ACIL ALLEN CONSULTING

REPORT TO
ESSENTIAL SERVICES COMMISSION

18 DECEMBER 2017

VICTORIAN FEED IN TARIFF

ESTIMATE OF ENERGY VALUE

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1 INTRODUCTION

The Essential Services Commission (Commission) is required under section 40FBB of the *Electricity Industry Act 2000* (the Act) to determine the minimum rates that an electricity retailer must pay to its customers, who are small renewable energy generators, for electricity they produce and export into the grid. This is referred to as the minimum feed-in tariff (FiT).

The Act requires certain factors to be taken into account when determining the minimum FiT. The factors as set out in the Act were recently amended. The factors that the Commission must have regard to in determining the 2018-19 minimum FiT are set out in section 40FBB(3) of the Act and include:

— prices of electricity in the wholesale electricity market
— any distribution and transmission losses avoided in Victoria by the supply of small renewable energy generation
— the avoided social cost of carbon and the avoided human health costs attributable to a reduction in air pollution.

ACIL Allen Consulting (ACIL Allen) was engaged by the Commission to provide estimates of the energy value of electricity exported to the grid during 2018-19 by small scale renewable energy generators using a methodology that was developed during the Commission's recent inquiry into the true value of distributed generation.

This report sets out the calculations made to estimate the energy value of electricity exported to the grid during 2018-19 by small scale renewable energy generators.

In the inquiry the Commission recommended that the FiT should consist of four components, namely:

1. the wholesale value of the energy exported to the grid from a distributed generator
2. the value of avoided network losses
3. the value of avoided market fees and ancillary charges
4. the avoided social costs of carbon and other relevant health costs.

This report relates to only the first three of these components. No attempt is made here to incorporate the value of avoided greenhouse gas emissions or other environmental or health benefits. Therefore, this report refers to 'FiT energy values', which is intended to include all but the fourth source of value identified above.

This report is structured as follows

- chapter 2 relates to the wholesale energy component of the FiT. It describes the methodology used to project the wholesale spot price of electricity for 2018-19 and the results of that projection
- chapter 3 sets describes the adjustments made to account for network losses and market and ancillary services fees.
- chapter 4 provides the results, which are FiT energy values on both single rate and time varying bases
- chapter 5 discusses a characteristic of the results which we have not seen before, namely that the solar weighted electricity prices presented here are *below* the time weighted electricity prices, whereas in the past they have been above.

2 WHOLESALE SPOT PRICE OF ELECTRICITY

When electricity is generated by one generator, whether a distributed generator or otherwise, it does not need to be generated by another. The value of electricity generated by a distributed generator is the cost of another generator generating that electricity, which is avoided.

All wholesale electricity in Victoria is traded through the wholesale National Electricity Market (NEM).

The wholesale spot price of electricity is determined through a series of auctions that are conducted every five minutes and averaged to the half hour level. There are 17,520 half hours in a year so there are 17,520 wholesale electricity spot prices in Victoria every year.[1]

The FiT needs to be set in advance so it is based on projections of these spot prices which we prepared using *PowerMark*, our proprietary model of the NEM's wholesale spot market.

The projections in this report cover financial year 2018-19. They were prepared in November 2017.

They are based on demand forecasts produced by the Australian Energy Market Operator (AEMO) in its 2017 National Electricity Forecasting Report (NEFR) and ACIL Allen's internal supply assumptions. The projections were prepared on the assumption that:

- the aluminium smelter at Portland will continue to operate
- the Large scale Renewable Energy Target (LRET) will continue in its current form with the current target
- the Victorian Renewable Energy Target (VRET) will proceed as planned.

There are various policy uncertainties in the electricity market at the time of writing. These relate to questions such as the form the National Energy Guarantee (NEG) might take and indeed whether it will be implemented. The NEG is not reflected in the modelling discussed here.

2.1 PowerMark modelling

The NEM is a market in which electricity generators interact with one another by bidding to supply electricity. Those bids are submitted to an auction which is conducted every five minutes. The price outcome of the six auctions occurring each half hour are averaged to provide a half hourly spot price of electricity.

PowerMark is a model of this process. Each generator in the NEM is reflected in *PowerMark* in a way that *reflects* our understanding of its cost structures and other characteristics such as capacity, ramp rate and ownership. Those assumptions have been established over an extended period from our understanding of the physical and other properties of generators in the NEM and other relevant sources.

[1] In leap years, such as 2016, there are 17,568 half hourly intervals.

At its core, *PowerMark* is a simulator that emulates the settlements mechanism of the NEM. It uses a linear program to settle the market, as does AEMO's NEM Dispatch Engine in its real time settlement process. In very simple terms, *PowerMark* uses that linear program to project the output of each generator in the NEM.

PowerMark projects entry by new generators when this is supported on a commercial basis and we add generators to the model in accordance with the list of committed projects reported by the Australian Energy Market Operator (AEMO). This projection is characterised by substantial entry of wind and solar generators in New South Wales, Victoria and South Australia. Projected entry is summarised in Appendix A.

We routinely operate *PowerMark* on an hourly basis, so the analysis presented here is based on hourly projections of the wholesale spot price of electricity and other things.

2.2 Stochastic approach to projecting wholesale spot price of electricity

As demand and supply for electricity must be balanced in real-time, spot prices in the gross, energy-only market of the NEM can highly volatile. Spot price outcomes can range from the market price floor (-$1,000 per MWh) to the price ceiling ($14,200 per MWh at the time of writing).

As the price ceiling is much higher than average price, whether measured in time weighted or load weighted terms, individual price spike events can have a significant effect on annual average price outcomes.

There are many factors that contribute to this price volatility.[2] Key among them is the inherent uncertainty of:

— generator unavailability due to unplanned (forced) outages
— timing of high demands and peak demand variability driven by extreme weather factors (consecutive hot days in summer and cold days in winter)
— intermittent generator output (particularly wind farms).

These factors are stochastic (random) by nature and cannot be forecast deterministically.

To provide a fuller summary of potential outcomes, ACIL Allen applied Monte Carlo techniques to reveal an underlying price distribution of likely price outcomes.

The price distribution is naturally skewed to the right (high price). This reflects the fact that prices can spike to very high levels during times of generator outage coinciding with high demand periods, whereas low price events are generally bound by marginal generator costs.

2.2.1 Stochastic analysis – demand traces

The timing of high demand events and the shape of the upper end of the load duration curve (how many or how few high demand periods there are) are important for price formation. ACIL Allen therefore utilises historical weather patterns to develop a range of 'synthetic' demand traces.

These 'synthetic' demand traces are derived from 41 years of historical weather data for each NEM region, sourced from the Bureau of Meteorology. Each day's historical weather data is 'mapped' to recent demand observations by finding the best matching daily temperature profile (given the month and day type) across the NEM. The best match is identified by searching for the closest least squares match between the temperature profile for that day and the temperature profile for a day in the five years 2009-10 to 2014-15 across all NEM regions simultaneously.

This produces a set of 46 'synthetic' demand traces which correspond to prevailing historical weather patterns. Each of these traces will have slight differences in terms of timing of peak events and the shape of the load duration curve. Importantly, the traces maintain the levels of correlation between NEM regions on a daily basis.

[2] Note that price variation caused by stochastic factors is different to structural factors (such as explicit carbon pricing), which tends to shift the whole price distribution. Structural factors can be examined through the examination of different scenarios.

2.2.2 Stochastic analysis – intermittent profiles

In keeping with the 46 synthetic demand traces, ACIL Allen aligns intermittent wind generation profiles with these demand sets to preserve the correlation between wind output and demand events. For example, it is important to preserve the correlation between peak demand and the output of wind farms in South Australia and Victoria.

2.2.3 Stochastic analysis – peak demands

The absolute level of peak demand in each region is another stochastic factor, reflected by AEMO producing peak demand forecasts on a probabilistic basis. To account for this, ACIL Allen grows each demand trace so that the peak demand aligns randomly with a point on AEMO's distribution.

The forecast P10, P50 and P90 peak demand levels from AEMO's 2016 NEFR for each NEM region have been used to anchor the maximum and minimum peak demands from the synthetic demand traces for each year (the median is anchored to the P50). While we recognise that the P10 and P90 points do not represent the absolute extremes expected – by definition 10 per cent of occurrences occur above and 10 per cent below these levels – we lack the necessary data points.

2.2.4 Stochastic analysis – forced outages

PowerMark requires the availability of each generator unit as an input for each half-hour of the year. Using binomial probability theory, ACIL Allen has simulated 11 sets of forced outages, which are defined by inputs relating to the binary condition of outage (i.e. either an outage event or not an outage event) and the outage duration.

This process allows a range of outage outcomes to be produced. The most important factor in outages is coincidence – if a number of units are forced out at the same time, volatile prices usually result. The process used to simulate the outage sets allows these sorts of coincidences to be represented appropriately.

The outage scenarios are built using randomly selected sequences of events for each plant in the model which are consistent with the underlying unplanned outage rates determined for each plant.

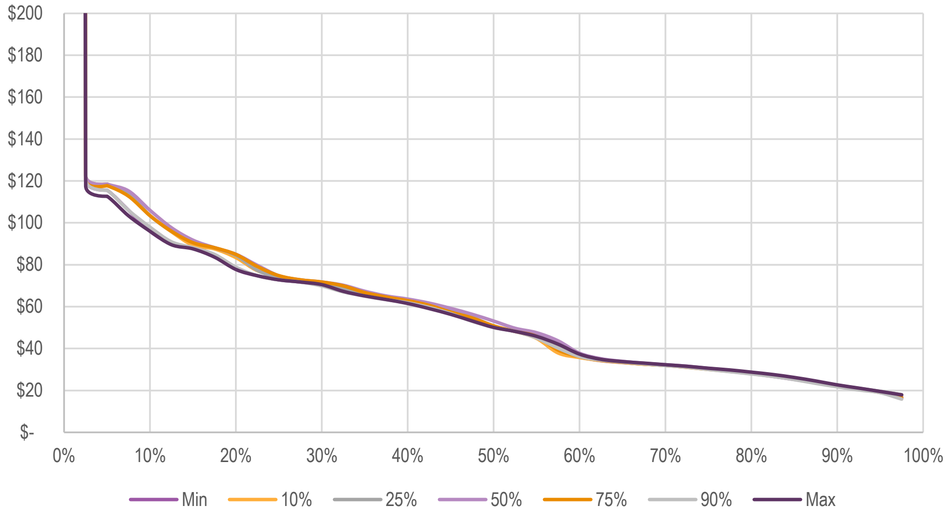
2.2.5 Stochastic simulations

Once the required stochastic inputs have been generated, *PowerMark* is run for each of them independently. All structural inputs – for example fuel prices, new entrant timing, retirements etc. – are held constant across these simulations. Combining the 46 synthetic demand profiles with the 11 forced outage sets results in a total of 506 simulations for each year examined.

2.3 Projection results

The projected time-weighted average spot price for Victoria for financial year 2018-19 ranges from $58.55 per MWh to $145.03 per MWh, with a mean (average) of $91.20 per MWh and a median of $87.52 per MWh. These levels are higher than corresponding projections in recent years due to an ongoing tightening of the balance between the supply of energy and the demand for energy in Victoria and a change in the generation mix resulting from the closure of Hazelwood Power Station in early 2017. Figure 1 illustrates the projected price duration curves for 2018-19.

FIGURE 1 VICTORIAN SPOT PRICE DURATION CURVES: 2018-19, SELECT PERCENTILES



SOURCE: ACIL ALLEN POWERMARK MODELLING

3 NETWORK LOSSES AND OTHER FEES

3.1 Network losses

We analysed historic distribution loss factors for Victoria as published by the Australian Energy Market Operator (AEMO). This requires consideration of the fact that:

— both transmission and distribution losses must be taken into account
— there are five distribution network service providers (DNSPs) in Victoria, each with its own loss factors
— the number of customers supplied by each DNSP varies quite substantially
— each distribution network connects to the transmission network at more than one connection point.

During the inquiry we took account of these factors by averaging combined Transmission and distribution loss factors over the five distribution networks weighted by an approximation of the number of residential customers in each network. In each case we used the 'Short E' distribution loss factor on short sub-transmission lines, which applies to most residential customers in a given network. We accounted for the different transmission loss factors (Marginal Loss Factors) by taking a simple average across each transmission connection point on each network.

This produced five average loss factors, one for each distribution network. These were combined to a single average which was weighted by customer numbers as reported by the DNSPs.

On this occasion we applied the same approach, but AEMO has updated the distribution loss factors, which it does routinely every year. The revised distribution loss factors are as shown in Table 3.1 and the values used here are in **bold**.

Updated transmission loss factors were also used, but they are too numerous to list here. They are available from AEMO.[3]

In all cases the loss factors used here relate to the 2017-18 financial year. However, at the time of writing they are the most recent available.

When the 'single statewide' loss factor is calculated using these updated values it takes the value of 106.8 per cent as shown in Table 3.2.

[3] https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Loss_Factors_and_Regional_Boundaries/2017/Marginal-Loss-Factors-for-the-2017-18-Financial-Year.pdf

TABLE 3.1 DISTRIBUTION LOSS FACTORS

Distributor	Type	A	B	C	D	E
Jemena	Short Sub-transmission	1.0	1.0	1.0	1.0	**1.0**
Jemena	Long Sub-transmission	1.0	1.0	1.0	1.0	1.1
Citipower	Short sub-transmission	1.0	1.0	1.0	1.0	**1.0**
Powercor	Short sub-transmission	1.0	1.0	1.0	1.1	**1.1**
Powercor	Long sub-transmission	1.0	1.0	1.1	1.1	1.1
AusNet Services	Short Sub-transmission	1.0	1.0	1.0	1.1	**1.1**
AusNet Services	Long Sub-transmission	1.0	1.0	1.0	1.1	1.1
United Energy	Short Sub-transmission	1.0	1.0	1.0	1.0	**1.1**
United Energy	Long Sub-transmission	1.0	1.0	1.0	1.1	1.1

SOURCE: AEMO DISTRIBUTION LOSS FACTORS FOR THE 2017/18 FINANCIAL YEAR, HTTPS://WWW.AEMO.COM.AU/-/MEDIA/FILES/ELECTRICITY/NEM/SECURITY_AND_RELIABILITY/LOSS_FACTORS_AND_REGIONAL_BOUNDARIES/2017/DLF_2017_2018.PDF

TABLE 3.2 SINGLE STATEWIDE LOSS FACTOR

DNSP	Simple average – DLF*MLF	Customers (approx.)
Powercor	1.1	750,000
Citipower	1.0	300,000
Jemena	1.1	319,000
United Energy	1.1	640,000
Ausnet Services	1.1	670,000
	Customer weighted average	**106.8%**
	Inverse	**6.3%**

SOURCE: ACIL ALELN CONSULTING

A loss factor of 106.8 per cent implies that, on average, 1,067.5 MWh of electricity must be transmitted to the regional reference node for every 1,000 MWh that is to be used. The remaining 67.5 MWh are lost, mainly as heat, in the network. The table also shows the inverse loss factor, which is 6.3 per cent. This indicated that 6.3 per cent of the electricity transmitted to the regional reference load is subsequently lost.

3.2 Market and ancillary service fees

The adjustment for market fees is based on AEMO's 2017-18 Electricity Budget and Fees report, which is the most recent available at the time of writing. This provides for the fees summarised in Table 3.3. We understand that the Commission has previously chosen to round market fees to the nearest tenth of a cent, which has been continued here.

TABLE 3.3 MARKET AND ANCILLARY SERVICE FEES

Item	Fee ($/MWh)
NEM general fees	0.4
FRC operations	0.1
National Transmission Planner	0.0
Ancillary services	0.2
TOTAL ($/MWh)	**0.7**
Total (c/kWh, rounded)	**0.1**

SOURCE: AEMO, ELECTRICITY-BUDGET-AND-FEES-REPORT-2017-18

Ancillary service fees vary on a weekly basis. In Victoria they are generally in the range of $0.10 per MWh to $0.25 per MWh. However, on occasion they can spike to much higher levels. The average cost of ancillary services fees in the period from 2012 to the time of writing is $0.22 per MWh. This value was carried forward to the results.

4 FIT ENERGY VALUES

As discussed in chapter 1 this report provides FiT energy values estimated in two ways:

— multi rate without critical peak price approach
— single rate (solar weighted).

The rationale for each approach is described in the Commission's final report on the Inquiry and in our report to it from that time. Briefly:

— the single rate approach is relatively simple for retailers to implement but it cannot reward customers for behaviour change and is inherently 'tied' to a given technology, in this case solar photovoltaic.
— the multi rate approach is not 'tied' to a particular technology so it has the benefit of providing a more appropriate payment to non-solar technologies and can compensate customers for behaviour change. However, it is relatively complex to implement.

4.1 Single rate FiT energy value

The single rate FiT energy value is the weighted average of series of projected wholesale spot prices of electricity. The weights that are used reflect the assumed quantity of electricity exported to the grid in each hour of the projection year.[4] The weights used in this case assume that the distributed generator for which the FiT is being estimated is a rooftop solar photovoltaic system. The export weights are based on data relating to a sample of Victorians with this type of generator. They were provided to the Commission during the inquiry by the five Victorian Distribution Network Service Providers. The data relate to a period of several years and to several thousand Victorians, though these details vary within the sample period partly because some people's solar systems were installed during the period for which data were provided and partly because the period for which the DNSPs provided data varied.

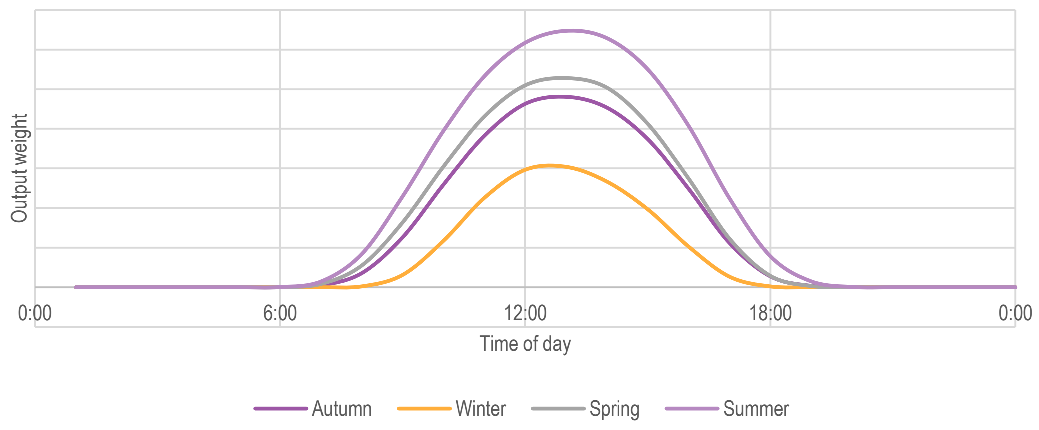
The dataset upon which the weights are based contains the quantity of electricity exported from individual 'solar homes', the size of each solar system and the date on which it was installed.

The weights are at hourly resolution. They were 'paired' with the projected spot prices from *PowerMark* using the same method that is used to create the synthetic weather years that underpin the projection. This preserves any correlation that might exist between solar exports and spot prices, both of which are likely to be correlated with weather.

The weights are shown in average form in Figure 4.1.

[4] Whiel the NEM wholesale spot market operates at half hourly resolution our modelling is hourly.

FIGURE 4.1 SOLAR EXPORT WEIGHTS



SOURCE:ACIL ALLEN CONSULTING

With 506 projections of the wholesale spot price of electricity and corresponding sets of weights there are also 506 projections of the *solar weighted* spot price of electricity. These reflect the range of outcomes discussed in chapter 2. Consistent with the Commission's previous decisions we report the average (mean) of those numbers in Table 4.1.

TABLE 4.1 SINGLE RATE FIT ENERGY VALUE

Component	Estimated value (c/kWh)
Energy value (c/kWh)	6.8
Market fees (c/kWh)	0.1
Subtotal	6.9
loss adjustment (% - multiply)	106.8%
FiT energy value (c/kWh)	**7.4**

SOURCE: ACIL ALLEN CONSULTING

4.2 Multi rate FiTs

A multi rate FiT energy value is the average value of the projected wholesale spot price at certain times of day adjusted for losses, market fees and ancillary service charges. Unlike the single rate approach the multi rate approach does not rely on weighting so it is not 'tied' to any particular technology.[5]

The time blocks used here are those established by the Victorian Government for the standard flexible pricing tariff as depicted in Table 4.1.

[5] Strictly speaking this approach assumes that the technology for which the FiT is paid is equally likely to export electricity at any time during a given time block.

FIGURE 4.2 FLEXIBLE PRICING TIME BLOCKS

SOURCE: HTTPS://WWW.VICTORIANENERGYSAVER.VIC.GOV.AU/BILLS-PRICING-AND-METERS/FLEXIBLE-PRICING

With 506 projections of the wholesale spot price of electricity there are 506 projections of the FiT energy value in *each* time block. As with the single rate FiT the values reported here are the mean value in each time block. This is shown in Table 4.2.

TABLE 4.2 MULTI RATE FIT

FiT element	Peak	Shoulder	Off Peak
Energy value (c/kWh)	24.7	7.2	4.2
Market fees (c/kWh)	0.1	0.1	0.1
Subtotal	24.8	7.3	4.3
loss adjustment (% - multiply)	106.8%	106.8%	106.8%
FiT energy value (c/kWh)	**26.4**	**7.8**	**4.6**

SOURCE: ACIL ALLEN CONSULTING

5 CHANGING PATTERN OF ELECTRICITY PRICES

The projections reported here have a characteristic that we have not seen in previous projections of the Victorian FiT energy value, namely that the time weighted, or simple, average wholesale spot price projected on this occasion is higher than the FiT energy value, which is a solar weighted average of the same set of spot price projections.

The issue is illustrated in Table 5.1, which shows each of the time weighted and solar weighted wholesale spot prices we projected for the Commission for 2017/18 and now along with the corresponding values that underpinned the 2016 FiT. The 2016 value was based on wholesale spot price projections prepared by ACIL Allen, but the solar weighting was applied by others, so these values may not be directly comparable.

TABLE 5.1 TIME AND SOLAR WEIGHTED SPOT PRICES – 2016 TO 2018-19

Item	2016	2017-18	2018-19
Time weighted average spot price	$40.14	$77.03	$91.12
Solar weighted average spot price	$45.70	$81.30	$68.10

SOURCE: ACIL ALLEN CONSULTING

The table also shows the extent to which the pattern was seen in the stochastic scenarios produced last year and in this report, though not for the 2016 values because we did not do the solar weighting on that occasion.

The table shows that there has clearly been a change in the relative size of these two measures of projected price in the last few years.

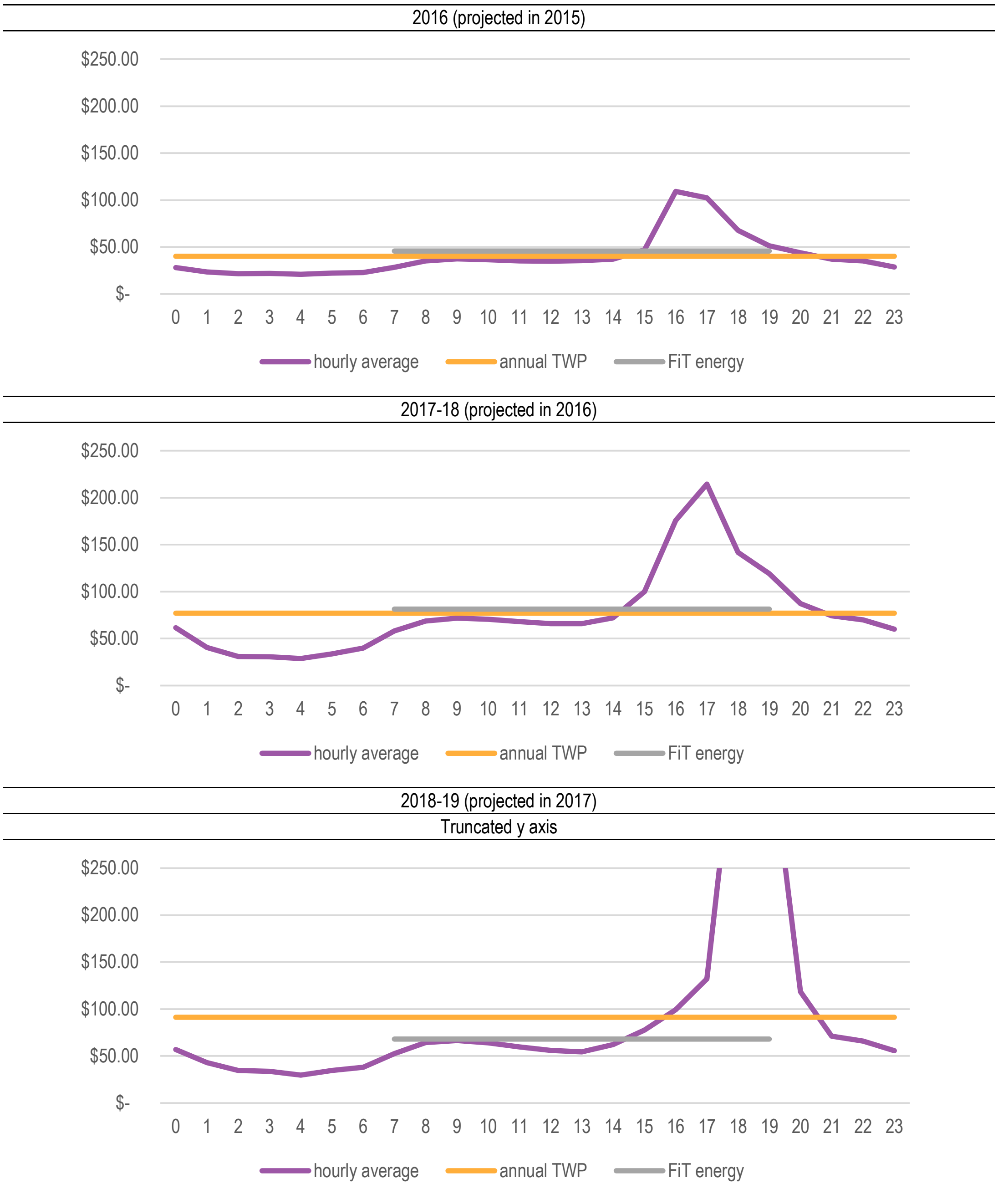
The reason this has occurred begins to be seen in Figure 5.1, which breaks down the median price projection from each year by hour.

Figure 5.1 shows that the price projections have become increasingly ‘peaky’ over the period shown here and that the peak has shifted progressively later in the day. This is verified by the solar weights, which are shown as annual averages in Figure 4.1.

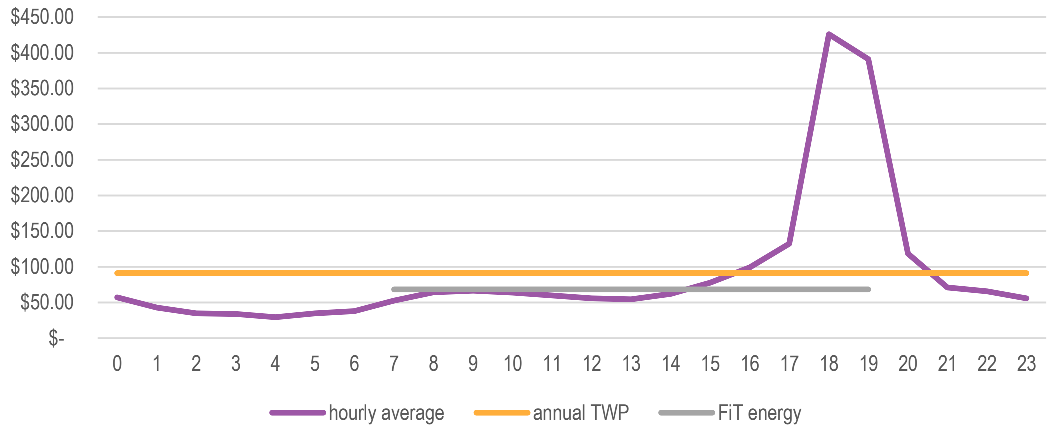
The combination of these two effects has caused the change in the relativity of the time and solar weighted price projections. The figure shows that, over time, the 'peak' has come a:

— *more* important contributor to the time weighted price as it has become larger
— *less* important contributor to the solar weighted price because it has moved to a time when solar output is relatively small.

FIGURE 5.1 TIME AND SOLAR WEIGHTED WHOLESALE SPOT PRICES, BY HOUR – 2016 TO 2018-19



Full y-axis



SOURCE: ACIL ALLEN POWERMARK MODELLING

Therefore, the change in the relationship between the projected time and solar weighted prices of electricity is due to the increasing importance of the projected peak in prices. The likely drivers of this change are the closure of the Hazelwood Power Station and the inclusion in the PowerMark modelling of the substantial projected uptake of grid scale solar generation. This is projected in Victoria as well as in South Australia and New South Wales.

One of the key differences between this projection and previous projections we have prepared for the Commission is that the summer period projected here will be without the Hazelwood Power Station.

The closure of the Hazelwood Power Station is significant for Victoria's electricity generation sector. It was almost 'always on' with capacity of approximately 1,600 MW. Given Victoria's recent typical demand of around 5,500 to 6,000 MW this is substantial.[6] In a sense it is equivalent to increasing demand by around one quarter.

The closure of the Hazelwood Power Station would be expected to lead to an increase in electricity spot prices on a time weighted basis. It is also likely to leave Victoria more exposed to higher cost generation when demand is high, which will add to the 'peakiness' of electricity prices.

The other key difference between this projection and previous projections is the role played by grid scale solar generation.

Grid scale solar photovoltaic generation uses similar technology to rooftop solar generation. Therefore, generally speaking, the two forms of solar generation have similar generation profiles.

As the market becomes increasingly 'populated' by generators with any given generation profile the price that those generators receive for the electricity they generate is expected to fall based simply on supply and demand considerations.

Our PowerMark projections routinely take account of generators that are listed by AEMO as 'committed' and others expected to enter on commercial grounds. In Victoria these projections include the following three solar projects, with total nameplate capacity of 188 MW:

— Gannawarra solar farm, 50 MW, committed, commences April 2018 [7]
— Numurkah solar farm, 38 MW, publicly announced to commence operating from 2019[8]
— Bannerton solar park, 100 MW, publicly announced to commence operating July 2018.[9]

There are also projects in other jurisdictions which add substantially to projected solar capacity at the NEM level. In addition, rooftop PV continues to be installed at high rates. At the national level we understand that approximately 120 MW were installed in a one month period recently.

[6] Demand is sometimes substantially higher than this, but not very often.
[7] https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Generation-information
[8] http://numurkahsolarfarm.com.au/faqs/
[9] https://blog.plantminer.com.au/ugl-wins-133m-epc-contract-for-bannerton-solar-park-in-vic

Given their lack of fuel, grid scale solar plants such as these have very low Short Run Marginal Costs and are expected to bid into the NEM at very low prices, typically $0 per MWh or less.

This solar generation capacity is projected to place downward pressure on spot prices throughout the NEM, but only during daylight hours. Thus it will tend to reduce the FiT energy values. However, the solar generators are, of course, unable to supply electricity overnight. The relatively more concentrated generation market projected for ‘dark’ times is projected to lead to increases in wholesale spot prices. These are projected to be particularly large in the early evening, when domestic loads are relatively high but solar output is very low.

It should be noted that while we have projected the effect of these changes, the changes themselves are already happening or, in the case of the Hazelwood closure, have already happened. There is room, of course, for differences between the modelled outcomes and what actually happens, but there is a high degree of confidence in the inputs discussed here.

A PROJECTED NEW GENERATION CAPACITY

Table A.1 summarises the generation either committed to enter the NEM during 2018/19 or projected to enter on commercial grounds. Capacity is shown twice. The rightmost column shows the nameplate capacity of the plant while the middle column takes account of the fact that some generators will enter partway through the year. For example, a 100 MW generator that enters the market mid year will appear as 50 MW in this column.

Shaded rows in the table provide subtotals. Where generators are expected to enter but not yet committed they are grouped on a row marked 'Commercial.'

TABLE A.1 NEW GENERATION ENTRY BY NEM REGION AND FUEL TYPE

Generator	2019 capacity	Nameplate capacity
New South Wales	**659**	**1143**
Solar	180	303
Commercial	112	150
Griffith Solar Farm	8	30
Manildra Solar Farm	36	48
Parkes Solar Farm	14	55
White Rock Solar Farm	10	20
Wind	479	839
Bodangora Wind Farm	56	113
Commercial	45	90
Crookwell 2 WF	60	91
Sapphire WF	96	170
Silverton WF	200	200
White Rock WF	22	175
Queensland	**931**	**1624**
Solar	699	990
Clare SolarPV	50	100
Collinsville Solar Farm	27	42
Commercial	83	100

Generator	2019 capacity	Nameplate capacity
Darling Downs Solar Farm	55	110
Daydream Solar Farm	150	150
Hamilton Solar Farm	36	57
Hayman Solar Farm	50	50
Kidston Solar Farm	13	50
Ross River Solar Farm	123	148
Sun Metals Solar Farm	78	125
Whitsunday Solar Farm	36	57
Wind	232	633
Coopers Gap WF	112	453
Mt Emerald WF	120	180
South Australia	**456**	**937**
Gas	104	210
Barker Inlet	104	210
Solar	193	320
Bungala Solar Farm	110	220
Commercial	83	100
Wind	143	347
Commercial	60	120
Hornsdale 3 WF	54	109
Willogoleche WF	29	118
Commercial	15	60
Tasmania	**72**	**144**
Wind	72	144
Commercial	72	144
Victoria	**683**	**1324**
Solar	160	188
Commercial	128	138
Gannawarra Solar Farm	31	50
Wind	443	1056
Commercial	181	363
Kiata WF	8	30
Mt Gellibrand WF	93	132
Salt Creek WF	43	58
Stockyard Hill WF	89	444
Yaloak South WF	29	29
Commercial	80	80

SOURCE:ACIL ALLEN CONSULTING

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ACIL ALLEN CONSULTING IS ONE OF THE LARGEST INDEPENDENT, ECONOMIC, PUBLIC POLICY, AND PUBLIC AFFAIRS MANAGEMENT CONSULTING FIRMS IN AUSTRALIA.

WE ADVISE COMPANIES, INSTITUTIONS AND GOVERNMENTS ON ECONOMICS, POLICY AND CORPORATE PUBLIC AFFAIRS MANAGEMENT.

WE PROVIDE SENIOR ADVISORY SERVICES THAT BRING UNPARALLELED STRATEGIC THINKING AND REAL WORLD EXPERIENCE TO BEAR ON PROBLEM SOLVING AND STRATEGY FORMULATION.