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 2015

Energy — Issues Paper
June 2015

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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 13 July 2015.

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:

2015 Solar feed-in tariff review
Independent Pricing and Regulatory Tribunal
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Late submissions may not be accepted at the discretion of the Tribunal. Our normal practice is to make submissions publicly available on our website <www.ipart.nsw.gov.au> as soon as possible after the closing date for submissions. If you wish to view copies of submissions but do not have access to the website, you can make alternative arrangements by telephoning one of the staff members listed on the previous page.

We may choose not to publish a submission—for example, if it contains confidential or commercially sensitive information. If your submission contains information that you do not wish to be publicly disclosed, please indicate this clearly at the time of making the submission. IPART will then make every effort to protect that information, but it could be disclosed under the *Government Information (Public Access) Act 2009* (NSW) or the *Independent Pricing and Regulatory Tribunal Act 1992* (NSW), or where otherwise required by law.

If you would like further information on making a submission, IPART's submission policy is available on our website.

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1 Introduction

As in the past four years, the NSW Government has asked the Independent Pricing and Regulatory Tribunal of NSW (IPART) to review the subsidy-free value to retailers of the electricity householders and small businesses with solar photovoltaic units (PV customers) export to the grid. Based on this review, we are to:

- Determine the **retailer contribution** NSW electricity retailers must make towards the cost of the subsidised feed-in tariffs the Government pays PV customers who are part of the NSW Solar Bonus Scheme (SBS).
- Recommend a **benchmark range** for the unsubsidised feed-in tariffs electricity retailers voluntarily offer PV customers who are not part of the SBS. (See Box 1.1 for more information.)

As the SBS will end on 31 December 2016, this is likely to be our last determination on the retailer contribution.

This issues paper outlines the scope and context of our review, and the approach and methodology we propose to use to make our determination and recommendation.

Box 1.1 What has IPART been asked to do?

Solar feed-in tariff review

NSW households with solar PV units can earn feed-in tariffs for electricity they export to the grid. If they are in the Solar Bonus Scheme, they earn subsidised tariffs from the Government. If not, they may be able to earn unsubsidised tariffs from their energy retailer. The retailer contribution recovers some of the cost of the subsidised feed-in tariffs. The benchmark range provides a guide on a fair and reasonable value for the unsubsidised feed-in tariffs.

RETAILER CONTRIBUTION

Households who installed PV units when the SBS was open to new participants earn subsidised feed-in tariffs of 60 or 20 cents per kWh, depending on when they joined the scheme. This cost is recovered through:

- a levy on all electricity customers (included in electricity prices), and
- a retailer contribution that reflects the estimated value to retailers of the electricity generated under the scheme.

IPART sets the retailer contribution only. The subsidised tariffs are set in legislation, and will apply until the SBS ends on 31 December 2016.

BENCHMARK RANGE

Households who installed solar PV after the SBS was closed to new participants may be able to earn unsubsidised feed-in tariffs.

The majority of NSW retailers offer a voluntary feed-in tariff as part of their overall price offering for PV customers. Retailers set the level of this voluntary tariff within the competitive market. Consumers can compare retailers' price offerings, including feed-in tariffs, on **www.energymadeeasy.gov.au** to help them find the best deal for them.

IPART recommends a benchmark range for unsubsidised feed-in tariffs as a guide for retailers and consumers. This range reflects a fair and reasonable value for the electricity PV customers export to the grid.

1.1 How will we conduct this review?

In conducting this review, we will undertake public consultation and detailed analysis. This Issues Paper is the first step in our consultation. We invite all interested parties to make submissions in response to the issues raised in the paper, and other issues they think are relevant and within the terms of reference and scope of the review (as discussed in section 3 below). Depending on the nature of issues raised in submissions we may hold a public forum around September 2015.

Table 1.1 provides an indicative timetable for the review.

Table 1.1 Indicative review timetable

Key tasks	Timing
Release Issues Paper	15 June 2015
Submission on Issues Paper due	13 July 2015
Release Draft Report	Mid-August 2015
Submission on Draft Report due	Mid-September 2015
Release Final Report	**October 2015**

1.2 What does the rest of this paper cover?

The rest of this paper provides more detail on the review and the issues on which we seek comment:

- Chapter 2 outlines the context for this review, including the number of PV customers in NSW, the unsubsidised feed-in tariffs currently available in the competitive retail electricity market and the changes occurring in the small-scale solar energy market.
- Chapter 3 explains the terms of reference and the scope of this review.
- Chapter 4 discusses the approach and methodology we propose to use to make our decisions for the review.
- Chapter 5 outlines how we propose to approach future solar feed-in tariff reviews.

The appendices provide a copy of our terms of reference, an overview of gross and net metering arrangements, and a detailed description of our proposed modelling approach for estimating the wholesale market value of PV exports.

1.3 List of issues on which we seek comment

The issues on which we particularly seek stakeholder comment are highlighted in Chapters 4 and 5 below. For convenience, these issues are also listed below.

1 Do you agree with our proposed methodology for estimating the wholesale market value of solar PV exports, having regard to our terms of reference? If not, how could this methodology be improved? 12

2 Do you agree with our proposal to estimate a weighted average loss factor across the three network areas in NSW (Ausgrid, Endeavour Energy and Essential Energy)? If not, why? 12

3 Do you agree with our proposed approach to set the retailer contribution having regard to the wholesale market value for gross metered customers and the benchmark range having regard to the wholesale market value for net metered customers? If not, why? 13

4 The terms of reference require that the retailer contribution be set so that the total contribution reflects the estimated total value to retailers of the energy generated under the scheme. Should we have regard to either the 25th percentile, median or mean of the wholesale market value of PV exports at all times, or an alternative measure? Why is your preferred approach the best option? 13

5 Do you agree with our proposed approach to continue to set the benchmark range based on the wholesale market value of PV exports during a 2-hour period when the solar premium is highest and during all other periods excluding the 2-hour period? 13

6 Do you agree with our proposal to release an annual market update on the benchmark range with the first update published in May 2016? 14

2 Context for this review

Since we began conducting our annual reviews of solar feed-in tariffs, the number of households and small businesses in NSW with solar PV units connected to the grid has continued to grow. There have also been a range of developments in the solar electricity market that are changing the significance of solar feed-in tariffs for PV customers.

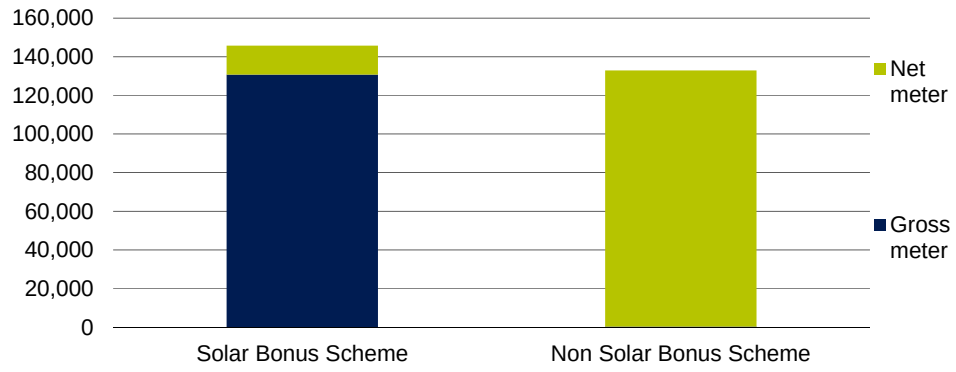
2.1 PV customers in NSW

More than 145,000 PV customers receive a subsidised feed-in tariff under the SBS. Another 130,000 PV customers, who are not part of the SBS, may receive unsubsidised feed-in tariffs in the competitive retail electricity market.

Most PV customers in the SBS have gross metering arrangements. This means they export (and receive the subsidised feed-in tariff for) all the electricity they produce, and import (and pay the retail price for) all the electricity they consume.

However, most PV customers outside the SBS have net metering. They use the electricity they produce to meet their own energy needs at the time of production. If they produce more than they need at any time, they export (and may receive an unsubsidised feed-in tariff for) the excess. If they need more than they produce at any time, they import (and pay the retail price for) this amount. (Appendix B provides more information on gross and net metering arrangements.)

Figure 2.1 Number of PV customers (as at 31 December 2014)



Note: A small number of non-Solar Bonus Scheme customers have a gross meter.

Data source: NSW Trade and Investment.

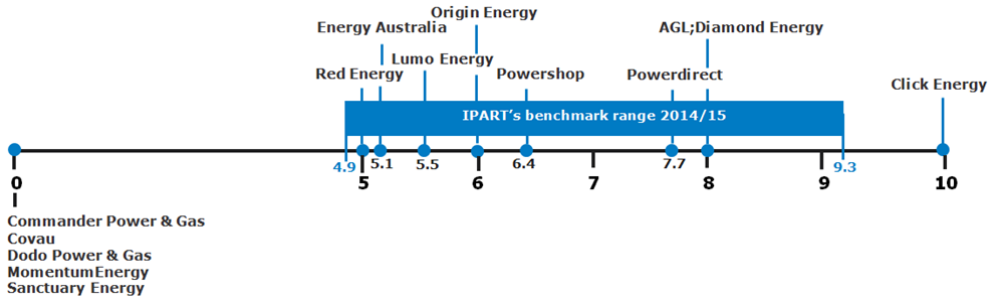
2.2 Voluntary feed-in tariffs compared to the benchmark range

In our 2014-15 review, we recommended a benchmark range for retailers' voluntary, unsubsidised solar feed-in tariffs of between 4.9 and 9.3 c/kWh. We have used the **energymadeeasy** website to compare the voluntary feed-in tariffs currently on offer in NSW to this range (see Figure 2.2). We found that:

- 14 retailers have market offers open to PV customers.
- Nine of those retailers offer a voluntary feed-in tariff as part of these market offers. In all cases, the voluntary feed-in tariff is:
  - within or above our recommended benchmark range for 2014-15

– the same in all three network distribution areas.[1]

Figure 2.2 Retailers' voluntary feed-in tariffs based on market offers available in June 2015 (c/kWh)



Note: Lumo Energy also offers a voluntary feed-in tariff of 5c/kWh.

Data source: www.energymadeeasy.gov.au accessed 9 June 2015.

However, the voluntary feed-in tariff is not the only factor PV customers should take into account when comparing market offers. As discussed above, these customers only receive the feed-in tariff when they export electricity that is excess to their needs at the time of production. If they need more than they produce at any time (eg, at night) they import and pay the retail price for this energy. Since most of these customers import more electricity than they export, the retail price is likely to be a more important factor than the feed-in tariff.[2] For example, our analysis for last year's review found that the market offer with the highest feed-in tariff would not necessarily provide the best overall deal for PV customers.[3]

2.3 Changes in the solar energy market

Several changes occurring in the solar energy market may have an impact on solar feed-in tariffs in the future. These include the end of the SBS, and innovations in solar energy products.

1 Postcodes sampled in the Ausgrid, Endeavour and Essential areas are 2066, 2147 and 2340 respectively. Click Energy and Powershop provide a voluntary feed-in tariff to SBS customers of 4.9c/kWh and 1.3c/kWh, respectively.

2 Other important factors are the terms and conditions associated with the offer, such as any contract period, early termination fees etc.

3 See IPART, *Solar feed-in tariffs - The subsidy-free value of electricity from small-scale solar PV units from 1 July 2014 - Final Report*, June 2014, pp 36-38.

2.3.1 End of the Solar Bonus Scheme

As Chapter 1 noted, the SBS will end on 31 December 2016. This means from 1 January 2017:

- SBS customers will no longer receive subsidised feed-in tariffs for the electricity they export to the grid
- retailers will no longer be required to make the retailer contribution towards the costs of the SBS, and
- the levy on electricity prices which funds the residual costs of the scheme will be removed.

Once the SBS is closed, PV customers who were in the scheme may be able to receive a voluntary feed-in tariff as part of a retailer's competitive market offer. However, most will be better off changing from a gross meter to a net meter (see section 2.1 above).

More information on the closure of the SBS can be found on the NSW Trade & Investment, Resources and Energy website.[4]

2.3.2 Innovations in solar energy products

We are starting to see innovations in solar energy products that, over time, will influence how and when PV customers use the electricity they produce, and how important solar feed-in tariffs are in their decision-making about retailers' price offers.

Retailers are increasingly offering more diverse solar products to their customers, including zero upfront cost PV systems, zero interest payment options and battery storage. These new products will make solar PV accessible to a broader range of customers, and make it possible for PV customers to use more of the electricity they generate to meet their own needs. The structure of some of these products may mean that traditional feed-in tariffs become less relevant over time. For example:

- AGL's Solar Smart Plan involves a zero upfront cost solar system that AGL agrees to maintain over its lifetime. AGL guarantees that the system will supply a minimum amount of solar energy to the customer, and the customer pays a predetermined monthly amount for this energy. Any extra energy generated during the day is provided to the customer for free.[5]

4 http://www.resourcesandenergy.nsw.gov.au/energy-consumers/solar/solar-bonus-scheme/solar-bonus-scheme, accessed 26 May 2015.

5 http://aglsolar.com.au/payment-options/, accessed 26 May 2015.

- Several retailers have launched or are trialing battery storage products that enable PV customers to store the 'excess' electricity they produce during the day rather than export it to the grid. These products will enable customers to use all their production to meet their own needs, further reducing the amount they need to import from the grid. For instance, AGL launched its first battery product, 'Power Advantage' in May 2015. This product can store 6kWh of solar energy and is suitable for households with PV units of 3-4.5kW. Origin Energy has announced it will launch a battery product later this year.[6,7]
- Tesla and Reposit Power are developing technology that would allow PV customers to participate in the wholesale market. It involves integrating software into battery systems to allow consumers to buy electricity from the grid when wholesale prices are low and store it to use when these prices are high, and store their own solar power to use at another time or sell to the market when prices are high.[8]
- New competitors known as 'alternative energy sellers' are emerging. These businesses typically offer an arrangement where they install solar panels at a customer's home or business, and sell the energy produced by these panels to the customer. The Australian Energy Regulator may grant these businesses an exemption from the requirement to hold an electricity retailer authorisation under the National Energy Retailer Law.[9]

3 Terms of reference and scope of this review

The terms of reference and scope for this review are similar to those of our 2014 review. However, there are some differences.

3.1 Terms of reference

The terms of reference provided by the Minister for Industry, Resources and Energy ask us to make a determination on the retailer contribution towards the costs of the SBS, and to recommend a benchmark range for retailers' voluntary unsubsidised solar feed-in tariffs. In doing so, we are required to consider the following:

- 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

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6 http://www.agl.com.au/about-agl/media-centre/article-list/2015/may/agl-is-first-major-retailer-to-launch-battery-storage accessed 15 May 2015.

7 Sydney Morning Herald, *Energy retailers climb on board with Panasonic for battery trials,* 2 June 2015 available at http://www.smh.com.au/business/energy-retailers-climb-on-board-with-panasonic-for-battery-trials-20150602-ghellb.html accessed 11 June 2015.

8 http://arena.gov.au/news/tesla-and-reposit-power-team-up-with-arena-supported-storage-solution/, accessed 26 May 2015.

9 See AER, *Statement of Approach: Regulation of alternative energy sellers under the National Energy Retail Law*, June 2014, p 9.

- the determination on the retailer contribution should broadly conform with the Council of Australian Government's *Revised National Principles for Feed-in Tariff Arrangements*.

In addition, in making the determination the terms of reference state that we should set the retailer contribution so the total amount "reflects the estimated **total value** to retailers of the energy generated under the scheme". This requirement was not included in last year's terms of reference.

In last year's review, we set the retailer contribution with regard to the estimated value of PV exports at different times of day. We estimated the value of PV exports during the 2-hour block when the value tends to be highest, as well as the value at all other times. We based our determination of 5.1c/kWh on the value at all other times. The terms of reference this year require us to set the retailer contribution so that the total amount to be contributed by retailers reflects the estimated total value to retailers of the energy generated under the scheme. This means we should set the retailer contribution with regard to the value of PV exports **at all** times. This issue is discussed further in section 4.2.

As we received our terms of reference to undertake this review in June 2015, we will not be able to make our determination by 1 July 2015. As our current determination for the retailer contribution expires on 30 June, the Minister has asked us to make an 'interim determination' on the retailer contribution that will apply from 1 July until we make our final determination.[10] This final determination will then apply from the date it takes effect until 31 December 2016 or until replaced.

We consulted with key stakeholders (retailers, distribution network businesses, the Public Interest Advocacy Centre and the Clean Energy Council) on a proposal to make an interim determination for the retailer contribution that is unchanged from the current determination (5.1c/kWh). Retailers and network businesses were in broad agreement with this approach. Our interim determination is that the retailer contribution will remain unchanged at 5.1c/kWh. The interim determination and report is available on our website.[11]

3.2 Issues outside the scope of our review

During our previous solar reviews, stakeholders have often raised matters that are outside the scope of our review. These include suggestions that feed-in tariffs for PV customers outside the SBS should be:

- equal to the retail price of electricity (ie, a '1-for-1' credit), and
- mandatory rather than voluntary.

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10 An interim determination on the benchmark range is not required as it is not binding on retailers.

11 http://www.ipart.nsw.gov.au/Home/Industries/Electricity/Reviews/Retail_Pricing/Solar_feed-in_tariffs_2015-16

We have carefully considered these issues in our previous reviews. See Appendix C for more detail.

4 Our proposed approach and methodology

As in previous reviews, we propose to:

1. estimate the subsidy-free value of PV exports using the wholesale market value method, and
2. use this estimate to set both the retailer contribution and the benchmark range.

4.1 Estimating the subsidy-free value of PV exports

The wholesale market value method estimates the value of PV exports if they could be sold on the National Electricity Market (NEM) at the time they were exported. It recognises that the value of PV exports depends on when the PV electricity is exported to the grid, and what NEM spot prices are at these times.

Under this method, the value of PV exports (c/kWh) is calculated as follows:

Forecast average spot price × *solar premium* × *(1+loss factor)* + *Avoided NEM fees and charges*

- **Forecasting the average spot price.** The starting point for estimating the value of PV exports is to calculate forecast average spot price for NSW in 2015-16. This price is then adjusted by a solar premium, loss factor and NEM fees and charges.
- **Applying a solar premium.** PV exports tend to occur in the middle of the day when spot prices are higher than the average spot price across the entire day. Therefore, they earn a 'premium' to the time-weighted average spot price. This premium is calculated as the ratio of solar PV output-weighted electricity price to the time-weighted electricity price.
- **Applying a loss factor.** PV exports tend to be consumed close to where the electricity is produced, so the energy losses that usually arise as electricity flows through the transmission and distribution network are avoided. To account for the value of these avoided losses, we 'gross up' solar PV generation to the NSW node using an estimated loss factor. This ensures the benefit of being located close to where PV exports occur is included in the value we estimate.
- **Adding the value of avoided fees and ancillary charges.** Retailers pay NEM fees and ancillary charges on electricity they purchase on the NEM. Because they avoid paying these fees and charges on PV exports, we add the estimated value of these fees to the wholesale market value of the exports.

Table 4.1 summarises the main inputs for the wholesale market value method and the information/sources of data we propose to use to calculate each input.

Table 4.1 Overview of approach and data for estimating key inputs to wholesale market value method

Input	Proposed approach/ data source
Forecast average spot price in 2015-16	Inferred from ASX Base Load electricity contracts for 2015-16 and adjusted for a contract premium.
Solar premium	Based on a Monte Carlo simulation process using historical market price data and historical PV export data from gross and net meters.
Loss factors	Published distribution and transmission loss factors from the Australian Energy Market Operator (AEMO). Last year we used loss factors from Ausgrid's network area (the same network area as the PV data). This year we propose to estimate a weighted average loss factor across all three distribution network areas in NSW.
NEM fees and ancillary charges	AEMO corporate reports.

To calculate the solar premium, we propose to use a consistent modelling approach with the approach used in last year's review, developed by Frontier Economics.[12] This model uses data on PV exports from both gross metered and net metered customers, so we can estimate the wholesale value of PV exports from both meter types.

This year we propose to estimate a weighted average loss factor (including transmission and distribution losses) across all three distribution network areas in NSW. We consider that this would be a better estimate of avoided losses for PV customers in NSW, compared to using a loss factor for Ausgrid only. All else being equal this would likely increase the wholesale market value of PV exports, as relative to the Ausgrid network area, losses are higher in the Essential Energy network area and similar in the Endeavour network area.[13]

We also propose to estimate the wholesale market value of PV exports during different periods of the day. Consistent with our approach last year (see Table 4.2), we will estimate the wholesale market value of PV exports for three time periods

- all times
- the 2-hour block when the solar premium is the highest, and
- all other times excluding the 2-hour block when the solar premium is the highest.

12 For example see, Frontier Economics, *Market value of solar PV exports – A final report prepared for IPART*, June 2014.

13 See IPART, *Review of regulated retail prices and charges for electricity from 1 July 2013 to 30 June 2016 - Final Report*, June 2013, p 87.

Table 4.2 Wholesale market value of PV exports from the 2014 review ($2014-15, c/kWh)

	2014/15 Gross meters	Net meters
All times	6.0	5.6
Period of highest value (3-5pm)	10.0	9.3
Other periods (excluding 3-5pm)	5.1	4.9

Note: The estimates for 2014-15 are based on median values.

Source: Frontier Economics, *Market value of solar PV exports – A final report prepared for IPART*, June 2014, pp 17 and 21.

Appendix D provides more information about the wholesale market value methodology and the data we propose to use in applying this method.

IPART seeks comments on the following

1 Do you agree with our proposed methodology for estimating the wholesale market value of solar PV exports, having regard to our terms of reference? If not, how could this methodology be improved?

2 Do you agree with our proposal to estimate a weighted average loss factor across the three network areas in NSW (Ausgrid, Endeavour Energy and Essential Energy)? If not, why?

4.2 Setting the retailer contribution

Once we have estimated the subsidy-free value of PV exports using the wholesale market value method, we will use this estimate to set the retailer contribution. Last year, we set this contribution at 5.1 c/kWh based on the estimated value of exports by customers with **gross meters** during **all other times of day** excluding the 2-hour block when the solar premium was the highest (ie, 3 to 5pm).[14]

This year, we propose to again set the contribution based on the value of exports by customers with **gross meters**. The retailer contribution relates to customers in the SBS, and most of these customers have gross meters. Therefore, we consider this approach best reflects the financial benefit retailers receive from their customers' participation in the SBS.

However, a change in our terms of reference means that we will set the retailer contribution based on the value of PV exports at **all times of day,** rather than at all other times of day which excludes the 2-hour block period when the solar premium was the highest. There are several ways we could do this. For example, we could set the retailer contribution based on the 25th percentile, median or mean of the wholesale market value of PV exports at all times. We seek stakeholder comment on this issue.

14 IPART, *Solar feed-in tariffs - The subsidy-free value of electricity from small-scale solar PV units from 1 July 2014 - Final Report*, June 2014, pp 23-26.

As discussed in Section 3.1, our final determination on the retailer contribution will apply until 31 December 2016 (or until replaced). However, we are proposing that our analysis for the wholesale market value method be based on the 2015-16 financial year as this aligns with certain data inputs we use (for example loss factors and NEM fees). In effect, we are using 2015-16 as a proxy for the 18-month period, noting that the NSW Government can replace the terms of reference if required. We seek stakeholder comment on this issue.

4.3 Setting the benchmark range

We will also use our estimate of the subsidy-free value of PV to set the benchmark range. Like last year, we propose to have regard to the value of PV exports by customers with **net meters**. The benchmark range is relevant to PV customers who are not part of the SBS, as virtually all these customers have net meters.

Also like last year, we propose to have regard to the estimated value of these PV exports at different times of day. In particular, we propose to set the upper end of the range based on the estimated value of PV exports during a 2-hour period when the solar premium is the highest, and the lower end based on the value during all other periods excluding the 2-hour period. We will also identify the median wholesale market value of PV exports across all times of the day.

IPART seeks comments on the following

3 Do you agree with our proposed approach to set the retailer contribution having regard to the wholesale market value for gross metered customers and the benchmark range having regard to the wholesale market value for net metered customers? If not, why?

4 The terms of reference require that the retailer contribution be set so that the total contribution reflects the estimated total value to retailers of the energy generated under the scheme. Should we have regard to either the 25th percentile, median or mean of the wholesale market value of PV exports at all times, or an alternative measure? Why is your preferred approach the best option?

5 Do you agree with our proposed approach to continue to set the benchmark range based on the wholesale market value of PV exports during a 2-hour period when the solar premium is highest and during all other periods excluding the 2-hour period?

5 Proposed approach to future solar reviews

As section 2.3.1 discussed, the SBS is legislated to end on 31 December 2016. Our terms of reference indicate that our final determination on the retailer contribution for 2015-16 will apply until the end of the scheme, or until it is replaced (section 3.1). This means we will not make a determination on the retailer contribution next year unless the NSW Government provides us with new terms of reference.

If we are asked to continue to set the benchmark range next year, we propose to do so as part of an annual 'market update'. We would not consult with stakeholders on our approach for annual market updates. However, we would use the approach we establish to set the benchmark range following our consultations in this review. For each annual market update we would use the most recent PV export data and other market data.

We propose to release our first annual market update, providing our benchmark range for 2016-17 in May 2016.[15] We also propose to monitor solar PV offers as part of our annual market monitoring report of the retail electricity market.

IPART seeks comments on the following

6 Do you agree with our proposal to release an annual market update on the benchmark range with the first update published in May 2016?

[15] We already publish market updates for example on the weighted average cost of capital (WACC). The WACC market update is released bi-annually in February and August. See, http://www.ipart.nsw.gov.au/files/sharedassets/website/trimholdingbay/fact_sheet_-_wacc_biannual_update_-_february_2015.pdf accessed 10 June 2015.

Appendices

A Terms of reference

NSW GOVERNMENT

The Hon Anthony Roberts MP
Minister for Industry, Resources and Energy

V15/3001

Mr Peter J Boxall AO
Chairman
Independent Pricing and Regulatory Tribunal
PO BOX Q290
QVB POST OFFICE NSW 1230

Dear Mr Boxall

I write with regard to my recent reference to the Independent Pricing and Regulatory Tribunal (IPART) to set the retailer contribution for the NSW Solar Bonus Scheme (the Scheme) and set a fair and reasonable benchmark tariff for electricity exported from complying generators to the distribution network.

Thank you for advising that the current determination for the retailer contribution will lapse on 30 June 2015. So as to ensure continuity of a retailer contribution for the Scheme I am withdrawing the current reference in accordance with section 43EA (5) of the *Electricity Supply Act 1995* (the Act) and am referring new terms of reference pursuant to section 43ECA of the Act. The new Terms of Reference will allow IPART to make an interim determination to apply from 1 July 2015 until replaced by a subsequent determination.

You will also note that the subsequent determination remains in effect until 31 December 2016 or until replaced.

Pursuant to section 43ECA of the Act, I refer the attached Terms of Reference to IPART for determination.

In developing the proposed Terms of Reference I have given consideration to:

- IPART's previous consultation
- the degree to which the benchmarking method for NSW conforms with the Council of Australian Government's *Revised National Principles for Feed-in Tariff Arrangements*
- observations, including consumer feedback, on the state of retail offers in the market
- allowing consideration of additional factors or changes to methodology where this might enhance the rigour or completeness of establishing a fair and reasonable value and an appropriate retailer contribution to the costs of the Solar Bonus Scheme.

GPO Box 5341, Sydney NSW 2001
Phone: (02) 8574 5600 Fax: (02) 9339 5544 www.nsw.gov.au/ministercontactform/minister-roberts

The enclosed Terms of Reference differ from the reference for the 2014/15 period in that IPART is to set the retailer contribution so that the total amount to be contributed by retailers reflects the estimated total value to retailers of the energy generated under the Scheme. This is to address concerns that setting the contribution at the lower-range estimate of the wholesale market value does not fulfil the intent of the introduction of the retailer contribution. I have not prescribed a method that IPART must adopt.

I note that for 2014/15, IPART's calculation of the retailer contribution was based on the value of exports from gross metered customers. I expect that the vast majority of Scheme customers will remain on gross meters for most of the remainder of the Scheme. However, I will advise if I become aware that Scheme participants are switching to net meters in significant numbers.

IPART advised on a benchmark range for time-of-export based feed-in tariffs in its 2014/15 report. Although no retailers have offered time-based feed-in tariffs to date, such an exercise may assist innovation in retail offerings if significant numbers of smart meters begin to be deployed in the future.

In its 2014/15 review IPART identified both a benchmark range, to have regard to the value of PV exports at the time of day of export, and a single (all time) rate. There is merit in repeating both of these approaches and I would encourage IPART to give prominence to both the range and a single rate in its report and subsequent publications.

If you require further information please contact Ms Claudia Huertas, Director Operations and Programs on (02) 9995 0628.

Yours sincerely

03 JUN 2015

Anthony Roberts MP
Minister for Industry, Resources and Energy

Encl.

TERMS OF REFERENCE

Investigation and determination by IPART of a retailer benefit component and benchmark range for feed-in tariffs from 1 July 2015

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

I, Anthony Roberts, Minister for Industry, 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 report, the determination of:

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).

IPART is to issue an interim determination of the retailer contribution (Interim Determination) to apply from 1 July 2015 until replaced by a subsequent determination.

IPART is to issue a subsequent determination in respect of the retailer contribution and the voluntary benchmark range (Subsequent Determination) as soon as practicable after the Interim Determination takes effect. The Subsequent Determination is to apply from the date the determination takes effect under section 43EC(1) of the Act until 31 December 2016 or until replaced.

Conduct of investigation

In making the Subsequent Determination, IPART is to consider the following matters:

- 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
- The determination should be broadly in conformance with the Council of Australian Government's *Revised National Principles for Feed-in Tariff Arrangements.*

In making the Interim Determination, IPART may set the retailer contribution at the same rate that it determined for the 2014/15 period or may set a different rate.

In making the Subsequent Determination, IPART should set the retailer contribution so that the total amount to be contributed by retailers reflects the estimated total value to retailers of the energy generated under the Scheme.

Reporting

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

Consultation

In making the Interim Determination and the Subsequent Determination, IPART may undertake such consultation as it sees fit.

Definitions

"Solar Bonus Scheme" means the Scheme established under section15A of the Act.

B Metering arrangements

There are two types of metering arrangements for customers with PV units:

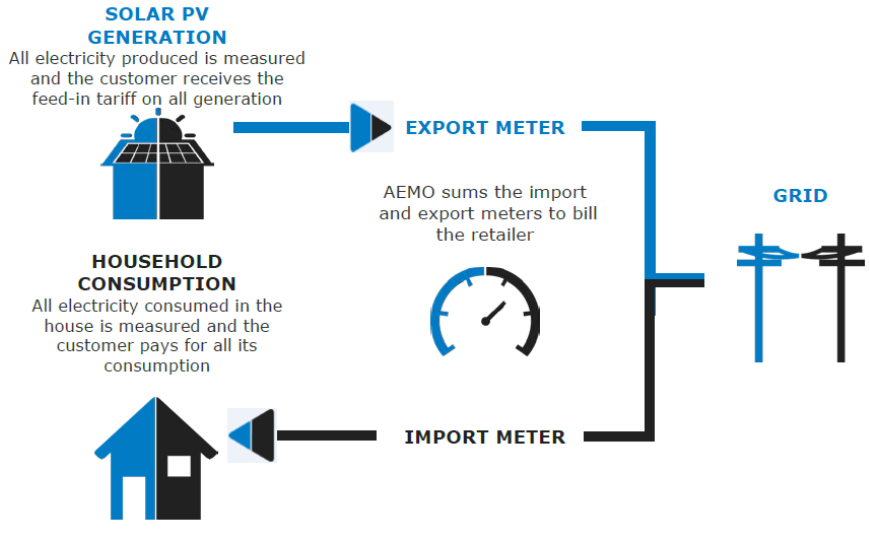
- **gross metering arrangements** – where **all electricity produced** by the PV unit is measured on an export meter and **all consumption** in the premises is measured on an import meter, and
- **net metering arrangements** – where the electricity generated by the PV unit is first consumed in the premise and any **excess electricity exported** to the grid is measured on an export meter and **net consumption** in the premises is measured on an import meter.

B.1 Gross metering arrangements

Figure B.1 illustrates gross metering arrangements. It shows that the electricity produced by the customer's PV unit flows from the panels through an export meter that registers all production. The electricity consumed by the customer flows from the grid and is registered on an import meter. Therefore, all generation and all consumption are measured separately.

When the Australian Energy Market Operator (AEMO) settles the market, it sums together the generation and consumption meters to bill the retailer. The retailer pays the customer the feed-in tariff for all PV generation, and bills them the retail price for all consumption.[16]

Figure B.1 Gross metering arrangements



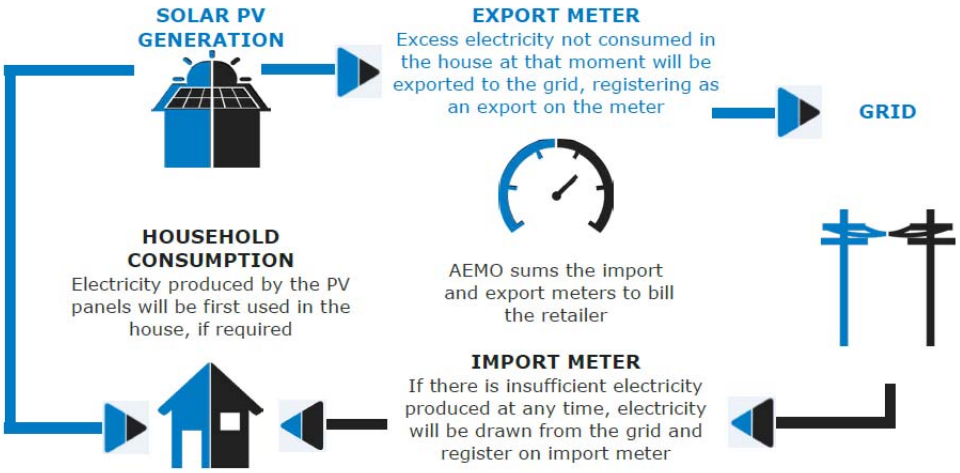
16 IPART, *Solar feed-in tariffs - Setting a fair and reasonable value for electricity generated by small-scale solar PV units in NSW - Final Report*, March 2012, pp 128-129.

B.2 Net metering arrangements

Figure B.2 illustrates net metering arrangements. It shows that the electricity produced by the customer's PV unit is first used in the house at the time it is generated if it is required. If more electricity is produced than required in the house at any time, this excess electricity will be measured on an export meter and flow to the grid. If less electricity is produced than required in the house at any time, electricity will be imported from the grid and measured on an import meter. For example, this would occur at night, when the PV panels are not generating electricity. The customer pays the retail price for this imported electricity.

When AEMO settles the market, it sums together the import and export meters to bill the retailer. The retailer pays the customer the feed-in tariff for the exported electricity, and bills them the retail price for the imported electricity.[17]

Figure B.2 Net metering arrangements



In the absence of subsidised feed-in tariffs, customers installing PV units will be better off with net metering arrangements because they will save the entire retail price for electricity they produce and consume themselves, but will only earn a proportion of that retail price for electricity they produce and export.

[17] 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 129-130.

C Matters outside the scope of this review

As Chapter 3 indicated, while popular with some stakeholders, we cannot consider setting feed-in tariffs for PV customers outside the SBS that are equal to the retail price of electricity (ie, a '1-for-1' credit), or making such tariffs mandatory rather than voluntary because both options are outside the scope of our review.

C.1 '1-for-1' credit for electricity exports

When solar electricity is exported to the grid, retailers can save on the amount of energy they need to purchase from the wholesale electricity market. However, they do not get this electricity for 'free'. Retailers still incur network, green scheme and retailing costs on this electricity, which they cannot avoid.

These costs represent a substantial portion of the total cost of providing retail electricity. Therefore, the value of PV customers' exports to retailers is considerably less than the retail price. If we were to require retailers to pay the retail price as a feed-in tariff, they would incur a loss, and this would mean retailers would avoid serving PV customers. This would not be in these customers' interests.

In addition, our terms of reference require that we estimate the subsidy-free value of PV exports. A '1-for-1' feed-in tariff would require a subsidy to be paid to PV customers.

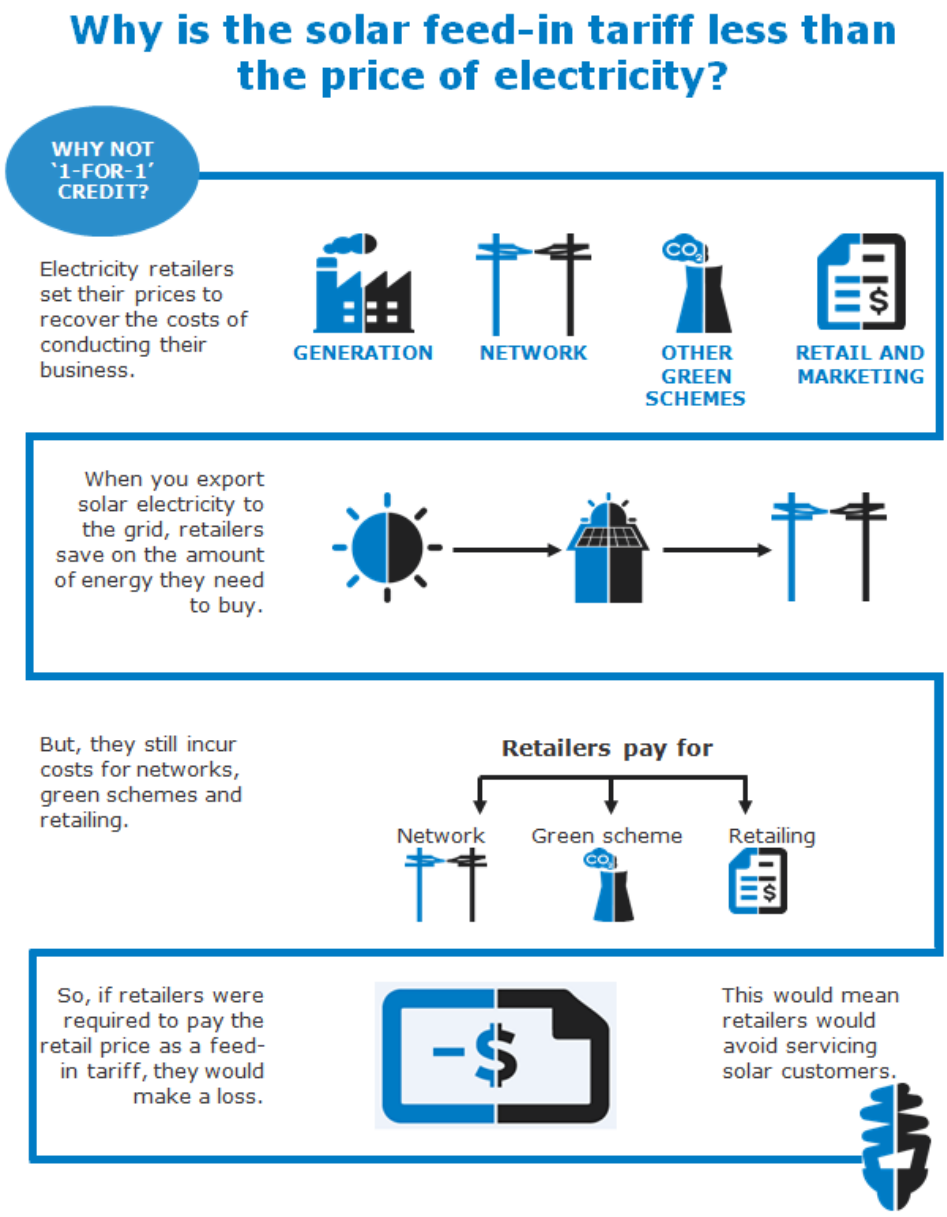
Box C.1 illustrates why the solar feed-in tariff should be less than the price of electricity.

C.2 Mandatory feed-in tariffs

Our terms of reference ask us to set a **voluntary** benchmark range which should operate in such a way as to support a competitive electricity market in NSW.

Our view is that retailers should have the flexibility to determine whether or not to offer a feed-in tariff and how much it should be. In a competitive retail electricity market, retailers compete to attract and retain customers. In a competitive market there is a range of different solar market offers to meet the needs of different customers. As outlined in Chapter 2, in NSW there are currently nine retailers offering a range of different feed-in tariffs within or above our current benchmark range. There are also solar products available at no upfront cost to customers. This diversity has occurred without mandating minimum feed-in tariffs.

Box C.1 Why don't we have a '1-for-1' feed-in tariff?



D More information on the wholesale market value method

The wholesale market value method estimates the value of PV exports if they could be sold on the National Electricity Market (NEM) at the time they were exported. Under this approach, the value of PV exports will depend on when the PV electricity is exported to the grid and what spot prices are at these times.

The value of PV exports (c/kWh) is calculated as follows:

Forecast average spot price × *solar premium* × *(1+loss factor)* + *Avoided NEM fees and charges*

The following sections describe how each of the inputs above will be estimated.

D.1 Forecasting average spot price for 2015-16

Consistent with our approach last year, we will calculate forecast average spot price for NSW in 2015-16 inferred from market contract prices. To do so, we propose to use daily prices of NSW Base Load electricity contracts for 2015-16 traded on the ASX. To infer average spot prices for 2015-16 from the ASX contract prices, we will:

- calculate a 40 trading day average of the ASX contract prices for 2015-16, and
- remove an assumed contracting premium of 5% from these contract prices to arrive at forecast average spot price for 2015-16.

D.2 Estimating the solar premium

We propose to estimate solar premiums using a modelling framework developed by Frontier Economics.[18]

The solar premium measures the relative value of solar PV output compared to a flat output profile.[19] It is calculated as the ratio of solar PV output-weighted electricity price to time-weighted electricity price.

The solar premium captures how much solar PV exports occur at high or low price times. If more solar export occurs during the time when spot electricity prices tend to be high, this will increase output-weighted electricity price relative to time-weighted electricity price, and the resulting solar premium will be greater than one. Instead, if an equal amount of solar PV is exported throughout the day, the solar PV output-weighted electricity price will be equal to the time-

18 For example see, Frontier Economics, *Market value of solar PV exports – A final report prepared for IPART*, June 2014, pp 7-10.

19 Flat output profile means an equal amount of solar PV is exported throughout the day.

weighted electricity price, and the resulting solar premium will be one (ie, solar PV export has a zero premium).

Generally, solar PV export occurs during day time when spot prices tend to be higher than average across the day, and is close to zero during night time when spot prices tend to be lower than average. For this reason, a solar premium is usually greater than one.

D.2.1 Data requirements

To estimate solar premiums, we will use:

- historical half-hourly PV export data, and
- historical half-hourly spot prices in the NEM.

Half-hourly PV exports

Consistent with previous reviews, we propose to use half-hourly PV exports in the Ausgrid network area from 2009-10 to 2013-14. We consider this area provides the best available data as it includes a large number of solar PV customers with time-of-use meters that record PV generation or exports every half-hour. The data on half-hourly PV export in the Endeavour Energy and Essential Energy network areas is insufficient for our needs, as most PV customers in these areas have accumulation meters or time-of-use meters that do not record data half-hourly.

For prior reviews, Ausgrid has provided data for around 1,000 and 10,000 PV customers over the 2009-10 and 2010-11 financial years, respectively. It has also provided a random sample of around 2,000 PV customers for 2011-12, and 1,000 PV customers for 2012-13 and 2013-14 financial years. These customers included business and residential PV customers with gross and net meters and a range of PV unit sizes (in kW).

As our final report is due to be released in October 2015, we anticipate that we will be able to incorporate Ausgrid's 2014-15 data into our final decision.

Half-hourly (historical) 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 AEMO. We propose to use this public information to obtain historical spot prices for each half-hour.

D.2.2 Modelling methodology

To estimate solar premiums, we propose to use a Montel Carlo simulation process. This is consistent with the approach used in last year's review and includes the following three steps:

Step 1 - Aggregation

We have historical half-hourly PV export profile for a set of sampled PV customers with net and gross meters (see Appendix B for more information about net and gross meters). The first step in the simulation process is to create an aggregate half-hourly PV export profile for each meter class and year of data. This is calculated by summing the half-hourly exports of each sampled customer in a given half hour in a given day. For example, to create net metered half-hourly PV profile for 2013-14, we sum half-hourly exports of all net metered customers for each half hour for a given day during the 2013-14 period.

The resulting half-hourly PV export profile for each year and meter class is then normalised to 1 GWh per annum. Some years could have more solar PV energy exported than other years – for example, due to weather conditions. In addition, customers with gross meters generally export more solar PV than those net meters due to the nature of the metering arrangements. The normalisation of the half-hourly PV export profiles enables us to easily compare the shapes of solar PV export profiles in different years and meter classes. The normalisation process does not affect calculation of the solar PV output-weighted electricity price since the correlation between solar PV exports and spot prices is preserved.

Step 2 – Simulation

To estimate solar premiums based on a Montel Carlo simulation, we generate 5,000 synthetic years for 2015-16 from the historical data. A synthetic year consists of 365 days, and for each day in a synthetic year we extract half-hourly price and PV export data from a pool of comparable historical days. Comparable historical days are defined in terms of day name and quarter. For example, a Monday in January is comparable to any other Monday in the first quarter.

Our daily data contains half-hourly historical export profile and prices. To preserve the intra-day correlation between PV export and electricity price, we sample days as a whole.

Step 3 – Calculate and generate a distribution of solar premiums

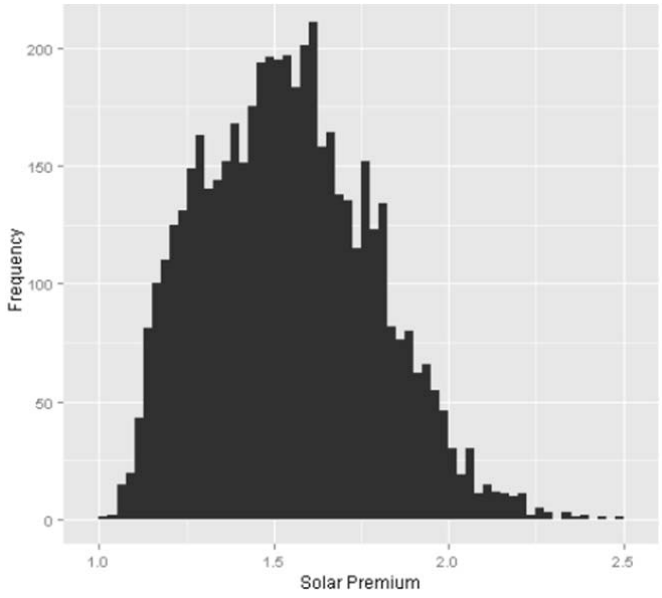
For each of the 5,000 synthetic years we calculate a solar premium for each meter class (ie, gross and net meters).

As discussed above, the solar premium is calculated as the ratio of the solar PV output-weighted price to the time-weighted price, where:

- the output-weighted price is the average price across the year weighted by how much solar is exported at each half hour, and
- the time-weighted price is the arithmetic average price across the year.

This process results in 5,000 solar premiums from which we can generate a distribution for both gross and net meters (for example, see Figure D.1). From this distribution we can calculate various summary statistics such as the median, 25th percentile and 75th percentile.

Figure D.1 Example distribution of solar premiums



Source: Frontier Economics, *Market value of solar PV exports – A final report prepared for IPART*, June 2014, p 10.

D.3 Loss factors

We propose to include the value of energy losses in the wholesale market value of PV exports. This reflects the fact that since PV exports tend to be consumed close to where they are injected into the grid, they avoid energy losses that usually arise as electricity flows through the transmission and distribution network.

We account for avoided losses by grossing up the wholesale market value of solar PV by a 'loss factor'. In our review last year, we used distribution and transmission loss factors for 2014-15 applicable to Ausgrid's distribution area (the same network area as the solar PV data). This year we propose to estimate a weighted average loss factor (including transmission and distribution losses) across all three distribution network areas in NSW. We consider that this would be a better estimate of avoided losses for PV customers in NSW, compared to using a loss factor for Ausgrid only. All else being equal this would increase the wholesale market value of PV exports, as relative to the Ausgrid network area, losses are higher in the Essential Energy network area and similar in the Endeavour network area.[20]

D.4 NEM fees and ancillary charges

Retailers pay NEM fees which include market fees and ancillary charges based on the amount of electricity they purchase from the NEM. These charges are levied on retailers' net purchases as measured by AEMO, and therefore retailers avoid having to pay these costs for the amount of PV electricity their customers export to the grid.

Consistent with our approach last year, we propose to include the avoided NEM fees in the wholesale market value of PV export. NEM fees are very small compared to the other costs of supply, so avoiding them provides a small financial gain to retailers, which approximately amounts to 0.1 c/kWh.[21]

Future NEM fees can be obtained from AEMO corporate reports. Data on historical ancillary costs[22] is also provided by AEMO and we propose to forecast these costs in 2015-16. In the past we have used a simple average of historical data as there was no discernible pattern or trend in past annual data.

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

21 Ibid, p 85. We estimated the amount of NEM fees in our regulated retail electricity price review in 2013.

22 Ancillary services are those services used by AEMO to manage the power system safely, securely and reliably.