Independent Pricing and Regulatory Tribunal | NSW

Solar feed-in tariff benchmarks 2021-22 IPART methodology

Technical Paper

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Energy

Tribunal Members

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The Independent Pricing and Regulatory Tribunal (IPART)

We make the people of NSW better off through independent decisions and advice. IPART's independence is underpinned by an Act of Parliament. Further information on IPART can be obtained from IPART's website.

We have made incremental improvements to our previous approach

Our feed-in tariff benchmarks are a guide to what customers could expect to receive from their retailers for their solar exports. Retailers are free to set their own feed-in tariffs.

This technical paper provides our final decisions on our methodology for setting feed-in tariff benchmarks. We have updated our previous approach to setting the feed-in tariff benchmarks to:

- Recognise that not all retailers set their feed-in tariffs the same way. Our methodology reflects the range of approaches that retailers take to setting their feed-in tariffs. This should mean that our benchmark is a better guide to the tariffs that customers could expect to receive from retailers for their solar exports.
- Simplify our approach to improve transparency and ensure that the regulatory costs are proportionate to setting a benchmark.

We also explain how we have considered stakeholder submissions to our Issues Paper and Draft Report in making our final decisions.

We will use this methodology to update our feed-in tariff benchmarks in 2022 and 2023.

Final decisions

1. We have included a longer historical average of Australian Securities Exchange energy futures for our forecast wholesale electricity costs, in addition to the short term (40-day) average.
2. To calculate the solar multiplier, we have calculated the average solar weighted and time weighted prices directly from three years of historical data. Previously, we used this historical data to generate a Monte Carlo simulation and used the median from the distribution of modelled scenarios.
3. We have used solar export data from all 3 distribution network service providers (Ausgrid, Endeavour Energy and Essential Energy) to calculate a solar multiplier for each network. We will reflect the variations in the solar multipliers within our state-wide benchmark ranges.

In line with our final decisions, we have set the feed-in tariff benchmarks by:

1. Forecasting the average wholesale electricity price for 2021-22 using NSW baseload electricity futures contracts traded on the Australian Securities Exchange (ASX). We have taken a 40-day average to reflect the latest market information on forecast wholesale spot prices to establish one end of the range. We have also taken a volume weighted average of all historical trades available to establish the other end of the range to reflect retailers' actual practices in purchasing wholesale electricity to hedge wholesale spot price risk.

   Previously, we only took the 40-day average of the ASX energy futures. We provide further detail below on our final decision on forecast wholesale electricity prices.

2. Applying a 'solar multiplier' to reflect whether wholesale prices are likely to be lower or higher than the average wholesale price at the times when solar exports occur. Typically, wholesale prices in the National Electricity Market (NEM) are lowest at night (when demand is lowest) and through the middle of the day (when solar energy meets a proportion of demand). We have calculated the ratio of the average solar-weighted price to the average time weighted price using the most recent three years of historical wholesale spot prices and net solar export data.[1]

   We have calculated individual solar multipliers for each of the 3 distribution network areas, and reflected the variations within our benchmark range. Previously, we only had data from Ausgrid.

3. Increasing the value of our benchmark range by an avoided loss factor. When electricity is purchased from the NEM and flows through the transmission and distribution networks some of it will be lost. However, given that solar exports are located closer to where it will be used by other customers, less needs to be purchased by retailers to meet the same level of demand.

4. Adding the value of the NEM fees and charges that retailers avoid paying when they supply customers with other customers' solar exports because these charges are levied on retailers' net purchases.

Using this methodology, our final all-day solar feed-in tariff benchmark for 2021-22 is 4.6 to 5.5 c/kWh (Table 1). More detail on each of these aspects of our calculation are provided in this paper.

1 For the purposes of setting our feed-in tariff benchmarks we are focussing on customers' net solar exports – the unused electricity that is exported to the grid. This is the volume of electricity for which customers will earn feed-in tariff revenue.

Table 1 Components for the final all-day solar feed-in tariff benchmark range 2021-22

Benchmark component	2020-21	2021-22 (Draft)	2021-22 (Final)
Forecast wholesale electricity price range	5.7 to 7.0 c/kWh	4.6 to 6.1 c/kWh	4.9 to 5.7 c/kWh[c]
ASX futures baseload contracts for the 12-month period 2021-22 using the 40-day average price (including 5% adjustment to remove contract premium)	6.4 c/kWh	4.6 c/kWh	4.9 c/kWh
ASX futures baseload contracts for the 12-month period 2021-22 using a volume-weighted average of all historical trades	Not applicable[a]	6.1 c/kWh	5.7 c/kWh
Solar multiplier range	0.97	0.88 to 0.91	0.88 to 0.90
Ausgrid	0.97	0.90	0.89
Endeavour Energy	Not available[b]	0.88	0.88
Essential Energy		0.91	0.90
Network loss factor	1.06	1.06	1.06
NEM fees and ancillary charges	0.10 c/kWh	0.09 c/kWh	0.09 c/kWh[d]
Solar feed-in tariff benchmark range	**6.0 to 7.3 c/kWh**	**4.4 to 5.9 c/kWh**	**4.6 to 5.5 c/kWh**

a. In setting our last feed-in tariff benchmark in 2020-21, our estimated average wholesale spot price range was based on a +/-10% range for uncertainty.

b. In our last benchmark, we based the solar multiplier estimate on Ausgrid data only, due to data quality issues.

c. Prices taken at 17 May 2021. For our longer-term historical average, the trades available commenced from May 2019.

d. NEM fees for 2021-22 are estimated as 0.06c/kWh, based on AEMO's advice of proposed 8.3% increase in its NEM fees (of 0.054c/kWh from 2020-21), 31 May 2021.

Note: The main difference between our final and draft benchmarks for 2021-22 is due to changes in our estimates for the forecast wholesale electricity price range. The increase in the lower bound reflects the recent increase in forecast wholesale electricity prices (see Figure 1 below). The decrease in the upper bound is due to a modelling error where we overstated the longer-term historical forecast of wholesale electricity prices.

We have set time-dependent benchmarks

Retailers could offer different feed-in tariffs across the day as an alternative to an all-day rate. However, retailers are choosing to offer their customers a single feed-in tariff that applies at all times.[2]

Under our Terms of Reference, we are required to set time-dependent feed-in tariff benchmarks. We have set prices for different times based on how much price variation occurs throughout the day. Very little price variation occurs in the earlier part of the day between 6 am and 3 pm. Therefore, we have set one price for this time. On the other hand, prices vary a lot between 3 pm and 8 pm so we have set hourly benchmarks for these times. This is consistent with our previous approach. Table 2 provides our final time-dependent tariff benchmarks.

We have also set a price for between 8 pm to 6 am so that we have a time-dependent benchmark tariff available for all times of the day. This will accommodate solar exports from batteries at any time during the day.

[2] An exception is Amber Electric that is offering a real-time feed-in tariff that varies every 30 minutes in line with changes in the wholesale spot price of electricity, as at 23 April 2021.

Table 2 Final benchmark ranges for time-dependent feed-in tariffs

Time window	2020-21 ranges (c/kWh)	2021-22 Draft ranges (c/kWh)	2021-22 Final ranges (c/kWh)	% of solar exports 2019-20[a]
6 am to 3 pm	5.7 to 7.0	4.1 to 5.5	4.3 to 5.1	91.77
3 to 4 pm	6.5 to 7.9	6.4 to 8.8	6.6 to 8.1	5.85
4 to 5 pm	7.8 to 9.5	9.2 to 14.2	9.6 to 12.4	1.97
5 to 6 pm	9.0 to 11.0	11.0 to 17.0	11.5 to 14.5	0.30
6 to 7 pm	8.8 to 10.8	8.2 to 10.7	8.5 to 9.9	0.02
7 to 8 pm	8.0 to 10.0	6.0 to 7.9	6.3 to 7.3	0.01
8 pm to 6 am	-	4.2 to 5.4	4.3 to 5.1	0.08

a. Based on Australian Eastern Standard Time (AEST). These are different to the proportions previously reported due to different treatment of daylight savings.

Note: These tariffs are for Australian Eastern Standard Time (AEST). The benchmarks for the 6 pm to 7 pm, 7 pm to 8 pm and 8 pm to 6 am time windows are based on solar multipliers that are not solar-weighted. These times cover less than 0.5% of solar exports. In previous years we did not set a benchmark between 8 pm to 6 am because exports are immaterial and wholesale prices are relatively low at those times (e.g. IPART, Solar feed-in tariffs 2018-19, June 2018, p 8).

Source: IPART analysis based on financial year 2020 export data provided by Endeavour Energy (February 2021), Essential Energy (April 2021) and Ausgrid (April 2021).

We set a range for the forecast wholesale price using the latest market and historical information

The forecast average wholesale electricity price is the key determinant of our benchmark tariffs. Retailers avoid this cost when they use exports from customers rather than purchasing electricity from the NEM.

Our final decision is that the forecast average wholesale electricity price for 2021-22 is 4.9 to 5.7 c/kWh.

Under our Terms of Reference, we have been asked to set a voluntary benchmark range for solar feed-in tariffs paid by retailers. To establish the range, our final decision is to use a:

- 40-day average of ASX energy futures to reflect that retailers may base their prices using the latest market information (including a 5% downward adjustment to remove the contract premium) (4.6 c/kWh)
- a volume weighted average of all historical trades of ASX energy futures to reflect retailers' actual practices in purchasing electricity to hedge wholesale spot price risk (5.7 c/kWh).[3]

Our previous approach was to only use the 40-day average of ASX energy futures. We then established a range by multiplying our forecast by ± 10% to recognise the forecasting uncertainty around wholesale prices. We have no longer applied the ± 10% to our wholesale price estimates.

[3] Only trades since June 2019 were available for ASX energy futures for 2021-22, and so 5.6 c/kWh represents a 23-month volume-weighted average price.

Our new approach recognises that retailers may have different approaches to setting feed-in tariffs. Because it reflects that retailers may value solar exports differently, our benchmark range could provide a more helpful guide to customers of the feed-in tariffs they might receive from retailers.

We have continued to adjust our 40-day average of ASX energy futures downwards by 5% to reflect that contracts typically trade at a premium to spot prices. This approach is the same assumption we used when we regulated retail electricity prices.

However, for our longer-term average, we have not made the same 5% downward adjustment. This is because we are reflecting retailers' actual practices in purchasing electricity, rather than prevailing spot prices, which includes hedging costs.

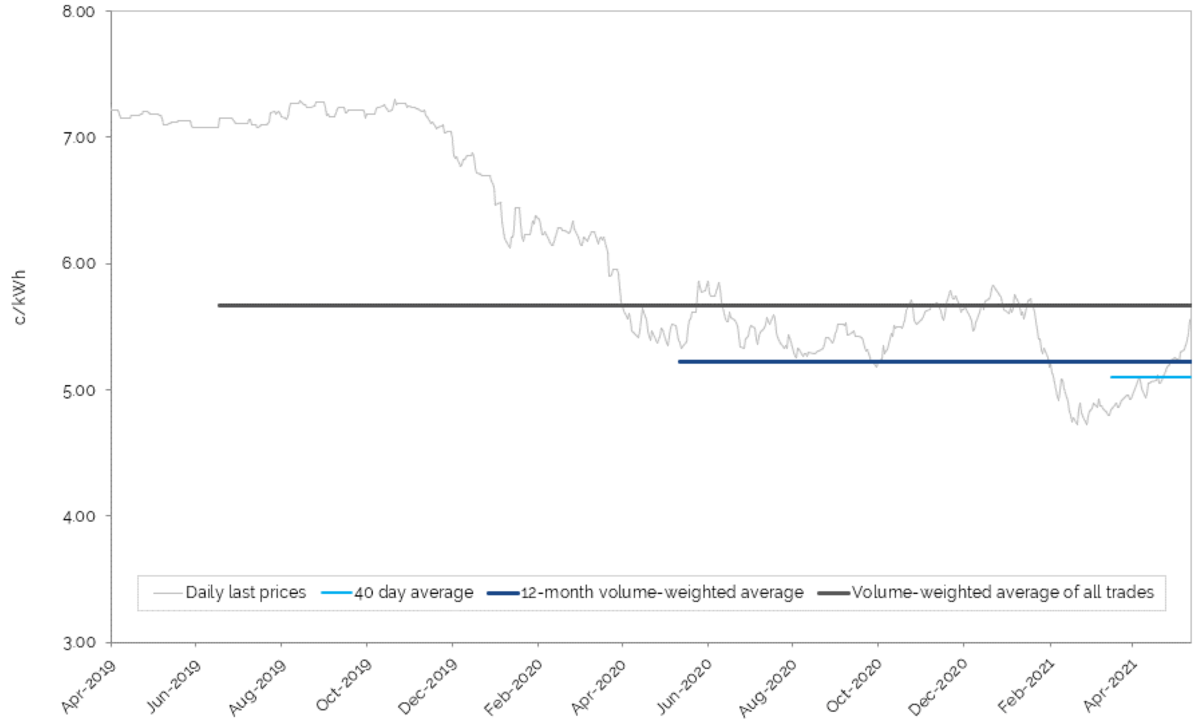
In response to our Draft Report, only Origin Energy commented on our approach.[i] It submitted that it supported our revised approach of incorporating historical trades of ASX energy futures. It considered that such an approach provides a better reflection of retailers' actual practices in purchasing electricity.

Including a longer-term average of ASX futures contracts in our range would recognise that retailers may have different approaches to purchasing wholesale electricity. It would also better align our approach with other regulators in setting solar feed-in tariffs, regulating electricity prices, and forecasting costs. For example:

- The Essential Services Commission uses a 12-month volume-weighted average price of ASX quarterly baseload futures when setting its minimum feed-in tariff for Victoria.[ii]
- The AER uses a market hedging approach and adopts a volume-weighted average of ASX Electricity futures contract prices using all available trade and price data when setting its Default Market Offer. The majority of trades are 24 months prior to the start of the determination period.[iii]
- The Queensland Competition Authority adopts the same approach as the AER for forecasting wholesale costs when setting the feed-in tariff for regional Queensland.[iv]
- The Australian Energy Market Commission uses contract prices based on an exponential book build where futures hedge contracts are procured over a 24-month period prior to delivery. This is for its wholesale market costs modelling which underpins its residential electricity price trends forecasts.[v]

Figure 1 below compares the different averaging periods of ASX futures contracts. It shows that forecast average wholesale prices have been decreasing significantly in recent months. Depending on retailers' actual practices, some may offer feed-in tariffs higher than the latest forecasts, reflecting their hedging strategies.

Figure 1 Forecast average wholesale electricity prices for 2021-22



Source: Data from Refinitiv and Bloomberg, ASX NSW Baseload Electricity Strip June 2022, accessed 17 May 2021.

We apply a solar multiplier to the wholesale price forecasts

The solar multiplier is the ratio of the solar output-weighted wholesale price to the time weighted wholesale electricity price, where:

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

If more solar exports occur during times when wholesale spot prices are higher than average, the solar multiplier will be greater than one. If more exports occur when wholesale spot prices are lower than average, then it will be less than one.

A stylised worked example of how we calculate the all-day solar multiplier is set out in Box 1.

Box 1 Stylised worked example of how we calculate the all-day solar multiplier

Assume that the spot price is set in the electricity market 4 times across the day, and there are only 3 days in a year, so that there are only 12 prices in the year. The first spot price that occurs each day is for the morning, the second is for the afternoon (when the majority of exports occur), the third is in the evening (when exports are very low), and the fourth is at night (when the solar exports are negligible).

The first 2 days in this example are sunny days, and the third is cloudy (and so the proportion of exports over this day is lower).

		Price	Proportion of exports	Price x proportion of exports
Day 1				
	Spot price 1 (morning)	$70	15%	$11
	Spot price 2 (afternoon)	$40	20%	$8
	Spot price 3 (evening)	$150	0.50%	$1
	Spot price 4 (night)	$50	0%	$0
Day 2				
	Spot price 5 (morning)	$80	16%	$13
	Spot price 6 (afternoon)	$50	25%	$13
	Spot price 7 (evening)	$120	0.50%	$1
	Spot price 8 (night)	$40	0%	$0
Day 3				
	Spot price 9 (morning)	$90	8%	$7
	Spot price 10 (afternoon)	$60	14%	$8
	Spot price 11 (evening)	$100	0.50%	$1
	Spot price 12 (night)	$50	0%	$0
Solar export weighted price			100%	$61
Average (time-weighted price)		$75		
Solar multiplier (solar weighted price / average price)				**0.82**

We apply a solar multiplier to the longer-term average of historical ASX energy futures (which is a forecast of the average daily spot price and is inclusive of a hedging premium) to reflect the avoided cost of solar exports to retailers under their actual practices of hedging spot price risk.

We obtained expert advice from HoustonKemp about the appropriateness this approach. It advised that this approach was reasonable and approximated the value of hedging costs that retailers avoid when they hedge their spot price risk. This is because:

- the value of solar exports to retailers is the value of the hedging costs they avoid by forecasting that a certain portion of their electricity demands would be met from solar exports
- over the longer term, the value of the hedging costs can be approximated by the value of solar exports when they occur plus a hedging premium.[vi]

The HoustonKemp report is available on the IPART website.

We have simplified our approach to calculating the solar multiplier

Our final decision is to calculate the solar-weighted average and time-weighted averages directly using historical export and spot price data. This is simpler than our previous approach, where we used this same data to generate a Monte Carlo simulation.[4] We then selected a median value from the resulting distribution of solar multipliers.

In March 2021, we released a Working Paper that showed the difference in solar multipliers between the simplified approach and the Monte Carlo method:

- For the all-day solar multipliers, the difference was small.
- There could be some variation between the two approaches for the time-dependent solar multipliers during times where there is significant price volatility. The Monte Carlo method smooths out the occurrence of extreme prices in the actual data through the simulation process. The resulting difference in feed-in tariffs where most of the price volatility occurs is up to about 2 c/kWh (between 3 pm to 6 pm).

Most of the stakeholders that commented on the solar multiplier supported our simpler approach as it is more transparent and replicable compared to the Monte Carlo method.[vii] AGL also stated that Frontier Economics had recommended against the use of the Monte Carlo approach to the Essential Services Commission in Victoria for their latest feed-in tariff decision.[viii] This was because it may inappropriately preserve historical correlations between prices and exports (when a longer data set is used).

Climate Change Balmain-Rozelle suggested an alternative approach which involved constructing a data set representing many years' worth of weather conditions.[ix] For each time of year and time of day, the dataset would record a probability distribution of conditions (such as temperature and solar irradiation).

[4] See Chapter 5 of our Issues Paper for further details on how we previously calculated the solar multiplier using a Monte Carlo method.

Our final decision is to adopt a simpler approach that is more transparent and replicable. Our feed-in tariff benchmarks are a guide as to what customers could expect to receive from retailers. Therefore, we do not want to imply a false level of precision by adopting a more complex approach.

We have continued to use the last 3 years of historical data

Our final decision is to maintain our approach of using the most recent 3 years of historical data, to calculate our best estimate of the forecast solar multiplier for the upcoming financial year. Specifically, we would calculate separate solar multipliers for:

- the most recent year of data
- the most recent 2 years of data, and
- the most recent 3 years of data.

We have used the midpoint of the minimum and maximum values from the above 3 historical data sets. This approach gives more weight to the most recent year of data, while balancing any one-off events by having an additional two years of historical data.

Most stakeholders supported this approach. AGL and Origin Energy considered that the dynamic nature of solar uptake means that using longer historic data may not provide an accurate picture of current market conditions.[x] Origin Energy considered our current approach, which places more weight on the most recent year, to be pragmatic.

However, EnergyAustralia considered that we should project the solar multiplier for the upcoming financial year, rather than using historical data only. It submitted this would provide a better guide to customers about the expected reductions in feed-in tariffs..[xi] By extrapolating historical data it forecasted that the solar multiplier is likely to decrease even further in 2021-22, resulting in a lower all-day feed-in tariff benchmark of 3.8 to 5.7 c/kWh, compared to our Draft Report of 4.4 to 5.9 c/kWh.

We consider our existing approach to be reasonable and proportionate to our role in setting a voluntary benchmark that provides a guide for customers.

- We publish annual updates to our benchmarks, which reflects the most recent solar export data available. This provides customers with an updated guide each year about the value of their solar exports.
- We have published an information paper on the medium to longer-term outlook to provide customers with expectations about the value of their solar exports – that they are likely to be worth half of what they were over the last few years.

In response to EnergyAustralia's submission, we examined wholesale spot prices for 2020-21 (up to May 2021) to estimate what the likely solar multiplier would be in 2020-21. We found that at certain times in November and December 2020 the spot price increased up to $7,500/MWh when solar exports occurred (around 1 pm to 2 pm).[xii] Using Ausgrid's solar export data for 2019-20 as an example[5] and applying it to the spot prices for 2020-21 (up to May 2021), we calculated a solar multiplier for Ausgrid of 0.86 compared to 0.85 for 2019-20. Therefore, the actual solar multiplier for 2021-22 may be higher compared to a forecast that extrapolates historical data as proposed by EnergyAustralia. As such, we have decided not to extrapolate historical data to estimate the solar multiplier for 2021-22.

Our benchmark range includes solar multipliers from each network

We calculated solar multipliers for each network (Table 3 and Table 4).[6] These are very similar for each network:

- For the all-day feed-in tariff benchmark, and for most time periods in our time dependent benchmarks, the resulting differences in benchmark tariffs across the 3 networks would be less than 1 c/kWh.
- For the time periods with slightly larger variation in multipliers, the resulting difference in benchmark tariffs across the 3 networks would be about 2 to 3 c/kWh.

Because there is very little variation between the solar multipliers during most times, our final decision is to set a state-wide benchmark range, which incorporates the variations between networks.

The all-day solar multiplier ranges from 0.88 to 0.90. Therefore, for our all-day feed-in tariff benchmark we have applied:

- the 0.88 solar multiplier to the lower end of our forecast wholesale electricity price (i.e. the 40-day average of the ASX energy futures)
- the 0.90 solar multiplier to the upper end of the forecast wholesale electricity price (i.e. the longer-term average).

Similarly, for the time-dependent multipliers we have applied the lower (higher) multiplier to the lower (upper) end of our forecast wholesale electricity price for each time period.

The multipliers for Endeavour are lower than for the other networks. This is because there were less solar exports from customers in Endeavour's network when wholesale prices were higher.

Our final all-day solar multipliers are lower than the solar multiplier for 2020-21 and for previous years, which ranged from 0.97 to 0.99.[xiii] The lower multipliers are due to lower historical wholesale prices during the middle of the day as a result of increased penetration of solar panels.

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5 Corresponding solar exports should be used when examining spot prices to establish the appropriate relative wholesale value of solar exports when they occur. However, we have used solar exports for 2019-20 to apply to spot prices for 2020-21 (up to May 2021) as an example of the likely solar multiplier for 2020-21.

6 Previously, we only had net solar export data from Ausgrid.

Table 3 All-day solar multipliers for the 3 networks

	Ausgrid	Endeavour	Essential
2019-20	0.85	0.83	0.86
2018-19 to 2019-20	0.90	0.88	0.92
2017-18 to 2019-20	0.93	0.92	0.94
Selected value – midpoint of min and max values	0.89	0.88	0.90

Source: IPART analysis based on export data provided by Endeavour Energy (February 2021), Essential Energy (April 2021) and Ausgrid (April 2021) for financial years 2018 to 2020.

The time-dependent multipliers represent the average value of wholesale prices during each time period relative to the average wholesale price across the day. Our final time-dependent multipliers are higher in the evening periods compared to previous years. This is because of higher wholesale prices in the peak periods from 4pm to 6pm during 2019-20 compared to previous years. However, very few solar exports occur during these hours – about 2% of daily exports (and so do not materially affect the all-day solar multipliers).

In Table 4, the time-dependent multipliers between 6 pm to 6 am have not been weighted by solar exports. During these times solar exports are negligible, so the main reason for setting benchmarks for these periods is to provide a price signal for the value of battery exports (which could occur at any time).

Table 4 Time-dependent multipliers for the 3 networks

	6am to 3pm (Solar weighted)	3pm to 4pm (Solar weighted)	4pm to 5pm (Solar weighted)	5pm to 6pm (Solar weighted)	6pm to 7pm (Time weighted)	7pm to 8pm (Time weighted)	8pm to 6am (Time weighted)
Ausgrid	0.84	1.32	1.92	2.41	1.65	1.21	0.83
Endeavour	0.82	1.28	1.86	2.22	1.65	1.21	0.83
Essential	0.84	1.33	2.05	2.34	1.65	1.21	0.83

Source: IPART analysis based on export data provided by Endeavour Energy (February 2021), Essential Energy (April 2021) and Ausgrid (April 2021) for financial years 2018 to 2020.

Stakeholders supported calculating a solar multiplier for each of the 3 networks to reflect the diversity across the different regions. AGL submitted that if we were to set different benchmarks for different networks it would not create material issues as retail contracts are already offered on a network basis.[xiv] However, Origin Energy submitted a preference for a single NSW network benchmark with the potential for any network variation to be incorporated within the benchmark range.[xv] This is because it considered the costs to implement separate network benchmarks to be significant.

If we were to adopt different time-dependent benchmarks for each network, then for the 5pm to 6pm period (which has the greatest variation), the resulting benchmarks are likely to vary by up to 2 to 3 c/kWh. For most of the other time periods, the benchmarks would be very similar with differences less than 1 c/kWh. Given that the differences are not significant, our final decision is to adopt a single benchmark and to reflect the variations within our benchmark range.

We found minimal variance in solar multipliers between climate zones

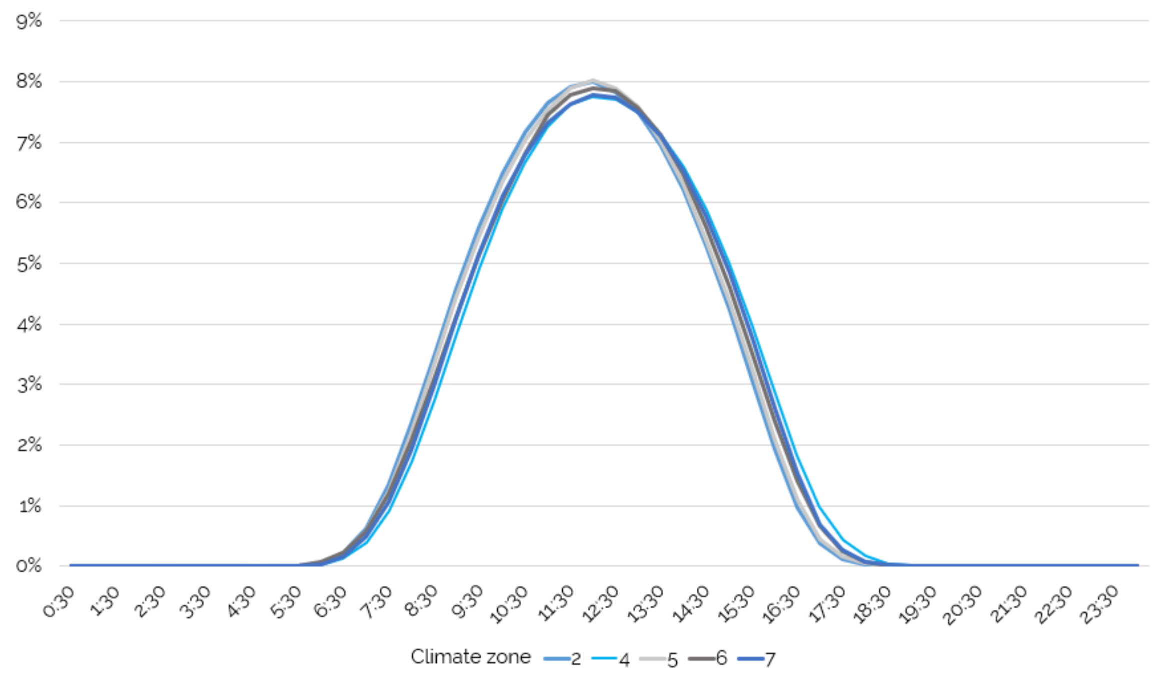
In response to our Draft Report, PIAC submitted that we should consider adopting different solar multipliers for different climate zones in NSW, especially for Essential Energy since the solar availability will vary across their jurisdiction.[xvi] It considered that the difference in general climate and weather patterns will affect both the gross solar generation from a system and a household's typical usage pattern, and hence the amount of solar generation exported to the grid.

Our solar multipliers are calculated based on the proportion of solar electricity that is exported in each half hour across the day, rather than the total amount generated during each of these half hours. This means that it is possible for regions with higher net exports overall to have a lower solar multiplier, if more of this electricity is exported when prices are lower.

We found that there is not a significant difference in the timing of solar exports between regions which means the solar multipliers are similar for the different climate zones – see Table 4 below. This means that the value of solar exports (per kWh) when they occur are similar between different climate zones in NSW. However, areas that generate more solar electricity and export more to the grid, will receive higher feed-in tariff revenue overall.

Figure 2 shows the proportion of exports during the day for different climate zones in NSW using solar export data from Essential Energy (which covers up to 95% of NSW).

Figure 2 Proportion of net exports during the day in different climate zones within Essential Energy's network



Source: IPART analysis based on net export data provided by Essential Energy for financial years 2018 to 2020, April 2021; Australian Energy Regulator, Simple electricity and gas benchmarks, postcode mapping, December 2020.

Table 5 All-day solar multipliers in the different climate zones within Essential Energy's network

Climate zone	Sample postcode areas	Estimated solar multiplier
2 – warm humid summer, mild winter	Arakoon, Coffs Harbour, Lismore	0.88
4 - hot dry summer, cool winter	Tamworth, Broken Hill, Narrabri	0.91
5 - warm temperate	Brandy Hill, Batar Creek, Port Macquarie	0.88
6 - mild temperate	Batemans Bay, Bega, Glen Innes	0.89
7 - cool temperate	Armidale, Bannaby, Orange	0.90
Average		**0.89**

Note: The random sample data provided by Essential Energy did not contain customers with postcodes in climate zones 1 (high humidity summer, warm winter), 3 (hot dry summer, warm winter) and 8 (alpine).
We based the solar multipliers in the climate zones developed by the Australian Building Codes Board. This is consistent to the localised zones for electricity benchmarks used by the Australian Energy Regulator, in its electricity and gas benchmarks.
Source: IPART analysis based on net export data provided by Essential Energy for financial years 2018 to 2020, April 2021; Australian Energy Regulator, Simple electricity and gas benchmarks, postcode mapping, December 2020; Australian Building Codes Board, Climate zone map: New South Wales and Australian Capital Territory, last accessed 2 June 2021.

Given that the variations in the solar multiplier between different climate zones are reasonably reflected in our benchmark range, we have not made any further adjustments.

We also provide information on the differences between solar generation and consumption between different areas in NSW in Appendix A.

How we calculate avoided loss factors

When retailers purchase electricity on the NEM, they must buy more than they supply to customers because some will be lost as the electricity flows along the transmission and distribution networks. However, when retailers supply solar exports, these losses don't occur because solar exports tend to be consumed close to where they are produced. This results in a saving (or avoided cost) for retailers.

To account for this avoided cost, we multiply our adjusted forecast average wholesale price of solar exports by a loss factor. We estimate this loss factor using loss factors published by the Australian Energy Market Operator (AEMO). We weight the average loss factor across the 3 distribution network areas in NSW, accounting for both transmission and distribution line losses. We include:

- Marginal Loss Factor (MLF), which 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
- Distribution Loss Factor (DLF) which is distribution loss factors for small customers for the coming financial year, weighted by customers' actual consumption.

Appendix

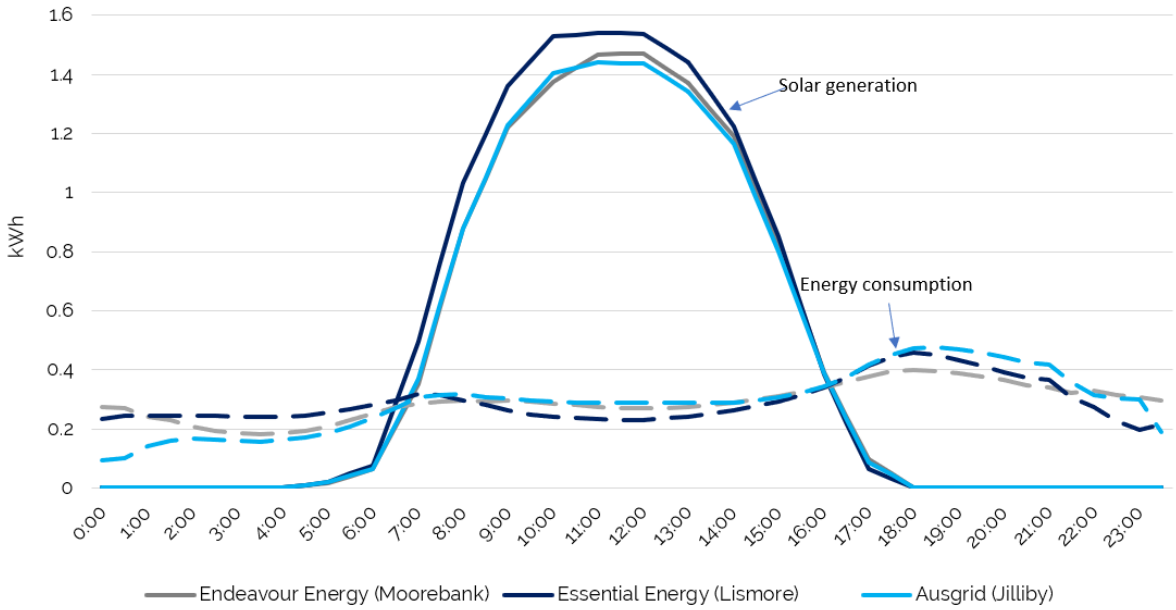
A Solar generation by regions in NSW

We investigated solar generation data between different areas in NSW (Lismore, Jilliby and Moorebank). Figure A.1 shows the average solar generation and electricity consumption for these locations for a customer with a 5 kW system.[7]

The sample region (Lismore) for Essential Energy shows that more solar electricity is generated overall. Customers that generate more electricity and have more solar exports will receive higher feed-in tariff revenue.

However, the times at which solar electricity is generated is similar to the other regions. This means that the value of solar exports (per kWh) when they occur is similar.

Figure A.1 Average daily solar generation and consumption profiles in sample regions across the three networks in NSW



Note: The sample regions provided by AEMC is in Lismore (Essential Energy), Jilliby (Ausgrid) and Moorebank (Endeavour) for the calendar year 2018. The above analysis assumes 5kWh system capacity, north facing panels and 5,100 kWh yearly consumption.
Source: IPART analysis based on data from the AEMC, 21 May 2021.

7 Using the net system load profiles for each distribution area to allocate the consumption across different times of the day.

[i] Origin Energy submission to IPART's Draft Report, May 2021.
[ii] ESC, Minimum electricity feed-in tariff to apply from 1 July 2020, February 2020, p 25.
[iii] AER, Default Market Offer Prices 2021-22 – Draft Determination, February 2021, p 35.
[iv] ACIL Allen, Report to QCA, Estimated energy costs – 2020-21 Retail tariffs for use by the Queensland Competition Authority in its Draft Determination on retail electricity tariffs, 8 June 2020, p 13.
[v] EY, AEMC, Residential electricity price trends – Wholesale market costs modelling 2018, 18 December 2018, p 15.
[vi] HoustonKemp, Retailer wholesale energy purchasing practices given solar exports, May 2021, p ii.
[vii] AGL submission to IPART's Issues Paper, March 2021, p 2; Origin Energy submission to IPART's Issues Paper, March 2021, p 2; PIAC submission to IPART's Issues Paper, March 2021, p 3.
[viii] AGL submission to IPART's Issues Paper, March 2021, p 2.
[ix] Climate Change Balmain-Rozelle submission to IPART Issues Paper, March 2021, pp 3-4.
[x] AGL submission to IPART's Issues Paper, March 2021, p 2; Origin Energy submission to IPART's Issues Paper, March 2021, p 2.
[xi] EnergyAustralia submission to IPART's Draft Report, May 2021.
[xii] AEMO, Aggregated price and demand data – Historical and Current.
[xiii] AGL submission to IPART's Issues Paper, March 2021, p 2.
[xiv] AGL submission to IPART's Issues Paper, March 2021, p 2.
[xv] Origin Energy submission to IPART's Issues Paper, March 2021, p 2.
[xvi] PIAC submission to IPART's Draft Report, May 2021, p 1.