Independent Pricing and Regulatory Tribunal
New South Wales

SOLAR FEED-IN TARIFF BENCHMARKS

APPROACH TO SETTING BENCHMARKS 2021-22 – 2023-24

Issues Paper
Energy

February 2021

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The Independent Pricing and Regulatory Tribunal (IPART)

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Tribunal Members

The Tribunal members for this review are:

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Invitation for submissions

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

Submissions are due by 15 March 2021

We would prefer to receive them electronically via our online submission form.

You can also send comments by mail to:

Solar feed-in tariff benchmarks
Independent Pricing and Regulatory Tribunal
PO Box K35
Haymarket Post Shop, Sydney NSW 1240

Late submissions may not be accepted at the discretion of the Tribunal. Our normal practice is to make submissions publicly available on our website as soon as possible after the closing date for submissions. If you wish to view copies of submissions but do not have access to the website, you can make alternative arrangements by telephoning one of the staff members listed above.

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

Summary

Since 2012, IPART has been setting benchmarks to guide customers with solar panels about how much they could expect to be paid by their retailer for the solar electricity that they generate and export to the grid. The NSW Government has asked IPART to continue to set these benchmarks for the next 3 financial years. We are seeking feedback on our approach to calculating these.

Retailers are not required to pay customers for the electricity that they generate, but most of them do. If retailers do offer feed-in tariffs to their customers, they set this tariff themselves. IPART's benchmarks provide information to consumers about how much this electricity is worth to help them compare retail offers. This empowers customers to make environmentally and financially sustainable choices, consistent with the NSW Government's Net Zero Plan Stage 1: 2020-2030 to reduce emissions over the next decade so that net emissions fall to zero by 2050.

We set benchmarks based on a forecast of the average value of solar electricity. This value fluctuates with supply and demand each year, and so we update the benchmark range each financial year to reflect these changes. As we have done in previous reviews, we are proposing to set the benchmark ranges around a forecast of the average value of wholesale electricity, multiplied by a 'solar multiplier' and a network loss factor, plus national electricity market ('NEM') fees and charges.

The benchmark feed-in tariff across the whole day is currently 6.0 to 7.3 cents per kilowatt hour (c/kWh). We also set feed-in tariffs for different times across the day. The forecast wholesale prices are currently lower than our forecasts for this year, so the benchmarks are likely to fall for 2021-22. These expectations are driven by falling demand and more renewable generation coming into the market. However, we will use the most up to date data when we publish our benchmarks in June.

We are seeking feedback on the following, as well as any other relevant issues:

1. Is there enough information for customers to make the best financial decisions (given how much electricity they use and when they use it) on:
   - whether to invest in solar systems?
   - the size of the system most suitable for them?
   - the retail offer they should choose?
2. Are retailers providing new types of offers to households that can help them optimise the times that their energy is used, exported, or stored, for the benefit of these households, and other customers? Are customers interested in getting different prices for solar at different times across the day, depending on how much it is worth at the time?

3 Are there any barriers to customers installing batteries? What options are available to customers?

4 Are consumers facing any problems getting paid for their solar exports? For example, are smart meter installations timely? Are consumers able to export all the solar electricity that they wish to export? Is there adequate notice about solar feed-in rates changing?

5 How should we estimate the inputs to the forecast value of solar electricity, including:

The wholesale value of electricity

– Should we be forecasting the wholesale spot price?

– If so, should we continue to use ASX futures contract prices as the main source of data, and is a 5% contract premium still appropriate?

– What period of data should we use?

– Are there other available forecasts published by Australian regulators that could be suitable for our purposes?

The solar multiplier

– Which calculation method provides the most appropriate balance of precision, transparency, and use of taxpayer resources?

– What historical time period provides the best indication of the future relationship between prices at the times solar is exporting to the grid and the average price of electricity over a day? If multiple years are used, how should the data be weighted across years?

– How should we use different solar export profiles from each network to calculate a solar multiplier?

6 How should we form a range around our values of solar electricity? If we continue to set a range based on forecasting uncertainty around the average wholesale value of electricity, what should this range be?

7 How should the day be divided to set different solar feed-in tariff benchmarks for different times across the day? Are there barriers to retailers offering customers more cost-reflective time dependent offers?

8 Have there been any changes to the market design that affect the value of solar exports, and the inputs that should be included in our calculation?

Contents

1 Introduction

The NSW Government is committed to taking decisive and responsible action on climate change. In March 2020, the NSW Government released its Net Zero Plan Stage 1: 2020-2030 to set out how it will reduce emissions over the next decade so that net emissions fall to zero by 2050.

The plan will support a range of initiatives targeting electricity and energy efficiency, electric vehicles, hydrogen, primary industries, coal innovation, organic waste and carbon financing. Businesses will be supported to modernise their plant and increase productivity, while farmers will have access to new markets and technologies. The plan will also help to drive down the cost of living and provide consumers with more information to help them make more environmentally and financially sustainable choices.

As a low-emissions technology, solar panels reduce the need for electricity to be generated from sources that contribute to climate change. IPART's solar feed-in tariff benchmark is one tool that informs solar consumers to help them compare retail offers to improve the financial returns on their panels.

Around half a million residential household and small businesses have installed solar panel systems in NSW.[1] This represents around 15% of residential households and 3% of small businesses in NSW.[2] Energy from solar panels makes up around 5% of total electricity generated in NSW.[3] In addition, the number of households with battery systems is slowly increasing, so that solar electricity can be used or exported to the grid even when solar panels are not generating electricity.

When solar customers use the electricity generated by their solar panels rather than buying electricity from their retailer, they can make significant savings on their bill. A secondary benefit is that when solar customers don't use all the electricity generated by their panels, the excess amounts are exported to the grid and customers may be paid a 'solar feed-in tariff' for these solar exports. New types of retail packages supported by new technologies could also be developed to help optimise the times that households use, store, or export electricity, to benefit these households and also other customers around them.

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1 Based on data provided by Endeavour Energy, Essential Energy and Ausgrid on small customer numbers as at 30 June 2020.

2 Estimated from data provided by Endeavour Energy, Essential Energy and Ausgrid; NSW Department of Planning, NSW 2019 Population Projections; Small Business Commissioner, The NSW small business landscape at a glance, last accessed 8 February 2021.

3 Data from Australian Energy Council, 5 February 2021; Clean Energy Council, Clean Energy Generation in 2019.

Retailers are not required to pay customers for the electricity that they generate, but most of them do. If retailers do offer feed-in tariffs to their customers, they set this tariff themselves. IPART's solar feed-in tariff benchmark can help customers in deciding whether the tariff a retailer is offering is reasonable. Under the current benchmark of 6.0 to 7.3 c/kWh a typical solar customer would earn around $220 to $260 a year from feed-in tariffs and save around $1,000 annually on their electricity bill. These savings represent more than half of a typical bill for a solar customer.[4]

Helping customers get paid fairly for their solar exports enables them to make financially sustainable choices, which also helps the community tackle the climate change challenge. However, customers need to consider all elements of a retailer's offer, particularly the retail price. Previously we have found that offers that include a high feed-in tariff are not necessarily the best overall deal for customers.

4 Based on a customer with a 5 kW solar panel system and assuming that 50% of the electricity generated is consumed (avoiding buying 3,650 kWh from the retailer at 27.5 c/kWh) and the remainder is exported. We have also assumed that a 5 kW solar panel system produces an average 20 kWh of electricity per day (Clean Energy Council, Guide to installing solar PV for businesses in NSW, p 6).
In our 2020-21 solar feed-in tariff benchmark report, we stated that the average bill for a typical solar customer would be lower by $455 based on a 3 kW solar system.

2 What have we been asked to do?

IPART has been providing advice to the NSW government on the value of solar electricity since 2012 (See Appendix A). In November 2020, the NSW Government provided IPART with a Terms of Reference for IPART to continue this role for the next 3 years (See Appendix B).

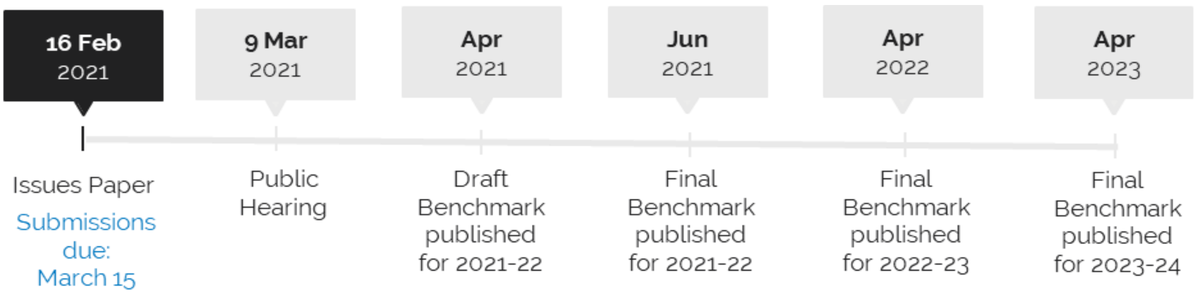
This requires us to set annual benchmark ranges for an all-day feed-in tariff, and feed-in tariffs for different times across the day. In doing so, we are required to consider the following key parameters:

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

We have also been asked to report on the feed-in tariffs currently being offered by each retailer, and to note whether they are within the benchmark range.

Over the next 4 months, IPART will consult with stakeholders and conduct analysis to set the solar feed-in benchmarks. We will consider whether our existing approach remains fit for purpose, and whether any changes are required to our methodology. The purpose of this paper is to discuss the main issues we need to consider for this review. We invite all interested parties to register online to attend our online public hearing on 9 March. We will be accepting written submissions until 15 March.

After deciding on an approach, we will provide our benchmark range for 2021-22 to the Minister for Energy and Environment (the Minister) by 30 June 2021.[5] This approach will continue to be used for following years. In 2022 and 2023, we will publish a benchmark in April for the next financial years.



5 Our Terms of Reference requires us to publish solar feed-in tariff benchmarks by April each year. However, we have received a letter from the Coordinator-General of the Department of Planning, Industry and Environment confirming that the benchmark for 2021-22 will be published by IPART in June 2021.

3 Overview of our previous approach

The approach we have used in previous reviews for setting the benchmark range has been developed over a number of years in consultation with stakeholders. It is based on our forecast of the average price that retailers would pay for solar exports across a day, or parts of the day (weighted by solar output) if they were buying this electricity on the wholesale spot market.

In this market, wholesale prices are set for each half hour of the day to reflect the supply and demand for electricity at that time.[6] Typically, these wholesale prices are:

- lower late at night (when demand is lowest), and through the middle of the day (when solar energy meets a higher proportion of demand)
- highest in the late afternoon and evening (when demand is highest, and when solar energy meets little or none of this demand).

This approach we use is consistent with the approaches taken in other jurisdictions that value solar exports (Table 3.1). The exception is Victoria, where the Essential Services Commission (ESC) estimates the wholesale value of the solar of exports, and also includes an avoided cost of carbon.[7] However, unlike in NSW, the solar feed-in tariff in Victoria is a mandatory minimum tariff that all retailers must pay.

Because our benchmark is a guide for consumers, if IPART set a higher benchmark, it would not mean that retailers would have to pay customers more for their solar energy. For our benchmarks to be useful to customers, they should reflect what retailers are actually likely to pay their customers, based on how much the solar electricity is worth to them.

If IPART did set a higher benchmark, and all retailers paid a higher feed-in tariff, this would result in higher costs to retailers, which would mean that they would have to increase their prices. For example, if all retailers paid a feed-in tariff of 15 cents per kWh (around double the current benchmark), the average annual household bill would need to increase by around $25 (to recover additional costs of $90 million each year). This would not be consistent with our Terms of Reference, which requires that our benchmark should not result in increased retail electricity prices.

Solar customers currently receive an upfront subsidy for installing their panels under the Small Scale Renewable Energy Scheme (SRES) to reflect the avoided costs of carbon emissions. For a 5 kW solar system installed in Sydney, the subsidy is currently worth

6 From October 2021, the prices will be set at every 5 minute interval across the day, rather than in half hour intervals. AEMC, Delayed implementation of the five minute and global settlement, accessed 28 January 2021.

7 In February 2017, the Victorian Government issued an Order in Council specifying a methodology that the ESC must use for determining the social cost of carbon. This results in a value of 2.5 cents. ESC, Minimum electricity feed-in tariff to apply from 1 July 2021, November 2020, p 53.

around $2,600.[8] All electricity customers pay an average of around $41 per year to customers with solar panels to subsidise these costs. Customers also pay another $55 per year (for an average bill) for other 'green costs' (including subsidies for the Renewable Energy Target, the climate change fund, and the Energy Saving Scheme).[9]

Table 3.1 Role of Government and approach to solar feed-in tariff by state

State	Role	Approach	Current tariff (2021) (c/kWh)
NSW	IPART sets benchmark ranges	Avoided wholesale electricity price + avoided transmission and distribution losses + avoided NEM fees and charges.	6.0 to 7.3 (single rate) 5.7 to 11.0 (time varying)
VIC	The Essential Services Commission (ESC) sets mandatory minimum tariffs	Avoided wholesale electricity price + avoided market fees and ancillary service charges + avoided transmission and distribution losses + value of avoided social cost of carbon.	10.2 (single rate); 9.1 to 12.5 (time varying)
QLD	The Queensland Competition Authority (QCA) sets a flat rate tariff for regional QLD, and monitors the South East QLD market	Avoided wholesale energy costs + avoided NEM management fees and ancillary services fees + avoided transmission and distribution losses.	7.861
SA	The Essential Services Commission of South Australia (ESCOSA) monitors the market	ESCOSA has not determined a minimum tariff since January 2017. Currently has a monitoring role and will regulate if it determines it appropriate e.g. if solar customers are unable to access a feed-in-tariff across the entire retail market or offers are comparable to those available to non-solar customers.	n/a
WA	WA Government sets time varying tariffs	WA Government sets the tariffs based on an avoided cost methodology.	10 (3 pm to 9 pm) 3 (all other times)
TAS	Office of the Tasmanian Regulator (OTTER) sets a minimum tariff	Avoided wholesale electricity price + loss factor adjustments + avoided management and ancillary service fees.	8.471
NT	NT Government sets a flat rate tariff	NT Government sets the flat rate equivalent to the value of electricity exported to the grid.	8.3
ACT	ACT Government monitors the market	Have not been regulated since July 2011. The ACT Government publishes a report annually on the number of compliant renewable energy generators installed and their total capacity.	n/a

Source: ESC, Minimum electricity feed-in tariff to apply from 1 July 2020, February 2020; QCA, 2020-21 Solar feed-in tariffs - Determination, May 2020 & QCA solar feed-in tariffs, accessed 28 January 2021; ESCOSA, Monitoring of retailer feed-in tariffs, WA Government Distributed Energy Buyback Scheme FAQs, accessed 28 January 2021; April 2017. OTTER, Feed-in tariff rate from 1 July 2020 to 30 June 2021, accessed 28 January 2021 & method for calculating the regulated feed-in tariff rate (1 July 2019 to 30 June 2021), accessed 28 January 2021; NT Government, Changes to feed-in tariffs fact sheet, April 2020; ACT Government Rooftop solar, accessed 28 January 2021 & ACT Government, 2019-20 Annual Feed-in Tariff Report, p 1.

8 IPART calculation, based on Australian Government Clean Energy Regulator Rec Registry, Small generation unit STC calculator, accessed 9 February 2020. Ecosave, Spot Trade Market Update, accessed 9 February 2020.

9 AEMC, Residential electricity price trends report - End-year 2020, 21 December 2020, p 16.

3.1 Steps to estimate the value of solar exports

We have used the following steps to estimate the value of solar exports to retailers for the next financial year:[10]

1. Forecasting the NSW average wholesale electricity price on the NEM for the next financial year using NSW baseload electricity futures contracts traded on the Australian Stock Exchange (ASX), averaging the daily close price over 40 days, including a range of +/-10% around this average to recognise the forecasting uncertainty around wholesale prices, and then adjusting each end of the range downwards by 5%, reflecting that contracts typically trade at a premium to spot prices.
2. Applying a 'solar multiplier' to adjust this forecast price to account for whether wholesale prices are likely to be higher or lower than this average price at the times when solar exports occur. We estimate the multiplier using historical data on wholesale prices and the timing of solar exports.
3. Increasing the value of the range by a loss factor (Box 3.1), because the value of solar electricity is slightly more than the value of electricity from other generators which are further away from where it is being used. This is because some of the electricity that is generated further away will be lost as it moves through the transmission and distribution networks, and so more needs to be purchased to supply 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 range because these charges are levied on retailers' net purchases.

The inputs for our most recent 2020-21 benchmark range are outlined in Table 3.2.

Table 3.2 Benchmark components for all-day solar feed-in tariffs in 2020-21

Benchmark component	Value
Estimated average wholesale value	**5.7 to 7.0 c/kWh**
ASX futures baseload contract for the 12 month period 2020-21 using the 40-day average price	6.7 c/kWh
% range for uncertainty	+/-10%
Adjustment to removed contract premium	5%
Solar multiplier	**0.97**
Network loss factor	**1.06**
NEM fees and charges	**0.10 c/kWh**
Solar feed-in tariff benchmark	**6.0 to 7.3 c/kWh**

Source: IPART, Solar feed-in tariff benchmark April 2020, p 11.

The following chapters consider in detail how we should undertake Step 1 (forecasting the average value of electricity), and Step 2, (applying a solar multiplier) for this review. We are also interested in stakeholders' views on Steps 3 and 4.

10 IPART, Solar feed-in tariffs, The value of electricity from small-scale solar panels in 2018-19, pp 34-35.

Box 3.1 How we calculate 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 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.

4 How should we forecast the average wholesale value of electricity?

The first input to the forecast solar value is the forecast average value of wholesale electricity for the relevant financial year. It fluctuates significantly over time, and is the key driver of changes to the solar feed-in tariff benchmarks.

In previous years, we based this forecast on expectations of wholesale spot prices, using the following steps:

- Sourcing publicly available price data from NSW baseload electricity futures contracts for the 12 months of next financial year traded on the Australian Stock Exchange (ASX). This data reflects the prices paid to purchase electricity contracts prior to the start of the financial year, based on expectations of what this electricity will be worth.
- Averaging this data over 40 trading days prior to the start of the financial year (typically 15 March or 15 May, depending on the release date of our benchmark).
- Adjusting this value down by 5% to reflect that contracts typically trade at a premium to spot prices.

If we continued to use this approach to valuing wholesale electricity, the solar feed-in tariff benchmark is likely to fall in 2021-22, as the futures contract prices are lower than for the previous year. This reflects the market's expectation about falling wholesale electricity prices as more new generation comes into the market and demand remains low (see Box 4.1).

Box 4.1 Wholesale prices are expected to remain low in 2021-22

Wholesale electricity prices in NSW have fallen markedly over the last year. Annual volume weighted average price for 2019-20 was $79 per megawatt hour (MWh), which was the lowest since 2015-16. Average prices by quarter decreased by around 45% in the second and third quarters of 2019-20 compared to the same quarters of the previous year.[a]

Wholesale electricity prices are forecast to remain low for the next year as more new generation such as solar and wind comes into the market and demand stays flat. According to the AEMC, while the COVID-19 restrictions exacerbated the low demand outcomes in March and April, the main driver for low demand has been a significant increase in solar panels. The AEMC forecasts that wholesale costs in NSW are likely to continue to decrease until 2021-22 before increasing in 2022-23 due to tightening of supply and demand balance occurring following the closure of Liddell power station.[b]

Significant reductions in electricity futures contract prices reflect the market's expectation about falling wholesale electricity prices. Futures contract prices are expected to be low and stable for the next two years, with prices expected to remain around $55/MWh in NSW.[c]

a Analysis based on data from AER, Wholesale markets quarterly Q3 2020 July – September, November 2020

b AEMC, Residential electricity price trends report - End-year 2020, 21 December 2020, pp 3-6 and pp 9-11.

c Based on 40-day average ASX futures contract prices for 2020-21 and 2021-22.

4.1 What is the most suitable forecast of wholesale electricity prices?

Electricity that is distributed over the national electricity market is bought and sold at the spot price, which reflects the supply and demand of electricity. Spot prices are different in each of the 5 NEM states, and are currently updated every thirty minutes but this will move to every 5 minutes in October 2021.[11]

To manage their financial risks and have more certainty over wholesale energy costs, retailers enter into various wholesale hedging contracts. These contracts fix the wholesale price retailers pay for electricity over the course of a year, or several years. This reduces retailers' exposure to the highs and lows of the spot market - which can go as low as minus $1,000/MWh, and as high as $14,500/MWh - and smooths their costs. It allows retailers to offer their customers stable retail prices, which typically change only once a year.[12]

In previous reviews, we have forecast the average wholesale spot price, rather than use contract costs. This is the price (on average) that solar electricity could be sold for in the market at the time it is exported to the grid. Because the amount of solar electricity that households export to the grid varies from day to day, it makes it difficult for customers to sell a fixed or 'firm' amount of this electricity in advance.

We have also used the forecast wholesale prices, because regardless of what retailers have paid for the contracts, the contracts are still only worth what the market would pay for them today. For example, a retailer might have entered into future contracts for energy in 2021-22 over the past two years. But if the retailer wanted to sell those contracts, it would not receive what it paid for them - it would receive what the market thought that they were worth today reflecting the current demand and supply conditions. Accordingly, pricing outcomes in a competitive market should reflect that:

- 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.
- Retailers' 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.

Rather than forecast spot prices to value wholesale electricity, some stakeholders have previously argued that IPART should use the value that retailers would have paid for the equivalent deliverable amount of electricity if they had contracted for it in advance. They consider that this better reflects the way most retailers will purchase their energy and, therefore, better reflects the benefit or avoided costs that a retailer faces when paying for solar exports.[13] Other reguators usually refer to these contracting or hedging costs when they consider the cost of electricity for different purposes (Table 4.1).

11 This change will align price signals with physical operations (as electricity is dispatched in 5 minute blocks) which should lead to more efficient bidding, operational decisions and investment. Over time, this change is expected to result in lower wholesale costs, resulting in lower electricity prices compared to a market with 30 minute settlements. AEMC, Five minute settlement, accessed 28 January 2021. AEMC, Fact Sheet – How the spot market works, accessed 28 January 2021. AEMC, Delayed implementation of the five minute and global settlement, accessed 28 January 2021.

12 Extract from AEMC, Spot and contract markets, accessed 3 February 2020.

13 For example see Origin, Transcript of Public Hearing on IPART's Draft Report, 15 May 2018, p 8.

Because of the different approaches used by regulators to value electricity, IPART's forecasts of the value of electricity for our solar feed-in tariff can vary significantly compared to estimates used by other regulators for a similar time period. We are interested in whether any forecasts published by other regulators could be suitable for us to use in setting our benchmark.

As discussed in Chapter 6, one option could be to use several approaches to estimating the wholesale value, and use these to set a range for the solar feed-in tariff benchmark.

Table 4.1 Regulators' approaches to valuing wholesale electricity costs (2020-21)

Function	Regulator	Method	Value
Solar feed-in tariff benchmark range	IPART	Spot price forecast (40-day average of ASX quarterly baseload futures (NSW)), adjusted by a 5% contract premium	6.7 c/kWh
Mandatory solar feed-in tariff	ESC	Volume weighted 12-month average price of ASX quarterly baseload futures (VIC), adjusted by a 5% contract premium	7.26 c/kWh (for single rate) and 6.20-9.48 c/kWh (for time-varying feed-in tariff)
Mandatory solar feed-in tariff	QCA	Market hedging approach using volume-weighted average of ASX Electricity daily settlement prices of base, peak and cap contracts for 2020–21 using all available price data (for example, pricing data may be available for 3 years).	7.241 c/kWh
Default regulated tariff [a]	Australian Energy Regulatory (AER)	Market hedging approach using volume-weighted average of ASX Electricity futures contract prices (base, peak and cap contracts) for 2020-21 using all available price data (for example, pricing data may be available for 3 years). ASX data were supplemented with broker data in the case of peak contracts.	10.092 c/kWh (for Ausgrid network), 10.107 c/kWh (for Endeavour network) and 9.384 c/kWh (for Essential network).
Retail price trends[a]	Australian Energy Market Commission (AEMC)	Contract prices based on 24-month exponential book build where futures hedge contract products are procured over a 24-month period prior to delivery. The contract strike prices were calculated by weighting the average monthly settlement prices from the ASX futures market.	9.27 c/kWh[b]

a For the AER and AEMC, we show estimated wholesale costs for NSW.

b Includes network losses, ancillary services and market fees.

Source: IPART, Solar feed-in tariff benchmark - Final report, April 2020, p 11. ESC, Minimum electricity feed-in tariff to apply from 1 July 2020 - Final decision, 25 February 2020, p 25 and p 31; QCA, 2020-21 Solar feed-in tariff, Regional Queensland-Determination, May 2020, p 7; 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, 17 February 2020, pp 15-16; ACIL Allen, Report to AER, Default market offer – estimating wholesale energy and environmental costs, Phase 2: Application of methodology for 2020-21 Final Determination, 28 April 2020, pp 27-28 and p 73. AEMC, Residential electricity price trends 2020- Final report, 21 December 2020, p 9; EY, AEMC, Residential electricity price trends – Wholesale market costs modelling 2018, 18 December 2018, p 15.

4.2 Should we continue to use ASX futures contract prices as the main source of data?

We have previously used the baseload futures contracts published by the ASX to forecast the future wholesale electricity prices. These are contracts to trade a fixed amount of electricity for a certain price at all times of the day. They represent the market's view of average wholesale electricity spot prices. Most trade and liquidity in these contracts are around 12 months out with futures contracts for the calendar year 2021 accounting for more than 75% of volume traded on 30 September 2020[14], and as they are exchange-traded and publicly reported, there is more price transparency relative to trades that occur on a confidential basis directly between counterparties.[15]

4.3 Is a 5% contract premium still appropriate?

ASX futures contract prices typically trade at a premium to underlying spot prices. Therefore, we need to adjust these prices if we continue to forecast spot prices. However, the contract premium cannot be directly observed. In previously years, we assumed a contract premium of 5% based on expert advice from Frontier Economics.[16] The ESC also makes an adjustment of 5%.[17] We used this same assumption when we regulated retail electricity prices.[18]

4.4 What time period should we use?

For our spot price forecast, we previously averaged the ASX futures contract prices over the most recent 40 days because this information captures the most up-to-date expectations of the value of electricity for the period. If we averaged the data over a shorter period, it may be too prone to one-off fluctuations, while averaging it over a longer period would include expectations of the market based on out-of-date information that may no longer be relevant.

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 weighted average cost of capital (WACC) parameters.[19]

If we were instead seeking to value historical wholesale costs, a longer time period would be appropriate. In previous reviews we found that a longer averaging would have reduced some volatility between years, but there would have still been substantial price fluctuations. This reflects underlying wholesale price volatility.

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14 AER, Quarterly base futures prices and volume traded, accessed 10 February 2021.
15 IPART, Solar feed-in tariffs, The value of electricity from small-scale solar panels in 2018-19, p 46.
16 Frontier Economics, 2018 Solar Feed-in Tariff Review – A Final Report prepared for IPART, March 2018, p 15.
17 ESC, Minimum electricity feed-in tariff to apply from 1 July 2021 - Draft decision, 17 November 2020, p 49.
18 Frontier Economics, Energy purchase costs – A final report prepared for iPART, March 2010, p 65.
19 IPART, Review of our WACC method, Final Report, February 2018. p 9.

In contrast to IPART's approach, the ESC uses a 12 month average price because it is more reflective of retailers' approach to buying contracts. However, as outlined above it also subtracts a 5% contract premium from the contract prices to make it more comparable with spot prices.[20]

As shown in Figure 4.1, currently the 40 day average (to 2 February 2021) is $55.88/MWh which is very similar to the 12 month average at $56.21/MWh.[21] We would use the most up to date data when we publish our benchmark in June.

Figure 4.1 Forecast average wholesale electricity prices for 2021-22 using different averaging periods

Data source: Data from Bloomberg, ASX NSW Base Electricity Strip June 2022, last accessed 3 February 2021.

20 ESC, Minimum electricity feed-in tariff to apply from 1 July 2021 - Draft decision, 17 November 2020, p 49.

21 Price averages sourced from Bloomberg based on the last daily traded price for ASX baseload electricity financial year 2022 strip.

5 How should we calculate the solar multiplier?

The solar multiplier is the difference between the average price of electricity across the whole day, and the average price of electricity when solar is exporting to the grid (weighted by solar output). 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.

Using historical price and solar output data, we calculate the ratio of the solar output-weighted wholesale electricity 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
- the time-weighted electricity price is the arithmetic average price across the year.

Using historical data, the solar output-weighted price is calculated by taking the spot price in each of the 17,520 half hours in the year (48 per day, 365 days a year), and multiplying each price by the proportion of exports that occurred in that half hour, and summing the result. The time weighted price is simply the average price across those 17,520 half hours in the year. Box 5.1 shows a stylised example of this calculation.

Solar multipliers can also be calculated for discrete time periods across the day (for example for any one-hour period). We can do this by dividing the average price in the discrete period (weighted by solar output) by the average price across all periods in the day.

In our most recent reviews, this solar multiplier across the whole day was just less than 1, which means that the average price of electricity when solar is exporting to the grid was slightly lower than the average price across the day.[22] This is largely because the demand for electricity from the national electricity market is lower during these hours because a proportion of total demand is being met by solar generation.

22 IPART, Solar feed-in tariffs, The value of electricity from small-scale solar panels in 2018-19, June 2018, p 4. IPART. Solar feed-in tariff benchmark 2019-20, April 2019, p 11. IPART, Solar feed-in tariff benchmark, April 2020, p 11.

Box 5.1 Stylised worked example of how we calculate the 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)	$60	15%	$9
	Spot price 2 (afternoon)	$80	20%	$16
	Spot price 3 (evening)	$200	0.5%	$1
	Spot price 4 (night)	$50	0%	$0
Day 2	Spot price 5 (morning)	$50	16%	$8
	Spot price 6 (afternoon)	$150	25%	$38
	Spot price 7 (evening)	$150	0.5%	$1
	Spot price 8 (night)	$40	0%	$0
Day 3	Spot price 9 (morning)	$90	8%	$7
	Spot price 10 (afternoon)	$100	14%	$14
	Spot price 11 (evening)	$120	0.5%	$1
	Spot price 12 (night)	$50	0%	$0
Solar exported weighted price			100%	**$94**
Average (time-weighted price)		**$95**		
Solar multiplier (solar weighted price / average price)				**0.99**

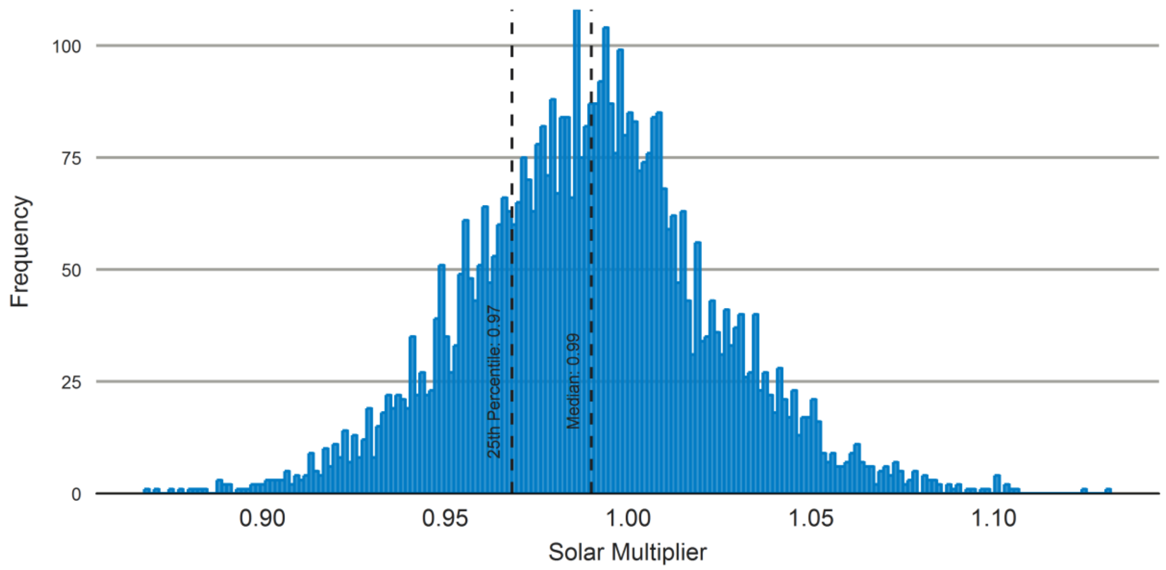
Source: IPART

5.1 How should we model the solar multiplier?

In our most recent reviews, we used a simulation process based on the Monte Carlo method to estimate the solar multiplier, using historical half-hourly spot prices in the NEM for NSW and half-hourly solar export data. This method generates 5,000 synthetic years and calculates a solar multiplier for each synthetic year (Box 5.2).

The purpose of using the Monte Carlo method is to generate a distribution of solar multipliers and identify the range of possible outcomes and the probabilities that they will occur using the probability distribution. For example, Figure 5.1 shows the distribution of solar multipliers for the 5,000 synthetic years for 2018-19. In this example, the median solar multiplier for this distribution was 0.99 – for around 50% of the synthetic years, the solar multiplier was less than 0.99, and for around 50% of the synthetic years it was greater than 0.99.

Figure 5.1 Distribution of solar multipliers (2018-19)



Data source: IPART

By using a range of possible values, instead of a single estimate, we can create a fuller picture of what might happen in the future (noting that, like any forecasting model, the simulation only represents probabilities and not certainty). We could set the solar multiplier equal to the median value if we consider that the input data is not likely to inherently understate or overstate the results, as we have done for the last 3 years.[23] Otherwise we could choose another point on the distribution. For example, between 2015-16 and 2017-18, we set the solar multiplier based on the 25th percentile because we considered that prices for several years that were included in the historical set (2009-10 and 2010-11) were unusually high in the middle of the day compared to other years, and market evidence suggested that these prices would be unlikely to reoccur. This meant that a median solar multiplier calculated from this data would overstate the likely solar multiplier for future years.[24]

23 We also found that there was very little variation in the all-day multipliers across the distribution of results. Therefore the benchmark ranges were almost the same regardless of the point in the distribution chosen.

24 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. IPART, Stakeholder letter, May 2016, p 1. IPART, Solar feed-in tariffs, Benchmark range 2017-18, June 2017, p 15.

We are also considering alternative modelling approaches, because the Monte Carlo modelling is complex and costly. A simpler method would be to calculate a weighted average wholesale price of solar, based on the price of each half hour of electricity throughout a year (or multiple years), and the corresponding proportion of solar electricity that is exported in that half hour. We expect this to result in a solar multiplier very similar to the median value under the Monte Carlo approach, with the method being more transparent and replicable. We used this approach between 2011-12 and 2013-14[25], and this is similar to the approach currently used by the Essential Services Commission in Victoria.[26]

Box 5.2 How the Monte Carlo modelling works

The Monte Carlo method is used to generate a distribution of solar multipliers, using historical half-hourly spot prices in the NEM for NSW and half-hourly solar export data. This method generates 5,000 synthetic years and calculates a solar multiplier for each synthetic year.

To generate each synthetic year, we randomly pick comparable days from previous years of data for 365 days to make up the year. For example, using 3 years of historical data, a synthetic year could be made up of 100 days from year 1, 200 days from year 2, and 65 days from year 3. Comparable historical days must be for the same day name and from the same quarter. For example, a Monday in January in the synthetic year could come from any Monday between January and March from the historical data, and a Saturday in August could come from any Saturday between July and September.

For each 'synthetic year' there will be 17,520 spot prices for each hour, and a proportion of solar exports for each half hour (with the total exports adding to 100% for the synthetic year), based on a sample of customers (in previous years we have used a sample of 500 customers in the Ausgrid network).

25 For example, see 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 55-56. IPART, Solar feed-in tariffs, The subsidy-free value of electricity from small-scale solar PV units from 1 July 2013, June 2013, p 20.

26 ESC, Minimum electricity feed-in tariff to apply from 1 July 2021 - Draft decision, November 2020, pp 16, 49-50.

5.2 How many years of historical data should we use?

In selecting the historical data that we use to model the solar multiplier, we will consider whether future years will continue to be like previous years.

In our previous 2018-19 review, we used the most recent 3 years of historical data. Prior to this, we used a longer time series. However, in 2018 we found that there had been a sustained shift in the times of the day when high wholesale prices occur in the market, and therefore we considered that a longer time series would not be a good indicator of future prices.

Most recently, there has been a significant increase in uptake of solar panels. The amount of electricity generated from solar panels in 2020 was significantly higher than in the previous year. This has had a major impact on demand and supply conditions in NSW.[27] Given that solar exports now have a significant impact on prices, and they represent a permanent change in the market, the ESC only uses the most recent year of historical data to capture the most up to date conditions in the market.[28]

Our preliminary view is that we should continue to use several years of historical data, to avoid overstating fluctuations in prices driven by one-off events such as weather or power outages. For example, Figure 5.2 shows that the price profile for 2020-21 (year to date) is different to the years immediately prior – with prices peaking earlier in the afternoon. However, these prices are being driven by one-off maintenance outages.[29] If these extreme prices and those above $300 are excluded, the average prices in the afternoon of 2020-21 remain considerably lower than earlier years.

We can also use several years of data, but give more weight to the most recent year of data as we have done for the last three years. For our 2018-19 review, we decided to give the most weight to the most recent year of data as we considered it would be the best indicator of future years. This is because Hazelwood power station exited the market in that year, which represented a permanent change in supply in the market.

Therefore, we calculated separate solar multipliers for:

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

The solar multiplier was then based the on the midpoint of the minimum and maximum solar multipliers for 3 historical data sets.[30]

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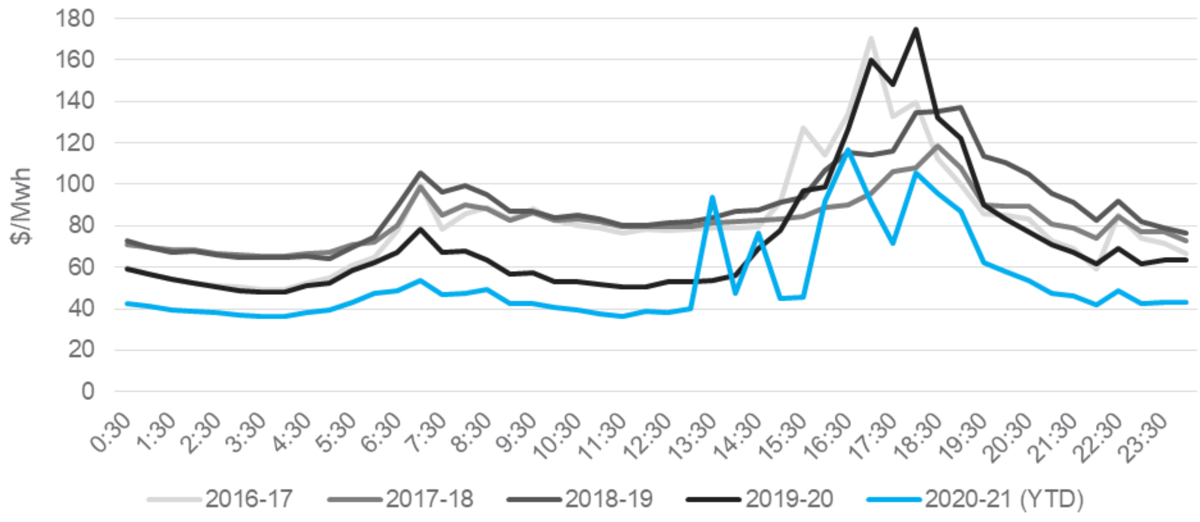
27 AEMC, Residential electricity price trends report - End-year 2020, 21 December 2020, pp 3-6 and pp 9-11.

28 ESC, Minimum electricity feed-in tariff to apply from 1 July 2020, Final decision, February 2020, p 25.

29 AER Electricity spot prices above 5,000/MWh New South Wales,16 November 2020 and Electricity spot prices above $5,000/MWh New South Wales, 20 November 2020, accessed 10 February 2021.

30 IPART, Solar feed-in tariffs, The value of electricity from small-scale solar panels in 2018-19, June 2018, p 56.

Figure 5.2 Average price by time 2017-18 to 2020-21 (YTD) (NSW, $/MWh, nominal)



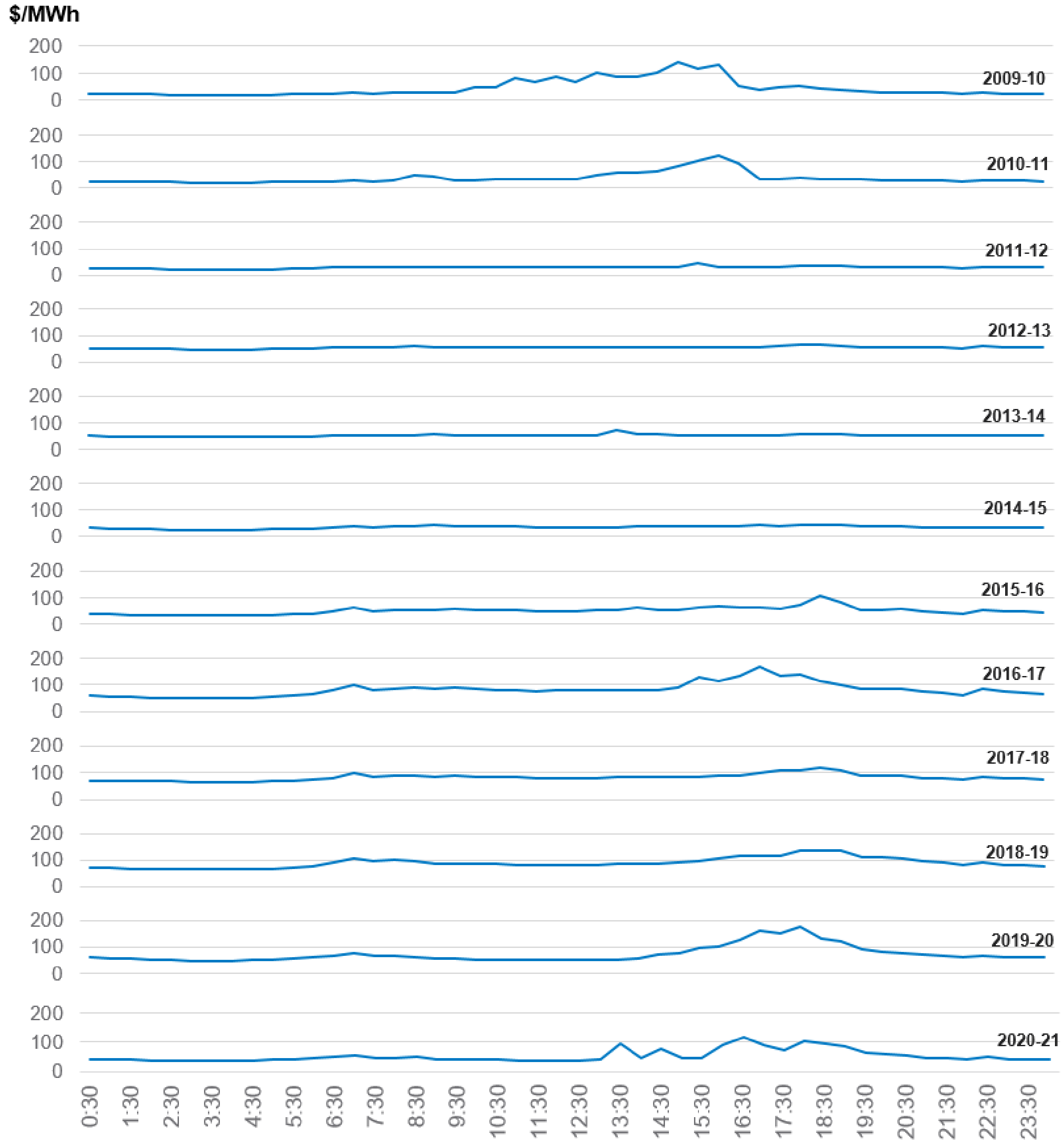
Data source: Data source: IPART, based on AEMO data.

Figure 5.3 shows how wholesale prices have changed over time. It shows that prices in the middle of the day have fallen relative to other times, while prices in the late afternoon have increased significantly:

- Prior to 2011-12, prices peaked in the afternoon. However, due to the increased penetration of solar systems, from 2012-13 these peaks reduced or did not occur in the afternoon, lowering the value of solar energy compared to the average price.
- In more recent years, prices have peaked during the late afternoon, as the demand-supply balance has tightened. This peak became particularly pronounced with the decommissioning of the Hazelwood power station in March 2017. As a result, higher cost gas-fired peaking plant sets wholesale prices more regularly during the late afternoon peak. This contrasts with the very low levels of price volatility between 2011-12 and 2014-15 (Figure 5.4).
- In 2020-21, several extreme spot prices resulted in unusually high average spot prices in the afternoon of 2020-21 (based on data available to date). These extreme price events were due to planned maintenance and/or planned and unplanned power outages.[31]

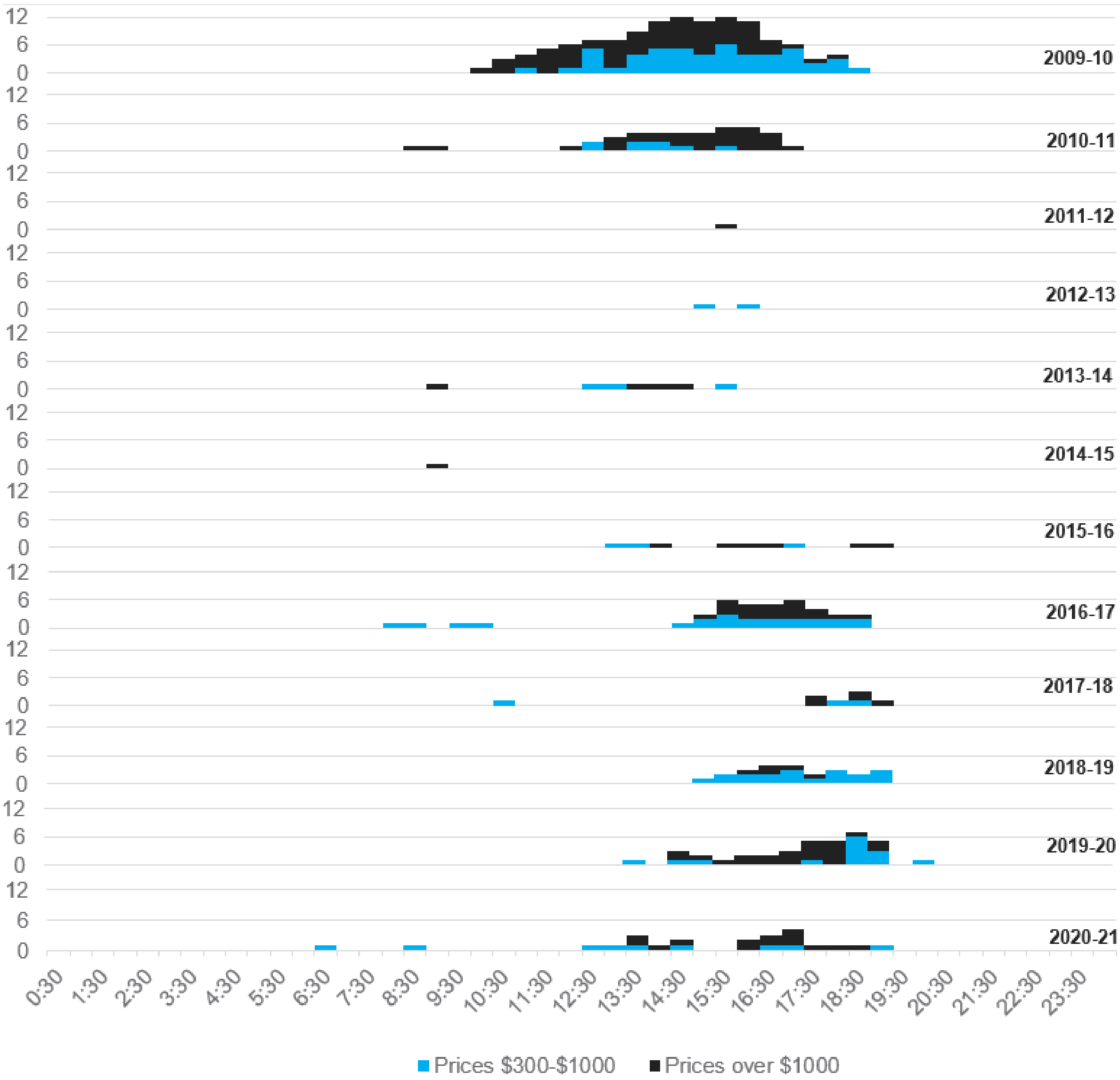
31 AER Electricity spot prices above 5,000/MWh New South Wales,16 November 2020 and Electricity spot prices above $5,000/MWh New South Wales, 20 November 2020, accessed 10 February 2021.

Figure 5.3 Average price by time 2010-11 to 2020-2021 (YTD) (NSW, $/MWh, nominal)



Data source: IPART, based on AEMO data.

Figure 5.4 Number of high price events by time 2010-11 to 2020-2021 (YTD) (NSW)



Data source: IPART, based on AEMO data.

5.3 How should we use data from all 3 network areas?

Solar exports profiles are likely to vary slightly across networks given their different geographic locations, and average panel sizes.

In our previous reviews, we estimated the value of solar electricity for all of NSW based on the solar export profile of a random sample of 500 Ausgrid solar customers (which covers Newcastle and most of Sydney). This was because digital meters capturing this data were first installed in the Ausgrid area. Since our 2018-19 review, we have also been collecting this data from the Essential Energy and Endeavour Energy networks, but we have not yet used it in setting our benchmark ranges.[32]

For this review, we are proposing to use the solar export profiles from all networks. We are proposing to firstly calculate solar multipliers for each network separately. If the results are very similar, we would consider setting one benchmark across all of NSW, and reflecting any differences within the range. However, if the results are significantly different we could set separate benchmarks for each network.

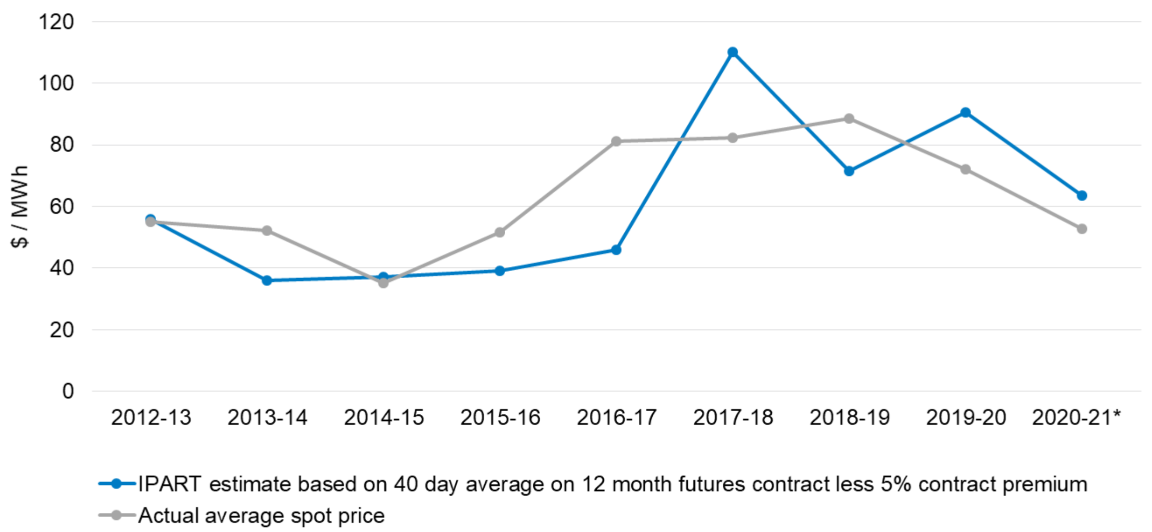
32 IPART, Solar feed-in tariffs, The value of electricity from small-scale solar panels in 2018-19, June 2018, p 57.

6 How should we set the ranges around the benchmarks?

Our Terms of Reference requires us to express the solar feed-in tariff benchmarks as ranges.

Currently the range for the all-day solar feed-in tariff benchmark is set around the wholesale value of electricity (+/-10%), to recognise the forecasting uncertainty of wholesale spot prices. Figure 6.1 demonstrates this forecasting uncertainty. On average, our estimates based on the 40 day average of the 12 month futures contract are an average of around 30% higher or lower than the wholesale spot prices that eventuate in the market.

Figure 6.1 IPART's forecast of the wholesale spot prices compared to actual spot prices



Note: Actual average spot price for 2020-21 for the year to date (to 31 January 2021). Average spot prices are based on the arithmetic average of the 30 minute spot prices throughout the financial year.

Data source: IPART; AEMO, Aggregated price and demand data, last accessed 1 February 2021.

In previous reviews, we have set ranges using other approaches. Between 2014-15 and 2017-18, we formed a range for our solar feed-in based on the value of solar at different times of the day: [33]

- the top of the range based on the 2 hour window when the value of solar exports was forecast to be highest (this was between 2 pm and 4 pm in 2017-18)
- the bottom of the range based on the value of exports at all other times.

33 IPART, Solar feed-in tariffs The subsidy-free value of electricity from small-scale solar PV units from 1 July 2014, Final Report, June 2014, p 2. IPART, Solar feed-in tariffs, The value of electricity from small-scale solar panels in 2018-19, p 6.

We decided not to use this same approach for setting a benchmark range from 2018-19, because our forecasts indicated that the value of solar exports would hardly vary across the times of the day when most of these exports occur. Rather than the highest prices occurring between 2 to 4 pm, when there is high volume of solar exports, the highest value of solar was forecast to be after 5:30 pm when less than 1% of solar exports occur. Because such a small amount of solar generation occurs in this time window, we did not consider that it would provide a realistic guide to customers about the value of solar for the overwhelming majority of their exports.[34]

Another possible approach is to set the range based on different approaches to estimating the average wholesale value of electricity. For example, one end of the range could be set based on the average forecast wholesale spot price, and the other end of the range could be based on hedging costs (contracting for the electricity in advance).

34 IPART, Solar feed-in tariffs, The value of electricity from small-scale solar panels in 2018-19, June 2018, p 6.

7 How should we set benchmarks for different times of the day?

Although retailers currently offer their customers a single feed-in tariff that applies at all times, they could choose to offer a tariff that varies depending on the time of day the solar customer exports to the grid. The NSW Government has asked us to provide guidance on this variation throughout the day.

The times used for the last 3 years are shown in Table 7.1, along with our 2020-21 benchmark ranges for these times. We set these ranges based on when the most price variation occurred during the day:[35]

- Between 6 am and 3 pm there was little variation in wholesale prices.
- In each one-hour period after 3 pm there was much more price variation. The average value of solar is higher in the afternoon, so it would be more cost-reflective if retailers offered a higher feed-in tariff in the afternoon, compared to the morning.
- Even though solar exports are very low after 5 pm, we set benchmarks in the later afternoon and evening because wholesale prices were highest at this time. The peak prices in the late afternoon and evening are being driven by high levels of electricity demand at the same time of the day as solar output is falling. Higher wholesale prices in the evening also reflected increasing 'peakiness' of wholesale prices in recent years, as the demand-supply balance tightened. This means that prices are often driven by higher cost generation (such as gas generators) when demand is highest. These benchmarks provide a price signal to customers with batteries, or who are considering purchasing batteries, about when they should export their energy to the grid. Only a small number of households currently have batteries. But over time this signal will become more important as battery prices fall and their uptake increases.
- After 6 pm, electricity values are not weighed by solar output, because solar exports are negligible during these times.
- Between 8 pm and 6 am we did not set a benchmark because exports are immaterial, and because wholesale prices are relatively low.

35 IPART, Solar feed-in tariffs, The value of electricity from small-scale solar panels in 2018-19, June 2018, pp 7-8.

Table 7.1 Benchmark ranges for time-dependent solar feed-in tariffs

Time window	(c/kWh) (2020-21)	% of solar exports (2018-19)
6 am to 3 pm	5.7 to 7.0	86.96
3 to 4 pm	6.5 to 7.9	8.36
4 to 5 pm	7.8 to 9.5	3.71
5 to 6 pm	9.0 to 11.0	0.84
6 to 7 pm	8.8 to 10.8	0.07
7 to 8 pm	8.2 to 10.0	0.01

Source: IPART, Solar feed-in tariff benchmark April 2020, p 4. Calculations based on Ausgrid data.

Another option would be to align the time intervals for our time-dependent benchmark ranges with time-of-use time consumption tariff bands. However, the time-of-use time periods are different across each network (Table 7.2). This would mean that different time-dependent range would apply to each network.

Table 7.2 Time-of-use periods are different for each network 2020-21

Network	Peak	Shoulder	Off-peak
Ausgrid	2 pm to 8 pm weekdays For 1 Nov to 31 March 5 pm to 9 pm weekdays For 1 June to 31 August	7 am to 2 pm and 8 pm to 10 pm weekdays For 1 Nov to 31 March 7 am to 5 pm and 9 pm to 10 pm weekdays For 1 June to 31 August, 7 am to 10 pm all weekends and public holidays	10 pm to 7 am
Essential	5 pm to 8 pm weekdays	7 am to 5 pm and 8 pm to 10 pm weekdays	All weekend hours, 10 pm to 7 am weekdays
Endeavour	4 pm to 8 pm weekdays	Not applicable	All other times and public holidays

Note: Times in the table for Ausgrid are for residential customers only. Under Essential's time of use definition, public holidays are treated as a normal day. The times shown in table differ for customers with Basic and Accumulation meters and premises on obsolete tariffs.

Source: Ausgrid: Residential customers – seasonal time of use definitions, last accessed 4 February 2021; Essential: Essential's Time of Use Tariffs brochure, p2, last accessed 4 February 2021; Endeavour: Network Price List: Network Tariffs 2020-2021, p19, last accessed 4 February 2021.

While the time-dependent feed-in tariffs are likely to be more cost-reflective, retailers may continue to prefer to set an all-day rate, reflecting the small amount of variation in the value of the vast majority of solar exports. In our previous review, retailers submitted that a single all-day solar feed-in tariff is simple to understand and does not create complexity and additional costs to retail operations.[36]

36 For example, see AGL submission to IPART Issues Paper, April 2018, p 2.

8 Have there been any changes to the market design that affect the value of solar exports?

The traditional model of electricity supply is changing. Smaller generators, such as solar panels, have increased rapidly over the network (known as distributed energy resources or "DER"). Many consumers have installed solar panels and so now both import and export their electricity. However, the design and rules for the electricity market were established when electricity flowed in one direction, from a small number of large thermal generators to consumers.

Regulators and various market bodies are working to ensure that the NEM can continue to meet the needs of consumers as technology evolves. We highlight particularly relevant work below.[37] Our preliminary view is that changes are not needed to our approach in valuing solar exports. However, we are seeking stakeholders' views on this.

We will continue to monitor the developments in the market as we finalise our approach to setting feed-in tariffs, and for future years.

AEMC – Access, pricing and incentive arrangements for distributed energy resources

The AEMC is consulting on rule change requests from SA Power Networks, St Vincent de Paul Society Victoria, and the Total Environment Centre/Australian Council of Social Services to better facilitate the efficient integration of DER. These rule change proponents indicated that:

- DER customers are beginning to experience poorer performance of their systems, as the technical limits of the network are reached.
- The renewables industry is concerned that Distribution Network Service Providers (DNSPs)[38] will increasingly impose 'zero export' requirements on new solar customers connecting in areas already congested. Technical issues will increasingly act as a handbrake on the decarbonisation of the energy system.
- DNSPs do not have a clear basis upon which to make DER related investment decisions.
- Vulnerable customers are concerned about the increasing cross-subsidies from customers who do not have DER, and may never be able to, to those who do.[39]

37 Other work includes rule change requests submitted by AEMO to the AEMC regarding technical standards for DER (this is to enable Distribution Network Service Providers and the AEMO to better manage the growing number of micro-embedded generators, primarily rooftop solar panels, connecting across the NEM) and integrating energy storage systems into the NEM (to better support the participation of storage systems in the NEM, including by defining storage technologies which can also include aggregation of smaller batteries, in the National Electricity Rules).

38 DNSPs build, maintain and operate the distribution networks (poles and wires) that carry electricity to houses and businesses.

39 AEMC, Distributed energy resources integration – Updating regulatory arrangements consultation paper, July 2020, pp 7,9-10.

The rule change proponents consider that the increased use of distribution networks by DER to export electricity into the system will eventually drive the need for new network expenditure as the inherent 'hosting capacity' (typically 1 to 3 kW per customer)[40] of the existing assets is used up.[41] Therefore, the rule change requests include removing prohibiting system charges for export services into the distribution network.[42] This would enable export charges to signal the need for additional network expenditure where appropriate and better allocate costs.[43, 44]

One of the proponents (SA Power Networks) proposes that any future tariffs applied to exports would principally seek to recover incremental costs of providing export capacity. It considers that customers should have choices that enable them to avoid some or all of the export component of the tariff if they choose to maintain their exports below a level that would, on average, require additional capacity investment. For example, customers could choose from:

- a 'basic' service at low or zero cost that is reflective of low export capacity aligned to the intrinsic hosting capacity of the network, or
- a 'premium' service, such as higher than average export capacity, without the associated costs being apportioned to customers that do not want such services.[45]

The AEMC is due to release its draft determination in March 2021.

If DNSPs commence charging for export services, then it may affect the overall revenue that certain customers receive for their solar exports. Under the SA Power Networks proposal, this would depend on how much customers are charged for the service they choose. If such a charge was dependent on the level (or quantity) of exports, it may be appropriate to maintain our current approach – which is setting benchmark ranges for the value of solar exports per kWh, which excludes any additional distribution network charges. Such charges could be applied separately by retailers to recover these costs.

40 DEIP, Access and pricing reform package – Outcomes report, June 2020, p 18.
41 AEMC, Distributed energy resources integration – Updating regulatory arrangements consultation paper, July 2020, p 4.
42 NER clause 6.1.4.
43 'Export charges' refer to ongoing distribution use of system charges for the DNSP 'poles and wires' to transport electricity exported by a distribution network user. Currently, only connection charges are allowed to connect a DER customer to the network.
44 AEMC, Distributed energy resources integration – Updating regulatory arrangements consultation paper, July 2020, p 4.
45 AEMC, Distributed energy resources integration – Updating regulatory arrangements consultation paper, July 2020, p 8.

Post 2025 Market Design Initiatives

The Energy Security Board (ESB) is consulting on its Post-2025 Market Design Initiatives. The ESB has been tasked to develop a market design for the NEM that delivers secure and reliable power at least cost to consumers, and accommodates the changes underway and expected in the future.

In January 2021, the ESB released its directions paper outlining the 4 reform directions it will focus on.[46] The 'demand side participation' reform direction is relevant for solar exports. The ESB considers that some of the changes needed are:

- improving system efficiency and lowering costs as the NEM moves towards a system of millions of DER
- making it easier for new and innovative technologies or service providers to enter the market and reward customers for the demand flexibility that DER could efficiently offer
- making it easier for disengaged and low-income consumers to access new and innovative energy products and services - with the continued rapid deployment of solar panels and the expected growth of electric vehicles, the ESB will consider new ways for customers and communities to access these benefits.[47]

Some of the options that the ESB will further examine include:

- approaches to accelerate the shift to pricing for solar exports, where the price for solar exports are more responsive to changes in the wholesale price (rather than passive solar export pricing which applies to most feed-in tariffs currently offered where prices change infrequently in comparison – typically yearly)
- participation models that better allow aggregators (those that combine DER outputs from multiple customers) to participate in the NEM, and enable residential customers to contract with one participant for standard retail services and then a different participant that aggregates DER outputs and sells services on their behalf in the wholesale market
- incentives for DER to participate in scheduling e.g. arrangements to lock in a financial position and trade energy ahead of time, such as a voluntary energy ahead market, may encourage flexible demand to participate (currently hindered by the requirement to operate using real-time price signals).[48]

In March 2021, the ESB expects to consult on potential market designs which are being developed in accordance with its directions paper. We do not consider changes to our approach are needed in response to the ESB post-2025 directions paper, but we will continue to monitor developments.

46 ESB, Post-2025 Market Design Directions Paper, January 2021, pp 6, 8-9.
47 ESB, Post-2025 Market Design Directions Paper, January 2021, pp 57-58.
48 ESB, Post-2025 Market Design Directions Paper, January 2021, pp 66, 69, 71.

A History of IPART's role in reviewing solar feed-in tariffs

IPART has been providing advice to the NSW government on the value of solar electricity since 2012, following the introduction of the Solar Bonus Scheme in 2010. Initially, our role was to set 'retailer contributions' towards the costs of the Solar Bonus Scheme, and to set a benchmark range for solar feed-in tariffs for solar customers who were not part of this scheme.[49]

Our legislative role in determining the retailer contribution and benchmark range ended with the conclusion of the Solar Bonus Scheme in December 2016. However, the NSW Government has asked us to continue reviewing solar feed-in tariff benchmarks.[50] For this review and our previous review, we received Terms of Reference under Section 9 of the *Independent Pricing and Regulatory Tribunal Act 1992 (*IPART Act) requiring us to review solar feed-in tariff benchmarks annually for the next 3 financial years.[51]

A.1 Setting Solar Bonus Scheme 'retailer contributions'

When IPART was first asked to review solar exports, the NSW Government had introduced the Solar Bonus Scheme, which provided a subsidised feed-in tariff to solar customers from 2010. Initially, the feed-in tariff was set at 60 c/kWh. This was reduced to 20 c/kWh for participants that entered the scheme between 28 October 2010 and 1 July 2011. It was then closed to new participants. Participants in the scheme received these payments until the scheme ended on 31 December 2016.[52]

Over the life of the scheme, the total amount paid in feed-in tariffs was around $1.25 billion.[53] Most of the subsidy to customers was funded through a levy on electricity distribution networks, which was passed on to all electricity customers in NSW.[54] However, retailers were also benefiting from the scheme: when customers exported solar energy to the grid, retailers could save on the amount of wholesale electricity they had to purchase from the national electricity market to supply their customers. Therefore the NSW Government passed legislation that allowed the Minister to ask IPART to determine the 'retailer contribution' to the Solar Bonus Scheme each year based on the value of these savings. We published our first determination in June 2012 for the 2012-13 financial year.[55]

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49 IPART, Solar feed-in tariffs – 2011-2012, March 2012, pp 14-15.
50 Section 43ECA of the Electricity Supply Act 1995 (repealed).
51 NSW Government, Terms of Reference, received 22 December 2017, See Appendix B for current Terms of Reference.
52 NSW Trade and Investment, NSW Solar Bonus Scheme Statutory Review, Report to the Minister for Resources and Energy, August 2014, p I, 10-11.
53 NSW Trade and Investment, NSW Solar Bonus Scheme Statutory Review, Report to the Minister for Resources and Energy, August 2014, p I, 10-11.p ii.
54 IPART, Solar feed-in tariffs – 2011-2012, March 2012, p 109.
55 IPART, Solar feed-in tariffs, Retailer contribution and benchmark range for 1 July 2012 to 30 June 2013, Determination, June 2012.

A.2 Setting the benchmark range for customers outside the Solar Bonus Scheme

Customers who installed solar panels after 1 July 2011 were not eligible for the Solar Bonus Scheme. As part of our first review, the Government asked us to advise whether retailers should be obliged to provide a feed-in tariff for these solar customers, and if so, how it should be set.

We recommended that the best way to implement a feed-in tariff was to set a benchmark range to help guide retailers and customers, based on the savings to retailers. We considered that this would provide the best balance between the risk that regulatory intervention would deter competition for solar customers, against the risk that solar customers may not receive a payment for the value of the electricity they export to the grid without regulatory intervention. We considered that the benchmark range should be set annually because the significant volatility in wholesale prices would make it difficult to set a reasonably accurate range for a period longer than one year.[56]

We set a benchmark range for 2011-12, and subsequently each year the NSW Government asked us to continue to set an unsubsidised benchmark range.

56 IPART, Solar feed-in tariffs – 2011-2012, March 2012, see Chapter 9.

B Terms of reference

TERMS OF REFERENCE

The investigation and determination by IPART of an annual benchmark range for feed-in tariffs for financial years 2021-22, 2022-23 and 2023-24

Reference to IPART under section 9 of the Independent Pricing and Regulatory Tribunal Act 1992

With the approval of the Hon. Gladys Berejiklian MP, Premier of NSW and Minister administering the Independent Pricing and Regulatory Tribunal Act 1992 (IPART Act), pursuant to section 9(2) of the IPART Act, the Independent Pricing and Regulatory Tribunal (IPART) will enter into arrangements with the Department of Planning, Industry and Environment (the Department) to investigate and determine:

- the voluntary benchmark range for solar feed-in tariffs paid by retailers for electricity produced by complying generators and supplied to the distribution network
- time dependent benchmark ranges paid by retailers for electricity produced by complying generators and supplied to the distribution network during different times of the day.

Conduct of investigation

In conducting this investigation, IPART is to consider the following key parameters:

- There should be no resulting increase in retail electricity prices.
- The voluntary benchmark range should operate in such a way as to support a competitive retail electricity market in NSW.

In conducting this investigation, IPART may incorporate:

- half-hourly solar export data reflecting customers in all three network areas
- forecast electricity wholesale prices for the financial year of the determination.

Reporting

IPART is to:

- report on the standard and time-of-use feed-in tariffs offered by each retailer at the time of writing its report
- note whether that tariff was within the benchmark for the preceding financial year
- provide a one to two-page factsheet that assists consumers to understand feed-in tariffs.

Consultation

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

Timing

IPART is to provide its determination by 30 April each year for the next three years starting with the benchmark range for financial year 2021-22 in April 2021. The Department may amend the Terms of Reference to align with the government policies and to remain relevant in the energy market.

Signed:

Matt Kean MP
Minister for Energy and Environment

Date: 02.10.20