

# Minimum electricity feed-in tariff to apply from 1 July 2019

Draft Decision

4 December 2018



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## Summary

The commission's draft decision is to set two minimum feed-in tariff (FiT) rates to apply from 1 July 2019, of which retailers must offer at least one:<sup>1</sup>

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

Our draft decision continues the approach we established for the 2018-19 FiT whereby retailers have the flexibility to offer one or both forms of the tariff (either single rate or time-varying). This helps the transition towards time-varying FiTs to continue, allowing retailers to offer FiTs in response to customer demand.

The draft tariff rates are set out in table S.1 and S.2 respectively.

**Table S.1 Single rate minimum feed-in tariff – draft 2019-20 tariff rate**

	Minimum rate to apply (all times) (c/kWh)
Rate	11.0

The draft single rate FiT of 11.0 c/kWh represents a 1.1 cent increase from the single rate FiT for 2018-19.

**Table S.2 Time-varying minimum feed-in tariff – draft 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	8.9	10.7	14.1

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

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<sup>1</sup> Pursuant to section 40FBB(1) of the *Electricity Industry Act 2000* (Vic).

customer, but is instead a credit on a customer's bill this new rule does not apply to the FiT for customers.

The draft decision involves an adjustment to the method used to forecast wholesale prices. The updated approach provides more transparency to stakeholders and aligns with the approach taken by other regulators when benchmarking FiTs.<sup>2</sup> We also received support from stakeholders in 2018 as part of our consultation for developing an approach for setting a reference retail price for electricity.<sup>3</sup>

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<sup>2</sup> 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.

<sup>3</sup> Essential Services Commission 2018, *Developing a reference price methodology for Victoria's energy market: Consultation paper*, 20 March

## Summary

# 1. What is a feed-in tariff?

A feed-in tariff (FiT) is the rate at which consumers are credited when they export excess generation from their small-scale solar, wind, hydro or biomass sources. As set out in the *Electricity Industry Act 2000* (Vic), we set the minimum FiT for small renewable generation for each financial year, but retailers may offer rates above this.

Under the Act, we're 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.<sup>4</sup> This is a credit paid to small renewable energy generation facilities which use fuel sources such as wind, solar, hydro or biomass.<sup>5</sup> We update the FiT on an annual basis to reflect changes in the wholesale electricity market and expectations of prices.

## 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.

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<sup>4</sup> See section 40FBB of the *Electricity Industry Act 2000*.

<sup>5</sup> 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)).

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

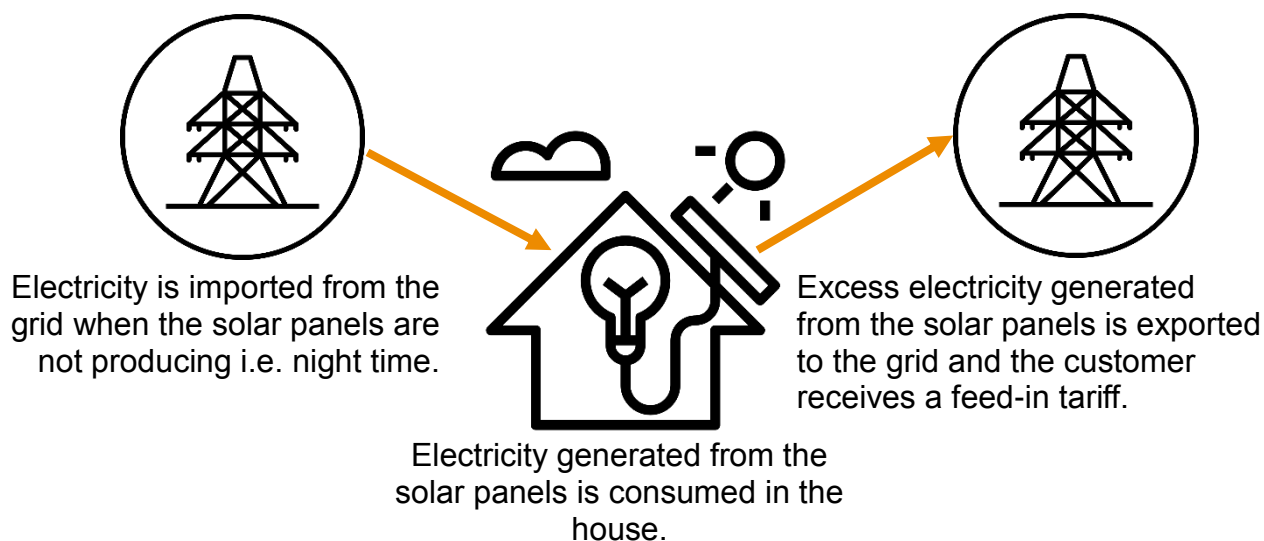


Figure 1.1 – How solar panels work to change your consumption of electricity from the grid

### What offers are in the market?

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

The FiT rate may vary across retailers and across different offers. Publicly available information on retailers' websites and the Victorian Energy Compare website<sup>6</sup> provides insight into the different feed-in tariffs offered by retailers. As at 1 November 2018, the range of single rate FiTs was between 9.9 c/kWh (the minimum FiT for 2018-19) up to 20 c/kWh. Several retailers appear to have retained the previous year's (2017-18) minimum FiT rate of 11.3 c/kWh.

As at 1 November, 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 rates both in the lead up and following 1 July 2019.

We do not consider the premium feed-in tariff (PFiT), or any bonus that retailers may offer above the PFiT rate of 60 c/kWh. This is outside the scope of our role.

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<sup>6</sup> Victorian Energy Compare (<https://compare.energy.vic.gov.au/>) is the government energy price comparator website.

#### 1. What is a feed-in tariff?

## What is our role?

The commission is 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. 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 varies considerably across time.<sup>7</sup>

We propose to maintain this approach to provide more time to observe how a time-varying FiT may affect the market. We have also had regard to the range of FiTs (including time-varying) 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 price signals that reflect how the wholesale price varies throughout the day.

## Structure of the document

This document sets out the commission's draft decision on the minimum FiT to apply from 1 July 2019, and is structured as follows:

Chapter 2: Our approach to estimating the minimum feed-in tariff rates

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

Chapter 4: We invite feedback on our draft decision

Appendix A: Legal context

Appendix B: Technical methodology

Appendix C: Comparison with previous years

Appendix D: Abbreviations

Appendix E: Glossary

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<sup>7</sup> 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.

### 1. What is a feed-in tariff?



## 2. Our approach to estimating the minimum feed-in tariff rate

The minimum feed-in tariff (FiT) rates aim to reflect the costs a retailer avoids when purchasing electricity from a small scale generator (as outlined in figure 2.1 below), as well as including a value for the avoided social cost of carbon.

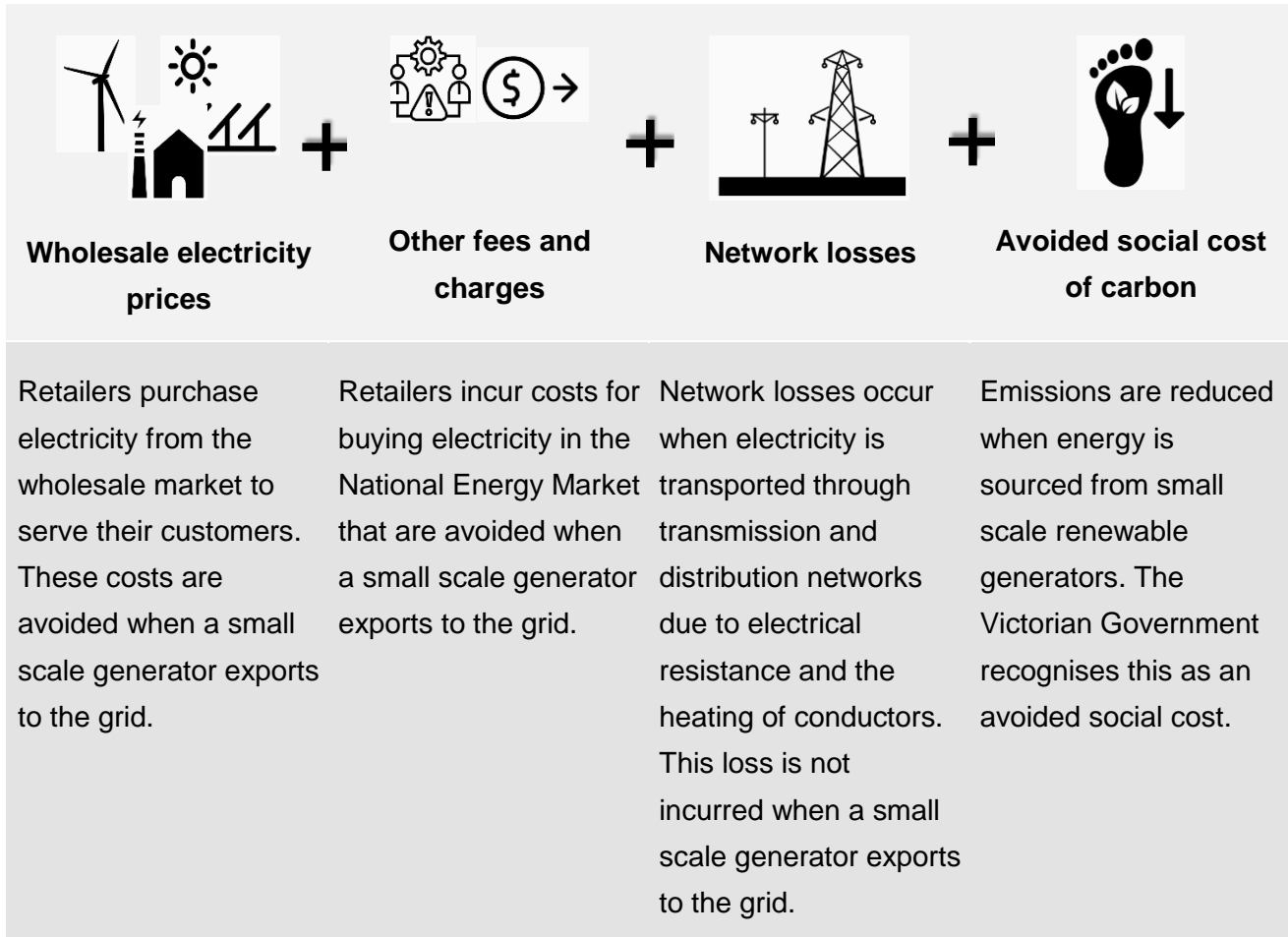


Figure 2.1 – Retailer avoided costs when purchasing from a small scale renewable generator

In line with previous years, we have used the following process to determine the FiT:

1. Develop a forecast of wholesale electricity prices for the relevant year (2019-20):
  - a. For the *single rate* tariff – using the forecast wholesale prices, calculate the value of wholesale electricity during the hours solar photovoltaic (PV) systems typically export.
  - b. For the *time-varying* tariff – using a time-weighted forecast of wholesale prices, calculate the value of wholesale electricity during each of the time blocks that form the tariff structure.

### 2. Our approach to estimating the minimum feed-in tariff rate

2. Incorporate market fees and ancillary services charges that are avoided by retailers when they purchase from small scale generators, as opposed to the wholesale market.
3. Adjust the values above to account for network losses.
4. Incorporate any value associated with the avoided social cost of carbon and avoided human health costs.

With the exception of the calculation of the wholesale component of the FiT, all elements of the method are identical for both the single rate tariff and the time-varying tariff.

## Choosing an approach to forecast wholesale electricity prices

Calculating the minimum FiT 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 (NEM) in 2019-20?

This year we have used a futures market approach to forecast the wholesale prices that underpin the FiT decision. This is a departure from our previous FiT decisions, which have used the market modelling approach (see Appendix B – Technical methodology for more information).

We are adopting the futures market approach because of feedback we received during consultation on last year's FiT decision<sup>8</sup> and during the development of a reference price methodology for Victoria's energy market.<sup>9</sup> Both projects consulted on approaches to forecasting wholesale prices and are therefore related to the aims of this project.

The feedback we received on our draft decision on minimum FiTs for 2018-19 included interest in our approach to wholesale electricity price forecasting. Some retailers questioned the modelling method at the time, with Powershop noting the lack of transparency in the assumptions that underpin the market modelling approach.<sup>10</sup> Origin Energy's submission also reflected this

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<sup>8</sup> See Essential Services Commission 2018, *Minimum electricity feed-in tariffs to apply from 1 July 2018: Draft decision*, 19 December, and Essential Services Commission 2018, *Minimum electricity feed-in tariffs to apply from 1 July 2018: Final decision*, 27 February.

<sup>9</sup> Developing a reference price methodology for Victoria's energy market is part of our work program under the Victorian Government's interim response to recommendations from the Independent Review into the Electricity and Gas retail Markets in Victoria. See Essential Services Commission 2018, *Developing a reference price methodology for Victoria's energy market: Consultation paper*, 20 March and John Thwaites, Patricia Faulkner and Terry Mulder, *Independent Review into the Electricity and Gas retail Markets in Victoria*, Final Report, August 2017.

<sup>10</sup> Powershop 2018, submission on minimum electricity feed-in tariffs to apply from 1 July 2018, 29 January.

## 2. Our approach to estimating the minimum feed-in tariff rate

sentiment, noting the difficulty in scrutinising our approach as stakeholders are unable to analyse actual model inputs.<sup>11</sup>

Utilising a futures market approach to forecasting the wholesale prices is also consistent with our proposal for establishing a reference price as part of our work program following the government's interim response to recommendations from the Independent review of the electricity and gas retail markets in Victoria. At the time we consulted on several methods for forecasting retailer wholesale electricity costs. We identified the futures market method as the most transparent due to its reliance on publicly available data. This makes it more easily observable for our stakeholders, particularly when compared to the market modelling method.

Many stakeholders supported our approach in using the futures market method. AGL told us it agreed with the use of a futures market method for estimating wholesale electricity costs, as it more accurately reflects a retailer's costs when compared to other approaches.<sup>12</sup> Momentum told us that it considered that a futures market based approach provides the best approximation of the wholesale market prices faced by retailers.<sup>13</sup>

More discussion on options for forecasting the wholesale electricity prices for 2019-20 can be found in Appendix B – Technical Methodology.

## **Wholesale market forecasting**

Based on advice provided by Frontier Economics, the market's expectation of what wholesale prices will be in 2019-20 is best represented by Victorian baseload swap futures contracts that are traded on the Australian Stock Exchange (ASX) Energy. Futures contracts generally trade at a premium to the expected prices in the wholesale market, which requires a small downward revision to arrive at the prices expected in 2019-20.<sup>14</sup> Table 2.1 provides the value of these contracts over the 40 days up to and including 19 October 2018.<sup>15</sup> Frontier Economics will update these estimates in the lead up to our final decision in February 2019 to reflect market expectations at that point in

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<sup>11</sup> Origin Energy 2018, submission on Victorian feed-in tariff rates to apply from 1 July 2018 – Draft decision, 29 January.

<sup>12</sup> AGL Energy 2018, submission on developing a reference price methodology for Victoria's energy market: consultation paper, 17 April.

<sup>13</sup> Momentum Energy 2018, submission on developing a reference price methodology for Victoria's energy market, 17 April.

<sup>14</sup> As advised by Frontier Economics, based on an analysis of historical data the average futures price appears to include a five per cent premium above average wholesale prices.

<sup>15</sup> Frontier Economics has advised the commission that a 40 day average is preferred over a 12 or 24 month average since base swaps further from maturity are less likely to be traded with accurate market information and are less representative of expected spot prices.

## 2. Our approach to estimating the minimum feed-in tariff rate

time. These updates will likely result in a difference between the estimates contained in the draft and final decisions.

**Table 2.1 – Average baseload swap price levels for 2019-20 (less 5 per cent premium)**

Calendar quarter	Average price in 40 days up to 19 October 2018
Q3 2019	\$77.66/MWh
Q4 2019	\$68.34/MWh
Q1 2020	\$94.47/MWh
Q2 2020	\$65.31/MWh

Source: Base swap price data from ASX Energy and analysis from Frontier Economics

### Calculating the single rate minimum FiT

Table 2.1 represents the average wholesale price expected for each quarter in 2019-20. It does not reflect the fact that prices change throughout the day, or how this relates to the period in the day when small renewable generation is being fed into the grid. Most small scale renewable generation in Victoria is rooftop solar photovoltaic (PV). Solar PV typically exports electricity to the grid during the day, when the amount of electricity the solar PV system generates is greater than the household's demand.

Consistent with previous decisions, the single rate FiT is weighted to account for the timing of exports. Weighting more accurately reflects the value of the electricity produced by small scale renewable systems, accounting for variations in the wholesale value of electricity that occurs throughout the day. Solar weighting ensures that the value of electricity during periods in which solar PV is not exporting electricity – such as in the middle of the night – is not included in the calculation of the single rate FiT.

For this draft decision we have updated the data used to weight the single rate FiT. We have received aggregate 30 minute export data for customers across three electricity distribution

## 2. Our approach to estimating the minimum feed-in tariff rate

networks for the period from 1 July 2016 to 30 September 2018.<sup>16</sup> The data from these businesses provides data across metropolitan and regional Victoria.<sup>17</sup>

These historic export profiles are then correlated with the corresponding half-hourly wholesale spot prices over the same time period. This correlation is then used to project the expected relationship between wholesale prices and exports throughout each day in 2019-20. One (hypothetical) way of considering this concept is that it estimates what retailers would pay for customers' solar exports if this electricity were sold into the wholesale spot market in 2019-20 in the same way as other generators' output.

After analysing the past five years of wholesale spot price and Victorian consumption data, Frontier Economics recommended using the most up-to-date data as it provides the best indicator of the level and pattern of 2019-20 exports, especially when considering the rapid uptake of rooftop solar in Victoria. Our draft decision includes data from the period 1 October 2017 to 30 September 2018 to establish the relationship between wholesale spot prices and exports.

After accounting for this relationship, relevant all day wholesale electricity price forecast for the single rate FiT in 2019-20 is \$80.01/MWh.

More discussion on data and calculations can be found in Appendix B – Technical Methodology.

### Calculating the time-varying minimum FiT

The 2018-19 final decision on the minimum FiT (applying from 1 July 2018) determined both a single rate minimum FiT and a time-varying minimum FiT. We allowed retailers to select whether to offer customers a time-varying tariff, a single rate tariff or both in 2018-19.

Last year's decision utilised three time blocks – off-peak, shoulder and peak. We have maintained the structure of the time blocks to provide a level of consistency for both consumers and retailers from our inquiry into the true value of distributed generation, as well as last year's final decision. These time blocks are identical to those used for flexible pricing in Victoria and are set out in table 2.2.

Consumers with solar panels reduce their grid electricity consumption at different times of the day. As such, the amount of solar penetration can affect both system demand and spot prices. It is expected that solar penetration will continue to increase in Victoria, and as such we will monitor the impact this has on system demand and spot prices.

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<sup>16</sup> We also received data from the two other distribution businesses for the period 1 July 2016 to 30 June 2018. Given our preference to use the most up to date data, we have not used their data for the 2019-20 FiT.

<sup>17</sup> The three businesses used are Citipower, Powercor and United Energy.

## 2. Our approach to estimating the minimum feed-in tariff rate

**Table 2.2 – 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

Using the same wholesale futures market estimates and wholesale spot prices for the period 1 October 2017 to 30 September 2018, table 2.3 details the expected wholesale prices across each time block for 2019-20. Consistent with our 2018-19 decision and our distributed generation inquiry, these rates are calculated using a simple time weighted average of wholesale prices in each period. This is done to provide price signals that are technologically neutral across all relevant types of small renewable generation.

**Table 2.3 – 2019-20 wholesale price forecasts for the time-varying feed-in tariff (\$/MWh)**

Time blocks	Off peak	Shoulder	Peak
Wholesale price forecast	60.11	77.09	108.83

Source: Frontier Economics

These draft wholesale price forecasts are distributed as expected, with peak rates higher than shoulder rates, which themselves are higher than the off peak rates. The peak rate is significantly lower than what was estimated in 2018-19, which suggests that increased generation capacity and demand management actions may have moderated the impact of very high wholesale prices in peak periods compared with what was previously expected.

In line with our previous decisions and the findings of the distributed generation inquiry, we believe that there is value in providing signals to all small renewable generators that reflect wholesale price variation throughout the day and not focusing on one particular generation technology.

## 2. Our approach to estimating the minimum feed-in tariff rate

## Market fees, ancillary services and line losses

### Market fees and ancillary services charges

When retailers buy electricity from the wholesale market they must pay market fees and ancillary service charges to the Australian Energy Market Operator (AEMO). Some fees are based on the amount of electricity they purchase from the wholesale market. Retailers avoid these fees when they source electricity from small renewable generators. We have included these fees as part of calculating avoided wholesale costs.<sup>18</sup> The approach we have taken is consistent with our 2018-19 FiT final decision.

The market fees levied by AEMO are set in advance through its budgeting process. AEMO has estimated its relevant 2019-20 market fees to be \$0.53/MWh.<sup>19</sup>

For the purpose of determining a FiT that applies from 1 July 2019, we have assumed that the average cost of ancillary services in 2019-20 will be consistent with the average for the period from 2012 to the present.<sup>20</sup> This is consistent with the approach we took in setting the 2018-19 minimum FiT. Adding this cost to the market fees described above, the value of ancillary services charges and market fees avoided when a retailer obtains electricity from a small scale renewable generator is \$0.74/MWh.

### Network or line losses

Electricity purchased on the wholesale market is supplied by large central generators located some distance 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, some portion of the electricity originally generated is lost as heat. These are known as 'line losses'.

Small scale renewable generation reduces line losses, as electricity does not need to travel as far from the point where it is generated to the point it is consumed. The extent of this saving varies depending on where the generation is located (and other factors). We have incorporated these

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<sup>18</sup> Section 40FBB(3) of the Act requires us to have regard to prices of electricity in the wholesale electricity market when determining a rate for purchases of small renewable energy generation electricity.

<sup>19</sup> Australian Energy Market Operator 2018, *2018-19 AEMO Final Budget and Fees*, June. [https://www.aemo.com.au/-/media/Files/About\\_AEMO/Energy\\_Market\\_Budget\\_and\\_Fees/2018/Final-AEMO-Consolidated-Budget-and-Fees-2018-19.pdf](https://www.aemo.com.au/-/media/Files/About_AEMO/Energy_Market_Budget_and_Fees/2018/Final-AEMO-Consolidated-Budget-and-Fees-2018-19.pdf).

<sup>20</sup> Australian Energy Market Operator 2018, *Ancillary services payments and recovery*, accessed 5 November 2018, <https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Data/Ancillary-Services/Ancillary-Services-Payments-and-Recovery>.

## 2. Our approach to estimating the minimum feed-in tariff rate

cost savings into the FiT rates by applying a 'loss factor' as part of the avoided cost of purchasing energy on the wholesale market.

Consistent with the 2018-19 FiT decision, we have used AEMO's publications for both distribution loss factors (DLF) and marginal loss factors (MLF) for the 2018-19 year. Using these factors allows us to develop a loss factor for each distribution zone, which we have combined into one single loss factor for Victoria by weighting each distribution zone's loss factor by the number of customers.

Using loss factors for Victoria as published by AEMO, we have estimated a customer weighted loss factor of 1.05714. We apply the inverse of the loss factor to the forecast solar weighted average pool price, including market fees and ancillary charges.

More discussion on the calculation of losses and market fees can be found in Appendix B – Technical Methodology.

## **Social cost of carbon and avoided human health costs**

Electricity sold in the NEM is generated using a variety of fuel sources and technologies. These include coal, gas, solar and wind farms, and hydroelectric power. In Victoria, most wholesale electricity is generated by coal fired power stations, which produce carbon emissions. These emissions are reduced when energy is sourced from small scale renewable generators.

Consistent with the approach used in our 2018-19 final decision, we have applied the method outlined by the Victorian Government's Order in Council (the Order) published on 21 February 2017. The Order specifies the factors and methodologies for determining the avoided social cost of carbon to which the commission must have regard when setting the FiT.<sup>21</sup> As in 2018-19, the value generated by this approach, which is applied to both the single rate and the time-varying FiT for 2019-20, is 2.5 c/kWh of electricity exported by a small scale renewable generator. More detail can be found in Appendix B – Technical Methodology.

The order did not specify a factor or method for determining avoided human health costs.

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<sup>21</sup> 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)*.

## 2. Our approach to estimating the minimum feed-in tariff rate



### 3. Our draft decision on the minimum feed-in tariff

This chapter sets out our draft decision on the feed-in tariff to apply from 1 July 2019. It follows our approach outlined in Chapter 2. Our draft decision is to continue the process of transitioning to time-varying feed-in tariffs (FiTs) in Victoria by setting two FiT rates for the period starting 1 July 2019, namely:

- a minimum single flat rate FiT
- a minimum time-varying tariff, with peak, shoulder and off peak rates

#### Proposed rates to apply from 1 July 2019

The tariff structures and rates are set out in tables 3.1 and 3.2.

The draft single rate FiT of 11.0 c/kWh represents a 1.1 cent increase from the FiT that we set for 2018-19. This is generated largely by an increase in the forecast value of electricity at times when solar PV is exporting into the network, rather than indicating an increase in overall wholesale prices.

**Table 3.1 – Single rate minimum feed-in tariff – 2019-20 draft rate**

Single rate to apply at all times	
Minimum feed-in tariff	11.0 c/kWh

The single rate minimum FiT rate is based on the approach described in chapter 2 and is broken down in more detail in table 3.4. We are proposing that retailers who choose to offer the single rate minimum FiT must offer customers at least 11.0 c/kWh for all exports, regardless of what time of day they occur. Retailers can, and do, offer rates above the minimum we set.

**Table 3.2 – Time-varying minimum feed-in tariff – 2019-20 draft rates**

Time blocks	Off peak	Shoulder	Peak
Minimum feed-in tariff	8.9 c/kWh	10.7 c/kWh	14.1 c/kWh

The draft time-varying FiT rates are based on the approach described in chapter 2 and are broken down by each relevant component in table 3.4. The pattern of the rates is consistent with the

expectations of wholesale spot prices and also reflects the patterns we observed in our 2016 inquiry into the true value of distributed generation.

We propose that retailers who offer a time-varying FiT must offer the minimum rate that applies in each time block. As with the single rate FiT, retailers can offer rates above the minimum we set in one or all of the time blocks.

The commission has previously received feedback that the time blocks adopted are prescriptive and limit the flexibility of retailers. While we acknowledge that there is some constraint on the time blocks a retailer might offer with their own time-varying FiTs, this is only true to the extent that a retailer is not willing to offer rates above the minimum set by the commission at each point in time. So long as retailers meet the minimum rate at each point in time, there is significant flexibility for designing their own time-varying FiT profiles.

Table 3.3 sets out the relevant periods, or time blocks, in which the time-varying FiT applies.

**Table 3.3 – 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

On October 2018, the commission released a final decision requiring all charges and tariffs payable by customers 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 is not applicable to the FiT for customers.

### **Components of the feed-in tariff**

Table 3.4 below sets out how each component contributes to the overall FiT for both the single rate and time-varying options.

**Table 3.4 – Detailed breakdown of the components for the 2019-20 minimum FiT (c/kWh)<sup>22</sup>**

Component	Single rate	Off-peak	Shoulder	Peak
Wholesale electricity prices	8.00	6.01	7.71	10.88
Avoided market fees and ancillary service charges	0.07	0.07	0.07	0.07
<i>Sub-total</i>	<i>8.08</i>	<i>6.08</i>	<i>7.78</i>	<i>10.96</i>
Loss adjustment (multiply)	5.42%	5.42%	5.42%	5.42%
Value of avoided distribution and transmission losses	0.44	0.33	0.42	0.59
<i>Sub-total</i>	<i>8.51</i>	<i>6.41</i>	<i>8.21</i>	<i>11.55</i>
Value of avoided social cost of carbon	2.50	2.50	2.50	2.50
Value of avoided human health costs	-	-	-	-
<b>Total (rounded to 1 decimal place)</b>	<b>11.00</b>	<b>8.90</b>	<b>10.70</b>	<b>14.10</b>

Figure 3.2 provides an indication of how the minimum FiT varies throughout the day 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 vary across customers.

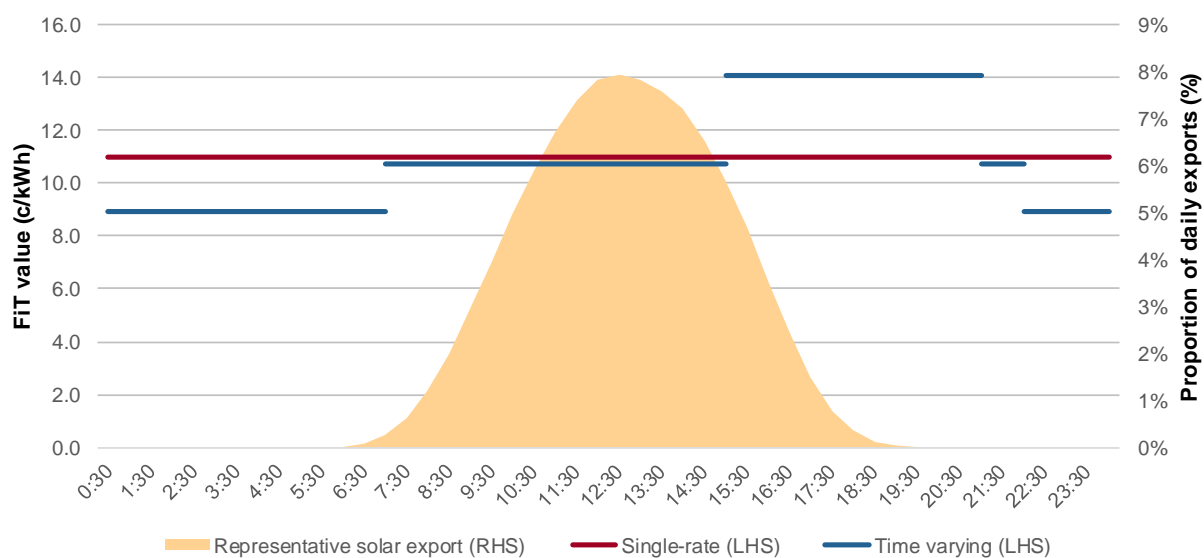


Figure 3.2 – Comparison of 2019-20 minimum FiT rates and export profile throughout the day

<sup>22</sup> Table may not add due to rounding.

3. Our draft decision on the minimum feed-in tariff

## 4. We invite feedback on our draft decision

We invite feedback from stakeholders on our draft decision before we make a final decision. Our final decision will be released by 28 February 2019 in accordance with the Act. We are inviting all interested parties, including consumers, energy licence holders and other stakeholders to make a submission to us by midnight 13 January 2019.

### **Making a submission via Engage Victoria**

Submissions can be made via Engage Victoria – the Victorian Government’s online consultation platform located at <https://engage.vic.gov.au/minimum-feed-tariff>.

### **Provide written comments or submissions**

Electronic submissions can also be made to [fitreview@esc.vic.gov.au](mailto:fitreview@esc.vic.gov.au).

You can send submissions by mail, marked ‘Submissions to Energy Division’, to:

Essential Services Commission  
Level 37, 2 Lonsdale Street  
Melbourne Victoria 3000

The commission’s normal practice is to make all submissions publicly available on its website. Please identify clearly any confidential or commercially sensitive information that you do not wish to be disclosed publicly, including your name and other details.

Once we have received submissions, we will review these to inform the preparation of our final decision.

## Appendix A – Legal context

The Essential Services Commission (the commission) is required under the Electricity Industry Act 2000<sup>23</sup> 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).

The FiT is a credit paid by a relevant retailer<sup>24</sup> 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.<sup>25</sup>

Each year, the commission determines the minimum FiT for the following year.<sup>26</sup> The new FiT described in this document will apply from 1 July 2019.

By law,<sup>27</sup> 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 generators.<sup>28</sup> The Act allows the Governor in Council to issue an order specifying a methodology or

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<sup>23</sup> See section 40FBB of the *Electricity Industry Act 2000* (the Act).

<sup>24</sup> A person that holds a licence to sell electricity and sells to more than 5,000 customers.

<sup>25</sup> 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)).

<sup>26</sup> 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.

<sup>27</sup> The factors that the commission must have regard to in determining the FiT that applies from 1 July 2018 are set out in section 40FBB(3) of the Act.

<sup>28</sup> Following recent amendments to section 40FBB(3) of the Act.

factors for determining these avoided costs.<sup>29</sup> An order made in 2017<sup>30</sup> sets out factors and methodologies including the following:

- methodologies for determining the number of units of carbon dioxide equivalent (CO<sub>2</sub>e) reduced per unit of electricity exported from a small renewable energy generator
- the monetary value for each of unit of CO<sub>2</sub>e 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.

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<sup>29</sup> Section 40FBB(3B).

<sup>30</sup> Victorian Government 2017, *Victoria Government Gazette No. S 36*, Tuesday 21 February 2017.

## Appendix B – Technical methodology

The commission has set two FiT rate options to apply from 1 July 2019. The approach we have used to determine the FiT options is based on the approach taken in setting the minimum FiT for 2018-19. The approach used for the single rate minimum FiT is consistent with the approach taken to setting the rate in the past four years.

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 2019-20. 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.

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.

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 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 2019-20 (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 2019-20

We engaged Frontier Economics to assist in forecasting wholesale prices for 2019-20 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 2019-20.** Using the average price of 2019-20 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 2019-20. 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.<sup>31</sup> 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 2019-20 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 2019-20 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 2019-20.

### **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 2019-20 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.

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<sup>31</sup> 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
<b>TOTAL</b>	<b>0.74</b>

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<sup>32</sup> and calculated the average marginal loss factors (MLF) by taking a simple average of the loss factors published by AEMO across each distribution area.<sup>33</sup> 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.<sup>34</sup>

**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
<b>Customer weighted</b>			<b>1.0574</b>	
<b>Inverse</b>			<b>5.42%</b>	

<sup>32</sup> [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](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)

<sup>33</sup> [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](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)

<sup>34</sup> 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.<sup>35</sup>

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:

$$\textit{Avoided social cost of carbon} = \textit{Volume factor} \times \textit{Price factor}$$

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<sub>2</sub>e) per kWh of electricity exported by a small renewable energy generator. This means that 1.27 kg of CO<sub>2</sub>e is assumed to be avoided for each kWh exported by a small renewable energy generator (or 0.00127 tonne of CO<sub>2</sub>e 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<sub>2</sub>e 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.

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<sup>35</sup> 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 – Comparison with previous years

Table C.1 – Minimum single rate FiT from previous years (c/kWh)

FiT component	2015	2016	2017-18	2018-19	2019-20 (proposed)
Forecast solar-weighted average wholesale electricity price	5.7	4.6	8.1	6.8	8.0
Avoided market fees and ancillary service charges	0.05	0.1	0.1	0.1	0.1
Value of avoided distribution and transmission losses	0.4	0.3	0.6	0.5	0.4
Value of avoided social cost of carbon	n/a	n/a	2.5	2.5	2.5
<b>FiT rate</b>	<b>6.2</b>	<b>5</b>	<b>11.3</b>	<b>9.9</b>	<b>11.0</b>

Table C.2 – Minimum time-varying FiT 2018-19 and 2019-20 (c/kWh)

	2018-19	2019-20 (proposed)
Peak	29.0	14.1
Shoulder	10.3	10.7
Off peak	7.1	8.9

## Appendix D – Abbreviations

Term	Definition
AEMO	Australian Energy Market Operator
c/kWh	cents per kilowatt hour
DLF	Distribution loss factor
FiT	Feed-in tariff
IPART	Independent Pricing and Regulatory Tribunal in New South Wales
kW	Kilowatts
kWh	Kilowatt hour
MLF	Marginal loss factor
MWh	Megawatt hour
MW	Megawatts

## Appendix E – Glossary

Term	Definition
the Act	<i>Electricity Industry Act 2000 (Vic)</i>
commission	Essential Services Commission (Victoria)
Small renewable energy generator	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.
Relevant retailer	A person that holds a licence to sell electricity and sells to more than 5,000 customers.