

Independent Pricing and Regulatory Tribunal
New South Wales

Solar feed-in tariffs

Benchmark range 2017-18



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The Tribunal members for this review are:

Dr Peter J Boxall AO, Chair

Ms Deborah Cope

Mr Ed Willett

Inquiries regarding this document should be directed to a staff member:

Jenny Suh (02) 9113 7775

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1 Executive summary

The NSW Government asked the Independent Pricing and Regulatory Tribunal (IPART) to review and recommend the voluntary benchmark range for solar feed-in tariffs for the year from 1 July 2017. The Government requested that our recommended feed-in tariffs:

- ▼ not lead to increased retail electricity prices, and
- ▼ support a competitive retail electricity market.

To meet these requirements, our recommended range for solar feed-in tariffs must be **no higher than the financial benefit** retailers receive from exported solar electricity. If retailers were to pay feed-in tariffs higher than this benefit, they would make a loss on solar exports. Therefore, they would need to charge higher retail prices to cover this loss. Or they would choose not to supply solar customers, which would reduce competition in the retail market.

We have now completed our review, including considering the many submissions we received from solar customers and other stakeholders. This report presents and explains our final recommendation on the benchmark range, and responds to stakeholder comments.

1.1 The benchmark range is substantially higher than last year

Our final recommended benchmark range for solar feed-in tariffs in 2017-18 is **11.9 to 15.0 cents per kilowatt hour** (c/kWh). This is slightly higher than our draft recommendation in May (11.6 to 14.6 c/kWh) and substantially higher than last year's benchmark range of 5.5 to 7.2 c/kWh.

Our recommendation reflects the estimated financial benefit retailers would receive from each kWh of solar electricity their customers export to the grid in the coming year. The main financial benefit is the avoided cost of buying this electricity in the wholesale market. There are also smaller benefits from the associated avoided market fees and avoided electricity line losses. Because the cost of buying electricity in the wholesale market varies at different times of the day, the benchmark range for 2017-18 is based on the financial benefit to retailers:

- ▼ in the 2-hour period when the value of solar exports is highest (this 'peak time' is 2-4 pm and represents the upper end of the range), and
- ▼ at all times except the 2-hour peak period (this 'off peak time' represents the lower end of the range).

Like other commodities, the value of solar electricity will rise and fall based on market conditions. The main reason the recommended benchmark range is higher than last year is because forecast wholesale market prices for electricity have risen substantially. There is a much tighter supply/demand balance in the wholesale electricity market, with both an upturn in electricity demand and the recent retirement of major electricity generators,

including the Northern Power Station in South Australia and the Hazelwood Power Station in Victoria.

Our final recommended range is slightly higher than the range in our draft report, as it reflects updated forecast wholesale electricity prices.

1.2 The benchmark range is still lower than many stakeholders expect

Around 1,400 stakeholders made a submission in response to our Draft Recommendation. Many of these were among the 145,000 customers who used to receive subsidised feed-in tariff of 20c or 60c/kWh under the NSW Solar Bonus Scheme (SBS), but no longer do so because this scheme ended on 31 December 2016.

Most stakeholders supported an increase in the benchmark range. However, many also considered that solar feed-in tariffs should be much higher than the Draft Recommendation. Most of the arguments they raised to support this view are issues we considered in our previous reviews of solar feed-in tariffs. In general, the most common themes in submissions were:

- ▼ feed-in tariffs should include a subsidy to reflect the value of the environmental and health benefits that solar electricity provides to the broader community
- ▼ feed-in tariffs should be the same as retail prices or retailers will profit unfairly from solar customers
- ▼ feed-in tariffs should also reflect the financial benefit to electricity network suppliers, particularly the potential to defer network investment
- ▼ retailers should be required to pay a minimum, mandatory feed-in tariff rather than IPART recommending a voluntary benchmark range.

We have summarised our response to these themes below, and provided a more detailed response including references to submitters in Appendix C.

1.2.1 Customers receive a subsidy when they install a solar system

Some stakeholders submitted that solar feed-in tariffs should include a component for the environmental and health benefits that solar electricity provides to the broader community. We have not included a value for this in our benchmark range for two main reasons.

First, the subsidy that customers receive under the Australian Government's Small-scale Renewable Energy Scheme (SRES) when they install a solar system is designed to take account of benefits to the broader community.¹ This subsidy reduces the upfront costs of a solar system. The amount of the subsidy is based on geographical location, installation date, and the amount of electricity the system will generate or displace over its lifetime. For a 3

¹ Under the SRES, electricity retailers are required to purchase certificates based on the volume of electricity they acquire each year. The retailer's costs are recovered through its retail electricity prices. See <http://www.cleanenergyregulator.gov.au/RET/Scheme-participants-and-industry/Renewable-Energy-Targetliable-entities>, accessed 14 June 2017.

kilowatt solar system installed in Sydney, the subsidy is currently worth around \$1,740 to \$2,200.² The costs of the SRES subsidy are recovered through electricity prices.

Second, retailers don't capture the environmental or health benefits associated with solar energy. If a value for these benefits were included in feed-in tariffs, retailers would need to recoup this amount from their customers (including those without solar panels) through higher retail prices. This would disproportionately affect the lowest income households, who may be unable to install a solar system themselves. It would also be contrary to the requirement that our recommended benchmark range must not lead to higher retail prices.

1.2.2 Retailers would make a loss if feed-in tariffs were equal to retail prices

Numerous submissions claimed that retailers were unfairly profiting from solar customers because they offer feed-in tariffs that are much lower than their retail charges. They argued that to be equitable, feed-in tariffs should be the same as retail prices ('1-for-1').

These stakeholders consider that retailers can sell the solar electricity exported by their customers to other customers at little or no cost on top of any feed-in tariffs they pay. But this is not accurate. The metering and settlement arrangements in the National Electricity Market (NEM) mean that retailers incur network and green scheme costs for every kWh of electricity they supply to a customer, regardless of where and how the electricity was generated. Retailers also incur costs in running their retail business – including costs related to billing and customer inquiries, regulatory compliance and corporate overheads. These costs depend more on how many customers a retailer has than on how much electricity their customers use. Therefore, retailers do not avoid incurring these costs when a customer exports electricity.

If retailers were required to pay 1-for-1 solar feed-in tariffs, they would make a substantial loss on solar customers. Therefore, they would likely increase their retail prices to recoup this loss, or choose not to supply solar customers. Both these outcomes would be contrary to the requirements we must meet in recommending the benchmark range.

1.2.3 Solar exports are unlikely to provide system wide net benefits for networks

Some stakeholders called for feed-in tariffs to include a value for the benefit that solar provides to the electricity network, particularly the potential to defer investment in the transmission and distribution networks.

While electricity from solar PV uses the distribution network it does not use the transmission network. Where there are reliable reductions in peak demand on the transmission network the National Electricity Rules contain mechanisms to provide payments to embedded generators to reflect the benefit they provide to the transmission network³.

² The estimated subsidy is based on a solar unit installed in Sydney on 31 May 2017. The price of certificates (STCs) is assumed to be \$30 and \$38 and the number of eligible certificates is based on the Clean Energy Regulator's Small generation unit STC calculator, <https://www.rec-registry.gov.au/rec-registry/app/calculators/sgu-stc-calculator>, accessed 14 June 2017.

³ See Appendix C for more information on these mechanisms.

However, these mechanisms are designed for larger embedded generators, and may be less accessible for small-scale solar PV. A rule change request was recently put to the Australian Energy Market Commission (AEMC) to introduce a new mechanism that would allow small-scale embedded generators to earn revenue commensurate with their potential to reduce distribution and transmission network costs. The AEMC decided against the proposal. It noted that the impact of embedded generation on network costs depends on where the generator connects to the network and whether it can generate at times of peak network demand. It commissioned analysis that showed that even in areas where there was projected network congestion, payments to embedded generators can significantly increase costs to consumers while offering little or no deferral of network investment. The analysis also showed solar PV combined with batteries had a limited additional effect on deferring network investment, and that the benefit is still outweighed by the cost.⁴ The AEMC's review is discussed further in Chapter 2.

We have not included a value for network benefits in our benchmark range for two reasons. First, we do not have sufficient evidence that solar exports provide a net benefit to the electricity network. Second, if there was a net benefit, in the absence of any mechanism for a retailer to claim this benefit from a network business, including this value in solar feed-in tariffs would increase electricity prices for all customers.

1.2.4 Mandatory feed-in tariffs would likely harm competition

Some stakeholders consider retailers should be required to pay a minimum feed-in tariff, rather than IPART recommending a voluntary benchmark range. We don't have the power to set a mandatory feed-in tariff, as the Government has asked us to recommend a benchmark range.

Nevertheless, we have considered whether this would be in the long-term interest of customers. In our view, there is no need to regulate solar feed-in tariffs and doing so would likely be detrimental to the competitive market. Our analysis shows that the majority of retailers are currently offering feed-in tariffs, and of those that do, all offers are either within or above the benchmark range for 2016-17. All electricity customers in NSW are able to choose their retail electricity supplier.

Retail electricity prices in NSW were deregulated in 2014, and since this time there has been a substantial increase in the range of innovative products and services available to electricity customers. Much of this innovation has been in relation to solar electricity. We expect that competition will continue to develop and provide benefits to customers over time. Regulating feed-in tariffs would likely impede future innovation.

1.3 Solar customers should shop around for a better deal

As noted above, many of the solar customers who made submissions to this review previously received subsidised feed-in tariffs under the SBS. These customers are now likely to have changed (or will soon change) to net metering arrangements. With net metering:

- ▼ PV electricity generated is first used to power appliances running in the customers' home at the time the electricity is generated

⁴ AEMC, *Local Generation Network Credits, Final Rule Determination*, December 2016, pp vii, 34.

- ▼ when this generation is more than required to power the home, the excess is exported to the grid and can earn an unsubsidised feed-in tariff, and
- ▼ when this generation is less than required to power the home (including the times when the PV unit is not generating at all), the shortfall is imported from the grid and the customer pays the retail price.

With a net meter, most solar customers will use the bulk of their solar generation to power their own home – only a smaller proportion will be exported.⁵ Therefore, the largest financial benefit from solar is likely to be savings on electricity bills – any feed-in tariff they receive is likely to be a secondary benefit.⁶

We recommend that all customers, including solar customers, regularly shop around for a better deal. The Australian Government’s Energy Made Easy website (www.energymadeeasy.gov.au) is a good place to compare offers. Customers need to consider all aspects of an electricity offer, not just whether it includes a solar feed-in tariff and the amount of this tariff. In fact, analysis we did last year showed that the offer with the highest feed-in tariff is unlikely to provide the best overall electricity deal.⁷

For most solar customers, the most important aspect to consider when comparing offers is likely to be the price each retailer will charge for electricity. This price typically includes a daily supply charge and per kilowatt hour (kWh) usage charges. There might also be exit fees and/or upfront fees that customers need to take into account.

1.4 What the rest of this report covers

The rest of this report explains our review and final recommendation in more detail:

- ▼ Chapter 2 discusses the context, including the market and regulatory changes in the wholesale electricity and solar energy markets since our last review.
- ▼ Chapter 3 outlines the process and methodology we used to make our recommendation on the benchmark range for 2017-18, and discusses our response to stakeholder comments on the methodology.
- ▼ Chapter 4 sets out our final recommendation on this benchmark range, and the components that make up the upper and lower tariffs of the range.
- ▼ Appendices A to C provide supporting information (including more detailed responses to the stakeholder views outlined in section 1.2 above).

⁵ IPART, *Customers with solar PV units in NSW – producing and consuming electricity* – Fact Sheet, March 2012, available at https://www.ipart.nsw.gov.au/files/sharedassets/website/trimholdingbay/fact_sheet_-_customers_with_solar_pv_units_in_nsw_%e2%80%93_producing_and_consuming_electricity_-_solar_feed-in_tariffs_-_14_march_2012.pdf.

⁶ For more information on how net metering works, and the potential financial benefits of solar generation with a net meter, see IPART, *Why SBS customers should change to a net meter* – Fact Sheet, November 2016, available at <https://www.ipart.nsw.gov.au/files/sharedassets/website/shared-files/pricing-reviews-electricity-publications-retail-offers-for-solar-bonus-scheme-customers/why-sbs-customers-should-change-to-a-net-meter.pdf>.

⁷ See IPART, *Solar Customers should shop around for the best retail electricity offer* - Fact Sheet, November 2016, available at <https://www.ipart.nsw.gov.au/files/sharedassets/website/shared-files/pricing-reviews-electricity-publications-retail-offers-for-solar-bonus-scheme-customers/solar-customers-should-shop-around-for-the-best-retail-electricity-offer.pdf>.

2 Context for this review

Since we last reviewed the benchmark range for solar feed-in tariffs in 2016, substantial market and regulatory developments have influenced the wholesale electricity market and solar energy industry. These developments provide the key context for this current review:

- ▼ the tightening of supply-demand in wholesale electricity market
- ▼ the end of subsidised feed-in tariffs under the NSW Solar Bonus Scheme (SBS)
- ▼ changes in unsubsidised feed-in tariffs offered by retailers in the market
- ▼ the AEMC's final determination on local generation network credits, and
- ▼ regulatory decisions on solar feed-in tariffs in other jurisdictions.

2.1 A tighter supply-demand balance is driving up wholesale electricity prices

As outlined in Chapter 1, a key factor driving up the benchmark range in 2017-18 is a tighter supply-demand balance in the wholesale electricity market. The Australian Energy Regulator (AER) recently released its State of the Energy Market Report for 2017 which explains that an influx of wind and solar generation in the wholesale electricity market has affected the viability of existing thermal generators. This has seen several coal generators retiring from the market, including South Australia's Northern Power Station in 2016 and Victoria's Hazelwood plant in 2017. These retirements withdrew over 2000 megawatts (MW) of supply from the market. In addition, peak demand is rising, particularly in NSW and Queensland.⁸

The tighter supply-demand balance in the market has seen gas powered generation often setting dispatch prices. Gas generators are responding to higher gas fuel costs by bidding into the market at higher price levels. In 2015-16, 30-minute settlement prices in the wholesale market exceeded \$200 per megawatt hour (MWh) almost 4,000 times – a record level. Another 2,100 instances occurred in the first nine months of 2016-17.⁹ Futures markets are factoring in substantial wholesale price rises in 2017-18.¹⁰ Our methodology for recommending the benchmark range directly incorporates futures prices for wholesale electricity.

2.2 The end of subsidised feed-in tariffs under the Solar Bonus Scheme

The NSW SBS ended on 31 December 2016. From 1 January 2017, customers previously under this scheme are no longer receiving subsidised feed-in tariffs of 60 or 20 c/kWh for

⁸ AER, *State of the Energy Market*, May 2017, pp 8, 51.

⁹ AER, *State of the Energy Market*, May 2017, p 8.

¹⁰ AER, *State of the Energy Market*, May 2017, p 52.

the PV electricity exported to the grid. This means the costs of the feed-in tariff subsidies are no longer being funded by all electricity customers through electricity prices.

In November 2016, we published a series of Fact Sheets which provide information on what SBS customers can do to minimise the impact on their electricity bills after the scheme closes, and what tariff and technology options are available for them. To get the most benefits, we recommended that solar customers consider:

- ▼ changing to a net (smart) meter, if they don't already have one
- ▼ using as much PV generation within the home as possible
- ▼ shopping around for the best retail electricity offer, focusing on the overall deal not just the feed-in tariff, and
- ▼ the cost of installing a battery storage system is likely to come down in the future.¹¹

Since the closure of the scheme, demand for smart meter installations has surged, resulting in delays mostly due to the number of smart meters and qualified installers available. The NSW Government encourages former SBS customers finding it difficult to source a digital (smart) meter through their retailer to approach competing retailers to see if they can replace their meter.¹²

2.3 There is a range of unsubsidised feed-in tariffs offered in the market

While the NSW SBS has ended, most retailers are voluntarily offering unsubsidised feed-in tariffs. We conducted a survey of retailer feed-in tariffs in early June 2017 using the Australian Government website, Energy Made Easy. The results are summarised in the table below.

Around 24 retailers offer electricity to households in NSW, and 18 of 24 retailers include offers with a feed-in tariff. For the most part, retailers' feed-in tariff offers do not vary by network area but some retailers do not have offers in all three network areas. Table 2.1 shows that of those retailers offering feed-in tariffs, all include offers either within or above the current (2016-17) benchmark range of 5.5 to 7.2 c/kWh.

In our view, because all customers can choose their electricity retailer in NSW, these results suggest that it would be relatively easy for solar customers in NSW to find an offer that includes a solar feed-in tariff. That a number of retailers are voluntarily offering feed-in tariffs above the 2016-17 benchmark range (up to 12 c/kWh) is also a sign that the market is working and that there is no need to regulate – or set mandatory feed-in tariffs.

In November the Minister for Industry, Resources and Energy asked IPART to investigate how customers could minimise the impact on their electricity bills after the SBS closed. As our fact sheet, *Options for solar customers after the Solar Bonus Scheme ends* discussed, electricity customers need to consider all aspects of an electricity offer, not just the solar feed-in tariff. In fact, our analysis in November 2016 showed that the offer with the highest feed-in tariff is unlikely to provide the best overall electricity deal.¹³

¹¹ IPART, *Options for solar customers after the Solar Bonus Scheme ends*, November 2016.

¹² <http://www.resourcesandenergy.nsw.gov.au/energy-consumers/solar/solar-bonus-scheme/smart-meter-installation-delays> accessed 1 June 2017.

¹³ IPART, *Solar customers should shop around for the best retail electricity offer*, Fact Sheet, November 2016.

Table 2.1 Feed-in tariffs offered by network area, June 2017 (c/kWh)

Retailer	Ausgrid	Endeavour Energy	Essential Energy
AGL	6.1	6.1	6.1
Alinta Energy	6.1	6.1	6.1
Click Energy	6 & 10	6 & 10	6 & 10
Commander Power & Gas	11.6	11.6	11.6
Diamond Energy	8	8	8
Dodo Power & Gas	11.6	11.6	11.6
Energy Locals	10	10	10
EnergyAustralia	6.1	6.1	6.1
Enova Energy	-	-	6 & 12
Lumo Energy (NSW)	6	6	6
Mojo Power Pty Ltd	7.3	7.3	7.3
Momentum Energy	7	7	7
Origin Energy	6, 10 & 12	6, 10 & 12	6, 10 & 12
Pooled Energy	6	6	-
Powerdirect	6.1	6.1	6.1
Powershop	8.2	8.2	8.2
Red Energy	6 & 6.5	6 & 6.5	6 & 6.5
Simply Energy	6.5	6.5	6.5

Source: Energy Made Easy (www.energymadeeasy.gov.au).

2.4 The AEMC's final determination on local generation network credits

The National Electricity Rules (Rules) contains mechanisms to provide payments to embedded generators¹⁴ (including solar PV) to reflect the benefit they provide to the electricity network.¹⁵ However, these mechanisms may be less accessible for small-scale embedded generators. This is due to the transaction costs of negotiating payment arrangements and because network businesses generally require a guarantee of availability to generate electricity when needed, which is difficult for an individual small-scale embedded generator to offer.

Noting the limitations of existing mechanisms for smaller embedded generators, a rule change request was put to the AEMC by the City of Sydney, the Total Environment Centre and the Property Council of Australia.¹⁶ The rule change request sought to introduce a new mechanism that would allow small-scale embedded generators to earn revenue commensurate with their potential to reduce distribution and transmission network costs. It did this by proposing that distribution network service providers would be required to:

- ▼ calculate the long-term economic benefits (cost savings) that embedded generators provide to distribution and transmission networks, and

¹⁴ Embedded generation is defined in the Rules as a generating unit connected within a distribution network and not having direct access to the transmission network. It is commonly known as distributed generation.

¹⁵ See Appendix C for more information on these mechanisms.

¹⁶ AEMC, *Final rule determination – National Electricity Amendment (Local Generation Network Credits) Rule 2016*, 8 December 2016, p 9.

- ▼ pay embedded generators ‘local generation network credits’ (LGNCs) that reflect those estimated benefits.¹⁷

The AEMC’s final decision was **not** to introduce LGNCs based on its conclusion that LGNCs would not contribute to the achievement of the National Electricity Objective, which is to promote efficient investment in, and efficient operation and use of electricity services for the long-term interest of consumers.¹⁸

The AEMC noted that the impact of embedded generation on network costs depends on where the generator connects to the network and whether the generator can meet any on-site demand or export electricity when the network is constrained. LGNCs would be a broad mechanism and would not reflect the highly specific impact of embedded generation on network costs. That means LGNCs would incentivise embedded generation in areas where there is spare capacity and network costs cannot be reduced, and provide insufficient incentives to embedded generation in constrained areas where there is potential to defer or avoid investment in the network. The AEMC also noted that the Rules contain other mechanisms, some which are currently being implemented, such as cost-reflective distribution pricing and the Demand Management Incentive Scheme, that can meet the majority of the rule change proposal’s objectives.¹⁹

In making its final determination, the AEMC engaged AECOM to analyse how more embedded generation, as a result of LGNC payments, would affect networks’ investment decisions. AECOM focused on solar generators as it estimated these would be the greatest beneficiary of LGNC payments. It assessed the impact of increasing uptake of solar PV on reducing peak demand, and analysed whether they would result in any deferral of network augmentation. It then compared the benefits of LGNCs resulting from any such deferral with the costs of LGNC payments to solar customers in the same area. AECOM’s analysis is summarised in Box 2.1.

Overall, AECOM forecast a significant increase in the uptake of solar PV (even in the absence of LGNCs). It found that LGNCs are likely to have only a marginal impact on reducing network peak demand and impose a significant net cost to consumers. AECOM considered the best-case scenarios where network investment is most likely to be required due to system limitations and LGNC payments have the biggest impact on reducing network costs. AECOM found that even in these cases LGNCs are likely to impose a substantial net cost to consumers.²⁰

With the network peak period shifting outside of daylight hours due to increasing solar PV, no capacity constraints were forecast in many network areas over the near to medium term. As a result, LGNCs were not expected to lead to any deferral of network investment. Across all scenarios, AECOM also found that the cost of paying LGNCs is substantial and more than offset any benefits resulting from network investment deferral. The analysis also showed solar PV combined with batteries had a limited additional effect on deferring network investment, and that the benefit is still outweighed by the cost.²¹

¹⁷ Ibid, pp iv-v.

¹⁸ Ibid, p viii.

¹⁹ Ibid, pp vi, 9, 27-35.

²⁰ AECOM, *Modelling the impact of embedded generation on network planning* – Australian Energy Market Commission, 29 August 2016, pp vii-viii.

²¹ Ibid, pp vii-viii, 57.

Box 2.1 AECOM's analysis of the impact of solar PV generation on network planning and network costs

To analyse the impact of solar PV generation on network planning and network costs, AECOM conducted various scenarios analysis for three zone substations (ie, Belconnen ZS, Flemington ZS and Emerald ZS) on different networks (ie, ActewAGL, Jemena and Ergon Energy) that are expected to face capacity constraints at three different time periods (ie, within the current regulatory period, within 10 years and beyond 10 years).

In its baseline scenario, AECOM found that the increasing uptake of solar PV is likely to shift peak demand periods outside of sunlight hours, and as a result solar PV is unlikely to further reduce peak demand. Based on AEMO's forecast uptake of solar PV, AECOM predicted solar PV would have a substantial impact on network load profiles. Solar PV is already reducing peak demand during daylight hours, and the forecast uptake of solar PV is expected to shift peak demand periods from daylight hours to the evenings. Once the peak period has been shifted, it was estimated that LGNCs would not be able to further reduce peak demand.

Across all different scenarios, LGNCs only had a marginal impact on peak demand magnitude and frequency. Furthermore, as shown in Table 2.2, introducing LGNCs did not result in any deferral of network investment. AECOM also found that the cost of paying LGNCs is substantial, and outweighs any benefits from deferring network investment.

Table 2.2 AECOM Case study results

	Belconnen ZS	Flemington ZS	Emerald ZS
Network	ActewAGL	Jemena	Ergon Energy
Total LGNC payments	\$1.2-1.3 million	\$2.0-2.2 million	\$17.7-18.7 million
Length of deferral required to offset LGNC costs	3 years	5 years	LGNC costs are too large to be recovered through any length of deferral
Deferral resulting from LGNCs	None	None	None
Net cost to consumers	\$1.2-1.3 million	\$2.0-2.2 million	\$17.7-18.7 million

Source: AECOM, *Modelling the impact of embedded generation on network planning* – Australian Energy Market Commission, 29 August 2016; AEMC, *Final rule determination – National Electricity Amendment (Local Generation Network Credits) Rule 2016*, 8 December 2016, pp 33-34.

2.5 The QPC's review of 'fair' solar feed-in tariffs in Queensland

The Queensland Productivity Commission (QPC) was asked to investigate and report on a fair price (or prices) for solar exports produced by small customers. It delivered its final report in June 2016 with key findings that:

- ▼ Feed-in tariffs being offered by retailers are more than what a solar PV exporter could earn if they were a large generator in the wholesale market.
- ▼ Feed-in tariffs are now one of a number of solar products electricity retailers are offering. Retailers have started offering a range of innovative products.
- ▼ In South Eastern Queensland, competition is working effectively and delivering a range of feed-in tariffs and other options for solar customers.

- ▼ In regional areas, there is lack of retail competition, and hence there is need for regulated solar feed-in tariffs.²²

QPC found that solar customers have already been compensated for the environmental benefits they provide through existing programs. The SRES creates a financial incentive for individuals and small businesses to install small-scale renewable energy systems, including solar panels. Under the SRES, purchases of solar panels receive a subsidy and this effectively reduces the up-front cost of purchasing and installing a solar PV panel by around 30% to 40% on average. QPC estimated that based on average solar PV system prices, solar customers receive a subsidy of between 2.8 and 2.9 c/kWh for the total PV electricity **generated** under the SRES. When the **net** amount of PV electricity **exported** to the grid is considered, solar customers receive a subsidy of around 7.1 c/kWh.²³

In addition, QPC found that including additional payments in a feed-in tariff would lead to relatively low emissions abatement at high costs. Its analysis showed that:

- ▼ More than 85% of the subsidy would go towards increasing the financial returns to solar PV owners, rather than inducing additional solar PV generation
- ▼ Under the most likely subsidy scenario, the cost of reducing emissions is \$268-327 per tonne of abatement, or \$363-\$422 per tonne including the SRES subsidy.

QPC concluded that national policy instruments would be more effective at reducing emissions at least-cost than state and territory government policies.²⁴

2.6 The ESC's decision on 2017-18 solar feed-in tariffs in Victoria

In February 2017, the Essential Services Commission (ESC) determined that the minimum feed-in tariff in Victoria for 2017-18 will be 11.3 c/kWh. In determining the feed-in tariff, the ESC was required to take into account wholesale electricity prices, avoided distribution and transmission losses, avoided ancillary fees and charges, avoided social costs of carbon, and avoided human health costs.

The ESC estimated that avoided social cost of carbon is 2.5 c/kWh of electricity exported by a small renewable energy generator. While acknowledging avoided human health costs, the ESC concluded that the necessary data to quantify those benefits with sufficient reliability are not available at present. Therefore it did not include them in calculating the minimum feed-in tariff.²⁵ The ESC's decision was criticised by some stakeholders, including St Vincent de Paul who said it would cost low income renters and other households that couldn't afford to install solar panels on their roofs.²⁶

²² Queensland Productivity Commission, *Solar feed-in pricing in Queensland*, June 2016, p viii.

²³ *Ibid*, p 69.

²⁴ *Ibid*, p 69.

²⁵ Essential Services Commission, *Minimum electricity feed-in tariff to apply from 1 July 2017 – Final Decision*, February 2017.

²⁶ <http://www.afr.com/news/victoria-doubles-feedin-tariff-slugs-poor-to-drive-solar-20170228-gun1x0>, accessed 5 June 2017.

3 Our process and methodology

IPART conducted this review in line with the terms of reference we received from the Minister for Energy & Utilities on 21 April 2017 (see Appendix A). As in the past five years, we were asked to recommend a benchmark range for solar feed-in tariffs as guidance to consumers. We were required to release our recommendation in June 2017.

To make our Draft Recommendation on the benchmark range for 2017-18, we applied the same methodology that we used last year. We invited stakeholders to make submissions by 29 May in response to the Draft Recommendation. We received around 1,400 submissions from organisations and individuals. (Submissions received to our review are available on our website).²⁷ We considered all stakeholder submissions, and then reapplied our methodology using updated market data to make our Final Recommendation.

The sections below outline our methodology, and then discuss stakeholders' comments on this method and our response to them. (Our responses to other stakeholder comments are outlined in Chapter 1 and discussed in more detail in Appendix C.)

3.1 Overview of our methodology

Our methodology involves estimating the financial benefit of solar exports to retailers, and taking account of how this benefit varies at different times of the day.

3.1.1 Estimating the financial benefit to retailers

When solar customers export to the grid, retailers make a financial benefit when they sell that solar electricity to another customer. This is because they avoid paying three of the five cost components that they recover in retail electricity prices. These are:

- ▼ the cost of purchasing wholesale electricity from the National Electricity Market (NEM)
- ▼ the cost of electricity line losses that occur when electricity is generated a long way from where it is consumed, and
- ▼ the fees and charges they incur when they purchase electricity from the NEM.

Because of the metering and settlement arrangements in the NEM, retailers cannot avoid paying the other two costs recovered through retail prices – network costs and green scheme charges when customers export to the grid.

We calculate the financial benefit to retailers using four components:

1. the forecast average wholesale electricity price in NSW in 2017-18 per kWh
2. the 'premium' that solar electricity earns over the average wholesale price

²⁷ <https://www.ipart.nsw.gov.au/Home/Industries/Energy/Reviews/Electricity/Solar-feed-in-tariffs-201718>.

3. the loss factor applicable to NSW, and
4. the NEM fees and charges per kWh.

We estimate the first two components, and use publicly available information for the second two. Appendix B provides more information.

3.1.2 Taking account of the financial benefit at different times of the day

Solar customers export to the grid across the day, but most exports typically occur during the middle of the day. Because retailers' avoided cost of buying electricity in the wholesale market varies at different times of the day, we calculate the financial benefit to retailers:

- ▼ in the 2-hour period when the value of solar exports is highest (this 'peak time' is 2-4pm and represents the upper end of the range), and
- ▼ at all times except the 2-hour peak period (this 'off peak time' represents the lower end of the range).

3.2 Stakeholders comments on our methodology

Stakeholders commented on several specific elements of our methodology:

- ▼ the Australian Energy Council (AEC) raised concerns about the data we use to forecast the average wholesale electricity price in NSW
- ▼ AEC and an anonymous stakeholder raised two different concerns about the data we use to estimate the solar premium
- ▼ PIAC suggested that because Origin Energy is currently offering a feed-in tariff higher than our benchmark range for 2016-17 our methodology must undervalue the benefit to retailers
- ▼ Climate Change Balmain-Rozelle (CCBR) did not agree we should base feed-in tariffs on the marginal cost of wholesale electricity.

After considering these comments, we decided not to adjust our methodology.

3.2.1 AEC submitted we should use a longer averaging period

For our Draft Recommendation, we calculated forecast average wholesale electricity prices for 2017-18 using the most recent 40-day average of electricity futures contract prices. This approach is consistent with how we estimated energy purchase costs when we regulated retail electricity prices, and the approach we currently use to determine market-based WACC parameters.

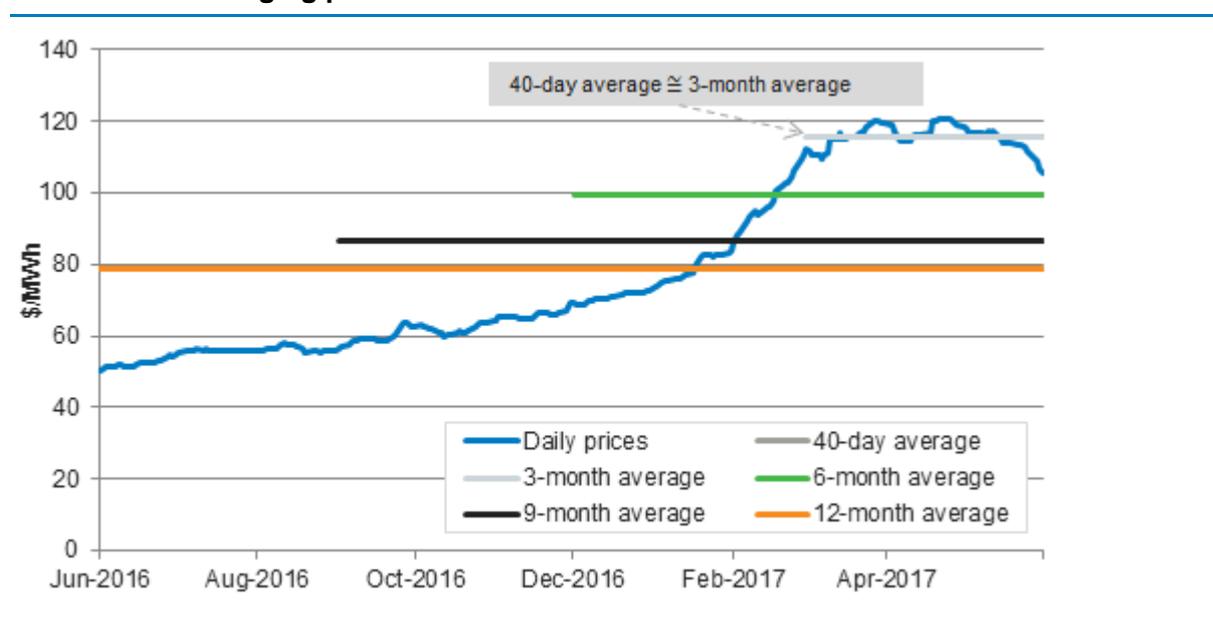
The AEC submitted that using a short averaging period can result in a material misestimate, especially during periods of price volatility. In its view, our approach of using a 40-day average is likely to overestimate the forecast average wholesale electricity price, compared to using a longer averaging period. It noted that in practice, energy retailers contract for

their load in increments over a longer period of time, potentially up to three years, and make adjustments as the expected customer load they need to serve changes.²⁸

We acknowledge that the length of the averaging period can have a large impact on the resulting forecast price. Figure 3.1 shows daily electricity futures contract prices averaged over a number of different periods:

- ▼ 40-day average until 31 May 2017 (used as a basis for the benchmark range)
- ▼ 3-month average from 1 March 2017 to 31 May 2017
- ▼ 6-month average from 1 November 2016 to 31 May 2017, and
- ▼ 12-month average from 1 June 2016 to 31 May 2017.

Figure 3.1 Forecast average wholesale electricity prices for 2017-18 using different averaging periods



Note: Averages are calculated as of 31 May 2017, and include a 5% contracting premium.

Data source: Thomson Reuters Eikon.

This figure shows that NSW electricity futures contract prices for 2017-18 have increased substantially over the last year. Since mid-February 2017, prices have remained above \$100/MWh, and peaked at the end of March and the end of April, reaching over \$120/MWh. Given this trend, using a longer averaging period would have substantial impact on the forecast price for 2017-18. As of 31 May 2017, the 3-month and 6-month average prices are \$115.6/MWh and \$99.4/MWh, respectively.

Nevertheless, we consider our current approach for forecasting average wholesale electricity price remains appropriate. This approach is based on a 'mark-to-market' (or 'point-in-time') approach, which we have consulted on over a number of years. A point-in-time approach is based on the principles of setting pricings that reflect outcomes in a competitive market. In particular, a point-in-time approach reflects that:

²⁸ Australian Energy Council submission, 29 May 2017, p 2.

- ▼ Economic decisions should be based on the current value of assets, rather than their historic value.
- ▼ The extent to which retailers have entered into contracts in the past that are either cheaper or more expensive than today's contract prices are sunk costs. A competitive market would not allow a retailer to recover the costs of 'out of the money' contracts.
- ▼ Retailer's decisions around what retail price to offer customers should reflect expectations of the cost of supplying that customer and not the consequences of prior decisions.

While in practice retailers may purchase contracts over a longer period of time, our approach should be consistent with above principles.

3.2.2 AEC submitted we should use solar export data in all three network areas

For our Draft Recommendation, we estimated the solar premium using half-hourly PV export data from customers in the Ausgrid network area. AEC submitted that customers in the Essential Energy and Endeavour Energy network areas have very different characteristics, and we should extend our dataset to include all networks.²⁹

We agree with the AEC that solar exports could exhibit different patterns given their geographic locations, and bigger PV unit sizes, particularly in the Essential Energy network area. Because of this variation, it would be ideal to include data from all three network areas in our modelling of solar premiums.

However, at present, the Ausgrid network is the best available source for half-hourly PV exports, including a large number of solar PV customers with time-of-use meters that record PV generation or exports each half-hour. Half-hourly data for a complete financial year is essential for our methodology. Neither Endeavour Energy nor Essential Energy currently has a sufficiently large dataset of half-hourly exports, either because basic accumulation meters are mostly in use, or time-of-use meters record data less frequently than half-hourly.

With the closure of the SBS on 31 December 2016, former SBS customers in these network areas have started changing to a (digital) net meter, which records half hourly PV exports. We propose incorporating half-hourly PV export data from the Endeavour and Essential Energy network areas in our modelling when sufficient data is available.

3.2.3 One stakeholder submitted we should exclude data from some years

Our dataset for estimating feed-in tariffs spans from 2009-10 to the most recent financial year (ie, 2015-16). We analysed historical spot prices and found that years 2009-10 and 2010-11 experienced unusually high spot prices in the middle of the day when most PV exports occur. This has a substantial effect on estimated solar premiums. In line with previous decisions, for our Draft Recommendation this year we decided to adopt a conservative approach and set the benchmark range based on the 25th percentile value of solar premiums, rather than the median.

²⁹ Australian Energy Council submission, 29 May 2017, p 2.

An anonymous stakeholder submitted that we should exclude 2009-10 and 2010-11 from our dataset and use the median solar premium. While this approach would have some merit, on balance, we decided to continue estimating solar premiums using all available data, but choose the 25th percentile value to account for the impact of 2009-10 and 2010-11 years on solar premiums. We consider this is preferred to removing some years and reducing the size of our dataset.

To understand the impact of this decision, we estimated solar premiums excluding the earlier years, and calculated the benchmark range based on the median value of solar premiums. Without 2009-10 and 2010-11, solar premiums are substantially lower, particularly during the peak period. The resulting benchmark range (11.5-12.6 c/kWh) slightly lower than our final recommended benchmark range (11.9-15.0 c/kWh).

3.2.4 PIAC suggested there is market evidence our methodology undervalues solar

PIAC submitted that our methodology does not accurately reflect the value of solar exports based on market evidence. Specifically, it noted that Origin Energy is currently offering a feed-in tariff much higher than our benchmark range for 2016-17.³⁰

We do not agree that the fact that some retailers currently offer feed-in tariffs above our 2016-17 benchmark range indicates that our methodology undervalues solar exports. Our recommendation for 2016-17 was made in June 2016, based on the best information available at that time. Figure 3.1 shows how much the futures price for wholesale electricity increased since we made our final recommendation last year. In our view, the fact that some retailers have increased their feed-in tariffs already shows that the competitive market is working and that there is no need to regulate solar feed-in tariffs.

3.2.5 CCBR did not agree with our marginal cost approach

Climate Change Balmain-Rozelle submitted that if there had been no PV generation in NSW, then peak wholesale electricity prices would have been higher than the current forecast for 2017-18. Therefore, it argued that PV has contributed to the lower wholesale prices upon which our calculation is based, and PV generators should receive some of this benefit. It set out two different scenarios that would transfer some of this benefit to solar customers.³¹

In our view, any new generator (or new customer) entering or exiting the electricity market would change the balance of supply and demand, and thus could lead to lower or higher wholesale electricity prices. Such a generator (or customer) would not be compensated for this impact. We consider that other than through policies specifically designed to encourage more investment in small-scale PV, such as the SRES, solar customers should be treated like any other generator in the competitive market.

³⁰ PIAC submission, May 2017, p 2.

³¹ CCBR submission, May 2017.

4 Benchmark range for 2017-18

Our Final Recommendation on the benchmark range for solar feed-in tariffs in 2017-18 is 11.9-15.0 c/kWh. Table 4.1 summarises the four components we used to calculate this range. The only component for which updated data is available since the Draft Recommendation is the forecast average wholesale price. Our 40-day average of market prices has risen slightly since the Draft Recommendation.

Table 4.1 Summary of the components in the benchmark range (2017-18)

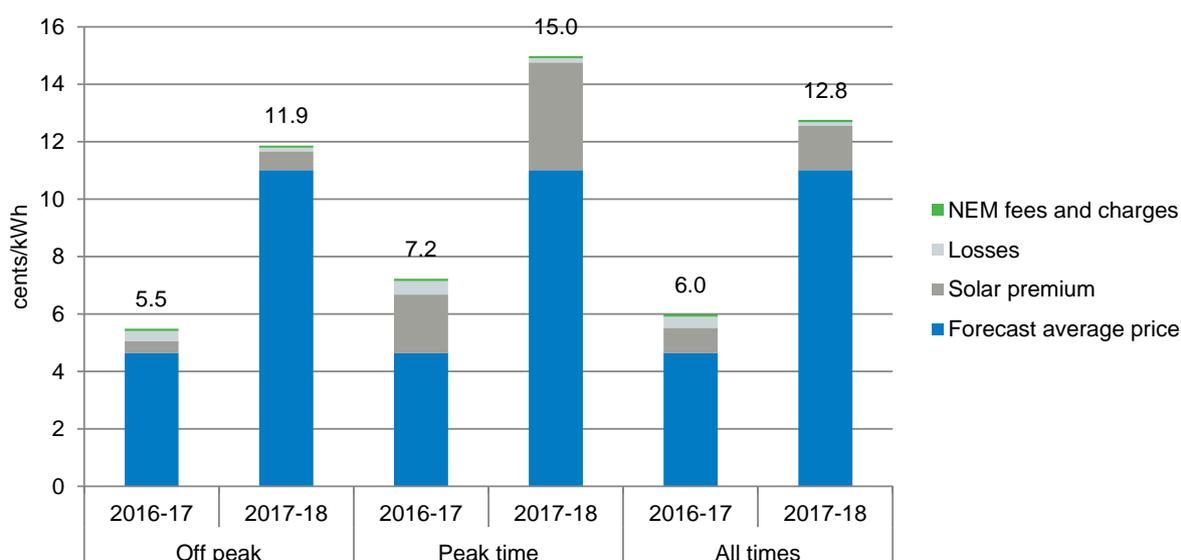
	Forecast average price (c/kWh)	Solar premium	Loss factor	NEM fees and charges (c/kWh)	Total (c/kWh)
All times other than peak	11.01 (10.70)	1.06 (1.06)	1.01 (1.01)	0.08 (0.08)	11.9 (11.6)
Peak time (2-4pm)	11.01 (10.70)	1.34 (1.34)	1.01 (1.01)	0.08 (0.08)	15.0 (14.6)
All times	11.01 (10.70)	1.14 (1.14)	1.01 (1.01)	0.08 (0.08)	12.8 (12.4)

Note: Figures in brackets are from the Draft Recommendation. Total = Forecast average price x Solar premium x Loss factor + NEM fees and charges. Figures may not add up due to rounding.

Source: IPART.

Like other commodities, the value of solar electricity will rise and fall based on market conditions. While there has been a small increase in the benchmark range since our Draft Recommendation, there has been a substantial increase compared to the benchmark range we released last year. As Figure 4.1 shows, this is driven mainly by the higher forecast average wholesale price. The contribution from the solar premium is also higher, as this contribution derives from the solar premium multiplied by the forecast wholesale price.

Figure 4.1 Summary of the benchmark range 2016-17 and 2017-18 (c/kWh, incl. inflation)



Source: IPART.



As indicated in our Draft Recommendation, our modelling produced slightly lower solar premiums this year compared to last year.³² Similarly, updated information provided by network businesses resulted in loss factors slightly lower this year compared to the data they provided last year.

³² IPART, *Solar Feed-in tariffs – Draft recommendation*, May 2017, Table 5.1, available at <https://www.ipart.nsw.gov.au/files/sharedassets/website/shared-files/pricing-reviews-energy-services-publications-review-of-solar-feed-in-tariffs-201718/fact-sheet-review-of-solar-feed-in-tariffs-2017-18-may-2017.pdf>.



Appendices



A Terms of reference



Don Harwin MLC

Minister for Resources, Minister for Energy and Utilities,
Minister for the Arts, Vice-President of the Executive Council

V16/1991#20
OUT17/15883

Dr Peter Boxall AO
Chairman
Independent Pricing and Regulatory Tribunal
PO Box Q290
QVB POST OFFICE NSW 1230

Dear Dr Boxall

I write to the Tribunal with regard to the voluntary benchmark range for solar feed-in tariffs paid by retailers for electricity exported from a complying generator to the distribution network.

Pursuant to section 234B of the National Energy Retail Law (NSW) the Tribunal as Market Monitor is requested to carry out a special review and to provide a report in accordance with the attached Terms of Reference.

In developing the Terms of Reference I have given consideration to customer and industry feedback which suggest that it is a priority to update the current benchmark in line with changes in wholesale electricity prices.

The Terms of Reference therefore focus on using existing approaches so that guidance can be provided to consumers by early June 2017.

If you require further information please contact Mr Dominic Kelly, Senior Policy Advisor, in my office on 02 8574 7224.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Don Harwin', with a long horizontal line extending to the right.

Don Harwin MLC
Minister for Resources,
Minister for Energy and Utilities,
Minister for the Arts,
Vice-President of the Executive Council

Encl.

TERMS OF REFERENCE

Special review to recommend a voluntary benchmark range for solar feed-in tariffs

1 Request to IPART under section 234B of the National Energy Retail (NSW)

I, Donald Harwin, Minister for Resources, Energy and Utilities and Arts, request under section 234B of the National Energy Retail Law (NSW) the Tribunal as Market Monitor to carry out a special review and to report on:

"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)."

2 Conduct of special review

In carrying out this special review the Tribunal is to consider the following matters:

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

3 Reporting

The Tribunal 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.

4 Consultation

In preparing its report on the voluntary benchmark range, the Tribunal may consult on any matter that it regards as material.

5 Timing

The Tribunal is requested to complete the special review and provide its report as soon as is practicable.

6 Interpretation

For the purposes of this Terms of Reference:

- 1) **complying generator** means a generator:
 - a) that is a renewable energy generator that has a generating capacity of no more than 10 kilowatts, and
 - b) complies with, and is installed and connected in a manner that complies with, any applicable safety, technical or metering requirements.
 - 2) **Market Monitor** means the Tribunal prescribed by clause 8A of the National Energy Retail Law (Adoption) Regulation 2013
 - 3) **Tribunal** means the Independent Pricing and Regulatory Tribunal established under the Independent Pricing and regulatory tribunal Act 1992 (NSW).
-

B Methodology for the benchmark range

This appendix provides more information on our methodology for estimating the financial benefit that retailers receive when solar electricity is exported to the grid. Our methodology is based on the following formula:

$$\text{Forecast average wholesale price} \times \text{solar premium} \times \text{loss factor} + \text{NEM fees and charges}$$

B.1 Forecasting average wholesale electricity prices

We forecast average wholesale electricity prices for NSW using futures contract prices. We use daily prices of NSW Base Load electricity contracts for the coming financial year traded on the ASX. To estimate average spot prices from the ASX futures contract prices, we:

- ▼ calculated a 40-day trading average of the ASX contract price for the coming financial year (2017-18) as at 31 May 2017, and
- ▼ removed an assumed contracting premium of 5% from the average price to arrive at a forecast average spot price.

B.2 Solar premiums

The solar premium captures how much solar exports occur at high or low price times. It is calculated as the ratio of the solar output-weighted electricity price to the time-weighted electricity price, where:

- ▼ solar PV output-weighted electricity price is the average price across the year weighted by how much solar is exported at the time, and
- ▼ time-weighted electricity price is the arithmetic average price across the year.

If more solar exports occur during times when spot electricity prices are relatively high, this would result in a solar premium greater than one. If an equal amount of solar PV is exported throughout the day, the solar PV output-weighted price would be equal to the time-weighted price and the solar premium would be one.

B.2.1 Data sources

To estimate solar premiums, we used:

- ▼ historical half-hourly PV export data from 2009-10 to 2015-16, and
- ▼ historical half-hourly spot prices in the National Electricity Market (NEM) from 2009-10 to 2015-16.

We used half-hourly PV exports from solar customers in the Ausgrid network area. In this network area there is a large number of solar PV customers with time-of-use meters that

record PV generation or exports every half-hour. The data on PV exports in the Endeavour Energy and Essential Energy network areas is currently insufficient for our needs, as most solar customers in these areas have accumulation meters or time-of-use meters that do not record data half-hourly. However, this is changing as more customers in these areas install digital / smart meters. We will look to incorporate this data in the future.

Our historical dataset on PV exports goes back to 2009-10. Each year we request a random sample from Ausgrid for the most recent complete financial year, including small business and residential PV customers with a range of PV unit sizes (in kW). Now that the SBS has closed, our focus is customers with net meters.

In NSW, the spot electricity price is referenced to the NSW regional reference node (RRN). We obtain half-hourly spot prices for the NSW RRN for financial years from 2009-10 to 2015-16 from AEMO's website.³³

B.2.2 Modelling methodology

To estimate solar premiums we use a Monte Carlo simulation process including the following three steps.

Step 1: Aggregation

We have historical half-hourly PV export profile for a set of sampled solar customers with net 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 a net metered half-hourly PV profile for 2015-16, we sum half-hourly exports of all net metered customers for each half hour for a given day during the 2015-16 period.

The resulting half-hourly PV export profile for each year 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. The normalisation of the half-hourly PV export profiles enables us to easily compare the shapes of solar PV export profiles in different years. 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

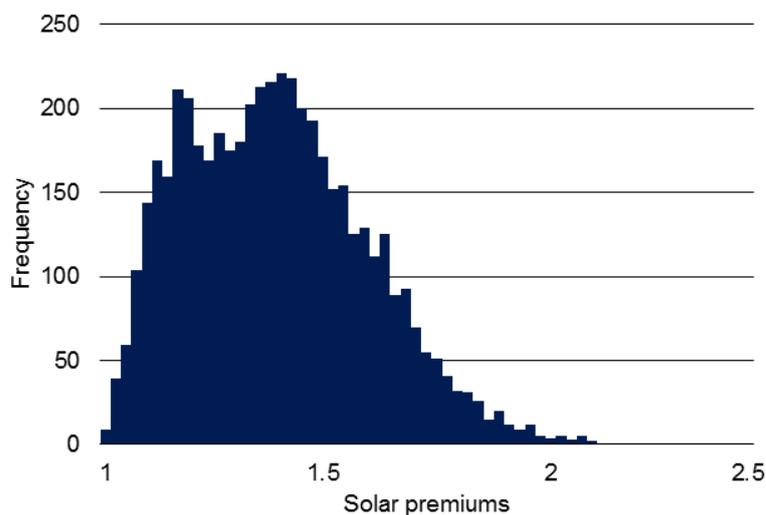
To estimate solar premiums based on a Monte Carlo simulation, we generate 5,000 synthetic years for 2017-18 from the historical data. A synthetic year consists of 365 days, and for each day in a synthetic year, we extract half-hourly price and PV export data from a pool of comparable historical days. 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 prices, we sample days as a whole.

³³ <http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Data-dashboard#aggregated-data> accessed 14 June 2017.

Step 3: Calculate and generate a distribution of solar premiums

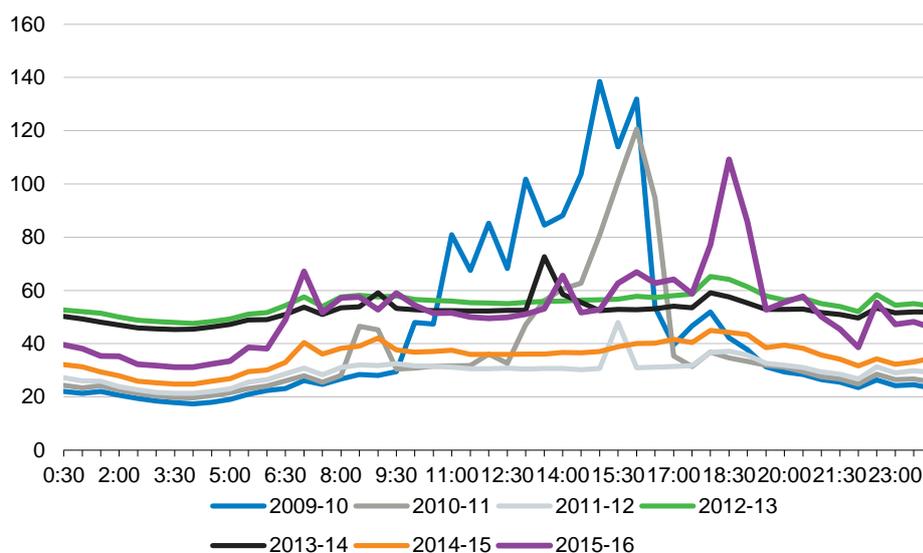
This process results in 5,000 solar premiums from which we can generate a distribution for net meters (for example, see Figure B.1). From this distribution we can calculate various summary statistics such as the median, 25th percentile and 75th percentile.

Figure B.1 Distribution of solar premiums (example only)



In line with previous years, we have used the 25th percentile solar premium, rather than the median. This is because we consider that the pattern of high prices in the middle of the day during 2009-10 and 2010-11 may not be representative of future years (see Figure B.2). More discussion on using the 25th percentile is provided in our 2015 Final Report.³⁴

Figure B.2 Average half-hourly NSW spot prices (\$/MWh, nominal)



Source: AEMO and IPART analysis.

³⁴ IPART, *Solar feed-in tariffs – The subsidy-free value of electricity from small-scale solar PV units in 2015-16 – Final Report*, October 2015, p 2.

B.3 Avoided losses

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.

We updated our weighted average loss factor for 2017-18 across the three distribution network areas in NSW, accounting for both transmission and distribution line losses. In particular, our loss factor is calculated as $MLF \times DLF$, where:

- ▼ *MLF* is transmission line losses between the Regional Reference Node and each bulk supply connection point for the coming financial year, weighted by actual energy consumption at each connection point, excluding industrial customers.
- ▼ *DLF* is distribution loss factors for small customers for the coming financial year, weighted by customers' actual consumption.

B.4 Avoided 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. Because these charges are levied on retailers' net purchases as measured by AEMO, they avoid having to pay these costs for the amount of electricity their customers export to the grid. NEM fees are very small compared to the other costs of supply, so avoiding them provides a small financial gain to retailers.

Our estimates of NEM fees and ancillary charges for the coming financial year are based on information reported by AEMO.

C Our detailed response to submissions

We received around 1,400 submissions in response to our Draft Recommendation. The majority were submissions from individual stakeholders, coordinated through a solar community group. Four common themes emerged from these submissions, including that:

- ▼ feed-in tariffs should include a payment for environmental and health benefits of solar electricity
- ▼ retailers should offer feed-in tariffs at the same rate they charge customers
- ▼ solar customers should receive a payment for the benefit they provide to the network, and
- ▼ there should be a mandatory minimum feed-in tariff.

Our response to these themes is detailed in the sections below. All submissions are available on our website, www.ipart.nsw.gov.au.

C.1 Customers receive a subsidy when they install a solar system

A large number of stakeholders, mostly individual owners of solar panels, submit that there should be a payment (or financial incentive) to reflect the environmental and health benefits that all solar electricity generation provides to the broader community.³⁵ Other submissions note that pricing should account for externalities including social costs and carbon pollution.³⁶ The Blue Mountains Renewable Energy Co-operative (BMRenew) note that the inclusion of externalities in the benchmark range is outside the terms of reference, but that IPART should make a recommendation to change the terms of reference to allow for this.³⁷

Not all submissions support the inclusion of an environmental value in solar feed-in tariffs. Science Party NSW submits that solar feed-in tariffs are not an appropriate mechanism. It considers that feed-in tariffs should not be so high as to be prohibitive for retailers, nor subsidised by all users like the NSW Solar Bonus Scheme – particularly given solar panels are not an option for all electricity users.³⁸

We have not included a value for environmental, health benefits or other externalities in the benchmark range for two main reasons. First, the subsidies that customers receive under the Australian Government's SRES takes account of community wide benefits of clean renewable energy (Box C.1). Similar to the QPC findings outlined in Chapter 2, we estimate the SRES subsidy in NSW is worth around 2c for each kWh generated, or around 6c for each kWh of electricity exported.³⁹

³⁵ For example, see submissions from B Graham (individual), N Waters (individual), P Jaggle (individual), B Rennie (individual), B Pottinger (individual), L Katz (individual), K Slade (individual), A Nielsen (individual), D Skyes (individual), R Geary (individual) May 2017.

³⁶ J Ray submission, May 2017; Public Interest Advocacy Commission submission, May 2017, p 2.

³⁷ BMRenew submission, May 2017.

³⁸ Science Party NSW submission, May 2017, p 2.

³⁹ Based on an assumed useful life of 20 years and an average export ratio of 40%.

Box C.1 Financial incentives under the SRES

The aim of the SRES is to reduce emissions of greenhouse gases and encourage the additional generation of electricity from sustainable and renewable sources. The SRES works by allowing the owners of small-scale systems to create small-scale technology certificates for every megawatt hour of electricity they generate. Certificates are then purchased by electricity retailers and submitted to the Clean Energy Regulator to meet the retailers' legal obligations under the Renewable Energy Target. This creates a market which provides financial incentives to the owners of small-scale renewable energy systems.

Small-scale technology certificates can be created following the installation of an eligible solar system, and are calculated based on the amount of electricity a system produces or replaces (that is, electricity from non-renewable sources). Generally, households who purchase an eligible solar system assign the certificates to an agent in return for a lower purchase price.

For example, the financial incentive under the SRES is currently worth around:

- ▼ \$870 to \$1,100 for a 1.5 kW solar unit
- ▼ \$1,740 to \$2,200 for a 3 kW solar unit
- ▼ \$2,880 to \$3,645 for a 5 kW solar unit

Financial incentives under the SRES are gradually being phased out over the period 2017 to 2030.

Note: The examples above assume the solar unit is installed in Sydney on 31 May 2017. The dollar range is based on certificate prices of \$30 and \$38.

Source: Clean Energy Regulator, <http://www.cleanenergyregulator.gov.au/RET/About-the-Renewable-Energy-Target>; Small generation unit STC calculator, <https://www.rec-registry.gov.au/rec-registry/app/calculators/sgu-stc-calculator>; Deeming period decline, <http://www.cleanenergyregulator.gov.au/RET/Scheme-participants-and-industry/Agents-and-installers/deeming-period-decline>.

Second, retailers don't capture avoided externalities associated with solar energy. If a value for these benefits were included in feed-in tariffs, retailers would need to recoup this amount from their customers (including those without solar panels) through higher retail prices. This would disproportionately affect the lowest income households, who may be unable to install a solar system themselves. It would also be contrary to the requirement that our recommended benchmark range must not lead to higher retail prices.

C.2 Retailers would make a loss if feed-in tariffs were equal to retail prices

Numerous submissions claim that retailers are unfairly profiting from solar customers because they offer feed-in tariffs that are much lower than their retail charges. They submit it would be more equitable if feed-in tariffs were the same as retail prices ('1-for-1').⁴⁰ There were also variations on proposals for 1-for-1 feed-in tariffs, including feed-in tariffs that are a minimum rate (for example 18c or 25c), a rate slightly higher than the wholesale price that retailers pay for, and a rate high enough to provide an appropriate return on investment.⁴¹

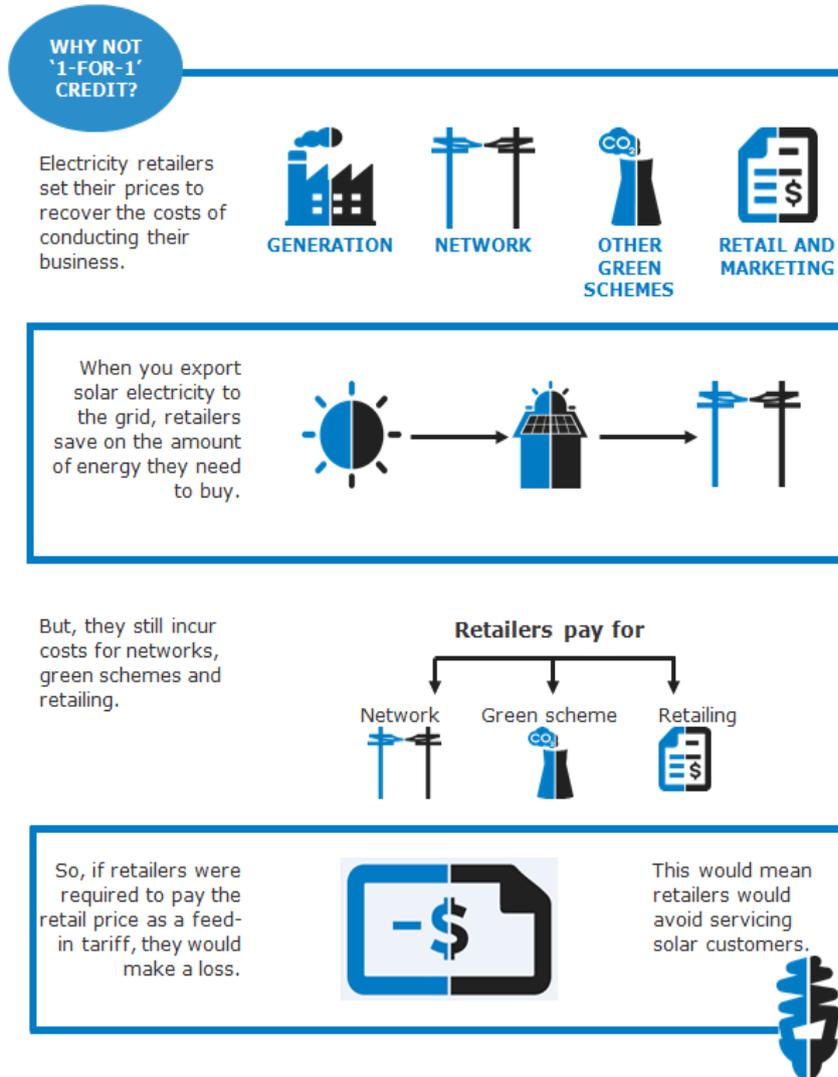
In general, these stakeholders consider that retailers can sell the solar electricity exported by their customers to other customers at little or no cost, apart from any feed-in tariffs they pay. However this view does not account for the metering and settlement arrangements in the NEM. These arrangements require retailers to pay network and green scheme costs for

⁴⁰ For example, see submissions from A Bingham (individual), S Chambers (individual), M James (individual), I Ridgway (individual), K Giles, J Purser (individual), May 2017.

⁴¹ See submissions from A Kountouris (individual), W Hampton (individual), A Pearce (individual), two anonymous individuals, May 2017.

every kWh of electricity they supply to a customer, regardless of where and how the electricity was generated.

Figure C.1 Why solar feed-in tariffs are less than the retail price of electricity



Source: IPART.

Retailers incur costs in running their retail business – including costs related to billing and customer inquiries, regulatory compliance and corporate overheads. These costs depend more on how many customers a retailer has rather than how much electricity their customers use. Therefore, retailers do not avoid incurring these costs when their customer exports electricity.

If retailers were required to pay 1-for-1 solar feed-in tariffs, they would make a substantial loss on solar customers (Figure C.1). Therefore, they would likely increase their retail prices to recoup this loss, or choose not to supply solar customers. Both these outcomes would be contrary to the requirements we must meet in recommending the benchmark range.

C.3 Solar exports are unlikely to provide system wide net benefits for network suppliers

Many stakeholders called for feed-in tariffs to include a value for the benefit that solar provides to the electricity network, particularly the potential to defer network investment. The Southern Sydney Regional Organisation of Councils (SSROC) submits that distributed energy generation, including small-scale solar, has the potential to delay or even to avoid the cost of that additional investment in poles and wires. It considers that this benefit needs to be quantified, and reflected in the value of the solar feed-in tariffs. A similar comment was made in the submission from the Public Interest Advocacy Centre (PIAC).⁴²

BMRenew notes that further efforts should be made to recognise the network benefits realised by local generation, in addition to reduced transmission due to reduced peak capacity demands. It states that as the network is engineered based on peak demand, the demand reduction delivered by solar generation could be significant in terms of network infrastructure spending that has been avoided.⁴³ The submission from Climate Change Balmain-Rozelle (CCBR) submits that since solar PV, as a whole, reduces peak demand it allows network providers to provide less transmission and distribution capacity than they otherwise would. It presents analysis that shows PV owners should receive a benefit for this of 3.55c/kWh.⁴⁴

We investigated the potential for solar PV to provide a net benefit to network suppliers in a previous solar review. We found that solar exports are unlikely to provide system-wide benefits that materially reduce distribution or transmission network costs in NSW. Any network benefits that do arise are time and location specific, and may be offset by additional network costs that arise from solar exports.⁴⁵

In addition, electricity retailers are billed network charges (incorporating transmission and distribution charges) for the **total** amount of electricity they supply to customers - including electricity from solar PV which does not use the transmission network. This means **retailers** do not receive any network-related benefit when customers export solar electricity. In the absence of any mechanism for a retailer to claim a network-related benefit from a network business, including a value for this in solar feed-in tariffs would increase electricity prices for all customers. In general, we consider that feed-in tariffs are not a preferred payment mechanism for any network benefits as they are broad based and would not target specific areas of the network where solar has the potential to defer network investment.

In our view, any net benefit from solar PV to the network should be provided to solar customers through a network-related payment. The National Electricity Rules contain specific mechanisms that provide for payments to embedded generators (including solar PV) in relation to avoided transmission costs:

- ▼ a **network support payment** made directly from Transgrid for a specific service provided by the embedded generator (with a capacity of more than 5MW) to defer investment in the transmission network

⁴² SSROC submission, May 2017, p 2; PIAC submission, May 2017, p 2; Climate Change Balmain Rozelle submission, May 2017.

⁴³ BMRenew submission, May 2017.

⁴⁴ Climate Change Balmain and Rozelle submission, May 2017, p 1, 8, 10.

⁴⁵ 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 66-67.

- ▼ an **avoided transmission use of service (TUoS) payment** from the distribution network service provider (DNSP) is paid where the embedded generator (with a capacity of more than 5MW) has reduced the demand taken by the DNSP from the transmission system at times of peak demand. Reducing a DNSP's demand at system peak reduces its liability for TUoS payments it makes to Transgrid.⁴⁶

Given the mechanisms above are designed for larger embedded generators, a rule change request was made to the AEMC that would have provided for a mechanism for smaller embedded generators to receive a payment/credit from DNSPs. The local generation network credit rule change request is discussed in Chapter 2.

In response to the analysis by CCB, we note that solar customers remain connected and use the electricity distribution network and therefore should contribute to its costs. As outlined in Chapter 2, the AEMC recently commissioned analysis that showed that even in areas where there was projected network congestion, payments to embedded generators (like solar PV) can significantly increase costs to consumers while offering little or no deferral of network investment. The analysis did not show that embedded generation including solar PV cannot reduce network costs, but rather any benefit from additional embedded generation as a result of introducing a network credit scheme would be far outweighed by the costs of the scheme.⁴⁷ The analysis also showed solar PV combined with batteries had a limited additional effect on deferring network investment, and that the benefit is still outweighed by the cost.⁴⁸

C.4 Mandatory feed-in tariffs would likely harm competition

Some stakeholders consider retailers should be required to pay a minimum feed-in tariff, rather than IPART recommending a voluntary benchmark range.⁴⁹ We don't have the power to set a mandatory feed-in tariff, as the Government has asked us to recommend a benchmark range.

Nevertheless, we have considered whether this would be in the long-term interest of customers. In our view, there is no need to regulate solar feed-in tariffs and doing so would likely be detrimental to the competitive market. Our analysis shows that the majority of retailers are currently offering feed-in tariffs, and that these are either within or above the benchmark range for 2016-17. All electricity customers in NSW are able to choose their retail electricity supplier.

Retail electricity prices in NSW were deregulated in 2014, and since this time there has been a substantial increase in the range of innovative products and services available to electricity customers. Much of this innovation has been in relation to solar electricity. In our view, regulating feed-in tariffs will likely impede future innovation.

⁴⁶ National Electricity Rule 5.4AA, <http://www.aemc.gov.au/getattachment/dc395945-787c-4d07-b74c-bfa0006642f4/National-Electricity-Rules-Version-92.aspx> accessed 15 June 2017.

⁴⁷ AEMC, *Local Generation Network Credits, Final Rule Determination*, December 2016, pp vi-vii.

⁴⁸ AEMC, *Local Generation Network Credits, Final Rule Determination*, December 2016, pp vi-vii, 34.

⁴⁹ See submissions from Blue Mountains Renewable Energy Co-op, S Chambers, A Bingham, S Turner, R Boehm, M Wilcox and two anonymous individuals, May 2016.