ESSENTIAL SERVICES COMMISSION

Minimum electricity feed-in tariffs to apply from 1 July 2019

Final Decision

28 February 2019

An appropriate citation for this paper is:

Essential Services Commission 2019, Minimum electricity feed-in tariffs to apply from 1 July 2019: Final Decision, 28 February

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Summary

The commission's final decision is to set two minimum feed-in tariffs (FiTs) rates to apply from 1 July 2019, of which each retailer must offer at least one:[1]

- the single rate feed-in tariff, and/or
- the time varying feed-in tariff

Our final decision continues the approach we established for the 201819 feed-in tariff, where retailers have flexibility to offer one or both forms of the tariff (either single rate or time varying). This helps the transition towards time-varying feed-in tariffs to continue, allowing retailers to offer feed-in tariffs in response to customer demand.

This year we used a futures market approach to forecast the wholesale electricity prices that underpin the feed-in tariffs. The futures market approach provides more transparency to stakeholders and aligns with the approach taken by other regulators when benchmarking feed-in tariffs.[2] Feedback from stakeholders on our draft decision supported this new approach.

Wholesale electricity prices in the futures market have increased since the draft decision was made. This has caused the feed-in-tariffs in the final decision to be higher than in the draft decision.

The final rates are shown in tables S.1 and S.2

Table S.1 Single rate minimum feed-in tariff – final 201920 tariff rate

	Minimum rate to apply (all times) (c/kWh)
Rate	12.0

This is a 2.1 cent increase from last year's single rate of 9.9 c/kWh.

[1] Pursuant to section 40FBB(1) of the Electricity Industry Act 2000 .

[2] Independent Pricing and Regulatory Tribunal (IPART) 2018, *Solar feed-in tariffs: The value of electricity from small-scale solar panels in 2018-19*, 2 July.

Table S.2 Time-varying minimum feed-in tariff – final 2019-20 tariff rates

	Minimum rates to apply (c/kWh)		
	Off peak	Shoulder	Peak
Times	Weekdays: 10pm-7am Weekends: 10pm-7am	Weekdays: 7am-3pm, 9pm-10pm Weekends: 7am-10pm	Weekdays: 3pm-9pm Weekends: n/a
Rates	9.9	11.6	14.6

On 30 October 2018, the commission released a final decision requiring all charges and tariffs payable by customers on a bill to be shown including GST. As the feed-in tariff is not payable by a customer, but is instead a credit on a customer's bill this new rule does not apply to the Feed-in tariff for customers.

1. What is a feed-in tariff?

A feed-in tariff (FiT) is the rate at which consumers are credited when they export excess electricity generation from their small-scale solar, wind, hydro or biomass fuelled generators.

What is our role?

As set out in the Electricity Industry Act 2000, the Essential Services Commission (the commission) sets the minimum FiT for small renewable generation for each financial year, but retailers may offer rates above this.

Under the Act, we are required to determine one or more rates an electricity retailer must pay its customers for the electricity they export to the grid, referred to as the minimum FiT.[3] This is a credit paid to small renewable energy generation facilities which use fuel sources such as wind, solar, hydro or biomass.[4,5] We update the FiT on an annual basis. Details on the legal framework underpinning the FiT can be found in Appendix A.

Feed-in tariffs

Last year, we set both a flat and a time-varying minimum FiT. The time-varying minimum FiT was based on three blocks – peak, shoulder and off-peak – and was optional for retailers to implement. This was intended to reflect the underlying value of the electricity, which is based on a wholesale electricity market in which prices change every 30 minutes, and which vary considerably across time.[6]

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[3] See section 40FBB of the Electricity Industry Act 2000.

[4] An important exception is that a 'small renewable energy generation facility' does not include a generating facility that is under the premium solar feed-in tariff scheme (Electricity Industry Act section 40F(1)). Further, the Governor in Council, by order published in the Government Gazette, can specify a facility or class of facility that generates electricity in any way as a small renewable energy generation facility (Electricity Industry Act section 40F(2)).

[5] Further, the Governor in Council, by order published in the Government Gazette, can specify a facility or class of facility that generates electricity in any way as a small renewable energy generation facility (Electricity Industry Act section 40F(2)).

[6] The wholesale spot price of electricity is determined through an auction, which is conducted every five minutes by the Australian Energy Market Operator (AEMO). Currently, the process is repeated six times each half hour and generators are paid the average of the six marginal prices for the electricity they generate during that half hour. On 28 November 2017, the Australian Energy Market Commission made a determination to change the settlement period from 30 minutes to five minutes. As a result, the half hourly averaging process will not be required from the proposed commencement date of the rule change of 1 July 2021.

Our draft decision maintained this approach, to provide more time to observe how a time-varying FiT may affect the market. We also had regard to the range of FiTs (including time-varying FiTs) that are currently being offered in the market to see how retailers respond to a variety of consumer preferences. For example, some consumers may prefer simplicity, while others may prefer rates that reflect how the wholesale price varies throughout the day.

How do we calculate feed-in tariffs?

Calculating the minimum FiTs requires us to estimate prices retailers avoid paying on wholesale electricity purchases when a small scale generator exports electricity to the grid. In other words, what would a retailer pay if the electricity provided by a small scale generator needed to be purchased on the National Electricity Market in 2019-20?

This year we have used a futures market approach to forecast the wholesale prices that underpin the FiT draft and final decisions. We identified the futures market method as more readily reproducible due to its reliance on publicly available data. This makes it more easily observable for our stakeholders, particularly when compared to previous methods. Other costs are also included in the FiT. These are the avoided:

- cost of market fees and ancillary service charges
- value of distribution and transmission losses
- value of the social cost of carbon

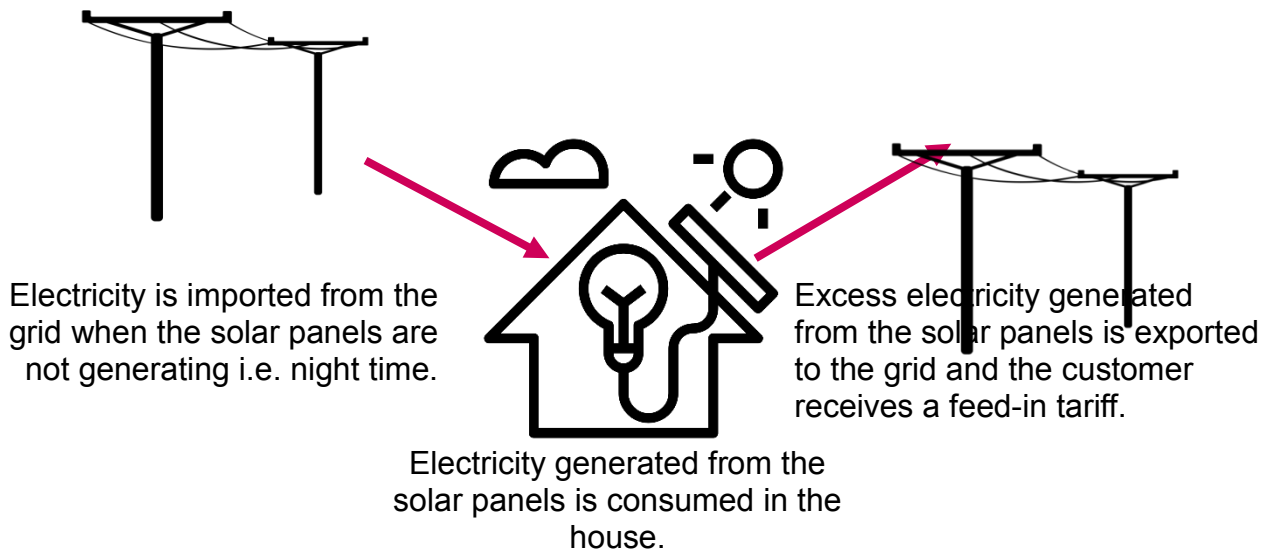
Details on the method used to calculate the FiT can be found in Appendix B.

How can customers benefit from small renewable generation?

Customers who have small renewable generation capacity can benefit by:

- Using the electricity they generate in their home or business – rather than purchasing from their electricity retailer.
- Exporting any excess renewable electricity generated to the grid, and receiving a FiT for the amount of electricity exported.

Figure 1 illustrates an example of a solar customer both consuming and producing electricity.



Electricity generation and use by a solar customer

What offers are in the market?

Retailers are required to provide at least the minimum FiT in all offers they make to customers. They can also make offers where the FiT may be higher than the minimum.

The FiT (measured in cents per kilowatt hour (c/kWh)) may vary across retailers and across different offers. Publicly available information on retailers' websites and the Victorian Energy Compare website[7] provides insight into the different FiTs offered by retailers. As at 31 January 2019, several retailers appear to have retained the previous year's (2017-18) minimum FiT of 11.3 c/kWh.

[7] Victorian Energy Compare (https://compare.energy.vic.gov.au/) is the government energy price comparator website.

As at 31 January 2019, the commission also understands that EnergyAustralia is offering the minimum time-varying FiT we set for 2018 -19. We will continue to monitor whether more retailers offer the time-varying FiTs in the future.

We do not consider the premium feed-in tariff. This is outside the scope of our role.[8]

Structure of the document

This document sets out the commission's final decision on the minimum feed-in tariffs to apply from 1 July 2019, and the remainder of the report is structured as follows:

Chapter 2: Submissions on our draft decision

Chapter 3: Our final decision on the minimum feed-in tariff

Appendix A: Legal context

Appendix B: Method

Appendix C: Submissions

Appendix D: Comparison with previous years' feed-in tariffs

Appendix E: Detailed breakdown of costs making up the feed-in tariffs for 201920

Appendix F: Profile of feed-in tariffs across the day

Attachments

Frontier Economics 2019, *Wholesale Price Forecasts for calculating Minimum Feed-in Tariff, A Report for the Essential Services Commission,* February

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The Premium Feed-in Tariff started in late 2009 and closed to new applicants at the end of 2011. The scheme offered eligible households, businesses and community organisations with small-scale solar systems of five kilowatts or less a credit of at least 60 cents per kilowatt hour for excess electricity fed back into the grid.

2. Submissions on our draft decision

The draft decision on the minimum electricity feed-in tariffs (FiTs) to apply from 1 July 2019 was released for consultation on 4 December 2018. The consultation period closed on 13 January 2019.

We received 12 submissions in response to the draft decision (six from organisations and five from individuals).[9]

We would like to take the opportunity to thank stakeholders for their input which has helped us inform our final decision.

Stakeholders broadly supported the move towards using a futures market approach to forecast wholesale electricity prices that underpin FiTs. Specific feedback fell into four categories, namely views on:

- the method used
- the proposed tariff structure
- the calculated draft FiT values
- matters outside of the scope on this decision, including:
  - solar PV policy
  - consistency with the Victorian Default Offer
  - the potential effects of increased solar PV penetration.

This chapter describes stakeholder feedback on the first three points above and then sets out our responses.

Method used

Stakeholders put forward their views on a number of issues related to the method used to calculate the FiTs. These were:

- the futures market approach
- wholesale prices used to calculate the FiTs
- an alternative way to calculate the FiT
- the avoided cost of human health and the avoided social cost of carbon and
- the time period covered by the FiT.

[9] The complete list of submissions can be found in Appendix C.

Futures market approach

Four stakeholders supported the introduction of the futures market approach to forecast wholesale electricity prices.[10] None of the feedback we received opposed the introduction of the futures market approach.

Origin Energy stated:

> Origin supports the Commission's decision to change its approach to estimating wholesale electricity prices from market modelling to a 'futures price' methodology. The use of futures prices to estimate energy purchase cost is the AEMC's preferred approach and provides stakeholders with a greater ability to understand the Commission's estimates.[11]

The Victorian Council of Social Service (VCOSS) added:

> ..it is consistent with the methodology used by other Australian regulators to develop feed-in tariffs allowing consumer advocates to better assess the reasonableness of tariffs in different jurisdictions. A futures market approach is also more transparent than a market modelling approach because it is based on publically available data and appears to be the most accurate method of forecasting wholesale prices, with energy retailers managing their own financial risks through the futures market.[12]

The commission's view is that the futures market approach provides stakeholders with a relatively simple and more readily reproducible approach in the way we estimate wholesale electricity prices.

Wholesale prices used to calculate feed-in tariffs

EnergyAustralia stated that Frontier Economic's wholesale projections for 201920 are higher than what might be recoverable for large scale PV generation.[13] EnergyAustralia submitted this indicates that the FiT may over compensate customers for their solar PV exports. EnergyAustralia

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[10] The stakeholders were: Mr L Doig, submission to the Essential Services Commission consultation paper 'Minimum electricity feed-in tariff to apply from 1 July 2019: Draft decision' December 2018. EnergyAustralia Pty Ltd, Origin Energy Ltd, and Victorian Council of Social Service.

[11] Origin Energy Limited, submission to the Essential Services Commission consultation paper 'Minimum electricity feed-in tariff to apply from 1 July 2019: Draft decision' December 2018.

[12] Victorian Council of Social Service, submission to the Essential Services Commission consultation paper 'Minimum electricity feed-in tariff to apply from 1 July 2019: Draft decision' December 2018.

[13] EnergyAustralia Pty Ltd, submission to the Essential Services Commission consultation paper 'Minimum electricity feed-in tariff to apply from 1 July 2019: Draft decision' December 2018.

claimed that Frontier Economics used rates of $80/MWh for the solar weighted flat rate against rates of $53/MWh that have been offered by the Victorian Government.[14]

Our view is that the wholesale electricity prices used in the calculation of the FiT should reflect the prices any retailer in Victoria would avoid paying for wholesale electricity purchases when a small scale generator exports electricity to the grid. In other words, the amount that a retailer would pay if the electricity provided by a small-scale generator needed to be purchased on the National Electricity Market in 201920.

Because the wholesale price is driven by variety of generation sources in the NEM, it is appropriate for the estimation of a wholesale price to be based on a market price rather than any single contracted arrangement such as those offered by government – under schemes like the Victorian Renewable Energy Target. Furthermore, we consider that using a futures market approach to forecast wholesale electricity prices will account for market expectations of changing fuel sources over time. Our final decision is to apply the futures market approach in estimating wholesale electricity prices.

An alternate way to calculate feed-in tariff rates

Mr Peter Poteralski and Mr Ferdinand Hillen suggested that the FiT rates could be based on a percentage of the retail consumption rates.[15,16] The relevant legislation requires us to determine one or more rates for the FiT.[17] This precludes determining FiTs as a percentage of retail rates which may vary widely. Moreover, our calculation has taken into account all the factors required under the legislation refer to page 12.

Other avoided costs

Professor Peter Seligman commented that the commission had omitted to include an amount for the avoided human health costs in the calculation of the FiTs. He also included a proposed methodology to calculate this cost. He then stated:

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[14] In November 2017, the Department of Environment Land Water and Planning made a presentation to industry on the Victorian Renewable Energy Target scheme. The presentation referenced a contract for difference strike price of $53.06 MWh for fixed plate solar projects. https://www.energy.vic.gov.au/__data/assets/pdf_file/0025/90925/2017-VRET-Information-Session-Presentation-28-November.pdf

[15] Mr Peter Poteralski, submission to the Essential Services Commission consultation paper 'Minimum electricity feed-in tariff to apply from 1 July 2019: Draft decision' December 2018.

[16] Mr Ferdinand Hillen, submission to the Essential Services Commission consultation paper 'Minimum electricity feed-in tariff to apply from 1 July 2019: Draft decision' December 2018.

[17] Section 40FBB(1) Electricity Industry Act 2000. We do this by basing the FiTs on a cent per kilowatt hour basis.

> I further suggest that the actual value of solar PV exceeds the ESC Social Cost. My rationale is as that it reflects export only and not generation. So whilst an FiT based on export is one method of determining the social and health costs, this neglects the benefit of self-consumption, which also clearly reduces fuel use. I attach my methodology re the health benefit but make the further point that the proposed *Value of avoided distribution and transmission losses* and *Value of avoided social cost of carbon* of 0.4 and 2.5 cents/kWh should reflect generation rather than just the export portion. These should be multiplied by 1.5[18]

In response, we note the legislation requires us to have regard to any Order in Council that sets out a methodology or factor to calculate the avoided social cost of carbon and avoided human health costs.[19] In February 2017, the Government issued an Order in Council specifying a method for determining the social cost of carbon.[20] Applying that method yields a value of 2.5 cents per kilowatt hour of electricity exported by a small renewable generator, which we add to both the single rate and time varying tariffs. The order did not specify a factor or method for determining avoided human health costs.

We also note that an earlier inquiry by the former Victorian Competition and Efficiency Commission into distributed generation in 2012 concluded that there was no clear value in mandating a gross FiT, preferring a net FiT (that is, where the distributed generator is compensated for the energy that is exported to the grid but not for the energy consumed on site).[21]

Feed-in tariff period

EnergyAustralia stated that setting FiTs on a financial year basis created a repricing risk for retailers operating in Victoria. This is because retailers typically amend tariffs on 1 January each year to be in line with the Australian Energy Regulator's electricity distribution determinations.[22] In response, we note the legislation requires us to determine FiTs on a financial year basis.[23]

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[18] Professor Peter Seligman, submission to the Essential Services Commission consultation paper 'Minimum electricity feed-in tariff to apply from 1 July 2019: Draft decision' December 2018.

[19] Section 40FBB(3A) Electricity Industry Act 2000.

[20] Victorian Government 2017, Victoria Government Gazette No. S 36, Tuesday 21 February 2017, Order specifying a methodology and factors for the determination of the avoided social cost of carbon (Order in Council)

[21] Victorian Competition and Efficiency Commission, 2012, Power from the people, inquiry into distributed generation, summary report, July. p.12

[22] EnergyAustralia Pty Ltd, submission to the Essential Services Commission consultation paper 'Minimum electricity feed-in tariff to apply from 1 July 2019: Draft decision' December 2018.

[23] Section 40FBB(2)(a) Electricity Industry Act 2000.

We are satisfied that the methodology we have used to calculate the FiTs is consistent with the relevant legislation and that the futures market approach forecasts wholesale electricity prices with greater transparency for stakeholders.

Tariff structures

Stakeholders raised three issues in relation to the tariff structures for the FiTs. These were:

- transitioning towards a time-varying tariff structure for the FiT
- considering a FiT with two time blocks
- considering the timeframes used for the time-varying FiT.

Our final decision is to allow retailers the option of offering customers a single rate and/or a time-varying three part FiT. We set out our responses below.

Transitioning toward a time-varying tariff feed-in tariff

In our draft decision we proposed to continue transitioning toward time-varying feed-in tariffs, for the period starting on 1 July 2019. We proposed to do this by allowing retailers to offer:

- a minimum single rate FiT and/or;
- a minimum time-varying tariff, with peak, shoulder and off peak rates.

We received different views on whether we should transition toward a time varying FiT. Submissions ranged from continuing to set a single rate only to continuing to transition toward the time-varying FiT. One retailer suggested that retailers should be able to implement flexible pricing structures (potentially different from those proposed by us) to meet their customer demands. Origin Energy supported continuing with the single rate FiT only.[24] EnergyAustralia said that it supported retailers being able to offer either the single rate or time varying FiTs depending on their circumstances. EnergyAustralia wrote:

> We are also in favour of retailers retaining the option of offering customers either a flat rate or TOU FiT depending on their circumstances and other retail product offerings.[25]

The Victorian Council of Social Service supported our approach to transition toward a time varying FiT.

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[24] Origin Energy Limited, submission to the Essential Services Commission consultation paper 'Minimum electricity feed-in tariff to apply from 1 July 2019: Draft decision' December 2018.

[25] EnergyAustralia Pty Ltd, submission to the Essential Services Commission consultation paper 'Minimum electricity feed-in tariff to apply from 1 July 2019: Draft decision' December 2018.

> We welcome continuation of this approach and the transition to time varying tariffs, which will help optimise the timing of household electricity exports. This should put further downward pressure on wholesale prices and lower network costs, e.g. by reducing the risks of high reverse flows into the network in the middle of the day.[26]

Red Energy indicated that the Commission should only set the minimum single rate FiT and, retailers should have the flexibility to set their own time varying FiTs aligned with their customer demands. Red Energy stated:

> In a highly competitive and unregulated market, retailers offer innovative product offerings including pricing structures that appeal to customers. This can include time varying FiTs, should customers want to take them up. Costs of establishing the innovating pricing structure will be accounted for by retailers who have a strong level of customer demand for these innovative solutions.[27]

We consider that our proposal in the draft decision which permits retailers to implement a single rate and/or time varying FiT meets the needs of all stakeholders. This is because it allows:

- retailers time to invest in updating their billing systems
- retailers to differentiate their service offerings and hence promote competition
- customers time to update their metering technology so as to be able to move to a time varying FiT
- distributors more time to consider any impacts of a time varying FiT on their networks, particularly if large numbers of customers export simultaneously to take advantage of higher peak prices.

In response to Red Energy's submission, we note the legislation requires the commission to determine one or more rates for purchases of small renewable energy generation electricity.[28] Nevertheless, we consider that there is still some flexibility for retailers to set their own FiTs under the current arrangements as long as they meet the minimum rate at each point in time.

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[26] Victorian Council of Social Service, submission to the Essential Services Commission consultation paper 'Minimum electricity feed-in tariff to apply from 1 July 2019: Draft decision' December 2018.

[27] Red Energy Pty Ltd and Lumo Energy (Australia) Pty Ltd, submission to the Essential Services Commission consultation paper 'Minimum electricity feed-in tariff to apply from 1 July 2019: Draft decision' December 2018.

[28] Section 40FBB of the Electricity Industry Act 2000.

Consider a two part tariff structure

Mr Peter Poteralski suggested a two part time varying tariff with just shoulder and peak rates would more accurately reflect the times when solar generation is fed into the grid.[29]

In 2016, as part of an inquiry into the true value of distributed generation, our final report concluded the benefit of a time-varying tariff is to provide a market reflective outcome for all forms of distributed generation not just solar generation and that a three part tariff was most suitable because it aligns with the existing time blocks used in retail electricity pricing and is more easily understood by market participants.[30] Furthermore, the commission's Energy Retail Code states that the residential electricity standing offer should contain a domestic flexible tariff with the same time blocks as those of the time-varying minimum feed-in tariff.[31]

Consistency between set timeframes and wholesale prices

Red Energy raised concerns about whether the set timeframes used in the time varying tariff reflected wholesale electricity prices at those times. We interpreted this to mean, for example, do peak wholesale prices occur between 3 and 9 pm on weekdays or do they occur during another time period(s)? We note Red Energy's concerns in relation to ensuring the set timeframes in the time-varying tariff reflect wholesale electricity prices during those timeframes. We will continue to review the daily distribution of spot wholesale electricity prices in determining the minimum rates and time periods for time-varying FiTs. As part of the analysis underpinning this years' FiT calculation, Frontier Economics found that peak prices (for working days across the year) have typically occurred between 3 and 9 pm.[32] This is consistent with the rate and time period of the peak tariff rate in the time-varying tariff.

Calculated draft decision feed-in tariff rates

We received opposing views on our draft decision FiT calculated rates. EnergyAustralia and the Victorian Council of Social Service were supportive of the FiT rates proposed, including the peak time-varying rate of 14.1 c/kWh.

The Victorian Council of Social Service stated:

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[29] Mr Peter Poteralski, submission to the Essential Services Commission consultation paper 'Minimum electricity feed-in tariff to apply from 1 July 2019: Draft decision' December 2018.

[30] Essential Services Commission, 2016, The Energy Value of Distributed Generation, Distributed Generation Inquiry Stage 1 Final Report, August. p. 53

[31] Essential Services Commission, 2019, Energy Retail Code version 12, January p.118

[32] Frontier Economics noted that prices also peaked between 6.30 and 7.30 am on weekdays during the winter quarter.

> The time varying tariff for 2019-20 seems to better reflect wholesale electricity prices, unlike the 2018-19 tariff. The 2018-19 peak rate seemed particularly inconsistent with wholesale electricity prices, since it was equal to or exceeded some peak retail prices. As VCOSS noted in its submission on 2018-19 tariff, this could have led to higher prices for non-solar households if retailers recovered additional costs from other customers.[33]

On the other hand some stakeholders were dissatisfied with the FiT rates proposed in the draft decision because they considered that the rates were too low – including the peak time varying tariff. [34,35]

The National Electrical and Communications Association and Keemin Energy Solutions expressed concerns that the reduction in the peak time varying rate from 29.0 to 14.1 c/kWh would discourage people from installing rooftop solar PV.[36]

The National Electrical and Communications Association submitted:

> The proposed peak time - varying FiT rates from 29 c/kWh to 14.1 c/kWh in our view may have an unintended consequence for consumers who may not see a reasonable return on investment which could impact the take –up of solar panels.[37]

The method we used to calculate the FiT rate is consistent with the legislation as it takes into account:[38]

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

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[33] Victorian Council of Social Service, submission to the Essential Services Commission consultation paper 'Minimum electricity feed-in tariff to apply from 1 July 2019: Draft decision' December 2018.

[34] Chelsea M, submission to the Essential Services Commission consultation paper 'Minimum electricity feed-in tariff to apply from 1 July 2019: Draft decision' December 2018.

[35] Callee Schembri, submission to the Essential Services Commission consultation paper 'Minimum electricity feed-in tariff to apply from 1 July 2019: Draft decision' December 2018.

[36] Keemin Energy Solutions, submission to the Essential Services Commission consultation paper 'Minimum electricity feed-in tariff to apply from 1 July 2019: Draft decision' December 2018.p.4

[37] National Electrical and Communications Association, submission to the Essential Services Commission consultation paper 'Minimum electricity feed-in tariff to apply from 1 July 2019: Draft decision' December 2018.

[38] Section 40FBB (3) (a) to (c) Electricity Industry Act 2000.

On this basis, we are satisfied that rates proposed in the draft decision reflect the factors that we are required to take into account. As we set the FiTs annually, we expect to see rates fluctuate, particularly as wholesale electricity prices change in the energy futures market. Furthermore, it is not open to the commission to set the rate on the basis of other considerations, such as the objective of promoting more rooftop solar generation.

In Appendix D we compare the single rate FiT value for 201920 with the single rate values of previous years.

3. Final Decision

This chapter sets out our final decision for the minimum feed-in tariffs to apply in Victoria from 1 July 2019.

Transition to time-varying rates

The commission's final decision is to set two minimum feed-in tariffs (FiTs) rates to apply from 1 July 2019, of which each retailer must offer at least one:[39]

- the single rate feed-in-tariff, and/or
- the time varying feed-in-tariff

Our final decision continues the approach we established for the 201819 feed-in tariff, where retailers have flexibility to offer one or both forms of the tariff (either single rate or time-varying). This helps the transition towards time-varying feed-in-tariffs to continue, allowing retailers to offer feed-in-tariffs in response to customer demand.

We recognise that a time-varying FiT provides a more granular reflection of how the value of wholesale electricity varies throughout the day than is possible with a single, flat-rate tariff. This provides the opportunity for solar owners to modify their export profile in response to higher and lower prices, if they so choose. Solar owners who modify their behaviour to take advantage of the higher rates during peak periods may be able to capture higher revenues.

Feed-in tariff rates to apply from 1 July 2019

We used the same method to calculate the minimum FiTs for the draft and final decisions. The only difference between the draft and final decisions is that Frontier Economics used a more recent period to measure the 40 day trade weighted average of ASX traded quarterly base swap prices.[40] This has resulted in changes to the wholesale electricity cost of the FiT calculation. In turn, this has increased the estimated value of avoided line losses. [41] The values used for all other elements in the FiT calculation remain unchanged from the draft decision. A detailed breakdown of the costs making up the FiT values in the final decision can be found in Appendix E.

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[39] Pursuant to section 40FBB (1) of the Electricity Industry Act 2000.

[40] 40 day average up until 18 January 2019.

[41] The value of avoided line losses takes into account forecast solar weighted average wholesale electricity price, including market fees and ancillary charges.

Table 3.1 below compares the draft and final decision minimum FiT rates.

Table 3.1 Comparison of Draft and Final decision FiT rates

	Minimum rates to apply (c/kWh)			
Tariffs	Single	Off-peak	Shoulder	Peak
Draft decision	11.0	8.9	10.7	14.1
Final decision	**12.0**	**9.9**	**11.6**	**14.6**

All minimum FiT rates are higher than they were at the time the draft decision was published. The FiT rates have increased by between 0.5 and 1.0 c/kWh. The reason for the increase in FiT rates was solely due to increases in ASXEnergy contract prices since the draft decision.[42]

We note the single rate and elements of the time-varying tariff have not increased uniformly refer to table 3.1. This is because each element of the FiT (single rate and elements of the time-varying tariff) are affected differently by different increases in quarterly ASXEnergy contract prices. The peak rate is more heavily affected by high prices in quarter 1 (summer quarter). And since the draft decision ASXEnergy prices for quarter 1 of 2020 have not increased to the same extent as the prices for the other quarters. Consequently, the peak rate has increased to a lesser extent than the other rates.[43]. The consultant report by Frontier Economics is available on our website.

Table 3.2 below sets out our final decision for the minimum single rate FiT to apply from 1 July 2019.

Table 3.2 Single rate minimum feed-in tariff – final 201920 tariff rate

	Minimum rate to apply (all times) (c/kWh)
Rate	12.0

[42] Frontier Economics 2019, *Wholesale Price Forecasts for calculating Minimum Feed-in Tariff, A Report for the Essential Services Commission,* February. p.14

[43] Frontier Economics 2019, *Wholesale Price Forecasts for calculating Minimum Feed-in Tariff, A Report for the Essential Services Commission,* February. p.14

Table 3.3 below sets out our final decision for the minimum time-varying FiT to apply from 1 July 2019.

Table 3.3 Time-varying minimum feed-in tariff – final 201920 tariff rates

	Minimum rates to apply (c/kWh)		
	Off peak	Shoulder	Peak
Times	Weekdays: 10pm-7am Weekends: 10pm-7am	Weekdays: 7am-3pm, 9pm-10pm Weekends: 7am-10pm	Weekdays: 3pm-9pm Weekends: n/a
Rates	9.9	11.6	14.6

The time periods – or 'time blocks structure' for the time-varying FiT are set out in Table 3.4.

Table 3.4 Time block structure for time-varying minimum feed-in tariff

Period	Weekday	Weekend
Off-peak	10pm-7am	10pm-7am
Shoulder	7am-3pm, 9pm-10pm	7am-10pm
Peak	3pm-9pm	n/a

For retailers who offer the single-rate FiT, this means they must pay at least 12.0c/kWh for all exports, regardless of what time of day they occur. Retailers who offer the time-varying FiT must, at a minimum, pay the rate that applies at that particular time of day. For instance, for electricity exported at 4pm on a weekday, the retailer must pay at least 14.6 c/kWh. So long as the minimum is met or exceeded in each time period, retailers may structure their FiTs in any way they deem appropriate. We have included an indication of how the FiT varies throughout the day and compares with the average export profile in Appendix F.

Feed-in tariffs and GST

On 30 October 2018, the commission released a final decision requiring all charges and tariffs payable by customers on a bill to be shown including GST. As the FiT is not payable by a customer, but is instead a credit on a customer's bill, this new rule does not apply to the FiT for customers.

Commencement

Retailers must offer at least one of the minimum tariffs – that is, the single-rate tariff set out in Table 3.2 or the time-varying tariff set out in Table 3.3– from 1 July 2019.

Appendix A – Legal context

The Essential Services Commission (the commission) is required under the Electricity Industry Act 2000[44] to determine the minimum rate or rates an electricity retailer must pay its customers, who are small renewable energy generators, for electricity they produce and export to the grid. This rate or rates is referred to as the minimum feed-in tariff (FiT).[45]

The FiT is a credit paid by a relevant retailer[46] to each customer per kilowatt hour (kWh) of electricity exported. It applies to small renewable energy generation facilities with capacities of less than 100 kilowatts (kW) which produce electricity using renewable energy sources such as wind, solar, hydro or biomass.[47]

Each year, the commission determines the minimum FiT for the following year.[48] The new FiT described in this document will apply from 1 July 2019.

By law, [49] the commission must take into account certain factors in determining the minimum FiT. These factors include:

- the prices of electricity in the wholesale electricity market
- any distribution and transmission losses avoided in Victoria as a result of small renewable energy generation.

The commission must also have regard to the avoided social cost of carbon and avoided human health costs which can be attributed to reduced air pollution caused by small renewable energy

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[44] See section 40FBB of the Electricity Industry Act 2000 .

[45] A wind, solar, hydro, biomass energy facility (or other facility if specified by Order in Council) connected to a distribution system that generates electricity and has an installed or name-plate generating capacity of less than 100 kilowatts.

[46] A person that holds a licence to sell electricity and sells to more than 5,000 customers.

[47] An important exception is that a 'small renewable energy generation facility' does not include a generating facility that is under the premium solar feed-in tariff scheme (*Electricity Industry Act* section 40F(1)). Further, the Governor in Council, by order published in the Government Gazette, can specify a facility or class of facility that generates electricity in any way as a small renewable energy generation facility (Electricity Industry Act section 40F(2)).

[48] While this has previously been done on a calendar year basis, following recent amendments to the Act the commission is now required to set one or more rates (section 40FBB(2)) by 28 February in the financial year preceding the financial year in which it is to apply (section 40FBB(1). See *Energy Legislation Amendment (Feed-in Tariffs and Improving Safety and Markets) Act 2017* (Vic), assent date 14 February 2017.

[49] The factors that the commission must have regard to in determining the FiT that applies from 1 July 2019 are set out in section 40FBB(3) of the Act.

generators.[50] The Act allows the Governor in Council to issue an order specifying a methodology or factors for determining these avoided costs.[51] An order made in 2017[52] sets out factors and methodologies including the following:

- methodologies for determining the number of units of carbon dioxide equivalent (CO_2e) reduced per unit of electricity exported from a small renewable energy generator
- the monetary value for each of unit of CO_2e that is reduced because of the exports of a small renewable energy generator.

The order did not specify factors or methodologies for determining the avoided human health costs caused by a reduction in air pollution.

[50] Following recent amendments to section 40FBB(3) of the Act.

[51] Section 40FBB(3B).

[52] Victorian Government 2017, *Victoria Government Gazette No. S 36,* Tuesday 21 February 2017.

Appendix B – Method

The commission has set two FiT rate options to apply from 1 July 2019. The methodology comprises the following components:

- the value of electricity produced by small scale renewable generators, based on the avoided cost of purchasing the same amount of electricity from the wholesale market (NEM), accounting for price changes throughout the day and seasonally. This includes:
  - wholesale electricity price forecast, both a single rate and time-varying
  - avoided distribution and transmission losses
  - avoided ancillary service charges and market fees
- avoided social costs of carbon and avoided human health costs.

Forecasting wholesale electricity prices

Approaches to forecasting wholesale electricity prices

As set out in our draft decision, we have used a futures market approach to estimating the wholesale price of electricity in 201920.[53] This is based on feedback that we have received from stakeholders in establishing an approach for setting a reference retail price, a desire to align all our pricing approaches, and advice from Frontier Economics as to the best practice approaches used by other regulators in completing similar work. Frontier Economic's paper is attached.[54]

Both market modelling and futures market approaches are well established techniques that both have their relative advantages, but the commission has determined that the factors above mean that it is appropriate for us to use a futures market approach.

In previous years, we have used a market modelling approach that essentially models the process that occurs in the NEM. Doing so requires detailed assumptions on bidding strategies from generators, fluctuations in demand and intermittent wind and solar generation, unplanned plant outages, and transmission constraints. These models can also incorporate the impact of new generation assets, structural changes in the market and longer range forecasts. Based on these assumptions, the model then generates wholesale prices forecast at half-hourly level.

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[53] The legislation as described in Appendix A requires us to have regard to wholesale electricity prices.

[54] Frontier Economics 2019, *Wholesale Price Forecasts for calculating Minimum Feed-in Tariff, A Report for the Essential Services Commission,* February

By their nature, these models are complex, which limits the level of transparency that can be provided to stakeholders about how we have reached a decision. In preparing this draft decision we reviewed the feedback we have received from stakeholders on approaches to forecasting wholesale electricity prices over the time we have been setting the minimum FiT. We have also examined the approaches taken to forecast wholesale electricity prices in other jurisdictions and the response from stakeholders in their most recent decisions.

Using a futures market approach does represent a change from previous FiT decisions and we recognise that not all stakeholders would have been involved in our consultation on an approach to setting a reference price, or in previous FiT decisions. We believe that there are benefits from using a futures market approach by providing more transparency to stakeholders, particularly as there is not expected to be a significant structural change in the market in 201920 (e.g. there are not expected to be any large generators exiting the market). Increased transparency over the inputs for analysis provides stakeholders with greater opportunity to provide meaningful feedback on our draft decision.

Wholesale price forecasts for 201920

We engaged Frontier Economics to assist in forecasting wholesale prices for 201920 using a futures market approach. The following section outlines the approach.

Wholesale price forecast for the single rate

Forecasting the relevant wholesale price for the single rate minimum FiT involve four steps.

1. **Calculating the price level for 201920.** Using the average price of 201920 quarterly baseload future swaps from the ASX (after adjusting for an assumed contract premium of five per cent) weighted by traded volume across the most recent 40 days up to a particular date (for this draft decision this was 19 October 2018).
   As advised by Frontier Economics, using the most recent data (in this case, the 40 days up to a relevant point in time) provides the current view in the market of what wholesale prices will be in 201920. We understand that stakeholders may have differing views about the appropriate time period to use when calculating average futures prices, but we are not aware of a consistent view on what a preferred single option would be in place of the 40 day average.
2. **Selecting the appropriate historical prices and export profile.** The commission received half-hourly actual export data from three distribution businesses for the period 1 July 2016 to 30

September 2018.[55] The most recent data is likely to be the best indicator of solar export profiles in 2019-20. Similarly, corresponding spot price data is available from the Australian Energy Market Operator (AEMO). Based on analysis of the historical Victorian system demand and spot prices over the past five years, Frontier Economics advised that the most recently available data was likely to be the most appropriate indicator of 201920 patterns. We have used data for the period 1 October 2017 to 30 September 2018 to generate a solar weighted average price.

3. **Scaling historical prices to 201920 levels.** After averaging prices (weighted by a solar export profile) for each quarter for the relevant historical base year, they are compared to the quarterly futures prices in step 1 to determine each scaling factor.
4. **Apply the scaling factor to the historical prices.** Each half-hourly price in the base year is scaled by the relevant factor calculated in step 3 to estimate forecast the half-hourly prices expected in 201920.

Wholesale price forecast for the time-varying rate

Forecasting the relevant wholesale prices for the time-varying rate undertakes a similar but slightly modified approach. Unlike the single rate approach the commission has not set the time-varying rate using any weighting based on solar export profiles, so it is not 'tied' to any particular technology. As such, step 2 described above does not include a solar weighting. Instead spot prices for the relevant base year are a simple time-weighted average.

The time blocks used here are those established by the Victorian Government for the standard flexible pricing tariff.

Estimate of market charges and ancillary services

When retailers buy energy from the wholesale market, they must pay market fees and ancillary service charges to AEMO. They pay these fees based on the amount of electricity they purchase from the wholesale market, and avoid them to the extent that they source electricity from small renewable generators. We have included these fees when calculating avoided wholesale costs.

The market fees levied by AEMO are set in advance, through its budgeting process. AEMO has estimated its relevant 201920 market fees to be $0.525 /MWh. In previous years, our estimate of market fees included the fees associated with full retail competition as they were levied per megawatt hour of wholesale electricity purchased. However from 1 July 2019, AEMO has advised that these fees will be recovered on a per customer basis and are therefore excluded from our calculation.

[55] We also received data from two other distribution businesses for the period 1 July 2016 to 30 June 2018, which we have reviewed in making our draft decision but has not informed analysis due to the timing.

The cost of ancillary services is recovered from market participants. On a weekly basis, AEMO publishes data showing the cost recovery rate for ancillary services. In 2018 (to mid-November), that recovery rate was on average $0.22/MWh. This is consistent with an average in the period since 2012 to 2017 of $0.217/MWh or 0.022 c/kWh. For the purpose of determining a FiT that applies from 1 July 2019, we assume that the average cost of ancillary services in 2019-20 will be consistent with the average from 2012 to November 2018. When this is added to the relevant market fees, the value of ancillary services charges and market fees avoided when a retailer obtains electricity from a small scale renewable generator is 0.074 c/kWh. Table B.1 provides a breakdown of this calculation.

In maintaining consistency with previous years, the cents per kilowatt hour has been rounded to the nearest 0.1 cent amount, meaning the value applied for market fees and ancillary services in the 2019-20 feed-in tariff is 0.1 c/kWh.

Table B.1 – Market and ancillary service fees

Item	Fee ($/MWh)
NEM general fees	0.50
National transmission planner	0.02
Ancillary services	0.22
TOTAL	**0.74**

Source: AEMO, Electricity Budget and Fees report 2018-19 and Ancillary service payments and recovery

Estimate of the avoided transmission and distribution losses

Electricity purchased from the wholesale market is often supplied by large generators located away from the point where it is consumed. Electricity is transported to households and other users via the transmission and distribution network (also known as the grid). During that transportation process, a small portion of the electricity originally generated is lost as heat. This is often referred to as ‘line losses’.

Small-scale renewable generation is typically generated and consumed close together. The extent of this saving varies depends on where the generation is located (and other factors). We have incorporated this cost saving into the feed-in tariff by applying a ‘loss factor’ as part of the avoided cost of purchasing energy on the wholesale market.

Using data obtained from AEMO, the commission estimates a customer weighted line loss factor of 1.0574. The inverse of the loss factor is applied to estimate the value of losses in the calculation. Table B.2 sets out the inputs to this calculation. Consistent with previous decisions, we have taken the short sub-transmission 'E' distribution loss factors[56] and calculated the average marginal loss factors (MLF) by taking a simple average of the loss factors published by AEMO across each distribution area.[57] We have not published the MLFs, but they can be sourced from the AEMO website. Both sets of loss factors use the 2018-19 factors published by AEMO. The loss factors are then weighted by the number of low voltage residential and non-residential customers in each distribution zone to calculate a Victoria wide loss factor.[58]

Table B.2 – Inputs for calculating loss factors

Distribution area	Distribution loss factor	Average marginal loss factors	Total loss factor	Customers
AusNet Services	1.0597	0.9857	1.0445	723,834
Citipower	1.0476	1.0006	1.0483	335,011
Jemena	1.0526	1.0013	1.0540	330,244
Powercor	1.0711	1.0069	1.0785	808,538
United Energy	1.0533	0.9987	1.0519	669,491
Customer weighted			**1.0574**	
Inverse			**5.42%**	

[56] https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Loss_Factors_and_Regional_Boundaries/2018/Distribution-Loss-Factors-For-The-2018-2019-Financial-Year.pdf

[57] https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Loss_Factors_and_Regional_Boundaries/2018/Marginal-Loss-Factors-for-the-2018-19-Financial-Year.pdf

[58] This data was provided by the Australian Energy Regulator from publicly available sources.

Estimate of the avoided social cost of carbon

In February 2017, the Victorian Government issued an Order in Council specifying a method for determining the social cost of carbon.[59]

The avoided social cost of carbon for a relevant financial year is the cost per kilowatt-hour of small renewable energy generation electricity purchased by a relevant licensee (retailer), determined in accordance with the following methodology and factors:

$$Avoided\ social\ cost\ of\ carbon = Volume\ factor\ X\ Price\ factor$$

The order specifies the factors the commission must use when applying this methodology.

With regard to the volume factor, the commission must use an emissions intensity coefficient factor of 1.27 kilograms (kg) of carbon dioxide equivalent (CO_2e) per kWh of electricity exported by a small renewable energy generator. This means that 1.27 kg of CO_2e is assumed to be avoided for each kWh exported by a small renewable energy generator (or 0.00127 tonne of CO_2e avoided per kWh exported).

With regard to the price factor, the order specifies a method for determining the value, which the commission has applied to determine a value per tonne of CO_2e of $19.63.

The resulting avoided social cost of carbon is $0.025/kWh of electricity exported by a small renewable energy generator.

Structuring time-varying tariffs

We are also applying a time-varying FiT containing peak, shoulder and off peak periods. Consistent with the findings of our inquiry into the true value of distributed generation, these time blocks are identical to those used for flexible pricing in Victoria. The time periods – or 'time blocks structure' – for the time-varying rates are set out in table B.3.

[59] See Victorian Government 2017, Victoria Government Gazette No. S 36, Tuesday 21 February 2017, Order specifying a methodology and factors for the determination of the avoided social cost of carbon (Order in Council).

Table B.3 – Time block structure for time-varying feed-in tariff

Period	Weekday	Weekend
Off peak	10pm-7am	10pm-7am
Shoulder	7am-3pm, 9pm-10pm	7am-10pm
Peak	3pm-9pm	n/a

Appendix C – Submissions

Organisations

Electricity retailers

EnergyAustralia Pty Ltd

Origin Energy Limited

Red Energy Pty Ltd and Lumo Energy (Australia) Pty Ltd

Retailer and Installer of Solar PV systems

Keemin Energy Solutions

Consumer Group

Victorian Council of Social Service

Peak Body

National Electrical and Communications Association

Individuals

Mr Lester Doig

Mr Ferdinand Hillen

Mr Peter Poteralski

Ms Chelsea M

Ms Callee Schembri

Professor Peter Seligman

Appendix D – Comparison with previous years' feed-in tariffs

Table D.1 compares this year's single rate FiT with previous years' single rate FiTs. All rates are c/kWh.

Table D.1 This years' single rate FiT compared to previous years'

Component	2015	2016	2017-18	2018-19	2019-20
Forecast solar-weighted average wholesale electricity price	5.7	4.6	8.1	6.8	8.90
Avoided market fees and ancillary service charges	0.05	0.1	0.1	0.1	0.07
Value of avoided distribution and transmission losses	0.4	0.3	0.6	0.5	0.49
Value of avoided social cost of carbon	n/a	n/a	2.5	2.5	2.50
FiT rate	**6.2**	**5.0**	**11.3**	**9.9**	**12.0**

Table D.2 compares this years' time varying FiT with last years' time varying FiT. All rates are c/kWh.

Table D.2

	2018-19	2019-20
Peak	29.0	14.60
Shoulder	10.3	11.60
Off peak	7.1	9.90

Appendix E – Detailed breakdown of costs making up the feed-in tariffs for 2019-20

Table E.1 below sets out how each component contributes to the overall FiT for both the single rate and time-varying options.

Table E.1 – Detailed breakdown of the components for the 2019-20 minimum FiT (c/kWh)[60]

Component	Single rate	Off-peak	Shoulder	Peak
Wholesale electricity prices	8.90	6.91	8.53	11.39
Avoided market fees and ancillary service charges	0.07	0.07	0.07	0.07
Sub-total	*8.97*	*6.98*	*8.60*	*11.46*
Loss adjustment (multiply)	5.42%	5.42%	5.42%	5.42%
Value of avoided distribution and transmission losses	0.49	0.38	0.47	0.62
Sub-total	*9.46*	*7.36*	*9.07*	*12.09*
Value of the avoided social cost of carbon	2.50	2.50	2.50	2.50
Value of the avoided human health costs	-	-	-	-
Total (rounded to 1 decimal place)	**12.0**	**9.9**	**11.6**	**14.6**

[60] Table may not add due to rounding.

Appendix F – Feed-in tariffs across the day

Figure F.1 below provides an indication of how the minimum FiT for 201920 varies throughout a weekday and how it compares with an average export profile. As the export profile is different for each individual customer, the best combination of feed-in tariffs and usage tariffs will vary across customers.

Figure F.1 FiT rates across the day for the average solar export profile