REC AGENTS ASSOCIATION (RAA)

RESPONSE

TO

THE CLIMATE CHANGE AUTHORITY'S STATUTORY RENEWABLE ENERGY TARGET REVIEW

14 SEPTEMBER 2012.

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1. INTRODUCTION

1.1 The REC Agents Association[1].

The REC Agents Association (**RAA**) was established in late 2011 by a group of some of the largest independent traders of Renewable Energy Certificates (**RECs**) in Australia as a national not-for-profit industry association. The RAA represents agents registered with the Clean Energy Regulator (**CER**) that creates RECs and other environmental certificates.

The RAA defines, encourages and promotes best practice in the REC industry to new and potential REC Agents as well as other stakeholders primarily through the Committee of Management ensuring its members adhere to its Code of Conduct and Accreditation requirements.

The RAA has been established to allow for different levels of membership from Gold, Silver, Associate and General membership levels to allow for all REC Agents to become members and work towards accreditation.

1.2 Outline of RAA's Response

RAA is delighted to respond to the Renewable Energy Target Review (Issues Paper) August 2012 as part of the Climate Change Authority's (**CCA**) statutory review of the Renewable Energy Target (**RET**) implemented pursuant to the Renewable Energy (Electricity) Act 2000 (**RE Act**) and the Renewable Energy (Electricity) Regulations 2001.

In support of our submission we have also included the following supporting documents:

- Impact on electricity prices (**Attachment 1**);
- RAA Fact Sheet 1 – Solar Systems creating RECs (15 August 2012) (**Attachment 2**); and
- Report: Impact of Market Based Measures on NEM power Consumption (June 2012) (**Attachment 3**).

RAA has specifically focused its submission on the Small-scale Renewable Energy Scheme (**SRES**) and we believe that the SRES is successfully working to deliver on the "objects" of the RE Act[2] namely:

- To encourage the additional generation of electricity from renewable sources; and
- To reduce emissions of greenhouse gases in the electricity sector; and
- To ensure that renewable energy sources are ecologically sustainable,

[1] See: <<http://www.recagents.asn.au>> last accessed 13 September 2012.
[2] s.3 of the Renewable Energy (Electricity) Act (Cth) 2000

through the issuing of certificates for the generation of electricity using eligible renewable energy sources and requiring certain purchasers (**Liable Entities**) to surrender a specified number of certificates for the electricity they acquire during a year.

RAA supports the Government's appreciation of the need to continue to support the SRES by its position that if the uptake of small-scale technologies is greater than anticipated, the Large-scale Renewable Energy Target (**LRET**) will not be reduced[3].

RAA also takes comfort in the Howard Government's endorsed Tambling Review (2003), which categorically endorsed the position for a fixed GWh target in order reduce market and investment uncertainty. With the 2020 electricity demand unknown, the uncapped nature of the SRES and the future output of pre-1997 capacity (mainly hydro strongly affected by rainfall), it is in RAA's view dangerous to review the output of the RET at a point in time as justification for reducing the output of renewable energy under the RET from the current targets. Due to these uncertainties, the current RET target could be less than 20% of electricity generation, especially if GDP growth and electricity consumption increases noting that we are about to enter into an El Nino weather pattern which is likely to increase consumption[4] and reduce the level of rainfall and subsequent hydro generation from pre-existing generators.

The fact that electricity demand has decreased recently is positive from many perspectives, however, the very nature of the electricity market is uncertain as is historically proven with many factors contributing to demand reductions.

RAA believes that the RET is complementary to the:

- Carbon Pricing Mechanism (**CPM**) in that the CPM incentivises the lowest form of abatement of GHG gases, not necessarily renewable energy generation. With the removal of the "floor price" from 1 July 2015, the top up benefit of the RET to deliver renewable energy is even more important as there is increased uncertainty of the carbon price during the flexible price period which is likely to place pressure on the "objects" of the RE Act; and

- the Clean Energy Finance Corporation (**CEFC**) because with an oversupply of RECs, liable parties have not been required to enter into Power Purchase Agreements (**PPAs**) in any meaningful way. Further, the liable entities are likely to only enter into PPAs from established technologies such as wind generation and thus other technologies will not receive funding support and diversify Australia's electricity mix without the CEFC funding.

As a general comment about the RET, the RAA believes that a transparent, long living and clear (**TLC**) approach to the RET should be endorsed by the Government to ensure private sector investment in the industry continues to enable the "objectives" of the RE Act to be achieved and to facilitate the delivery of the environmental, equitable and economic returns to the Australian public and Australian Government.

2. SRES SCHEME PERFORMANCE

2.1 Introduction

The SRES has been successful in developing the solar industry in Australia. It has

[3] Australian Government, "Enhancing the Renewable Energy Target Discussion Paper" March 2010.
[4] Australian Government Climate Change Authority, "Renewable Energy Target Review, Issues Paper, August 2012" at 23.

resulted in more than 1.5 million solar systems being installed across the country with nearly one in five families having embraced solar.

The cost of solar PV systems has reduced considerably over the last few years with around 2,200 MW of PV capacity expected to be installed by end of 2012[5].

The roll-out of solar has led to a material reduction in electricity consumption which in turn has contributed to a reduction in wholesale electricity prices.

The SRES has largely worked as expected and is assisting households, small businesses and community groups with the upfront cost of installing small-scale renewable energy systems. The importance of the SRES should not be underestimated because prior to the SRES, small-scale renewable energy systems could not attract funding from financiers due to transactional costs and scale. The rationale for creating the SRES scheme (the RET was split into the large-scale and small-scale components from 1 January 2011) was to have an uncapped scheme with a fixed price. Control over a possible cost blow-out was through the ability of the Minister to reduce the $40 Clearing House (**CH**) price.

The SRES was implemented so as to achieve a self-correcting target over a two-year period. It was critical to set an annual target (in advance) to enable liable parties to recover the cost of acquiring the small-scale technology certificates (**STCs**) from their customers. The CH was to operate as a fall-back and the $40 would only effectively be received once the supply of certificates was close to the target.

The dramatic reduction in the cost of Solar PV, the solar credits multiplier and delays in the winding back of state feed-in tariffs (**FiTs**) has meant that over the last two years the level of PV installations has significantly exceeded expectations. Due to the leveraging impact of the solar credits multiplier that applies to PV a significant STC oversupply has resulted. The oversupply of STCs has meant that the STC price has been considerably below the $40 CH price.

2.2 STC price lower than one would expect due to regulatory risk

As the STC target is self-correcting over a two year period one would expect that the spot STC price would be higher and the discount to the CH price of $40 explained by the interest cost of holding or banking certificates. The spot price over the last three months has ranged from $26 to $31. As an example, if we expected the market to get back into balance (i.e. CH to settle) say in two years – then at a 6% interest rate (cost of carry) we would expect the spot price to be $36.

The significantly lower price can be explained by:

- Regulatory risk around possible changes to the SRES scheme (eg. that might arise as a result of the RET review);
- Risk around the Minister reducing the $40 CH price;
- Risk that STC target setting process continues to understate actual STC creation; and
- Short term market factors due to trading strategies of market participants.

Perceived issues or problems around the STC market include the following:

[5] RAA Research Notes No.2 & 3 to be provided separately.

- Inability to predict the dramatic reduction in the installed costs of PV (this has caught policy makers by surprise;

- State policy settings (e.g. FiTs) being wound back too slowly (in response to fall in installed PV costs);

- Regulatory risk associated with possible changes to the STC scheme (including reduction in $40 clearing house price); and

- Systemic understating of target.

The solar credit multiplier has now reduced to two (2) times, and will step down to one (1) times by 1 July 2013. The 2012 STC oversupply will be absorbed into the target next year and all states have now wound back their FiTs. The first two issues above have now been effectively dealt with. With a one (1) times multiplier from 1 July 2013 the STC supply and demand balance is not likely get materially out of balance compared to that seen over the 2011-2012 period.

Therefore, the RAA believes that very little needs to be done to ensure that the SRES works and achieves its objectives (including the operation of the CH). The key remaining issues are then to reduce regulatory risk around the scheme and to achieve a more accurate target setting process.

The RAA's core recommendations to reduce regulatory risk:

- Remove requirement for a two year review – the timing for any formal review process should be a minimum of four years and then matters to be reviewed should be quite narrow and specific. The objective being to provide a framework that minimises uncertainty and supports long term investment;

- Remove the ability for the Minister to reduce the $40 CH price. A review of the appropriateness of the CH price could be included as part of any formal review process with a minimum of 12 months' notice of any changes in the CH price and a requirement that anyone that has submitted STCs into the CH should not be disadvantaged;

- Improve the accuracy of the STC target setting process through:

    - including pending registration STCs as part of the surplus that is carried forward into the following years target[6]. This change may not involve changes to the RET legislation;

    - making allowance for Section 38 AF of the RE Act revisions by revising upwards by 5% each of the quarterly targets. Under section 38 AF of the RE Act, Liable Parties are able to request a reduction in their liability if they can demonstrate that their electricity sales in the current year will be less than the previous years. This means that less STCs get surrendered on a quarterly basis. In 2012 as an example, we expect that quarterly surrenders will be 5% less and that the final square up in February 2013 will be 20% - not 15%.

[6] STCs submitted for registration before 31 December can be used to meet the Liable Parties' February 14 surrender requirement (when approved) however these certificates are not included in the calculation of the surplus that is carried forward into the following year.

2.3 Cost of the SRES Scheme

Concerns over rising residential electricity prices have focused attention on the cost of so called "green schemes". On analysis of the composition of electricity prices detailed in the Report at Attachment 3[7]" it was network charges that had increased dramatically recently with the cost of renewables and other schemes accounting for only 5.4% of the residential electricity price. Further discussion of electricity prices is included as Attachment 1.

In a paper prepared for the RAA (provided separately to this submission) the average cost of meeting the STC scheme has been around $30 per STC, which is significantly less than the $40 CH price. The cost to consumers is expected to peak in 2012 at 2.7% of retail prices then is expected to reduce significantly over the next three years as the solar credits multiplier gets wound back to less than 1% of retail electricity prices.

Electricity consumers will also benefit from lower wholesale electricity prices (energy component) as the level of electricity consumption has reduced due the roll out of small-scale solar systems. In the three years to the end of 2011 solar systems supported by the RET have been responsible for 2,400 GWh of reduced consumption in the National Electricity Market (**NEM**). This is equivalent to a 1.2% reduction. The contribution from solar is expected to more than double over the next three years to more than 3% of total electricity consumption. This reduced consumption is meeting the "objects" of the RE Act and has obvious environmental, economic and equitable benefits to the Australian public.

2.4 Installations of small-scale renewables

In the RAA Fact sheet on the number of systems creating certificates (Attachment 3) 754,000 solar PV and 744,000 SWH systems had created certificates to 30 June 2012. This amounted to more than 14% penetration for each of PV and SWH when compared to the number of owner occupied detached and semi-detached dwellings (refer to Table 1 below).

When we factor in the PV systems expected to be installed in 2012 (total of 322,000) and the projected level to be installed in 2013 of 230,000 we expect that by end 2013 nearly 1.1 million PV systems will have been installed – equivalent to a penetration rate of 21%.

[7] Included separately as part of this submission

Table 1 - Systems creating certificates – penetration rates

		Market Penetration Rate		
	Number of Dwellings	Solar PV	Solar Water Heater	Total
Number of Systems		753,844	743,842	1,497,686
Housing Type				
Separate or semi-detached (owner occupied)	5,235,300	14.4%	14.2%	28.6%
Separate or semi-detached dwellings	7,479,000	10.1%	9.9%	20.0%
Total Households	8,398,500	9.0%	8.9%	17.8%

Note: Dwelling data from ABS for 2009-10 (2012 Yearbook, 1301.0) and based on 70% of dwellings being owner occupied.

In a report prepared for the RAA (provided separately to this submission) an assessment and evaluation was undertaken of the postcode locations of solar PV and SWH system installations. The analysis found that most solar systems (53%) were installed in regional and rural communities with only 43% installed in the major capital cities (refer to Table 2).

The level of penetration amounted to 13% in the major capital cities of Australia (58% of households) and was 60% greater at 21% outside of the major capital cities.

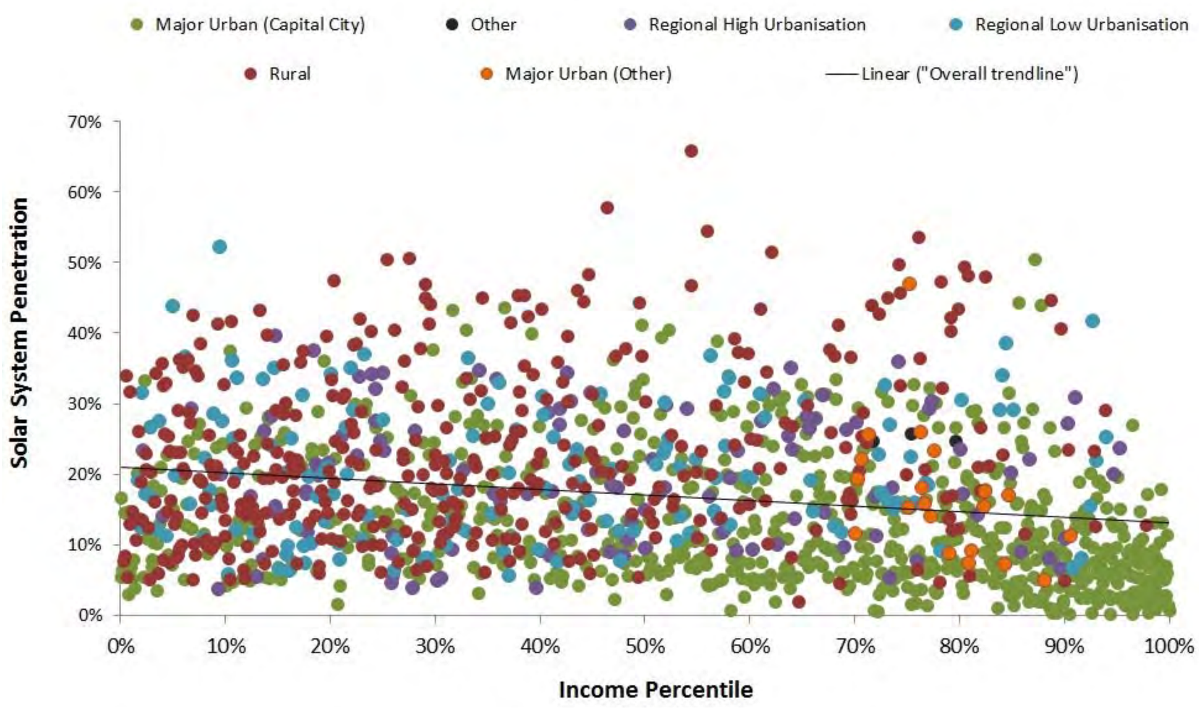
Table 2 – Solar system installation compared to income levels

Urban Classification	Number of systems	% share of total systems	Number of dwellings	% share of total dwellings	Average penetration	Average Income (per dwelling)
Major Urban (Capital City)	662,240	46.7%	5,068,447	57.9%	13.1%	$ 69,491
Major Urban (Other)	191,523	13.5%	1,111,786	12.7%	17.2%	$ 52,008
Regional High Urbanisation	221,416	15.6%	1,067,421	12.2%	20.7%	$ 48,776
Regional Low Urbanisation	120,404	8.5%	581,306	6.6%	20.7%	$ 42,985
Rural	221,584	15.6%	913,519	10.4%	24.3%	$ 43,119
Other	1,311	0.1%	5,262	0.1%	24.9%	$ 54,079
Total Australia	**1,418,478**	**100.0%**	**8,747,741**	**100.0%**	**16.2%**	**$ 60,216**

Of the systems installed in capital cities, those suburbs with the highest penetration (number of systems installed in suburb divided by the number of dwellings in that suburb) were typically in the outer metropolitan mortgage belt.

The analysis also found that there was a slight inverse relationship between average incomes and solar penetration levels (refer to Figure 1). The suburbs with the highest income levels did not correspond to those with highest penetration, if anything the opposite was more likely. The slope of the line (solar penetration) in Table 3 slopes downwards as income levels increase.

Figure 1 – Solar system installation compared to income levels



A broad range of communities have accessed solar under the RET scheme and the above figures explode the myth that the RET is supporting metropolitan middle class welfare and is evidence of the RET's equitable effectiveness.

3. ANSWERING SPECIFIC CCA QUESTIONS

In the following section we specifically address the questions that the CCA sought comment.

(i) What do you consider to be the costs and benefits of having a separate scheme for small-scale technologies? Should there be a separate scheme for small-scale technologies?

RAA believes that there is no case for the SRES to be rolled back into the LRET. Both the small-scale and large-scale schemes are currently working through an oversupply of certificates and will get back to a more normal form of operation soon.

The nature of investment tends to be different, with the large scale renewable power generation industry making long term investments with certificates created progressively over the life of the project as generation takes place. Residential scale renewables, which receives deemed certificates "up-front" can respond more readily to market prices (for certificates) and conversely changes in supply dynamics can quickly cause changes to market prices.

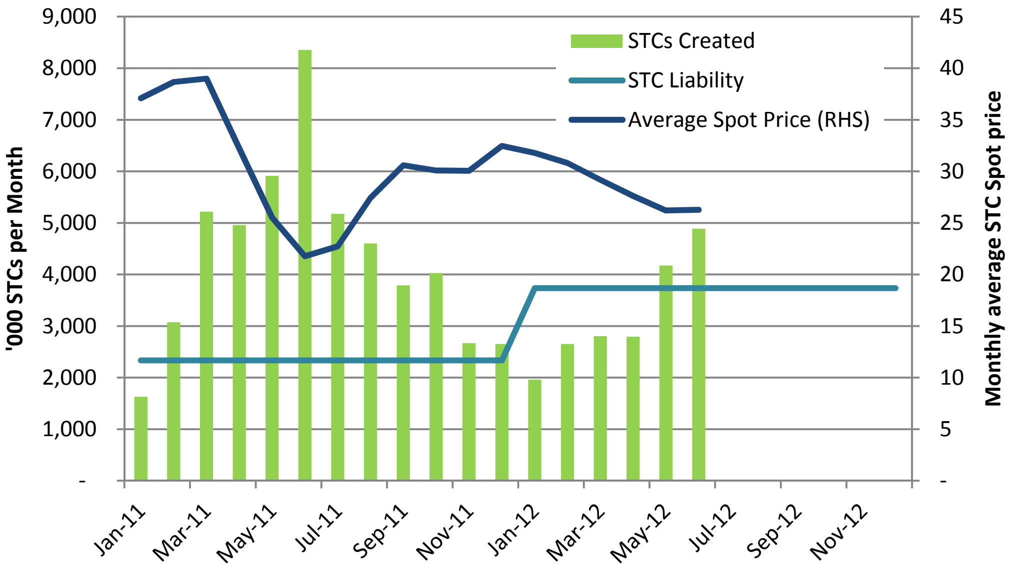
Small-scale energy systems also do not typically require bank funding. Large scale projects on the other hand typically require specific financing arrangements.

(ii) Is the uncapped nature of the SRES appropriate? What are the costs and benefits of an uncapped scheme in terms of economic efficiency, environmental effectiveness and equity? Is the SRES driving investment in small-scale energy systems? Is it driving investment in skills?

RAA believes the uncapped nature of the SRES is appropriate and achieves the policy objectives when the scheme split was announced.

The SRES has largely worked as expected and is assisting households, small businesses and community groups with the upfront cost of installing small-scale energy systems. The rationale for creating the SRES scheme (the RET was split into the large-scale and small-scale components from 1 January 2011) was to have an uncapped scheme that did not constrain the development of the solar industry and a stable price mechanism that reduced volatility in certificate prices. Control over a possible cost blow-out was through the ability of the Minister to reduce the $40 CH price.

Figure 2 - Systems creating certificates and Spot STC Price



The CH has not come into play in any meaningful way (currently more than 6 million STCs are queued) due to the oversupply of STCs caused by large numbers of PV systems installed, which was exacerbated by the solar credits multiplier (refer to Figure 2). This could not have been foreseen in setting of the STC target. The CH will work when the supply and demand for STCs comes back into balance as the solar credit multiplier reduces.

The SRES and the ability to monetise certificates on a "deemed" basis has supported the large scale roll out of solar PV and SWH systems. On any measure the SRES has been successful and has been embraced by Australians with unparalleled enthusiasm.

Some key dimensions are as follows:

- More than 1.5 million solar systems installed and claiming certificates under the RET by 30 June 2012. This is equivalent to 18% of Australian families having a solar system. (See Attachment 2);

- We expect that 2,200 MW of solar PV will be installed by end of 2012 which will be contributing to reducing peak demand (RAA Research Notes will be provided separately);

- Australia installed more residential rooftop solar panel systems in 2011 than any other country, clearly supporting Australia's response to climate change[8];

- Solar PV and SWH accounted for nearly 50% of the 3.2% reduction in NEM electricity consumption since 2008 leading to environmental and economic benefits to the Australian public;

- The lower level of power consumption in turn has meant that wholesale power prices have been the lowest they have been for more than 10 years bringing economic and equitable returns to the Australian public;

- The roll-out of around 800,000 SWH systems and 2,200 MW of PV installations by end 2012 will mean that around 4.7 million tonnes per annum of greenhouse gas emissions will be avoided (based on an average emission intensity of 1 tonne per MWh) evidence of the SRES's environmental effectiveness and supporting the Australian Government's response to climate change;

- Peak power consumption will be lower which in turn will result in lower network investments over time which will reduce network charges delivering economic and equitable returns to the Australian public;

- The solar industry currently employs approximately 25,000 people driving an investment in skills from the installation and manufacture through to the financing of such systems, bringing clear economic benefits to businesses, workers and communities;

- Solar has been embraced by the Australian community across the board with in fact more systems installed in regional and rural Australia than in the major capital cities. Solar penetration has been higher in those suburbs with lower incomes. In terms of solar system installations in capital cities, wealthy inner suburban suburbs are under-represented. The suburbs with the greatest level of installations are those in the outer metropolitan mortgage belt. Often stated claims that the RET support for solar amounts to middle class welfare are patently incorrect and not supported by the facts. In fact, the SRES is clearly delivering a clear equitable return to those suburbs by enabling them to reduce their exposure to rising electricity prices.

(iii) What is the appropriate process for considering and admitting new technology to the SRES? Should any additional small-scale technologies be eligible to generate STCs? Is it appropriate to include displacement technologies in the SRES? Should additional eligible technologies be limited to generation technologies?

[8] See: <<http://www.recagents.asn.au/gold-medal-for-australian-solar/>> last accessed 10 September 2012.

RAA believes that the RET should remain as a renewables support measure with "non-renewable" displacement technologies being subject to energy efficiency schemes, either from a national white certificate scheme or relevant state scheme.

RAA supports other small-scale generation renewable generation technologies receiving support under the SRES provided that the compliance arrangements are robust enough and the deeming methodologies properly represent system performance over time.

RAA believes, that a demonstration phase could be introduced to test any new renewable technologies prior to their introduction to the SRES. Initial 5 by 5 year deeming as happens with small wind and hydro could be implemented.

(iv) Is deeming an appropriate way of providing certificates to SRES participants? Are the deeming calculations for different small-scale technology systems reasonable?

RAA believes "deeming" is the best way of providing STCs for small-scale renewable energy technologies. The relatively small system size means that an approach other than deeming would involve significant transaction costs. The RAA draws the CCA's attention to the changes that were made to deeming for PV back in 2005/6 where 5 years (at a time) deeming was expanded to 15 years, and system size increased from 10kW to 100 kW. Prior to this change only around 5 to 10% of certificates that could be created were ever created due to high transactional costs for the values involved.

Given that Australia has one of the highest penetration rates for solar PV in the world, it is clear that the RET and its "deeming" arrangements have been the most successful policy support measure. Most other countries have FiTs, with very few having "up front" support such as provided by the RET (refer to Figure 3).

Figure 3 – PV Installation by Country (Largest 10 PV Markets)

2011 Installations by country	Installed Capacity MW	Residential Proportion MW	Residential Capacity MW
Italy	9,301	8%	744
Germany	7,500	9%	675
China	2,200	27%	600
US	1,867	37%	698
France	1,634	16%	261
Japan	1,296	90%	1166
Belgium	958	68%	651
UK	899	56%	503
Australia	865	95%	822
Spain	345	5%	17

Data Sources:

IEA-PVPS (National Survey Reports) www.iea-pvps.org

European Photovoltaic Industry Association - Global Market Outlook (May 2012)

US Solar Market Trend 2011, Interstate Renewable Energy Council (August 2012)

The RAA also believes that the current deeming calculations are reasonable and appropriate and no case has been made to change these.

(v) What are the lessons learned from the use of multipliers in the RET? Is there a role for multipliers in the future?

The "multiplier" has been successfully used to assist with reducing the installed cost for small-scale technologies. The fact that Australia installed more residential solar PV systems than any other country in 2011 is testament to this.

The use of the multiplier has not however been without issue and it is possible in hindsight the 5 times multiplier was too slow in being reduced. The introduction of the "out of pocket expense" provisions allowed the STC to link with falling technology costs as a means of "digression" is prudent.

(vi) Is the STC Clearing House an effective and efficient mechanism to support the operation of the SRES? Should changes be made to the Clearing House arrangements? If so, what would be the costs and benefits of any suggested alternative approaches? Is $40 an appropriate cap for STCs given the recent fall in cost of some small-scale technologies, particularly PV?

We have made the case in the initial part of this submission that the CH mechanism has worked exactly as it was intended and should be left as it is.

The CH will work when the supply and demand for STCs comes back into balance as the multiplier reduces. A CH type approach is required, as we do not have a fixed annual target.

RAA also notes that financiers now have taken security over STCs under the Personal Property & Securities Act (2009) based on a $40 price in some instances if the STCs reside in the CH. The removal of the CH or reduction to the CH price is likely to result in an event of default under such security arrangements and lead to financing issues for the parties concerned.

RAA believes the CH should remain unchanged and it will start to settle within the next 9-12 months due to the reduced "multiplier" and progressive winding back of state based feed-in tariffs. Implementation of our recommendations in Section 2.2 of this submission to improve the accuracy of the target setting process would make the CH work more effectively.

(vii) Is $40 an appropriate cap for STCs given the recent fall in cost of some small-scale technologies, particularly PV?

With the removal of the solar credits multiplier from 1 July 2013 and the reduction in state based feed-in tariffs the level of policy support for solar PV reduces significantly.

Whilst falling installed costs for PV have increased its attractiveness, it is the availability of solar credits and reasonably attractive feed-in tariffs have made solar PV affordable for most Australians delivering equitable results. With rising residential power prices many industry commentators are claiming that PV has or is about to reach "grid-parity". This does not however mean that PV does not require further support!

The concept of grid parity typically involves discounting the future benefits at some nominal discount rate that perhaps reflects the cost of mortgage financing say around 6 to 7%, which implies a nominal payback period of around 10 years. The significant reduction in the value of PV electricity exported to the grid in nearly all states now and the move to fixed or demand based pricing (that is hard to avoid by distributed generation) means that effective grid parity is longer away than expected

In any event low up-front cost is a major consideration of system affordability and this is clearly apparent when we consider that most other countries that have feed-in tariffs generally have low levels of residential system installations (refer to Figure 3). This is not to under-estimate the importance of attractive feed-in tariffs as we have seen recently in Queensland.

We have seen other technologies and applications achieve so called "grid parity" years ago but it has only when there has been up-front support through rebates or deemed certificates have we seen customers embrace the activity. Some recent examples are:

- Efficient residential lighting "CFLs" reached "grid parity" many years ago but it was only when NSW Greenhouse Gas Abatement certificates (and VEECs in Victoria) were available and could be used to significantly reduce or eliminate the up-front cost did we see large scale take up;

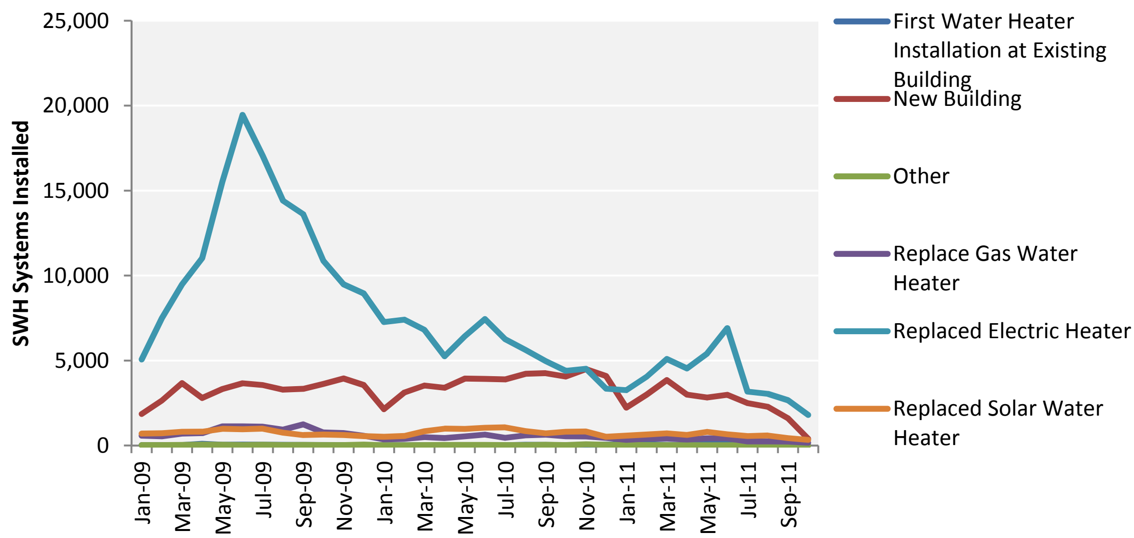
- SWH also reached "grid parity" a number of years ago and it was only when (i) rebates were introduced at Commonwealth and State level did the market expand or (ii) new home regulations were introduced. This situation is shown clearly in Figure 4. Once rebates were removed the level of SWH installations reduced markedly. and

- Efficient commercial lighting technologies – "T5s" achieved grid parity years ago but it is only once energy efficiency certificates are available (in NSW and soon in Victoria) that reduce the up-front cost were they be rolled out in any meaningful quantities. New building efficiency standards effectively require these fittings on new buildings.

The issue here is that PV will face the type of barriers that other energy efficiency technologies face (high up-front costs, split incentives etc.). This will make it more difficult to sell PV systems when the up-front cost increases with the removal of solar credits. As a result without policy support a sub-optimal level of investment will take place.

It is likely that PV installations will track what has happened to SWH installations as the multiplier reduces. When we track the number of PV systems installed in 2011 that created certificates we see a massive reduction in installation levels once the multiplier is reduced from 5 times to 3 times (refer to Figure 5). The same outcome is currently being observed for 2012 installations from July when the multiplier reduced from 3 times to 2 times;

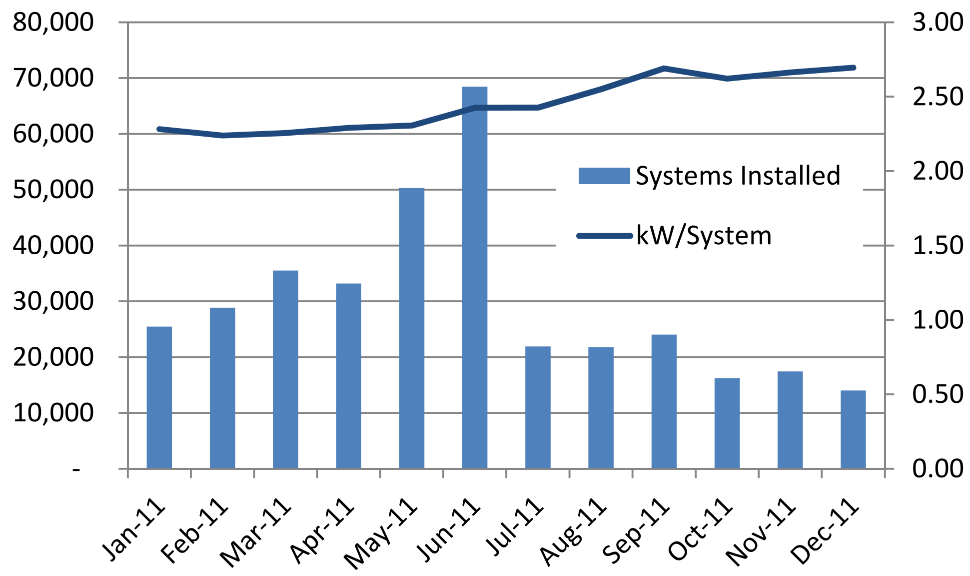
Figure 4 - SWH system installations by system type
(Source: Green Energy Markets Report on STC Modelling for ORER, November 2011)



Note: certificates can be created up until 12 months after installation so figures in later months are incomplete

The RAA believes that the $40 is an appropriate cap to ensure that a sustainable level of solar installations take place.

Figure 5 - PV system creating certificates by installation month during 2011
(Source: CER, Postcode Data, July 2012)



The RAA believes that the minimum ongoing level of certificate creation for small-scale technologies should be based on delivering a sustainable level of annual installations of PV and SWH. Recent activity suggests that this should be at least 300,000 solar systems per annum (based on 200,000[9] PV systems and 100,000 SWH systems). Any ongoing

[9] Average system size of around 2.5 kW

consideration of future renewables target needs to ensure that at a minimum this level is allowed for.

(viii) Are the SRES administration arrangements appropriate and working efficiently?

The RAA believes that the administration and compliance arrangements are working very well. The compliance and inspection arrangements have also worked well to ensure high levels of compliance and good quality installations.

The only suggestion we make relates to concerns around improving the accuracy of the STC target setting process (refer to section 2.2 of our submission).

(ix) What is the appropriate frequency for reviews of the RET? What should future reviews focus on?

RAA believes the RET review should be extended from 2 to a minimum of 4 years. The current 2 year review increases investment uncertainty for the renewable energy industry.

ATTACHMENT NO. 1
IMPACT ON ELECTRICITY PRICES

Forecast residential electricity price rises

RAA acknowledges that the renewable energy component of national "domestic" electricity prices is "projected" to increase electricity costs for retail consumers for 2013/14 by:

(a) 3.8% for the LRET; and

(b) - 0.8% for the SRES.

By far the largest contributor to retail electricity price increases is projected to be (with a carbon price):

(c) Distribution costs (33.6%);

(d) Wholesale costs (40.2%) (Generally set by the jurisdictional regulator: save WA, NT and Vic); and

(e) Retail costs (12.1%)[10].

Wholesale and Retail Electricity Prices

The SRES is "projected" to exert downward pressure on the price paid for energy by domestic consumers. Compliance costs for the liable parties will further reduce as the "multiplier" and "feed-in tariffs" are reduced leading to reduced wholesale and retail costs.

Wholesale energy costs reflect the costs incurred by the retailers in purchasing electricity from the National Electricity Market (**NEM**) and managing the associated risks. Some jurisdictional regulators have indicated that these rising wholesale costs are attributed to:

- Changes in the generation mix;
- Increasing natural gas prices (unrelated to the SRES);
- Financing risks associated with the uncertainty of carbon pricing (hopefully now resolved); and
- Price volatility.

So, one may argue that with the carbon price having been implemented, wholesale prices should stabilise or reduce in the future as the uncertainty has reduced. In NSW, South Australia, Queensland and the ACT a retail margin of around 5% on all costs (including wholesale costs, retail operating costs and network costs) has been determined by the jurisdictional regulators. The retail cost generally comprises 13% of the total residential electricity price as set by the jurisdictional regulator[11].

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[10] Australian Energy Market Commission, "Final Report: Possible Future Retail Electricity Price Movements – 1 July 2012 to 30 June 2014" 25 November 2011 at 6. (Table 2).
[11] Australian Energy Market Commission, "Final Report: Possible Future Retail Electricity Price Movements – 1 July 2012 to 30 June 2014" 25 November 2011 at 14,

It is claimed that the cost of STCs increases the wholesale costs, however RAA notes that[12]:

- some jurisdictional regulators have allowed a pass-through of the CH price of $40 – however, we note that the average cost of STCs purchased by retailers has been 25% less than this at around $30 over the past 12 - 18 months. As that CH has rarely been used, there appears to have been a misunderstanding by the jurisdictional regulators on how the SRES works leading to a pass through in excess of real cost;

- the SRES (in conjunction with the NSW/Vic Energy Savings Schemes) have saved 3,455 GWh of electricity in 2001 leading to a 1.7% in total electricity consumption and this contribution to reduced power consumption is set to treble over the next three years[13];

- with the reduction of the SRES "multiplier" and state FiTs, wholesale prices are expected to reduce;

- vertical integration between generators and retailers is being used as an alternative to manage the risk of "spot" price volatility (traditionally managed through entering into hedging contracts with each other and through the Sydney Futures Exchange) which is reducing liquidity and contracting options in futures markets – driving up energy costs for independent retailers and may pose a barrier to entry and expansion for both independent generators and retailers)[14];

- strategic bidding on the NEM (i.e. prices not reflecting the underlying cost of generation) in some instances using re-bidding large amounts of capacity at times of high wind generation and low demand driving the spot price close to the market floor price causing other generators (including wind farms) to shut down[15]; and

- the RET actually places some downward pressure of wholesale costs partially off-setting the RET compliance costs[16].

The AER note that the big three retailers now jointly supply over 80% of small electricity retail customers, and they control almost 30% of generation capacity in the mainland regions on the NEM[17].

[12] Australian Energy Market Operator, "2012 Electricity Statement of Opportunities for the National Electricity Market" at Figure 2-3.
[13] See: http://www.recagents.asn.au/category/news/media-releases/ last accessed 5 September 2012.
[14] Australian Energy Regulator, "State of the Energy Market 2011" at 4.
[15] Australian Energy Regulator, "State of the Energy Market 2011" at 4 & 14.
[16] Australian Energy Market Commission, "Final Report: Possible Future Retail Electricity Price Movements – 1 July 2012 to 30 June 2014" 25 November 2011 at 3.1.4.
[17] 17 Australian Energy Regulator, "State of the Energy Market 2011" at 12.

Transmission and Distribution Costs

We note that “distribution” costs have increased dramatically due to both increasing levels of capital works and increases in the cost of undertaking those works. Current energy network expenditure for the current 5 year regulatory cycle is running at historical levels: over $7 billion in electricity transmission, $35 billion in electricity distribution and $3 billion in gas distribution. These costs represent an increase on investment in the previous regulatory periods of around 82 per cent in electricity transmission, 62 per cent in electricity distribution and 74 per cent in gas distribution. This investment is being driven by: more rigorous licencing conditions; load growth and rising peak demand; new connections; and ageing assets. The increase in costs is partly driven by the higher cost of capital post GFC and operating/maintenance costs[18]

We highlight that the Australian Energy Regulator (**AER**) has raised concerns with the current regulatory framework leading to price increases that are difficult to justify and submitted a draft change to the National Electricity Rule (**NER)** in 2011 to the Australian Energy Market Commission (**AEMC**) which has consulted and now published its draft determination and rule changes rules on 23 August 2012 for consultation until mid September 2012 with a final determination made by October 2012[19].

The input costs for these upgrades (i.e. aluminium, steel, and copper) are forecast to increase – however, this may change due to the reduction in commodity prices from China possibly leading to lower domestic prices.

Transmission costs drivers are similar to the drivers for the distribution section.

[18] See: <<http://www.aer.gov.au/sites/www.aer.gov.au/files/State%20of%20the%20energy%20market%202011%20-%20complete%20report.pdf>> at Figure 1 last accessed 4 September 2012.
[19] See: <<http://www.aemc.gov.au/Electricity/Rule-changes/Open/economic-regulation-of-network-service-providers-.html>> last accessed 27 August 2012.

ATTACHMENT NO. 2

RAA FACT SHEET – SOLAR SYSTEMS CREATING RECS (15 AUGUST 2012)

FACT SHEET No 1

Updated: 15 August 2012

Solar Systems creating RECs

Highlights:
- 1.5 million solar systems installed and creating Renewable Energy Certificates (RECs)
- 1,700 MW of installed PV capacity
- nearly 18% of Australian families have a solar system

Small-scale renewable energy is supported under the Renewable Energy Target (RET) Scheme and many Australian households have embraced renewable energy by purcahasing a solar power or solar hot water system.

The Clean Energy Regulator releases information on the number of systems that have created renewable energy certificates on a quarterly basis. This Fact Sheet will be updated as new information becomes available.

The following figures summarise the number of systems that have created certificates since the RET Scheme came into force on 1 April 2001. Note that not all systems installed will have created certificates so the figures below will understate the level of system installations to date.

Systems creating Certificates	(as at 30 June 2012)	
Small Generation Units		
Solar Panel (Deemed)	753,844 systems	1,671,489 kW
Wind (Deemed)	370 systems	1,326 kW
Hydro (Deemed)	13 systems	21 kW
	754,227 systems	**1,672,836 kW**
Solar Water Heater		
Solar Water Heater (SWH) - Solar	590,311 systems	
SWH - Air Sourced Heat Pump (ASHP)	153,531 systems	
	743,842 systems	

		Market Penetration Rate		
	Number of Dwellings	**Solar PV**	**Solar Water Heater**	**Total**
Number of Systems		753,844	743,842	1,497,686
Housing Type				
Separate or semi-detached (owner occupied)	5,235,300	14.4%	14.2%	28.6%
Separate or semi-detached dwellings	7,479,000	10.1%	9.9%	20.0%
Total Households	8,398,500	9.0%	8.9%	17.8%

Note: Dwelling data from ABS for 2009-10 (2012 Yearbook, 1301.0) and based on 70% of dwellings being owner occupied.

The REC Agents Association represents the interests of Registered Agents under the Renewable Energy Scheme. Please refer to our website: **www.recagents.asn.au**

ATTACHMENT NO. 3

RAA REPORT: IMPACT OF MARKET BASED MEASURES ON NEM POWER CONSUMPTION (JUNE 2012)

Impact of market based measures on NEM power consumption

June 2012

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Report for the REC Agents Association and The Energy Efficiency Certificate Creators group

REC Agents Association (RAA)

The RAA was established in late 2011 to represent and self-regulate the activities of businesses that are "Registered Agents" to create and trade in Renewable Energy Certificates and other environmental credits.
www.recagents.org.au

Energy Efficiency Certificate Creators group (EECC)

The EECC was established in 2009 as a forum to represent the interests of businesses that were registered as "Accredited Parties" under the Victorian Energy Efficiency Scheme.

Disclaimer

The data, analysis and assessments included in this report are based on the best information available at the date of publication and the information is believed to be accurate at the time of writing. Green Energy Markets does not in any way guarantee the accuracy of any information or data contained in this report and accepts no responsibility for any loss, injury or inconvenience sustained by any users of this report or in relation to any information or data contained in this report.

1. Summary

Power consumption across the eastern states National Electricity Market (NEM) has reduced over the last three years, falling 6,565 GWh (3.2%) from 207,400 GWh in 2008 to 200,800 GWh in 2011. This seems to have caught policy makers and some industry participants by surprise as the accepted wisdom seemed to be that power consumption would keep increasing in Australia with continued population growth and with continued economic growth.

Commonwealth and state market based schemes that have supported distributed energy technologies have under-pinned the large scale rollout of solar energy and energy efficiency technologies such that these can explain a significant part of the reduction in power consumption. Solar energy installations supported by the Commonwealth Renewable Energy Target (RET) and energy efficiency activities supported by the Victorian and NSW Energy Efficiency schemes are estimated to account for 3,500 GWh or 53% of the reduction in power consumption since 2008. These activities currently account for around 1.7% of total power consumption and this is expected to increase to around 5% by 2015.

Electricity avoided (GWh per annum)	2011	2015
SWH - RET	1,181	1,839
PV - RET	1,180	3,460
Victorian – Energy Efficiency Scheme	667	3,393
NSW - Energy Efficiency Scheme	427	1,972
Total	**3,455**	**10,664**

One of the consequences of the reduction in power consumption is that existing scheduled generators have greater competition for being dispatched and as a result the regional reference price across all states has fallen to the lowest levels seen for more than 10 years. The lower regional reference price will progressively flow through to lower wholesale prices so that all customers benefit from the roll-out of solar and energy efficiency activities under these schemes.

It is a different story however with peak demand as continued roll-out of cheap and inefficient air conditioners has driven higher summer maximum demand with peak demand across NEM states expected to increase at around 800 MW per annum (2.4% per annum).

Rising maximum demand and the need to refurbish aging network infrastructure means more than $40 billion of regulated distribution and transmission expenditure has been committed for the current five year regulatory period. This in turn has driven a dramatic increase in retail electricity prices as regulated transmission and distribution charges make up around 45% of the residential power price. The cost of so called 'green schemes' which includes the RET, energy efficiency schemes and feed-in tariffs accounts for only 5.4 % of the residential price.

Residential electricity prices, according to the Australian Energy Market Commission (AEMC) are expected to increase by 37% over the three year period to 2013/14. The largest contributor to the increase is distribution charges which account for 34% of the increase, the carbon price accounting for 21% and green schemes accounting for only 10%.

2. Introduction

Green Energy Markets (GEM) has been engaged by the REC Agents Association (RAA) and the Energy Efficiency Certificate Creators group (EECC) to assess the impact that market based measures have had on the reduction in power consumption in the National Electricity Market (NEM) over the last three years and to estimate their likely impact over the period to 2015.

In undertaking this assessment GEM has only considered power consumption in the NEM and therefore excluded Western Australia, the Northern Territory and off-grid power consumption.

The market based schemes and activities that we have considered are:

- Solar PV and solar hot water installations supported under the Commonwealth's Renewable Energy Target (RET)
- Energy efficiency activities supported under the Victorian Energy Efficiency Scheme
- Energy efficiency activities supported under the NSW Energy Efficiency Scheme

In this report we have expressly excluded consideration of energy efficiency and distributed generation activities supported by other programs such as:

- Non-scheduled renewable energy projects supported by the Commonwealth's Renewable Energy Target, these are estimated to have accounted for 1,500 to 2,000 GWh in 2011[1].
- Insulation installed under the Commonwealth's insulation program where more than 1 million homes were insulated with possible annual savings in electricity of around 250 to 300 GWh per annum from 2011.
- More efficient appliances installed as part of Minimum Energy Performance standards

Our approach has been to determine the level of activity that has been supported by the three schemes considered and then determine the level of electricity reduction that can be expected on an annual basis. We have only considered and assessed the activities that have claimed certificates under these schemes and as a result this is a conservative estimate of the contribution of the activities as not all solar energy or energy efficiency installations and activities will claim certificates.

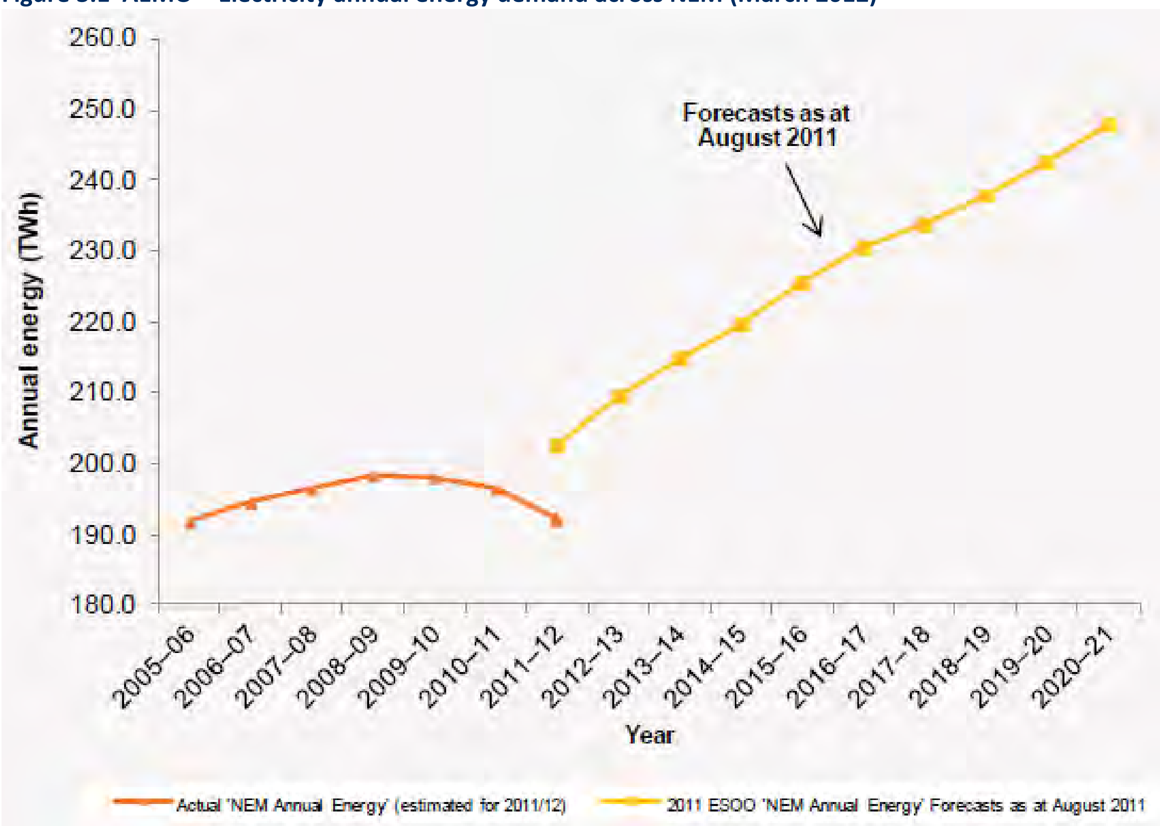
[1] Some of this non-scheduled renewable generation will be included in the Australian Energy Market Operator's power consumption figures.

3. Electricity consumption in the NEM

3.1 Review of AEMO power consumption data

Electricity consumption across the NEM, as measured by Australian Energy Market Operator (AEMO) has been falling for the last four years. AEMO recently published an update to its "Statement of Opportunities" in March 2012 which revised downwards by 5% the expected power consumption for 2011/12. An extract from the report is included as Figure 3.1.

Figure 3.1 AEMO – Electricity annual energy demand across NEM (March 2012)



Forecasts beyond 2011/12 have not been updated although AEMO has advised that it will be changing the way in which it undertakes its projections in future.

> *"AEMO has changed the way it develops and publishes demand forecasts for the electricity industry. AEMO is for the first time developing an independent set of electricity demand forecasts for each of the five NEM regions."*
> In the past – *"AEMO developed demand forecasts for South Australia and Victoria, whilst the regional transmission network service providers (TNSPs) developed demand forecasts for the remaining three regions in the National Electricity Market (NEM), namely Queensland, New South Wales (including the Australian Capital Territory), and Tasmania."*
>
> *AEMO, Economic Outlook Information Paper – National Electricity Forecasting (May 2012)*

Using AEMO data we have analysed electricity consumption across the NEM states on a calendar year basis over the last 10 years (refer to Figure 3.2 and 3.3). Electricity consumption across the NEM had been increasing at around 2% per annum until 2007 and then plateaued and from 2008 has been decreasing. Over the last three years electricity consumption has fallen by an average of 1.1% per annum, with some states such as Victoria reducing by an average of 1.5% per annum. Electricity consumption data by state is included as Attachment 1.

Figure 3.2 Power consumption in NEM states since 2001 (excluding Tasmania)

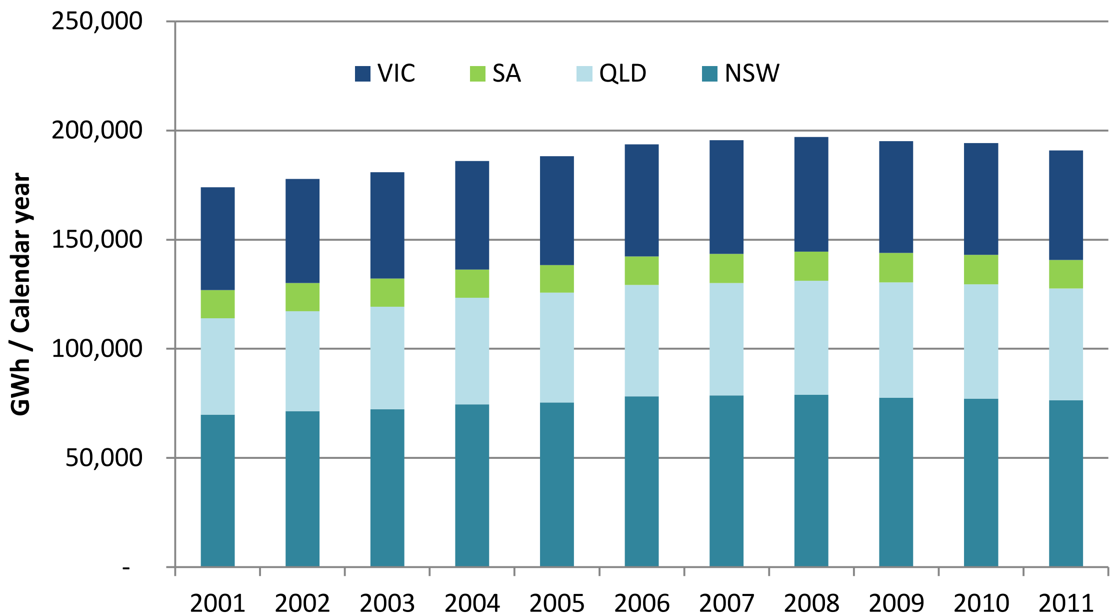
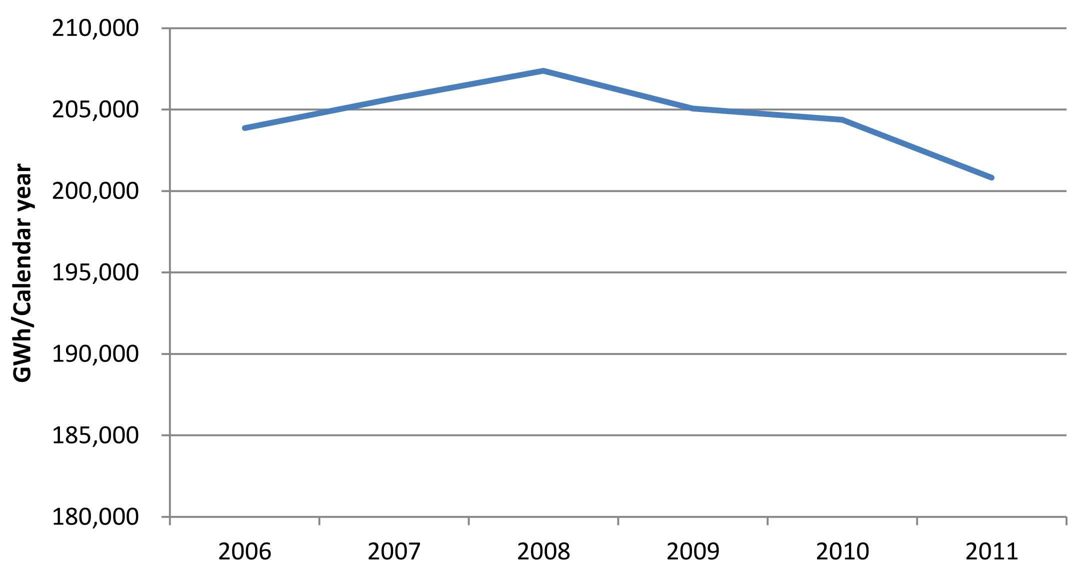


Figure 3.3 Power consumption in NEM states since 2006 (including Tasmania)



The electricity consumption and demand figures published by AEMO essentially represent the level of demand at the transmission system. As such it understates the level of power consumption as the demand figures also include the impact of smaller generation that is connected at the distribution system.

> ***Calculating energy and maximum demand***
> *The energy projections account for the sent-out energy from scheduled, semi-scheduled, and significant non-scheduled generation. Calculating the amount of energy supplied by generation controlled through the NEM dispatch process (scheduled and semi-scheduled generation) requires subtracting the energy supplied from significant non-scheduled generation.*
>
> *The MD [2]projections account for the as-generated demand supplied from scheduled, semi-scheduled, and significant non-scheduled and exempt generation. Calculating the MD supplied by generation controlled through the NEM dispatch process requires subtracting the MD met by significant non-scheduled generation.*
>
> *AEMO – 2011 Electricity Statement of Opportunities, August 2101*

Electricity consumption in 2011 is 6,565 GWh lower than the level three years earlier. There will be a number of reasons to explain this that could include:

- milder weather;
- reduction in industrial energy consumption due to lower manufacturing output[3];
- customer response to higher prices by reducing consumption;
- dramatic increase in the level of solar PV;
- impact of a range government programs outlined in Section 2.

Over this period we have however, seen increased population, increases in real GDP and an increase in the number of dwellings.

3.2 Rises in peak demand

In contrast to falling power consumption, the continued roll-out of cheap and in-efficient air conditioners has meant that peak summer demand continues to increase (refer to Figure 3.4). Peak summer demand has increased by around 600 MW per annum to 2011 and AEMO expect it to increase at around 800 MW per annum over the next 10 years.

As an example of the significant impact that air-conditioners have, it is estimated that the installation of a 2 kilowatt (electrical input) reverse-cycle air conditioner costs a consumer around (on average) $1500 yet imposes costs on the energy system as a whole of up to $7000 when adding to peak demand[4]. The $7000 system-wide cost must then be spread across all other customers."

Rising peak demand and the need to replace aging network assets has underpinned more than $40 billion of regulated network investment over a five year period. This in turn has resulted in significant

---

[2] MD = Maximum Demand

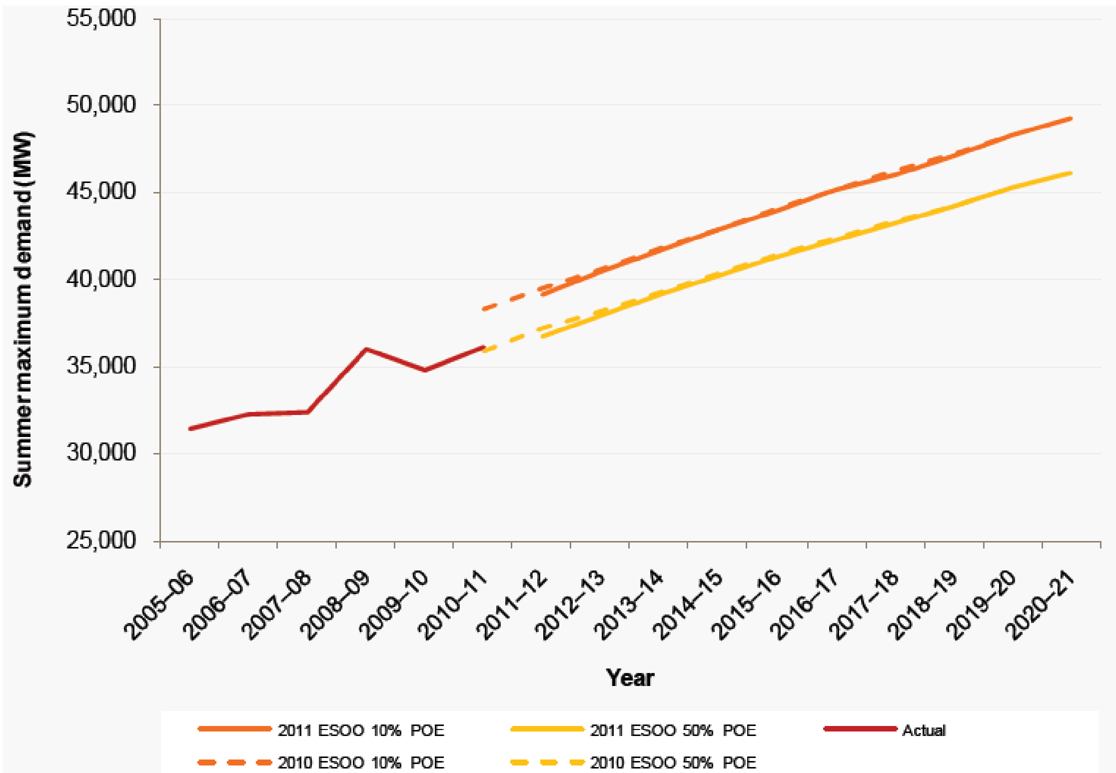
[3] Lower manufacturing output could be the result of the global financial crisis, higher exchange rate our outsourcing manufacturing overseas

[4] Department of Employment, Economic Development and Innovation, *Queensland Energy Management Plan,* Queensland Government, Brisbane, 2011.

increases in residential prices and as a result Australia now has some of the highest residential power prices in the developed world.

The carbon price and green schemes have been blamed by some sectors for significantly higher residential power prices. This however is not the case as rising regulated network charges are responsible for the bulk of the increase in residential prices.

Figure 3.4 AEMO – Peak demand across NEM (Statement of Opportunities, August 2011)



What is clear is that something needs to be done to curtail the growth in peak demand as this will lead to continued spiralling power prices. The need to address rising peak power demand has been under consideration for more than 10 years and efforts to date have largely been inadequate or in-effective. It is also clear that we need to do something different to what has been considered to date.

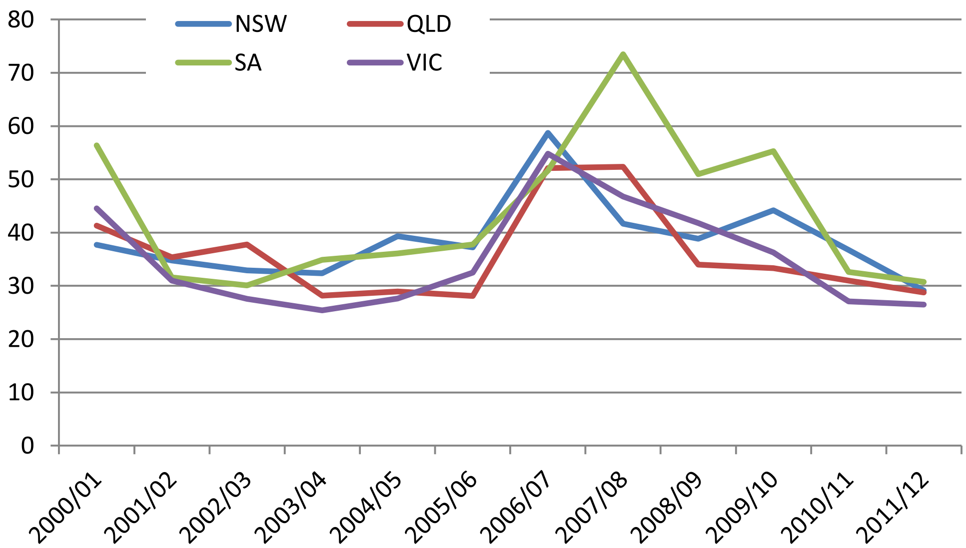
We have seen market based schemes deliver reduction in electricity consumption. These schemes have worked because the incentive or price-signal can be captured by service and equipment providers and as a result energy efficient appliances and distributed generation have been rolled out in significant numbers. There is no reason why this approach would not work for equipment, products and services that reduce peak demand.

3.3 Wholesale prices have been falling

One of the consequences of lower electricity consumption is that there is more competition between generators to be dispatched to supply the available load. Whilst electricity consumption has been falling, new generation has also continued to be commissioned. Focusing on renewables we have seen more than 1,100 MW of renewable projects get committed over the last three years which will result in an additional 3,500 GWh of generation. There has also been additional gas-fired generation projects committed, particularly in NSW and Queensland.

Lower demand, combined with additional generation, has resulted in considerably lower wholesale power prices. The average Regional Reference Price (RRP) for all states, as published by AEMO, has dropped considerably over the last five years to levels not seen for around 10 years. Figure 3.5 incorporates the average RRP for New South Wales, Victoria, Queensland and South Australia. In real terms prices in 2011/12 are between 52% to 60% of the level over the 2000-2002 period (details included in Attachment 2).

Figure 3.5 Average Regional Reference price (AEMO)



The forward contract prices for wholesale electricity according to data published by d-cypha trade[5] are currently trading at between $53/MWh in Victoria to $58/MWh in NSW for a base contract for 2013 calendar year. These figures include impact of the carbon price at $23/tonne from 1 July 2012.

To meet the 41,000 GWh large scale renewables target by 2020 we can expect that an additional 22,000 GWh of renewable generation will come on line by 2020 which will serve to continue to keep downward pressure on wholesale power prices.

3.4 Retail prices have been increasing

Residential electricity prices have increased dramatically in Australia to reach more than 22 cents per kWh in 2010/11 according to the AEMC report 'Possible Future Retail Electricity Price Movements: 1 July 2011 to 30 June 2014' released in November 2011. Residential electricity prices are expected to increase by 37% over the period (refer to Figure 3.6).

[5] http://d-cyphatrade.com.au/ (13 June 2012)

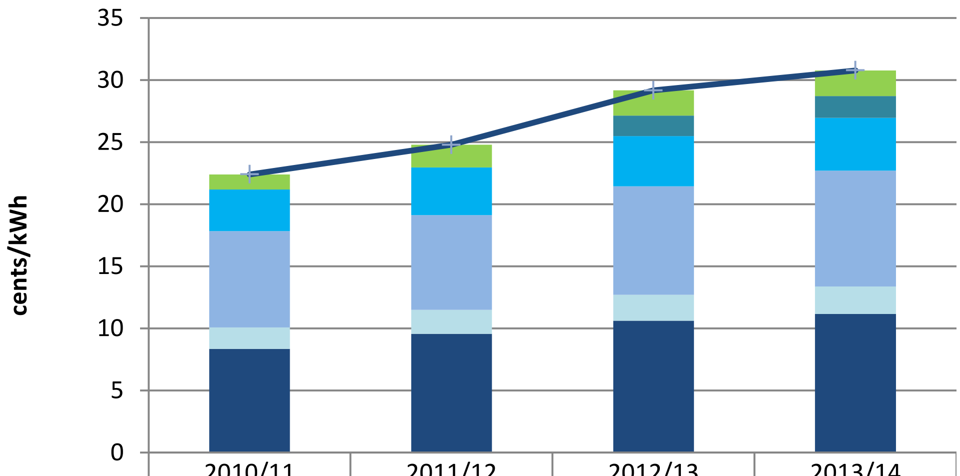
The AEMC have assumed that wholesale prices (before the impact of the carbon price) will rise over the next few years due to rising gas prices, higher capital costs and a tighter supply/demand balance. It appears that their estimates have been based on AEMO's increasing power consumption projections (refer to Figure 3.1). Whilst peak demand might increase, lower power consumption due to solar energy and energy efficiency and new large scale renewables coming on line will mean that there will be a surplus of generation capacity which should have a dampening impact on wholesale prices.

When we consider the components that make up the 8.37 cent/kWh (37%) increase, the largest contributor is distribution charges accounting for 34% of the increase, the carbon price accounting for 21% and green schemes accounting for only 10%.

Table 3.1 . Breakdown in expected electricity price increases (2010/11 to 2013/14), AEMC

	Increase in cost (c/kWh)	% Increase
Green schemes	0.84	10.0%
Carbon price	1.76	21.0%
Transmission	0.5	6.0%
Distribution	2.8	33.5%
Wholesale	1.59	19.0%
Retail	0.88	10.5%
Total	**8.37**	**100.0%**

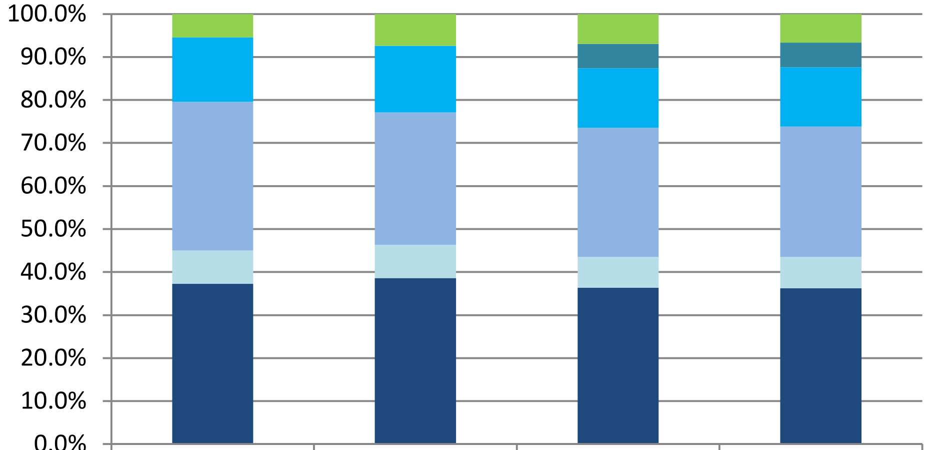
Figure 3.6 Expected residential electricity prices (2010/12 to 2013/14), AEMC



	2010/11	2011/12	2012/13	2013/14
Green Schemes	1.22	1.84	2.02	2.06
Carbon Price			1.65	1.76
Retail	3.36	3.83	4.06	4.24
Wholesale	7.74	7.63	8.74	9.33
Transmission	1.73	1.92	2.08	2.23
Distribution	8.35	9.57	10.61	11.15
Total	22.4	24.79	29.16	30.77

Regulated distribution and transmission costs make up 45% of electricity prices with the cost of green schemes comprising 5 to 7% of the final electricity price.

Figure 3.7 Components of expected residential electricity prices (2010/12 to 2013/14), AEMC



	2010/11	2011/12	2012/13	2013/14
Green Schemes	5.4%	7.4%	6.9%	6.7%
Carbon Price	0.0%	0.0%	5.7%	5.7%
Retail	15.0%	15.4%	13.9%	13.8%
Wholesale	34.6%	30.8%	30.0%	30.3%
Transmission	7.7%	7.7%	7.1%	7.2%
Distribution	37.3%	38.6%	36.4%	36.2%

3.5 International comparison of retail prices

Australia no longer has one of the lowest retail electricity prices in the world. This may have been the case once, but it is not the case anymore with residential electricity prices in Australia now one of the highest in the developed world.

The Energy Users Association of Australia commissioned CME to undertake an international comparison of retail electricity prices and published a report in March 2012[6]. At 2011 exchange rates Australian retail power prices were the highest as can be seen in Figure 3.8 which is an extract from the CME report.

According to the CME report, residential electricity prices in Australia had been stable from 2002 to 2007 but since then have risen around 40% in real terms. This is in contrast to other developed countries where electricity prices had been reasonably stable over the 2002 to 2011 period. Figure 3.9 shows this situation graphically and clearly shows the significance of recent rises in electricity prices.

[6] Electricity Prices in Australia and International Comparison, CME for the Energy Users Association of Australia (March 2012)

Figure 3.8 International comparison of residential electricity prices (2011 exchange rates) (Extract from the CME report for the Energy Users Association of Australia, March 2012)

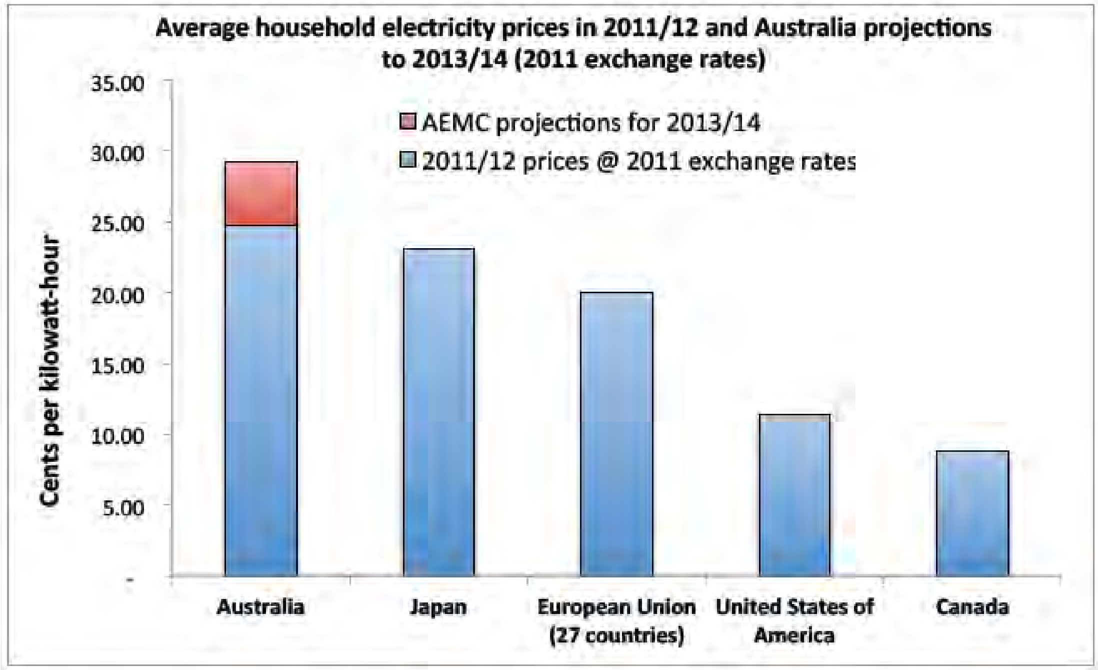
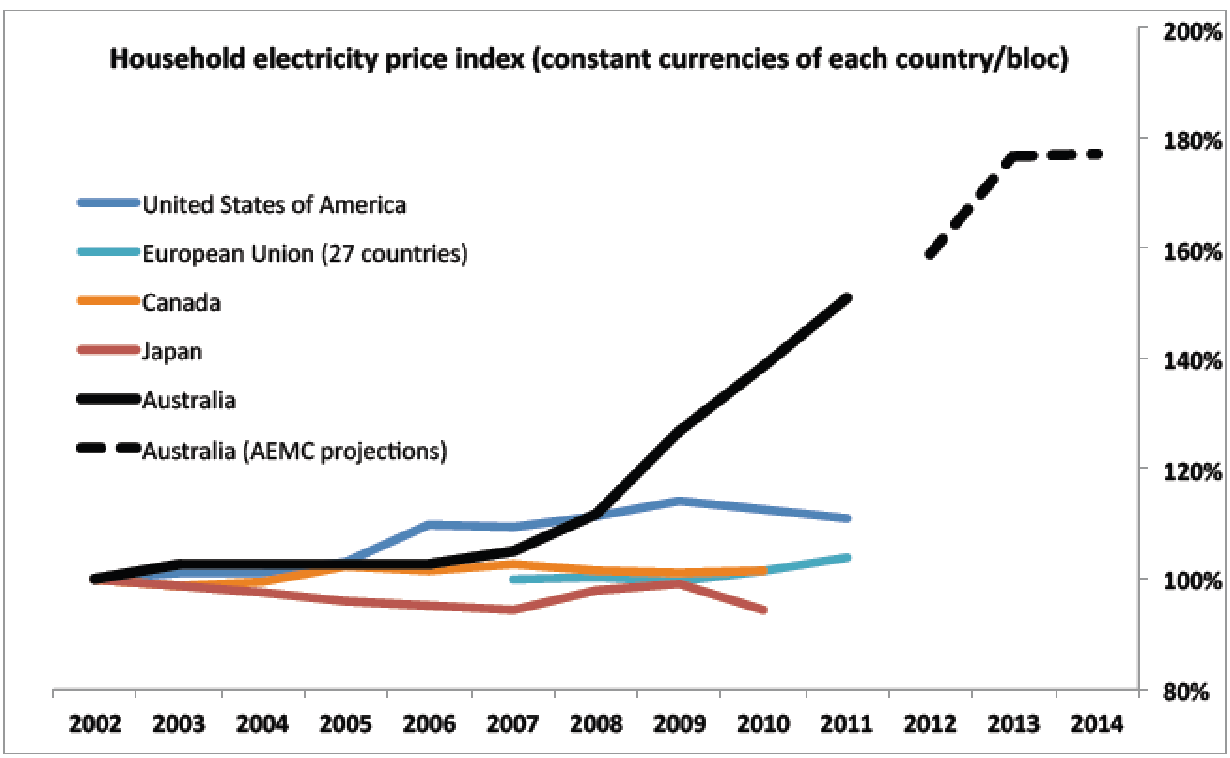
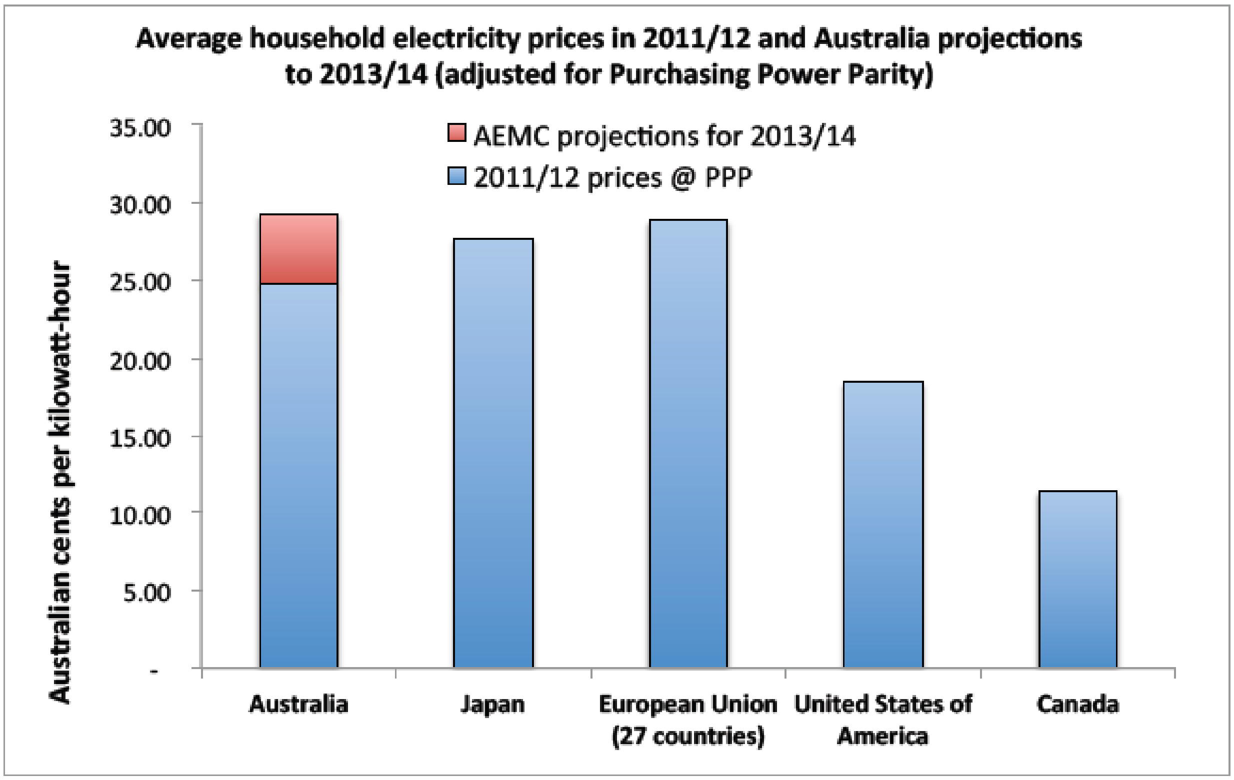


Figure 3.9 Historical electricity price comparison (Extract from the CME report for the Energy Users Association of Australia, March 2012)



Discounting the impact of exchange rates and using the 'purchasing power parity' approach adopted by the OECD, Australia whilst not the highest, is still higher than other comparable countries and clearly no longer enjoys an electricity price advantage, at least not at the retail level. Australia is likely to have one of the lowest wholesale or generated electricity prices due to the availability of low priced fossil fuels. However due to significantly higher costs for transmission and distribution, our delivered electricity price is quite high.

Figure 3.10 International comparison of residential electricity prices (Purchasing Power Parity) (Extract from the CME report for the Energy Users Association of Australia, March 2012)



4. Contribution of solar installations under the RET

The Renewable Energy Target (RET) came into effect on 1 April 2001 and was the cornerstone greenhouse policy measure of the Howard Government at the time. The key objective of the RET was and remains to increase renewable generation.

From 1 January 2011 the RET was split into two separate schemes, the large-scale scheme was to support larger renewable energy projects and the small-scale scheme is to support smaller renewable system installations.

Solar PV and solar hot water are the key distributed energy technologies that have been supported by the RET. Solar PV and solar hot water are 'deemed technologies' where certificates can be created up-front on the installation of these systems.

4.1 Solar PV under the Renewable Energy Target (RET)

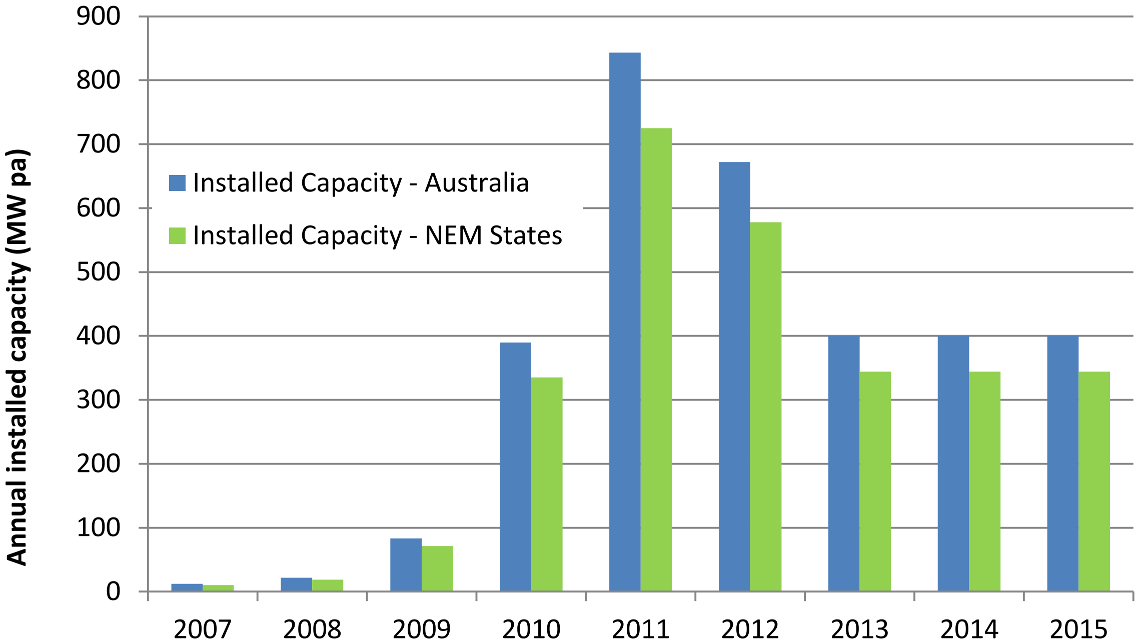
In the case of Solar PV, certificates equivalent to 15 years' worth of electricity generation can be created once the system has been installed. Additional certificates referred to as 'solar credits' can be created for eligible premises. A multiplier of 3 times up to the first 1.5 kW capacity can be claimed for installations until 30 June 2012 and then it reduces to 2 times on 1 July 2013 and then one times on 1 July 2014. In the case of solar hot water certificates, the equivalent of 10 years of avoided electricity consumption can be claimed on system installation.

In determining the level of electricity that has been avoided, we have adopted the following approach:

- The postcode system data for Solar PV released by the Clean Energy Regulator in April 2012 has been used as the key data source. This summarises on a monthly basis, the number of systems and system capacity installed up until 31 March 2012 that have created certificates.
- PV systems installed in Western Australia and Northern Territory have been excluded and these account for 13.6% of total PV installations that had claimed certificates to March 2012.

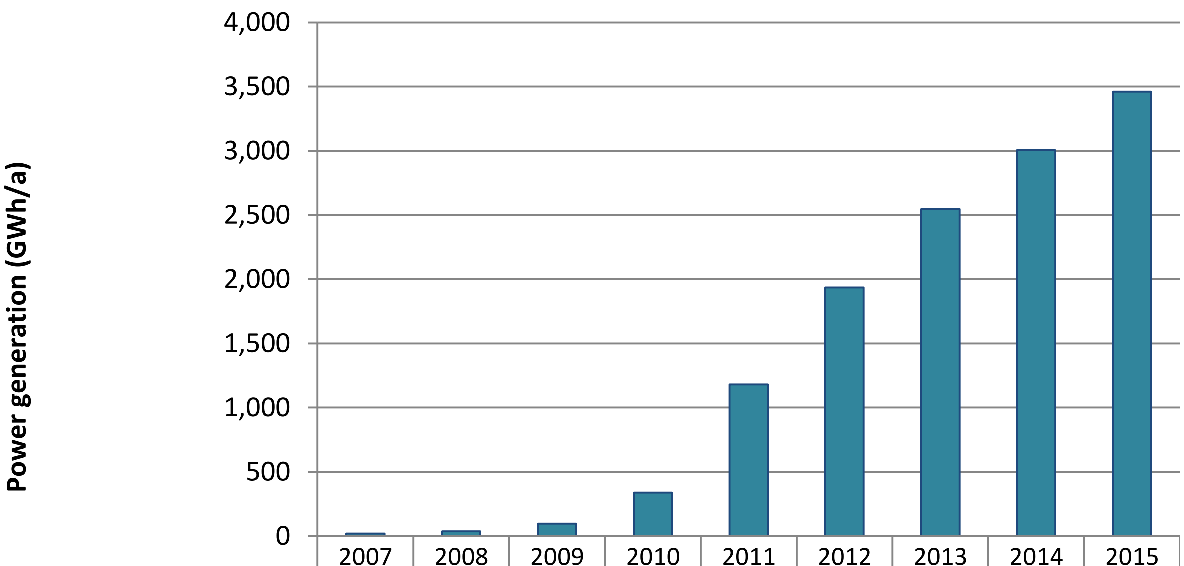
Solar PV installations have grown by an average of 336% per annum from 2008 to 2011. Installations in 2012 are expected to reduce by 20% to 672 MW. We have assumed that ongoing PV installations amount to at an average of 400 MW per annum across Australia. Continued reduction in installed costs and the recovery in the small-scale certificate (STC) price should offset the adverse financial impact of the progressive reduction in the solar credits multiplier.

Figure 4.1 Installed capacity of PV systems submitted for certificate creation



The level of electricity produced by PV has been determined by using the zone rating applied in each state. For Queensland, New South Wales, the ACT, Western Australia and South Australia we have used 1.382 MWh per annum for each kW installed and in Victoria and Tasmania we have used 1.185 MWh per annum per kW. The level of power generated by PV in NEM states amounted to 1,200 GWh in 2011 and is expected to increase to 3,500 GWh by 2015.

Figure 4.2 Electricity generated from PV systems claiming certificates in NEM states



	2007	2008	2009	2010	2011	2012	2013	2014	2015
Generation - NEM States	18	38	95	338	1,180	1,935	2,547	3,004	3,460

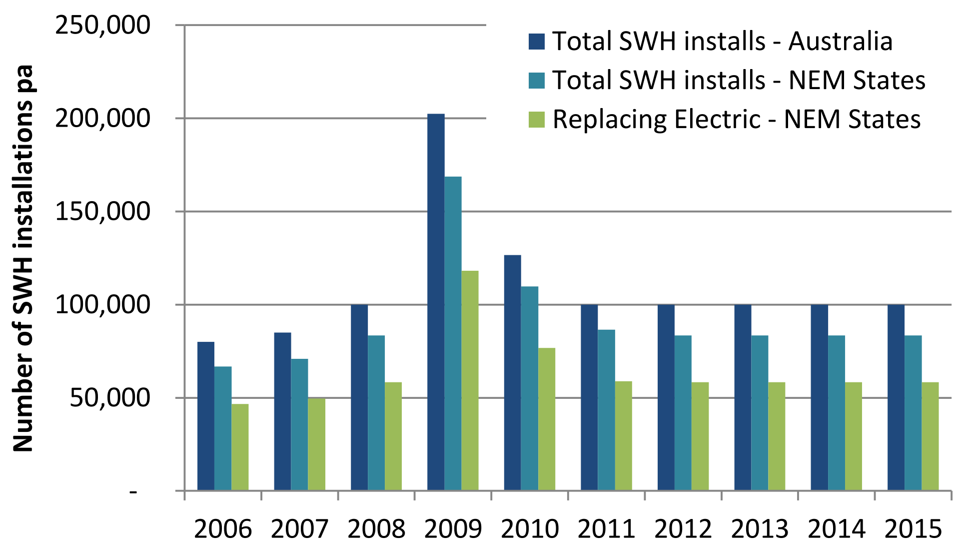
4.2 Solar hot water systems under the Renewable Energy Target (RET)

Solar hot water systems (SWH) can claim certificates up-front on a deemed basis for 10 years of avoided electricity. In determining the level of electricity that has been avoided, we have adopted the following approach:

- The postcode system data for SWH (including air sourced heat pumps) released by the Clean Energy Regulator as at 31 March 2012 has been used. This summarises on a monthly basis, the number of systems installed up until 31 March 2012 that have created certificates.
- SWH systems installed in Western Australia and Northern Territory have been excluded and these account for 16.6% of total SWH installations that had claimed certificates to March 2012.
- We have assumed that 30% of SWH system installations replace gas or solar and have excluded these from our analysis
- Each SWH system is assumed to displace 3 MWh of electricity per annum, this is equivalent to 30 certificates per system, which corresponds to the average over the last two years.

Solar hot water installations in Australia increased dramatically in 2009 with more than 200,000 systems claiming certificates under the RET. The surge in installations was due to additional rebates from both Commonwealth and state governments in response to the global financial crisis. Since 2009 the level of solar hot water systems claiming certificates has fallen with around 100,000 systems expected to claim STCs in 2012. We have maintained this level of installation out to 2015.

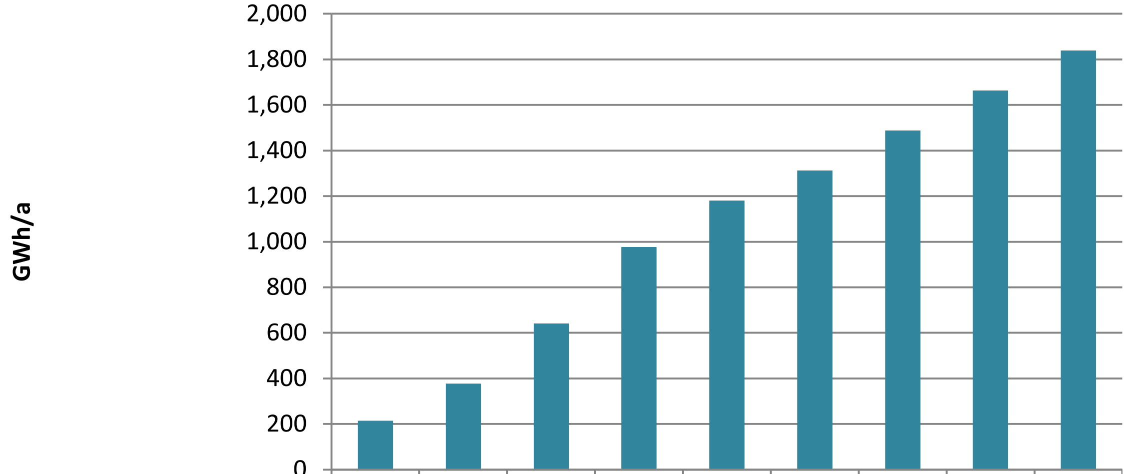
Figure 4.3 Solar hot water installations submitted for certificate creation



The level of electricity avoided has been determined by assuming that 70% of systems are replacing an electric water heater[7] and an average of 3 MWh of electricity avoided per system. The level of power avoided by solar hot water in NEM states amounted to 1,200 GWh in 2011 and is expected to increase to 1,840 GWh by 2015.

[7] Green Energy Markets report for the Renewable Energy Regulator on modelling for the 2012-14 STC Target (November 2011)

Figure 4.4 Electricity avoided from solar hot water systems claiming certificates in NEM states



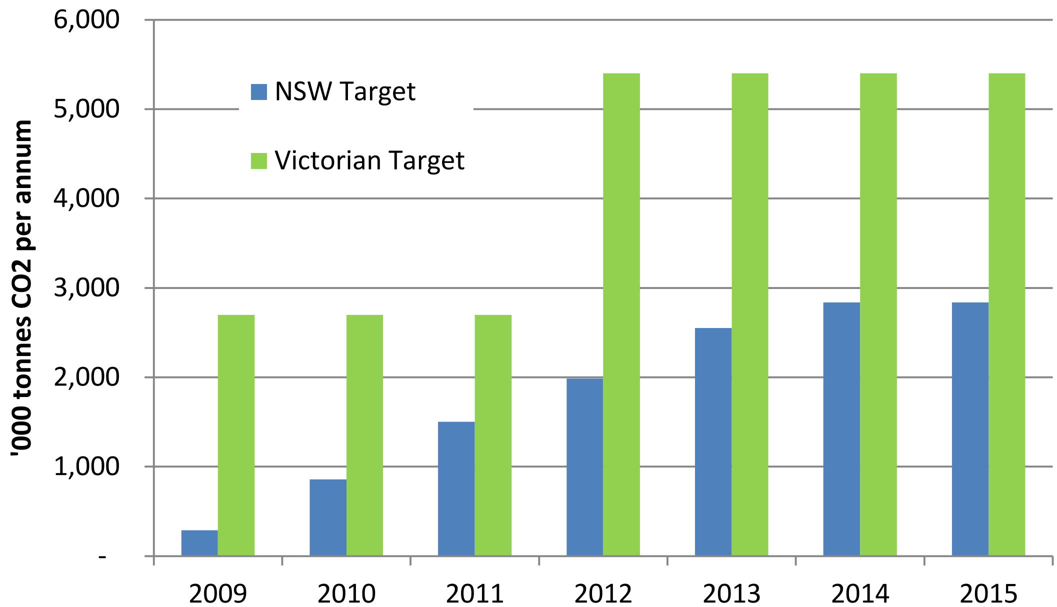
	2007	2008	2009	2010	2011	2012	2013	2014	2015
Avoided power consumption	214.5	376.6	641.3	976.6	1,180.7	1,313.1	1,488.3	1,663.4	1,838.6

5. Contribution of energy efficiency schemes

The Victorian Energy Efficiency Scheme also known as the Energy Saver Incentive, was introduced at the beginning of 2009 and applied to electricity and gas consumption in the residential sector. The scheme was expanded from 2.7 million tonnes to 5.4 million tonnes from the beginning of 2012 and extended to also include commercial and industrial energy consumption. Those larger sites that are covered by the Environmental and Resource Efficiency Plan (EREP) initiative are excluded from participating.

The NSW scheme was introduced from 1 July 2009 and builds up to 5% of eligible electricity consumption and excludes gas. The target build-up under the Victorian and NSW Energy Efficiency Schemes is shown as Figure 5.1. In determining the number of certificates to be created we have assumed that eligible electricity in NSW remains at 2011 levels through to 2015 (ie. no growth in electricity consumption). As a result, the NSW energy efficiency target increases steadily from 2.0 million certificates in 2012 to 2.8 million certificates in 2015.

Figure 5.1 Victorian and NSW energy efficiency targets



The certificates created under both the New South Wales and Victorian Energy Efficiency Schemes are measured in terms of avoided greenhouse gas emissions. Victoria and New South Wales use different conversion methodologies and factors to convert electricity savings into greenhouse gas emissions. Current factors used are 0.963 tonnes/MWh in Victoria and 1.06 tonnes/MWh in New South Wales[8]. We have applied these factors to determine the level of electricity savings to 2015.

[8] We understand that the differences in methodologies relate to Victoria using a marginal abatement factor whereas an average abatement factor is used in New South Wales

5.1 Energy Efficiency activities under the Victorian Energy Efficiency Scheme

Victorian Energy Efficiency Certificates (VEECs) can be created by Accredited Persons (APs) on the installation of approved products. Energy suppliers as liable parties under the scheme are required to surrender certificates representing their share of energy supply or pay a penalty. The number of certificates that may be created is 'deemed', based on the level of energy savings over the life of the particular product appropriately discounted to reflect uncertainty around the savings.

A list of the activities that have created VEECs is included as Table 5.1. In addition to these a range of commercial activities have also been approved on a deemed basis in 2012. These include commercial lighting, efficient motors, refrigeration fans and refrigeration cabinets. The Victorian government plans to roll out a number of other activities and methodologies progressively during 2012. We anticipate that in addition to deemed methodologies, project impact assessment and metered baseline methodologies which have been used in New South Wales, will also be used.

Table 5.1 VEECs created by activity on an installation year basis (as at May 2012)

VEEC Activity	2009	2010	2011
11 - Ceiling Insulation	56,918		
12 - Under Floor Insulation		17	
15 - Weather Sealing	21	152	1,713
16 - Lighting (revoked from 1 Jan 2011)	3,379,443	1,872,157	16,247
17 - Low Flow Shower Rose	154,193	65,812	70,865
18 - Purchasing HE Refrigerator or Freezer	1		
19 - Destruction of Pre-1996 Refrigerator or Freezer	7,047	16,837	30,636
1A - Water Heating - Gas/LPG Storage Replacing Electric	13,103	19,547	29,340
1B - Water Heating - Gas/LPG Instantaneous Replacing Electric	17,512	31,826	104,286
1C - Water Heating - Electric Boosted Solar Replacing Electric	510,459	102,575	107,131
1D - Water Heating - Gas/LPG Boosted Replacing Electric	186,831	80,519	70,809
2 - Water Heating - Solar Retro-Fit Kit	66	89	
20 - HE Ducted Gas Heater		168	461
21A - Lighting - GLS Lamps		544	398,364
22 - HE Refrigerators and Freezers			2
24 - HE Television			840
29 - Standby Power Controller			1,299,399
3 - Water Heating - Solar Replacing Gas/LPG	46,049	21,402	13,496
4 - Water Heating - Solar Pre-Heater	21		
5 - Space Heating - HE Ducted Gas Replacing Ducted Gas	728	868	1,731
6 - Space Heating - HE Ducted Gas Replacing Central Electric Heater	28,089	36,160	122,863
8 - Space Heating - HE Ducted Heat Pump Replacing Cent Elect Heater	171		724
9 - Space Heating - Gas/LPG Space Heater	493	444	1,498
Grand Total	**4,401,145**	**2,249,117**	**2,270,405**

In determining the level of electricity that has been avoided we have adopted the following approach:

i. Excluded those activities that result in a reduction in gas use rather than power use (eg. replacing inefficient ducted gas heating);
ii. Excluded those activities that have already been accounted for under the Renewable Energy Target (eg. solar replacing electric water heater); and
iii. Applied the relevant deeming factor (10 years for most residential activities) to the number of certificates that have been created in that year, to arrive at the level of electricity avoided on an annual basis.

We have developed projections for the breakdown in certificate creation by broad activity types to 2015 (refer to Table 5.2). Standby power controllers (SPCs) dominated the creation of certificates in 2011 and this is expected to continue in 2012. We anticipate that SPCs creating certificates will reduce considerably from 2013 onwards as saturation is achieved. Commercial lighting and a number of other activities were included as eligible activities from May 2012. We anticipate that commercial lighting will produce the largest number of certificates from 2013 onwards. We expect that methodologies other than the deemed ones available at present will be progressively rolled out and we have assumed that project impact (or similar approach) and metered baseline approaches will be available from 2013.

Under a project impact methodology (as applies in New South Wales) savings are discounted and brought forward on the basis of 100% of year 1, 80% of year 2, 60% of year 3, 40% of year 4 and 20% of year 5. This is equivalent to getting 3 years of savings (equivalent certificates) on installation and then claiming the remaining savings after year 5. Under a metered baseline approach, certificates are created annually as the savings are achieved.

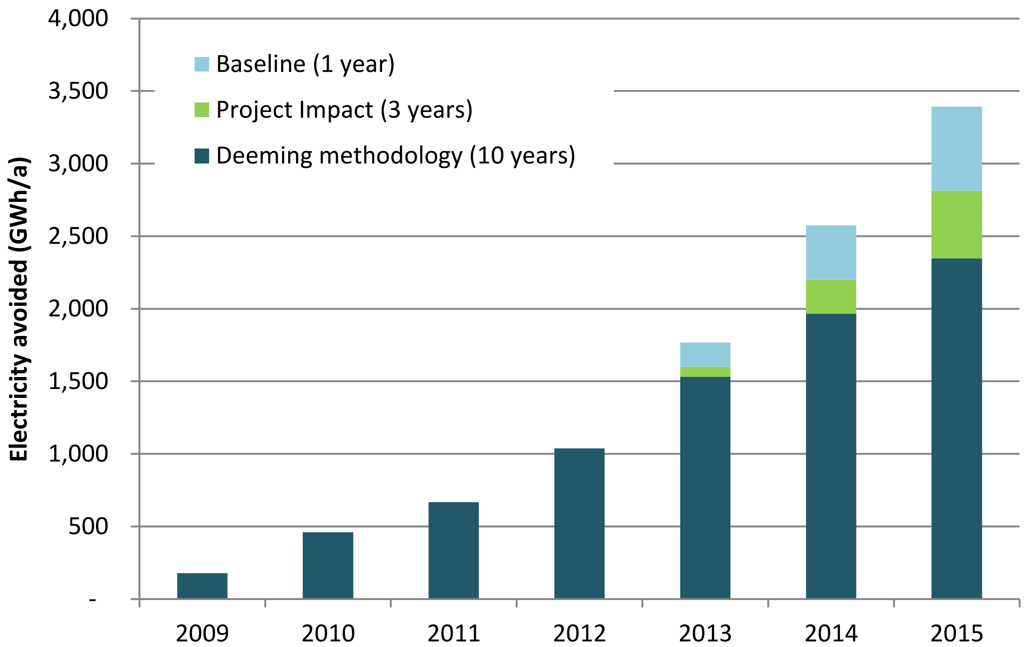
Table 5.2 Projected VEECs to be created by broad activity type

Summary Certificates Created	2009	2010	2011	2012	2013	2014	2015
Residential activities - replacing gas/covered by RET	955,780	272,046	268,546	279,852	292,745	306,282	320,496
Residential activities - replacing electric	3,445,365	1,977,071	2,001,859	4,111,951	1,961,951	1,311,951	1,411,951
Commercial lighting	-	-	-	958,197	2,345,304	2,511,767	1,873,553
Other Deemed Commercial	-	-	-	50,000	100,000	120,000	144,000
Project impact assessment	-	-	-	-	500,000	700,000	950,000
Metered Baseline	-	-	-	-	200,000	450,000	700,000
	4,401,145	**2,249,117**	**2,270,405**	**5,400,000**	**5,400,000**	**5,400,000**	**5,400,000**

In determining the amount of electricity that has been avoided we have assumed that commercial lighting and a range of other deemed technologies have 10 years of savings brought forward. For project impact methodology we have assumed that an average of 3 years of savings have been brought forward. We have also assumed that 80% of the certificates created under the project impact and metered baseline methodologies relate to avoided electricity, with the 20% covering avoided gas consumption being excluded from our analysis[9].

The level of power avoided by energy efficiency activities supported by the VEEC scheme amounted to 667 GWh in 2011 and is expected to increase to 3,393 GWh by 2015.

Figure 5.2 Electricity avoided by activities installed under the Victorian Energy Efficiency Target



5.2 Energy Efficiency activities under the NSW Energy Efficiency Scheme

The NSW scheme only covers avoided electricity consumption but incorporated savings from commercial and industrial activities since the scheme started on 1 July 2009. A range of methodologies were developed including 'deemed' creation for residential activities, commercial lighting and a range of other commercial activities. Project impact assessment and metered baseline methodologies were also available and these had been used extensively for commercial and industrial activities. NSW Energy Saving Certificates (ESCs) created up until May 2012 by methodology are summarised in Table 5.3.

Methodologies used in the NSW scheme are summarised below:

- **Project Impact Assessment Method**
  Certificate creation is based on an engineering assessment of only the equipment, process, or system that is the subject of energy Savings.
- **Metered Baseline Method**

[9] The major gas (and electricity) consuming sites in Victoria are covered by EREP and have been excluded from creating VEECs. As there are less energy reduction options and activities available to reduce gas consumption (compared to electricity) we have assumed that only 20% of certificates created under project impact and metered baseline methodologies are for reducing gas consumption.

Certificate creation is based on the difference in measurements of the electricity consumption before and after the recognised energy saving activity has taken place.

Sub-methodologies: Baseline per unit output, Baseline unaffected by output, normalised baseline, NABERs baseline.

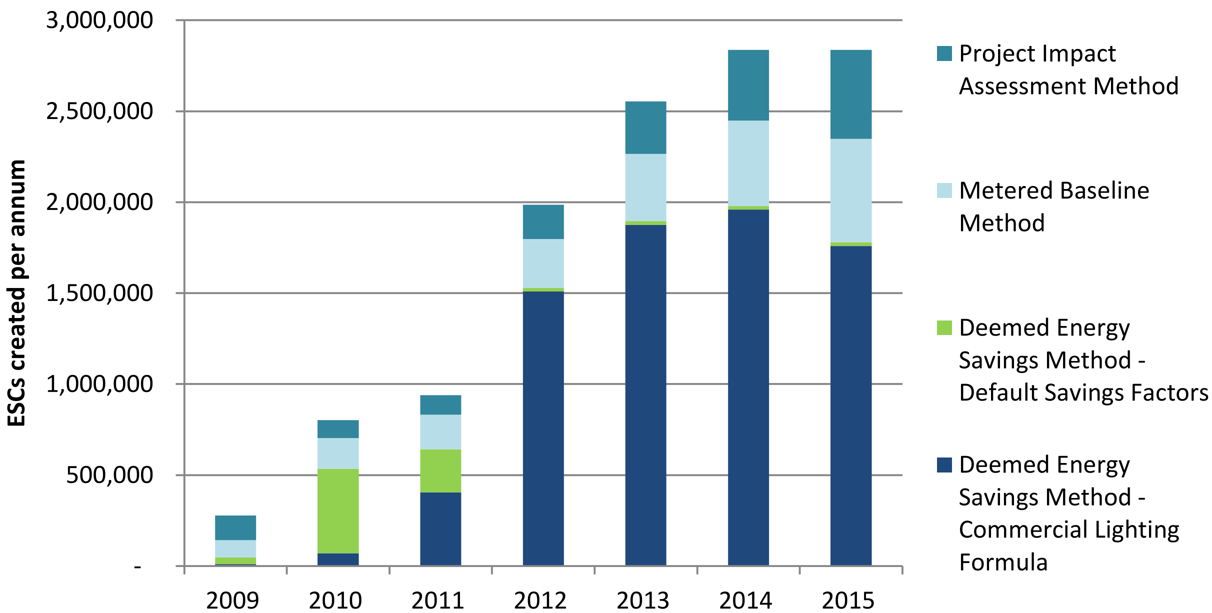
- **Deemed Energy Savings Method**
  Certificate creation is based on common end-user equipment formulas determined by the administrator over a specific period of time.
  Sub-methodologies: Default Savings Factor, Commercial Lighting Energy Savings formula, High Efficiency Motors and Power Factor Correction Energy Savings Formulas.

Table 5.3 ESCs created by methodology by installation year (as at May 2012)

	2009	2010	2011
Deemed Energy Savings Method - Commercial Lighting Formula	10,123	70,357	394,897
Deemed Energy Savings Method - Default Savings Factors	37,733	463,389	236,747
Metered Baseline Method - baseline per unit of output	89,497	153,475	144,229
Metered Baseline Method - baseline unaffected by output	730	887	3,054
Metered Baseline Method - normalised by NABERS scheme	4,073	14,339	37,577
Project Impact Assessment Method	134,886	99,390	105,463
	277,042	**801,837**	**921,967**

We have developed projections for certificate creation by broad methodology types to 2015. Most residential deemed activities have been phased out and we expect that commercial lighting will become a very significant creator of ESCs. Project impact assessment and metered baseline are expected to continue to grow.

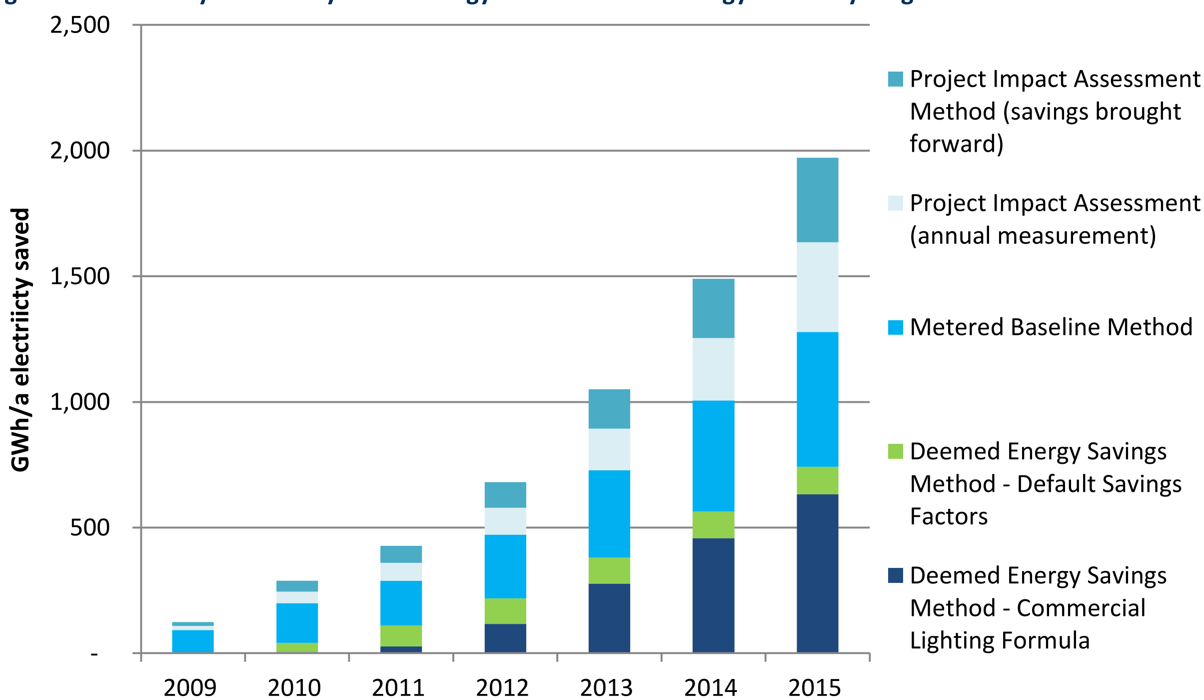
Figure 5.3 Projected ESCs to be created by broad methodology type



Similar to our approach for the Victorian Energy Savings Scheme, in determining the amount of electricity that has been avoided, we have assumed that commercial lighting and other deemed technologies have 10 years of savings brought forward. For project impact methodology, we have assumed that an average of 3 years of savings is brought forward for 74% of the certificates created and only one year brought forward for 26% of certificates[10].

The level of power avoided by energy efficiency activities supported by the NSW Energy Saving scheme amounted to 427 GWh in 2011 and is expected to increase to 1,972 GWh by 2015.

Figure 5.4 Electricity avoided by methodology under the NSW Energy Efficiency Target



[10] The breakdown of 74% /26% has been sourced from IPARTs 2011 annual report

6. Summary of results

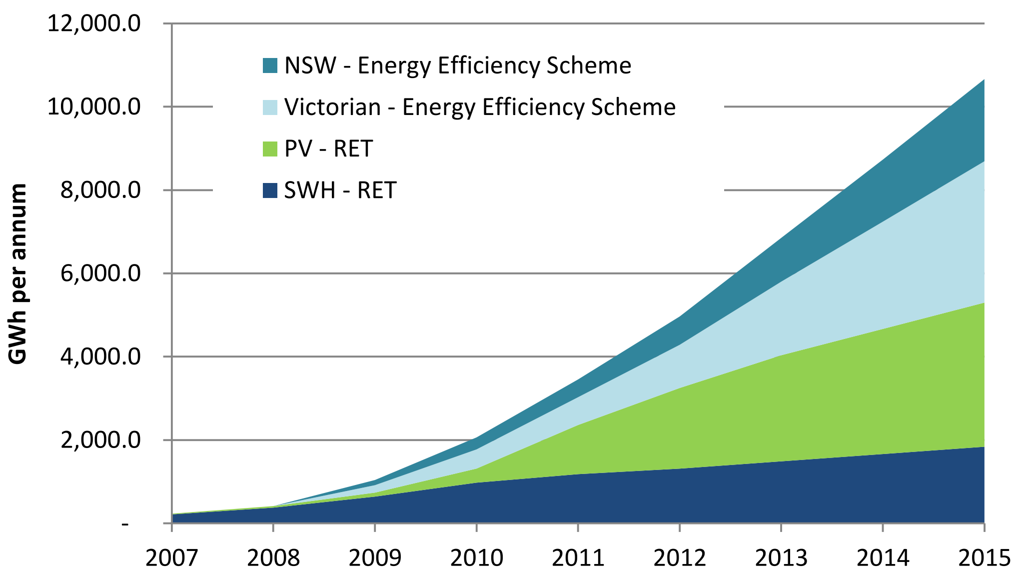
The three market based schemes that we assessed have supported solar and energy efficiency activities which have resulted in nearly 3,500 GWh of avoided electricity in 2011 across the NEM states. This equates to 1.7% of electricity consumption. Importantly however, power consumption across NEM states reduced by 6,600 GWh in the three years from 2008 to 2011. The contribution of solar and energy efficiency activities supported by the market based schemes was material at 53%. By 2015 the contribution of these schemes is expected to more than treble to 10,708 GWh.

A breakdown of the contribution by scheme is summarised in Table 6.1 and Figure 6.1.

Table 6.1 Electricity avoided in NEM States

GWh per annum	2011	2015
SWH - RET	1,181	1,839
PV - RET	1,180	3,460
Victorian – Energy Efficiency Scheme	667	3,393
NSW - Energy Efficiency Scheme	427	1,972
Total	**3,455**	**10,664**

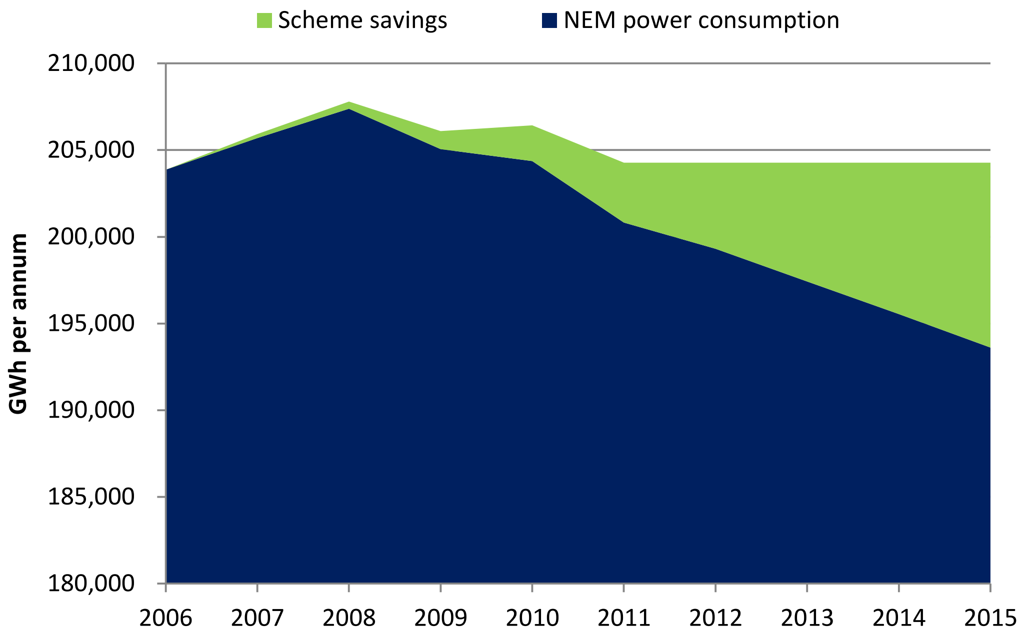
Figure 6.1 Electricity avoided in NEM States by scheme



In considering the impact on NEM power consumption to 2015, we have notionally assumed that gross power consumed prior to the contribution of solar and energy efficiency activities remains the same to 2015. We would normally expect that both continued population growth and economic growth would support increases in power consumption. However, the expected closure of some large electricity consuming facilities (eg. the Point Henry and Kurri Kurri aluminium smelters) and the contribution of other energy efficiency and distributed generation activities not covered by the above schemes, means that continuing gross electricity consumption at 2011 levels, whilst simplistic is likely to be a reasonable estimate.

Based on the above approach, gross electricity consumption was 204,300 GWh in 2011 and after allowing for the contribution of solar and energy efficiency supported by the market based schemes, net consumption amounted to 200,800 GWh. Assuming that gross consumption remains at 2011 levels to 2015 then solar and energy efficiency's contribution, amounts to 5.2% of total consumption (refer to Figure 6.2).

Figure 6.2 Electricity avoided relative to NEM power consumption



Attachment 1

Power Consumption in the NEM

Source: AEMO
GWh per state on a calendar year basis

	NSW	QLD	SA	VIC	TAS	Total NEM	Total Excl TAS
2001	69,898	44,057	12,887	47,128	-	173,970	173,970
2002	71,490	45,798	12,910	47,599	-	177,796	177,796
2003	72,364	46,952	12,821	48,768	-	180,904	180,904
2004	74,531	48,902	12,890	49,724	-	186,046	186,046
2005	75,413	50,378	12,564	49,804	6,399	194,558	188,159
2006	78,162	51,065	13,096	51,379	10,164	203,867	193,703
2007	78,629	51,562	13,351	51,972	10,179	205,693	195,514
2008	78,963	52,183	13,416	52,411	10,412	207,386	196,973
2009	77,664	52,711	13,477	51,305	9,900	205,057	195,157
2010	77,151	52,324	13,554	51,184	10,153	204,366	194,213
2011	76,459	51,107	13,093	50,142	10,019	200,820	190,801

Note: Snowy consumption to 2008 has been allocated one third to Vic and two thirds to NSW

Attachment 2

NEM – Regional Reference Price

Average annual prices (financial year)

Source: AEMO (16 May 2012)

1. Nominal Power Prices ($/MWh)

Year	NSW	QLD	SA	VIC
2000/01	37.69	41.33	56.39	44.57
2001/02	34.76	35.34	31.61	30.97
2002/03	32.91	37.79	30.11	27.56
2003/04	32.37	28.18	34.86	25.38
2004/05	39.33	28.96	36.07	27.62
2005/06	37.24	28.12	37.76	32.47
2006/07	58.72	52.14	51.61	54.8
2007/08	41.66	52.34	73.5	46.79
2008/09	38.85	34.00	50.98	41.82
2009/10	44.19	33.30	55.31	36.28
2010/11	36.74	30.97	32.58	27.09
2011/12	29.14	28.77	30.73	26.51

2. Real Power Prices ($/MWh)

Year	NSW	QLD	SA	VIC	CPI Factor
2000/01	37.69	41.33	56.39	44.57	133.8
2001/02	33.80	34.36	30.74	30.11	137.6
2002/03	31.16	35.78	28.51	26.10	141.3
2003/04	29.91	26.04	32.21	23.45	144.8
2004/05	35.46	26.11	32.52	24.90	148.4
2005/06	32.29	24.38	32.74	28.16	154.3
2006/07	49.88	44.29	43.84	46.55	157.5
2007/08	33.86	42.55	59.75	38.03	164.6
2008/09	31.13	27.24	40.85	33.51	167.0
2009/10	34.36	25.89	43.00	28.21	172.1
2010/11	27.57	23.24	24.45	20.33	178.3
2011/12	21.54	21.27	22.72	19.60	181.0
Change from 00/01-01/2	60.3%	56.2%	52.1%	52.5%	

RESEARCH NOTE 2

Understanding the Small-scale Renewable Energy Scheme

This Research Note has been prepared for the REC Agents Association by Green Energy Markets Pty Ltd. This research note analyses the Small-scale Renewable Energy Scheme (SRES) and provides a simple explanation of how the scheme works and how associated costs are passed on to electricity consumers.

Key points

- The SRES has been successful in stimulating the growth and development of the solar industry in Australia with more than 1.5 million solar systems installed by Australian families to 30 June 2012;
- The oversupply of certificates over the last two years has meant that the Clearing House mechanism has not been required. As the supply/demand balance adjusts the Clearing House will come into play;
- The price of certificates traded in the wholesale market over the last 18 months has averaged just over $30 which is 25% less than the Clearing House Price of $40;
- The cost impact of the SRES is set to reduce dramatically over the next year or two, to less than 1% of residential electricity prices as the Solar Credits multiplier gets phased out; and

Australia's Renewable Energy Target

The Renewable Energy Target (RET) was established by the *Renewable Energy (Electricity) Act 2000* and came into effect in April 2001. In August 2009, the RET was expanded to a mandated target of 45,000 GWh of electricity generation from renewable sources (solar, wind, hydro, bio-mass etc.) by 2020. At the time 45,000 GWh represented approximately 20% of electricity demand forecast for 2020.

On 1 January 2011 the RET was split into two components. The first was the Large-scale Renewable Energy Target (LRET) which supported electricity generation from large-scale renewable energy plant. The second component was the Small-scale Renewable Energy Scheme (SRES) which supports renewable energy generated by small generating units (SGUs), such as solar PV or energy displaced by solar water heaters (SWH).

The SRES

Although the SRES is referred to as an uncapped scheme in reality it is subject to an annual target which is based on a Small-scale Technology Percentage (STP). The STP is determined by the Clean Energy Regulator and is applied to the annual sales of electricity to determine the quantity of Small-scale Technology Certificates (STCs) liable parties must surrender to meet their obligations. The STP is determined by a two-step process: 1) forecasting the number of STCs that will be created for the year the STP is to be applied (including any surplus/deficit from the previous year); and 2) dividing this into the Liable Electricity Sales (refer to Figure 2 for the details of the calculation).

To meet their obligations under the RET Liable Parties must surrender the equivalent number of STCs as determined by the STP on a quarterly basis. The quarterly targets are 35% by 28 April, 25% by 28 July, 25% by 28 October and the balance (15%) by 14 February the following year.

STCs that are either in excess or short of the target for the compliance year are carried forward into the following year. This acts as a correction to the STC market on an annual basis and allows for the scheme to be administered by the Regulator without a formal cap. The SRES scheme as such can be described as a "self-correcting target" which ideally rebalances every two years.

For example, in 2011 the STC target was 28 million STCs and the STP 14.8%. By the end of 2011 there was a surplus of 22.5 million STCs; these were added to the 2012 estimate (22.3 million) to achieve a target of 44.8 million for the 2012 year. The 44.8 million equated to an STP of 23.96%.

Clearing House: How it works

The STC Clearing House facilitates the exchange of STCs between buyers and sellers at the fixed price of $40. It is accessed via the REC Registry and STCs must first be created and validated in the REC Registry, and fulfil all compliance and process requirements.

STCs are queued in the Clearing House and can be purchased by buyers at the Clearing House price ($40). Sellers STCs are added to the bottom of the STC Clearing House Transfer List and remain there until a buyer submits a purchase request. STCs in the Clearing House are settled on a “first in – first out” basis. STCs lodged in the Clearing House, with the expectation of trading at $40, must wait until a buyer makes a purchase from the Clearing House. There is no guarantee on how long the STCs will take to sell on this basis.

It is not mandatory for liable parties (electricity retailers and others) to purchase STCs to cover their liability from the Clearing House. They still have the opportunity to seek sellers in the STC market who may be willing to sell their certificates at a lower price (this is also referred to as the secondary market).

Buyers can purchase STCs from the Clearing House even when there are none listed. They will be issued with Regulator-created STCs which can be traded and surrendered exactly like ordinary STCs. Regulator-created STCs are automatically replaced with STCs when STCs are offered for sale in the STC Clearing House.

The Clearing House in effect operates as a seller of last resort and the $40 payable through the Clearing House becomes in effect a price cap.

STC Market and falling STC Prices

A prolonged surplus of STCs available through the market has meant the Clearing House has not been utilised in any significant way. To date a modest 140,000 STCs have been settled through the Clearing House all of which were transacted before the end of July 2011.

The STC target for 2011 was met (and substantially exceeded) with some ease. The surplus STCs created in 2011 acted to suppress the wholesale market price and the $40 Clearing House price was never reached (refer to Figure 1). A similar situation has developed through 2012 to date and, despite the carry-forward of the 2011 surplus, a significant STC surplus is expected for the 2012 year[1] (approximately 15 million).

Several factors have conspired to create the oversupply of STCs seen to date. Panel prices and the installed cost of solar PV has fallen dramatically. Reducing installed costs for solar PV together with the solar credits multiplier and persistent premium feed-in tariffs (in some states) has meant the financial returns to install solar systems were quite attractive. This has meant the level of solar PV installations for 2011 and now 2012 significantly exceeded expectations and created an oversupply in the market. The oversupply of STCs has been the primary reason for the relatively low STC price.

At the end of 2011 a total of 50.5 million STCs had been registered to meet the target of 28 million. In 2011 solar PV accounted for 95% of STC registration and SWH the balance.

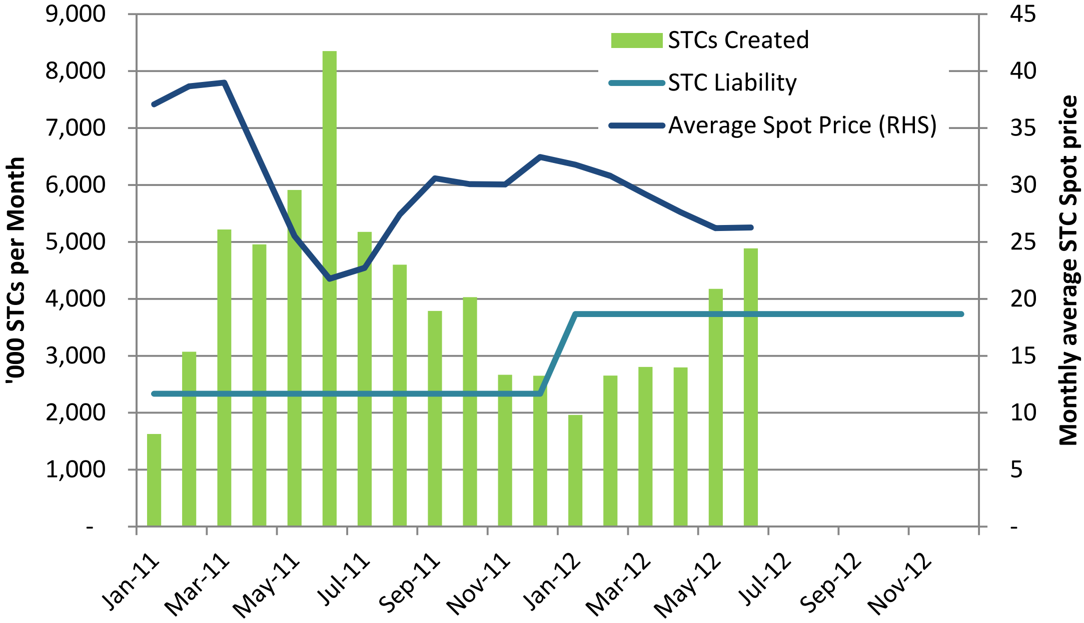
Average monthly prices for STCs progressively fell during 2011 as the number of STCs from solar PV systems increased dramatically. Towards the end of 2011 the number of STCs submitted for creation

[1] Green Energy Markets, July 2012 Solar Report

reduced, as a result the STC price increased. Inversely, the STC price fell as the level of STCs created started to rise in 2012 (refer to Figure 3).

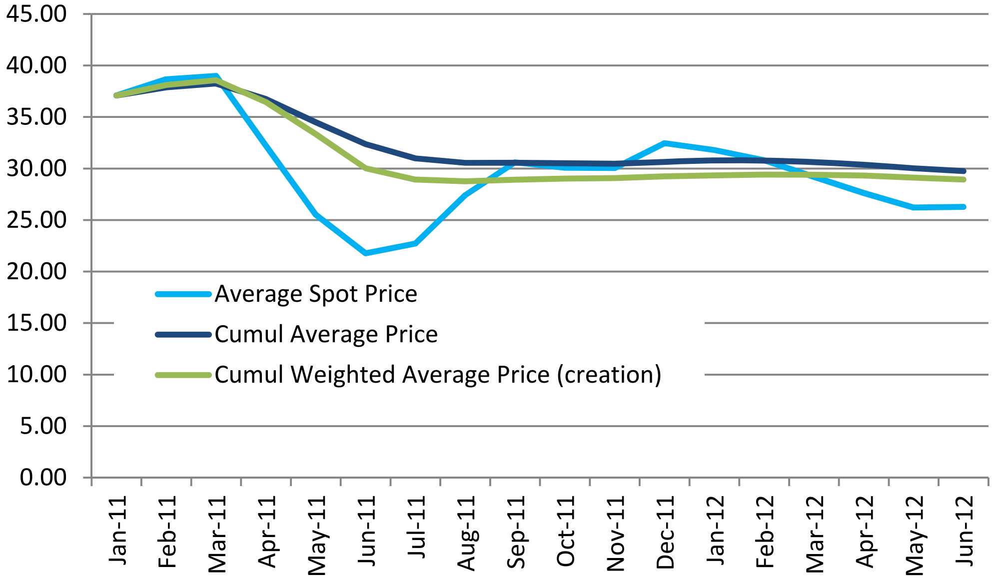
The solar credits multiplier (5 times to 30 June 2011 then reducing to 3 times to 30 June 2012) has significantly contributed to the quantity of STCs created to date. The spot STC price has tended to vary inversely to the level of STCs created. Since the end of June 2012 the price has increased as the level of STCs submitted for creation has reduced`.

Figure 1. STCs created to meet the Target[2]



The average STC price over the 2011 calendar year was $30.63. If a Liable Party were to have purchased its compliment of STCs on a monthly basis and through the wholesale market (at the spot price) the cost of doing so would be on average $30.63 per STC (77% of the Clearing House Price). Figure 2 shows the average monthly spot price together with the cumulative average price. The average price for the 6 months to May 2012 was $28.64.

Figure 2. STC wholesale spot prices



[2] The STC target has been converted to a monthly target by dividing the annual target by 12.

Environmental brokers NextGen calculate and publish a traded volume weighted STC spot price[3].

- For the 2011 calendar year the volume weighted STC spot price was $30.08;
- For the six months to 30 June 2012 the volume weighted STC spot price was $28.35; and
- For the 18 month period since the start of the SRES volume weighted STC spot price was $29.46.

While it is very unlikely that Liable Parties purchase their entire obligation of STCs through the wholesale market and pay the prevailing spot price, the pricing information above strongly indicates that the actual cost of meeting the STC target is well below the $40 per STC Clearing House price. Based on the above analysis the real cost of the STC scheme is probably closer to $30 per STC on a cumulative basis.

Cost of the SRES

In estimating the cost of the STC scheme some observers have simply used the $40 Clearing House price and multiplied this by the STC Target. This overstates the real cost by around 25% as the STC market price is considerably lower than the $40.

In 2011 the STC scheme cost 0.45 cents per kWh, based on an average STC price of $30.63 which translates into approximately 1.9% of the average residential retail electricity price (refer to Table 1). The impact of the STC scheme on the average electricity price is forecast to increase to 2.7% for 2012 due to the STC Target being increased to absorb the 2011 oversupply.

Table 1. STC Cost impact

	2011	2012	2013	2014	2015
STP	14.80%	23.96%	18.37%	7.66%	7.37%
Target (000 STCs)	28,000	44,796	34,345	14,319	13,780
Liable Generation (GWh)	189,189	186,962	186,962	186,962	186,962
STC Prices	30.63	30.00	35.00	37.00	37.00
STC Cost ($m per annum)	858	1,344	1,202	530	510
STC Cost $/MWh	4.53	7.19	6.43	2.83	2.73
STC Cost cents/kWh	0.45	0.72	0.64	0.28	0.27
Retail Price (AEMC) Cents/kWh	23.60	26.98	29.97	29.97	29.97
STC cost proportion	1.9%	2.7%	2.1%	0.9%	0.9%

The STC target will reduce in 2013, this is due to the scheduled Solar Credits Multiplier reduction. A smaller STC target will mean the cost impact of the SRES on the average electricity price will fall to 2.1%. The solar credits multiplier will be completely phased out after 2013 and will act to further reduce the impact the STC scheme has on average electricity prices (to less than 1%).

Assumptions used in estimating the cost of the STC Scheme (Figure 3):

- STC Target for 2013 is assumed to be 34.3 million STCs which allows for 15 million surplus STCs carried forward from 2012;
- PV system installations are assumed to be 322,000 for 2012, 230,000 for 2013, 210,000 for 2014 and 200,000 thereafter

[3] The spot price is weighted by the volume of reported transactions across the wholesale market

- SWH system installations are assumed to be 80,000 in 2012 and then increasing to 100,000 from 2013 onwards.
- Liable generation for 2013 is estimated to be the same as that used for 2012 (ie. no growth in electricity consumption);
- STC prices are assumed to recover during the second half of 2012 and into 2013 to average $30.00 for 2012, $35.00 for 2013 and $37.00 for 2014 and 2015.
- Estimated retail electricity prices have been sourced from the Australian Energy Market Commission (AEMC) report 'Possible Future Retail Electricity Price Movements; 1 July 2011 to 30 June 2014' released in November 2011.

Contribution to reducing power consumption and reducing wholesale electricity prices

The cost of the SRES scheme is mitigated by the downwards pressure it indirectly applies on wholesale electricity prices. As of 2011 the SRES had supported a significant 2,400 GWh reduction (1.2%) in power consumption across National Electricity Market (NEM)[4]. The reduction in consumption has been accompanied by a reduction in wholesale electricity prices. This is because generators who supply their electricity to the wholesale market are competing to supply a lower demand. According to the Green Energy Markets report wholesale power prices have been at their lowest levels in real terms for more than 10 years. This is a reduction of around $20 per MWh or 2 cents per kWh.

The contribution the SRES will make to reducing power consumption is expected to more than double by 2015 (more than 5,300 GWh). This will continue to put downwards pressure on wholesale electricity prices while at the same time the operational costs of the SRES will continue to fall.

[4] Green Energy Markets – Impact of market based measures on NEM power consumption, June 2012

Attachment 1

Small-scale Renewable Energy Scheme (SRES)

The SRES has been designed to deliver households, small business and community groups, up to $40 for each small-scale technology certificates (STCs) created by small-scale technologies like solar panels and solar water heaters.

The Renewable Energy Regulator has established a voluntary 'clearing house' as a central point for the transfer of STCs at $40. There will be no cap on the number of STCs that can be created. In most cases, householders will continue to get the value of STCs immediately, as an agreed upfront discount on the cost of installing their solar water heater or solar PV system, as they do under the current arrangements.

In order to ensure the $40 clearing house price in the SRES remains relevant over time, the legislation establishes a process to review the price, if necessary. Before making any determination to reduce the $40 price, the Minister must obtain and take into consideration independent advice on a number of issues, including: changes in the costs of solar PV and solar water heaters; the extent to which owners of solar PV and solar water heaters contribute to the upfront costs of those systems; and the impact of the clearing house price and the levels of installation of solar PV and solar water heaters on the electricity market, including on electricity prices.

To facilitate the smooth operation of the small-scale market, the legislation also stages the flow of STCs. The regulations establish an estimate each year for the number of STCs needed to be acquired by liable entities. The target is set to align with expected rates of STC creation based on historic rates, analysis of government support, and expert judgement. Based on this target, liable entities are required to surrender STCs four times a year.

http://www.climatechange.gov.au/government/initiatives/renewable-target/fs-enhanced-ret.aspx

RESEARCH NOTE 3

September 2012

Geographical analysis of solar systems under the Renewable Energy Target

This Research Note has been prepared by Green Energy Markets for the REC Agents Association and analyses the installation of solar PV and solar water heater (SWH) systems that have claimed Renewable Energy Certificates (RECs) under the Renewable Energy Target (RET). This analysis utilises data published by the Clean Energy Regulator on the number of solar systems that have been installed and claimed RECs by postcode.

Four million Australians now have solar on the roofs of their homes and businesses, supported by the RET. Most solar systems are in outer metropolitan and regional communities. This analysis shatters the myth that the RET amounts to upper and middle class welfare.

Key findings:

- most solar systems (53%) were installed in regional and rural communities with only 43% installed in the major capital cities;
- the level of solar penetration amounted to 13% in the major capital cities of Australia (representing 58% of households) and was 21% outside of the major capital cities (60% higher penetration);
- of the systems installed in capital cities, those suburbs with the highest penetration (number of systems installed in suburb divided by the number of dwellings in that suburb) were typically in the outer metropolitan mortgage belt;
- there was a slight inverse relationship between average incomes and solar penetration levels;
- the suburbs with the highest income levels did not correspond to those with highest penetration, the opposite was more likely;
- The suburbs with the highest penetration of solar systems in each states tended to be either regional or outer metropolitan; and
- The six suburbs in Australia with the largest number of solar systems are[1]:
  - Coodanup, WA, near Mandurah, 70 km south of Perth - 9,463 systems (30% of houses)
  - Abbotsford, Qld, near Bundaberg, 310 km north of Brisbane – 9,029 systems (26% of houses)
  - Booral, Qld, near Maryborough, 236 km north of Brisbane – 8,823 systems (34% of houses)
  - Cocoroc, Vic, near Werribee, 38 km west of Melbourne – 8,426 systems (29% of houses)
  - Hoppers Crossing, Vic, near Werribee, 24 km west of Melbourne – 8,138 systems (34% of houses)
  - Bentley, NSW, near Ballina, 595 km north of Sydney – 7,673 systems (39% of dwellings)

Sections covered by this Research Note

This Research Note analyses the following key attributes of solar installations:

1. Solar system penetration and income levels by postcode
2. Urban classification and solar system penetration
3. Top 20 suburbs in each state by solar PV and SWH system penetration

[1] A number of houses may have both Solar PV and SWH systems installed so the penetration rate may be slightly lower.

1. Solar system penetration and income levels by postcode

It has been often stated that the RET in so far as it supported solar amounted to upper and middle class welfare. Using data on the installation of solar systems by postcode we sought to put the spotlight on this contention.

At a suburb level there was no correlation at all between income levels and solar penetration. In fact the opposite was the case with a higher penetration of solar systems in lower income suburbs (refer to Figure 1). The slope of the line indicates an inverse relationship between system penetration and income levels.

The key determinants of solar penetration on a suburb basis are more likely to be things such as (i) level of home ownership, (ii) level of detached and semi-detached dwellings (ie. available roof space) and (iii) level of new home and renovation activity[2].

Figure 1 – Solar system penetration by postcode compared to income levels

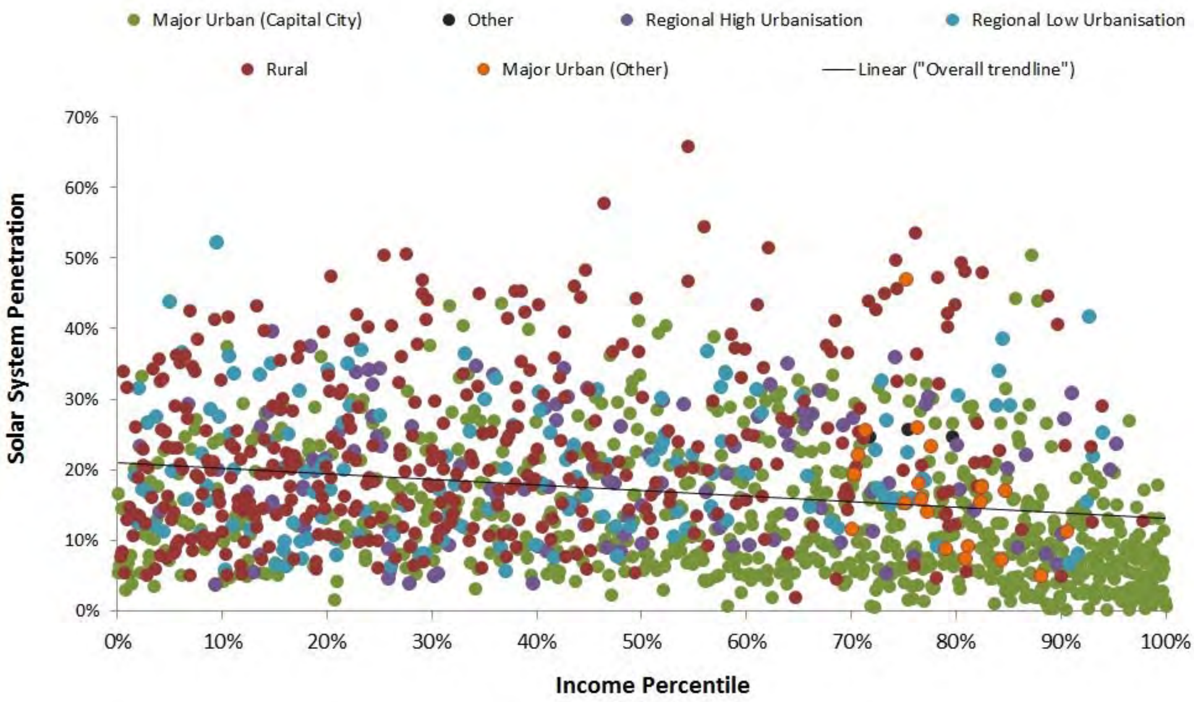


Figure 1 plots each postcode we have available data for on a scatter plot. Its place on the scatter plot is determined by the income percentile and solar system penetration associated with the postcode. A third parameter is the relevant urban classification of each postcode—this is represented by the colour of the marker. A rich capital city postcode with low solar penetration will be green and at the bottom right of the graph, while a poor rural postcode with high solar penetration will be red and at the top left. The methodology for this analysis is explained below.

[2] A number of builders offer attractive solar packages and in many states building regulations support a low greenhouse hot water systems to be installed

Solar Penetration

To estimate solar system penetration for each Australian postcode (as used in Figure 1) we used total systems installed at each postcode divided by total number of dwellings at each postcode. Statistics on dwellings were available from the Australian Bureau of Statistics (ABS) and the latest *2011 census data*.

Traditionally analysis of system penetration focusses on total systems installed divided by the available market for solar installations. The available market for solar installations is considerably less than total dwelling numbers and, with a few exceptions, is often confined to owner-occupied semi-detached or detached houses. For example, the total number of dwellings in Australia (as per 2011 census data) is 9.14 million, yet only 51.2 percent of total dwellings (4.68 million) are available for solar installations (likely to be higher for reasons explained in following paragraph).

We have used total dwellings, as opposed to owner-occupied semi-detached or detached houses because we believe the census data, for reasons out of the control of the ABS, fails to paint an accurate picture of the quantity of owner-occupied semi-detached or detached houses. This is because 15.9 percent (1.45 million) of census dwelling numbers are attributed to '*not stated'* and '*not applicable'* dwelling types. For whatever reason (unattended holiday homes for example) a portion of these are likely to be owner-occupied semi-detached or detached houses and therefore if we used 4.68 million as an estimate of owner-occupied semi-detached or detached houses we would probably overstate penetration figures. Further we do not know what portion of the 1.45 million '*not stated'* and '*not applicable'* dwellings are conducive to solar installations or whether this 'portion' is consistent across all postcodes. It is worth noting that because we used total dwellings for each postcode we have probably understated solar penetration.

Each quarter the Clean Energy Regulator releases installation figures for Small Generation Units (SGUs) and Solar Water Heaters (SWH). These figures are at the postcode level and to achieve penetration rates for each postcode we simply took the total number of installations (solar PV, SWH and Air Source Heat Pump) and divided them by the total number of dwellings at each postcode. Using this approach may in some cases act to overstate penetration levels. This is because we have treated each installation (whether solar PV or solar hot water) as a separate installation at a different dwelling. In some cases a dwelling may have both solar PV and solar hot water installed but there is no way of knowing which dwellings have more than one solar installation.

Not all solar PV and SWH systems installed will create RECs, a small proportion may either (i) not meet requirements or (ii) may not bother creating certificates due to complexities in creation[3].

Income measurements

Using average income for each postcode is one way we can characterise each postcode. The Australian Tax Office (ATO) releases a summary of tax returns for each financial year; this publication includes average taxable income for each postcode in each state. We used financial information from the most recent ATO publication: '*Taxation Statistics 2009–10'*.

Ordering or ranking average income provides insight into how a particular postcode fits within the broader average taxable incomes of all postcodes. For each average taxable income we calculated its percentile – the 100th percentile was an average taxable income of $182,254 and $39,998 was the 0.07% percentile.

[3] Solar systems installed in new homes have more complexity in certificate creation

2. Solar system penetration and urban classification

Urban Classification

In the '*Taxation Statistics 2009–10'* publication the ATO classifies the urban environment in which each postcode lies. We have adopted the urban classification definition used by the ATO. Each postcode, according to specific criteria, falls into one of the six categories included in Table 1.

Table 1 - Solar system penetration and income statistics by urban classification

	ATO Classification	ATO criteria
1	Major urban (Capital city)	Postcodes in capital city urban centres
2	Other Urban (we have used Major urban (other)	Postcodes in urban centres with population greater than 50,000 persons (excluding capital cities)
3	Regional-high urbanisation	Postcodes in urban centres with population between 10,000 and 50,000 persons
4	Regional-low urbanisation	Postcodes in urban centres with population between 3,000 and 10,000 persons
5	Rural	All other postcodes (includes urban centres with population less than 3,000 persons and all other sparsely settled areas)
6	Other	Postcodes listed by Australia Post as valid but not in use, special PO boxes and other special mailing postcodes

We assigned system installation quantities to each of the six urban classifications used by the ATO. For each postcode that had available system installation data (from the CER) and associated urban classification (as per the ATO definition) we aggregated system installation figures up to the level of urban classification.

Table 2 - Solar system penetration and income statistics by urban classification

Urban Classification	Number of systems	% share of total systems	Number of dwellings	% share of total dwellings	Average penetration	Average Income (per dwelling)
Major Urban (Capital City)	662,240	46.7%	5,068,447	57.9%	13.1%	$ 69,491
Major Urban (Other)	191,523	13.5%	1,111,786	12.7%	17.2%	$ 52,008
Regional High Urbanisation	221,416	15.6%	1,067,421	12.2%	20.7%	$ 48,776
Regional Low Urbanisation	120,404	8.5%	581,306	6.6%	20.7%	$ 42,985
Rural	221,584	15.6%	913,519	10.4%	24.3%	$ 43,119
Other	1,311	0.1%	5,262	0.1%	24.9%	$ 54,079
Total Australia	**1,418,478**	**100.0%**	**8,747,741**	**100.0%**	**16.2%**	**$ 60,216**

Due to the inadequacy of some of the postcode data we used only 1,500 (50 percent) of the total 2,988 postcodes (postcodes for SGU, SWH and ASHP). The inadequacy of most of the postcode data came from two sources:

- Some postcodes were either no longer in use or were used under special circumstances. While this meant installation data was available, data from other sources (income, urban classification and/or dwelling data sources for example) was not available;

- Certain postcodes had a combination of low dwelling and high installations figures, this created questionable penetration levels. To address this issue we restricted the postcodes to those with >1,000 dwellings.

System penetration for each postcode (and ultimately for each urban classification) was calculated using dwelling numbers from the 2011 census (ABS).

We did not use average taxable income per person for analysis in this table but rather total taxable income for the postcode (ATO) divided by total number dwellings in the postcode (ABS).

We took the total number of systems and divided it by the total number of dwellings to achieve an average penetration for each urban classification.

It is important to note that while only 50 percent of the postcodes were used in this analysis, the 1,500 used constituted:

1. 1,418,478 systems which is 94.7 percent of the total (1,497,686 systems);
2. 8,747,741 dwellings which is 95.7 percent of the total (9,137,471 dwellings);

3. Top 20 suburbs in each state

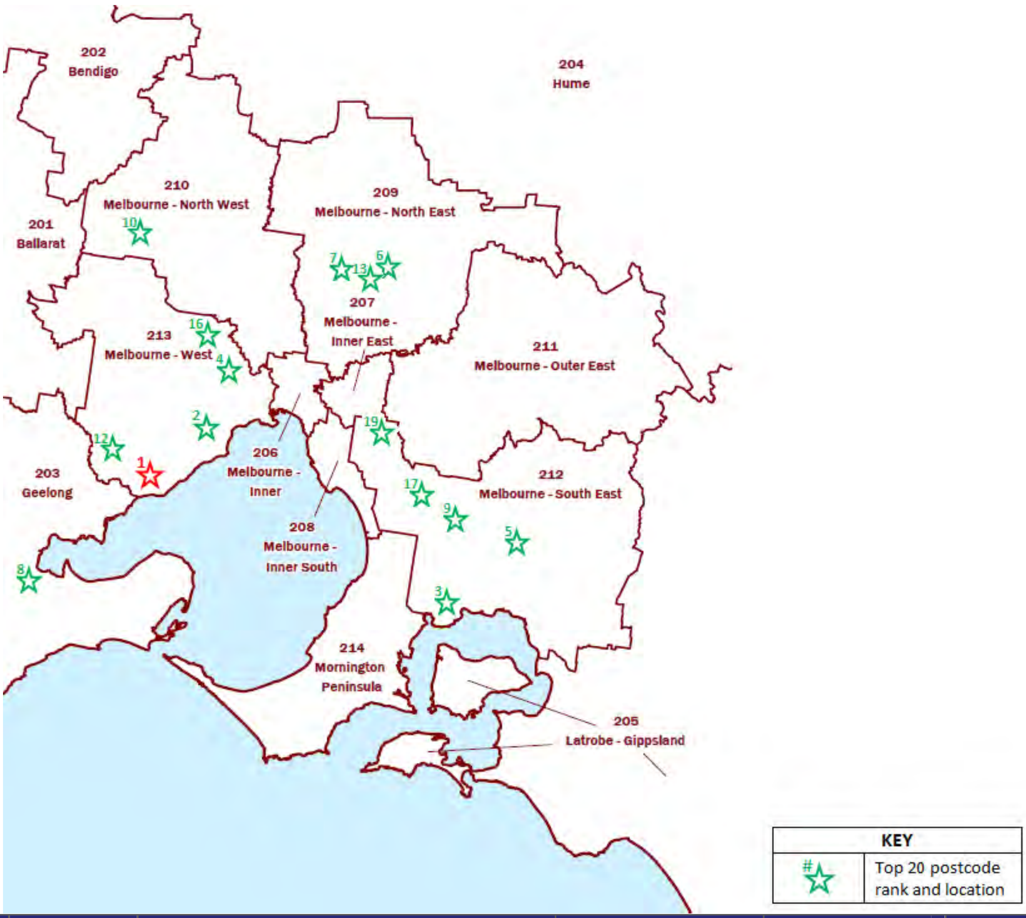
As part of our analysis we specifically identified those suburbs in each state with the highest level of system installations. In the case of Victoria, NSW and Queensland we also include a geographical summary. The analysis is included in the following attachments:

Attachment 1 – Geographical distribution of solar systems in Victoria
Attachment 2 – Geographical distribution of solar systems in NSW
Attachment 3 – Geographical distribution of solar systems in Queensland
Attachment 4 – Top 20 solar PV and SWH suburbs by state

Key findings of this analysis were:

- The 20 suburbs with the largest number of solar systems in Victoria accounted for 27% of total installations in the state;
- The suburbs in Victoria with the largest number of systems (and highest penetration) tended to be in outer metropolitan areas
- The 20 suburbs with the largest number of solar systems in NSW accounted for 22% of total installations in the state;
- Unlike in Victoria, the suburbs in NSW with the largest number of systems (and highest penetration) tended to be in regional areas;
- The 20 suburbs with the largest number of solar systems in Queensland accounted for 27% of total installations in the state; and
- The suburbs Queensland with the largest number of systems (and highest penetration) tended to be split between outer metropolitan areas and regional areas.

Attachment 1 – Geographical distribution of solar systems in Victoria

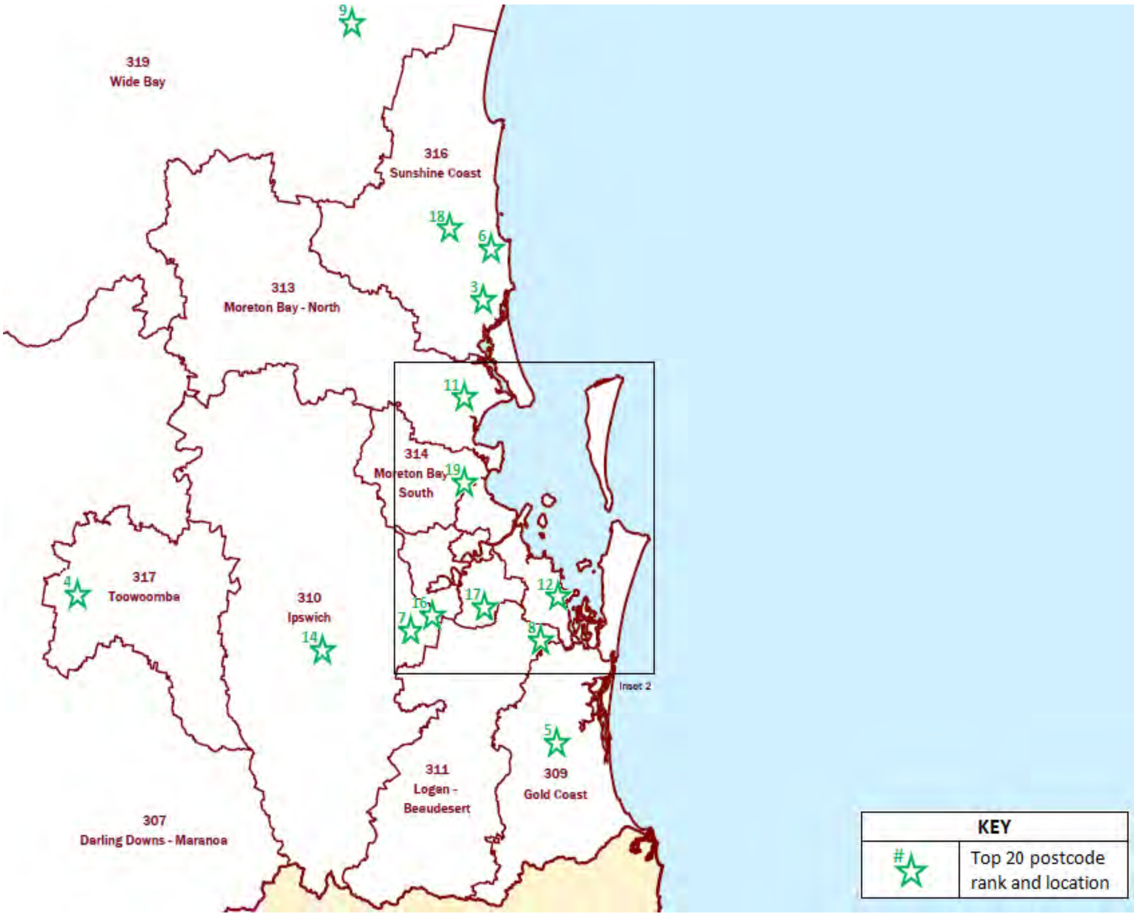


Rank	Postcode	Suburb	Distance from CBD (km)	Total installations	Penetration (%)
1	3030	Cocoroc	38.4	8,426	29.0
2	3029	Hoppers Crossing	24.3	8,138	33.6
3	3977	Cannons Creek	54.0	6,170	25.1
4	3023	Burnside	19.2	5,306	28.3
5	3810	Pakenham	54.4	4,426	32.2
6	3754	Doreen	27.7	4,309	65.8
7	3064	Craigieburn	24.1	3,936	23.4
8	3216	Belmont	67.7	3,053	13.9
9	3806	Berwick	41.4	2,777	17.1
10	3337	Kurunjang	35.8	2,772	22.7
11	3551	Arnold (Bendigo region off map)	159.0	2,715	30.3
12	3024	Mambourin	38.8	2,490	37.5
13	3076	Epping	19.9	2,364	25.8
14	3500	Mildura (Nth West region off map)	475.8	2,361	16.9
15	3350	Alfredton (Ballarat region off map)	106.6	2,322	9.7
16	3037	Delahey	20.1	2,312	15.2
17	3805	Fountain Gate	37.7	2,182	12.2
18	3550	Bendigo (Bendigo region off map)	132.2	2,152	11.9
19	3150	Brandon Park	19.9	2,006	9.2
20	3630	Branditt (Shepparton region off map)	166.3	1,948	15.5
	Total top 20	*(29.2% of total installations)*		72,165	
	Total other	*(70.8% of total installations)*		199,124	
	Total			**271,289**	

Attachment 2 – Geographical distribution of solar systems in NSW

Rank	Postcode	Suburb	Distance from CBD (km)	Total installations	Penetration (%)
1	2480	Bentley	595.2	7,673	38.8
2	2444	Blackmans Point	317.2	7,047	34.4
3	2540	Bamarang	131.1	6,117	25.6
4	2450	Boambee	430.7	5,750	33.6
5	2430	Black Head	236.4	5,198	34.5
6	2486	Banora Point	668.4	5,148	37.6
7	2560	Airds	42.1	4,685	18
8	2259	Alison	69.2	4,671	21.6
9	2830	Ballimore	284.9	4,522	28.9
10	2478	Ballina	600.4	4,425	34.7
11	2250	Bucketty	85.2	4,302	15.8
12	2170	Casula	29.4	3,776	11.5
13	2460	Alice	552.8	3,510	28.3
14	2484	Back Creek	644.7	3,317	41.7
15	2428	Blueys Beach	211.1	3,246	23.4
16	2153	Baulkham Hills	23.5	2,997	16.5
17	2324	Balickera	146.7	2,935	27.2
18	2340	Appleby	326.2	2,918	15.0
19	2283	Arcadia Vale	97.2	2,894	29.0
20	2261	Bateau Bay	59.6	2,833	11.8
	Total top 20	*(21.6% of total installations)*		87,964	
	Total other	*(78.4% of total installations)*		318,384	
	Total			**406,348**	

Attachment 3 – Geographical distribution of solar systems in Queensland



Rank	Postcode	Suburb	Distance from CBD (km)	Total installations	Penetration (%)
1	4670	ABBOTSFORD (Wide Bay region off map)	306.6	9,029	26.2
2	4655	BOORAL (Wide Bay region off map)	236.3	8,823	34.0
3	4551	AROONA	75.6	7,498	32.0
4	4350	ATHOL	126.3	6,692	15.4
5	4211	ADVANCETOWN	71.3	5,872	27.0
6	4556	BUDERIM	87.5	5,369	33.8
7	4305	BASIN POCKET	29.7	5,354	23.0
8	4207	ALBERTON	34.9	5,282	28.9
9	4570	AMAMOOR	129.3	5,262	30.1
10	4680	BARNEY POINT (Fitzroy region off map)	437.9	4,910	23.7
11	4510	BEACHMERE	37.3	4,835	28.2
12	4165	MOUNT COTTON	29.0	4,720	38.9
13	4740	ALEXANDRA (Mackay region off map)	807.4	4,497	14.2
14	4306	AMBERLEY	37.6	4,430	39.2
15	4870	AEROGLEN (Cairns region off map)	1,396.8	4,339	14.0
16	4300	AUGUSTINE HEIGHTS	25.2	4,310	26.7
17	4109	MACGREGOR	11.1	4,261	32.5
18	4560	BLI BLI	95.5	4,127	34.3
19	4500	BRAY PARK	20.5	4,015	29.6
20	4650	ALDERSHOT	225.5	3,782	25.6
	Total top 20	*(26.5% of total installations)*		107,407	
	Total other	*(73.5% of total installations)*		297,920	
	Total			**405,327**	

Attachment 4 – Top 20 solar PV and SWH suburbs by state

Highlights

- Total Solar PV systems installed and creating Renewable Energy Certificates (RECs) as at June 30, 2012 was 753,844 and total SWH systems were 743,842. This means almost 1.5 million solar systems have been installed so far in Australia.
- Solar PV, SWH, and Total Solar PV and SWH in the top 20 postcodes represented 8.63%, 10.65%, and 8.98% of total installations in Australia respectively.
- 50% of the top 20 postcodes for Solar PV are in QLD; for SWH NSW, VIC and QLD each share 30% of the top 20; and for total Solar PV and SWH QLD has 45% of the top 20 postcodes with NSW and VIC each with 20%.

Notes

- Installation figures for Solar Water Heater (SWH) units also include installation figures for Air Source Heat Pumps (ASHP) units.
- SGU/SWH installations by postcode data were obtained from the Clean Energy Regulator's website (http://ret.cleanenergyregulator.gov.au/REC-Registry/Data-reports).

1. Australia Solar PV

Rank	Postcode	Locality	State	Installations
1	6210	COODANUP	WA	5,210
2	4670	ABBOTSFORD	QLD	4,562
3	4655	BOORAL	QLD	4,403
4	4551	AROONA	QLD	4,355
5	2830	BALLIMORE	NSW	3,371
6	6155	CANNING VALE	WA	3,280
7	4350	ATHOL	QLD	3,273
8	6065	ASHBY	WA	3,132
9	4211	ADVANCETOWN	QLD	3,110
10	4556	BUDERIM	QLD	2,989
11	4305	BASIN POCKET	QLD	2,959
12	4570	AMAMOOR	QLD	2,951
13	4207	ALBERTON	QLD	2,866
14	2480	BENTLEY	NSW	2,808
15	5159	ABERFOYLE PARK	SA	2,753
16	5162	MORPHETT VALE	SA	2,688
17	6164	ATWELL	WA	2,665
18	4109	MACGREGOR	QLD	2,650
19	3029	HOPPERS CROSSING	VIC	2,564
20	6163	BIBRA LAKE	WA	2,467
		Total top 20		65,056
		Total other		688,788
		Total		**753,844**

1. Australia SWH + ASHP

Rank	Postcode	Locality	State	Installations
1	3030	COCOROC	VIC	6,037
2	3029	HOPPERS CROSSING	VIC	5,574
3	2444	BLACKMANS POINT	NSW	4,908
4	2480	BENTLEY	NSW	4,865
5	4670	ABBOTSFORD	QLD	4,467
6	4655	BOORAL	QLD	4,420
7	2450	BOAMBEE	NSW	4,387
8	6210	COODANUP	WA	4,253
9	2540	BAMARANG	NSW	4,246
10	3977	CANNONS CREEK	VIC	3,983
11	3754	DOREEN	VIC	3,806
12	2430	BLACK HEAD	NSW	3,693
13	3023	BURNSIDE	VIC	3,494
14	3810	PAKENHAM	VIC	3,455
15	4350	ATHOL	QLD	3,419
16	4551	AROONA	QLD	3,143
17	6065	ASHBY	WA	2,817
18	4680	BARNEY POINT	QLD	2,806
19	4211	ADVANCETOWN	QLD	2,762
20	2478	BALLINA	NSW	2,702
		Total top 20		79,237
		Total other		664,605
		Total		**743,842**

1. Australia TOTAL

Rank	Postcode	Locality	State	Installations
1	6210	COODANUP	WA	9,463
2	4670	ABBOTSFORD	QLD	9,029
3	4655	BOORAL	QLD	8,823
4	3030	COCOROC	VIC	8,426
5	3029	HOPPERS CROSSING	VIC	8,138
6	2480	BENTLEY	NSW	7,673
7	4551	AROONA	QLD	7,498
8	2444	BLACKMANS POINT	NSW	7,047
9	4350	ATHOL	QLD	6,692
10	3977	CANNONS CREEK	VIC	6,170
11	2540	BAMARANG	NSW	6,117
12	6065	ASHBY	WA	5,949
13	4211	ADVANCETOWN	QLD	5,872
14	2450	BOAMBEE	NSW	5,750
15	4556	BUDERIM	QLD	5,369
16	4305	BASIN POCKET	QLD	5,354
17	6155	CANNING VALE	WA	5,327
18	3023	BURNSIDE	VIC	5,306
19	4207	ALBERTON	QLD	5,282
20	4570	AMAMOOR	QLD	5,262
		Total top 20		134,547
		Total other		1,363,139
		Total		**1,497,686**

2. NSW Solar PV

Rank	Postcode	Locality	State	Installations
1	2830	BALLIMORE	NSW	3,371
2	2480	BENTLEY	NSW	2,808
3	2486	BANORA POINT	NSW	2,465
4	2170	CASULA	NSW	2,398
5	2560	AIRDS	NSW	2,272
6	2259	ALISON	NSW	2,228
7	2250	BUCKETTY	NSW	2,207
8	2444	BLACKMANS POINT	NSW	2,139
9	2540	BAMARANG	NSW	1,871
10	2153	BAULKHAM HILLS	NSW	1,840
11	2880	BROKEN HILL	NSW	1,830
12	2478	BALLINA	NSW	1,723
13	2155	BEAUMONT HILLS	NSW	1,652
14	2148	ARNDELL PARK	NSW	1,619
15	2145	CONSTITUTION HILL	NSW	1,597
16	2430	BLACK HEAD	NSW	1,505
17	2176	ABBOTSBURY	NSW	1,500
18	2450	BOAMBEE	NSW	1,363
19	2640	ALBURY	NSW	1,317
20	2484	BACK CREEK	NSW	1,280
		Total top 20		38,985
		Total other		146,607
		Total		**185,592**

2. NSW SWH + ASHP

Rank	Postcode	Locality	State	Installations
1	2444	BLACKMANS POINT	NSW	4,908
2	2480	BENTLEY	NSW	4,865
3	2450	BOAMBEE	NSW	4,387
4	2540	BAMARANG	NSW	4,246
5	2430	BLACK HEAD	NSW	3,693
6	2478	BALLINA	NSW	2,702
7	2486	BANORA POINT	NSW	2,683
8	2259	ALISON	NSW	2,443
9	2560	AIRDS	NSW	2,413
10	2460	ALICE	NSW	2,304
11	2428	BLUEYS BEACH	NSW	2,151
12	2250	BUCKETTY	NSW	2,095
13	2283	ARCADIA VALE	NSW	2,062
14	2484	BACK CREEK	NSW	2,037
15	2541	BANGALEE	NSW	1,968
16	2440	ALDAVILLA	NSW	1,906
17	2340	APPLEBY	NSW	1,875
18	2324	BALICKERA	NSW	1,810
19	2539	BAWLEY POINT	NSW	1,726
20	2290	BENNETTS GREEN	NSW	1,610
		Total top 20		53,884
		Total other		166,872
		Total		**220,756**

2. NSW TOTAL

Rank	Postcode	Locality	State	Installations
1	2480	BENTLEY	NSW	7,673
2	2444	BLACKMANS POINT	NSW	7,047
3	2540	BAMARANG	NSW	6,117
4	2450	BOAMBEE	NSW	5,750
5	2430	BLACK HEAD	NSW	5,198
6	2486	BANORA POINT	NSW	5,148
7	2560	AIRDS	NSW	4,685
8	2259	ALISON	NSW	4,671
9	2830	BALLIMORE	NSW	4,522
10	2478	BALLINA	NSW	4,425
11	2250	BUCKETTY	NSW	4,302
12	2170	CASULA	NSW	3,776
13	2460	ALICE	NSW	3,510
14	2484	BACK CREEK	NSW	3,317
15	2428	BLUEYS BEACH	NSW	3,246
16	2153	BAULKHAM HILLS	NSW	2,997
17	2324	BALICKERA	NSW	2,935
18	2340	APPLEBY	NSW	2,918
19	2283	ARCADIA VALE	NSW	2,894
20	2261	BATEAU BAY	NSW	2,833
		Total top 20		87,964
		Total other		318,384
		Total		**406,348**

3. VIC Solar PV

Rank	Postcode	Locality	State	Installations
1	3029	HOPPERS CROSSING	VIC	2,564
2	3030	COCOROC	VIC	2,389
3	3977	CANNONS CREEK	VIC	2,187
4	3023	BURNSIDE	VIC	1,812
5	3805	FOUNTAIN GATE	VIC	1,558
6	3150	BRANDON PARK	VIC	1,456
7	3216	BELMONT	VIC	1,455
8	3064	CRAIGIEBURN	VIC	1,399
9	3199	FRANKSTON	VIC	1,273
10	3806	BERWICK	VIC	1,194
11	3550	BENDIGO	VIC	1,181
12	3037	DELAHEY	VIC	1,176
13	3551	ARNOLD	VIC	1,112
14	3178	ROWVILLE	VIC	1,110
15	3020	ALBION	VIC	1,098
16	3021	ALBANVALE	VIC	979
17	3156	FERNTREE GULLY	VIC	972
18	3810	PAKENHAM	VIC	971
19	3337	KURUNJANG	VIC	967
20	3350	ALFREDTON	VIC	952
		Total top 20		27,805
		Total other		99,873
		Total		**127,678**

3. VIC SWH + ASHP

Rank	Postcode	Locality	State	Installations
1	3030	COCOROC	VIC	6,037
2	3029	HOPPERS CROSSING	VIC	5,574
3	3977	CANNONS CREEK	VIC	3,983
4	3754	DOREEN	VIC	3,806
5	3023	BURNSIDE	VIC	3,494
6	3810	PAKENHAM	VIC	3,455
7	3064	CRAIGIEBURN	VIC	2,537
8	3024	MAMBOURIN	VIC	1,840
9	3500	MILDURA	VIC	1,824
10	3337	KURUNJANG	VIC	1,805
11	3551	ARNOLD	VIC	1,603
12	3216	BELMONT	VIC	1,598
13	3806	BERWICK	VIC	1,583
14	3076	EPPING	VIC	1,572
15	3752	MORANG SOUTH	VIC	1,502
16	3350	ALFREDTON	VIC	1,370
17	3585	CASTLE DONNINGTON	VIC	1,315
18	3975	LYNBROOK	VIC	1,177
19	3037	DELAHEY	VIC	1,136
20	3875	BAIRNSDALE	VIC	1,097
		Total top 20		48,308
		Total other		95,303
		Total		**143,611**

3. VIC TOTAL

Rank	Postcode	Locality	State	Installations
1	3030	COCOROC	VIC	8,426
2	3029	HOPPERS CROSSING	VIC	8,138
3	3977	CANNONS CREEK	VIC	6,170
4	3023	BURNSIDE	VIC	5,306
5	3810	PAKENHAM	VIC	4,426
6	3754	DOREEN	VIC	4,309
7	3064	CRAIGIEBURN	VIC	3,936
8	3216	BELMONT	VIC	3,053
9	3806	BERWICK	VIC	2,777
10	3337	KURUNJANG	VIC	2,772
11	3551	ARNOLD	VIC	2,715
12	3024	MAMBOURIN	VIC	2,490
13	3076	EPPING	VIC	2,364
14	3500	MILDURA	VIC	2,361
15	3350	ALFREDTON	VIC	2,322
16	3037	DELAHEY	VIC	2,312
17	3805	FOUNTAIN GATE	VIC	2,182
18	3550	BENDIGO	VIC	2,152
19	3150	BRANDON PARK	VIC	2,006
20	3630	BRANDITT	VIC	1,948
		Total top 20		72,165
		Total other		199,124
		Total		**271,289**

4. QLD Solar PV

Rank	Postcode	Locality	State	Installations
1	4670	ABBOTSFORD	QLD	4,562
2	4655	BOORAL	QLD	4,403
3	4551	AROONA	QLD	4,355
4	4350	ATHOL	QLD	3,273
5	4211	ADVANCETOWN	QLD	3,110
6	4556	BUDERIM	QLD	2,989
7	4305	BASIN POCKET	QLD	2,959
8	4570	AMAMOOR	QLD	2,951
9	4207	ALBERTON	QLD	2,866
10	4109	MACGREGOR	QLD	2,650
11	4165	MOUNT COTTON	QLD	2,443
12	4306	AMBERLEY	QLD	2,417
13	4510	BEACHMERE	QLD	2,262
14	4300	AUGUSTINE HEIGHTS	QLD	2,216
15	4214	ARUNDEL	QLD	2,167
16	4680	BARNEY POINT	QLD	2,104
17	4560	BLI BLI	QLD	2,057
18	4500	BRAY PARK	QLD	2,021
19	4740	ALEXANDRA	QLD	1,958
20	4507	BANKSIA BEACH	QLD	1,938
		Total top 20		55,701
		Total other		153,516
		Total		**209,217**

4. QLD SWH + ASHP

Rank	Postcode	Locality	State	Installations
1	4670	ABBOTSFORD	QLD	4,467
2	4655	BOORAL	QLD	4,420
3	4350	ATHOL	QLD	3,419
4	4551	AROONA	QLD	3,143
5	4680	BARNEY POINT	QLD	2,806
6	4211	ADVANCETOWN	QLD	2,762
7	4870	AEROGLEN	QLD	2,615
8	4510	BEACHMERE	QLD	2,573
9	4740	ALEXANDRA	QLD	2,539
10	4207	ALBERTON	QLD	2,416
11	4305	BASIN POCKET	QLD	2,395
12	4556	BUDERIM	QLD	2,380
13	4570	AMAMOOR	QLD	2,311
14	4165	MOUNT COTTON	QLD	2,277
15	4701	BERSERKER	QLD	2,154
16	4300	AUGUSTINE HEIGHTS	QLD	2,094
17	4818	BEACH HOLM	QLD	2,081
18	4560	BLI BLI	QLD	2,070
19	4306	AMBERLEY	QLD	2,013
20	4500	BRAY PARK	QLD	1,994
		Total top 20		52,929
		Total other		143,181
		Total		**196,110**

4. QLD TOTAL

Rank	Postcode	Locality	State	Installations
1	4670	ABBOTSFORD	QLD	9,029
2	4655	BOORAL	QLD	8,823
3	4551	AROONA	QLD	7,498
4	4350	ATHOL	QLD	6,692
5	4211	ADVANCETOWN	QLD	5,872
6	4556	BUDERIM	QLD	5,369
7	4305	BASIN POCKET	QLD	5,354
8	4207	ALBERTON	QLD	5,282
9	4570	AMAMOOR	QLD	5,262
10	4680	BARNEY POINT	QLD	4,910
11	4510	BEACHMERE	QLD	4,835
12	4165	MOUNT COTTON	QLD	4,720
13	4740	ALEXANDRA	QLD	4,497
14	4306	AMBERLEY	QLD	4,430
15	4870	AEROGLEN	QLD	4,339
16	4300	AUGUSTINE HEIGHTS	QLD	4,310
17	4109	MACGREGOR	QLD	4,261
18	4560	BLI BLI	QLD	4,127
19	4500	BRAY PARK	QLD	4,015
20	4650	ALDERSHOT	QLD	3,782
		Total top 20		107,407
		Total other		297,920
		Total		**405,327**

5. SA Solar PV

Rank	Postcode	Locality	State	Installations
1	5159	ABERFOYLE PARK	SA	2,753
2	5162	MORPHETT VALE	SA	2,688
3	5158	HALLETT COVE	SA	2,164
4	5211	BACK VALLEY	SA	2,159
5	5108	PARALOWIE	SA	2,115
6	5114	ANDREWS FARM	SA	2,032
7	5109	BRAHMA LODGE	SA	1,466
8	5125	GOLDEN GROVE	SA	1,440
9	5118	BIBARINGA	SA	1,370
10	5214	CURRENCY CREEK	SA	1,323
11	5253	AVOCA DELL	SA	1,293
12	5092	MODBURY	SA	1,212
13	5169	MOANA	SA	1,171
14	5095	MAWSON LAKES	SA	1,170
15	5173	ALDINGA	SA	1,129
16	5098	INGLE FARM	SA	1,100
17	5022	GRANGE	SA	1,078
18	5163	HACKHAM	SA	1,065
19	5107	GREEN FIELDS	SA	1,064
20	5097	REDWOOD PARK	SA	1,034
		Total top 20		30,826
		Total other		76,718
		Total		**107,544**

5. SA SWH + ASHP

Rank	Postcode	Locality	State	Installations
1	5095	MAWSON LAKES	SA	1,570
2	5211	BACK VALLEY	SA	1,097
3	5173	ALDINGA	SA	946
4	5118	BIBARINGA	SA	872
5	5700	BLANCHE HARBOR	SA	849
6	5051	BLACKWOOD	SA	764
7	5114	ANDREWS FARM	SA	764
8	5251	BUGLE RANGES	SA	662
9	5159	ABERFOYLE PARK	SA	649
10	5113	DAVOREN PARK	SA	630
11	5214	CURRENCY CREEK	SA	629
12	5600	CULTANA	SA	618
13	5108	PARALOWIE	SA	597
14	5253	AVOCA DELL	SA	580
15	5112	ELIZABETH	SA	578
16	5162	MORPHETT VALE	SA	539
17	5255	ANGAS PLAINS	SA	464
18	5290	MOUNT GAMBIER	SA	455
19	5171	BLEWITT SPRINGS	SA	450
20	5608	WHYALLA NORRIE	SA	446
		Total top 20		14,159
		Total other		30,553
		Total		**44,712**

5. SA TOTAL

Rank	Postcode	Locality	State	Installations
1	5159	ABERFOYLE PARK	SA	3,402
2	5211	BACK VALLEY	SA	3,256
3	5162	MORPHETT VALE	SA	3,227
4	5114	ANDREWS FARM	SA	2,796
5	5095	MAWSON LAKES	SA	2,740
6	5108	PARALOWIE	SA	2,712
7	5158	HALLETT COVE	SA	2,590
8	5118	BIBARINGA	SA	2,242
9	5173	ALDINGA	SA	2,075
10	5214	CURRENCY CREEK	SA	1,952
11	5253	AVOCA DELL	SA	1,873
12	5109	BRAHMA LODGE	SA	1,768
13	5251	BUGLE RANGES	SA	1,689
14	5051	BLACKWOOD	SA	1,653
15	5700	BLANCHE HARBOR	SA	1,620
16	5125	GOLDEN GROVE	SA	1,591
17	5112	ELIZABETH	SA	1,555
18	5169	MOANA	SA	1,474
19	5092	MODBURY	SA	1,427
20	5098	INGLE FARM	SA	1,369
		Total top 20		43,011
		Total other		109,245
		Total		**152,256**

6. TAS Solar PV

Rank	Postcode	Locality	State	Installations
1	7250	BLACKSTONE HEIGHTS	TAS	630
2	7018	BELLERIVE	TAS	325
3	7310	ABERDEEN	TAS	277
4	7011	AUSTINS FERRY	TAS	226
5	7054	BARRETTA	TAS	223
6	7030	APSLEY	TAS	208
7	7000	BATHURST STREET PO	TAS	205
8	7050	ALBION HEIGHTS	TAS	200
9	7173	CARLTON	TAS	199
10	7008	LENAH VALLEY	TAS	197
11	7004	BATTERY POINT	TAS	194
12	7005	DYNNYRNE	TAS	191
13	7010	DOWSING POINT	TAS	184
14	7109	CRABTREE	TAS	181
15	7009	DERWENT PARK	TAS	179
16	7015	GEILSTON BAY	TAS	178
17	7248	INVERMAY	TAS	146
18	7249	KINGS MEADOWS	TAS	145
19	7315	ABBOTSHAM	TAS	145
20	7140	BLACK HILLS	TAS	142
		Tottal top 20		4,375
		Total other		3,506
		Total		**7,881**

6. TAS SWH + ASHP

Rank	Postcode	Locality	State	Installations
1	7250	BLACKSTONE HEIGHTS	TAS	693
2	7310	ABERDEEN	TAS	283
3	7018	BELLERIVE	TAS	254
4	7050	ALBION HEIGHTS	TAS	240
5	7320	ACTON	TAS	233
6	7315	ABBOTSHAM	TAS	225
7	7054	BARRETTA	TAS	224
8	7000	BATHURST STREET PO	TAS	201
9	7004	BATTERY POINT	TAS	197
10	7005	DYNNYRNE	TAS	191
11	7109	CRABTREE	TAS	184
12	7304	BRANDUM	TAS	163
13	7008	LENAH VALLEY	TAS	150
14	7277	BRIDGENORTH	TAS	149
15	7248	INVERMAY	TAS	139
16	7307	BAKERS BEACH	TAS	138
17	7170	ACTON PARK	TAS	137
18	7255	BLUE ROCKS	TAS	136
19	7316	CAMENA	TAS	133
20	7330	ALCOMIE	TAS	132
		Total top 20		4,202
		Total other		3,537
		Total		**7,739**

6. TAS TOTAL

Rank	Postcode	Locality	State	Installations
1	7250	BLACKSTONE HEIGHTS	TAS	1,323
2	7018	BELLERIVE	TAS	579
3	7310	ABERDEEN	TAS	560
4	7054	BARRETTA	TAS	447
5	7050	ALBION HEIGHTS	TAS	440
6	7000	BATHURST STREET PO	TAS	406
7	7004	BATTERY POINT	TAS	391
8	7005	DYNNYRNE	TAS	382
9	7315	ABBOTSHAM	TAS	370
10	7109	CRABTREE	TAS	365
11	7008	LENAH VALLEY	TAS	347
12	7011	AUSTINS FERRY	TAS	339
13	7030	APSLEY	TAS	314
14	7010	DOWSING POINT	TAS	307
15	7320	ACTON	TAS	300
16	7015	GEILSTON BAY	TAS	291
17	7248	INVERMAY	TAS	285
18	7173	CARLTON	TAS	281
19	7009	DERWENT PARK	TAS	277
20	7304	BRANDUM	TAS	273
		Total top 20		8,277
		Total other		7,343
		Total		**15,620**

7. WA Solar PV

Rank	Postcode	Locality	State	Installations
1	6210	COODANUP	WA	5,210
2	6155	CANNING VALE	WA	3,280
3	6065	ASHBY	WA	3,132
4	6164	ATWELL	WA	2,665
5	6163	BIBRA LAKE	WA	2,467
6	6169	SAFETY BAY	WA	2,298
7	6112	ARMADALE	WA	2,193
8	6027	BELDON	WA	2,130
9	6030	CLARKSON	WA	1,973
10	6230	BUNBURY	WA	1,967
11	6110	GOSNELLS	WA	1,897
12	6056	BASKERVILLE	WA	1,811
13	6107	BECKENHAM	WA	1,805
14	6280	ABBA RIVER	WA	1,604
15	6025	CRAIGIE	WA	1,599
16	6168	COOLOONGUP	WA	1,578
17	6069	AVELEY	WA	1,570
18	6026	KINGSLEY	WA	1,488
19	6018	CHURCHLANDS	WA	1,459
20	6108	THORNLIE	WA	1,459
		Tottal top 20		43,585
		Total other		61,068
		Total		**104,653**

7. WA SWH + ASHP

Rank	Postcode	Locality	State	Installations
1	6210	COODANUP	WA	4,253
2	6065	ASHBY	WA	2,817
3	6164	ATWELL	WA	2,591
4	6112	ARMADALE	WA	2,466
5	6076	BICKLEY	WA	2,411
6	6530	BEACHLANDS	WA	2,384
7	6163	BIBRA LAKE	WA	2,107
8	6155	CANNING VALE	WA	2,047
9	6056	BASKERVILLE	WA	2,028
10	6027	BELDON	WA	1,740
11	6280	ABBA RIVER	WA	1,721
12	6330	ALBANY	WA	1,707
13	6107	BECKENHAM	WA	1,675
14	6111	ASHENDON	WA	1,598
15	6025	CRAIGIE	WA	1,586
16	6169	SAFETY BAY	WA	1,515
17	6069	AVELEY	WA	1,509
18	6167	ANKETELL	WA	1,462
19	6110	GOSNELLS	WA	1,456
20	6714	ANTONYMYRE	WA	1,409
		Total top 20		40,482
		Total other		70,361
		Total		**110,843**

7. WA TOTAL

Rank	Postcode	Locality	State	Installations
1	6210	COODANUP	WA	9,463
2	6065	ASHBY	WA	5,949
3	6155	CANNING VALE	WA	5,327
4	6164	ATWELL	WA	5,256
5	6112	ARMADALE	WA	4,659
6	6163	BIBRA LAKE	WA	4,574
7	6027	BELDON	WA	3,870
8	6056	BASKERVILLE	WA	3,839
9	6169	SAFETY BAY	WA	3,813
10	6076	BICKLEY	WA	3,757
11	6530	BEACHLANDS	WA	3,626
12	6107	BECKENHAM	WA	3,480
13	6110	GOSNELLS	WA	3,353
14	6280	ABBA RIVER	WA	3,325
15	6030	CLARKSON	WA	3,293
16	6230	BUNBURY	WA	3,255
17	6025	CRAIGIE	WA	3,185
18	6069	AVELEY	WA	3,079
19	6168	COOLOONGUP	WA	2,802
20	6111	ASHENDON	WA	2,797
		Total top 20		82,702
		Total other		132,794
		Total		**215,496**

8. NT Solar PV

Rank	Postcode	Locality	State	Installations
1	0870	ALICE SPRINGS	NT	399
2	0810	ALAWA	NT	230
3	0830	ARCHER	NT	156
4	0812	ANULA	NT	131
5	0832	BAKEWELL	NT	89
6	0836	GIRRAWEEN	NT	82
7	0822	ACACIA HILLS	NT	68
8	0872	AHERRENGE	NT	63
9	0835	COOLALINGA	NT	52
10	0871	ALICE SPRINGS	NT	44
11	0850	COSSACK	NT	40
12	0820	BAGOT	NT	34
13	0852	ARNOLD	NT	30
14	0861	BRUNCHILLY	NT	14
15	0851	KATHERINE	NT	13
16	0881	NHULUNBUY	NT	12
17	0838	BERRY SPRINGS	NT	12
18	0800	DARWIN	NT	10
19	0845	BATCHELOR	NT	9
20	0846	ADELAIDE RIVER	NT	8
		Tottal top 20		1,496
		Total other		55
		Total		**1,551**

8. NT SWH + ASHP

Rank	Postcode	Locality	State	Installations
1	0870	ALICE SPRINGS	NT	2,189
2	0810	ALAWA	NT	1,814
3	0830	ARCHER	NT	1,723
4	0812	ANULA	NT	1,469
5	0832	BAKEWELL	NT	906
6	0820	BAGOT	NT	760
7	0822	ACACIA HILLS	NT	537
8	0836	GIRRAWEEN	NT	529
9	0872	AHERRENGE	NT	391
10	0835	COOLALINGA	NT	377
11	0850	COSSACK	NT	358
12	0885	ALYANGULA	NT	245
13	0880	GAPUWIYAK	NT	155
14	0852	ARNOLD	NT	120
15	0871	ALICE SPRINGS	NT	98
16	0828	BERRIMAH	NT	95
17	0800	DARWIN	NT	86
18	0851	KATHERINE	NT	77
19	0860	TENNANT CREEK	NT	69
20	0881	NHULUNBUY	NT	51
		Total top 20		12,049
		Total other		487
		Total		**12,536**

8. NT TOTAL

Rank	Postcode	Locality	State	Installations
1	0870	ALICE SPRINGS	NT	2,588
2	0810	ALAWA	NT	2,044
3	0830	ARCHER	NT	1,879
4	0812	ANULA	NT	1,600
5	0832	BAKEWELL	NT	995
6	0820	BAGOT	NT	794
7	0836	GIRRAWEEN	NT	611
8	0822	ACACIA HILLS	NT	605
9	0872	AHERRENGE	NT	454
10	0835	COOLALINGA	NT	429
11	0850	COSSACK	NT	398
12	0885	ALYANGULA	NT	245
13	0880	GAPUWIYAK	NT	162
14	0852	ARNOLD	NT	150
15	0871	ALICE SPRINGS	NT	142
16	0828	BERRIMAH	NT	98
17	0800	DARWIN	NT	96
18	0851	KATHERINE	NT	90
19	0860	TENNANT CREEK	NT	73
20	0881	NHULUNBUY	NT	63
		Total top 20		13,516
		Total other		571
		Total		**14,087**

9. ACT Solar PV

Rank	Postcode	Locality	State	Installations
1	2615	CHARNWOOD	ACT	1,347
2	2905	BONYTHON	ACT	870
3	2913	FRANKLIN	ACT	853
4	2617	BELCONNEN	ACT	839
5	2602	AINSLIE	ACT	815
6	2614	ARANDA	ACT	660
7	2904	FADDEN	ACT	647
8	2902	KAMBAH	ACT	583
9	2906	BANKS	ACT	479
10	2914	AMAROO	ACT	444
11	2607	FARRER	ACT	420
12	2605	CURTIN	ACT	368
13	2903	ERINDALE CENTRE	ACT	316
14	2606	CHIFLEY	ACT	207
15	2600	BARTON	ACT	181
16	2612	BRADDON	ACT	174
17	2603	FORREST	ACT	158
18	2604	CAUSEWAY	ACT	128
19	2912	GUNGAHLIN	ACT	91
20	2618	HALL	ACT	63
		Tottal top 20		9,643
		Total other		85
		Total		**9,728**

9. ACT SWH + ASHP

Rank	Postcode	Locality	State	Installations
1	2615	CHARNWOOD	ACT	1,798
2	2602	AINSLIE	ACT	785
3	0000	OTHER	ACT	680
4	2617	BELCONNEN	ACT	543
5	2905	BONYTHON	ACT	519
6	2614	ARANDA	ACT	518
7	2902	KAMBAH	ACT	404
8	2605	CURTIN	ACT	280
9	2904	FADDEN	ACT	262
10	2607	FARRER	ACT	259
11	2903	ERINDALE CENTRE	ACT	241
12	2606	CHIFLEY	ACT	162
13	2604	CAUSEWAY	ACT	151
14	2913	FRANKLIN	ACT	148
15	2612	BRADDON	ACT	148
16	2603	FORREST	ACT	137
17	2914	AMAROO	ACT	131
18	2906	BANKS	ACT	129
19	2600	BARTON	ACT	111
20	2618	HALL	ACT	59
		Total top 20		7,465
		Total other		70
		Total		**7,535**

9. ACT TOTAL

Rank	Postcode	Locality	State	Installations
1	2615	CHARNWOOD	ACT	3,145
2	2602	AINSLIE	ACT	1,600
3	2905	BONYTHON	ACT	1,389
4	2617	BELCONNEN	ACT	1,382
5	2614	ARANDA	ACT	1,178
6	2913	FRANKLIN	ACT	1,001
7	2902	KAMBAH	ACT	987
8	2904	FADDEN	ACT	909
9	0000	OTHER	ACT	684
10	2607	FARRER	ACT	679
11	2605	CURTIN	ACT	648
12	2906	BANKS	ACT	608
13	2914	AMAROO	ACT	575
14	2903	ERINDALE CENTRE	ACT	557
15	2606	CHIFLEY	ACT	369
16	2612	BRADDON	ACT	322
17	2603	FORREST	ACT	295
18	2600	BARTON	ACT	292
19	2604	CAUSEWAY	ACT	279
20	2618	HALL	ACT	122
		Total top 20		17,021
		Total other		242
		Total		**17,263**