000	2,960,000	6,100,000	1,550,000
SA	2,370,000	1,170,000	1,510,000	860,000	980,000	550,000
WA	6,890,000	4,690,000	7,350,000	3,550,000	5,320,000	2,080,000
Tasmania	390,000	290,000	410,000	230,000	270,000	130,000
NT	150,000	130,000	150,000	100,000	100,000	50,000
ACT	460,000	430,000	270,000	150,000	160,000	80,000
Australia	31,010,000	20,950,000	27,830,000	13,410,000	19,210,000	8,050,000

Data source: ACIL Tasman analysis.

The inherent uncertainty of this projection is reflected in the substantial bounds of the estimate: from 20.95 to 31.0 million STCs for 2011.

However, ACIL Tasman emphasises that the upper estimate is contingent on policy changes in Victoria and South Australia, namely a relaxation of the feed-in tariff caps in those jurisdictions. Similarly, the lower estimate is lowered by the assumption of policy changes in Queensland and WA to close their feed-in tariffs to new entrants from mid 2011.

Therefore, the bounds of uncertainty can be narrowed to a best estimate for 2011 consisting of the mid-point of the upper and lower estimates for NSW, Tasmania, NT and the ACT, the lower estimates for Victoria and SA (i.e. assuming no policy changes) and the upper estimates for Queensland and WA (i.e. also assuming no policy changes), with all numbers rounded to the nearest 100,000. This method delivers a point 'best' estimate of 26.4 million STCs created in 2011.

Table 13 Best estimate of STC creation for 2011 (million STCs)

NSW	VIC	QLD	SA	WA	TAS	ACT	NT	AUST
6.8	2.1	8.6	1.2	6.9	0.3	0.4	0.1	26.4

Data source: ACIL Tasman analysis.

Estimates for 2012 and 2013 have higher bounds of uncertainty. ACIL Tasman understands that ORER intends to revisit these estimates closer to those years in light of more recent events.

The estimated range for 2012 and 2013 is largely driven by the following factors:

- In Queensland and Western Australia the upper estimate includes the continuation of their feed-in tariffs, whilst these tariffs are assumed to no longer be available before the start of 2012 in the lower estimate
- Changes to Solar Credits multipliers have a compounding impact on STC creation rates: in the lower estimate, a lower multiplier directly reduces STC creation as well as reducing installation rates and average installation sizes
- More conservative estimates about the sustainable rate of solar PV installation are made in the lower estimate, leading to divergence between the two estimates.

Using the same methodology as above, ACIL Tasman's best estimates of STC creation in 2012 and 2013 are set out in Table 14.

Table 14 Best estimate of STC creation for 2012 and 2013 (million STCs)

Year	NSW	VIC	QLD	SA	WA	TAS	ACT	NT	AUST
2012	5.1	1.6	9.0	0.9	7.4	0.3	0.2	0.1	24.6
2013	3.5	1.0	6.1	0.6	5.3	0.2	0.1	0.1	16.9

Data source: ACIL Tasman analysis.

4 Take-up of SWHs

4.1 Assistance to SWHs

Governments around Australia provide support to the take-up of SWHs in various forms, including:

- RECs/STCs
- Up-front rebates
- Regulations that limit the circumstances under which competing water heating technologies (particularly electric water heating) can be used.

A fuller description of the measures that impact SWH take-up rates is provided in Appendix B. However, the key impacts are briefly summarised here.

The Commonwealth Government provides direct assistance to SWHs both through the value of RECs/STCs that can be created by these installations, and through its Solar Hot Water Rebate (SHWR). However, the absolute level of Commonwealth assistance has reduced in recent times due to a generally softening REC price since mid 2009 and a series of changes to the SHWR:

- In September 2009, the rebate for HPWHs was reduced from \$1600 to \$1000
- In February 2010 the rebate for HPWHs was further reduced to \$600
- In February 2010 the rebate for non-HPWHs was reduced from \$1600 to \$1000.

State and territory governments also provide various rebates to SWHs, but also to some competing technologies, particularly gas hot water systems. These rebates have varying eligibility conditions.

Another critical trend is the move by the Council of Australian Governments and the Ministerial Council on Energy to phase-out the use of electric resistance water heaters through the National Partnership Agreement on Energy Efficiency of July 2009.

Implementation of this agreement varies between jurisdictions but broadly involves the banning of the use of electric resistance water heaters in new-build detached or semi-detached dwellings where natural gas is available from 1 January 2010. Tasmania is not implementing this agreement due to the low greenhouse-intensity of its local electricity supply. South Australia and Queensland have already extended the measures to replacement water heaters, as is envisaged for (but not implemented in) in other jurisdictions.

4.2 Key historical trends

REC creation from SWHs has declined substantially since the middle of 2009, in part due to the changes to government assistance settings discussed above.

An important change that is not fully reflected in the ORER data due to its recent occurrence was the change to the RET legislation passed by the Commonwealth Parliament on 24 June 2010: amongst changes splitting the RET into the LRET and SRES schemes, this legislation also prevented the creation of RECs/STCs by air source HPHWs of over 425 litres capacity (effective immediately).

This change was made in response to the strong take-up of large commercial HPHWs at (with RECs factored in) extremely low cost.

This change means that, in future, individual installations are unlikely to create more than 60 RECs/STCs. Accordingly, ACIL Tasman has assumed future installation rates by examining historic data ***excluding all installations creating 60 RECs or above***, effectively controlling for this policy change. All tables and data discussed below only consider SWHs that created less than 60 RECs.

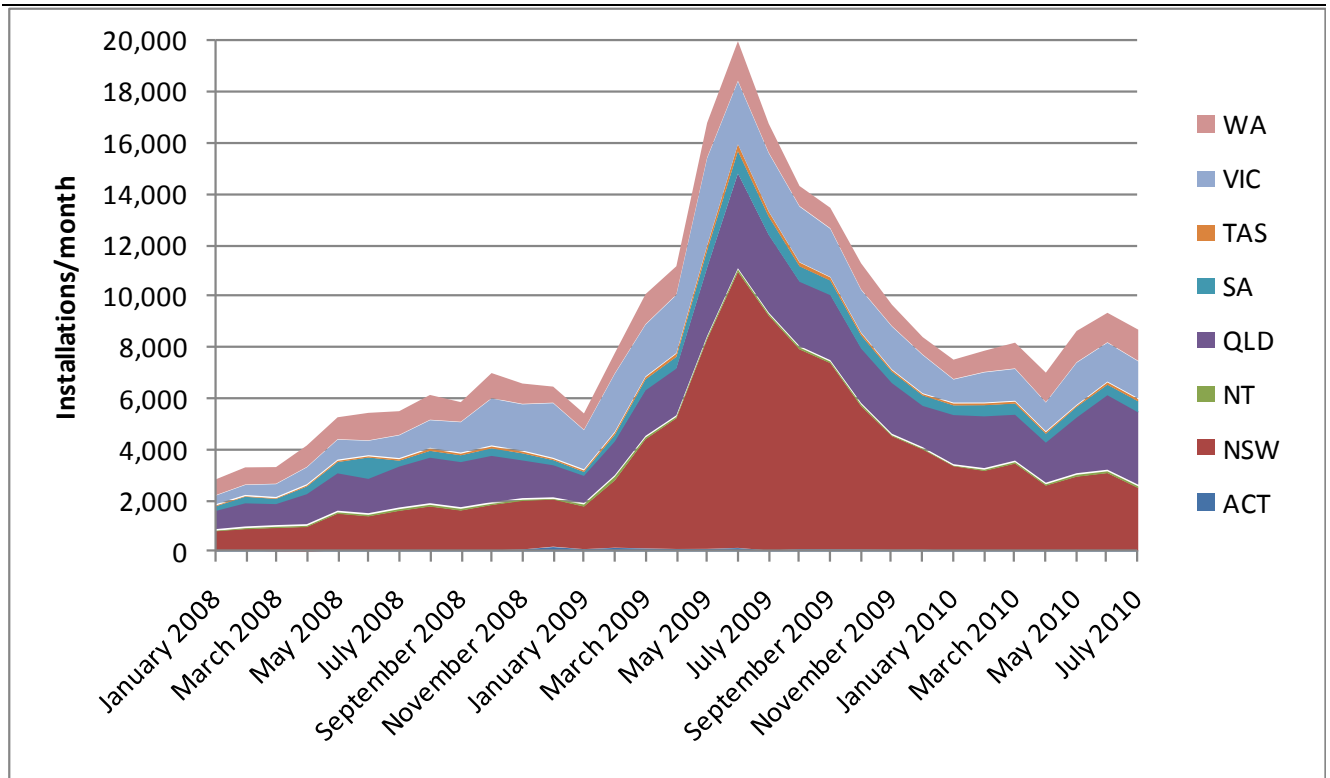
Even controlling for this change, there has been a material decline in the installation rate and REC creation rate by smaller SWHs since mid 2009. This is illustrated in Figure 10, which looks only at installations where RECs are created within 60 days (to allow a proper comparison between more recent data and data from 2009), and where the RECs created are less than 60 per installation.

This reduction is likely to result from declining rebates for SWHs and a change in consumer preference towards installing solar PV: as increasing assistance levels and reducing system costs have made solar PV increasingly attractive, it appears that fewer households have invested the time and money to install SWHs.

Our industry survey also indicated generally increasing underlying unit costs for SWHs as a result of a range of factors (primarily material and labour for production). However, the sample size was too small to place significant weight on this observation.



Figure 10 SWH installation rates (less than 60 RECs/installation and RECs created within 60 days)



Data source: ORER.

An important trend to examine in relation to SWHs is the breakdown between installations in new buildings and those that replace existing water heaters. This dynamic is quite different to solar PV installations: almost all households have one working water heater, and so a 'stock replacement' analysis can give important insights into take-up rates (whether the stock is of new houses or of the replacement of water heaters in existing dwellings).

The importance of this dynamic is illustrated by the variation in the portion of new-build and replacement SWH installations in each state/territory.

Table 15 **Portion of SWH installations in new buildings**

Jurisdiction	Portion of SWH installations occurring in new buildings (January 2008 to June 2009)
New South Wales	9.0%
Victoria	48.2%
Queensland	44.1%
South Australia	16.7%
Western Australia	28.3%
Tasmania	12.7%
Northern Territory	27.1%
Australian Capital Territory	13.0%
Australian average	29.4%

Data source: ORER.

Accordingly, ACIL Tasman has analysed installations in new buildings separately from replacement installations in this projection.

4.3 Projection assumptions

4.3.1 RECs/STCs per install

The number of RECs created per installation has stayed fairly constant within the historical data set, particularly when large systems (over 60 RECs/installation) are excluded. Part of the reason for this is that SWHs are not able to create Solar Credits in the way SGUs are.

Accordingly, ACIL Tasman has adopted the average RECs/install for SWHs producing less than 60 RECs over the period January 2008 to June 2010 inclusive as the likely number of STCs per installation over the projection period, as set out in Table 16 below.

Table 16 **Assumed STCs/SWH installation**

Jurisdiction	RECs/install
New South Wales	31.0
Victoria	26.4
Queensland	29.5
South Australia	28.6
Western Australia	29.2
Tasmania	25.5
Northern Territory	27.0
Australian Capital Territory	30.0

Data source: ORER.

4.3.2 Installations in new buildings

As noted above, ACIL Tasman has considered new build and replacement installations separately to identify any underlying trends that may differ between the two. For example, replacement trends in Queensland and South Australia may diverge from recent history as new regulations banning the use of electric resistance water heaters in certain dwellings take effect, whereas other jurisdictions have not adopted similar regulations.

New build installation rates were derived from ORER data, which distinguishes between installations of SWHs in new buildings from those that replace existing units. We assumed that 60% of all installations create RECs within 60 days in order to derive implied installation rates for months since August 2009. This data, when compared to ABS data on housing completions over the period January 2008 to July 2010, allowed an up to date estimate to be made of the rate of SWH penetration in the new build market.

These estimates, and ACIL Tasman's associated assumptions, are set out in Table 17.

Table 17 **Assumed SWH penetration in new separate houses**

Jurisdiction	Implied SWH penetration in new buildings (Jan 2008 to July 2010)	ACIL Tasman upper estimate assumption	ACIL Tasman lower estimate assumption
New South Wales	24%	35%	25%
Victoria	48%	55%	50%
Queensland	49%	60%	50%
South Australia	12%	25%	15%
Western Australia	25%	30%	25%
Tasmania	7%	7%	7%
Northern Territory	54%	80%	55%
Australian Capital Territory	15%	25%	15%

Data source: ABS Building Activity publication (catalogue number 8752.0), various editions; ORER.

ACIL Tasman's upper estimates of SWH penetration in new buildings are generally higher than historic numbers reflecting the increasing impact of regulations banning the use of electric water heaters in most new detached houses. The rate of increase varied between jurisdictions:

- The increase in Victoria was modest, reflecting the wide availability of reticulated natural gas in that state
- The increase in Western Australia was also modest as this state has had mandatory standards banning the use of electric water heaters in place since September 2008

- No increase was assumed in Tasmania as electric water heaters are not banned in that state
- A significant increase was assumed in the Northern Territory due to the limited availability of reticulated natural gas in that jurisdiction.

Future new build rates in each state/territory were then estimated by reference to ABS housing completions and housing approvals data. Housing approvals data was used to give an indication of the likely rate of housing completions over coming months. However, given the potential for actual completion rates to vary materially over the projection period, upper and lower estimates of housing completions were adopted based on the range suggested by data since October 2007. However, the lowest completion rates were often discounted when determining a lower estimate completion rate, due to the unusual effect of the global financial crisis on this data set.

ACIL Tasman's new build assumptions (and ABS housing data for comparison) are outlined in Table 18.

Table 18 **Assumed monthly housing completions**

Jurisdiction	ABS average building approvals (private houses) – six months to August 2010	Maximum rate of building completions (October 2007 - June 2010)	Minimum rate of building completions (October 2007 - June 2010)	ACIL Tasman upper estimate assumption	ACIL Tasman lower estimate assumption
New South Wales	1,413	1,553	992	1,500	1,000
Victoria	3,247	3,642	1,938	3,500	2,250
Queensland	1,751	2,756	1,633	2,500	1,600
South Australia	742	870	649	850	700
Western Australia	1,569	1,664	1,119	1,600	1,300
Tasmania	189	235	160	220	160
Northern Territory	48	70	36	70	40
Australian Capital Territory	187	232	92	200	100

Note: Building completions data was converted from a quarterly figure to a monthly figure by dividing quarterly figures by three.

Data source: ABS Building Activity publication (catalogue number 8752.0), various editions; ABS Building Approvals publication (catalogue number 8731.0), various editions; ORER.

4.3.3 Installations of replacement water heaters

In relation to replacement water heaters, ACIL Tasman has adopted a range of installation rates reflecting the bounds of activity in the past six months (during

which time activity appears to have stabilised after responding to the reduction in various rebates available).

Higher replacement rates were adopted in Queensland and South Australia than in other jurisdictions, reflecting the application of water heater standards to replacement units in those states (under certain conditions, such as the type of dwelling and the availability of reticulated natural gas). In these states, the lower estimate exceeded the implied rate of installation from January to June 2010, whereas in other jurisdictions the range bounded the observations from recent data.

The rate of installation for replacement units is presented in Table 19 below.

Table 19 **Assumed replacement installations/month**

Jurisdiction	Average replacement unit installation rate Jan-July 2010 (implied)	ACIL Tasman upper estimate	ACIL Tasman lower estimate
New South Wales	4,152	5,714	3,571
Victoria	984	1,429	857
Queensland	3,040	4,286	3,571
South Australia	688	857	714
Western Australia	1,523	1,857	1,429
Tasmania	118	143	86
Northern Territory	88	129	86
Australian Capital Territory	117	143	100

Data source: ACIL Tasman analysis and assumptions using ORER data.

4.4 Projection results

Using these assumptions, ACIL Tasman derived the projection of ‘underlying’ STC creation from SWHs in Table 20, i.e. based on date of installation rather than date of creation.

Table 20 **Projected STC creation by SWHs – based on year of physical installation**

Jurisdiction	Upper estimate	Lower estimate
New South Wales	2,320,000	1,420,000
Victoria	1,060,000	630,000
Queensland	2,050,000	1,550,000
South Australia	370,000	280,000
Western Australia	820,000	610,000
Tasmania	50,000	30,000
Northern Territory	60,000	30,000
Australian Capital Territory	70,000	40,000
Australia	6,800,000	4,590,000

Note: Estimates rounded to the nearest 10,000.

Source: ACIL Tasman analysis.

As noted for SGUs, this underlying projection based on physical installation dates must be adjusted for the lag in STC creation to pick up the effect of both the transition from creating LGCs to STCs, and the delayed effect of changes in installation rates on STC creation rates.

ACIL Tasman has used the a similar methodology for estimating lag rates for SWH REC/STC creation as was outlined in section 3.4.6 for SGUs. However, observed lag rates for REC creation are slightly different than those for SGUs, as detailed in Table 21.

Table 21 **Assumed lag in STC creation over projection period**

Months (n)	Installations creating RECs/STCs in the n th month after installation			
	September 2008 – August 2009	September 2009 – January 2010	Assumed lag	Assumed lag (cumulative)
1	56.8%	51.0%	50%	50%
2	18.7%	19.8%	20%	70%
3	8.0%	10.6%	10%	80%
4	4.4%	5.7%	6%	86%
5	3.7%	3.9%	4%	90%
6	2.1%	3.1%	3%	93%
7	1.8%	2.1%	2%	95%
8	1.3%	1.4%	1.5%	96.5%
9	0.9%	1.1%	1%	97.5%
10	0.8%	0.8%	1%	98.5%
11	0.7%	0.4%	1%	99.5%
12	0.9%	0.2%	0.5%	100%

Data source: ORER; ACIL Tasman assumptions.

Applying these lag rates results in a lower estimate of STC creation in 2011 than in subsequent years: effectively there is no lagged certificate creation from

2010 in this year, as RECs are treated separately and excluded from this analysis.

Our projection of likely STC creation by SWHs for the projection period by creation month, taking into account this lag, is set out in Table 22.

Table 22 **Projected STC creation by SWHs – based on year of certificate creation**

	2011		2012		2013	
Jurisdiction	Upper estimate	Lower estimate	Upper estimate	Lower estimate	Upper estimate	Lower estimate
NSW	2,040,000	1,250,000	2,320,000	1,420,000	2,320,000	1,420,000
Victoria	930,000	550,000	1,060,000	630,000	1,060,000	630,000
Queensland	1,800,000	1,360,000	2,050,000	1,550,000	2,050,000	1,550,000
SA	320,000	250,000	370,000	280,000	370,000	280,000
WA	720,000	540,000	820,000	610,000	820,000	610,000
Tasmania	40,000	30,000	50,000	30,000	50,000	30,000
NT	50,000	30,000	60,000	30,000	60,000	30,000
ACT	60,000	40,000	70,000	40,000	70,000	40,000
Australia	5,960,000	4,050,000	6,800,000	4,590,000	6,800,000	4,590,000

Data source: ACIL Tasman analysis.

5 Conclusion

The inherent uncertainty of policy changes (and consumer responses to these changes) has resulted in a significant gap between the upper and lower estimates set out in the projection above. Where possible, potential government policy and other changes have been factored into the range of estimates (particularly with respect to feed-in tariffs), but these matters cannot be predicted with any certainty.

A further source of uncertainty include variations in the average lag in REC/STC creation (i.e. the elapsed time between installation and STC creation): changes that may already be occurring in this area may have resulted in the authors' drawing incorrect inferences from historical data as to recent and current trends, whilst changes in future will particularly affect the total level of STC creation in 2011 due to the transition from the RET to the SRES.

Other issues that can affect this projection include fluctuations in exchange rates, underlying changes in solar PV and SWH system costs and changing consumer attitudes to environmentally-friendly energy.

Notwithstanding these uncertainties, we consider the bounds of the estimates to have been calibrated through careful analysis of the 'first order' trends that have affected and will affect REC/STC creation by these energy sources, and so can be used with some confidence by ORER.

For completeness, we summarise the upper, lower and best estimates from our projection for each technology type (applying a simple average of upper and lower estimates to deliver a best estimate for SWH) in Table 23 below.

Table 23 **Summary of STC creation projections**

Year	Technology	Upper estimate	Best estimate	Lower estimate
2011	SGUs	31,010,000	26,400,000	20,950,000
	SWHs	5,960,000	5,005,000	4,050,000
	Total	36,970,000	31,405,000	25,000,000
2012	SGUs	27,830,000	24,600,000	13,410,000
	SWHs	6,800,000	5,695,000	4,590,000
	Total	34,630,000	30,295,000	18,000,000
2013	SGUs	19,210,000	16,900,000	8,050,000
	SWHs	6,800,000	5,695,000	4,590,000
	Total	26,010,000	22,595,000	12,640,000

Data source: ACIL Tasman analysis.

We remind the reader that the best estimate of STC creation by SGUs effectively assumes no major policy changes in relation to state/territory feed-



ACIL Tasman

Economics Policy Strategy

Small-scale Technology Certificates Data Modelling

in tariffs over the projection period. Whether this is in fact the most likely outcome is open for debate, but it is worth considering that extremes of both the upper and lower bound estimates rely to some extent on conscious decisions of governments to reduce or maintain the up-take of these technologies over the projection period.

A SGU assistance

A.1 Commonwealth Government assistance

A.1.1 RECs/STCs

The Renewable Energy Target (RET) and its successor scheme the Small-scale Renewable Energy Scheme (SRES) provides up-front assistance to purchasers of small-scale renewable energy technologies.

Purchasers of these systems are entitled to create certificates (RECs under the RET and Small-scale Technology Certificates, or STCs, under the SRES) which can be on-sold to recoup some of the cost of purchasing the system.

These certificates have value because the legislation underpinning the RET/SRES requires wholesale purchasers of electricity to purchase and acquit a certain number of certificates or pay a penalty.

The value of assistance values with the value of a certificate. Whilst the value of a REC is set by the market for these certificates, the Government has effectively fixed the price of STCs by allowing liable entities to purchase them from a Government-run clearing house at a price of \$40 (although STCs will be able to be traded outside the clearing house, and these prices may vary).

RECs/STCs effectively represent a notional amount of renewable electricity generation by a system. Therefore, the number of RECs/STCs that a solar PV system can create is set by reference to its location: where solar irradiation is higher, the level of generation of such a system is assumed to be higher, allowing it to create more certificates. Similarly, larger systems can create more RECs reflecting their greater generation capacity.

RECs/STCs can be created for many years in advance when a system is installed, rather than being created gradually over the life of the system. This process, known as ‘deeming’ because certificates are ‘deemed’ in advance in relation to given period of time, effectively turns an ongoing subsidy into an upfront subsidy. Most agents opt for the option of an up-front, once-only 15 year deeming period, but can also use ongoing yearly or five-yearly deeming periods.

The RET and SRES also allow owners of SGUs (or agents) to receive a bonus through what are known as ‘Solar Credits’. These credits allow solar PV systems to create five RECs/STCs for each one they would normally be entitled to create, for each unit of capacity of up to 1.5 kilowatts. Units of capacity over 1.5 kilowatts create RECs/STCs at the normal rate.

A.1.2 The Solar Homes and Communities Plan

In November 2007 the incoming Commonwealth Government changed the then Photovoltaic Rebate Program (later the Solar Homes and Communities Plan) to increase the rebate available from up to \$4000 per system to up to \$8000 per system (\$8/watt for up to 1 kilowatt). Receiving the SHCP rebate did not prevent the agent from also creating RECs for the installation.

Unlike the Solar Credits policy, the SHCP rebate was means-tested from 13 May 2008: households with an annual taxable income of greater than \$100,000 were not eligible.

This rebate was cancelled on announcement of the Solar Credits policy, with no further applications taken after 9 June 2009. However, transitional arrangements meant that system owners continued to receive the rebate for over a year from the policy change. Where applicants had committed to purchase a system prior to 9 June 2009 they continued to be eligible for the rebate regardless of whether the installation occurred after 9 June 2009. The Government implemented a firm deadline for installations of 31 July 2010, meaning that some installations were receiving the SHCP rebate up until July 2010.

Installations that received the SHCP rebate were not entitled to create Solar Credits.

A.2 State government assistance

A.2.1 New South Wales

On 27 October 2010 changes, the NSW Government announced significant changes to its feed-in tariff scheme, known as the Solar Bonus Scheme.

Due to the overwhelming popularity (and associated cost) of the scheme, the scheme was closed to new applicants immediately, other than customers who had already entered a binding agreement to purchase a system. Those customers were given until 18 November 2010 to apply to enter the Solar Bonus Scheme.

The earlier Solar Bonus Scheme was replaced with a 20 cents/kWh gross feed-in tariff. The effect of this reduction is illustrated in more detail in section A.3.

The initial Solar Bonus Scheme commenced on 1 January 2010 and made a feed-in tariff available for 7 years, i.e. until 31 December 2016.

The initial Solar Bonus Scheme operated as a gross-metered scheme (subject to metering capability) at a fixed (nominal) level of 60 cents/kWh, with eligibility

limited to systems of 10 kW or less and organisations that consume 160 MWh per year or less.

A.2.2 Queensland

The Queensland Government's feed-in tariff, also known as the Solar Bonus Scheme, commenced on 1 July 2008.

The feed-in tariff is legislated to remain available until 2028, and the Queensland Government has recently announced its intention to continue the feed-in tariff in its present form.

The Queensland Solar Bonus Scheme operates as a 'net' feed-in tariff at a fixed (nominal) level of 44 cents/kWh.

Eligibility is limited to systems of 10 kW or less, and organisations that consume 100 MWh per year or less.

A.2.3 Victoria

The Victorian Government's 'premium' feed-in tariff commenced on 1 November 2009.

The feed-in tariff is legislated to remain available for 15 years from commencement, i.e. until 31 October 2024.

The Victorian feed-in tariff operates as a 'net' feed-in tariff at a fixed (nominal) level of 60 cents/kWh.

Eligibility is limited to systems of 5 kW or less.

The feed-in tariff will cease being available to new applicants once total applications reach 100 megawatts⁶.

A.2.4 South Australia

The South Australian Solar Feed-in Scheme commenced on 1 July 2008 and will operate for 20 years from that date (i.e. until 30 June 2028).

On 31 August 2010, the South Australian Government announced an increase in the feed-in tariff from 44 cents/kWh to 54 cents/kWh (fixed nominal in both cases), effective immediately. These changes also involved limiting the availability of the tariff to only the first 45 kWh exported to the grid on any given day (implying an absolute maximum of 16.425 MWh/year).

⁶ http://new.dpi.vic.gov.au/data/assets/pdf_file/0008/16289/FiT-Fact-Sheet-Sept-09.pdf; accessed 22 October 2010.

The South Australian Government also announced a firm cap on the scheme, such that the feed-in tariff will not be available to new applicants once total applications reach 60 megawatts⁷.

A.2.5 Western Australia

The Western Australian Government's Feed-in Tariff Scheme commenced on 1 August 2010.

The feed-in tariff will be paid for 10 years from installation.

The WA feed-in tariff operates as a 'net' feed-in tariff at a fixed (nominal) level of 40 cents/kWh.

The Feed-in Tariff Scheme operates in combination with the Renewable Energy Buyback Scheme, which ensures that the value of the electricity generated is also paid by the retailer (in addition to the feed-in tariff). The rate offered under this scheme is current set at 7 cents/kWh for customers in the Synergy supply area, and 18.94 cents/kWh for those in the Horizon Power supply area (effectively regional WA).

Eligibility is limited to systems of 5 kW or less for Synergy customers and 30 kW for Horizon Power customers. .

The WA Government has not announced a cap on the scheme.

A.2.6 Australian Capital Territory

The Australian Capital Territory's feed-in tariff scheme commenced on 1 March 2009.

The initial 'Premium Price' under the scheme was set at 50.05 cents/kWh for systems of 10 kW or less, fixed for 20 years from installation. The ACT scheme operates on a gross basis, i.e. the Premium Price is earned for every unit of energy generated, not just those units that are exported to the grid. For systems of 10-30 kW, a rate of 40.04 cents/kWh was paid.

As of 1 July 2010 the feed-in tariff rate was changed to 45.7 cents/kWh through a determination by the responsible Minister⁸. This rate will remain in place for two years.

⁷ <http://www.climatechange.sa.gov.au/index.php?page=sa-s-solar-feed-in-scheme>; accessed 22 October 2010.

⁸ <http://www.legislation.act.gov.au/di/2010-42/current/pdf/2010-42.pdf>; accessed 22 October 2010.

On 13 September 2010, the ACT Government announced that it would cap the existing micro-generation category at 15 megawatts.

Different arrangements apply for larger scale installations.

A.2.7 Tasmania

Aurora Energy, the sole supplier of domestic electricity in Tasmania, buys back renewable energy generated by small-scale (less than 3 kW) installations at the retail price of electricity, effectively providing a net feed-in tariff equal to the retail price (presently around 20 cents/kWh).

A.2.8 Northern Territory

The Northern Territory Government offers some customers in Alice Springs a special net feed-in tariff to support the Alice Springs Solar City project. However, as the Alice Springs feed-in tariff is only available to existing participants in the Solar City project, its effect on future solar PV uptake rates in the NT is negligible.

A.2.9 State opposition statements

ACIL Tasman considered the position of state oppositions to feed-in tariffs to assess the potential for elections and other political events to affect STC creation rates.

The clearest position identified were those of the WA opposition, which argued that WA's feed-in tariff 'did not go far enough'⁹. This tends to indicate that political events are less likely to result in reducing the scope of this feed-in tariff, although the issue of budgetary cost remains.

A.3 Comparison of effective subsidies

The effective subsidy offered by the RET/SRES through RECs/STCs and through various feed-in tariffs varies for a range of reasons, including system size, system location and date of installation.

ACIL Tasman has analysed the effective subsidies available to consumers in NSW, Victoria, Queensland, SA and WA under their various feed-in tariffs (including prior to the 27 October 2010 changes in NSW) and under RET/SRES policy settings including a Solar Credits multiplier of 3, 4 and 5.

⁹ 'Broken promises as feed in tariff fails to deliver', media release by Kate Doust MLC, Shadow Minister for Energy, WA.

As the NSW (60 cents/kWh), Victorian and South Australian feed-in tariffs are expected to be closed or cap out before any change to the Solar Credits multiplier, these were only analysed against a Solar Credits multiplier of 5. NSW (20 cent/kWh), WA and Queensland feed-in tariffs were compared with the STC value using multipliers of 3 and 4.

All installations were assumed to be in Zone 3, other than in Victoria which was assumed to be in Zone 4. PV installations were assumed to earn the clearing house STC price of \$40/certificate.

Under a net feed-in tariff households were assumed to export 50% of their own generation. WA feed-in tariff assistance levels were calculated for customers in the Synergy supply area.

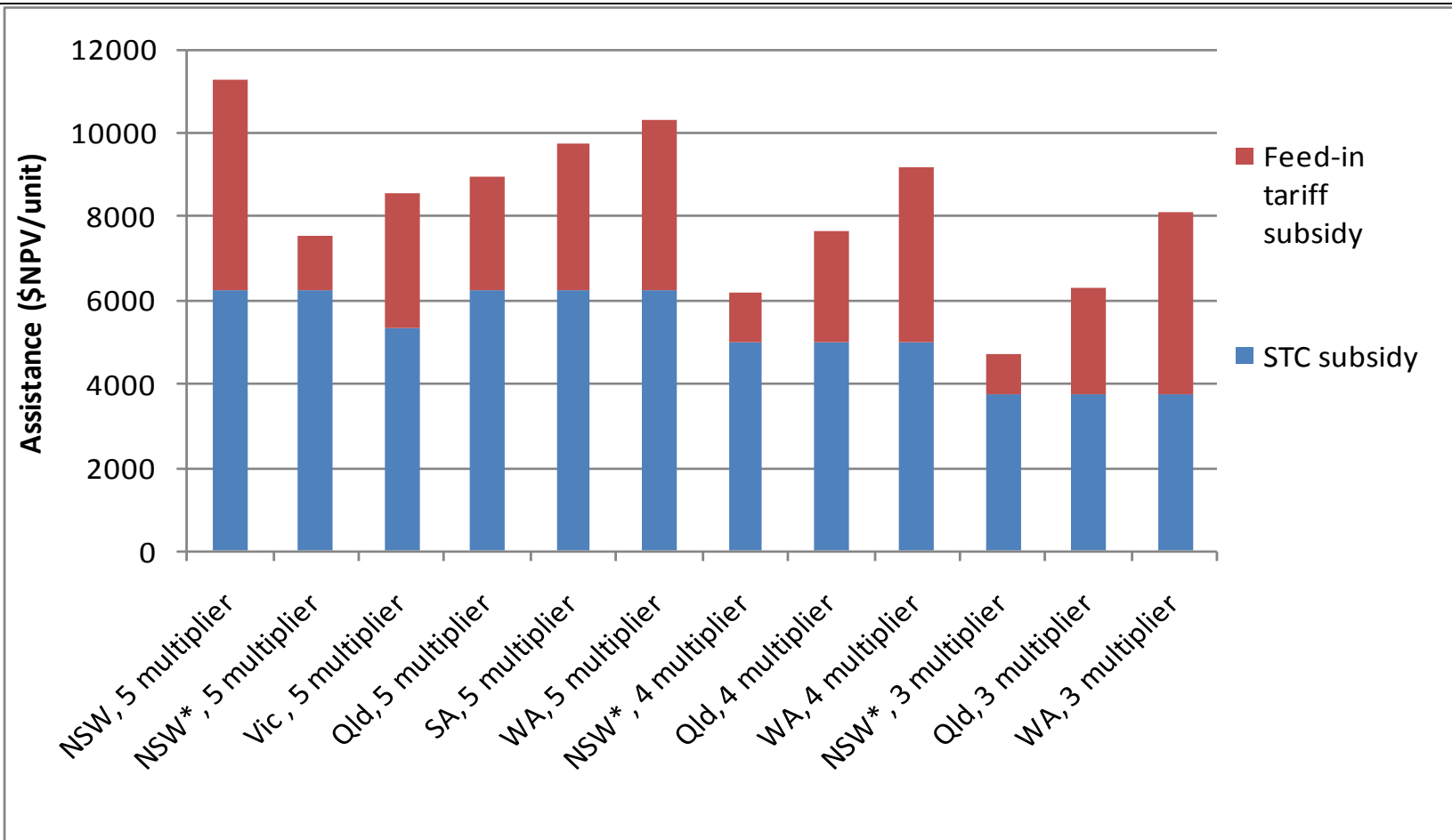
A nominal discount rate of 10 per cent was applied to benefit streams: this value is likely to err on this low side and therefore overstate the true value of feed-in tariff assistance.

The value of exported electricity in the absence of the feed-in tariff was assumed to be 40% of the retail tariff, approximately reflecting the variable energy component of a retail energy cost. If a value of 100% of the retail tariff was assumed, the assistance provided by the feed-in tariff would be reduced.

The effective subsidies from each policy under these assumptions are set out for systems of 1.5 kilowatts and 2.5 kilowatts in Figure 11 and Figure 12 below.



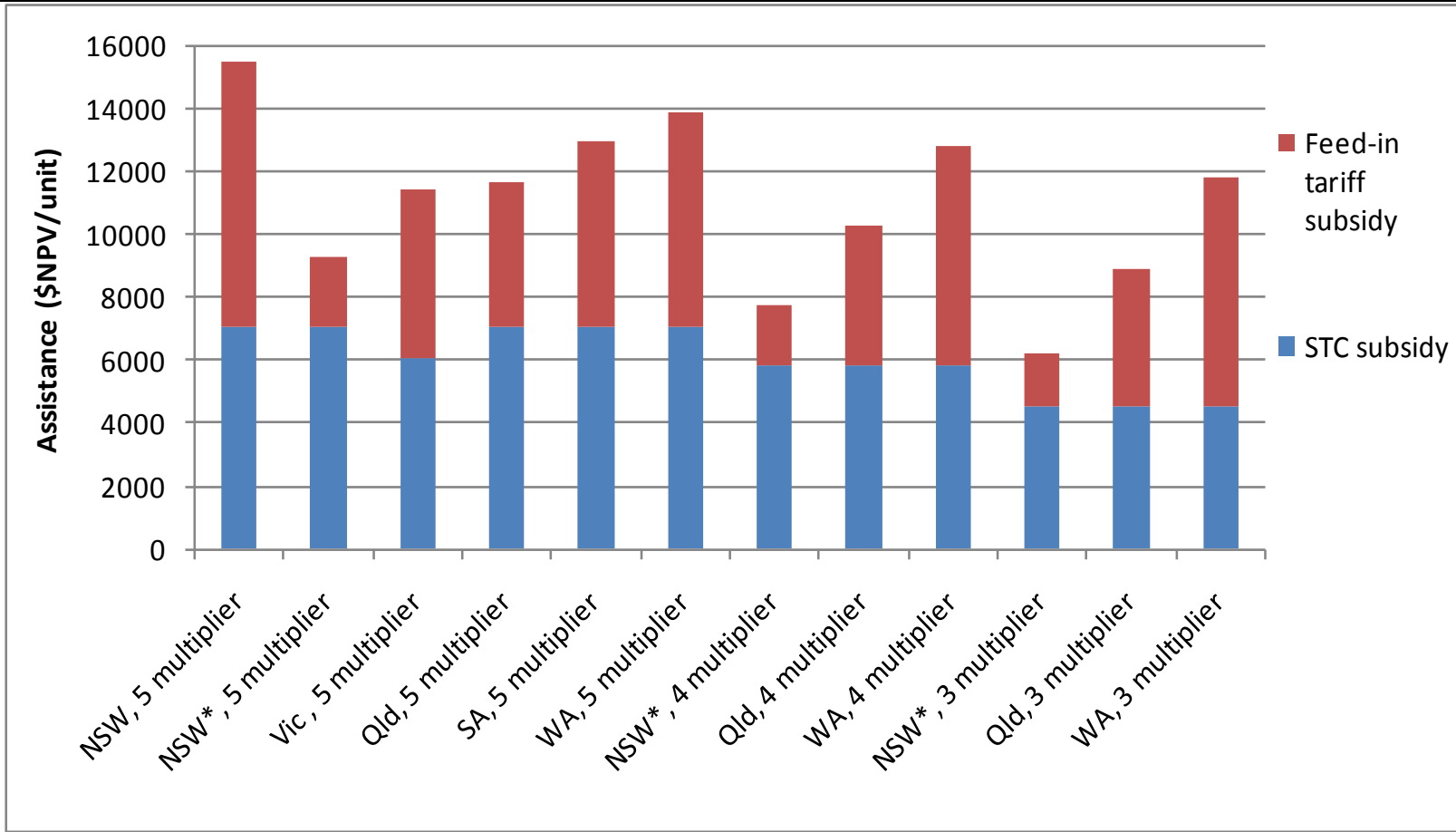
Figure 11 Assistance to 1.5 kilowatt PV systems



Note: Assistance to NSW units marked with an asterisk is calculated under the amended 20 cents/kWh gross feed-in tariff.

Source: ACIL Tasman analysis.

Figure 12 Assistance to 2.5 kilowatt PV systems



Note: Assistance to NSW units marked with an asterisk is calculated under the amended 20 cents/kWh gross feed-in tariff.

Source: ACIL Tasman analysis.



B SWH assistance

Governments around Australia provide support to the take-up of SWHs in various forms, including:

- Regulations that limit the circumstances under which competing water heating technologies (particularly electric water heating) can be used
- RECs/STCs
- Up-front rebates.

B.1 Regulatory issues

In July 2009 the Council of Australian Governments agreed to phase-out the use of electric resistance water heaters as part of the National Partnership Agreement on Energy Efficiency. Implementation of this measure has been progressed by the Ministerial Council on Energy under the broader National Framework for Energy Efficiency.

Implementation of this agreement varies between jurisdictions but broadly involves the banning of the use of electric resistance water heaters in new-build detached or semi-detached dwellings where natural gas is available from 1 January 2010.

The state of play at the time of writing is broadly as follows:

- Western Australia has not implemented any new regulatory changes as it had already imposed equivalent standards on water heaters for new buildings from 1 September 2008
- New South Wales and Victoria have incorporated changes within their respective building codes effectively banning electric water heaters in new buildings from 1 January 2010
- Queensland and South Australia have made additional changes to their respective building codes, such that the effective ban applies to electric water heaters in new buildings and to replacement water heaters in 'class 1' dwellings (i.e. detached or semi-detached dwellings) where reticulated natural gas is available
- Tasmania is not implementing any changes due to the low greenhouse-intensity of its local electricity supply.

B.2 Commonwealth Government assistance

B.2.1 RET/SRES

As for SGUs, the RET and SRES provide up-front assistance to purchasers of SWHs by allowing them to create RECs or STCs which can be on-sold to recoup some of the cost of purchasing the system.

These certificates have value because the legislation underpinning the RET/SRES requires wholesale purchasers of electricity to purchase and acquit a certain number of certificates or pay a penalty.

The value of assistance values with the value of a certificate. Whilst the value of a REC is set by the market for these certificates, the Government has effectively fixed the price of STCs by allowing liable entities to purchase them from a Government-run clearing house at a price of \$40 (although STCs will be able to be traded outside the clearing house, and these prices may vary).

For SWHs, RECs/STCs effectively represent a notional amount of non-renewable electricity that will be displaced by installing a system. Therefore, the number of RECs/STCs that a solar PV system can create is set by reference to its location, with local weather conditions causing variations in average water heating loads (colder climates require more energy for water heating) and solar irradiation (sunnier climates reduce the amount of non-solar boosting required to meet household requirements).

As for SGUs, RECs/STCs can be deemed over the life of a SWH and created in advance, rather than being created in an ongoing manner.

A key recent change to the treatment of SWHs under the RET/SRES was the legislated change in June 2010 preventing air source HPWHs of greater than 425 litres in capacity from creating RECs/STCs. This change has effectively excluded commercial-scale heat-pump systems that were creating large numbers of RECs under earlier arrangements. As noted in the body of the report, ACIL Tasman has controlled for this policy change by focusing almost entirely on installations that create less than 60 RECs, which are effectively household-scale SWHs (including small HPWHs).

B.2.2 Solar Hot Water Rebate

The Commonwealth Government also provides direct assistance to SWHs both through the value its Solar Hot Water Rebate (SHWR). The SHWR has undergone several changes in recent times, particularly:

- In September 2009, the rebate for HPWHs was reduced from \$1600 to \$1000
- In February 2010 the rebate for HPWHs was further reduced to \$600

- In February 2010 the rebate for non-HPWHs was reduced from \$1600 to \$1000.

The SHWR is not means-tested, but is only available where the unit is replacing an electric water heater and where the applicant did not receive assistance under the Commonwealth Government's Home Insulation Program.

B.3 State and territory government rebates

A range of state and territory government rebates are available to SWHs. The state and territory schemes are briefly summarised in the table below.

Table 24 **State/territory SWH incentives and rebates**

Jurisdiction	Rebate	Date available	Conditions
NSW	\$300	Since 15 January 2010	Replace electric hot water system
	\$1500	Prior to 15 January 2010	As part of NSW Home Saver Rebate package
Queensland	\$600	Since 13 April 2010	Replace electric hot water system
	\$1000	Since 13 April 2010	For pensioners and low-income earners
Victoria	\$300-\$1600	-	Rebate depends on system size and varies between Melbourne and regional Victoria.
	Variable	Since 1 January 2009	Assistance through Victorian Energy Efficiency Certificates
Western Australia	\$500-700	Until 30 June 2013	Applies only to gas or LPG boosted solar systems
South Australia	\$500	Since 1 July 2008	System must replace electric hot water system or be gas-boosted
Tasmania	N/A	-	-
Northern Territory	Up to \$1000	-	Timber-trussed roofs that require reinforcement
	Up to \$400	-	Where additional plumbing is required
Australian Capital Territory	Up to \$500	-	Must replace an electric hot water system and be used in conjunction with other energy saving investments.

Data source: www.energymatters.com.au; www.environment.nsw.gov.au; www.cleanenergy.qld.gov.au; www.resourcesmart.vic.gov.au; www1.home.energy.wa.gov.au; www.dtei.sa.gov.au; www.powerwater.com.au.

C Summary of survey outcomes

To complement and inform ACIL Tasman's projection of the creation of STCs under the SRES, a survey of suppliers of both solar water heaters (including heat pump water heaters) and solar photovoltaic systems was undertaken.

C.1 Process

A total of 25 businesses across Australia were contacted by telephone and asked to participate in the survey. Initially 17 businesses were chosen to be surveyed, with the largest historical creators of RECs in the SGU and SWH categories being targeted to maximise the reach of the survey in terms of market-share. The remaining 8 firms were selected based on an internet search of national suppliers of solar water heaters and/or solar photovoltaic systems. Contact details for businesses were obtained from the respective businesses' websites. ACIL Tasman contacted the 25 companies directly and asked to speak with the national sales manager or a senior member of the sales team. In most cases, ACIL Tasman was able to identify a suitable person within the business to seek survey input from.

Once we identified a suitable contact within the businesses, we introduced the survey and offered to conduct the survey in real time with the person over the phone or to provide electronically. Most respondents chose to complete the survey in their own time.

As at Tuesday November 9, a total of 7 businesses had completed and returned the survey, representing seven solar PV suppliers and three solar water heater suppliers.¹⁰ While the response to the survey has not been as large as originally hoped, this small sample is nonetheless useful in sense-checking our assumptions and informing our view of the market outlook for 2011 and beyond.

C.2 Responses

The survey asked businesses' views on key supply and demand trends for solar hot water and photovoltaic systems over calendar years 2011 to 2013 in comparison to 2009-10 (the benchmark year).

¹⁰ In two instances a combined response was provided (e.g. one survey response represented the outlook of two companies).

The key questions from the survey and accompanying results are presented below.

C.2.1 Supply costs and constraints

Respondents were asked to identify whether the wholesale purchase or manufacturing cost of solar PV or SWH systems would change between financial year 2009-10 and calendar years 2011, 2012 and 2013 and if so, the significance of changes. This was followed by questions exploring reasons for cost changes and if suppliers foresaw any difficulties supplying products during 2011 and 2013 inclusive in the event of increases in demand.

Questions 2b and 2e examined whether, if respondents thought costs of these systems would change over the projection period, in what way they would change. 2011 was considered separately to 2012 and 2013.

Table 25 **Change in cost – 2011 (question 2b)**

	SWHs (excluding HPWHs)	HPWHs	Solar PV
Costs will not change	0	0	1
Decrease by up to 20%	0	0	4
Decrease by 20% or more	0	0	0
Increase by up to 20%	3	3	2
Increase by 20% or more	0	0	0

Table 26 **Change in cost – 2012 & 2013 (question 2e)**

	SWHs (excluding HPWHs)	HPWHs	Solar PV
Costs will not change	0	0	1
Decrease by up to 20%	0	0	5
Decrease by 20% or more	0	0	0
Increase by up to 20%	3	3	1
Increase by 20% or more	0	0	0

All SWH respondents felt the cost of SWHs would increase, whilst a clear majority of solar PV suppliers felt the cost of these systems would decrease.

Questions 2c and 2f examined why, if respondents thought costs would change, they thought costs would change over the projection period.

Table 27 **Reason for cost change – 2011 (question 2c)**

	SWHs (excluding HPWHs)	HPWHs	Solar PV (increase in cost)	Solar PV (decrease in cost)
Costs will not change	0	0	1	0
Exchange rates	1	2	2	2
Cost of material for production	3	3	1	2
Cost of labour for production	2	2	0	1
Cost of labour for installation	1	1	1	1
Unsure/unspecified	0	0	0	0
Other	0	0	0	2

Note: multiple responses possible.

Table 28 **Reason for cost change – 2012 & 2013 (question 2f)**

	SWHs (excluding HPWHs)	HPWHs	Solar PV (increase in cost)	Solar PV (decrease in cost)
Costs will not change	0	0	1	1
Exchange rates	1	2	1	2
Cost of material for production	3	3	0	4
Cost of labour for production	2	2	0	1
Cost of labour for installation	1	1	1	1
Unsure/unspecified	0	0	0	0
Other	0	0	0	2

Note: multiple responses possible.

These questions revealed that a common cause of increasing costs of SWHs identified was increasing cost of materials, with increasing labour costs also nominated by two of three respondents.

In the case of solar PV, exchange rates were a mixed response: two respondents thought these would contribute to a reduction in cost over 2011, whilst two others thought the opposite. This illustrates the uncertain effect of exchange rates on the solar PV industry.

Labour for installation was also identified as affecting in different directions by different respondents.

Four solar PV respondents considered that reducing material costs would contribute to a reduction in system cost.

Question 3 examined whether, if demand were to increase significantly, respondents considered they would face constraints in increasing supply to meet demand. Question 3b examined whether this was likely, whilst question 3c examined the cause of any likely difficulty.

Table 29 **Likely to experience supply difficulty (question 3b)**

	SWHs (excluding HPWHs)	HPWHs	Solar PV
Not expecting to experience difficulty	3	3	5
1 - Unlikely	0	0	1
2	0	0	0
3	0	0	1
4	0	0	0
5 - Likely	0	0	0

Table 30 **Reasons for supply difficulty (question 3c)**

	SWHs (excluding HPWHs)	HPWHs	Solar PV
Not expecting to experience difficulty	3	3	5
Difficulty in sourcing labour for installation	0	0	0
Difficulty in increasing orders of units	0	0	1
Difficulty in increasing manufacturing of units	0	0	1
Unsure/unspecified	0	0	0
Other	0	0	0

Very few respondents considered that supply difficulties would be likely to arise.

C.2.2 Demand trends

Respondents were asked to identify whether they thought demand would change between financial year 2009-10 and calendar years 2011, 2012 and 2013 and, if so, the significance of changes. This was followed by questions exploring reasons for any changes.

Table 31 **Change in demand – all years (question 4c)**

	SWHs (excluding HPWHs)	HPWHs	Solar PV
Did not answer Yes	0	0	1
Decrease by up to 20%	0	1	1
Decrease by 20% or more	0	0	0
Increase by up to 20%	3	2	0
Increase by 20% or more	0	0	5

Most respondents considered that demand for products would increase over the projection period.

Table 32 **Reasons for demand change – increasing demand (question 4d)**

	SWHs (excluding HPWHs)	HPWHs	Solar PV
Did not answer Yes	0	-	-
Changes in government assistance are affecting the attractiveness of units to consumers	0	0	2
Changes in production costs are being passed on to consumers	0	0	4
Changes to the price of electricity	2	2	5
Changes in the environmental consciousness of consumers	2	1	4
Other	2	2	1

Note: multiple responses possible.

Reasons for increasing demand were mixed. Rising electricity prices and increasing environmental consciousness were common reasons for increasing demand. Four solar PV respondents also considered that continuing cost reductions would support demand.

One SWH supplier identified regulatory changes that limit the use of alternative products as a key reason for increased demand (notwithstanding the increasing cost of these systems identified in earlier questions).

Interestingly, however, the NSW Government's changes to its Solar Bonus Scheme were announced during the survey period. The last solar PV response received nominated changes to government assistance as leading to a reduction in demand, in contrast to two other responses (as shown in Table 33). It is unclear whether the earlier respondents would have changed their responses in light of updated information.

Table 33 **Reasons for demand change – decreasing demand (question 4d)**

	SWHs (excluding HPWHs)	HPWHs	Solar PV
Did not answer Yes	0	-	-
Changes in government assistance are affecting the attractiveness of units to consumers	0	0	1
Changes in production costs are being passed on to consumers	0	1	0
Changes to the price of electricity	0	0	0
Changes in the environmental consciousness of consumers	0	0	0
Other	0	0	0

Note: multiple responses possible.

C.2.3 Changes in solar PV system size

Questions 5a and 5b addressed whether solar PV suppliers expected the average size of the systems they supply to change and, if so, in what way. Five out of seven solar PV suppliers considered that system size would change, with all five considering that system size would increase.

Melbourne (Head Office)

Level 4, 114 William Street
Melbourne VIC 3000

Telephone (+61 3) 9604 4400
Facsimile (+61 3) 9604 4455
Email melbourne@aciltasman.com.au

Brisbane

Level 15, 127 Creek Street
Brisbane QLD 4000
GPO Box 32
Brisbane QLD 4001

Telephone (+61 7) 3009 8700
Facsimile (+61 7) 3009 8799
Email brisbane@aciltasman.com.au

Canberra

Level 1, 33 Ainslie Place
Canberra City ACT 2600
GPO Box 1322
Canberra ACT 2601

Telephone (+61 2) 6103 8200
Facsimile (+61 2) 6103 8233
Email canberra@aciltasman.com.au

Darwin

GPO Box 908
Darwin NT 0801

Email darwin@aciltasman.com.au

Perth

Centa Building C2, 118 Railway Street
West Perth WA 6005

Telephone (+61 8) 9449 9600
Facsimile (+61 8) 9322 3955
Email perth@aciltasman.com.au

Sydney

PO Box 1554
Double Bay NSW 1360

Telephone (+61 2) 9389 7842
Facsimile (+61 2) 8080 8142
Email sydney@aciltasman.com.au



ACIL Tasman

Economics Policy Strategy

ACIL Tasman Pty Ltd

www.aciltasman.com.au