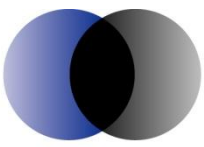
Small-scale Technology Certificates Data Modelling

Updated projection for calendar years 2011, 2012 and 2013

Prepared for the Office of the Renewable Energy Regulator

June 2011



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 The report must not be published, quoted or disseminated to any other party without ACIL Tasman's prior written consent.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:

Rowena Gregson
Owen Kelp

Contents

List of figures

List of tables

Executive summary

Policy context

In light of recent changes to policy settings that support the take-up of solar photovoltaic generating systems, the Office of the Renewable Energy Regulator (ORER) commissioned ACIL Tasman to update its March 2011 estimate of the take up of 'Small-scale Technology Certificates' (STCs) under the Commonwealth Government's Small-scale Renewable Energy Scheme (SRES).

This analysis is intended to assist the ORER to publish an updated non-binding estimate of the rate of likely STC creation in 2011, 2012 and 2013. This in turn will inform STC creators and purchasers of potential trends in this market in the future.

This updated analysis was necessary in light of a range of important changes in the STC market, driven in particular by trends in uptake of solar photovoltaic systems:

- on 5 May 2011 the Commonwealth Government announced that the 'Solar Credits multiplier'[1] available in respect of SGUs would reduce from five to three on 1 July 2011, reducing the financial attractiveness of solar photovoltaic systems from that time on
- a range of other changes to state and territory 'feed-in tariff' policies have also occurred since March 2011, generally working to reduce the attractiveness of solar photovoltaic systems
- ongoing reductions in the cost of PV systems, strong marketing from PV installers and consumer desire to install PV systems prior to the reduction in the Solar Credits multiplier on 1 July 2011 have contributed to extremely elevated installation rates for photovoltaic systems through the first half of 2011.

Methodology

To perform this analysis, ACIL Tasman has:

- analysed historic rates of STC creation rates by eligible 'small generation units' or SGUs, particularly photovoltaic systems
- analysed historic and future financial returns to installers of photovoltaic systems

[1] The Solar Credits multiplier increases the number of STCs that can be created in respect of the first 1.5 kilowatts of capacity of a solar photovoltaic installation, thereby increasing the financial attractiveness of installing such systems.

- undertaken a survey of photovoltaic system suppliers to assess the potential impact on STC creation rates of transitional arrangements associated with the reduction in the Solar Credits multiplier from five to three from 1 July 2011.

The financial payback analysis involved analysis of changes to government policies that financially support uptake of photovoltaic systems, changes to electricity retail tariffs, and changes to photovoltaic system costs.

Although solar water heaters can also create STCs, this analysis did not focus on likely rates of STC creation from installations of this type. It was considered that ACIL Tasman's March 2011 estimates of the rate of STC creation for this technology remained robust for the purpose of this analysis, and these estimates were retained.

Results

ACIL Tasman's analysis indicates that installation rates of photovoltaic have been extremely elevated during early 2011. Although limited data was available at the time of writing, early data provided by the ORER suggests that the Commonwealth Government's 5 May 2011 announcement has further accelerated installation rates due to the incentive to complete installations before the Solar Credits multiplier of five ceases to be available.

This analysis indicates that present installation rates are not easily explained by referenced to historic comparisons of financial returns to photovoltaic systems and installation rates. It appears that the present rate of installations captures a response not only to present payback levels, but to the anticipated difference (reduction) in paybacks between the present the near future.

Accordingly, our assumptions for installation rates from July 2011 onwards imply a return a level that can be explained by historic payback levels and installation rates. Implicitly this assumes two partially offsetting factors broadly cancel each other out:

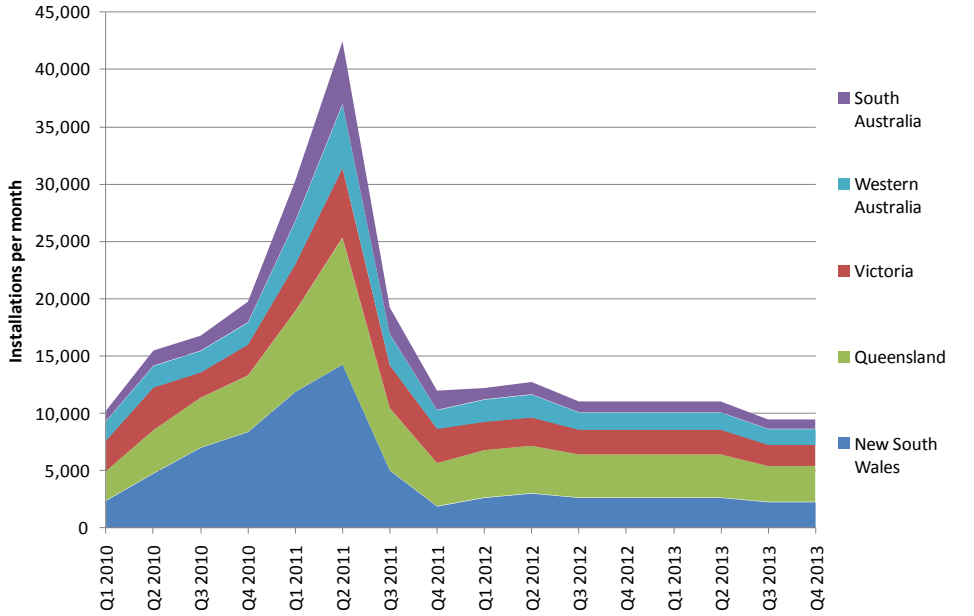
- over recent years the solar PV industry has expanded greatly in size and increased the sophistication of its marketing, potentially increasing its scope for reaching, attracting and servicing customers
- conversely, the success of the industry in ramping up capacity over recent years and the likely 'bring forward' of demand into the first half of 2011 is also likely to mean that a large number of highly suitable potential PV customers have already taken up a PV system, potentially reducing future installation rates.

The overall projection implies a substantial reduction in the rate of installation of photovoltaic systems in all states through late 2011 and into 2012. For example, while installation rates in Queensland are projected to stabilise at

around 35-45% of early 2011 rates, upheld in part by the continuation of Queensland's feed-in tariff, New South Wales is projected to experience a reduction to around 20% of early 2011 installation rate reflecting the combined effect of the removal of a highly generous feed-in tariff and the reduction of the Solar Credits multiplier.

The trend of reducing installation rates in the five major states of New South Wales, Queensland, Victoria, Western Australia and South Australia is illustrated in Figure ES 1.

Figure ES 1 **Installation rates – five major states**



Source: ACIL Tasman analysis.

In combination with the reduction in installation rates, the reduced Solar Credits multiplier applying from 1 July 2011 further contributes to a reduction in STC creation rates (as the number of STCs created by each installation reduces).

In total, the projection results suggest both extremely elevated rates of STC creation in 2011 (largely reflecting outcomes over the first half of the year), and substantially reduced rates through 2012 and 2013.

Given the present rate of STC acquittal is based on an expected level of STC creation of 28 million in 2011, this projection indicates a likely level of excess STC creation in 2011 (i.e. in excess of the legislated STC surrender level of 28 million) of around 20 million, reflecting the unprecedented levels of solar PV installations through the first half of 2011.

Accordingly, even though STC creation levels are projected to be significantly lower in 2012 than in 2011, STC surrender in 2012 would need to reach a level in the range of 37 to 40 million STCs in order to result in the surrender of the STCs created in 2012 as well as the overhang from 2011.

These results are presented in Table ES 1.

Table ES 1 **Projected STC creation – by year of certificate creation**

	2011	2012	2013
	(000s)	(000s)	(000s)
SGUs	45,070	14,540	8,080
SWHs upper estimate	3,490	4,930	5,270
SWHs lower estimate	2,570	2,720	2,710
Total – upper estimate	**48,560**	**19,470**	**13,350**
Total – lower estimate	**47,640**	**17,260**	**10,790**
Legislated STC surrender	28,000	N/A	N/A
Excess STC creation in 2011 – upper estimate	20,560	N/A	N/A
Excess STC creation in 2011 – lower estimate	19,640	N/A	N/A
Implied target for STC surrender – upper estimate	N/A	40,030	13,350
Implicit target for STC surrender – lower estimate	N/A	36,900	10,790
Implicit target for STC surrender – lower estimate	N/A	36,900	10,790

Data source: ACIL Tasman analysis.

1 Introduction

In light of recent changes to policy settings that support the take-up of solar photovoltaic generating systems, the Office of the Renewable Energy Regulator (ORER) commissioned ACIL Tasman to update its March 2011 estimate of the take up of 'Small-scale Technology Certificates' (STCs) under the Commonwealth Government's Small-scale Renewable Energy Scheme (SRES).

1.1 Policy background

The SRES commenced operation on 1 January 2011. It supports the take-up of 'Small Generation Units' (SGUs), particularly solar photovoltaic (PV) systems, and solar water heaters (SWHs) by households and businesses by requiring wholesale purchasers of electricity to purchase and surrender STCs. As STCs can only be created by owners of SGUs and SWHs, or agents assigned STC creation rights by the owner, this requirement gives STCs a financial value and therefore supports take-up SGUs and SWHs.

STCs are available for purchase and sale through a clearing house managed by ORER at a legislated fixed price (presently $40/certificate), but do trade bilaterally at lower prices. The $40 certificate price acts as an effective ceiling price for STCs, as ORER can create and sell as many STCs as needed at that price.

The number of STCs that a given liable entity much purchase and acquit is a pre-defined volume of its electricity acquisitions known as the 'small-scale technology percentage' (STP). As the SRES is an 'uncapped' scheme, the STP is set to reflect expected levels of STC creation over the coming calendar year so that all STCs created are purchased by liable entities and surrendered to ORER.

A further policy element is critical to the SRES: the number of STCs that can be created by SGUs is increased through a policy known as 'Solar Credits'. The number of STCs created by an SGU is ordinarily determined by the expected output of the system over its life, reflecting the amount of renewable electricity it will produce. However, the Solar Credits policy increased the number of STCs that could be created by SGUs so as to increase the value of assistance that these generators received. For solar PV systems, a 'Solar Credits multiplier' of five was set, which meant that the number of STCs created by the first 1.5 kilowatts of capacity of any single installation was increased five-fold. This policy has had a significant effect on the level of solar PV installations that

occurred in Australia, and particularly on the number of STCs created by those installations.

1.2 Setting the STP

In December 2010, the Commonwealth Government set the 2011 STP at 14.8 per cent, reflecting expected STC creation of 28 million in 2011. This decision was supported by analysis undertaken for the ORER by ACIL Tasman and other organisations, and took into account the Government's simultaneous decision to reduce the Solar Credits multiplier from five to four as of 1 July 2011.

In March 2011 ACIL Tasman undertook revised analysis of STC creation rates in 2011, 2012 and 2013 for the purpose of assisting ORER publish a non-binding estimate of the 2012 and 2013 STPs (as is required of ORER under section 40B of the *Renewable Energy (Electricity) Act 2001*).

This updated analysis indicated that 33.5 million to 35.2 million STCs were likely to be created in 2011, substantially higher than the original estimate. Consequently, when publishing its non-binding estimate of the 2012 STP, the ORER took into account an 'overhang' of STC creation in 2011 relative to that implied by the fixed 2011 STP. ORER estimated this overhang to be around 6.4 million STCs, and added this amount to the average of ACIL Tasman's updated 2012 estimate of STC creation rates (22.3 million to 27.1 million STCs, or 24.7 million STCs).

Consequently, ORER published a non-binding estimate of the 2012 STP of 16.75 per cent, reflecting an expected STC surrender requirement of 31.1 million STCs (i.e. the sum of 24.7 million STCs created in 2012 and the overhang of 6.4 million STCs created in 2011).[2]

1.3 An updated non-binding estimate of the 2012 STP

Since March 2011 a range of policy decisions have been made that affect 2011 and 2012 STC creation rates, and therefore the likely level of the 2012 STP (the 2011 STP is fixed and cannot be changed under present legislation). The most significant change was the Commonwealth Government's 5 May 2011 announcement that the Solar Credits multiplier available in respect of SGUs would reduce from five to three on 1 July 2011[3], rather than from five to four

[2] See http://www.orer.gov.au/stp/index.html for more information.

[3] http://www.climatechange.gov.au/minister/greg-combet/2011/media-releases/May/mr20110505.aspx

as announced on 1 December 2010.[4] All other things being equal, this announcement would be expected to reduce STC creation rates in the second half of 2011 and through 2012 relative to the 24.7 million STCs assumed in setting the original non-binding estimate of the 2012 STP.

In addition to this change, a range of other changes to state and territory 'feed-in tariff' policies were also made, which generally worked to reduce the financial attractiveness of PV systems and therefore the likely level of STC creation over 2011 and 2012.

In parallel with these policy changes, ongoing reductions in the cost of PV systems, strong marketing from PV installers and consumer desire to install PV systems prior to the reduction in the Solar Credits multiplier on 1 July 2011 have contributed to extremely elevated installation rates for PV systems through the first half of 2011.

In combination, ORER considered that these trends warranted the publication of an updated non-binding estimate of the 2012 STP to provide the industry with guidance on likely demand for STCs through 2012. This analysis re-examines recent and future trends in STC creation by SGUs (and solar PV in particular) to assist ORER's publication of this update.

This analysis does not revisit rates of STC creation by SWHs due to the relatively stable rate of STC creation over early 2011 and absence of drivers for a change to the March 2011 estimate.

1.4 Transitional arrangements

In changing the Solar Credits multiplier from five to three as of 1 July 2011, the Government also announced transitional arrangements that would, in broad terms, provide a Solar Credits multiplier of four to installations that were committed before 5 May 2011 but actually occur after 1 July 2011.

To assess the likely level of additional STC creation as a result of these transitional arrangements, ORER requested ACIL Tasman to survey a range of PV system suppliers to assess the likely number of systems that might meet the eligibility requirements set out by the Government.

ACIL Tasman surveyed 21 PV system suppliers reflecting approximately 25 per cent of the PV installation market.

[4] http://www.climatechange.gov.au/en/minister/greg-combet/2010/media-releases/December/mr20101201.aspx

1.5 Structure of this report

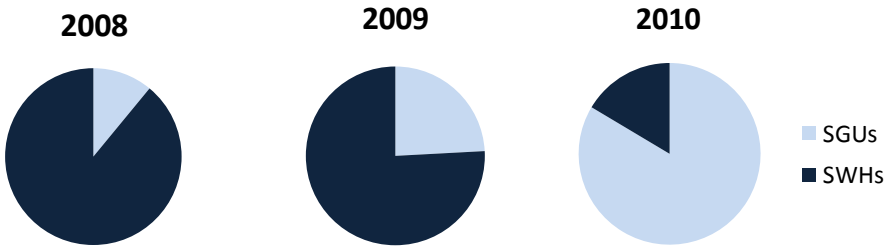
The report is structured as follows:

- Section 2 outlines the methodology used to assess the changing financial attractiveness of solar PV systems, and thereby likely rates of uptake over coming years:
  - Section 2.1 sets out the methodology for analysing changes to financial returns to PV system installations over time as a result of changing policy settings, system costs and electricity prices
  - Section 2.2 outlines the methodology used in the PV system supplier survey in relation to transitional arrangements applying in respect of the change in the Solar Credits multiplier from five to three on 1 July 2011.
- Section 3 outlines the results of our SGU STC creation projection, including the results of our survey of system suppliers
- Section 4 briefly restates the results of our SWH STC creation projection from March 2011 for completeness
- Section 5 summarises the overall projected level of STC creation in 2011, 2012 and 2013 by both SGUs and SWHs.

2 Methodology

Recent increases in the uptake of SGUs have dramatically increased the portion of STCs (historically Renewable Energy Certificates or RECs)[5] from small-scale sources created by SGUs rather than SWHs (see Figure 1).

Figure 1 **Portion of STCs created by technology**



Note: STC creation data presented to early May 2011.
Data source: ORER.

Accordingly, analysis of STC creation rates by SGUs increasing explains the key trends in overall STC creation rates, as is reflected by the focus on SGU STC creation trends in this analysis.

As for our November 2010 and March 2011 projections, this update examines likely STC creation by all SGUs. However, the historic portion of STC 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 trends.

This is illustrated by comparing the total rate of installations, STC 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, 2001-present**

Technology	Installations	STCs created	Capacity installed (kW)
Micro-hydro	14	406	22
Micro-wind	372	18,282	1,233
Solar PV	386,579	45,353,968	746,779

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.

[5] Throughout this report, the term REC and STC are used interchangeably when referring to REC creation by technologies that now create STCs.

2.1 Analysis of financial returns from SGUs

As in our March 2011 projection for ORER, ACIL Tasman has examined changes to the financial attractiveness of solar PV systems, to project likely future rates of STC creation rates. Accordingly, such projections of future STC creation rates are strongly driven by changes to policy settings affecting the uptake of solar PV, such as the Solar Credits multiplier, changes to solar PV system costs and changes to electricity tariffs.

The analysis also requires comparison of historic STC creation data with historic solar PV installation rates, and to assess the latest trends in activity (installation) levels, locations and lags between PV system installation and STC creation. As for our November 2010 and March 2011 projections, ORER has provided ACIL Tasman with access to a comprehensive database of STC creation data at the installation level. This data contains information on certificate creation by creation date, installation date, installation location and system size to support this analysis. The data provided was current to 13 June 2011.

To analyse the financial attractiveness of SGUs (specifically solar PV systems), ACIL Tasman has estimated the payback period in years, undiscounted financial return over the full system life, and discounted financial return over the full system life for PV systems of various sizes in each jurisdiction.

This methodology has been adopted as a means of capturing potential changes in a range of variables that will affect the attractiveness of SGUs to households and businesses, and therefore likely SGU installation and STC creation rates.

This analysis requires calculation of, amongst other things:

- system cost (upfront)
- any upfront rebates (e.g. Solar Credits) that reduce the 'out of pocket' costs of the system
- the avoided electricity costs of the system (representing a saving to the owner of the system)
- payments for electricity exported to the grid
- payments for own consumption of electricity associated with gross feed-in tariffs.

In turn, this financial analysis has required ACIL Tasman to make assumptions relating to, amongst other things:

- Solar Credits policy settings
- feed-in tariff policy settings

- electricity prices (including carbon pricing)
- system costs
- trends in relation to system size.

Details about the various assumptions made in this financial analysis are set out in the following sections.

It should be noted that a range of factors other than those listed above will affect household and business decisions to install solar PV systems. Many of these factors are not easily quantifiable, such as environmental attitudes, marketing and anecdotal responses to the experiences of friends and family.

Nevertheless, it is still reasonable to project future installation rates for this technology as being related to the financial attractiveness of the systems, even if the decision-making process of the households and businesses making the decision is not directly or exclusively financial.

2.1.1 Government assistance to SGUs

Assistance to SGUs has increased significantly over recent years and is a crucial driver of the financial attractiveness of these systems to households and businesses as reflected in our payback analysis.

Solar Credits

The Solar Credits policy affects STC creation rates in two important ways. Firstly, the Solar Credits policy affects the rate of STC creation for any given level of SGU installation, as it affects the number of STCs any single installation can create. Secondly, the Solar Credits policy affects the financial attractiveness of SGUs, and therefore SGU installation rates. Given these two interrelated effects, assumptions made in regard to this policy are critical to this projection.

As discussed in section 1, this updated analysis has taken account of the Commonwealth Government's 5 May 2011 announcement that the Solar Credits multiplier available in respect of SGUs would reduce from five to three on 1 July 2011, rather than from five to four as announced on 1 December 2010. Accordingly, ACIL Tasman analysed financial returns (and STC creation rates) under the Solar Credits multiplier policy sequence set out in Table 2.

Table 2 **Assumed Solar Credits multiplier**

	To 30 June 2011	1 July 2011 to 30 June 2012	1 July 2012 to 30 June 2013	1 July 2013 onwards
Solar Credits Multiplier	5	3	2	1

ACIL Tasman has also taken into consideration transitional arrangements announced in combination with the reduction of the Solar Credits multiplier to three from 1 July 2011.

Specifically, the Government announced that it would 'put in place transitional arrangements in regulations to recognise written contracts entered into prior to 5 May 2011, for system installation from 1 July 2011 to 30 June 2012, where the contract was made on the basis of the previous multiplier of four'. A range of specific conditions were set out relating to these arrangements, as detailed by the Department of Climate Change and Energy Efficiency.[6]

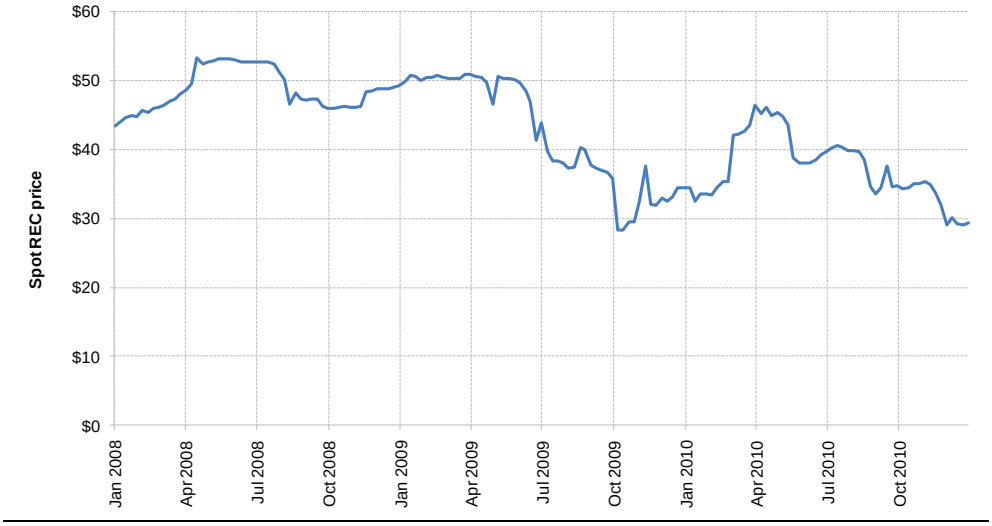
To assess the likely level of additional STC creation as a result of these transitional arrangements, ORER requested ACIL Tasman to survey a range of PV system suppliers to assess the likely number of systems that might meet the eligibility requirements set out by the Government, and accordingly the level of STC creation by systems receiving a Solar Credits multiplier of four. Further detail on the survey methodology is provided in section 2.2, while the survey results are discussed in section 3.3.

Also of importance to analysing the financial value of the Solar Credits policy to SGUs are changes in historic REC prices (prior to 1 January 2011) and historic and future changes in STC prices (following 1 January 2011).

REC prices for the period 2008 to 2010 are shown below in Figure 2. This captures the steady decline in the REC price towards the end of 2010 as high levels of solar PV installation tended to exacerbate the existing bank of certificates and depress price expectations.

[6] http://www.climatechange.gov.au/government/initiatives/renewable-target/need-ret/solar-credits-faq.aspx

Figure 2 **Historic REC prices 2006-2010**



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

Given recent significant reductions in STC prices, ACIL Tasman has specifically analysed potential future trends in this variable. In the early months of 2011 STCs traded close to their legislated price of $40/certificate. However, around mid April 2011 the balance of supply and demand in the STC market led to material reductions in this price, with the level approaching $25 by mid-May. Quotes for STC sales at the time of writing varied around $20/certificate.

ACIL Tasman's analysis indicates that the present level of STC prices cannot be fully explained by the economic phenomenon of 'holding costs', that is, the direct financial cost of borrowing money to purchase and hold a financial or other asset or, equivalently, the opportunity cost of using cash reserves for this purpose in preference to other potential investments.

The issue of holding costs in the STC market primarily arises because of a mismatch in supply and demand for STCs. Liable entities under the SRES, namely electricity retailers, must purchase and acquit STCs on a quarterly basis in accordance with their past electricity purchases and the ORER's specified STP. However, given recent levels of STC creation by SGUs, the level of STC acquittals for the April 2011 and subsequent surrender periods does not match the level of STC creation. Accordingly, STC creators must wait in a virtual queue to receive payment through the ORER-administered STC clearing house, or alternatively receive payment immediately by trading the STCs outside of the clearing house. Given the holding cost for the purchaser of the STC (assuming it is not needed for immediate liabilities), this wholesale exchange will occur at some discount to the clearing house price of $40/certificate.

ACIL Tasman has undertaken modelling of the holding cost for STCs on the assumption of an 8 per cent annualised cost of funds. This is seen to be

appropriate, given the involvement of large electricity retailers and some financial institutions in the STC market, which have low costs of funds.

This analysis indicates that, assuming the 2012 STP is set at a level that accounts for the high rates of STC creation observed in early 2011 and 'soaks up' the excess STCs created during 2011 over and above the 28 million anticipated in setting the 2011 STP, STCs being created at present would, at most, wait nine to ten months for acquittal. In turn, the market value of STCs should reflect, at most, a nine to ten month holding cost. Given STCs are presently trading at a discount of around 50 per cent to their legislated price, the present market price could only be attributed purely to holding cost issues if the general cost of funds to all participants in this market were in excess of 50 per cent. This does not appear plausible.

Accordingly, for our payback analysis, ACIL Tasman has assumed that the present low STC price is a significant, but temporary phenomenon, reflecting a range of factors including:

- the need of small solar PV businesses to sell STCs to sustain cashflow
- a market dynamic that favours the relatively small number of large electricity retailers in purchasing STCs from a great range of, generally smaller, parties that create STCs
- a potential 'policy risk' element where potential investors are not seeking to arbitrage the wholesale and legislated STC prices due to the risk of future government policy changes, including to the legislated STC price itself.

Accordingly, ACIL Tasman has assumed that the establishment of the 2012 STP by the responsible Minister (likely in late 2011 or early 2012) will 'firm up' the STC market considerably and return trading levels towards those reflecting the true holding cost.

Our assumptions in this regard are shown in Table 3:

Table 3 **STC price assumptions**

	1 April 2011 – 30 June 2011	1 July 2011 – 30 September 2011	1 October 2011 to 31 December 2011	1 January 2012 to 31 March 2012	1 April 2012 onwards
STC price	$25	$20	$25	$30	$40

Data source: ACIL Tasman assumptions

Feed-in tariffs

Many state and territory governments in Australia have implemented 'feed-in tariffs' to support the take-up of small scale solar PV systems. 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.

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).

NSW Solar Bonus Scheme

The original NSW Solar Bonus Scheme, consisting of a 60 cents/kilowatt-hours (kWh) gross feed-in tariff, was closed as of 27 October 2010 and replaced with a 20 cents/kWh gross feed-in tariff.

However, transitional arrangements provided that customers who had already entered a binding agreement to purchase a system were given until 18 November 2010 to apply to receive the original 60 cents/kWh tariff. A substantial number of applications to enter the Solar Bonus Scheme were received between 27 October and 18 November 2010, such that by 31 December 2010, the number of pending applications for solar PV installations in NSW was approximately equal to the total installed capacity (326 megawatts (MW) of applications, of which 163 MW has been installed).

Given this large backlog of installations, it is not surprising that elevated installation rates have continued in NSW long after the initial amendment to the Solar Bonus Scheme.

On 28 April 2011, the NSW Government suspended applications to the 20 cents/kWh feed-in tariff scheme as of the following day. This suspension remains in place at the time of writing.

On 13 May 2011, the NSW Government announced retrospective changes to the 60 cents/kWh feed-in tariff such that the rate for all eligible installations (whether installed or pending) would be reduced to 40 cents/kWh. However, this policy position was withdrawn on 7 June 2011 and so does has not been factored in to this analysis.

The NSW Government has indicated that, as of 6 May 2011, around 272 MW of Solar Bonus Scheme applications (including both 60 cents/kWh and 20

cents/kWh applications) have been installed, out of a total of 364 MW of applications.

Based on current installation rates in NSW, this implies that the extremely elevated installation rates of late 2010 and early 2011 will reduce over the period from July to September 2011 as remaining Solar Bonus Scheme applications are completed. Accordingly, ACIL Tasman has assumed that installations occurring in NSW after September 2011 will not receive a feed-in tariff, but will instead receive the variable component of the retail electricity price for exports (see section 2.1.4).

Victorian premium feed-in tariff

While the Victorian Government's pre-announced policy position is that its feed-in tariff will be capped at 100 MW, the level of installations in Victoria already exceeds this level. In the absence of greater clarity on the Victorian Government's intentions with respect to its feed-in tariff, ACIL Tasman has assumed that the feed-in tariff cap will be applied such that installations physically occurring during 2011 receive the feed-in tariff and installations occurring from 2012 do not.

South Australian Solar Feed-in Scheme

On 31 August 2010 the South Australian Government announced that it would increase its feed-in tariff from 44 cents/kWh to 54 cents/kWh.

On 6 April 2011, the South Australian Government introduced legislation implementing this change, and also providing that the Solar Feed-in Scheme would close as of 1 October 2011.

However, on 23 June 2011 this legislation was passed with amendments that prevented the increase in the feed-in tariff rate to 54 cents/kWh, but extended the scheme for two years through a transitional feed-in tariff of 16 cents/kWh.

This analysis was completed prior to 23 June 2011 and so was undertaken on the assumption that the South Australian feed-in tariff would close as of 1 October 2011, but would be increased to 54 cents/kWh. Paybacks for solar PV installations in South Australia were estimated on this basis. Further, due to the likely lag in physical installations occurring after the formal close of the scheme, ACIL Tasman assumed that the 54 cents/kWh feed-in tariff would remain available to installations through to the end of 2011.

Western Australian Feed-in Tariff Scheme

On 20 May 2011 the Western Australian Government announced that its scheme will move from a 40 cents/kWh net feed-in tariff to a 20 cents/kWh net feed-in tariff from 1 July 2011, with an overall scheme cap of 150 MW. Accordingly ACIL Tasman has modelled paybacks on the assumption of the availability of the 40 cents/kWh tariff through the third quarter of calendar year 2011, before reducing the rate available. Based on present and projected installation rates, the 150 MW cap is projected to be reached in mid-2012.

ACT Feed-in tariff Scheme

The ACT Government announced on 1 June 2011 that its small-scale feed-in tariff scheme had reached its pre-announced capacity cap of 15 MW and therefore that the scheme was closed as of midnight the previous day. ACIL Tasman has modelled paybacks for the ACT on the assumption that installations receiving the ACT feed-in tariff will be complete as of 30 June 2011.

Summary

A summary of assumptions made in relation to major State and Territory feed-in tariffs for the financial analysis is provided in Table 4.

Table 4 **Major Australian solar PV feed-in tariffs**

Jurisdiction	Basis	Rate (cents/ kWh)	Scheme start	Tariff paid until	Availability
NSW	Gross	60	1 January 2010	December 2016	Closed from 18 November 2010
	Gross	20	28/10/2010	December 2016	Closed from 29 April 2011
Victoria	Net	60	1 November 2009	October 2024	Assumed to be available through to the end of 2011
Queensland	Net	44	1 July 2008	June 2028	Available throughout projection
South Australia	Net	54*	1 July 2008	June 2028	Closed from 1 October 2011
Western Australia	Net	47 or 58.94, then 27 or 38.94**	1 August 2010	10 years from installation	Tariff reduction takes effect from 1 July 2011, with overall scheme cap at 150 MW
ACT	Gross	45.7	1 March 2009	20 years from installation	Closed from 30 June 2011

** Modelling of the South Australian feed-in tariff was based on the assumption that the Government's policy amendments announced on 31 August 2010 would be successfully implemented.*

*** 47 cents/kWh applies for customers in the Synergy supply area; 58.94 cents/kWh applies in the Horizon supply area, consisting of the combined Solar Feed-in Scheme and Renewable Energy Buyback Scheme rates. These rates are subject to change.*

Note: all feed-in tariff rates are expressed in nominal terms.

2.1.2 System size

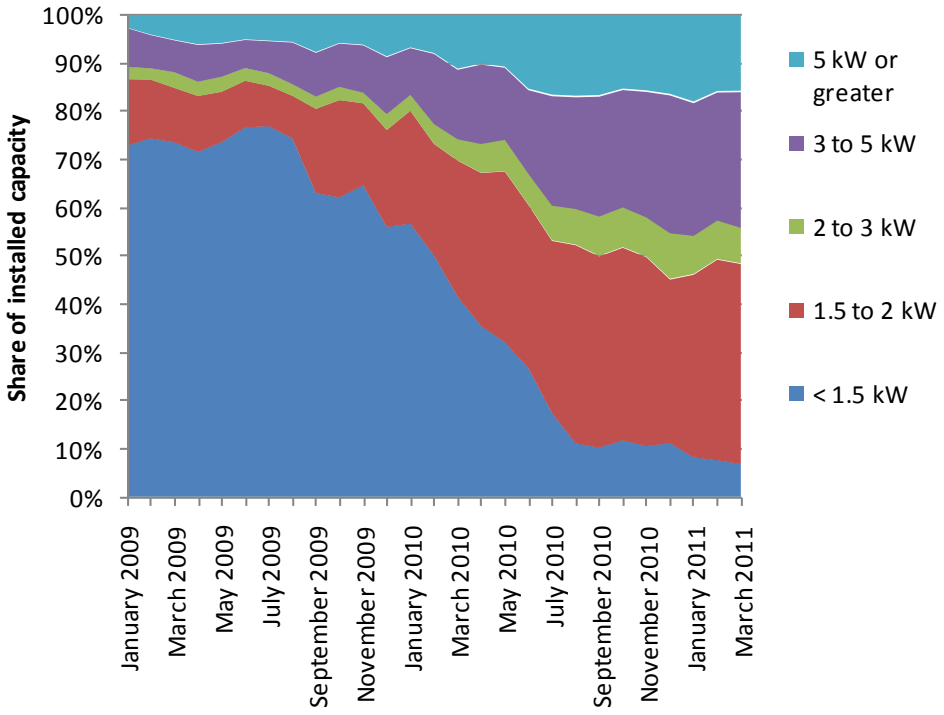
The financial return per kilowatt (kW) of installed PV capacity will vary by system size for a range of reasons including variation in installed system cost, the structure of the Solar Credits policy, caps or restrictions on feed-in tariffs, and variations in export rates according to system size.

For this reason, assumptions about system size are important to this type of financial analysis. ACIL Tasman has weighted the discounted financial return modelled in accordance with the expected proportion of systems of the relevant size are installed in any given location. This weighting approach is necessary to ensure that financial return estimates are appropriately driven by changes to the cost and return of the most common system sizes.

Figure 3 shows that a distinct change in PV system size emerged around the middle of 2009, with the change from the former Solar Homes and Communities Plan rebate policy (which delivered maximum assistance to systems of 1 kW capacity) to the Solar Credits policy likely contributing to a strong increase in the rate of installation of systems of 1.5 kW or more. The introduction of various feed-in tariffs over that time is also likely to have contributed to an increase in system size.

However, Figure 3 also demonstrates that this trend has largely stabilised, with the majority of installed capacity now coming from systems sized between 1.5 and three kW.

Figure 3 **System size trends**



Data source: ORER

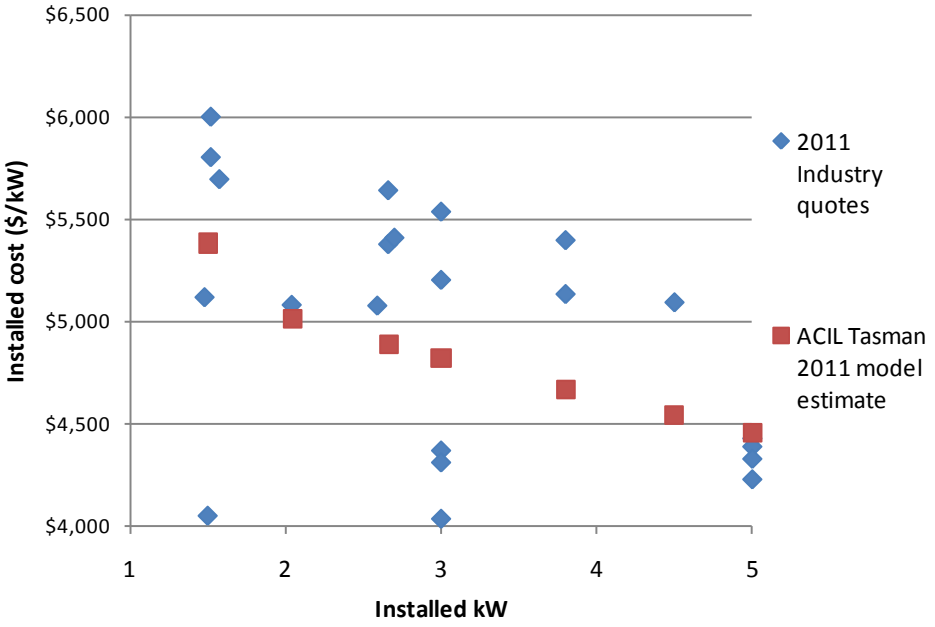
ACIL Tasman's assessment of the variation of system sizes across recent installations indicates that system size trends have largely stabilised in response to recent policy settings and reductions in system costs, sufficient to weight the paybacks for systems of a particular size on the assumption that the composition of system size will remain broadly constant over the projection period.

2.1.3 System costs

ACIL Tasman's analysis of system costs drew on a literature review of system cost components and a web-based review of public system cost quotes. The series of system cost quotes obtained indicated a large variation within common system size bands, potentially indicating a combination of variation in system quality, different treatment of non-standard installation costs and some special offers reflecting unusual market circumstances. Given the likelihood that consumers will gravitate towards lower cost systems, ACIL Tasman's system cost assumptions have erred on the lower side. This assumption also reflects the anticipated favourable conditions for purchasing PV systems wholesale given recent increases in manufacturing capacity worldwide (particularly in China).

ACIL Tasman's assumed pattern of variation in system costs by system size for the period July to September 2011 are as shown in Figure 4.

Figure 4 **June-September 2011 variation in installed system cost by size**



Note: Installed costs are GST exclusive.

Source: NUenergy,Going Solar, Solar Online and 2 confidentially provided installed system quotes; ACIL Tasman model assumptions

In turn, system costs were projected to decline in real terms. In particular, real module costs were assumed to decline at a rate of 5.5 per cent per year based on an assumed annual growth rate of module production of 22 per cent per year and a learning rate of 18 per cent (i.e. costs reduce 18 per cent for every doubling of installed capacity).[7] Conversely, other cost components were projected to reduce at a lower rate:

- inverter costs by 3 per cent real per annum (based on GreenEnergy assumptions used in its November 2010 analysis for ORER
- balance of system costs declining at 0.8 per cent per year (reflecting that these components are largely mature)
- labour efficiency improving at 2 per cent per annum, partially offset by skilled labour costs increasing at 1.4 per cent per annum (drawing on ACIL Tasman estimates of demand for and value of skilled labour).

Slight adjustments were also made to labour cost assumptions based on labour market conditions: labour costs were assumed to be 130 per cent of the base assumption in northern Western Australia, 110 per cent in south-west Western Australia and the Northern Territory, 90 per cent in lower cost jurisdictions South Australian and Tasmania, and 100 per cent elsewhere.

[7] As estimated by Hearps and McConnell, University of Melbourne Energy Research Institute, *Renewable Energy Technology Cost Review*, for the 2011 Garnaut Review, drawing on estimates by the International Energy Agency and the European Photovoltaic Industry Association.

Once installed, the output of a system is assumed to degrade by 0.5 per cent per year. System life was assumed as 25 years, with inverters replaced every 10 years.

2.1.4 Retail electricity prices

To estimate the value of retail electricity charges avoided by owners of PV systems, this financial analysis has required detailed examination of network cost trends, the level and incidence of costs associated with the Large-scale Renewable Energy Target and SRES, wholesale energy costs, retail portfolio hedging costs, retail operating costs, unique charges (e.g. the Victorian smart meters charge) and retail margins.

ACIL Tasman has used its wholesale electricity market model – *PowerMark* –to project wholesale electricity prices for this retail electricity price projection. The *PowerMark* modelling scenario utilised assumed the introduction of a carbon price from 1 July 2012.

Retail portfolio hedging costs were estimated from analysis of volatility in price trends in each energy market region, and the correlation of small customer load profiles (based on analysis of historic 'net system load profiles' published by the Australian Energy Market Operator) with price in each market region.

Network costs materially affect future retail price trends. The allocation of costs between customer classes in each state or network region was estimated through analysis of published network tariffs for different user types in each location. Cost increases were estimated from revenue allowances and load growth trends set out in network determinations approved by the Australian Energy Regulator or the Economic Regulatory Authority of Western Australia.

A portion of the bills of energy consumers takes the form of a fixed supply charge, and so cannot be avoided by producing electricity on-site using solar PV. For modelling purposes we have estimated the financial return to PV owners as amounting to 90 per cent of their retail cost in any given period, based on analysis of the typical ratio of fixed to variable bill components for small customers (this ratio would be significantly different for larger energy users). We note that whilst the true variable portion of the cost of supplying small electricity consumers is likely to be far smaller than this, and therefore the economic benefit of substituting grid supplied electricity for distributed PV generation is likely to be over-estimated by this approach, it is a reasonable approximation of the financial benefit to customers based on present bill structures.

However, where the PV system exports electricity *in the absence of a feed-in tariff*, further judgements are required as to what financial return the consumer will

receive (where a feed-in tariff is in place, the consumer will be paid for their electricity at the rate of the feed-in tariff).

Given the existence of 'standard' feed-in tariffs in Victoria and Tasmania (which effectively guarantee that "the amount you pay to consume electricity from the grid is the same amount you receive when your solar PV system generates power and that is fed back into the grid"[8]), for these jurisdictions, ACIL Tasman adopted the approach of assuming that exported electricity receives the variable component of the prevailing electricity tariff when no feed-in tariff is in place.

For other jurisdictions, ACIL Tasman has assumed that exported electricity receives the 'economically avoidable' component of retail charges in the absence of a feed-in tariff. We estimated this component as consisting of wholesale energy (including carbon) and hedging costs, and variable 'green scheme' costs. Retail operating costs, retail margins and network costs can be broadly categorised as not being economically avoidable.

2.2 Survey methodology

As discussed in Section 1, in addition to our analysis of financial returns to SGU installations, ACIL Tasman has surveyed a sample of solar PV installers to analyse the impact of transitional arrangements applying in relation to the reduction of the Solar Credits multiplier from five to three as of 1 July 2011 ('the transitional arrangements').

The survey involved telephone interviews with selected PV installers. The stakeholders were identified and initially contacted by ORER through an email advising them of the nature of the study and ACIL Tasman's role. A small number of stakeholders were identified and approached separately by ACIL Tasman.

Stakeholders identified by ORER were telephoned by ACIL Tasman between 26 May 2011 and 6 June 2011.

Given the time restrictions for this project, only a small number of PV installers were to be contacted. In total, 21 PV installers and four certificate traders were contacted, with responses from 18 installers and two traders obtained.

These installers, from whom the main data was drawn, included six large, five medium and six small businesses (with the size pre-determined by ORER).

[8] http://new.dpi.vic.gov.au/energy/policy/greenhouse-challenge/feed-in-tariffs/feed-in-tariffs-faq/standard-feed-in-tarrifs-faq; accessed 15 March 2011.

They also represented all jurisdictions[9], with the number of stakeholders having operations in each jurisdiction listed below:

- Western Australia - four
- South Australia - six
- Northern Territory - one
- Queensland - ten
- New South Wales - nine
- Victoria - seven
- Australian Capital Territory - three
- Tasmania - one.

Each stakeholder was asked three main questions:

1. Approximately how many installations will you have undertaken in the financial year 2010-11? (*Answer in units*)
2. Approximately how many installations will you undertake in the financial year 2011-12 that will be eligible for the solar credits multiplier of four? (*Answer in units)*
3. In terms of when these installations will be undertaken, please estimate how many will be undertaken in each quarter of 2011-12 financial year.
   a) 1 July 2011 to 30 September 2011 (Q1)
   b) 1 October 2011 to 31 December 2011 (Q2)
   c) 1 January 2012 to 31 March 2012 (Q3)
   d) 1 April 2012 to 30 June 2012 (Q4) (*Answer in units or per cent)*

The survey also often included discussions on other relevant issues, for example projected demand as the multiplier moves to three. However, these were not generally not structured conversations and so were not formally included as an input to the projection.

[9] Based on ACIL Tasman's review of the company websites.

3 SGU projection

3.1 Observed installation rates

3.1.1 Estimations of lag in STC creation

As noted in our November 2010 and March 2011 projections, one challenge in projecting future STC creation rates is making reliable estimates of recent installation rates and STC creation rates. This is because the primary data source in this area, the database complied by ORER and made available to ACIL Tasman to support this projection, relies on the STC creation process to provide information about installation date, location, size and other factors. The inherent lag between installation and STC creation means that this data set is not fully complete until around one year after a given period has ended.

Accordingly, a close analysis of lag rates is crucial to inform both our understanding of recent history and also our projection for 2012 and 2013.

Our estimates of lag rates were derived by firstly examining the observed STC creation rate for installations occurring in the most recent month for which complete STC creation data is available, i.e. the installation month ending one year before the data set was finalised. As the data set was current as of early June 2011, we took May 2010 as being this 'complete' data set.

For installations that occurred in May 2010, the rate of STC creation for each of the 12 months after installation can be directly observed. However, for installations occurring in more recent months this rate needs to be inferred or assumed from earlier data. For installations that occurred in June 2010, we took the data set for STCs created within 11 months of installation as complete and inferred the likely rate of STC creation in the 12th month from the May 2010 data. To infer July 2010 installation rates we drew on both the observed STC creation rate in 12th month after installation for May 2010 installations, and the observed STC creation rate in the 11th month for June 2010 installations. This process was continued for more recent months to estimate an implied 'underlying' installation rate for the 2010 calendar year from the STC creation data over the same period.

Rates for each of the 12 months were averaged across the observed and inferred data set for the period May 2010 to April 2011 and then smoothed. This analysis suggests lag rates as set out in Table 5 below.

Table 5 **Assumed lag in STC creation by SGUs over projection period**

	SGU installations creating STCs in the n^{th} month after installation			
Months (n)	April 2010	Observed/ inferred average over past 12 months	Assumed (smoothed) lag	Assumed lag (cumulative)
	%	%	%	%
1	60.7	60.6	60.5	60.5
2	18.8	17.5	17.5	78.0
3	6.3	7.0	7.0	85.0
4	5.2	3.8	3.8	88.8
5	1.1	2.4	2.5	91.3
6	1.0	1.7	1.8	93.0
7	2.4	1.8	1.8	94.8
8	1.9	1.4	1.0	96.0
9	0.8	0.9	1.0	97.0
10	0.3	1.1	1.0	98.0
11	0.4	1.1	1.0	99.0
12	1.1	0.9	1.0	100.0

Note: Totals may not add due to rounding.

Data source: ORER; ACIL Tasman assumptions.

It is worth noting that, after an increase in observed lag rates through 2009, STC creation has tended to follow installation more promptly during 2010 and the first part of 2011. Assuming there have been no rapid changes in lag rates that are too recent to be picked up by the methodology we have adopted, this would indicate that we are able to make more reliable estimates of recent installation rates and therefore of likely installation rates over the remainder of 2011 and into the projection period.

3.1.2 Implied recent installation rates

ACIL Tasman's analysis indicates that installation rates of PV units have generally increased or remained at extremely elevated levels up to and including the most recent data available. December 2010 is something of an exception, but likely reflects seasonal holidays impacting on installation rates) Whilst data available at the time of writing for April 2011 and indicates a slight reduction on March 2011 levels, early data for May 2011 indicates that this month is likely to exceed March's previously unprecedented installation rates.

To allow for a meaningful analysis of the most recent data available whist allowing for the lag effect noted above, ACIL Tasman has focused on the number of installations where STCs have been created within 60 days of installation. This allows reasonably robust comparisons to be made with data from as late as March 2011 and data from earlier months.

Table 6 shows national installation rates for each month since April 2010, both in absolute terms, and comparing installations where STCs were created within 60 days (to allow comparison with more recent months). Finally, the table illustrates an 'implied' installation rate for recent months based on the assumed lag factors in Table 5 above.

The reader may note that the percentage of installations creating STCs within 60 days tends to increase in recent periods: this is because more recent installations that will ultimately create STCs 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 per cent of observed STC creation will occur within 60 days. As further STC 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 STCs are created by installations undertaken in those months.

Table 6 **SGU installations rates**

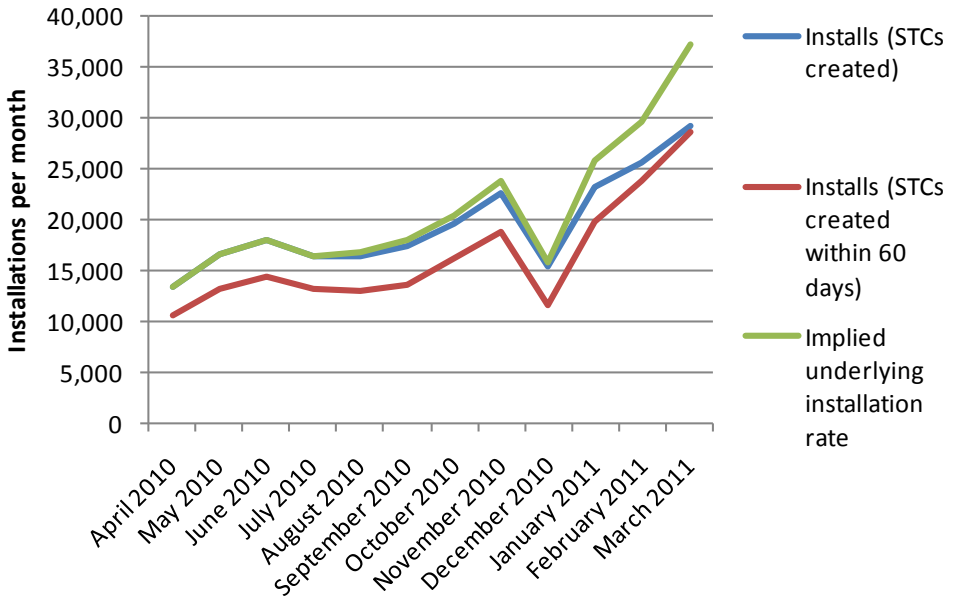
Month	Installs (total)	Installs (STCs created within 60 days)	% of installs with STCs created within 60 days	Assumed % of installs creating STCs within 60 days	Implied install rate
April 2010	13,427	10,671	79.5%	79.5%	13,427
May 2010	16,692	13,207	79.1%	79.1%	16,692
June 2010	17,970	14,422	**80.3%**	79.7%	18,088
July 2010	16,321	13,139	**80.5%**	80.4%	16,342
August 2010	16,435	12,925	**78.6%**	77.2%	16,738
September 2010	17,387	13,513	**77.7%**	75.4%	17,927
October 2010	19,607	16,164	**82.4%**	79.2%	20,417
November 2010	22,615	18,825	**83.2%**	79.3%	23,736
December 2010	15,384	11,644	**75.7%**	73.8%	15,782
January 2011	23,207	19,741	**85.1%**	76.6%	25,782
February 2011	25,655	23,735	**92.5%**	80.2%	29,580
March 2011	29,299	28,528	**97.4%**	76.8%	37,157

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

Data source: ORER.

This same data is illustrated in Figure 5.

Figure 5 **SGU observed and implied installation rates – April 2010 to March 2011**



Data source: ACIL Tasman manipulation of ORER data.

3.2 Assumed installation rates

3.2.1 April, May and June 2011

Installation rates for the months of April, May and June 2011 cannot be precisely estimated based on ORER data, due to the incomplete nature of the data set for these months available at the time of writing. Nevertheless, sufficient data is available for April and May 2011 to make preliminary estimates for those months.

Further, the Commonwealth Government's 5 May announcement regarding the reduction in the Solar Credits multiplier can be reasonably expected to create a rush of installations prior to 30 June to capture the full Solar Credits multiplier of five without the need for precise data to support this. The difficulty in this projection is to estimate the likely extent to which the industry's installation capacity can increase in response to the incentive created by the imminent change in policy.

To estimate installation rates through April and early May 2011, ACIL Tasman has analysed daily installation rate data distinguishing between installations that create STCs within a certain number of days. To capture as full a data set as possible, the data set analysed for this purpose was prior to audit of the validity of registered installations. Therefore, whilst a portion of these installations may be found invalid during audit, assuming the level of invalid registrations holds

broadly constant over the period analysed, the data set will give reliable indicators of the relative size of the months analysed on the same basis. Accordingly, the relative level of installations in April and May in comparison to March was estimated using this approach, but the absolute level was calibrated from March data once invalid registrations had been removed.

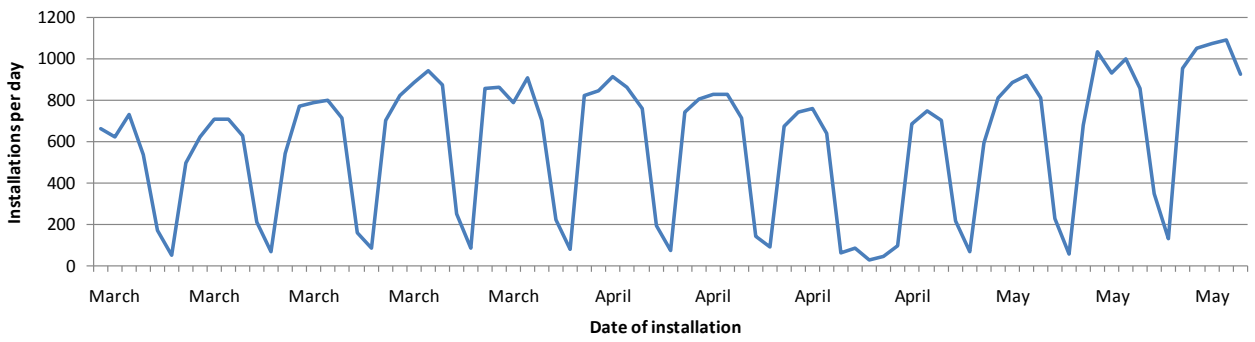
Given the date of the data provided for the purpose of this analysis, full comparisons could be made for the months of March, April and early May for installations creating STCs within 30 days of installation, whilst comparisons of activity levels through most of May with March and April could be made for installations where STCs are created within 15 days.

The figures below clearly show the weekly patterns in installations, and illustrate the lower weekly peaks in installation rates in April than in March. These figures also illustrate the impact of Easter on April 2011 installation rates.

In relation to May, the 15 day data set illustrated below indicates a strong reaction to the Government's 5 May announcement in relation to the change to the Solar Credits multiplier. In particular, weekday installation rates in the week 16 to 20 May appears to have reached around 140 per cent of average March levels, whilst weekend installation rates have accelerated to an even greater extent.

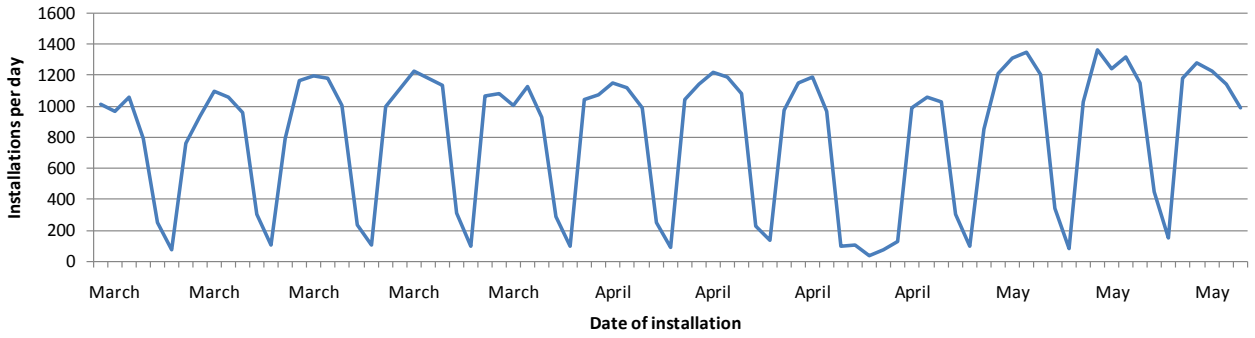
Given the difficulty in obtaining and training appropriately skilled personnel to install PV systems, particularly at short notice for a work 'boom' that is likely to last less than two months, a key area where the industry might achieve greater installation capacity is through working on weekends. Accordingly, it is of potentially high significance that the early data set indicates an industry reaction in this direction.

Figure 6 **Comparison of installations on a daily basis (March to May 2011) – installations creating STCs within 15 days**



Data source: ORER

Figure 7 **Comparison of installations on a daily basis (March to May 2011) – installations creating STCs within 30 days**



Data source: ORER

Based on our analysis of this early data, we have estimated that the number of installations in April 2011 is likely to approach around 90 per cent of March 2011 levels. Strong installation rates through much of the month were offset by the effect of the Easter long weekend.

ACIL Tasman has assumed that May 2011 installation rates will reach around 120 per cent of March 2011 levels, reflecting the delayed effect of the 5 May announcement: the second two weeks of May are likely to have witnessed significantly stronger installation rates than the first two, approaching 140 per cent of March 2011 levels.

As June 2011 will be characterised by a full month of installers seeking to maximise access to the Solar Credits multiplier of five, we have assumed an installation level of 130 per cent of March 2011 levels. In other words, we anticipate that June 2011 will strongly exceed March 2011's unprecedented levels of solar PV installation, notwithstanding the long weekend and the potential for installation rates to be hampered by poor weather.

3.2.2 Post June 2011 installation rates

Around 97 per cent of SGU installations have occurred in the states of New South Wales, Queensland, Victoria, Western Australia and South Australia since 2001. Accordingly, likely installation rates (and therefore STC creation rates), can be analysed substantially through understanding financial returns to potential solar PV system owners in these five states.

ACIL Tasman has analysed payback and financial return estimates from 2008 through the projection period to infer estimated installation rates in each of these five States.

The primary financial return variable analysed was a discounted financial return per kW to system owners. The discounted variable was adopted as it was considered to offer a stronger representation of household responses to short-term and longer-term incentives for PV installation. Whilst households may not apply a formal process of discounting in any financial analysis, the general desire of this consumer sector for short payback times and reduced out-of-pocket expenses indicates the value of using a discounted rather than an undiscounted financial return as the primary variable for analysis.

The financial return was calculated on a per kW basis to allow clearer comparison between jurisdictions (e.g. in the event that average system sizes vary) and to create a single comparable variable to estimate the financial return of a range of system sizes (see section 2.1.2).

The installation projection was based on ACIL Tasman's econometric analysis of historic payback and installation data, which implied a log linear relationship between discounted financial returns and solar PV installation rates.

However, due to the unprecedented level of installations in February and March 2011, and the likely extreme levels of installations in May and June 2011 (due to a rush to receive government subsidies while they remain available), there are limits on the predictive power of econometric analysis looking for explanatory variables in historic data.

As can be seen from a comparison of econometric predictions using data to the end of 2010 with implied early 2011 installations results, the unprecedented market circumstances in place during the first part of this year were not fully captured by econometric predictions of consumer responses to increased paybacks.

This is in large part due to the likely factor at play of consumers not only considering present paybacks to PV installations, but the imminent reduction in paybacks from 1 July 2011 on the reduction of the Solar Credits multiplier. This being the case, the present rate of installations is a response not only to present payback levels, but to the anticipated difference (reduction) in paybacks between the present the near future.

Accordingly, our assumptions for after June 2011 imply installations returning to a level that can be explained by historic payback levels and installation rates. Implicitly this captures two partially offsetting factors: the solar PV industry has expanded in size and increased the sophistication of its marketing, potentially increasing its scope for reaching and attracting customers. Further, the increased scope of the industry is likely to result in increased awareness of consumers to the use of solar PV.

Conversely, the success of the industry in ramping up capacity over recent years is also likely to mean that a large number of highly suitable potential PV customers have already taken up a PV system. This dynamic could work to reduce future installation rates once paybacks have reduced. In effect, pre-announced changes to government policy settings appear to have resulted in a significant 'bring forward' of demand for solar PV from the second of half of 2011 and beyond. In effect, a range of consumers who may have been considering solar PV installations are likely to have accelerated their decision in response to the foreshadowed policy changes, including both the original change in the Solar Credits multiplier of four and pre-announced closures of feed-in tariffs such as in South Australian and Western Australia.

On balance, the 'return to trend' over late 2011 indicates that the artificial bring forward of demand in 2011 is broadly offset by the increased scope and sophistication of the installation industry over recent years.

State-specific trends that were applied when adjusting the forecast installation trends are discussed below.

3.2.3 New South Wales

Installation rates in NSW are assumed to remain elevated throughout much of 2011 as a result of the generous 2010 Solar Bonus Scheme policy settings and the lag between these being committed and installed. As most installations currently occurring can reasonably be assumed to have been committed on the basis of receiving the original 60 cents/kWh gross feed-in tariff, it is somewhat difficult to discern the likely reaction of consumers to the absence of the feed-in tariff in future.

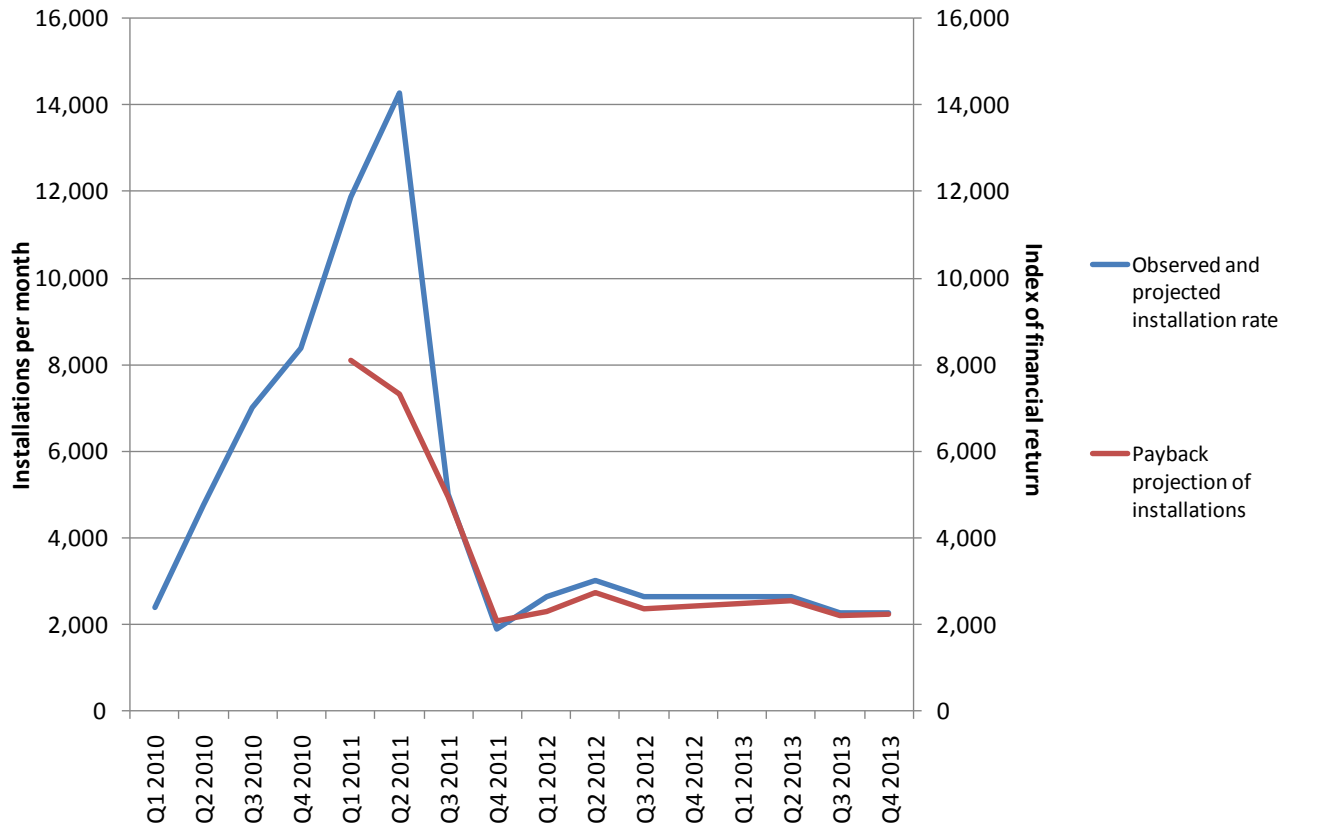
For these purposes, we assumed elevated installation rates (and financial returns reflecting the original Solar Bonus Scheme policy settings) until the back log of installations is worked through. Based on current installation rates in NSW, this implies that the extremely elevated installation rates of late 2010 and early 2011 will reduce from around July 2011. At that point it is likely that the level of installations in NSW will reduce dramatically to a level reflecting demand in the absence of a feed-in tariff and under the lower Solar Credits multiplier.

Given these circumstances, it is reasonable to expect a very significant short-term drop-off in demand in NSW, given the highly generous policy settings for solar PV would have brought forward substantial amounts of demand, and the likely reaction of consumers to the withdrawal of this assistance.

Correspondingly, the projected installation rate for PV in NSW shown in Figure 8 suggests a 'bottoming out' of the NSW market in the last quarter of

calendar year 2011, before a slight rebound in early 2012 and stabilisation over the remainder of the projection period. These estimates imply a 'sustainable' size of the NSW industry around 20 per cent of the inflated early 2011 size of the industry, or around 40 per cent of its size through 2010.

Figure 8 **NSW installation rates and discounted financial returns**



Source: ACIL Tasman analysis

3.2.4 Queensland

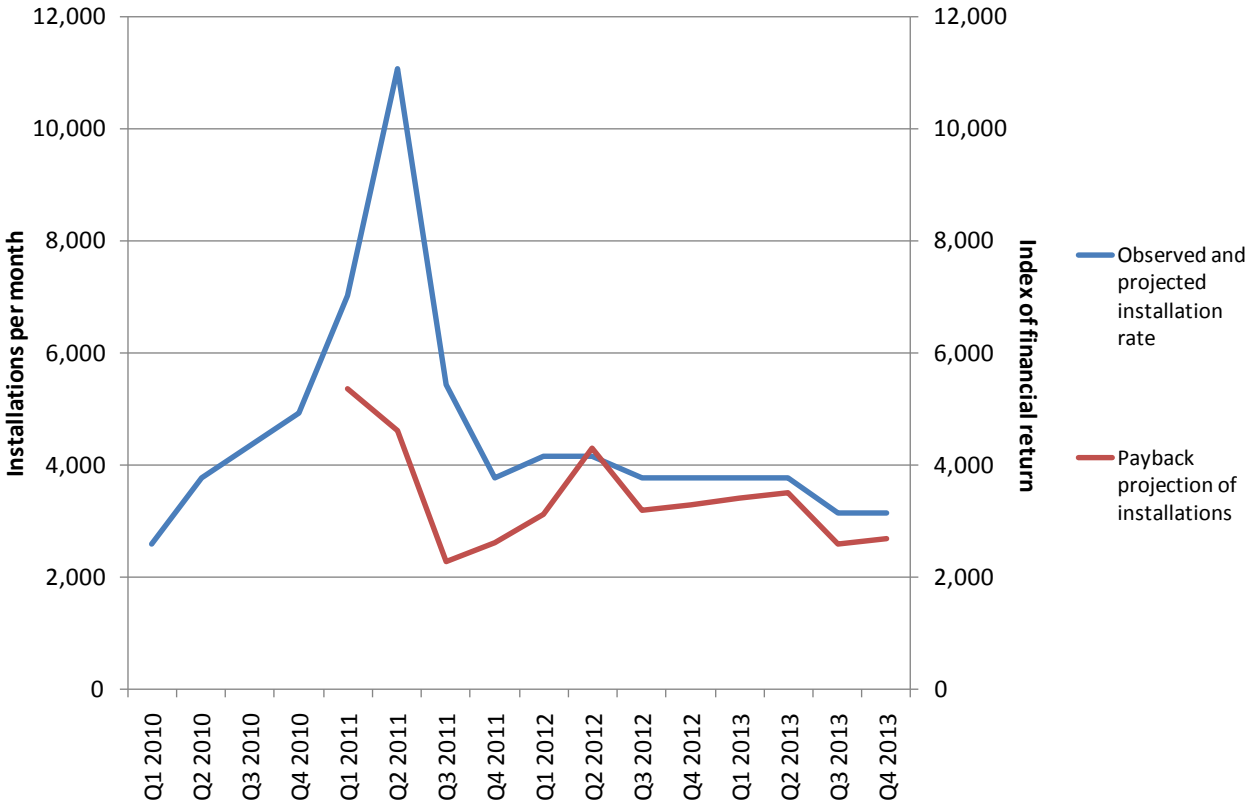
Recent installation rates in Queensland suggest a very strong response by consumers in that state to the announced reduction in the Solar Credits multiplier from 1 July 2011, with high installation rates through early 2011 (i.e. since the December announcement of the reduction in the multiplier to four).

Further, unlike in New South Wales, the Queensland feed-in tariff is uncapped and so is available throughout the projection period, reducing the impact of the reduction in the Solar Credits multiplier on paybacks and installation rates.

Nevertheless, our analysis indicates a material drop in paybacks from 1 July 2011, with the compounding effect of 'brought forward' demand suggesting a likely substantial drop off in installations in Queensland.

Our payback projection suggests that installation rates of 35-45 per cent of early 2011 levels may be sustainable given the future reduced returns to solar PV owners in Queensland. Figure 9 illustrates this payback projection and the assumed stronger ongoing installation rate.

Figure 9 **Queensland installation rates and discounted financial returns**



Source: ACIL Tasman analysis

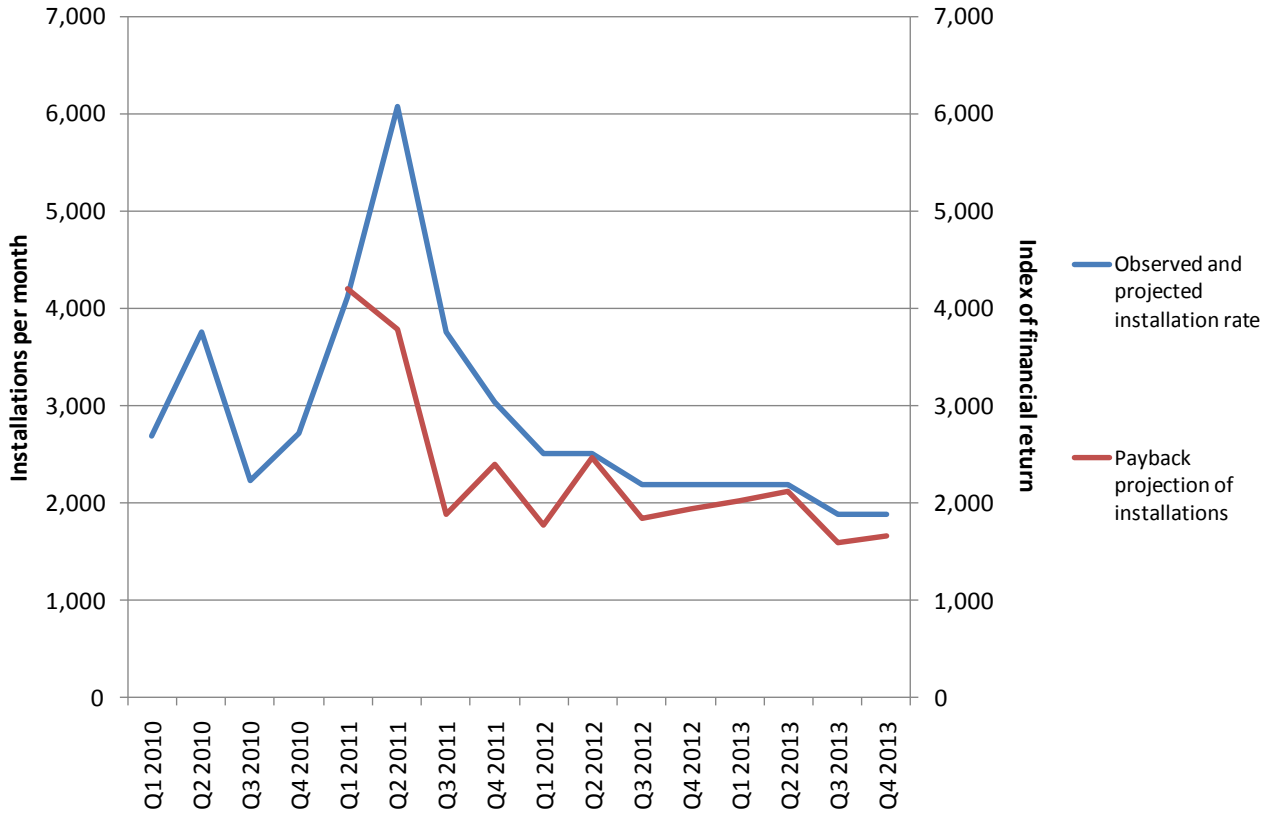
3.2.5 Victoria

Whilst the financial return to installers of PV in Victoria has not peaked to the same degree as seen in NSW, the early months of 2011 have nevertheless witnessed unprecedented levels of installations in that state. In turn, this increase in installations has seen the Victorian Government's 100 MW cap on its feed-in tariff reached and surpassed. As discussed in section 2.1.1, ACIL Tasman has assumed that the Victorian Government will cap its feed-in tariff such that it will not be available for installations from the start of 2012.

Our payback projection suggests that, once the Victorian feed-in tariff ceases to be available installation rates in Victoria could decline to a level around 35-45 per cent of early 2011 levels. The level of this decline in this state reflects in

part the less extreme spike in installations seen in Victoria compared to other jurisdictions.

Figure 10 **Victorian installation rates and discounted financial returns**

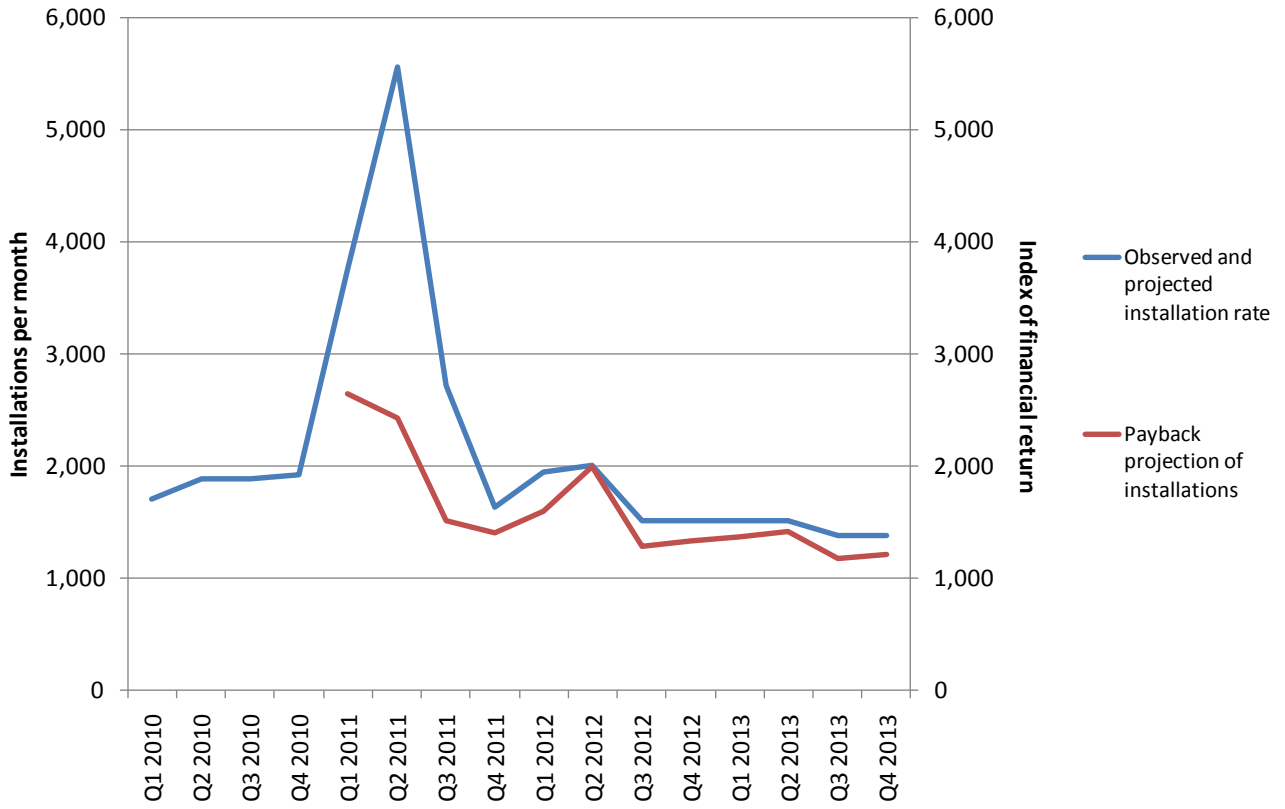


Source: ACIL Tasman analysis

3.2.6 Western Australia

The policy changes impacting financial returns to solar PV systems are evident in Western Australia through both the Solar Credits multiplier reduction and the WA Government's announced reduction in its feed-in tariff rate from 1 July 2011. The gradual phase-out of the WA feed-in tariff contributes to a two-step decline in installation rates over the projection period: an initial reduction to around 40-45 per cent of peak early 2011 levels in the period 2011-12, and then a further reduction to around 30-35 per cent following the capping of the 20 cents/kWh feed in tariff and further reduction of the Solar Credits multiplier from the middle of 2012. This is illustrated in Figure 11.

Figure 11 **Western Australian installation rates and discounted financial returns**



Source: ACIL Tasman analysis

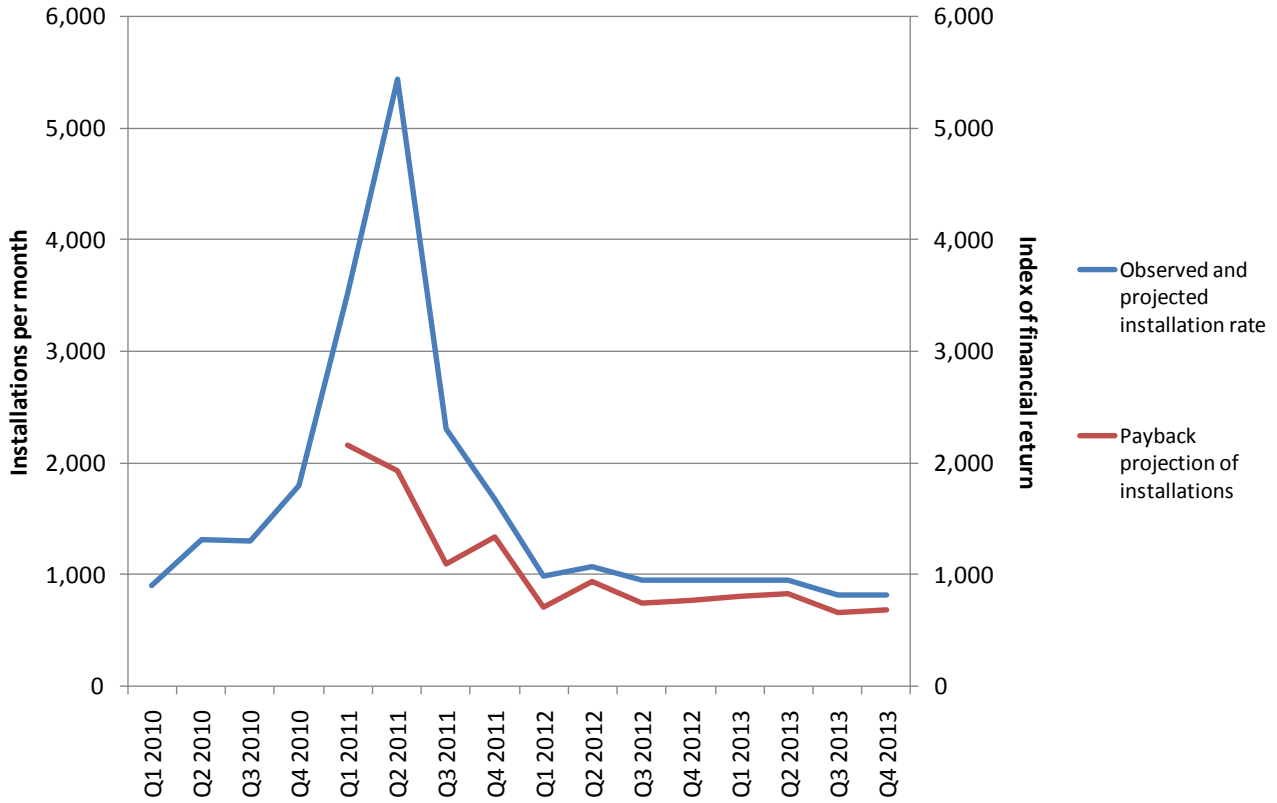
3.2.7 South Australia

The South Australian Government's announced closure of its feed-in tariff as of 1 October 2011 complicates the payback analysis for this state, as the likely bringing forward of installations to receive the Solar Credits multiplier of five is likely to be softened by the remaining availability of the feed-in tariff after that date, albeit for a limited time.[10]

However, whilst the stepping down of paybacks and installation rates reflecting this sequence of policy changes is relevant to this projection, the level of installations is projected to ultimately stabilise around 20 per cent of the peak 2011 level in South Australia. This reduction is illustrated in Figure 12.

[10] This analysis was completed prior to the passage of legislation in South Australian Parliament providing for a transitional feed-in tariff of 16 cents/kWh for a two year period following the closure of the original scheme.

Figure 12 **South Australian installation rates and discounted financial returns**



Source: ACIL Tasman analysis

3.2.8 System size

As noted above in section 2.1.2, the relative portion of system sizes has tended to stabilise under present policy settings. Although future changes to policy settings may cause these to change over the projection period, ACIL Tasman has generally assumed that recent system size averages will be largely maintained over the projection period.

Whilst the progressive reduction of the Solar Credits multiplier tends to reduce the difference in financial attractiveness of systems of above and below 1.5 kW in capacity, any changes resulting from this trend are likely to be offset by reductions in the cost per watt of PV modules, and the corresponding increase in meter, inverter and installation costs as a share of total system cost. This tends to improve economies of scale and reduce the attractiveness of very small systems over time.

Given the structure of the Solar Credits policy, where the first 1.5 kW for each installation create STCs at a different rate than later units of capacity, it is

necessary to consider the portion of systems that are greater than or less than 1.5 kW in size, and the average size of each of these system types.

Very recent data (from around November 2010 onwards) suggests a slight reduction in the average size of systems over 1.5 kW in size, levelling out at around 2.3 kW. The same data also indicates that systems below 1.5 kW have been steadily approaching 1.5 kW in capacity on average as very small systems lose popularity, with recent averages in this category very close to 1.4 kW in most jurisdictions. Trends in all jurisdictions have broadly converged, and so we have adopted common national assumptions in this regard from June 2011 onwards, with only the proportion of smaller systems varying by jurisdiction as set out in Table 7.

Table 7 **Assumed system sizes**

Location	% of units equal to or above 1.5 kW	Average size of units equal to or above 1.5 kW	% of units below 1.5 kW	Average size of units below 1.5 kW
	(%)	(kW)	(%)	(kW)
NSW	85	2.3	15	1.4
Queensland	85	2.3	15	1.4
Victoria	85	2.3	15	1.3
WA	85	2.3	15	1.4
SA	85	2.3	15	1.4
Tasmania	75	2.3	25	1.4
NT	75	2.3	25	1.4
ACT	85	2.3	15	1.4

Data source: ACIL Tasman assumptions.

3.2.9 Eligibility for Solar Credits

Our analysis of historic STC creation data supplied by ORER suggests that close to 100 per cent of SGU installations presently receive Solar Credits. Whilst a portion of systems may be ruled to be ineligible (e.g. due to participation in the National Solar Schools Program or the Renewable Remote Power Generation Program), recent data suggests close to 100 per cent access to Solar Credits. For simplicity we have assumed 100 per cent eligibility for Solar Credits in this projection.

3.2.10 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 per cent in each month.

For simplicity we have assumed 100 per cent use of the 15-year deeming period throughout the projection period.

3.2.11 Location of installations

Solar PV locations in areas with different levels of solar irradiation can create STCs at different rates. The *Renewable Energy (Electricity) Regulations 2001* provides for four zones, with Zones 1 and 2 having higher solar irradiation, and therefore STC creation per kW installed, than Zones 3 and 4.

For the purpose of this analysis ACIL Tasman has assumed that the zonal location of installations in each State remain constant at the observed average since January 2010 over the projection period. These assumptions are set out in Table 8 below.

Table 8 **Location of solar PV installations since January 2010**

Jurisdiction	Zone 1 installations	Zone 2 installations	Zone 3 installations	Zone 4 installations
	(%)	(%)	(%)	(%)
New South Wales	-	6	92	2
Victoria	-	-	5	95
Queensland	-	1	99	-
South Australia	-	1	98	1
Western Australia	1	4	94	2
Tasmania	-	-	-	100
Northern Territory	33	67	-	-
ACT	-	-	100	-

Data source: ORER.

3.3 Impact of transitional arrangements

ACIL Tasman's survey of system suppliers reached installers who collectively estimated their 2010-11 PV installations (including projected installations from the date of interview to 30 June) to total around 80,000. Given ACIL Tasman's analysis of past and current installation rates implies a total level of installations Australia-wide of around 350,000, the survey can be considered to have reached around one-quarter of the PV installation market.

The survey also reached two LGC/STC traders, bringing the total reach of the survey closer to one-third of the PV installation market. However, the STC traders operated on a basis of registering STCs on behalf of other installers, and so did not have visibility of upcoming installation rates or other factors relevant to the transitional arrangements.

The survey identified around 3,700 installations that were expected to qualify for the Solar Credits multiplier of four at the time of interview. Whilst the small survey size means that there is some uncertainty about how this observation would translate across the industry, given the time and resource constraints on the survey, for these purposes it is reasonable to extrapolate from this observation to conclude that around 17,000 installations were expected to qualify for the multiplier of four given forward work plans of the installers.

Further, ACIL Tasman has considered that, given the elevated level of installations likely to occur up until 30 June 2011, there is significant scope for unexpected slippage of installations beyond 30 June. This is particularly the case given the potential for poor weather to impact on installation rates. Given the nature of pre-commitments required by many installers, in turn it is reasonable to assume that a large portion of these delayed installations would also qualify for the multiplier of four.

Accordingly, ACIL Tasman has assumed around a further 8,000 installations will receive the multiplier of four due to slippage, representing around a sixth of each jurisdictions' June 2011 installation rate.

The survey reached a range of nation-wide PV installers, as well as locally based installers. For reasons of practicality and to maximise participation, state-level breakdowns of four multiplier installations were not requested.

Accordingly the expected four multiplier installations have been allocated to various states (and thereby to various solar irradiation zones) on a pro-rata basis.

The effect of these assumptions are as set out in Table 9.

Table 9 **Additional STCs created due to transitional arrangements**

Jurisdiction	Anticipated four multiplier installations	Unanticipated four multiplier installations	Additional STCs created by four multiplier installations
NSW	6,341	2,710	278,633
Victoria	2,312	1,110	90,340
Queensland	4,176	2,004	190,236
South Australia	1,839	993	87,198
Western Australia	2,000	1,001	92,407
Tasmania	83	44	3,359
Northern Territory	16	5	695
ACT	232	132	11,227
Australia	**17,000**	**8,000**	**754,094**

Note: Additional STCs refers to the difference in the number of STCs the relevant installations would create assuming a multiplier of four and the number of STCs that the same installations would create under a multiplier of three.

Data source: ACIL Tasman survey and additional assumptions.

3.4 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 2012 installations will not be created until 2013 and, similarly, some 2011 installations will create STCs in 2012.

Our projection of the number of STCs that will ultimately be created by installations that will physically occur in 2011, 2012 and 2013 is set out in Table 10 (rounded to the nearest 10,000 STCs).

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

Jurisdiction	2011	2012	2013
	(000s)	(000s)	(000s)
NSW	15,760	3,010	1,810
Victoria	6,400	2,250	1,300
Queensland	12,280	4,360	2,550
SA	5,880	1,080	650
WA	6,260	1,970	1,070
Tasmania	220	80	40
NT	50	60	40
ACT	850	190	100
Australia	**47,700**	**13,000**	**7,560**

Data source: ACIL Tasman analysis

As noted above, the lag between installation and STC creation means that the rate of STC creation in the projection period (the object of this analysis) is somewhat different from those presented in Table 10.

Allowing for lag has the effect that the rate of STC creation is higher in 2012 than would be implied by the rate of installation in that year, reflecting a hangover from the higher rate of installation in 2011. Similarly, the rate of STC creation in 2013 is higher than implied by the installation rate in that year, due to the higher projected installation rate in 2012 than 2013.

The lag rates applied for this adjustment are as shown in Table 5, with the results of the overall projection expressed in terms of STC creation by creation date presented in Table 11.

Table 11 **Projected STC creation by SGUs – by year of certificate creation**

Jurisdiction	2011	2012	2013
	(000s)	(000s)	(000s)
NSW	15,090	3,430	1,930
Victoria	5,960	2,500	1,390
Queensland	11,530	4,740	2,730
SA	5,550	1,320	690
WA	5,900	2,180	1,140
Tasmania	200	80	50
NT	40	60	40
ACT	800	230	110
Australia	**45,070**	**14,540**	**8,080**

Data source: ACIL Tasman analysis.

4 STC creation by SWH

ACIL Tasman has analysed STC creation data by SWHs for early 2011 for comparison with our March 2011 projection.

As policy variables do not impact STC creation by SWHs to the same extent as SGUs, underlying trends in this data set did not provide a basis on which to update our earlier SWH projections. On this basis, ACIL Tasman has retained the range of SWH STC projections (upper and lower estimates) from March 2011. These are replicated for completeness below.

ACIL Tasman's upper and lower projections of STC creation by SWHs according to the date of installation (rather than the date of STC creation) are shown in Table 12.

Table 12 **Projected STC creation by SWHs – by year of installation**

Jurisdiction	2011		2012		2013	
	Upper estimate	Lower estimate	Upper estimate	Lower estimate	Upper estimate	Lower estimate
	(000s)	(000s)	(000s)	(000s)	(000s)	(000s)
NSW	1,180	1,170	1,580	740	1,680	740
Victoria	660	650	930	510	980	510
Queensland	1,070	1,060	1,470	820	1,510	820
SA	180	180	300	170	310	170
WA	450	440	570	390	620	390
Tasmania	30	30	50	20	60	20
NT	30	30	50	30	50	30
ACT	30	30	50	30	60	30
Australia	**3,630**	**3,590**	**5,000**	**2,710**	**5,270**	**2,710**

Data 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 RECs in 2010 to STCs in 2011, and the delayed effect of changes in installation rates on STC creation rates.

Our upper and lower projections of likely STC creation by SWHs for the projection period by creation month, taking into account this lag, are set out in Table 13.

Table 13 **Projected STC creation by SWHs – by year of certificate creation**

Jurisdiction	2011		2012		2013	
	Upper estimate	Lower estimate	Upper estimate	Lower estimate	Upper estimate	Lower estimate
	(000s)	(000s)	(000s)	(000s)	(000s)	(000s)
NSW	910	700	1,550	740	1,680	740
Victoria	740	550	930	530	980	510
Queensland	1,050	740	1,440	820	1,510	820
SA	210	140	290	160	310	170
WA	470	350	570	390	620	390
Tasmania	50	30	50	20	60	20
NT	30	30	50	30	50	30
ACT	30	30	50	30	60	30
Australia	**3,490**	**2,570**	**4,930**	**2,720**	**5,270**	**2,710**

Data source: ACIL Tasman analysis.

5 Conclusion

The unprecedented levels of solar PV installations through the first half of 2011, even when combined with significantly lower (but still historically strong) levels of PV installation through the remainder of 2011 and 2012, indicates that the 2012 STP will be substantially higher than that set for 2011.

In total, this projection anticipates a level of STC creation in 2012 in the range of 17.2 to 19.5 million, as shown in Table 14. However, this projection also indicates excess STC creation in 2011 (i.e. in excess of the legislated STC surrender level of 28 million) of around 20 million.

This in turn would imply that the STP for 2012 would be set at a level in the range of 37 to 40 million STCs in order to result in the surrender of the STCs created in 2012 as well as the overhang from 2011.

Table 14 **Projected STC creation – by year of certificate creation**

	2011	2012	2013
	(000s)	(000s)	(000s)
SGUs	45,070	14,540	8,080
SWHs upper estimate	3,490	4,930	5,270
SWHs lower estimate	2,570	2,720	2,710
Total – upper estimate	**48,560**	**19,470**	**13,350**
Total – lower estimate	**47,640**	**17,260**	**10,790**
Legislated STC surrender	28,000	N/A	N/A
Excess STC creation in 2011 – upper estimate	20,560	N/A	N/A
Excess STC creation in 2011 – lower estimate	19,640	N/A	N/A
Implied target for STC surrender – upper estimate	N/A	40,030	13,350
Implicit target for STC surrender – lower estimate	N/A	36,900	10,790

Data source: ACIL Tasman analysis

A Acronyms used

Acronym	Term
kW	Kilowatt
kWh	Kilowatt-hour
LGC	Large-scale Generation Certificate
LRET	Large-scale Renewable Energy Target
MW	Megawatt
ORER	Office of the Renewable Energy Regulator
PV	Photovoltaic
REC	Renewable Energy Certificate
SGU	Small Generation Unit
SRES	Small-scale Renewable Energy Scheme
STC	Small-scale Technology Certificate
STP	Small-scale Technology Percentage
SWH	Solar water heater

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