Solar feed-in tariffs in 2017-18

Draft recommendation

1 May 2017

WHAT

IPART is undertaking a review of solar feed-in tariffs in NSW.

We are seeking stakeholder comment on a recommended benchmark range for solar feed-in tariffs of 11.6 to 14.6 cents per kilowatt hour (c/kWh) in 2017-18.[1]

WHY

Each year IPART is asked to review solar feed-in tariffs as part of the NSW Government's Renewable Energy Action Plan. IPART's recommendation must not result in an increase in electricity prices – it must be subsidy-free.

WHO

Our recommended solar feed-in tariff benchmark range is a guide for electricity retailers and residential and small business customers in NSW who have, or are planning to install, solar panels.

HOW

To make our draft recommendation, we used a methodology that estimates the value that electricity retailers receive when solar customers export electricity to the grid from their small-scale solar unit.

The three components that make up this value include:

- the amount that exported solar electricity would earn if it were sold on the wholesale electricity market at the time it was exported (retailers avoid paying for this)
- an amount to reflect the benefit of exported electricity being located close to where it is used (normally electricity is generated away from where it is used, and some of the electricity is lost as it flows over the transmission and distribution network)
- an amount for the market fees and charges that retailers avoid paying for on exported electricity.

The benchmark range has increased substantially since last year (5.5 to 7.2 c/kWh) due mainly to higher forecast wholesale electricity prices in 2017-18.

More information is attached to this Fact Sheet.

WHAT NEXT

We are inviting stakeholder comments on our methodology and draft recommendation until 29 May 2017.

Information on how to make a submission is provided on our website.

We will consider stakeholder comments and provide a Final Report to the Minister in June 2017.

[1] The benchmark range does not include GST.

1 What has IPART been asked to do?

We have been asked to recommend a 'benchmark range' for solar feed-in tariffs. The benchmark range is a guide as to the value of electricity exported to the grid from small-scale solar photovoltaic (PV) units in 2017-18.

Our terms of reference require that there should be no increase in retail electricity prices to provide subsidised feed-in tariffs.

The NSW Solar Bonus Scheme (SBS) was a subsidised feed-in tariff scheme. The 20 cents or 60 cents per kilowatt hour (c/kWh) feed-in tariffs provided under this scheme were funded by all electricity customers, through electricity prices that were higher than they otherwise would have been. The SBS ended on 31 December 2016.

2 What does IPART's review mean for me?

Our draft recommended benchmark range is **11.6 to 14.6 c/kWh**.[1] As noted above, the benchmark range is a guide for customers as to the value of electricity exported to the grid from small-scale solar PV units in 2017-18.

While it is not compulsory for retailers to offer electricity customers a feed-in tariff within the benchmark range, many voluntarily do.

Shop around for the best deal

We recommend that customers shop around for the best deal for their circumstances. When comparing offers, it is important to remember that the offer with the highest feed-in tariff may not represent the best deal overall. For example, an offer with a relatively high feed-in tariff my also include relatively high usage prices – so earning more from feed-in tariff payments may be outweighed by the higher charges paid for the electricity from the grid.

The Australian Government's Energy Made Easy website is a good place to compare the electricity offers and feed-in tariffs that retailers are currently offering. IPART's website also contains information about solar feed-in tariffs.[2]

3 How does IPART recommend the benchmark range?

Our approach to recommend the benchmark range for solar feed-in tariffs involves estimating the financial benefit that retailers receive when solar electricity is exported to the grid.

The financial benefit of exported solar electricity to retailers

The financial benefit to retailers is comprised of three components:

- the amount that exported solar electricity would earn if it were sold on the wholesale electricity market at the time it was exported (retailers avoid paying for this) – we estimate this amount by multiplying the forecast average wholesale electricity price in

[1] The benchmark range does not include GST.
[2] https://www.ipart.nsw.gov.au/Home/Industries/Energy/Solar.

NSW in 2017-18 by the 'premium' that solar electricity earns over the average wholesale price

- an amount to reflect the benefit of exported solar electricity being located close to where it is used (normally electricity is generated away from where it is used, and some of the electricity is lost as it flows over the transmission and distribution network – retailers avoid paying for these losses on exported solar electricity)
- an amount for the market fees and charges that retailers avoid paying for on exported solar electricity.

Section 5 of this information paper provides more details on our methodology.

Taking account of the financial benefit at different times of day

The financial benefit that retailers receive from exported solar electricity varies at different times of day, as the value of this electricity on the wholesale market also varies. We have taken account of this variation in setting the benchmark range. In line with previous years, the draft benchmark range for 2017-18 is based on:

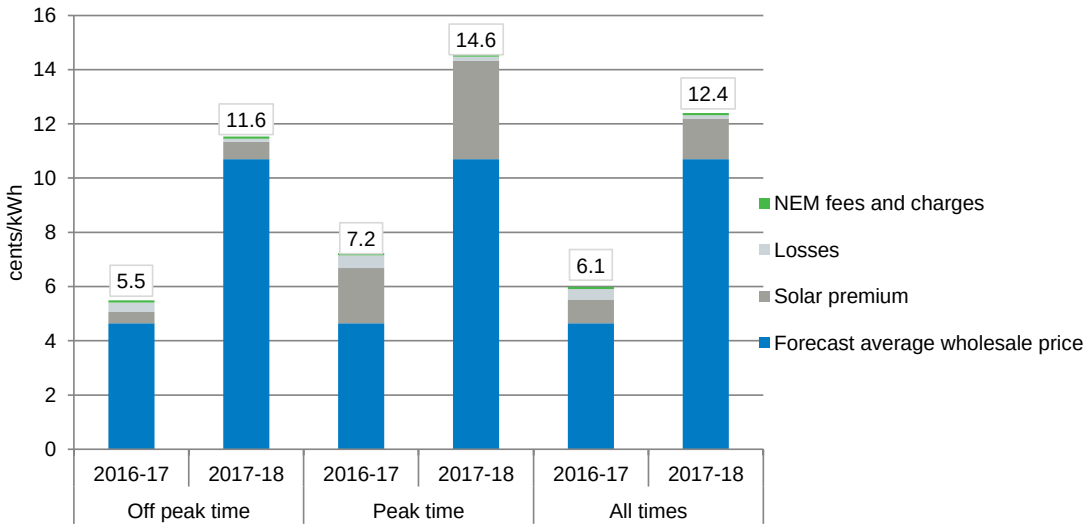
- the 2-hour period where solar exports are valued highest (this 'peak time' is 2-4pm and represents the upper end of the range), and
- the value of solar exports at all times except the 2-hour peak period (off peak time represents the lower end of the range).

We have also estimated the average value of exported solar electricity at all times.

4 Draft benchmark range for 2017-18

The draft benchmark range for 2017-18 is **11.6 to 14.6 c/kWh**. The value at all times is 12.4 c/kWh. As summarised in Figure 4.1 below, the draft benchmark range for 2017-18 is higher than in 2016-17 (5.5 to 7.2 c/kWh).

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

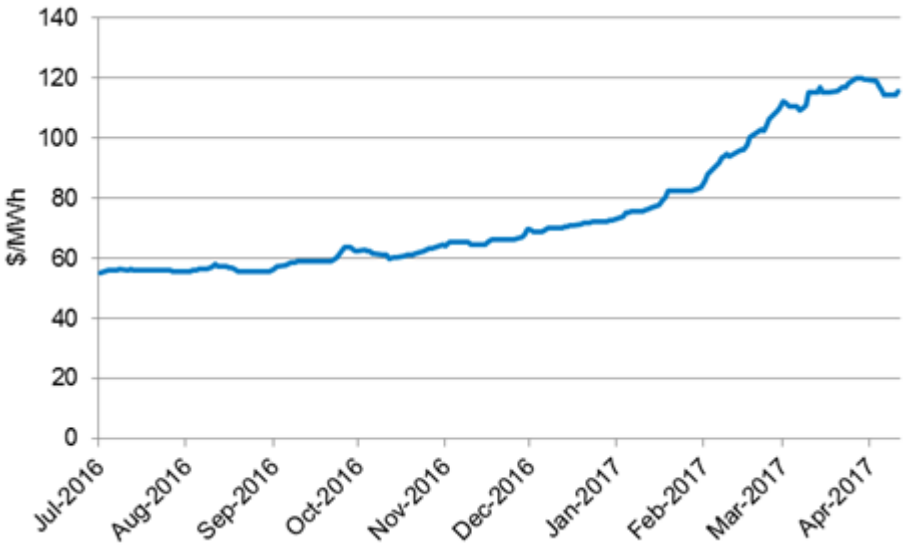


Data source: ASX, Ausgrid, Endeavour Energy, Essential Energy, AEMO, IPART.

Higher wholesale electricity prices are driving up the benchmark range

The main reason that the benchmark range is higher in 2017-18 relative to 2016-17 is because the forecast average wholesale electricity price in NSW has increased substantially as the market is predicting a tightening demand/supply balance (Figure 4.2).

Figure 4.2 ASX NSW Base Load electricity contract prices for 2017-18 ($/MWh)



Note: Series is ASX base strip prices for 2017-18 from 1 July 2016 to 11 April 2017.
Data source: Thomson Reuters.

5 More details on our methodology

This section 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:

Forecast average wholesale price × *solar premium* × *loss factor* + *NEM fees and charges*

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 forward contract prices, we:

- calculated a 40-day trading average of the ASX contract price for the coming financial year (2017-18) as at 11 April 2017, and
- removed an assumed contracting premium of 5% from the average price to arrive at a forecast average spot price.

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.

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 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. This may change as more digital / smart meters are installed across NSW. We would consider broadening the dataset once sufficient data is available.

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 the Australian Energy Market Operator's (AEMO) website.[3]

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.

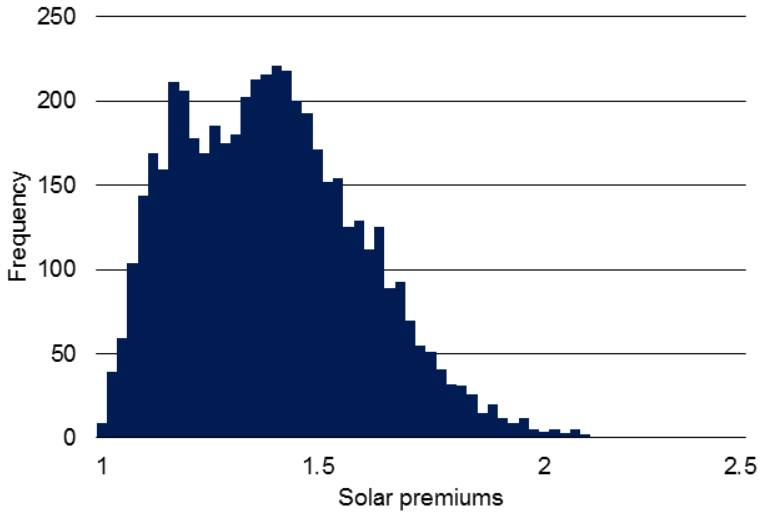
Our daily data contains half-hourly historical export profile and prices. To preserve the intra-day correlation between PV export and electricity prices, we sample days as a whole.

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 5.1). From this distribution we can calculate various summary statistics such as the median, 25th percentile and 75th percentile.

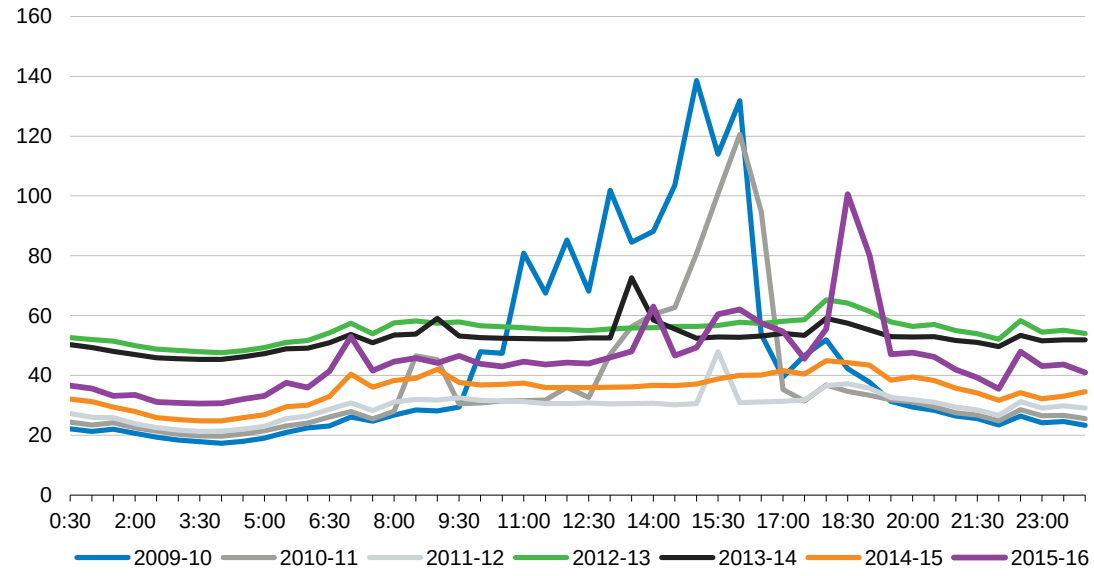
[3] http://www.aemo.com.au/Electricity/Data/Price-and-Demand/Aggregated-Price-and-Demand-Data-Files accessed 20 April 2017.

Figure 5.1 Distribution of solar premiums



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 5.2). More discussion on using the 25th percentile is provided in our 2015 Final Report.[4]

Figure 5.2 Average half-hourly NSW spot prices ($/MWh, nominal)



Data source: AEMO and IPART analysis.

[4] 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.

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 update our weighted average loss factor 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* × *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.

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.

Avoided social cost of carbon

Our recommended benchmark range does not include a value of avoided social cost of carbon. Retailers do not capture the financial benefits of any avoided social costs of carbon. Including such a value would require retail electricity prices to be higher to fund this amount. Our terms of reference require that there should be no increase in retail electricity prices to provide subsidised feed-in tariffs.[5]

Summary of our draft recommendation for 2017-18

Based on the methodology described above, Table 5.1 summarises the components in the draft benchmark range for 2017-18, compared to 2016-17.

[5] The Essential Services Commission in Victoria recently set a compulsory minimum feed-in tariff, which includes the value of avoided social cost of carbon. Essential Services Commission, *Minimum electricity feed-in tariff to apply from 1 July 2017 – Decision (Final)*, February 2017.

Table 5.1 Summary of the components in the benchmark range

	Forecast average price (c/kWh)	Solar premium	Loss factor	NEM fees and charges (c/kWh)	Total (c/kWh)
All times other than peak	10.70 (4.64)	1.06 (1.09)	1.01 (1.07)	0.08 (0.08)	11.6 (5.5)
Peak time (2-4pm)	10.70 (4.64)	1.34 (1.44)	1.01 (1.07)	0.08 (0.08)	14.6 (7.2)
All times	10.70 (4.64)	1.14 (1.19)	1.01 (1.07)	0.08 (0.08)	12.4 (6.1)

Note: Figures in brackets are from 2016-17. Total = Forecast average price x Solar premium x Loss factor + NEM fees and charges. Figures may not add up due to rounding.

Source: IPART.

6 Feed-in tariffs currently available in the market

We have examined a sample of voluntary feed-in tariffs on offer in all network areas (ie, Ausgrid, Endeavour Energy and Essential Energy) in NSW (Table 6.1).

The benchmark range for the current financial year 2016-17 is 5.5 to 7.2 c/kWh. As the table shows, all retailers, which have electricity offers available to solar customers, are currently providing feed-in tariffs that are within or above the current benchmark range. We also find that some retailers (eg, Click Energy and Origin Energy) are offering solar feed-in tariffs that are considerably above the current benchmark range for 2016-17.

Table 6.1 Voluntary feed-in tariffs in NSW (c/kWh, including inflation)

	Ausgrid	Endeavour	Essential
AGL	6.1	6.1	6.1
Alinta Energy	6.1	6.1	6.1
Click Energy[a]	6 & 10	6 & 10	6 & 10
Commander Power & Gas	6.5	6.5	6.5
Diamond Energy	8	8	8
Dodo Power & Gas	6.5	6.5	6.5
Energy Locals	10	10	10
Enova Energy	NA[b]	NA[b]	6 & 12
EnergyAustralia	6.1	6.1	NA[b]
Lumo Energy (NSW)	6	6	6
Mojo Power Pty Ltd	7.3	7.3	7.3
Momentum Energy[a]	0 & 7	0 & 7	0 & 7
Origin Energy[a]	6, 10 & 12	6, 10 & 12	6, 10 & 12
Pooled Energy	6	6	NA[b]
Powerdirect	6.1	6.1	6.1
Powershop	8.2	8.2	8.2
Red Energy[a]	6 & 6.5	6 & 6.5	6 & 6.5
Simply Energy	6.5	6.5	6.5

a Different feed-in tariffs are available for different electricity offers.

b No offers are available by these retailers in the distribution area.

Note: Postcodes sampled in the Ausgrid, Endeavour and Essential areas 2066, 2147, 2795 respectively. GST inclusive.

Source: www.energymadeeasy.gov.au accessed 27 April 2017.