

Solar feed-in tariffs

The subsidy-free value of electricity from small-scale solar PV units from 1 July 2014

Electricity — Draft Report

April 2014

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Energy — Draft Report
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Invitation for submissions

IPART invites written comment on this document and encourages all interested parties to provide submissions addressing the matters discussed.

Submissions are due by 21 May 2014.

We would prefer to receive them electronically via our online submission form <www.ipart.nsw.gov.au/Home/Consumer_Information/Lodge_a_submission>

You can also send comments by mail to:

2014/15 Solar Feed-in Tariff Review
Independent Pricing and Regulatory Tribunal
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If you would like further information on making a submission, IPART's submission policy is available on our website.

Contents

Invitation for submissions	iii
1 Executive summary	1
1.1 Our draft determination	1
1.2 How we made our draft decision	4
1.3 How can stakeholders comment on this draft decision?	4
1.4 What does the rest of this report cover?	5
2 Context and terms of reference	5
2.1 Our terms of reference	6
2.2 Our process for conducting this review	7
2.3 Our response to issues raised in submissions to our issues paper	7
3 Determining the retailer contribution and benchmark range	12
3.1 Draft finding on the estimated value of PV customer exports	12
3.2 Data and approach used to derive this estimated value	13
3.3 Frontier's estimate of the wholesale market value in 2014/15 in more detail	16
3.4 Draft decision on the benchmark range and retailer contribution	17
Appendices	19
A Terms of reference	21
B More information on PV customers	23
C Revised National Principles for Feed-in Tariff Arrangements	26

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. Those who are part of the NSW Solar Bonus Scheme currently receive a subsidised feed-in tariff of either 20 or 60 cents per kilowatt hour (c/kWh). Those who are not part of this scheme can receive unsubsidised feed-in tariffs in the competitive retail electricity market.¹

The NSW Government has asked IPART to investigate and determine:

- ▼ the benchmark range for the unsubsidised 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 PV customers who **are** part of the Solar Bonus Scheme to help fund this scheme (the retailer contribution).

We are currently undertaking this review and have made a draft determination on solar feed-in tariffs for 2014/15. We are seeking comments from stakeholders, which we will consider before making our final determination.

1.1 Our draft determination

We have made a draft determination that in 2014/15 the benchmark range for unsubsidised solar feed-in tariffs is **5.0 to 9.6 c/kWh** and the retailer contribution is **5.3 c/kWh** (Table 1.1).

Table 1.1 Draft determination on solar feed-in tariffs 2014/15 (\$nominal, c/kWh)

	2013/14	2014/15
Benchmark range for unsubsidised feed-in tariffs	6.6 – 11.2	5.0 – 9.6
Retailer contribution to costs of Solar Bonus Scheme	6.6	5.3

The benchmark range reflects the forecast wholesale market value of PV electricity in the coming year at different times of the day. The upper end of the range represents this value during the period when solar PV exports have the highest wholesale market value, which is between 3pm and 5pm. The lower end of the range represents this value at all other times of day. The median value across all times is 5.8c/kWh.

¹ Based on information provided by NSW Trade & Investment in March 2014, there are currently around 145,000 customers receiving subsidised feed-in tariffs under the Solar Bonus Scheme, while around 100,000 can receive unsubsidised feed-in tariffs on the competitive market.

Our draft benchmark range is lower than in 2013/14 because the forecast market price of electricity is lower. The main reason is because market prices currently incorporate the electricity market's expectation that the carbon pricing mechanism will be repealed in 2014/15, reducing the cost of electricity.

Our determination on the benchmark range is not binding on retailers. Like other components of energy retailers' competitive offers,² solar feed-in tariffs are not regulated by IPART. It is up to retailers to decide whether to offer them, how to structure the feed-in tariff, and what rate(s) per kilowatt hour (kWh) to offer. Our determination is intended to provide guidance on the likely value of the electricity exported by PV customers, to assist retailers in making these decisions, and customers in deciding whether to install a PV unit and comparing market offers.

We consider that the availability and rate of solar feed-in tariffs are likely to be secondary considerations for many PV customers. In general, most of the electricity generated by a PV unit is used to meet the customer's own energy needs at the time of generation, and the amount exported is relatively small.³ In addition, the customer still imports a significant amount of electricity to meet their needs when the PV unit is not generating (eg, at night). This means that in most cases, the primary financial benefit of having a PV unit is reduced electricity bills, and the most important financial consideration in selecting a market offer is likely to be the retail price of electricity.

The retailer contribution to the Solar Bonus Scheme reflects the financial benefit the retailers receive from their customers' participation in this scheme. This benefit is also lower than in 2013/14 because the forecast market price of electricity is lower.

Our determination on the retailer contribution is binding on retailers, but **does not** affect the solar feed-in tariffs Solar Bonus Scheme customers receive under the scheme. The contribution is paid by these customers' electricity retailers to offset some of the costs of the scheme, which are funded by all electricity customers (through a levy included in retail electricity prices).

We do not propose to recommend the retailer contribution and benchmark range with and without carbon as some stakeholders have submitted.⁴ If the carbon price is repealed in 2014/15, the impact would be modest (around 0.3c/kWh) because forecast wholesale market values already 'price in' much of the removal of the carbon price. As this is a voluntary benchmark range and the impact is small, we consider there is no need to recommend ranges with and without carbon. We invite stakeholder comments on this approach.

Box 1.1 provides more information on our review.

² For example 'green premiums'.

³ Assuming they have net metering arrangements.

⁴ See submissions from EnergyAustralia, January 2014, p 3; Origin Energy, January 2014, p 2.

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 How we made our draft decision

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

1. Estimated the value of PV customer exports based on the 'wholesale market value' method, using data from both gross and net metered customers. This involved calculating the price the PV exports would receive if they could be sold on the wholesale market at the time they were exported.
2. Set the benchmark range based on the lower and upper end of our estimate of the wholesale market value for **net** metered customers.⁵
3. Set the retailer contribution based on the lower end of our estimate of the wholesale market value for **gross** metered customers.⁶

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

We also had regard to stakeholder submissions in response to the issues paper we released in November 2013, and to expert advice from our consultant, Frontier Economics.

1.3 How can stakeholders comment on this draft decision?

We will hold a public hearing on Tuesday 13 May 2014. We also invite written submissions by 21 May 2014. (Page iii at the front of this report provides information on how to make a submission.) Late submissions may not be accepted.

We will consider all the issues raised in the public hearing and submissions, and make our final determination in mid-June.

⁵ **Under net metering** the electricity generated by the customer is first used to meet the customer's own consumption. Only when generation exceeds the customer's consumption at any point in time, will the excess be exported to the grid.

⁶ **Under gross metering** all the electricity generated by the customer is 'exported'.

1.4 What does the rest of this report cover?

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

- ▼ Section 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
- ▼ Section 3 discusses our estimate of the value of PV customer exports in 2014/15 and how we used this to make our draft determination for 2014/15.

Appendices A to C provide our terms of reference, information on the current number and characteristics of PV customers in NSW (as at March 2014), and the Revised National Principles for Feed-in Tariff Arrangements.

2 Context and terms of reference

IPART first reviewed solar feed-in tariffs in 2011/12. Our terms of reference for this review included 2 key requirements: that our recommendations must not lead to higher retail electricity prices, and must support competition in the retail market.

After extensive consultation and analysis, we found that setting mandatory feed-in tariffs for customers outside the Solar Bonus Scheme would **not** meet these requirements. Instead, we recommended that NSW retailers be encouraged to voluntarily offer an unsubsidised feed-in tariff to these non-Solar Bonus Scheme customers, and we should set a benchmark range for this tariff to assist customers in comparing retail offers. We also recommended that NSW retailers be required to make a contribution towards the subsidised feed-in tariffs paid to customers **inside** the Solar Bonus Scheme. In addition, we recommended an approach and methodologies for determining the values of the benchmark range and retailer contribution.

The Government accepted these recommendations, and subsequently asked us to conduct reviews to update the values of the benchmark range and retailer contribution each year. The terms of reference for these annual reviews are much narrower than those of our first review, and limit the scope of issues we can consider.

2.1 Our terms of reference

Recently the NSW Government provided us with revised terms of reference for the 2014/15 review (see Appendix A). These terms of reference are slightly different to those we referred to in our issues paper released in November 2013. Essentially, they ask us to:

- ▼ update the benchmark range and the retailer contribution
- ▼ in setting the benchmark range and retailer contribution, take into account the wholesale market value of PV customer exports at the time of day of export
- ▼ ensure that the value estimated reflects the subsidy-free value of PV customer exports to a retailer
- ▼ ensure there is no resulting increase in retail electricity prices
- ▼ ensure the benchmark range operates in a way that supports a competitive electricity market in NSW, and
- ▼ undertake the determination in broad conformance with the *Revised National Principles for Feed-in Tariff Arrangements*.⁷

The main difference between these and last year's terms of reference relates to what we are asked to consider in setting the benchmark range and retailer contribution. Previously we considered the estimated value of PV exports derived 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.

The revised terms of reference indicate that we should consider only estimates derived using the wholesale market value method. The direct financial gain to retailers method is no longer referred to because it does not estimate the value 'at the time of day of export'. This means it does not comply with the Revised National Principles for Feed-in Tariff Arrangements.⁸

Please note that under the revised terms of reference, many of the issues stakeholders have raised in previous reviews continue to be outside the scope of this 2014 review (discussed further in the section 2.3).

⁷ See Appendix C.

⁸ The estimated value under the direct financial gain to retailers method was roughly equivalent to the energy cost allowance from IPART's retail electricity determination. This energy cost allowance does not specifically relate to the time of day that PV customers export electricity to the grid.

2.2 Our process for conducting this review

We released an issues paper in November 2013. It outlined the purpose and scope of the 2014 review, and sought comment from stakeholders on ways we could enhance our approach and methodologies. We received 9 submissions from energy retailers, solar industry organisations and individuals. In preparing this draft report we have taken into account issues raised in these submissions. We also received expert advice on the value of PV customers' exports from Frontier Economics.

We are seeking submissions on this draft report and invite comments from interested parties. Submissions are due by 21 May 2014. Details on how to make a submission can be found on page iii at the front of this report. We may not accept late submissions. We will also hold a public hearing on the draft report and determination on 13 May 2014. We will consider all submissions and comments before finalising our report. We will release our final report and determination in June 2014.

2.3 Our response to issues raised in submissions to our issues paper

Stakeholders raised 4 main issues in submissions to our issues paper. These issues and our response are summarised below.

2.3.1 Improving our methods for estimating the value of PV customer exports

The submissions from energy retailers commented on our methods for estimating the value of PV customer exports. While there was broad support for improving our methodologies, there were differing views on the data we should use in our analysis. Some retailers also noted that if the carbon price was repealed, this would significantly reduce the value of solar PV exports.

We respond in detail to these issues in section 3. As noted in section 2.1, we have received revised terms of reference for this review which mean we will no longer use the direct financial gain to retailers method. Therefore, we have not included discussion on this particular method.

2.3.2 Time-varying solar feed-in tariffs

Stakeholders raised the need for time-varying feed-in tariffs so that PV customers can receive a fair price for their PV exports when the value of the energy is higher. For example, the Clean Energy Council submitted that Australia's solar industry does not seek a '1-for-1' feed-in tariff, however retailers should pay 'benefit-reflective feed-in tariffs' that are:

- ▼ technology-neutral
- ▼ time-varying and include a critical peak payment, and
- ▼ (ideally) location specific.

The Clean Energy Council submitted that benefit-reflective feed-in tariffs would promote more efficient outcomes and lead to lower costs for electricity customers.⁹ Similar comments were made in the submission from Solar Citizens.¹⁰

We support time-varying solar feed-in tariffs and agree this can contribute to more efficient outcomes where customers can respond to these price signals. We also agree that our solar feed-in tariff reviews could provide more information for both retailers and customers regarding how the value of solar PV exports varies by time of day.

Time-varying solar feed-in tariffs may comprise 2 elements:

- ▼ The value of energy on the wholesale electricity market, and
- ▼ The pass through of any net benefits associated with relieving network congestion.

We discuss each of these elements below.

Time-varying value of energy in the wholesale electricity market

In this report we are concerned with the payments made to PV customers to reflect the value that PV exports provide to retailers. In this context, time-varying feed-in tariffs would provide a price incentive to export more electricity at times when it has a greater value on the wholesale electricity market.

As mentioned above, we support retailers providing price signals to their customers where customers have the ability to respond. We also support retailers offering feed-in tariffs that approximate the wholesale price of electricity at times of peak and non-peak demand. While retailers are in the best position to structure their feed-in tariffs to meet the needs of their customers, we have provided additional information on the wholesale market value of solar PV by time of export. The analysis indicates that the value of PV exports on the

⁹ Clean Energy Council submission, January 2014, pp 1-2.

¹⁰ Solar Citizens submission, January 2014, pp 1-2.

wholesale electricity market tends to be highest between 3pm to 5pm. We have used this information to estimate the value of solar PV exports during this period, and at all other times. This is discussed in section 3.2.

A number of submissions also noted that battery storage would help PV customers respond to price signals, and that our solar determination could help to promote this technology.¹¹ We agree that battery storage would assist customers in deciding when to export their PV generation at a time when it has a greater value. We note that there is already an economic incentive for battery storage because of the opportunity to avoid paying the retail price for electricity (ie, to offset consumption at another time).

The Clean Energy Council's submission also notes that benefit-reflective feed-in tariffs should reflect the value provided to network businesses. This is discussed in the next section.

Time-varying value to network businesses

Some stakeholders submitted that our feed-in tariffs should incorporate the value that solar PV exports provide to network businesses.¹² For example, PV customer exports may delay the investment needed to augment the network and therefore have a value to network businesses.

PV customers can impose costs and benefits on a network business. For retailers to pass through network benefits in a feed-in tariff, they would need to receive a payment or benefit from the network businesses. However, currently network businesses in NSW are not providing payments to retailers to reflect any net benefits from solar PV customers.

The Standing Council on Energy and Resources has proposed a rule change in relation to the distribution network pricing principles.¹³ These proposed changes would result in more cost-reflective network prices and explicitly address locational benefits and time-of-use pricing where available. Under the proposed arrangements, PV customers would pay lower network charges when they improve congestion during peak times in the local network. While not a payment through a feed-in tariff, PV customers would receive the benefit through lower network charges at specific locations and times of day where available. It is important to note that cost-reflective network tariffs would also reflect where PV solar customers add to network costs.

¹¹ See submissions from Campaign For A 1 For 1 Solar Feed-in Tariff for NSW, December 2014, pp 2-3; Clean Energy Council, January 2014, p 1; Solar Citizens, January 2014, pp 1-2.

¹² See submissions from the Clean Energy Council, January 2014, p 2; Solar Energy Industries Association Inc, January 2014, p 2.

¹³ See <http://www.aemc.gov.au/Rule-Changes/Distribution-Network-Pricing-Arrangements>.

2.3.3 Gentailers will not provide fair feed-in tariffs

Some stakeholders noted that electricity generators make a lot of revenue from high price events in the wholesale electricity market. Therefore, ‘gentailers’ (retailers part of an integrated energy company that also generates electricity) have no incentive to open up to competition for electricity supply at these peak price times.¹⁴

In our view, in a competitive market any retailer (regardless of whether it is a gentailer or not) has an incentive to offer a fair price for a customers’ PV exports. If it doesn’t offer a fair price for PV exports, then it risks losing these customers to competitors and having to pay the same, or a higher price, to someone else for that electricity. For this reason, we consider that any retailer would be indifferent to whom it purchases its electricity from.

The feed-in tariffs currently available in the market support this view. We have examined a sample of voluntary feed-in tariffs on offer in each network area in NSW (Table 2.1). Of the 12 retailers included in the sample, 8 of 12 offer a voluntary feed-in tariff and 6 of 12 are within IPART’s recommended benchmark range for 2013/14. Based on this sample there were no differences between a retailer’s feed-in tariffs between network areas. We also note that 2 of the largest 3 gentailers in NSW (EnergyAustralia and AGL) offer feed-in tariffs towards the higher end of the market.

The summary in Table 2.1 also suggests that most customers in NSW should be able to access a feed-in tariff that is within, or very close to, IPART’s benchmark range. The retailers with the majority of market share in NSW all offer voluntary feed-in tariffs.

¹⁴ See submissions from the Clean Energy Council, January 2014, p 4; Solar Citizens, January 2014, p 1.

Table 2.1 Retailers' voluntary feed-in tariffs (March 2014)

Retailer	Feed-in tariff (c/kWh) and network area			Within IPART range?
	Ausgrid	Endeavour	Essential	
Momentum Energy	Nil	Nil	Nil	No
Red Energy	5	5	5	No
Origin Energy	6	6	6	No
Diamond Energy	8	8	8	Yes
Lumo Energy	6.6	6.6	6.6	Yes
Dodo Power & gas	Nil	Nil	Nil	No
Powerdirect	7.7	7.7	7.7	Yes
AGL	8	8	8	Yes
Sanctuary Energy	Nil	Nil	Nil	No
EnergyAustralia	7.7	7.7	7.7	Yes
Click Energy	10	10	10	Yes
Australian Power & Gas	Nil	Nil	Nil	No

Note: Postcodes sampled in the Ausgrid, Endeavour and Essential areas 2048, 2147, 2795 respectively.

Source: www.energymadeeasy.gov.au (accessed 10 March 2014).

It is important to note that voluntary feed-in tariffs are only one component of a retailer's offer. PV customers should also consider usage rates and other terms and conditions when comparing retailers' market offers. In other words, the retailer offering the best feed-in tariff may not be offering you the best overall deal on your electricity.

2.3.4 Mandating minimum feed-in tariffs

Some stakeholders called for a mandatory minimum feed-in tariff in NSW.¹⁵ However, as outlined in our issues paper, in our view the competitive market is the best way to deliver the fair value of PV customer exports. There is a risk that setting a mandatory rate too high would lead to less competition and/or higher retail prices for PV customers.

¹⁵ See submissions from Campaign For a 1 For 1 Solar Feed-in Tariff for NSW, December 2014, pp 1-2; G Tosio (Individual), December 2013, p 1.

3 Determining the retailer contribution and benchmark range

To determine the retailer contribution and the benchmark range, we first estimated the value of PV customer exports in 2014/15. As section 2.1 discussed, we have previously used 2 methods to estimate this value. However, in line with the revised terms of reference for this review, we only used the wholesale market value method. We engaged Frontier Economics (Frontier) to assist us with this task. We then used Frontier’s advice to make our draft decisions on the benchmark range and the retailer contribution.

The section below sets out our draft finding on the estimated value of PV exports. The subsequent sections discuss the data and approach Frontier used to derive this estimated value, the estimated value in more detail, and our draft decisions on the benchmark range and retailer contribution.

3.1 Draft finding on the estimated value of PV customer exports

In line with Frontier’s advice, our draft finding is that the estimated value of PV customer exports in 2014/15 ranges **from 5.0 to 10.4 c/kWh** (Table 3.1). This range represents Frontier’s estimate of the wholesale market value of PV exports at different times of the day by customers with both gross net meters, and a range of PV unit sizes. (Frontier’s methodology is discussed further in section 3.2.)

Table 3.1 Estimated value of PV customer exports (\$2014/15, c/kWh)

Method	2013/14	2014/15
Direct financial gain to retailers	6.8 – 11.5	
Wholesale market value	8.5	5.0 – 9.6 (based on net meters) 5.3 – 10.4 (based on gross meters)

Note: There is no range for the wholesale market value in 2013/14 as we based our analysis on net metered 1.5kW units only.

Data source: IPART and Frontier Economics.

For both net meters and gross meters, the upper end of the range for the estimated value of PV exports represents this value during the period of the day when the wholesale market value of PV exports is highest (3pm-5pm). The lower end of the range is the wholesale market value during other periods of the day.

There are several reasons why the estimated value of PV exports in 2014/15 is lower than in 2013/14, including changes in the method used to derive this range of values. However, the most significant reason is that this value reflects the forecast wholesale price of electricity in the coming year, and this price is lower than last year. This is because market prices factor in a high probability that the carbon price will be repealed in 2014/15. This means relative to 2013/14, there is

a much smaller carbon cost incorporated in wholesale prices in 2014/15. This is discussed further in section 3.2.2.

3.2 Data and approach used to derive this estimated value

In line with our terms of reference, we asked Frontier to estimate the value of PV exports in 2014/15 using the wholesale market value method. This method calculates the value of PV customer exports if they could be sold on the National Electricity Market (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.

3.2.1 Data used for estimating the wholesale market value

To estimate the wholesale market value, Frontier used historical data for half-hourly PV exports, half-hourly spot prices in the NEM and loss factors.

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.

Ausgrid previously provided data for around 1,000 and 10,000 PV customers over the 2009/10 and 2010/11 financial years respectively. It also provided a random sample of around 1,000 PV customers for the 2011/12 and 2012/13 financial years. These customers included business and residential PV customers with gross and net meters and a range of PV unit sizes (in kW).

In our issues paper, we asked stakeholders to comment on a few issues in relation to this data, including whether we should base the analysis on:

- ▼ a single 'base year' of historical data, or a broader range of historical data
- ▼ 1.5kw PV units only (as we did in 2013/14), or a range of PV units sizes, and
- ▼ half-hourly exports from gross and/or net metered customers.

The comments we received and our responses are summarised below.

Single base year or broader range of historical data

Both AGL and Origin Energy supported using more historical data because if only a single base year is taken into account then results are very sensitive to

which base year is chosen.¹⁶ We agree with this view and have revised our approach to take account of more historical data. This is discussed in section 3.2.2.

1.5kw PV units or a range of PV units sizes

AGL supported continuing to use 1.5kW units, but queried whether this is still the most common unit size as anecdotally larger units are being installed.¹⁷ However, both EnergyAustralia and Origin Energy put the view that using a range of PV unit sizes to be more representative of the market.¹⁸ We made a draft decision to use a random sample of PV unit sizes in our analysis rather than 1.5kW units only. In our view this approach is preferred because it is more representative of the range of different unit sizes that PV customers have installed. More information on the range of PV unit sizes included in our analysis is provided in Frontier's report.¹⁹

Exports from gross and/or net metered customers

AGL supported the continuation of using the net profile to estimate the wholesale market value because previously Frontier found little difference between values based on gross and net profiles.²⁰ Origin Energy also submitted that the net metered profile is more appropriate because it better reflects the physical flow of electricity. Even though gross metered customers 'export' all electricity their PV unit generates, typically much of this flows straight back into the customer's consumption meter and is not physically exported to the grid. The Solar Energy Industries Association Inc submitted that it makes sense to use net meters now that this is what most customers are installing.²¹

In contrast, EnergyAustralia put the view that both gross and net profiles be used with the results applying to the PV customers they relate to.²² For example, it submitted that gross profiles should be used for the retailer contribution because most customers in the Solar Bonus Scheme have gross meters. Similarly, net profiles should be used for the benchmark range as most customers outside the Solar Bonus Scheme have net meters. (See Appendix B for more information on PV customers' metering arrangements.)

We agree with EnergyAustralia that it is appropriate to estimate the wholesale market value using both gross and net metered profiles. While the physical flow of electricity may not be very different between gross and net metered customers, the metering and settlement arrangements are different. Therefore, by using

¹⁶ Origin Energy submission, January 2014, p 2; AGL submission, January 2014, p 1.

¹⁷ AGL submission, January 2014, p 1.

¹⁸ EnergyAustralia submission, January 2014, p 3; Origin Energy submission, January 2014, p 2.

¹⁹ Frontier Economics, *Market value of solar PV exports – A draft report prepared for IPART*, April 2014, pp 3-4.

²⁰ AGL submission, January 2014, p 1.

²¹ Solar Energy Industries Association Inc submission, January 2014, p 2.

²² EnergyAustralia submission, January 2014, p 3.

both gross and net profiles, our decisions on the benchmark range and retailer contribution can more closely capture the metering and settlements arrangements (and therefore financial implications) for the underlying customers they relate to.

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. Frontier used this public information to obtain historical spot prices for each half-hour.

Loss factors

The wholesale market value of PV exports includes 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. We used transmission and distribution loss factors applicable to the Ausgrid network area (6.47%) from our 2013 electricity determination.²³

²³ IPART, *Review of regulated retail prices and charges for electricity – From 1 July 2013 to 30 June 2016 – Final Report*, June 2013, p 87.

3.2.2 Approach used to estimate the wholesale market value

The approach Frontier used for estimating the wholesale market value is outlined in detail in its report.²⁴ In summary, this approach draws on historical PV export and spot price data to simulate a large number of possible outcomes for the wholesale market value in 2014/15.²⁵ This approach means that there is reduced reliance on the outcome from a single historical year (as has been the case in our previous solar determinations). We consider that by taking account of more historical data the wholesale market value methodology is more robust this year.

We also asked Frontier Economics to examine how wholesale market values might change depending on the time of day. To do this Frontier looked at wholesale market values over 2-hour blocks of the day. It then estimated the wholesale market value for the 2-hour 'period of highest value', and for all 'other periods'. The purpose of this analysis was to gain a better understanding of the potential value of PV exports and how this varies according to the time of day of export.

3.3 Frontier's estimate of the wholesale market value in 2014/15 in more detail

Frontier's estimates of the wholesale market value are summarised in Table 3.2 below. They include estimates of the average market value across all times, as well during the period of highest value (3-5pm) and other periods.

Table 3.2 Estimated wholesale market values (\$2014/15, c/kWh)

	2013/14	2014/15	
		Gross profiles	Net profiles
All times	8.5	6.2	5.8
Period of highest value (3-5pm)		10.4	9.6
Other periods (excluding 3-5pm)		5.3	5.0

Note: The wholesale market value in 2013/14 was based on net metered 1.5kW PV units only. The estimates for 2014/15 are based on median values.

Source: Frontier Economics.

²⁴ Frontier Economics, *Market value of solar PV exports – A draft report prepared for IPART*, April 2014.

²⁵ In particular, the outcomes are expressed in terms of a 'solar premium', which is the ratio of the PV export weighted price to the time weighted price. The wholesale market value (\$/MWh) is estimated by multiplying the solar premium by the forecast time weighted average spot price in 2014/15 and multiplied again by (1 + the loss factor).

Frontier found that the ‘all-times’ wholesale market values in 2014/15 are lower than estimated for 2013/14. This is mainly due to a relatively weaker wholesale price forecast in 2014/15, which is related to the market’s expectations of the carbon price repeal.²⁶ Currently, market prices incorporate a high probability that the carbon pricing mechanism will be repealed in 2014/15.

Frontier also found that the period in which the value of PV exports was highest was between 3-5pm. Note that this is not the time when most PV exports occur, but it is the time when PV exports are most valuable. During this ‘period of highest value’, forecast wholesale market values for 2014/15 are almost twice as high as in ‘other periods’.

Please note that this information is provided to assist both retailers and customers. It can assist retailers in designing innovative feed-in tariffs and can assist customers in understanding the potential value of their PV exports. While our analysis focuses on 2-hour blocks for the value of PV exports, we are not suggesting that the design of solar feed-in tariffs should necessarily reflect this approach: retailers are best-placed to design feed-in tariffs that meet the needs of their customers.

The wholesale market values under gross and net profiles are fairly similar. These profiles produce slightly different results because they have different ‘shapes’. A gross profile will reflect all generation from the PV unit (ie, all generation is ‘exported’). Under a net profile there are exports only when, at any point in time, generation exceeds the customers’ consumption). The wholesale market value is slightly higher under the gross metered profile. As Frontier noted in its report, gross profiles tend to export more in the afternoon when spot prices are higher.²⁷

3.4 Draft decision on the benchmark range and retailer contribution

Based on the estimated value of PV customer exports discussed above, we have made draft decisions on the benchmark range and retailer contribution, shown in Table 3.3.

Table 3.3 Draft decisions on the benchmark range and retailer contribution in 2014/15 (\$2014/15, c/kWh)

	2013/14	2014/15
Benchmark range for unsubsidised feed-in tariffs	6.8 – 11.5	5.0 – 9.6
Retailer contribution to costs of Solar Bonus Scheme	6.8	5.3

²⁶ Frontier estimated a time weighted average spot price of \$38.33 (\$2014/15) in 2014/15 which is lower than last year’s forecast for 2013/14 of \$54.89 (\$2013/14).

²⁷ Frontier Economics, *Market value of solar PV exports – A draft report prepared for IPART*, April 2014, p 13.

3.4.1 Benchmark range

Our draft decision on the benchmark range for 2014/15 includes the upper and lower bounds of the range for the wholesale market value method based on **net** metered customers. This is because the benchmark range is most relevant to customers with net meters.

This decision also incorporates the wholesale market value of PV exports during their highest value period (upper bound of the range) and outside this period (lower bound of the range). We consider that by setting the benchmark range this way we are having more regard to the value of PV exports at the time of day of export, as required by our revised terms of reference. However, we have set a single range so that it is simple for customers to understand. Note that a single (all-time) solar feed-in tariff would be most closely represented by the median value in the benchmark range (5.8c/kWh – see Table 3.2).

Note that our approach for setting the benchmark range has changed. Last year we set the benchmark range using 2 methods (the wholesale market value and the direct financial gains to retailers) and we did not estimate the wholesale market value of PV exports at different times of day.

3.4.2 Retailer contribution

Our draft decision on the retailer contribution is in line with the lower bound of the range for the wholesale market value based on **gross** metered customers. This is because the retailer contribution relates to customers under the Solar Bonus Scheme who mostly have gross meters. This approach is a change from 2013/14 where we set the retailer contribution using the lower bound of the direct financial gains to retailers method. We have been conservative using the low end of the range because this does not financially disadvantage Solar Bonus Scheme customers (ie, they still receive either 20c or 60c/kWh) and ensures that a competitive market remains for these customers.

Note that for both the benchmark range and the retailer contribution, we do not propose to determine values with and without carbon costs, as some stakeholders have submitted.²⁸ If the carbon price is repealed in 2014/15, it would have some impact on the lower end of our range. The impact would be modest (around 0.3c/kWh) because our wholesale market values already largely exclude any carbon cost. In our view as this is a voluntary benchmark range and the impact is small there is no need to recommend with and without carbon ranges. We invite stakeholders to comment on our proposed approach not to publish the retailer contribution and benchmark range with and without carbon.

²⁸ See submissions from EnergyAustralia, January 2014, p 3; Origin Energy, January 2014, p 2.



Appendices

A Terms of reference

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

Conduct of investigation

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; and
- the determination should be broadly in conformance with the *Revised National Principles for Feed-in Tariff Arrangements*.

In making the determination on the retailer contribution and benchmark range, IPART should take into account the wholesale market value of the photovoltaic exports at the time of day of export. The value estimated should reflect the subsidy-free value of photovoltaic exports to a retailer.

Reporting

IPART is to report the feed-in tariff offered by each retailer at the time of writing its report and to note whether that tariff was within the benchmark for the preceding financial year.

Consultation

In making its determination on both the retailer contribution and the benchmark range, IPART may consult on any matter that it regards as material.

Timing

IPART is to complete the investigation and provide its determination in June 2014 or as soon as practicable afterwards.

Definitions

“Solar Bonus Scheme” means the Scheme established under s.15A of the *Electricity Supply Act 1995*.

B More information on PV customers

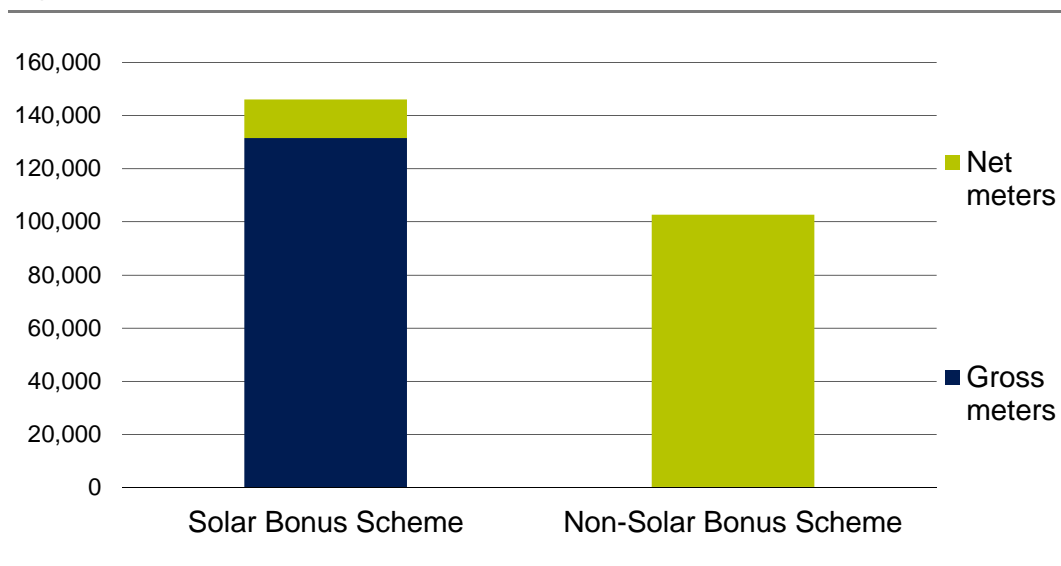
In this appendix we provide some additional information about PV customers.

B.1 Number of PV customers and their metering arrangements

Under the NSW Solar Bonus Scheme, more than 145,000 PV customers currently receive a subsidised feed-in tariff of either 20 or 60 cents per kilowatt hour (c/kWh) for electricity exported to the grid. Another 100,000 PV customers, who are not part of this scheme, can receive unsubsidised feed-in tariffs in the competitive retail electricity market.

Figure B.1 shows that most Solar Bonus Scheme customers have gross meters, while PV customers not part of this scheme have net meters.

Figure B.1 Number of PV customers (as at March 2014)



Data source: NSW Trade and Investment.

Under gross metering arrangements, all the electricity generated by the customer is measured independently from all the electricity consumed in the customer's premises. The customer earns the applicable feed-in tariff for all the electricity they generate, and pays the applicable retail price for all the electricity they consume.

Under net metering arrangements, the electricity generated by the customer that is exported to the grid and the electricity consumed by the customer that is imported from the grid are independently measured. The electricity generated and consumed in the customer's premises at the time of generation is not metered, and the customer pays nothing for this electricity. Whenever generation exceeds the customer's demand at a point in time, the excess amount is exported to the grid, and the customer may earn an unsubsidised feed-in tariff

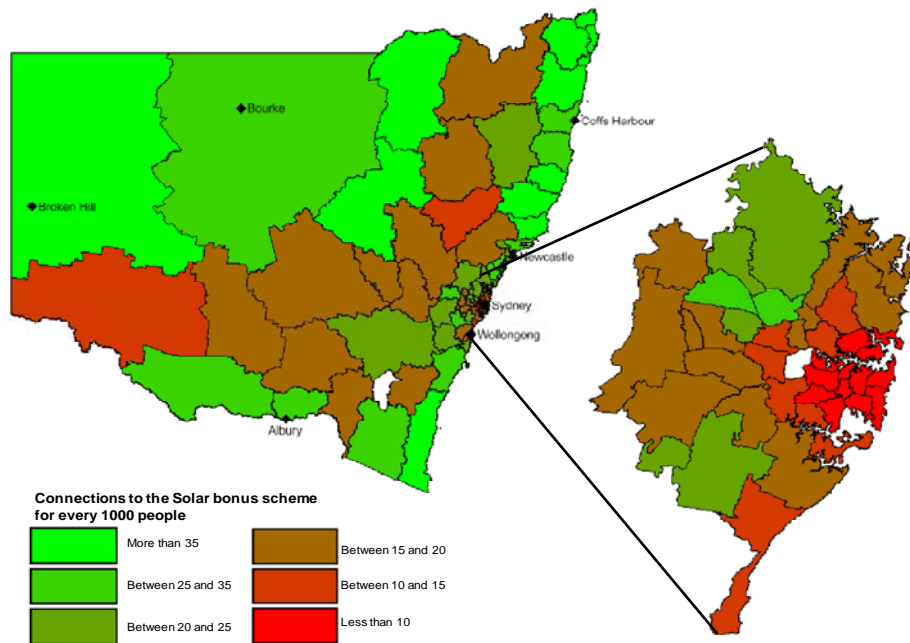
for this exported electricity (if their retailer voluntarily offers them one). Whenever the electricity being generated is insufficient to meet this demand, the extra electricity required is imported from the grid, and the customer pays the applicable retail price for this imported electricity.

Solar Bonus Scheme customers tended to install gross meters because their subsidised feed-in tariff is either higher than or similar to the retail price they pay for electricity. This means they are financially better off with a gross meter. In contrast, the vast majority of PV customers who are not eligible for the scheme have net metering arrangements. These customers are financially better off under these arrangements. This is because the unsubsidised feed-in tariff they can potentially earn is much lower than the retail price they pay for electricity.

B.2 Where are Solar Bonus Scheme customers located?

Using data provided by NSW Trade and Investment, we can create a visual representation of where Solar Bonus Scheme customers are located (based on their postcode). Figure B.2 shows the proportion of connections to the Solar Bonus Scheme per 1,000 head of population.

Figure B.2 Location of Solar Bonus Scheme customers



Data source: NSW Trade and Investment.

In Figure B.2, green areas have a higher concentration of scheme connections. Generally, the highest concentrations are either along the coast or well-inland. Not surprisingly, the concentration of Solar Bonus Scheme connections is not as high in inner city areas as a large proportion of the population live in apartments (and therefore cannot have solar PV units).

Figure B.2 should be considered as indicative only. To create this figure we converted data from postcodes to the ABS statistical SA3 regions. Where postcodes cross regions, we have assigned the number of solar connections by weight of population, which may not correspond exactly to the locations of the connections. As a result, there may be cases where solar connections are attributed to the incorrect region.

B.3 Average PV units sizes

The average PV unit size for customers in the Solar Bonus Scheme is around 2.3kW (based on generator capacity).

However, as at March 2014, the average PV unit size for customers outside the Solar Bonus Scheme is around 3.1kW. This suggests that since the Solar Bonus Scheme closed, customers have been installing larger systems. The analysis in this report uses a range of different PV unit sizes. More information about this range is provided in Frontier's report.²⁹

²⁹ Frontier Economics, *Market value of solar PV exports – A draft report prepared for IPART*, April 2014.

C Revised National Principles for Feed-in Tariff Arrangements

**Council of Australian Governments Meeting
Canberra, 7 December 2012
National Principles for Feed-in Tariff Arrangements**

Micro generation to receive fair and reasonable value for exported energy

1. Governments agree that residential and small business consumers with grid connected micro generation³⁰ should have the right to export energy to the electricity grid and market participants should provide payment for exported electricity which reflects the value of that energy in the relevant electricity market and the relevant electricity network it feeds in to, taking into account the time of day during which energy is exported.

Any premium rate to be jurisdictionally determined, transitional and considered for public funding

2. That any jurisdictional or cooperative decisions to legislate rights for micro generation consumers to receive more than the value of their energy must:
 - a) be a transitional measure (noting that a national emissions trading system will provide increasing support for low emissions technologies), with clearly defined time limits and review thresholds and be closed to new participants by 2014;
 - b) for any new measures, or during any reviews of existing measures, undertake analysis to establish the benefits and costs of any subsidy against the objectives of that subsidy (taking into account other complementary measures in place to support micro generation consumers);
 - c) give explicit consideration to compensation from public funds or specific levies rather than cross-subsidised by energy distributors or retailers; and
 - d) not impose a disproportionate burden on other energy consumers without micro generation.

SCER to ensure fair treatment of micro generation

3. That the Standing Council on Energy and Resources (SCER) should maintain regulatory arrangements for micro generation customers, consistent with the objectives of the relevant electricity legislation, whereby the:

³⁰ These national principles apply to grid connected micro generation compliant with the relevant Australian Standard (AS4777).

- a) terms and conditions for compliant micro generation customers should be incorporated into the regulation of the minimum terms and conditions for retail contracts such that they are no less favourable than the terms and conditions for customers without micro generation;
- b) connection arrangements for micro generation customers should be standardised and simplified to recognise the market power imbalance between micro generation customers and networks; and
- c) assignment of network tariffs to micro generation consumers should be on the basis that they are treated no less favourably than customers without micro generation but with a similar load on the network.

FiT policy to be consistent with previous COAG agreements (particularly the Australian Energy Market Agreement and COAG complementary principles)

- 4. That the arrangements for micro generation consumers by SCER and jurisdictions:
 - a) should not deter competition for their business from electricity retailers in jurisdictions where there is full retail contestability and innovation in the tariff offerings available to micro generation customers;
 - b) in relation to jurisdictions in the National Electricity Market (NEM), should not interfere with the regulation of distribution tariffs or operation of the NEM under the National Electricity Law or duplicate the regulatory arrangements that are part of that Law;
 - c) should be subject to independent regulatory oversight according to clear principles; and
 - d) should be consistent with implementation of other intergovernmental agreements relating to energy, competition policy or climate change.

