IPART
New South Wales

Independent Pricing and Regulatory Tribunal

Solar feed-in tariffs

The subsidy-free value of electricity from small-scale solar PV units from 1 July 2013

Energy — Final Report
June 2013

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1 Executive Summary

Households and small businesses with solar photovoltaic units in NSW (PV customers) can earn feed-in tariffs for the electricity they export to the grid. Currently more than 145,000 PV customers receive a subsidised feed-in tariff of either 20 or 60 cents per kilowatt hour (c/kWh) under the NSW Solar Bonus Scheme. Another 75,000 PV customers, who are not part of this scheme, can receive unsubsidised feed-in tariffs in the competitive retail electricity market.[1]

The Independent Pricing and Regulatory Tribunal (IPART) has an ongoing role in relation to these solar feed-in tariffs. The NSW Government has asked us to annually investigate and determine:

- the benchmark range for solar feed-in tariffs that retailers may voluntarily offer PV customers who are not part of the Solar Bonus Scheme (the benchmark range), and
- the amount NSW electricity retailers must pay the Government per kWh exported by their Solar Bonus Scheme customers to help fund the costs of this scheme (the retailer contribution).

The benchmark range relates to PV customers who are not part of the Solar Bonus Scheme. For them, the primary financial benefit of having a PV unit is likely to be reduced electricity bills, as the electricity they generate is first used to meet their own household's needs at the time of generation, before any 'excess' electricity is exported.[2] However, they can potentially receive payment for this exported energy, as some retailers offer unsubsidised solar feed-in tariffs as part of their competitive market offerings. Like some other components of retailers' competitive offers (for example 'green premiums'), these feed-in tariffs are not regulated by IPART. It is up to retailers to decide whether to offer them, and the rate per kWh to offer. The benchmark range we determine is intended to provide guidance on the likely value of the electricity exported by PV customers, to inform customers in assessing retailers' competitive offers.

1 Information provided by NSW Trade & Investment, May 2013.
2 Assuming they have net metering arrangements.

The retailer contribution relates to PV customers who are part of the Solar Bonus Scheme, but does not affect the solar feed-in tariffs they receive under the scheme.[3] The contribution is paid by these customers' electricity retailers, and reflects the financial benefit the retailers receive from the customers' participation in the scheme. It offsets some of the Solar Bonus Scheme's costs, which are funded by all electricity customers (through a levy included in retail electricity prices). See Box 1.1 for more information on our review.

1.1 How we made our determination

We made our determination on the retailer contribution and the benchmark range in line with the terms of reference provided by the Government. In particular, we:

1. estimated the value of PV customer exports, using the 2 methods detailed in our March 2012 report:
   - the direct financial gain to retailers method, which involves estimating the financial benefit that retailers receive per kWh of electricity their PV customers export to the grid
   - the wholesale market value method, which involves calculating the price the PV exports would receive if they could be sold on the NEM at the time they were exported[4]
2. set the retailer contribution based on our estimate using the direct financial gain to retailers method, and
3. set the benchmark range based on our estimates using both methods.

In doing so, we had regard to the requirement in our terms of reference that our determination should not result in an increase in retail electricity prices and should support a competitive retail electricity market.

[3] These tariffs are established by legislation. They will continue to be either 20 or 60 c/kWh until the scheme ends in 2016.

[4] IPART, *Solar feed-in tariffs – Setting a fair and reasonable value for electricity generated by small-scale solar PV units in NSW – Final Report*, March 2012, Chapter 6.

Box 1.1 What has IPART been asked to do?

Solar feed-in tariffs review

Households with solar units earn feed-in tariffs for energy that is exported to the grid. Some customers are eligible for a subsidised feed in tariff under the Solar Bonus Scheme. Other solar customers who are not eligible under the Solar Bonus Scheme need to assess feed-in tariff offers in the market. IPART has been asked to investigate feed-in tariffs for both groups.

RETAILER CONTRIBUTION TO THE SOLAR BONUS SCHEME

The Solar Bonus Scheme offered subsidised feed-in tariffs of 60 or 20 c/kWh for the energy supplied to the network from solar panels, depending on date of connection. This scheme is now closed to new participants.

The scheme is paid for in two ways:

- A levy on all electricity customers that is recovered through electricity prices, and
- A contribution from retailers, that reflects the value of the exported electricity to the retailer.

IPART sets the amount that retailers must contribute towards the subsidised scheme.

This 'retailer contribution' lessens the levy that is paid by all electricity customers, and means that electricity prices do not need to be as high as they would otherwise be.

IPART's decision does not affect the statutory feed-in tariff rates that customers receive (either 60c or 20c/kWh), as that has already been set at the time of connection.

BENCHMARK FEED-IN TARIFFS

Most consumers with solar panels first consume the energy that they produce and export only excess energy, so the bulk of the savings they make are from buying less energy from retailers.

Customers not eligible for the subsidised feed-in tariff can receive a feed-in tariff for the energy they export to the network directly from their retailer. These feed-in tariffs are set by retailers operating in the competitive market.

Customers can compare feed-in tariff offers on the www.energymadeeasy.gov.au website in the same way all energy and gas consumers can compare prices and overall packages to find the best deal for them.

IPART's review will value the energy that is exported to determine a fair and reasonable feed-in tariff.

The benchmark rate is only a guide for retailers and consumers, and is not mandatory.

1.2 Estimated value of PV customer exports

We estimated that the value of PV customer exports in 2013/14 ranges from 6.6 to 11.2 c/kWh (Table 1.1). This estimated range is lower than our estimated range in 2012/13 of 7.9 to 13.2 c/kWh. This is mainly because the wholesale energy purchase cost allowance in regulated retail prices is lower in 2013/14 than it was in 2012/13. This largely reflects a weaker outlook for wholesale energy prices.[5]

Table 1.1 IPART's estimate of the value of PV customer exports ($2013/14, c/kWh)

Method	2012/13	2013/14
Direct financial gain to retailers	7.9 – 13.2	6.6 – 11.2
Wholesale market value	7.9 – 10.1	8.3

Note: The range of direct financial gains to retailers in 2012/13 is different to what we reported last year because we have included market discounts in this table. There is no range for the wholesale market value in 2013/14 as we based our analysis on 1.5kW units. There is no evidence that retailers distinguish PV customers by unit size.

Data source: IPART and Frontier Economics.

There is a broad range of values under the direct financial gain to retailers method. The upper end of this range reflects our estimate of the financial gain to a Standard Retailer for its regulated customers. Because the financial gain would be lower for a retailer offering discounts to the regulated price, the lower end of the range reflects the financial gain after accounting for market discounts.

1.3 Benchmark range

We have determined that the benchmark range for solar feed-in tariffs in 2013/14 is **6.6 to 11.2 c/kWh** of PV electricity exported by non-Solar Bonus Scheme customers.

This range includes the upper and lower bounds of our estimated range for the value of PV customer exports considering both the wholesale market value and direct financial gains to retailers methods. The range is relatively wide due to uncertainties involved in forecasting the value of PV exports.

5 For more discussion on the energy purchase cost allowance for 2013/14 see IPART, *Review of regulated retail prices and charges for electricity – From 1 July 2013 to 30 June 2016 – Final Report*, June 2013, Chapter 6.

The benchmark range is not mandatory and is intended as a guide for retailers and customers. We consider that the competitive market is the best way for customers to get the best deal, having regard to their electricity usage and exports. Several retailers, but not all, are voluntarily offering unsubsidised feed-in tariffs therefore customers can access these feed-in tariffs. The value of PV customer's exports is also difficult to determine and its value can differ for different retailers and customers. If mandatory feed-in tariffs are set too high, retailers would be required to subsidise their customers. This would make it less attractive to serve these customers. If mandatory feed-in tariffs are set too low, these customers would not receive the full value of their exported energy.

1.4 Retailer contribution

We have determined that in 2013/14 retailers should contribute **6.6 c/kWh** for PV electricity exported by Solar Bonus Scheme customers towards the costs of the Solar Bonus Scheme.

This contribution is in line with the lower bound of our estimated range for the value of PV customer exports using the direct financial gain to retailers method. Because all retailers with Solar Bonus Scheme customers are required to make the retailer contribution, we have adopted a conservative approach. The low point of the range for the direct financial gain to retailers shows the gain to them after allowing for discounts. By setting the contribution at the lower bound of the range we ensure that the contribution is not higher than retailers' actual financial gains. This ensures that a competitive market is possible for Solar Bonus Scheme customers.

1.5 What does the rest of this report cover?

The rest of this report explains our review and determination in more detail. It is structured as follows:

- Chapter 2 provides some context and the terms of reference for the review, and responds to the main issues raised in the submissions we received from PV customers and solar energy organisations
- Chapter 3 discusses the methods we used to estimate the value of PV customers exports in 2013/14 and the resulting estimates
- Chapter 4 explains how we used these estimates to determine the retailer contribution and the benchmark range for 2013/14
- The appendices provide our terms of reference, and information on the current number and characteristics of PV customers in NSW (as at May 2013).

2 Context and terms of reference for this review

The terms of reference established the scope of our review. We could not consider matters outside this scope, including many of the issues raised in submissions.

The sections below explain the context and terms of reference, as well as the process we followed to conduct the review. The final section responds to the most common issues raised in submissions. Note that throughout this report, we refer to all customers with solar PV units as PV customers. Within this group, we refer to those who are participants in the Solar Bonus Scheme as SBS customers, and those who are not as non-SBS customers.

2.1 Context for the review

To encourage NSW households and small businesses to install small-scale solar PV units, the NSW Government established the Solar Bonus Scheme in 2010. This scheme provides SBS customers with a generous subsidised feed-in tariff for the electricity they export to the grid (either 20c or 60c/kWh), and will do so until it ends on 31 December 2016.[6]

Many more households joined the scheme than expected and, as a result, its costs were higher than expected. Because these costs are funded through retail electricity prices,[7] this increased those prices at a time when they were already rising due to other factors.

The Government closed the Solar Bonus Scheme to new participants in 2011, to prevent the costs from rising further. In response to our recommendation, it also considered requiring electricity retailers to contribute to the costs to reduce the impact on retail electricity prices.[8]

6 For details of the Solar Bonus Scheme see http://www.trade.nsw.gov.au/energy/sustainable/renewable/solar/solar-scheme/solar-bonus-scheme.

7 These costs are funded through the Climate Change Fund levy which is part of the network component of retail electricity prices.

8 See IPART, *Changes in regulated electricity retail prices from 1 July 2011*, June 2011, p 14.

The Government asked IPART to investigate what contribution retailers should make. At the same time, it asked us to recommend a mechanism for establishing a **non-subsidised** solar feed-in tariff for non-SBS customers, and a 'fair and reasonable' value for this tariff. The terms of reference specified that this mechanism and value must not increase retail electricity prices, and must support competition in the retail electricity market. In our March 2012 final report, we:

- recommended that the retailer contribution should be mandatory for all retailers, should be a specified rate for every kWh generated by their SBS customers, and should be updated annually until 2016
- recommended that a non-subsidised solar feed-in tariff should be encouraged (not mandated) by publishing a benchmark range, and
- detailed a method for determining the rate of the retailer contribution and the benchmark range that includes estimating the direct financial gain retailers make from their PV customers' exports and the wholesale market value of those PV exports at the time of day they are exported.[9]

Boxes 2.1 and 2.2 outline the rationale for our recommendations.

The Government accepted these recommendations and asked us to determine the rate of the retailer contribution and the benchmark range for 2012/13 using the method detailed in our March 2012 final report. Now it has asked us to make annual determinations to update the rate and range, starting in 2013/14, and provided us with ongoing terms of reference.

Box 2.1 Why we recommended retailers contribute to the cost of the Solar Bonus Scheme

In our 2012 review, we recommended retailers be obliged to contribute to the costs of the Solar Bonus Scheme because they make a direct financial gain from their SBS customers' exports. Obliging them to contribute this gain – rather than keeping it or passing it on to SBS customers – offsets some of the costs of the scheme, which would otherwise be fully funded by a levy included in retail electricity prices.

Retailers make a financial gain because when they supply the electricity generated by their SBS customers to other customers, they avoid some of the costs they would otherwise incur. These include electricity purchase costs, National Energy Market fees and energy losses. Retailers make a financial gain from non-SBS customers for essentially the same reason.

9 IPART, *Solar feed-in tariffs, Setting a fair and reasonable value for electricity generated by small-scale solar PV units in NSW*, March 2012, pp 11-13.

Box 2.2 Why we recommended voluntary feed-in tariffs and a benchmark range

In our 2012 review, we considered making it mandatory for retailers to offer non-subsidised solar feed-in tariffs to non-SBS customers. We also considered making it mandatory for them to offer these tariffs at a specified rate or within a specified range. However, we found that these more 'heavy-handed' options created a risk that retailers would choose not to supply these customers, or would only supply them on uncompetitive terms if the rate was set too high. In contrast, if a mandatory rate was set too low customers may not receive the full value of their PV exports. Thus they were not consistent with our terms of reference, which required us to recommend a mechanism that supports competition in the market.

We concluded that encouraging retailers to voluntarily offer a fair and reasonable unsubsidised feed-in tariff by publishing an annual benchmark range was most consistent with our terms of reference. This option should help customers understand the feed-in tariff they could potentially receive in the coming financial year, and assist them make informed decisions about installing a PV unit and assessing retailer offers. It should also increase the competitive pressure on retailers to offer a fair and reasonable feed-in tariff and reduce the risk of regulatory error.

2.2 Our terms of reference

The terms of reference for our annual determinations are quite narrow. Essentially, they require us to update the retailer contribution and the benchmark range using the same approach we have used previously. They do not ask us to reconsider this approach, take additional factors into account, or consider the feed-in tariff for SBS customers after the Solar Bonus Scheme closes in 2016.

In determining the retailer contribution, the terms of reference specify that we "have regard to the direct financial gain to retailers method, including discounts for market offers". In broad terms, this method estimates the direct financial gain retailers make per kWh of electricity their SBS customers export by:

- taking the average regulated retail price for electricity usage – which reflects the total costs retailers incur in supplying their customers[10]
- deducting the costs that retailers do not avoid when their PV customers export to the grid – including network costs and green scheme obligation costs, which represent the bulk of their total costs[11]
- deducting an amount to take account of the discounts included in competitive retail prices.

10 Total costs include network costs, energy costs, green scheme obligation costs and retail costs.

11 Based on modelling from our 2013 electricity determination, these costs represent around 70% of the total cost incurred by retailers in supplying electricity to small customers in 2013/14.

This approach ensures we do not set the retailer contribution higher than the retailers' actual financial gains, which might deter them from supplying SBS customers in the competitive market.

In determining the benchmark range, the terms of reference specify that we should:

- take into account our estimates of the wholesale market value of PV exports at the time of export, and the direct financial gain to retailers per kWh exported by PV customers (both calculated using the method we have previously used)
- ensure there is no resulting increase in retail prices and support the competitive market.

This means there is no scope for us to consider several issues raised in submissions from solar energy organisations and PV customers – such as reconsidering whether the benchmark range should take account of social benefits generated by PV customers' generation, including network benefits and the 'merit order effect'. Nevertheless, we have responded to the main issues raised in submissions section 2.4 below.

2.3 Our process for conducting the review

The time available for us to conduct this review was very short. We released a fact sheet on 15 May 2013, which outlined the purpose and scope of the review, and explained our proposed approach for making our 2013 determination. We invited stakeholders to make submissions by 7 June 2013, and received 25 submissions from energy retailers, solar energy industry organisations and individuals.

As our fact sheet indicated, we intend to conduct more extensive consultations next year. In late 2013/early 2014 we will consult on how we should update the retailer contribution and benchmark range for future years, starting in 2014/15, consistent with our standing terms of reference. We will consider how and how often to update the data we use in estimating the value of PV exports, whether there should be separate analysis for the retailer contribution and benchmark range and what consultation processes we will undertake each year.

2.4 Our response to the main issues raised in submissions

As noted above, many of the issues raised by customers and solar industry stakeholders were outside the scope of our review. Nevertheless, we have responded to the most frequently raised issues below.

2.4.1 Why aren't solar feed-in tariffs mandatory for non-SBS customers?

Several stakeholders argued that IPART should set a mandatory minimum solar feed-in tariff, as they believe relying on competition and the publication of a benchmark range has failed to deliver fair and reasonable tariffs. To support this view, they noted that currently, many retailers don't offer an unsubsidised feed-in tariff at all, and most of those that do have set the tariff below the benchmark range.[12]

We consider that a competitive market is the best form of protection for customers. As Box 2.2 discussed, we considered the option of a mandatory, regulated solar feed-in tariff in 2012, and found it would not support competition in the market. This is because the value of PV customer's exports is difficult to determine and its value can differ for different retailers. This creates a risk that a mandatory feed-in tariff for non-SBS customers would be set too high and adversely affect competition for these customers. This meant it was not consistent with our 2012 terms of reference. For the same reason, it is not consistent with our 2013 terms of reference.

We also note that because installing solar PV is optional for customers, there would not be a strong argument for regulating an unsubsidised feed-in tariff, even without these terms of reference. For example, we don't regulate the green premium that customers on regulated prices pay when they choose for a proportion of the electricity they use to come from renewable or 'green' sources. This is because, like installing PV units, they are optional. We don't consider it necessary to regulate prices for these optional services.

In addition, we consider the fact that not all retailers offer a feed-in tariff and most available tariffs are below the benchmark range does not necessarily mean the voluntary arrangements have failed. For example, it could mean that some retailers prefer not to market to PV customers. In a competitive market, retailers are free to choose which customers they would like to supply. Only Standard Retailers have obligations to supply customers in their network area.

Further, we note that most of the larger retailers in NSW do offer an unsubsidised feed-in tariff on certain products. Therefore, most non-SBS customers are likely to have access to a market offer that includes such a tariff. However, we stress that customers need to assess the whole offer (not just the solar feed-in tariff component) and compare it to other available offers. For example, an offer that includes a lower feed-in tariff and a lower usage price may provide a better deal than one with a higher feed-in tariff and a higher usage price. The Energy Made Easy website[13] can help customers make this assessment.

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12 For example see submissions from Alternative Technology Association, June 2013, p 4; Campaign for a 1 for 1 Solar Feed-in Tariff, June 2013, pp 1-2; Clean Energy Council, June 2013, p 2; R Murphy, June 2013, p 1.

13 http://www.energymadeeasy.gov.au/

2.4.2 Why can't non-SBS customers get a '1 for 1' credit for every kWh they export to the grid?

A number of submissions noted that it was unfair that non-SBS PV customers who export to the grid in the daytime are paid a small feed-in tariff or nothing for these exports, and then have to pay the full retail price when they import from the grid at night. They argued these customers should receive a feed-in tariff equal to the retail price for their exports, or a credit which they can use to offset their imports at a different time.[14]

Requiring retailers to pay a feed-in tariff that is equal to the retail price would cause them to lose money. This is because while retailers can 'sell' PV customers' exports for the retail price, they cannot avoid certain costs when this energy is exported. In particular, due to metering and settlement arrangements in the market, once PV energy passes through the meter the retailer will incur costs for use of the network and for green schemes. The costs that retailers cannot avoid are significant and therefore the value of these exports to retailers is considerably less than the retail price (see section 3.2). In addition, because the metering and settlement arrangements are instantaneous, if a retailer gave its PV customers a credit for their daytime exports that they could use to 'pay' for their night time imports, the retailer would make a direct financial loss.

Because of these arrangements, a 1 for 1 feed-in tariff that effectively treats the electricity network as free storage for customers' excess electricity would involve a subsidy to non-SBS customers that would need to be recovered from higher electricity prices or from the NSW budget.

2.4.3 Why aren't solar feed-in tariffs set to encourage green energy?

Some stakeholders submitted that to be fair and reasonable, solar feed-in tariffs should be high enough to provide an incentive for customers to install solar PV, given the social and environmental benefits of renewable energy.[15]

Whether or not solar feed-in tariffs should be used to create an incentive for further investment in small-scale solar generation is a policy decision, and thus is a matter for the NSW Government, not IPART. However, we note that the Commonwealth Governments Renewable Energy Target Scheme already provides this incentive. In addition, it would not be possible to include an additional incentive in NSW solar feed-in tariffs without increasing electricity prices or drawing on the NSW budget to subsidise the costs involved, as the Solar Bonus Scheme demonstrated (see section 2.1).

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14 For example see submissions from A Tan, May 2013, p 1; Campaign for a 1 for 1 Solar Feed-in Tariff, June 2013, pp 4, 7; S & J Leitch, June 2013, p 1.

15 See submissions from S & J Leitch, June 2013, pp 1-2; S Wyatt, May 2013, p 1; Clarence Environment Centre, June 2013, pp 1-2; J McMahon, June 2013, p 1.

2.4.4 Why don't solar feed-in tariffs take account of PV exports' impact on wholesale electricity prices?

Several stakeholders submitted that greater investment in small-scale solar PV has led to lower wholesale electricity prices (eg, through changes in the retailers' energy losses and load profile and the 'merit-order effect'). As this benefits all electricity customers, they argued it should be taken into account in setting the benchmark range.[16]

We considered this issue in our 2012 review of solar feed-in tariffs. Reconsidering it as part of this 2013 review was outside the scope of our terms of reference. Nevertheless, we maintain the view we reached in 2012, which was that any indirect financial benefit arising from a reduction in wholesale electricity prices should be excluded in setting the benchmark range because:

- Due to arrangements in the NEM, this benefit is not fully and directly captured by a PV customer's retailer. Rather, it is an 'external benefit' that is shared by all customers (PV and non-PV customers) reflecting the functioning of the competitive market.
- Reallocating these benefits from all customers to only PV customers would increase electricity prices for non-PV customers. This would be contrary to our terms of reference.

We also note that this impact is not unique to PV generation – any new generator (or new customer) entering or exiting the NEM would change the balance of supply and demand, and thus could lead to lower or higher wholesale prices. Such a generator (or customer) would not be compensated for this impact. We consider that other than through policies specifically designed to encourage more investment in small-scale PV, such as the Small-scale Renewable Energy Target, PV customers should be treated like any other generator in the competitive market.

2.4.5 What will happen to feed-in tariffs for SBS customers after 2016?

Two submissions argued that the subsidised feed-in tariff for SBS customers should continue beyond the legislated end of the Solar Bonus Scheme. They put the view that ending these tariffs in 2016 is unfair, as SBS customers invested in solar PV early and so paid higher installation costs.[17]

16 For example see submissions from Alternative Technology Association, June 2013, p 3; Australian Solar Council, June 2013, p 4; D Synnott, June 2013, p 1.

17 See submissions from J Swindale, May 2013, p 1; S Grady, May 2013, p 1.

This issue is outside the scope of our review. It is also a policy issue, and thus is a matter for the NSW Government (not IPART). However, we note that after 2016, SBS customers can still benefit from their investment in solar PV. If they have, or change to net metering, they will be able to reduce their electricity bills, as the electricity they generate will be used in their own premises to meet their demand at the time of generation. They will also be able to seek out a market offer that includes a feed-in tariff for any excess generation they export to the grid. Alternatively they may receive an unsubsidised feed-in tariff with their existing (gross) meter.

3 The subsidy-free value of solar PV exports

As Chapter 1 indicated, the first step in our approach for determining the retailer contribution and the benchmark range was to estimate the value of PV customer exports in 2013/14 using 2 methods:

1. **the direct financial gain to retailers method**, which involves estimating the financial benefit that retailers receive per kWh of electricity their PV customers export to the grid
2. **the wholesale market value method**, which involves calculating the price the PV exports would receive if they could be sold on the NEM at the time they were exported.

In line with our terms of reference, these methods are the same as those we detailed in our March 2012 final report.[18]

The section below summarises the resulting estimated value, while the following sections discuss our analysis and results for each method in more detail.

3.1 Summary of estimated value of PV customer exports in 2013/14

Our estimates indicate that the value of PV customer exports in 2013/14 ranges from 6.6 to 11.2 c/kWh (Table 3.1). This is lower than our estimated value of these exports in 2012/13 of 7.9 to 13.2 c/kWh. This is largely due to the weaker outlook for wholesale energy prices in the coming year, discussed further in the sections below.

18 IPART, *Solar feed-in tariffs – Setting a fair and reasonable value for electricity generated by small-scale solar PV units in NSW – Final Report*, March 2012, Chapter 6.

Table 3.1 IPART's estimate of the value of PV customer exports ($2013/14, c/kWh)

Method	2012/13	2013/14
Direct financial gain to retailers	7.9 – 13.2	6.6 – 11.2
Wholesale market value	7.9 – 10.1	8.3

Note: The range of direct financial gains to retailers in 2012/13 is different to what we reported last year because we have included market discounts in this table. There is no range for the wholesale market value in 2013/14 as we based our analysis on 1.5kW units. There is no evidence that retailers distinguish PV customers by unit size.

Data source: IPART and Frontier Economics.

3.2 Direct financial gain to retailers

When a PV customer exports a kWh of electricity to the grid, its retailer supplies that electricity to another customer. In doing so, the retailer avoids some – but not all – of the costs it would incur if it purchased that kWh on the National Electricity Market (NEM). The difference between the revenue it can earn from selling the electricity and the costs it **cannot** avoid represents a direct financial gain to the retailer.

We estimate this financial gain by taking the retail price the PV customer would pay for importing electricity, then subtracting all the costs the retailer cannot avoid, as shown on Table 3.2. More information on the costs that retailers can and cannot avoid on solar PV exports is provided in our March 2012 report.[19]

Table 3.2 IPART's approach for estimating the direct financial gain to retailers

Revenue per kWh of electricity imported	–	Unavoidable costs per kWh of PV electricity exported	=	Financial gain per kWh of PV electricity exported
Retail price paid by customers		Retail costs including customer acquisition and retention		Avoided electricity purchase costs
		Retail margin		Avoided NEM fees
		Network costs		Avoided electricity losses
		Green scheme costs		

19 IPART, *Solar feed-in tariffs – Setting a fair and reasonable value for electricity generated by small-scale solar PV units in NSW – Final Report*, March 2012, pp 45-53.

EnergyAustralia and Origin Energy submitted that retail costs associated with PV customers are higher than for customers without solar PV units. They indicated that we should consider the impact of these higher costs when setting the benchmark range for 2013/14.[20] As noted by EnergyAustralia, the retail costs associated with PV customers are difficult to quantify. While some factors such as more complex billing might drive higher retail costs for PV customers, other factors might reduce them. For example, PV customers are likely to have smaller bills and therefore may reduce bad debt expenses. We do not consider we have sufficient information to adjust our retail cost estimates which reflect the average cost of serving a range of customers.

Our views on the costs that retailers can and can't avoid on solar PV exports are broadly consistent with other recent reports that have considered the value of PV exports.[21] We note that the Queensland Competition Authority treated 'headroom' as an unavoidable cost in their recent feed-in tariff review.

3.2.1 Data for estimating the direct financial gain

The best available data to calculate the direct financial gain is information on the Standard Retailers' PV customers on regulated prices in 2013/14. For these customers, we know the retail price they pay, and the estimated cost of supply on which this retail price is based.

Therefore, using data from our 2013 electricity determination and additional information provided by the Standard Retailers, we estimated the direct financial gain by:

- Identifying the total volumes of these customers' PV exports in kWh.
- Allocating these volumes into categories according to the price the customer paid per kWh of electricity. Where this price included peak, shoulder and off-peak rates, we allocated the volume to the price that reflected the timing of the customer's PV exports.
- Calculating the financial gain per kWh of PV exports in each price category of each type of tariff by taking the price paid by those customers, then subtracting the costs that the retailer **could not** avoid for those customers' exports.
- Calculating the weighted average financial gain per kWh of electricity exported for each Standard Retailer.

20 EnergyAustralia submission, June 2013, pp 3-4; Origin Energy submission, June 2013, p 1.

21 See ACIL Tasman, *The fair and reasonable value of exported PV output – A report for the Essential Services Commission of South Australia*, March 2013, Chapter 3 and Appendix A; QCA, *Estimating a Fair and Reasonable Solar Feed-in Tariff for Queensland – Final Report*, March 2013, Chapter 4.

This weighted average financial gain for Standard Retailers is an upper estimate of the direct financial gain to retailers in general. This is because it is based on the average regulated price of electricity, and many retailers sell electricity for less than this price in the competitive market (which means their financial gain would be smaller). In line with our terms of reference, we took this into account (discussed below).

3.2.2 IPART's estimate of the direct financial gain from PV exports

We calculated that the weighted average financial gain for the Standard Retailers ranged from 9.1 to 11.2 c/kWh. EnergyAustralia was at the upper end of this range. This is because most of EnergyAustralia's PV customers are paying time-of-use prices and the difference between these prices and the costs EnergyAustralia can avoid is higher (ie, its financial gain is higher).

To adjust this range to account for the discounts in market offers, we repeated our calculations after applying an 8% discount to the regulated usage prices. We consider 8% represents a reasonable estimate of the discount included in market offers, and note that EnergyAustralia supports this view.[22] This discount is also broadly consistent with the discount applied in 2012/13.

This resulted in an estimated range for the direct financial gain to retailers of 6.6 to 11.2c/kWh (Table 3.3). While the upper end of this range reflects the estimated financial gain for a Standard Retailer only, we consider that this should still be reflected in the overall range.

Table 3.3 IPART's estimate of the direct financial gain to retailers in 2013/14 ($2013/14, c/kWh)

	Direct financial gain for Standard Retailers	Direct financial gain (after adjustment for market offers)
Energy Australia	11.2	9.2
Origin Energy (Endeavour Energy)	9.1	7.1
Origin Energy (Essential Energy)	9.2	6.6
Overall range		**6.6 – 11.2**

Data source: IPART.

22 EnergyAustralia submission, June 2013, p 3.

Our estimated range for the direct financial gain to retailers in 2013/14 is lower than in 2012/13 (7.9 to 13.2 c/kWh). This is because, relative to 2012/13, the energy purchase cost allowance included in regulated prices is lower. There are 2 reasons for this. First, for 2012/13 the energy purchase cost allowance was based on the long run marginal cost (LRMC) floor price, while for 2013/14 it was based on a 75%/25% weighting of the LRMC and market-based costs. Second, our estimates of both the LRMC and market-based costs for 2013/14 are lower than those for 2012/13.[23]

3.3 Wholesale market value of PV exports

An alternative way to estimate the value of PV customers' exports is to calculate the wholesale market value of this electricity if it could be sold on the NEM. This assumes PV customers are like any large-scale generator who sells electricity on the wholesale market. Using this approach, the value will depend on when and where the PV electricity is exported to the grid and what spot prices are at these times.

Our wholesale market value approach uses an historical year of half-hourly solar PV exports and corresponding spot prices. This historical correlation between PV exports and spot prices is maintained and 'scaled' to the forecast average spot price in 2013/14 to provide a wholesale market value for that year. Given this approach, the choice of historical year (or base year) is important for determining the wholesale market value in 2013/14.

Ideally we would have regard to several years of data. However, given that we have only a few years' PV data, at this stage we have decided to use a single year. While we would usually use the most recent year of complete historical data (2011/12) as this captures the most recent data for solar PV exports, we need to make sure that this is a reasonable year in terms of intra-day average spot price outcomes. If spot prices are unusually low or high around the middle of the day when most PV exports take place, this will have a significant effect on the average value of the PV exports (ie, high average prices in the middle of the day will increase the wholesale market value and vice versa).

We note that 2011/12 was a relatively flat year for average spot prices across each half-hour of the day compared to other recent years (Figure 3.1). This means the wholesale market value of solar PV exports in this year would be relatively low (Table 3.4). In our March 2012 report (when we did not have data for 2011/12) we decided that 2010/11 represented a fairly typical year for spot price outcomes and we used this as our base year.[24]

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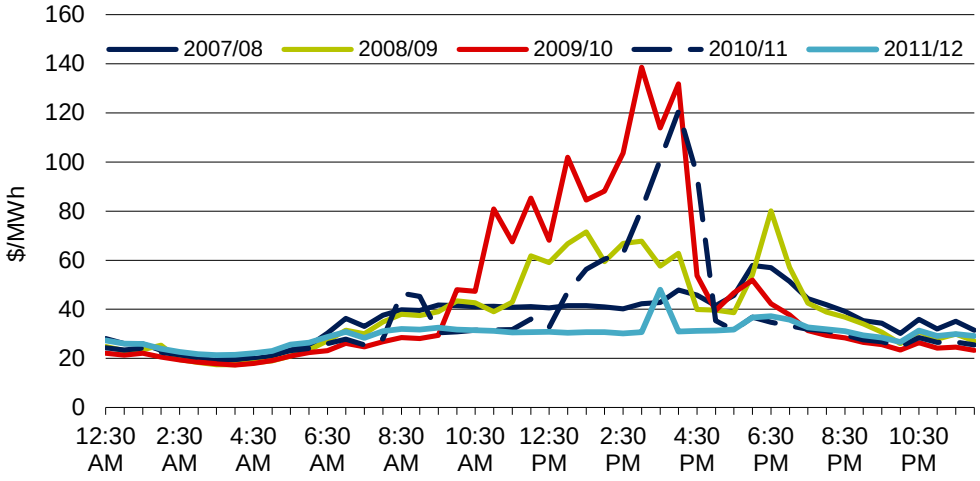
23 For more information on the energy cost allowance see IPART, *Review of regulated retail prices and charges for electricity – From 1 July 2013 to 30 June 2016 – Final Report*, June 2013, Chapter 6.

24 IPART, *Solar feed-in tariffs – Setting a fair and reasonable value for electricity generated by small-scale solar PV units in NSW – Final Report*, March 2012, p 59.

Figure 3.1 NSW average spot prices ($/MWh)



Data source: AEMO.

We found in our recent electricity price determination that average prices in 2013/14 are likely to be relatively low compared to historical prices (due to the relatively abundant generation capacity as a result of falling demand).[25] However, on balance, we decided to estimate the wholesale market value for 2013/14 using a base year of 2010/11. This is consistent with our previous solar decision, and will help to ensure that the wholesale market value captures a reasonable level of volatility in spot prices. We intend to consider this issue further in next year's review.

3.3.1 Data used for estimating the wholesale market value

We engaged Frontier Economics (Frontier) to assist us in applying this approach. As indicated above, Frontier used historical data for half-hourly PV exports and half-hourly spot prices in the NEM.

Half-hourly PV exports

The best available source of data on half-hourly PV exports relates to the Ausgrid network area. This is because this area includes a large number of solar PV customers with time-of-use meters that record PV generation or exports each half-hour. Neither Endeavour Energy nor Essential Energy routinely collects and stores half-hourly data – either because basic accumulation meters are in use, or time-of-use meters record data less frequently than half-hourly.

25 For more discussion see Frontier Economics, *Energy purchase costs – A final report prepared for IPART*, June 2013, p 38.

Ausgrid previously provided data for around 10,000 PV customers over the 2010/11 financial year. It also provided an updated sample of around 1,000 PV customers for the 2011/12 financial year. These customers included business and residential PV customers with gross and net meters and a range of PV unit sizes (in kW). However, a significant majority of these customers have a PV unit size of 1.5kW. The 2011/12 data is available from IPART on request.[26]

Half-hourly spot prices

In NSW, the spot electricity price is referenced to the NSW regional reference node (RRN). Half-hourly spot prices for the NSW RRN are publicly released by the Australian Energy Market Operator (see Figure 3.1). Frontier used this public information to obtain historical spot prices for each half-hour.

Frontier calculated the **historical** wholesale market value for 2009/10, 2010/11 and 2011/12 by multiplying the PV export volumes by the corresponding half-hourly spot price to obtain a PV-weighted price. These results are summarised in Table 3.4 below.

Table 3.4 Frontier's estimated historical wholesale market value of PV exports ($2013/14, c/kWh)

	Wholesale market value
2009/10	13.8
2010/11	6.0
2011/12	3.6

Note: The wholesale market values for 2009/10 and 2010/11 are based on data for 1.5kW PV units. For 2011/12 it is based on a sample of customers with different unit sizes.

Data source: Frontier Economics.

The historical wholesale market values in Table 3.4 show the sensitivity of the results to the pattern of average spot prices in these years. The flat average spot prices in 2011/12 means that the wholesale market value for this year is relatively low (noting that these prices exclude the cost of carbon which commenced on 1 July 2012 and is therefore included in both the 2012/13 and 2013/14 benchmark ranges). In contrast the relatively high spot prices in the middle of the day in 2009/10 contribute to a relatively high wholesale market value.

For the 2011/12 PV data Frontier examined the export profile for both gross and net metered customers. However, they found that there was very little difference in the wholesale market value of solar PV exports for the net and gross profiles.[27]

[26] The data provided by Ausgrid to IPART has customer specific identifiers removed. A dummy unique identifier was given to each customer.

[27] For more discussion see Frontier Economics, *Market value of solar PV exports – A final report prepared for IPART*, June 2013, p 6.

In our March 2012 review, Frontier presented wholesale market values for a range of different PV unit sizes. However, as EnergyAustralia noted in its submission to this review,[28] the sample size for some larger size units was fairly small, which means some results may be less reliable. Therefore, for this review, Frontier used data for 2010/11 focussing on 1.5kW units, which is the most common unit size among customers.

More information is provided in Frontier's report.[29]

3.3.2 Frontier's estimate of the wholesale market value of PV exports in 2013/14

As discussed above, to estimate the wholesale market value in 2013/14 Frontier scaled the historical data to the forecast average spot price in 2013/14. This approach maintains the PV 'shape premium' from the historical year (we have used 2010/11) and applies this to the forecast average spot price in 2013/14.[30] Frontier used a forward price for 2013/14 based on d-cypha Trade ($54.89/MWh in $2013/14). Frontier also presented results using their modelled forward prices for 2013/14. However, we have used the forward prices based on d-cypha Trade as these were used as the basis for our 2013 electricity determination.

This produced a wholesale market value of 8.3 c/kWh in 2013/14 which includes the cost of carbon. This is within the range of wholesale market values estimated for 2012/13 (7.9 to 10.1 c/kWh), although at the lower end of the range.

The estimates of historical and forecast wholesale market value of PV exports in this chapter include the value of energy losses. This reflects the fact that PV exports tend to be consumed close to where they were injected into the grid, and therefore benefit from favourable loss factors.

28 EnergyAustralia submission, June 2013, pp 4-5.

29 Frontier Economics, *Market value of solar PV exports – A final report prepared for IPART*, June 2013.

30 The PV shape premium is ratio of the wholesale market value of PV exports to the time-weighted average spot price.

4 Determining the retailer contribution and benchmark range

To determine the retailer contribution and the benchmark range for 2013/14, we considered our estimates of the value of PV customers exports, discussed in Chapter 3. We also considered the requirements in our terms of reference that these determinations should support a competitive electricity market and should not result in an increase in retail electricity prices. The sections below set out our decisions.

4.1 Retailer contribution

We have determined that retailers should contribute 6.6 c/kWh in 2013/14 for PV electricity exported by Solar Bonus Scheme customers towards the costs of the Solar Bonus Scheme.

Consistent with the approach we used for 2012/13, this is equivalent to the lower bound of our estimated range for the direct financial gain to retailers. This range has been adjusted to account for the discount included in market offers as required by our terms of reference (see section 3.2).

This approach was deliberately conservative to ensure that we did not set the contribution higher than retailers' actual financial gains. This would have affected the competitiveness of the market, making SBS customers less attractive to supply, and thus would have been inconsistent with our terms of reference.

The retailer contribution rate for 2013/14 is lower than the rate we determined for 2012/13 (7.7 c/kWh). This reflects a lower value of energy that is included in the direct financial gain to retailers.

4.2 Benchmark range

We have determined a benchmark range of 6.6 to 11.2 c/kWh in 2013/14.

Consistent with the approach we used for 2012/13, this range is based on the upper and lower bound for the estimated value of PV customer exports derived using both the wholesale market value and direct financial gain to retailers methods.

This range is quite broad, reflecting the considerable uncertainty that exists in forecasting a value for solar PV exports in 2013/14.

Appendices

A Terms of reference

Annual investigation and determination by IPART of a retailer benefit component and benchmark range for feed-in tariffs

Reference to IPART under section 43ECA of the *Electricity Supply Act 1995*

I, Chris Hartcher, Minister for Resources and Energy, refer to the Independent Pricing and Regulatory Tribunal (IPART) under section 43ECA of the Electricity Supply Act 1995 (the Act) for investigation and determination:

1) The retailer benefit component payable by a retailer to a customer for electricity produced by a complying generator and supplied to the distribution network by a customer under the Solar Bonus Scheme (the retailer contribution); and

2) The benchmark range for solar feed-in tariffs paid by retailers for electricity produced by complying generators and supplied to the distribution network (the benchmark range).

Conduct of investigation

In making its determination on the retailer contribution, IPART should have regard to the direct financial gain to retailers method including discounts for market offers as set out in its final report *Solar feed-in tariffs: setting a fair and reasonable for electricity generated by small-scale solar PV units in NSW* (March 2012) (the Final Report).

In making its determination on the benchmark range IPART should use the methodology adopted in its 2012/13 determination. IPART should take into account:

- its modeling of the wholesale market value for the relevant year as set out in its Final Report; and
- the direct financial gain to Standard Retailers for the relevant year.

In conducting this investigation IPART is to consider the following key parameters:

- there should be no resulting increase in retail electricity prices;
- the benchmark range should operate in such a way as to support a competitive electricity market in NSW

Consultation

IPART must undertake such consultation as is required under the Act and may undertake such further consultation as it considers appropriate.

Timing

IPART is to complete the investigation and provide its determination as soon as practicable following approval of regulated retail prices.

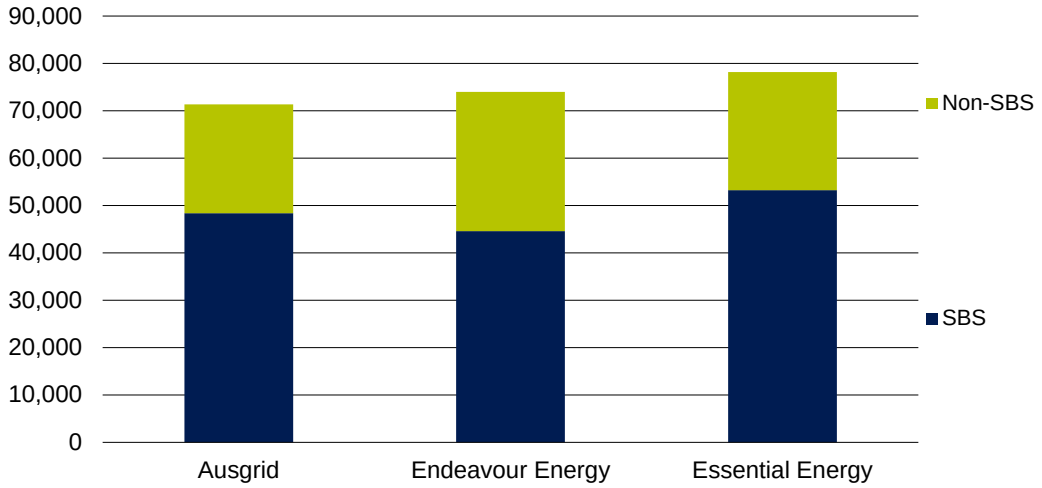
B Number and characteristics of solar PV units in NSW

Currently, more than 220,000 household and small business customers have installed solar PV units in NSW.[31] These PV units generate electricity by converting sunlight into low voltage electricity. In most cases, they are also connected to an 'inverter' which allows the electricity they generate to be converted into a form suitable for use in households and businesses.

B.1 Number of PV customers

As Figure B.1 shows, the state's 220,000 PV customers are spread fairly evenly across the 3 network supply areas in NSW. Overall, around 65% receive subsidised feed-in tariffs under the Solar Bonus Scheme. However, this proportion varies by network supply area, ranging from 60% in the Endeavour Energy network area to 68% in the Ausgrid and Essential Energy network areas.

Figure B.1 Number of PV customers in NSW by network area



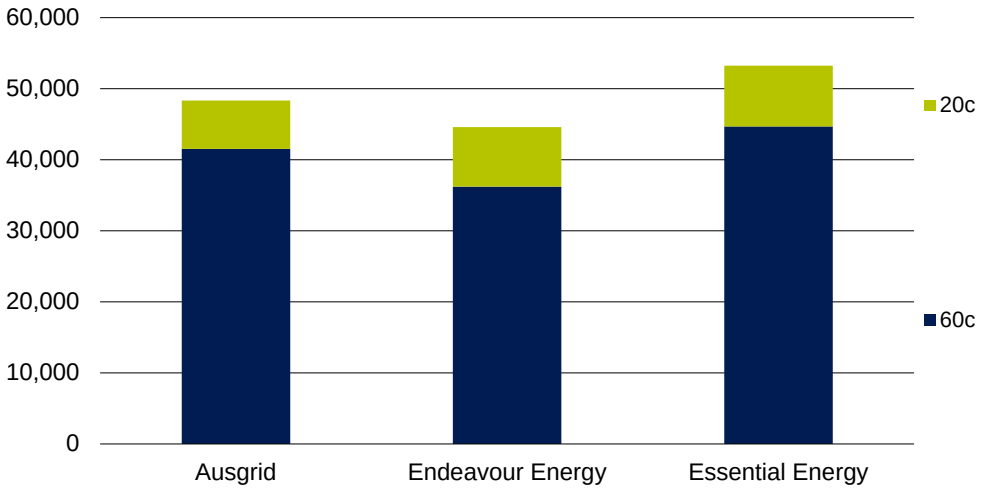
Note: As at May 2013.
Data source: NSW Trade & Investment.

[31] Information provided by NSW Trade & Investment, as at 3 May 2013.

Around 35% are non-SBS customers, and so are not entitled to receive a subsidised feed-in tariff. Many of these customers are likely to have installed PV units after the SBS closed to new participants in 2011.

As at May 2013, among SBS customers, 84% receive the 60c/kWh rate. As Figure B.2 shows this proportion also varies by network supply area. It is highest in the Ausgrid area (86%), followed by the Essential Energy (84%) and Endeavour Energy (81%) areas.

Figure B.2 Customers and feed-in tariff rates under the Solar Bonus Scheme



Note: Does not include eligible wind generators under the SBS, as at May 2013.
Data source: NSW Trade & Investment.

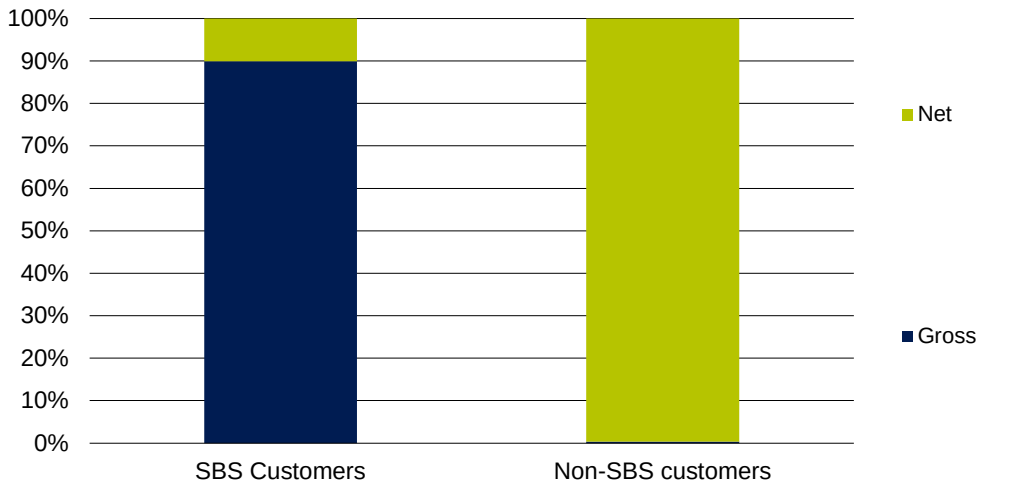
B.2 Metering arrangements for solar PV customers

PV customers can be connected to the grid under gross or net metering arrangements. Currently, the vast majority of SBS customers have gross metering arrangements, while virtually all non-SBS customers have net metering arrangements (Figure B.3). This reflects the different benefits the metering arrangements offer to different PV customers. In particular:

- SBS customers are likely to be better off with gross metering, provided the subsidised feed-in tariff they receive is higher than the retail price of electricity. With gross metering, the electricity produced by the PV unit is measured on one meter and the electricity consumed in the premises is measured on a different meter. The customer then earns the (higher) subsidised feed-in tariff on all the electricity they produce, and is charged the (lower) retail price for all the electricity they consume.

- Non-SBS customers are likely to better off with net metering arrangements, where the electricity produced by the PV unit and consumed in the premises is recorded on a single meter. The customer is billed for their **net** electricity consumption – that is, their total consumption minus the electricity they generate and consume in their premises **at the time of generation**. This means that within a billing period, for each kWh the customer generates and consumes in their premises, they save the retail price they would normally pay per kWh. They can also earn an unsubsidised feed-in tariff for any net exports to the grid if they enter into a market contract that includes a feed-in tariff.

Figure B.3 Metering arrangements for PV customers



Note: As at May 2013.
Data source: NSW Trade & Investment.

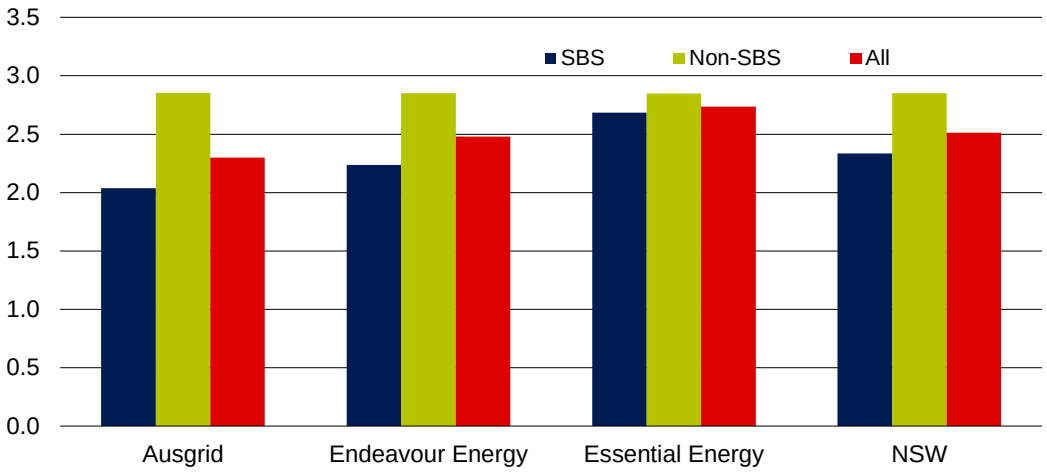
B.3 Average solar PV unit sizes

Across NSW, the average PV unit size is currently around 2.5kW (Figure B.4). Customers in the Essential Energy network supply area tend to install the largest units (average 2.7kW) followed by the Endeavour Energy (2.5kW) and Ausgrid (2.3kW) areas.

The average unit size is larger for non-SBS PV customers, indicating that more recent installations have tended to be larger units. Indeed the average unit size across NSW has increased from 2.3kW when we completed our March 2012 review.[32] The trend toward larger unit sizes might reflect the falling cost of PV units in more recent times.

[32] IPART, *Solar feed-in tariffs – Setting a fair and reasonable value for electricity generated by small-scale solar PV units in NSW – Final Report*, March 2012, p 25.

Figure B.4 Average PV unit size by network area (kW)

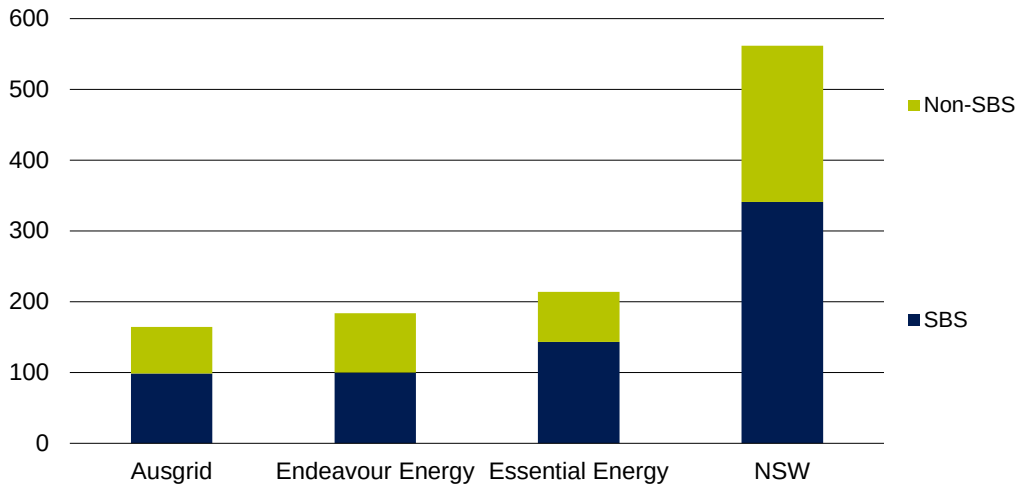


Note: As at May 2013.
Data source: NSW Trade & Investment.

B.4 Total solar PV generation capacity

There is currently over 560 megawatts of solar generation capacity in NSW (Figure B.5). Just over 60% (or around 340MW) relates to SBS customers. Consistent with having the largest number of PV customers and the largest average unit size, the Essential Energy network area has the largest generation capacity of the 3 network areas at just over 210MW.

Figure B.5 Solar generation capacity by network area (MW)



Note: As at May 2013.
Data source: NSW Trade & Investment.