

Minimum electricity feed-in tariff to apply from 1 July 2022

Final decision

24 February 2022

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Contents

Summary	1
What is a feed-in tariff?	1
We must set the minimum feed-in tariffs	1
We must protect the interests of both solar and non-solar customers	2
Our final decision is a minimum flat feed-in tariff of 5.2 cents	2
A feed-in tariff set at the true value of solar exports is consistent with our objectives	4
We have had regard to stakeholders' feedback	4
Retail rates and feed-in tariffs are not comparable	5
Next steps	7
Minimum feed-in tariffs final decision	8
Minimum flat feed-in tariff from 1 July 2022 is 5.2 cents per kilowatt hour	8
The minimum time-varying feed-in tariffs from 1 July 2022	9
Components of the feed-in tariff	9
Minimum feed-in tariffs over time	10
How we set the minimum feed-in tariffs	12
How solar energy interacts with the retail energy market	12
The factors we must consider in setting the minimum feed-in tariff	14
Steps for setting the minimum feed-in tariff	15
We used the futures market to forecast wholesale electricity prices	16
Calculating wholesale costs for the minimum flat feed-in tariff	16
Calculating wholesale costs for the minimum time-varying feed-in tariffs	17
Market fees and ancillary service charges	17
Transmission and distribution losses	18
We have kept our assumptions on the social cost of carbon and human health costs	19
Social cost of carbon	19
Human health costs	19
Themes from submissions and our responses	23
Solar customers say the minimum feed-in tariffs are too low and unfair	23
The minimum feed-in tariffs reflect the true value of solar exports	24
The minimum feed-in tariffs promote the interests of all customers	26
Avoiding imports from the energy grid helps solar customers recover their investment	27
Victorians still see value in installing solar	28
Some customers felt feed-in tariffs should equal retail rates	28
Forecast prices are the most appropriate method for determining wholesale prices	29
Avoided human health costs	30
Retailers consider feed-in tariffs should be lower	31
Wholesale electricity prices have dropped further	31
Retailers said the cost of carbon should be updated	31

Retailers suggested variable feed-in tariffs' time blocks should match network tariffs	32
Some solar consumers want more notice that feed-in tariffs could change	32
Appendix A – What is a feed-in tariff?	34
How does solar energy fit into the broader energy market?	34
Who is eligible to receive minimum feed-in tariffs?	35
What is our role?	37
Why is the retail rate higher than the feed-in tariff?	39
What offers are currently in the market?	40
How has the feed-in tariff changed over time?	41
Premium feed-in tariff	42
Standard feed-in tariff	42
Transitional feed-in tariff	42
Minimum feed-in tariff	43
Appendix B – Historic feed-in tariffs	44
Comparison of 2022-23 minimum feed-in tariff with historical rates	44
Appendix C – Feed-in tariffs in other jurisdictions	46
Other states also regulate their feed-in tariffs based on wholesale electricity prices	46
Wholesale electricity price component	46
Other components	47
Victoria is the only state with a social cost of carbon component	48
The level of feed-in tariffs in other jurisdictions	48
Sample feed-in tariffs offered across Australia	50
Appendix D – Technical methodology	51
Forecasting wholesale electricity prices	52
Wholesale price forecasts for 2022–23	52
Estimate of market fees and ancillary service charges	54
Market fees	54
Ancillary services	55
Estimate of the avoided transmission and distribution losses	55
Estimate of the avoided social cost of carbon	57
Human health costs	57
Structuring the time-varying feed-in tariff	58
Appendix E – Legislation on setting feed-in tariffs	59
Appendix F – Order in council – avoided social cost of carbon	64
Appendix G – List of stakeholders who have made submission	68

Summary

- The minimum flat rate feed-in tariff will be 5.2 cents per kWh starting 1 July 2022.
- The minimum time-varying feed-in tariffs will range from 5.0 to 7.1 cents per kWh.
- The minimum feed-in tariffs are lower than for 2021-22 due to a forecast decrease in daytime wholesale electricity prices for 2022-23.
- Retailers can offer the flat feed-in tariff and/or time-varying feed-in tariffs.
- Our decision does not stop retailers from offering feed-in tariffs above the minimum amounts.

What is a feed-in tariff?

Retailers pay customers a feed-in tariff when customers send electricity into the grid. Customers can use their small-scale solar, wind, hydro, biomass, or battery equipment to do this.

Victorian electricity retailers with 5,000 or more customers (including non-solar customers) must offer at least the minimum feed-in tariff rates to eligible customers. You are an eligible customer if you have a renewable energy generation facility with a capacity of less than 100 kilowatts.

For simplicity, this final decision refers to eligible customers as solar customers. Solar accounts for 99.9 per cent of small-scale renewable energy generation in Victoria.¹

We must set the minimum feed-in tariffs

The minimum feed-in tariffs reflect the value that solar customers provide to the energy market. This includes the social benefits of lowering carbon emissions.

The Electricity Industry Act 2000 requires us to determine one or more minimum rates for the electricity solar customers export to the grid. We refer to these rates as the minimum feed-in tariffs. Retailers can pay solar customers higher rates, but they cannot pay less.

¹ Clean Energy Council, Postcode data for small-scale installations, accessed 7 December 2021, <http://www.cleanenergyregulator.gov.au/RET/Forms-and-resources/Postcode-data-for-small-scale-installations#Installation-numbers-for-small-scale-systems-by-stateterritory>.

By no later than 28 February each year, we must set the minimum feed-in tariffs to apply for the next financial year.

The Electricity Industry Act 2000 sets out that in setting the minimum feed-in tariffs we must consider:

- prices in the wholesale electricity market,
- avoided transmission and distribution losses, and
- the social cost of carbon and human health costs.²

We must protect the interests of both solar and non-solar customers

Under the Essential Services Commission Act 2001 and the Electricity Industry Act 2000, our objectives are to promote the:

- long term interests of Victorian consumers,
- protections for customers, including in relation to assisting customers who are facing payment difficulties, and
- development of full retail competition.^{3, 4}

Minimum feed-in tariffs set above the value of solar exports would mean non-solar customers are subsidising solar customers through higher electricity rates. This would not be in line with our objectives.

Our final decision is a minimum flat feed-in tariff of 5.2 cents

The minimum flat feed-in tariff for 2022-23 is 5.2 cents per kWh. This is 22 per cent lower than the rate for 2021–22. The time-varying feed-in tariffs are also mostly lower than for 2021–22. Table S.1 shows the details.

² Electricity Industry Act 2000, s. 40FBB(3)(a),(b) and (c).

³ Essential Services Commission Act 2001, s. 8.

⁴ Electricity Industry Act 20020. s. 10.

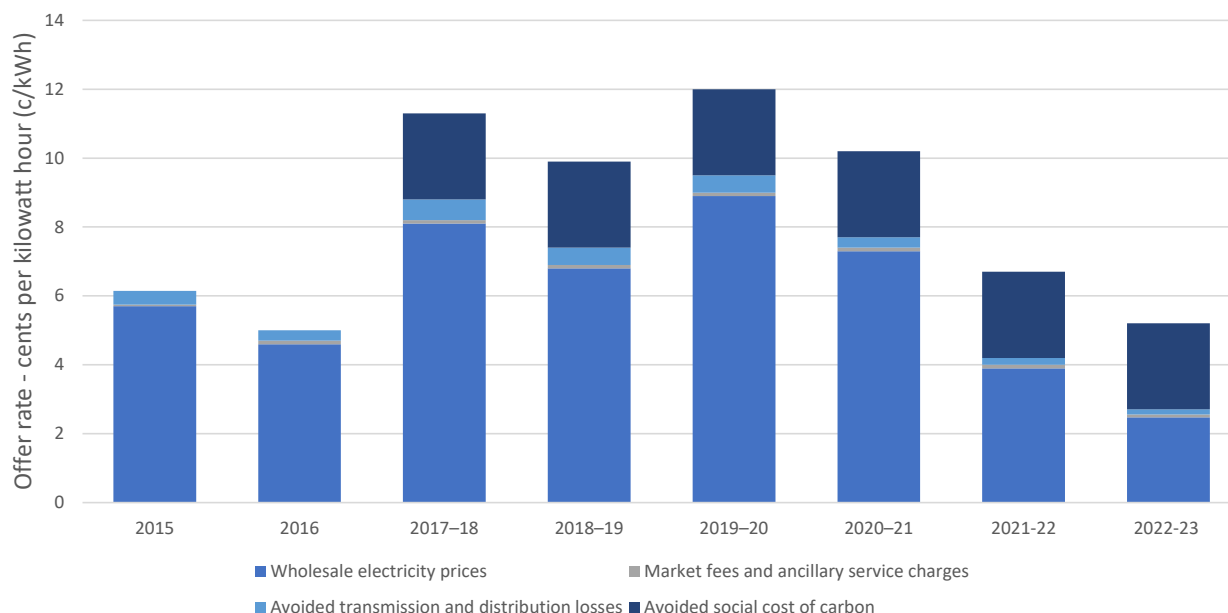
Table S.1: Minimum feed-in tariffs to apply from 1 July 2022, excluding GST*

Flat rate	Time-varying rates (c/kWh) ⁵		
All times	Overnight (Weekdays: 10pm-7am Weekends: 10pm-7am)	Day (Weekdays: 7am-3pm, 9pm-10pm Weekends: 7am-10pm)	Early Evening (Weekdays: 3pm-9pm Weekends: n/a)
5.2	7.1	5.0	6.9

* Feed-in tariffs for solar customers registered for GST are subject to GST. But most residential solar owners are not registered for GST.

The drop in minimum feed-in tariffs is mainly due to lower wholesale electricity prices. Wholesale prices have gone down by the most during the middle of the day when most solar is exported. Changes in the minimum feed-in tariffs largely mirror movements in wholesale electricity prices. Wholesale costs account for 48 to 60 per cent of the feed-in tariffs (see figure S.1).⁶

Figure S.1: Flat feed-in tariff cost components over time



⁵ We have changed the labels for the feed-in tariff periods to 'overnight', 'day' and 'early evening' due to changing market conditions (discussed below).

⁶ Wholesale electricity prices accounted for 60 per cent of the final feed-in tariffs for 2021-22 and 48 per cent of the final feed-in tariffs for 2022-23.

Summary

In our draft decision paper, we said we would update the wholesale electricity price forecasts for the final decision.⁷ Our final decision on the minimum feed-in tariffs uses wholesale prices from ASX Energy (futures prices) up to 14 January 2022.

The average futures prices up to 14 January 2022 are slightly higher relative to our forecast in the draft decision. But this increase in wholesale costs has been offset by a small drop in estimated transmission and distribution losses.

This is the standard approach we take each year. Updating wholesale price forecasts with the most up to date data can mean that sometimes prices in our final decisions are higher than in our draft decisions. At other times updating our forecasts will mean final prices are lower.

A feed-in tariff set at the true value of solar exports is consistent with our objectives

We set the minimum feed-in tariff based on the true value of solar exports. Under the Electricity Industry Act 2000, this means we must look at the costs retailers avoid when they buy electricity from solar customers rather than from the National Electricity Market. We must also look at the avoided social cost of carbon and human health costs.⁸

If retailers paid solar customers more than the true value of solar exports they would have to increase prices for their customers. We have explained this in past decisions.⁹

Our decision is in the long-term interest of Victorians. Solar customers get the true value of their solar exports without other customers paying higher retail rates. Higher retail prices may cause unnecessary hardship or costs for customers that cannot invest in solar systems.

We have had regard to stakeholders' feedback

Stakeholders made 33 submissions on our draft decision. The submissions were from 29 solar customers and 3 retailers.¹⁰

We had a consultation period to seek stakeholders' feedback. We published our draft decision online for public comment and held an online information session.

⁷ Essential Services Commission, Minimum electricity feed-in tariff to apply from 1 July 2022: Draft decision, December 2021, p.4.

⁸ Electricity Industry Act 2000, s. 40FBB(3)(a),(b) and (c).

⁹ Essential Services Commission, Minimum electricity feed-in tariff to apply from 1 July 2021: Final decision, 25 February 2021, p. 31.

¹⁰ One stakeholder made two submissions, resulting in 32 submissions from 31 stakeholders in total.

We considered all submissions in reaching our final decision. We summarise and address the key themes from submissions in the 'Themes from submissions and our responses' chapter.

The solar customers who made submissions disagreed with the minimum feed-in tariffs in our draft decision. In general, they felt that the proposed rates were too low and unfair. They also expressed concern that installing solar panels would no longer be of financial benefit. They said this would make it less attractive to install solar panels.

The three energy retailers who made submissions said that the feed-in tariff is too high.

Under the Electricity Industry Act when setting the minimum feed-in tariff we must look at specific factors and costs.¹¹ We have had regard to all of these factors and costs. Our decision on the minimum feed-in tariff reflects an efficient benchmark of the estimated avoided financial, environmental and health costs. This means that solar customers are paid the value of the energy they produce.

Retail rates and feed-in tariffs are not comparable

One of the most frequently heard comments from consumers was that the feed-in tariff should be closer to retail tariffs. The feed in-tariff should not be compared to retail tariffs. Solar customers are more like electricity generators than retailers when they export energy.

Large scale generators make their money through selling power to the wholesale market. Renewable generators also get payments through environmental programs. The minimum feed-in tariffs include payment for the wholesale energy and environmental benefits solar customers generate. They also include payment for some other costs (avoided market fees and network losses). So solar customers receive more for their energy than they would if they were large scale generators.

Solar customers do not incur the costs that electricity retailers do. When retailers sell electricity to their customers, they must cover their costs. Retailers' costs include:

- wholesale electricity costs,
- other energy market fees,
- hedging wholesale cost risks,
- transporting electricity (the poles and wires connecting customers to electricity generators),
- energy lost during transport,
- environmental programs, and

¹¹ Electricity Industry Act 2000, s. 40FBB(3).

- overhead costs.

When retailers buy energy from solar customers, retailers avoid only three of these categories:

- wholesale electricity costs,
- energy lost during transport, and
- other energy market fees.

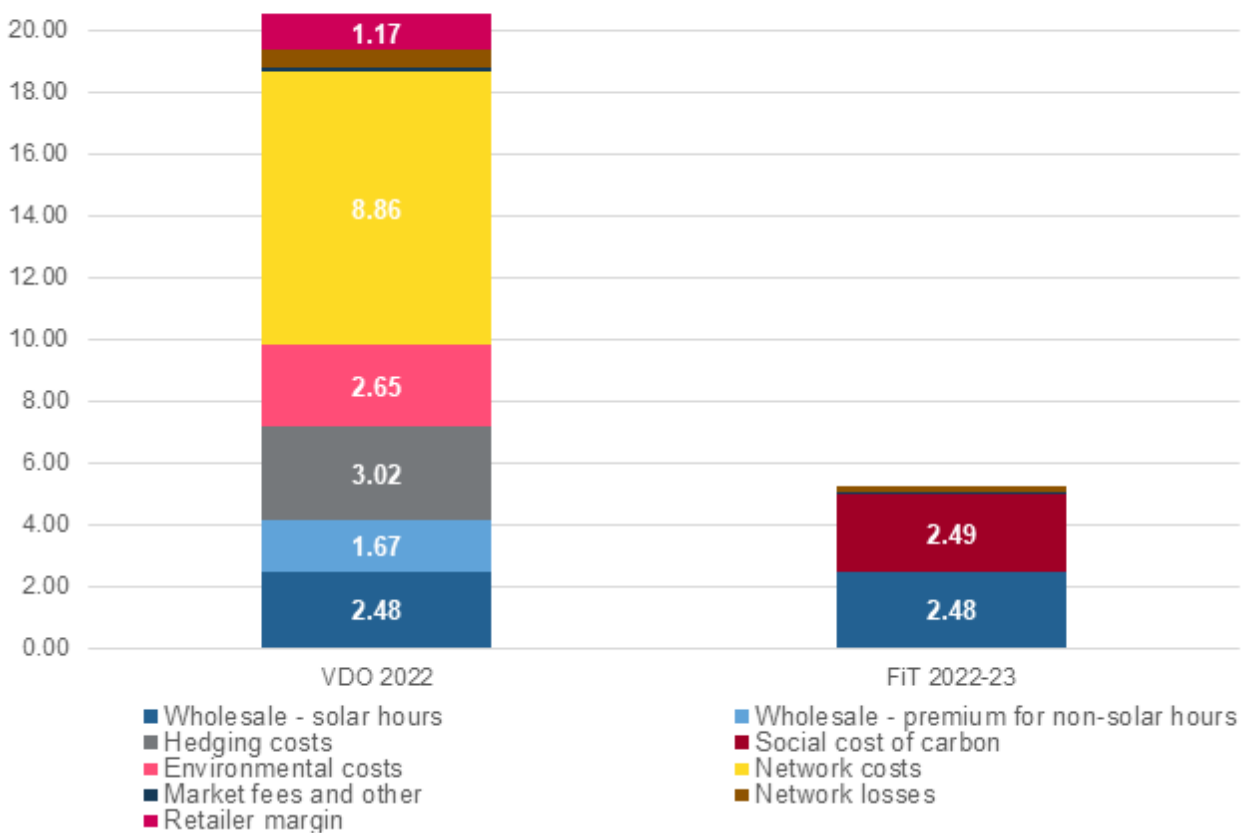
When selling solar customers' power, retailers still have to cover their other costs. If they did not they would make a loss on solar customers' energy.

This means the minimum feed-in tariff will always be lower than retail electricity prices.

Consequently, solar customers will get the greatest benefit from using their power to avoid paying retail prices. For example, they could run power intensive appliances like hot water systems, dishwashers and clothes dryers at times when they would otherwise send power to the grid.

Figure S.2 below compares retailers' variable charges to the value of the energy solar customers generate. It would not be appropriate to pay solar customers more than the value they create.

Figure S.2: Comparison of costs included in variable charges: Victorian Default Offer and flat minimum feed-in tariff (c/kWh)



Summary

Next steps

The minimum feed-in tariffs will apply from 1 July 2022. All retailers with more than 5,000 total customers must pay the minimum feed-in tariffs to eligible solar customers, but they can pay a higher rate.

If you have additional questions on the feed-in tariff, please email us at fitreview@esc.vic.gov.au.

Minimum feed-in tariffs final decision

Our decision is to set two minimum feed-in tariffs to apply from 1 July 2022: These are:

- a minimum flat feed-in tariff rate, and
- a minimum time-varying feed-in tariff, comprising of daytime, early evening, and overnight rates.

Retailers must offer either flat or time-varying feed-in tariffs to their solar customers. They are free to offer both tariff structures.

Retailers can offer feed-in tariffs higher than the minimum if they choose to.

Minimum flat feed-in tariff from 1 July 2022 is 5.2 cents per kilowatt hour

The flat feed-in tariff applies regardless of the time of the day or day of the week.

Table 1.1 shows the minimum flat feed-in tariff of 5.2 cents per kWh for 2022-23, which is 22 per cent lower than the flat tariff we set for 2021-22.

This is driven by lower wholesale electricity prices, particularly during the day. Lower demand for electricity partly due to the coronavirus pandemic and ongoing installations of solar panels have contributed to lower electricity prices in Victoria. See chapter 3 of Frontier Economics' report for details.¹²

Table 1.1: Minimum flat feed-in tariff – 2022-23 (cents per kilowatt hour, solar weighted)

	Flat rate to apply at all times
Minimum feed-in tariff	5.2

Retailers who choose to offer a flat feed-in tariff must offer customers at least the minimum rate that we set in our final decision. Retailers can offer rates above this.

As of January 2022, there are six Victorian retailers that offer a flat feed-in tariff that exceeds the 2021-22 minimum flat tariff of 6.7 cents per kilowatt hour – these offers are around seven cents per kilowatt hour.¹³ Appendix A sets out the feed-in tariff offers available, see the 'What offers are currently in the market?' chapter.

¹² Frontier Economics, Wholesale price forecasts for calculating minimum feed-in tariff, final report for the Essential Services Commission, January 2022, chapter 3, p. 19.

¹³ Publicly available information submitted to the government energy price comparator website Victorian Energy Compare as at 17 January 2022, <https://compare.energy.vic.gov.au/>.

Some retailers have higher feed-in tariffs available under special plans or terms and conditions, for example if you also buy solar panels from that retailer or export lower amounts of electricity to the grid (see Appendix A for examples). Consumers should carefully examine the various elements of such offers, as a higher feed-in tariff may be, at least in part, offset by higher daily charges, or prices to purchase electricity.

The minimum time-varying feed-in tariffs from 1 July 2022

Table 1.2 sets out the proposed time-varying feed-in tariffs for 2022–23 and the relevant time blocks, in which the time-varying feed-in tariffs apply. Retailers offering the time-varying feed-in tariff option must offer at least the minimum rate that applies in each time block, meaning they are free to offer rates above the minimum we set. So long as retailers meet the minimum rate at each point in time, there is significant flexibility for designing their own time-varying feed-in tariff profiles.

Table 1.2: Minimum time-varying feed-in tariffs – 2022-23 (cents per kWh)

Time block	Overnight (Previously off peak)	Day (Previously shoulder)	Early Evening (Previously peak)
Minimum feed-in tariff	7.1	5.0	6.9
Applicable period			
Weekdays:	10 pm – 7 am	7 am – 3 pm, 9 pm – 10 pm	3 pm – 9 pm
Weekend:	10 pm – 7 am	7 am – 10 pm	n/a

We have renamed the tariff periods 'overnight', 'day' and 'early evening'. Previously the tariff blocks were 'off-peak', 'shoulder' and 'peak' respectively. The old labels no longer reflect market conditions due to changing consumption and export patterns. As solar generation has increased during daylight hours, wholesale prices have decreased during day and early evening periods. As a result, solar weighted wholesale prices are now highest during the overnight period.

Components of the feed-in tariff

When setting the minimum feed-in tariffs we must have regard to certain costs that retailers avoid when they receive solar exports.¹⁴ These include:

- wholesale electricity prices
- market fees and ancillary service charges for participating in the National Energy Market
- network or line losses, and

¹⁴ Electricity Industry Act 2000, s. 40FBB(3)(a),(b) and (c).

We must also have regard to the avoided social cost of carbon and human health costs.

Annual movements in feed-in tariffs are affected primarily by changes in forecast wholesale electricity prices, which account for 48 to 60 per cent of the feed-in tariff.¹⁵ Table 1.3 sets out how the various cost components contribute to the feed-in tariffs.

Table 1.3: Components of the 2022-23 minimum feed-in tariffs (cents per kWh)

Component	Flat	Overnight	Day	Early Evening
Wholesale electricity prices	2.48	4.27	2.28	4.05
Market fees and ancillary service charges	0.09	0.09	0.09	0.09
Value of avoided transmission and distribution losses ¹⁶	0.15	0.25	0.14	0.24
Value of avoided social cost of carbon and human health costs ¹⁷	2.49	2.49	2.49	2.49
Total	5.2	7.1	5.0	6.9

Note: Table may not add due to rounding

Minimum feed-in tariffs over time

Table 1.4 and Figure 1.1 show the fluctuations of the minimum feed-in tariff over the last five years. This illustrates that our pricing methodology leads to both increases and decreases in the feed-in tariff. This fluctuation is primarily due to changes in forecast wholesale electricity prices, particularly during the day. For further information see Appendix B.

¹⁵ Wholesale electricity prices accounted for 60 per cent of the 2021–22 flat feed-in tariffs and 48 per cent of the final flat feed-in tariffs for 2022-23.

¹⁶ The value of network losses varies during the day as the value of the energy transported varies. For example, as the wholesale price of electricity increases, the value of the associated losses on the transmission and distribution networks will increase.

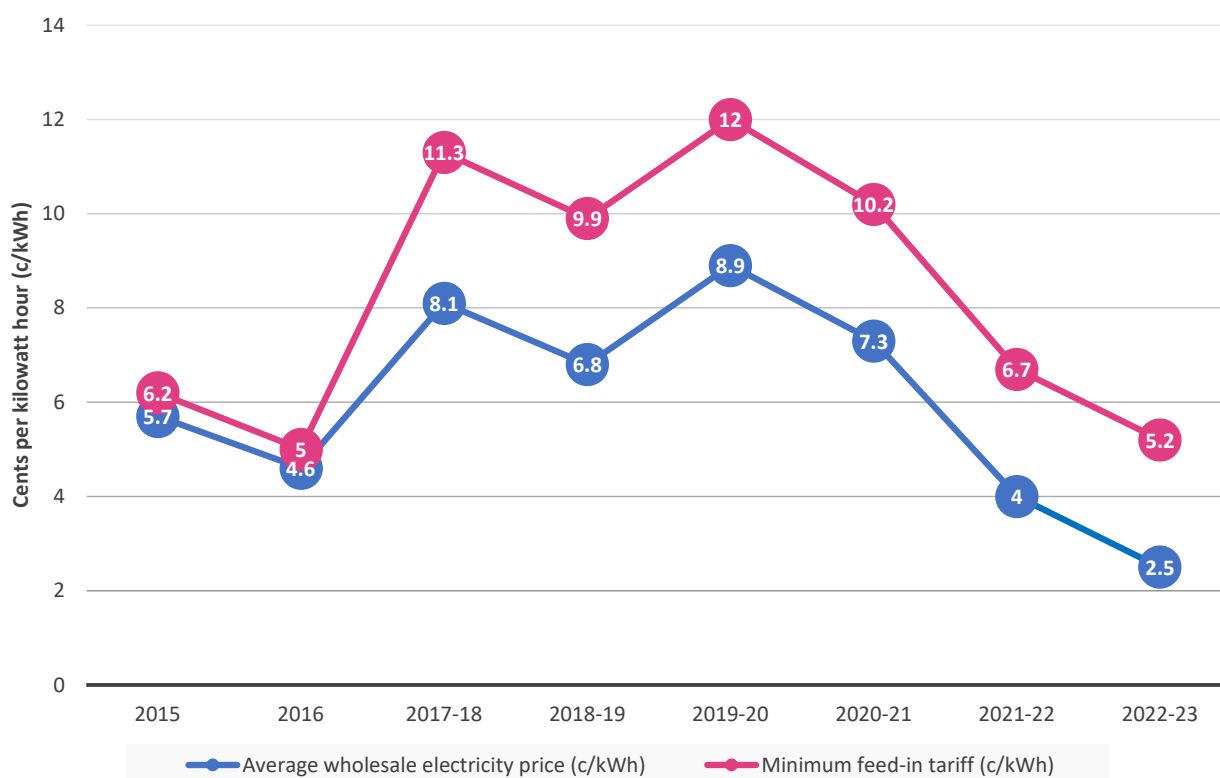
¹⁷ The social cost of carbon is based on an abatement cost model which estimates the greenhouse gas benefits of reducing consumption of electricity generated from coal. However, when coal generation is reduced, not only greenhouse gases, but other harmful pollutants are also abated. Further explanation is provided in this paper, see the Chapter “How we set the minimum feed-in tariffs”.

Minimum feed-in tariffs final decision

Table 1.4: Comparison of minimum feed-in tariffs, 2017-18 to 2022-23

Period	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23
Flat rate	11.3	9.9	12.0	10.2	6.7	5.2
Time-varying rate						
Early evening (Peak)	n/a	29.0	14.6	12.5	10.9	6.9
Day (Shoulder)	n/a	10.3	11.6	9.8	6.1	5.0
Overnight (Off peak)	n/a	7.1	9.9	9.1	6.7	7.1

Figure 1.1: Comparison of flat minimum feed-in tariffs 2015-16 to 2022-23



Note: The minimum feed in tariff diverged from the average wholesale price after 2016 due to the addition of social cost of carbon.

Minimum feed-in tariffs final decision

Essential Services Commission **Minimum electricity feed-in tariff to apply from 1 July 2022**

How we set the minimum feed-in tariffs

When retailers get solar exports from solar customers they avoid having to buy that energy from large generators in the National Electricity Market. The minimum feed-in tariff reflects the price a retailer would pay if they bought that electricity in the National Electricity Market instead of from solar customers, plus an allowance for the reduced social costs of carbon and human health costs.

When solar customers export electricity into the grid they act like generators. When we set the minimum feed-in tariff, we start with the wholesale prices that large scale generators receive in the National Electricity Market for the energy they produce.

This means solar customers receive a credit for the energy they generate that reflects the market value of that energy.

These wholesale prices are determined by the competitive market forces of supply of and demand for electricity. We then add to this price to account for avoided market fees, energy saved by not transporting power long distances and the additional environmental and health benefits of green energy.

We have used this approach to determine the minimum feed-in tariffs applicable from 1 July 2022. This is largely the same approach we have used in previous feed-in tariff reviews. The only difference from previous reviews is that we have added additional market fees that have come into effect recently and updated our approach to network losses. Both changes slightly increase the feed-in tariff. Further details on the calculations can be found in Appendix D – Technical methodology.

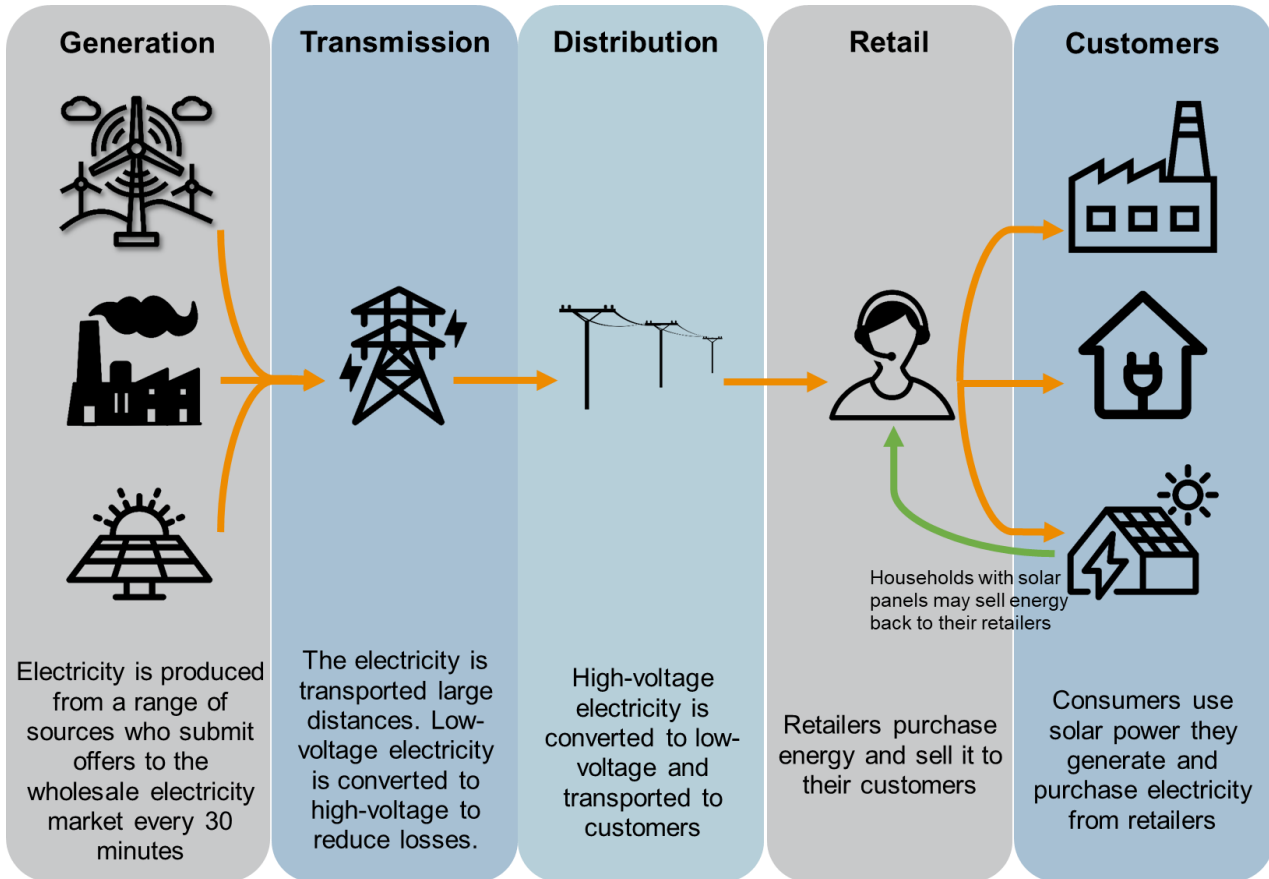
How solar energy interacts with the retail energy market

Energy supplied to Victorians is generated by various sources, such as coal, hydro, gas, and renewables. Large generators, like coal fired power stations, provide most of the energy in the National Electricity Market.¹⁸ Renewable energy generation, such as rooftop solar panels, provides a smaller but growing share.¹⁹ Figure 2.1 shows the links between solar customers and the different participants in the electricity market.

¹⁸ Australian Energy Market Operator, Data dashboard: Fuel Mix, <https://www.aemo.com.au/Energy-systems/Electricity/National-Electricity-Market-NEM/Data-NEM/Data-Dashboard-NEM>, accessed 10 February 2022.

¹⁹ OpenNEM Project, An Open Platform for National Electricity Market Data, <https://opennem.org.au/energy/nem/?range=7d&interval=30m> accessed 10 February 2022

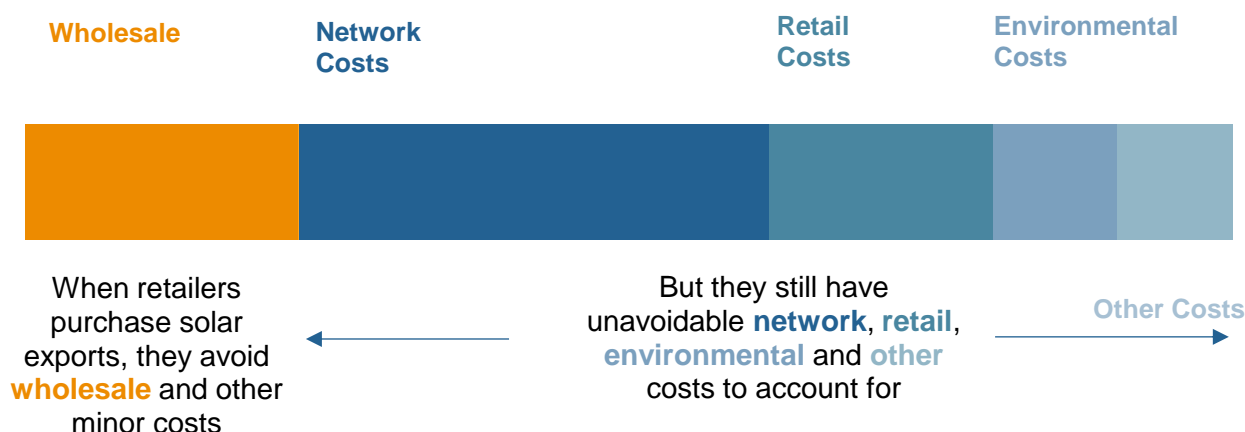
Figure 2.1 – Solar customers’ role in the Victorian electricity market



Solar customers play a dual role in the electricity market. They are generators when they export electricity to the grid, and customers when they purchase electricity from their retailer.

Buying electricity from the National Electricity Market and selling it to customers imposes certain costs on retailers, such as transmission and distribution network costs and losses, retail operating costs, market fees and ancillary charges, licence fees, environmental program costs, and the wholesale price of energy. Retailers avoid some of these costs when they buy electricity from solar customers. These avoided costs include network costs and losses, market fees and ancillary charges, and the price of wholesale electricity. These costs are then used to set the minimum feed-in tariff, reflecting the market value of solar energy. Figure 2.2 below shows the cost components that contribute to retail energy prices.

Figure 2.2 – Retail cost of providing electricity and costs avoided with solar exports



Source: Essential Services Commission analysis²⁰

We set the feed-in tariff equal to the costs retailers avoid plus the avoided human health costs and the social cost of carbon. Under this approach we ensure minimum feed-in tariffs represent the value that solar customers provide to the energy market and the social benefits of lowering carbon emissions.

The factors we must consider in setting the minimum feed-in tariff

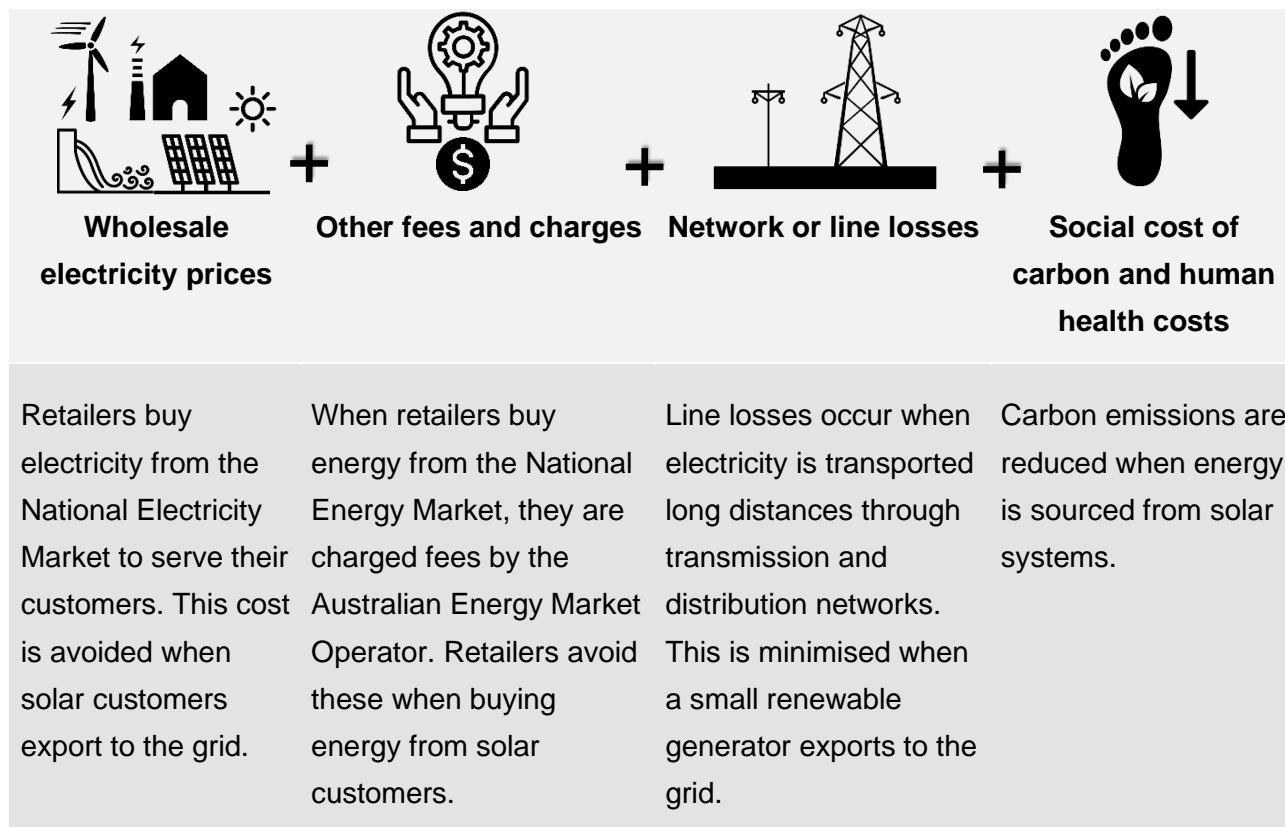
The avoided costs included in the minimum feed-in tariff calculations are outlined in Figure 2.3. Under the Electricity Industry Act 2000, we must have regard to these costs when setting the minimum feed-in tariffs.²¹

As part the costs outlined in Figure 2.3, we must also consider the avoided human health costs attributable to a reduction in air pollution (to the extent that renewable energy generation displaces energy generation that produces harmful emissions) in calculating the minimum feed-in tariff. Currently we do not separately account for these costs. However, as discussed later in this chapter, there is evidence that these costs may already be accounted for through the social cost of carbon.

²⁰ Essential Services Commission, 1 January 2022 Victorian Default Offer: Final decision, p, 4, 25 November 2021

²¹ Electricity Industry Act 2000, s. 40FBB(3).

Figure 2.3 Costs we must have regard to in setting the feed in tariff



Steps for setting the minimum feed-in tariff

In line with previous years, we have used the following process to determine the minimum feed-in tariffs and account for the factors outlined in Figure 2.3:

- Develop a forecast of wholesale electricity prices (2022-23):
 - For the minimum flat feed-in tariff – using forecast wholesale prices, calculate the average value of wholesale electricity weighted by the export share during the hours that solar systems typically export to the grid.
 - For the minimum time-varying feed-in tariffs – using forecast wholesale prices, calculate the average value of wholesale electricity weighted by export share, as above, for each time block under this tariff structure.
 - Add in the benefit of market fees and ancillary service charges retailers avoid when they get electricity from solar customers instead of from the wholesale market.
- Increase the resulting values to account for energy saved by not transporting the energy long distances from large scale generators (transmission and distribution losses).

- Add in the value associated with avoiding carbon emissions and other pollutants when energy is produced by solar customers.²²

Except for the different time periods used to calculate the wholesale component of the feed-in tariff, all other elements of the above methodology apply to both the flat and time-varying tariffs.

We used the futures market to forecast wholesale electricity prices

When retailers get energy from solar customers, they avoid paying the wholesale price for that energy. So, calculating the minimum feed-in tariff for the upcoming financial year requires that we estimate the wholesale price of energy in the National Electricity Market.

We have used a futures market approach to forecast wholesale prices. This is the same approach we used in our 2019-20, 2020–21, and 2021–22 minimum feed-in tariff decisions (see Appendix D – Technical methodology for more information) and is largely the same as the approach used in our Victorian Default Offer decisions.²³

The market's expectation of what wholesale prices will be in 2022–23 is best represented by Victorian baseload swap futures contracts that are traded on the Australian Securities Exchange.²⁴

Calculating wholesale costs for the minimum flat feed-in tariff

Solar panels account for 99.9 per cent of small-scale renewable generation in Victoria and export electricity to the grid during the daytime.²⁵ Unmodified futures prices are not appropriate for setting the feed-in tariffs because feed-in tariff exports from solar panels happen during the day.

To calculate the average wholesale price when solar energy is being exported to the grid, we use prices from times when exports occur. Because of this, our estimates of wholesale costs reflect the average value of electricity produced by solar systems. This is referred to as solar weighting.

²² The Victorian Government provides these values in an Order in Council, which are then included in our modelling.

²³ Essential Services Commission, Victorian Default Offer to apply from 1 July 2019: Advice to the Victorian Government, May 2019; Essential Services Commission, Victorian Default Offer to apply from 1 January 2020: Final report, November 2019; Essential Services Commission, Victorian Default Offer 2021: Draft Decision, September 2020.

²⁴ Frontier Economics, Wholesale Price Forecasts for Calculating Minimum Feed-In Tariff: Final Report for the Essential Services Commission, 27 January 2022, p. 10.

²⁵ Clean Energy Council, Postcode data for small-scale installations, accessed 5 January 2022, <http://www.cleanenergyregulator.gov.au/RET/Forms-and-resources/Postcode-data-for-small-scale-installations#Installation-numbers-for-small-scale-systems-by-stateterritory>.

Solar weighting ensures that the value of electricity during periods in which solar panels are not exporting or generating electricity – such as at night – is not included in the calculation of the feed-in tariff.

Calculating wholesale costs for the minimum time-varying feed-in tariffs

We determine both a minimum flat feed-in tariff and minimum time-varying tariffs. We allow retailers to choose whether to offer customers time-varying feed-in tariffs, a flat tariff or both.

Although they have been relabelled since our last decision, the time blocks for 2022–23 remain the same as past years. These are set out in table 2.1.

Table 2.1 – Time block structure for the time-varying feed-in tariff

Period	Weekday	Weekend
Overnight	10pm-7am	10pm-7am
Day	7am-3pm, 9pm-10pm	7am-10pm
Early Evening	3pm-9pm	n/a

The same forecast wholesale prices for 2022–23 are used to calculate the flat feed-in tariff and time varying feed-in tariffs. But for the time varying feed-in tariff, we calculated the weighted average value of wholesale electricity for each time block.

Our wholesale price forecasts have slightly increased from those used in the draft decision due to increases in electricity futures contract prices. This signals the market expects slightly higher wholesale prices over 2022-23 than it did when we made our draft decision in November 2021. These changes are very small and have not had a large impact on the minimum feed-in tariff rates. Wholesale prices are still expected to decrease over the 2022-23 financial year.

Market fees and ancillary service charges

When retailers buy energy from the wholesale spot market, they must pay market fees and ancillary service charges to the Australian Energy Market Operator (market operator).²⁶

²⁶ The Australian Energy Market Operator manages electricity and gas systems and markets across Australia. This includes the National Energy Market (NEM), which connects the power systems of Queensland, New South Wales, the Australian Capital Territory, Victoria, South Australia and Tasmania.

Retailers avoid these fees when they buy electricity from solar customers. These cost savings increase the value of energy produced by solar customers. Including these savings in the value of the feed-in tariff is consistent with the approach we have used in past reviews.

The fees levied by the market operator are set each year through its annual budgeting process. However, the market operator has not provided an estimate of the fees for 2022–23. We have used the market operator’s 2021–22 budget fees for retailers as a proxy for 2022-23 in this review.

In the 2021-22 financial year, the market operator started to levy new fees to recover the costs of the Five-Minute and Global Settlement upgrades.²⁷ Including these new fees in our avoided cost calculations has resulted in an upward adjustment to the feed-in tariffs.

We have used ancillary services recovery rates for the 2021 calendar year (the latest available) as our best estimate of the ancillary service charges for 2022-23. This ancillary services recovery data is more recent than that used in our draft decision. However, the impact of these changes on the minimum feed-in tariff since our draft decision is immaterial.

Transmission and distribution losses

Most of the large scale generators in the National Electricity Market are far away from the points where energy is consumed (households and businesses) so the energy produced by these generators must travel a long distance through the grid (transmission and distribution network).

When energy moves through the grid, some of it is lost as heat. We refer to this as ‘network losses’ or ‘line losses’. The magnitude of network losses depends on the location of the generation facility and factors like the quality of the power line.

Energy produced by solar systems is typically generated close to the point of consumption, so less energy is lost because it travels a shorter distance through the grid. We incorporate the smaller magnitude of network losses when energy is bought from solar customers by using a loss factor which we apply to the (avoided) cost of wholesale energy.

We have used the market operator’s estimates of distribution loss factors for 2021-22 and preliminary estimates of marginal loss factors for 2022–23 to develop a loss factor for Victoria. The market operator has not yet published preliminary estimates of distribution loss factors for 2022-23. Further details on the calculation of network losses and market fees can be found in Appendix D – Technical methodology.

²⁷ Australian Energy Market Operator 2021, 2021-22 AEMO Budget and Fees, accessed 10 February 2022, https://aemo.com.au/-/media/files/about_aemo/energy_market_budget_and_fees/2021/aemo-2021-22-budget-and-fees.pdf?la=en, p. 10-11.

Our draft decision used estimates of marginal loss factors for 2021-22. We have updated the data to use the most up-to-date estimates of the value of network losses. However, changes to the minimum feed-in tariff due to using the updated marginal loss factors are immaterial.

We have kept our assumptions on the social cost of carbon and human health costs

Social cost of carbon

Energy sold in the National Electricity Market is generated using a variety of fuel sources and technologies.²⁸ These include coal, natural gas, biomass, wind, solar and hydro-electric power.

The damage caused by emissions released during gas or coal-fired generation imposes a cost on society known as the social cost of carbon. Carbon emissions are reduced when energy is sourced from solar customers in place of fossil fuel generators. The avoided social cost of carbon reflects the value of these emissions reductions.

The Victorian Government's Order in Council published in February 2017 specifies a methodology and the factors for determining the avoided social cost of carbon which we must have regard to when setting the feed-in tariff.²⁹ We have adopted this methodology in our decision.

The Order in Council methodology results in an avoided social cost of carbon of 2.49 cents per kWh of electricity exported to the grid by solar systems. This is the same value as for previous years.

This value is incorporated into the calculation of both the flat feed-in tariff and time-varying feed-in tariffs for 2022–23 (more details can be found in Appendix D – Technical methodology).

Human health costs

The human health costs are the estimated costs of air pollution associated with fossil fuel powered electricity generation.³⁰ The human health costs are not priced in the National Electricity Market.

There is no Order in Council that specifies a factor or method for determining the avoided human health costs attributable to a reduction in air pollution. However, we note that the Department of

²⁸ Australian Energy Market Operator, Data dashboard: Fuel Mix, <https://www.aemo.com.au/Energy-systems/Electricity/National-Electricity-Market-NEM/Data-NEM/Data-Dashboard-NEM>, accessed 10 February 2022

²⁹ 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).

³⁰ Victorian Government 2016, Energy Legislation Amendment (Feed-in Tariffs and Improving Safety and Markets) Bill 2016, Explanatory Memorandum, p. 4.

How we set the minimum feed-in tariffs

Environment, Land, Water and Planning is in the process of considering whether it is appropriate to make an order in council for the human health costs.

Some analysis suggests that the human health costs are already accounted for when using an abatement cost approach to deriving a social cost of carbon. Both carbon emissions and other harmful pollutants are avoided when abatement takes place. When you pay to stop carbon emissions you are also paying to stop those other harmful pollutants. In this way the avoided human health costs are at least partly accounted for through the social cost of carbon.

Therefore, our final decision is to set the stand-alone avoided human health costs at 0 cents per kWh. This is because there are no definitive methods to accurately estimate the human health costs and they are at least partly accounted for through the social cost of carbon.

Methods for assessing human health costs

There are a variety of different methodologies to price the avoided human health costs attributable to the reduction in air pollution, with no one widely accepted or definitive. These methodologies fall into two broad categories:

- the costs of avoiding the pollution (abatement costs) and
- the damages caused by the pollution (damages costs).

From the current information, these approaches return health costs ranging from 0.0 to 5.0 cents per kWh (noting most results are clustered at the lower end of this range between 0 and 1.3 cents).³¹

Damages costs

Under a damages costs approach the avoided human health costs are calculated using estimated health costs of pollution from electricity generation. The costs of the damages vary significantly according to where the generation, and therefore pollution, occurs.³²

For instance, if generators are in a densely populated area, there will be higher human health costs associated with the generation. More people will be adversely affected by the pollution created by

³¹ ATSE, The hidden costs of electricity: Externalities of power generation in Australia, p. 46 <https://www.atse.org.au/wp-content/uploads/2019/01/the-hidden-costs-of-electricity.pdf> ; Department of Environment, Land, Water and Planning 2019, Estimating the health costs of air pollution in Victoria, pp. 3-5, https://www.climatechange.vic.gov.au/_data/assets/pdf_file/0022/421717/Final_Health-costs-of-air-pollution-in-Victoria.pdf.

³² Department of Environment, Land, Water and Planning 2019, Estimating the health costs of air pollution in Victoria, pp. 3-5, https://www.climatechange.vic.gov.au/_data/assets/pdf_file/0022/421717/Final_Health-costs-of-air-pollution-in-Victoria.pdf.

the generation. In contrast, if the generation occurs in a low population area, there will be lower overall health costs.

The higher estimates of human health costs are based on international damages costs studies adapted for Victoria.³³ For damages costs estimates location is very important. The dispersion of pollutants depends heavily on local conditions. No research at the necessary level of detail has been published on the dispersion of pollutants from fossil fuel generation in Victoria. Coal generation in Victoria is located in the Latrobe Valley.³⁴ This is a relatively long distance from Victoria's largest population centres. In many other parts of the world the distance between generation and its main consumption point is not as large.

To calculate the damage costs, it would be necessary to establish the unit health costs of fossil fuel generation and then assess how much fossil fuel generation is displaced by solar exports to find the total avoided human health costs.

Abatement costs

An alternative is to use the cost of avoiding pollution. Under this method, the value of avoided human health costs is measured by the cost of avoiding pollution. This approach can be especially helpful when abatement costs are known but damages costs are not.

Abatement costs have been adopted by some other jurisdictions as a possible way of measuring the social cost of carbon or human health costs when damages costs are unknown or uncertain.³⁵ The Order in Council for determining the avoided social cost of carbon uses an abatement cost approach.³⁶

If an abatement costs approach is used there is likely to be an overlap between the avoided health costs and the social cost of carbon. Abatement of fossil fuel generation is paid for through the social cost of carbon. Both carbon emissions and other harmful pollutants are avoided when this

³³ PAE Holmes with NSW EPA, 2013, Methodology for valuing the health impacts of changes in particle emissions – final report, p.10, www.epa.nsw.gov.au/~media/EPA/Corporate%20Site/resources/air/HealthPartEmiss.ashx.

³⁴ Australian Energy Market Commission, Changing Generation Mix: Victoria, <https://www.aemc.gov.au/energy-system/electricity/changing-generation-mix/victoria#:~:text=Electricity%20generation%20in%20Victoria%20has,main%20load%20centre%20of%20Melbourne>. Accessed 10 February 2022.

³⁵ Department of Energy and Climate Change 2009, Carbon Valuation in UK Policy Appraisal: A Revised Approach, July 2009, pp. 10-11, [DECC report \(publishing.service.gov.uk\)](http://DECC-report-publishing.service.gov.uk).

³⁶ 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).

How we set the minimum feed-in tariffs

abatement takes place. If we pay to avoid carbon pollution, the cost of avoiding other types of pollution, that are generated along with that carbon, is also covered.

Themes from submissions and our responses

In this chapter, we address the key themes raised by stakeholders in response to our draft decision.

We received 33 submissions, these include written submissions made through Engage Victoria and our fitreview@esc.vic.gov.au email. We received submissions from 32 stakeholders: 29 from solar customers and three from energy retailers.³⁷

We also considered all questions and comments raised at our public information session held on 28 October 2021. We have published a record of these questions and comments on our website.

Solar customers said the minimum feed-in tariffs proposed in our draft decision were too low.

Energy retailers generally submitted that the minimum feed-in tariffs in our draft decision were too high. In general they mostly support the overall methodology we use but oppose the social cost of carbon component.

Solar customers say the minimum feed-in tariffs are too low and unfair

Submissions we received from solar customers opposed our proposed reduction of the minimum feed-in tariffs. Some solar customers said the minimum feed-in tariffs should be closer to retail tariffs. They felt they are not fairly compensated by the feed-in tariffs and the difference with retail tariffs is unfairly large. Some said the low feed-in tariffs favour retailers and that retailers are not passing on the lower wholesale energy prices. Others expressed concern about the economic incentives to install solar panels and cost recovery for existing owners.³⁸

³⁷ One stakeholder made two submissions to us, resulting in 32 submissions from 31 stakeholders in total.

³⁸ Anonymous 1 submission 22 October 2021, Anonymous 2 submission 24 October 2021, Rebecca Cheong submission 2 December 2021, Anonymous 3 submission 2 December 2021, Anonymous 4 submission 2 December 2021, Gordon McMenemy submission 2 December 2021, Anonymous 5 submission 2 December 2021, Anonymous 6 submission 2 December 2021, Ian Clusker submission 2 December 2021, Surendra Talasila submission 2 December 2021, Andrew Martin submission 3 December 2021, Charles Spicer submission 3 December 2021, David Blum submission 7 December 2021, Jorge Rosales submission 8 December 2021, Brian Humphries submission 10 December 2021, Anonymous 7 submission 12 December 2021, Robert Hughes submission 14 December 2021, Alan Tam submission 14 December 2021, Anonymous 8 submission 17 December 2021, Robert Hughes submission 19 December 2021, Anonymous 9 submission 21 December 2021, Anonymous 11 submission 1 January 2022, Anonymous 12 submission 4 January 2022, Theo Sougleris submission 5 January 2022, Anonymous 13 submission 7 January 2022, Anonymous 15 submission 9 January 2022, Brian Gollard submission 10 January 2022, Michael Brand submission 10 January 2022.

The minimum feed-in tariffs reflect the true value of solar exports

Most solar customers felt that our proposed feed-in tariffs were too low and that retailers were not passing on lower wholesale prices. One solar customer wrote:

'Maybe the wholesale price is dropping, but it appears that the retailers are not passing it on. Maybe something for you people to have a look at'.³⁹

Forecast decreases in wholesale electricity prices during solar hours are the main factor influencing the decrease in the minimum feed-in tariff. Wholesale electricity prices for 2022-23, during solar hours, are 36 per cent lower than those for 2021-22.⁴⁰

This can also be seen in the trend in the Victorian Default Offer prices we set for standing offers. In 2022 the Default Offer dropped by five per cent for residential customers.⁴¹ This was mainly due to wholesale energy prices, for all hours, falling by 24 per cent. We also note that the VDO prices decreased by ten per cent in 2021.

Many retailers have also passed on the savings from lower wholesale electricity prices to their customers. Figure 3.1 below shows the median market offer price for residential customers has decreased by 11 per cent between September 2020 and September 2021.⁴²

The fall in minimum feed-in tariffs do not match changes in retail rates for several reasons. Wholesale electricity prices account for about 48 to 60 per cent of the costs included in the minimum feed-in tariffs but only 23 per cent of retail prices.⁴³ This difference in cost shares means that any changes in wholesale electricity costs will have a bigger impact on the minimum feed-in tariffs than retail rates.

³⁹ David Blum submission received 7 December 2021.

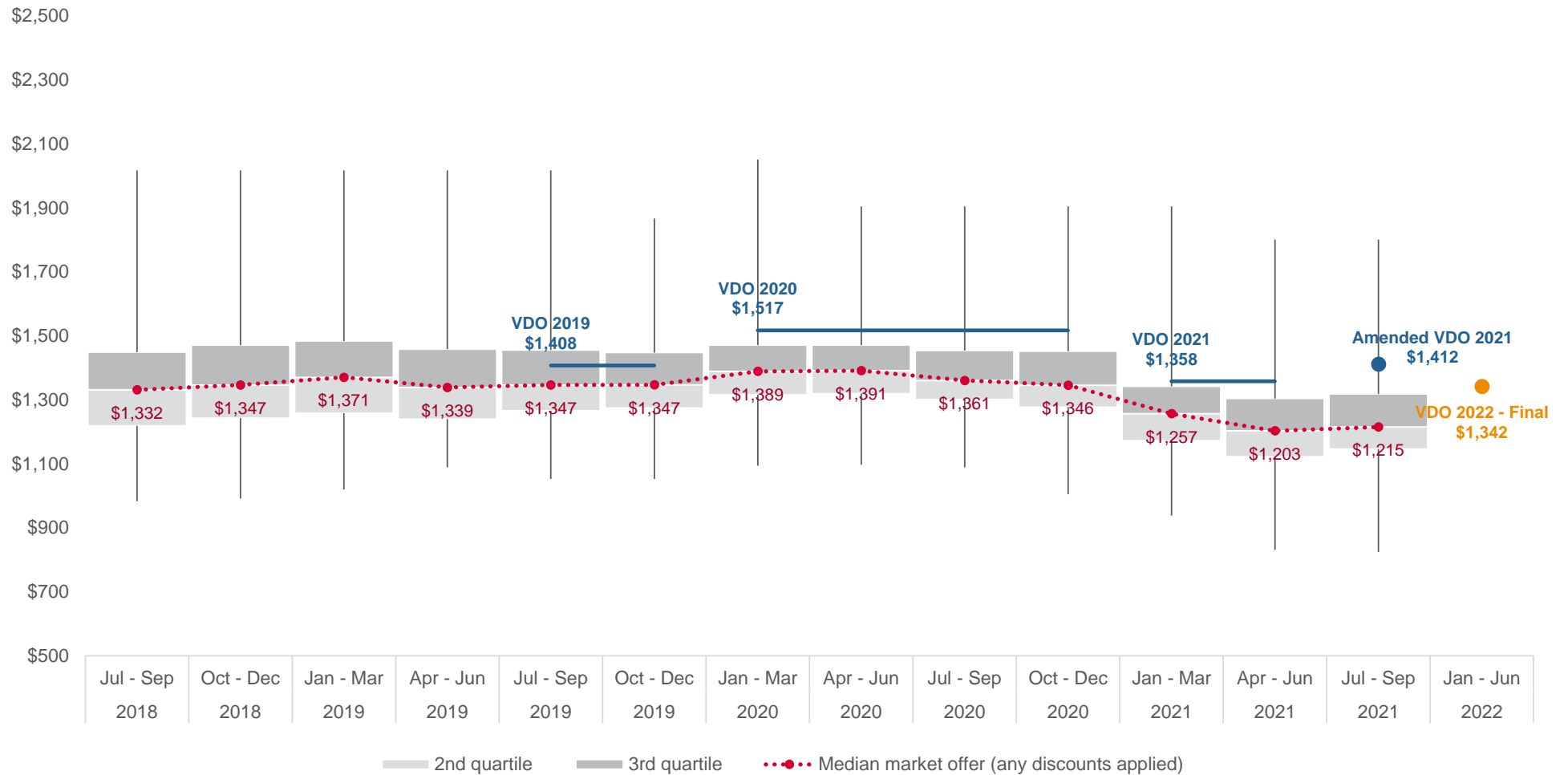
⁴⁰ See figure S.1

⁴¹ Essential Services Commission, 1 January 2022 Victorian Default Offer: Final decision, 25 November 2021

⁴² Essential Services Commission, 1 January 2022 Victorian Default Offer. Final Decision, 25 November 2021 p. 9

⁴³ Essential Services Commission, 1 January 2022 Victorian Default Offer. Final Decision, 25 November 2021 p. 10

Figure 3.1: Annual residential Victorian Default Offer bill compared to market offer bills (4,000 kWh/year)



Themes from submissions and our responses

Essential Services Commission **Minimum electricity feed-in tariff to apply from 1 July 2022**

Most customers will know that if your bills are increasing, you can reduce your bill by using less electricity or shopping around for a new offer. However, some solar customers may be seeing higher bills because the feed-in tariff has been decreasing. For some solar customers, particularly those with large solar systems and low consumption, the decrease in their feed-in tariff credits will outweigh the decrease in retail tariffs we have observed in the market. So while retail tariffs are in general lower, it may not feel that way for some solar customers.

The minimum feed-in tariffs promote the interests of all customers

Some solar customers felt that our proposed feed-in tariffs were unfair and favoured industry. For example, one solar customer wrote:

‘Despite my solar system and battery storage, my bills are exorbitant. I feel for those who are struggling on a pension. If indeed wholesale prices are lower, where is the benefit to the consumer? Where is the regulation that goes hand in hand with solar feed in tariffs that protect the individual resident from the giant retailer?’⁴⁴

The minimum feed-in tariffs for 2022-23 give solar customers a payment that reflects the value of their exports without other customers paying too much for electricity.

When they export, solar customers act as electricity generators. The feed-in tariff reflects how much their energy is worth in the energy market at the time they export it. Under the legislation, this value is equal to the costs retailers avoid when they purchase electricity from solar customers rather than from the National Electricity Market (plus the environmental and health benefits).

In this way, the minimum feed-in tariff benefits solar customers by ensuring they are being paid at least an efficient price for their energy. With the additional payment they receive for the social cost of carbon, solar customers get 48 per cent more through the feed-in tariffs than they would selling their energy at the spot price in the National Electricity Market.

If retailers had to pay solar customers more than the true value of solar exports, they would incur higher costs when selling solar customers’ exports. To recover these increased costs, retailers would have to increase the retail rates for all of their customers.

It would not be fair for non-solar customers, to then pay higher retail rates to subsidise solar customers. Non-solar customers are limited to purchasing energy at the retail rate to meet their

⁴⁴ Charles Spicer submission received 3 December 2021.

household demand and subsidising solar customers would expose them to increased energy prices.

Non-solar customers do not have the ability to generate their own energy through solar panels. This could be because they are unable to install solar panels. Maybe they live in an apartment that is linked to an embedded network. Maybe they aren't able to afford them. Or maybe they are renting and the property owner is unwilling or unable to install them.

Avoiding imports from the energy grid helps solar customers recover their investment

Some solar customers felt that our proposed feed in tariffs would not allow them to recover their investments in solar panels. One solar customer wrote:

'The ROI for a solar system should be aimed at 7 to 8 years, with the reduction in feed-in rates this make less sense economically'.⁴⁵

While the feed-in tariff does affect the savings from installing a solar system, it is critical to include the value of avoided grid imports when calculating solar pay back periods. A recent report into the Victorian Solar Homes Program found that houses with solar panels saved on average \$485 by avoiding buying electricity from the grid.⁴⁶

Some submissions also noted that solar customers incurred maintenance costs for their systems, for example:

'Each year you need to have the panels cleaned, every year the panels degrade so the feed in is less and less, and in 5 to 10 years you will probably need to pay for a new inverter.'⁴⁷

We acknowledge solar customers incur these costs. However, the maintenance and operating costs of generating electricity in the national electricity market are accounted for in the feed-in tariffs. The feed-in tariffs account for the wholesale price of electricity paid to generators. When electricity generators bid into the national electricity market, they take all of their costs (including both capital and operating costs) into account.

⁴⁵ Theo Sougleris submission received 5 January 2022.

⁴⁶ C4NET, Solar Homes Program Impact Measures (Pilot): Report for Solar Victoria, the Department of Environment, Land, Water, and Planning, 25 March 2021, p. 28.

⁴⁷ Anonymous 7 submission received 12 December 2021.

Victorians still see value in installing solar

Solar customers expressed concerns that our decision will discourage solar uptake. A solar customer wrote:

‘Consumers installed solar to have far cheaper energy bills than non-solar consumers but now the gap is minimal. I believe this is grossly unfair to those who have installed solar on an apparently false belief. Tariffs should remain high enough so we may benefit from our decision, not question why we ever installed solar’.⁴⁸

We are responsible for setting an efficient price that mirrors the true value of solar to maximise the well-being of all Victorian consumers. If we were to set a feed-in tariff above the true value of solar, then Victorians without solar panels would pay for this inefficiency. This would go against our legislative obligation to promote the long-term interests of all Victorian consumers.

We have also observed that the number of solar installations in Victoria continues to increase, with record installation numbers in both 2020 and 2021.⁴⁹ This suggests that Victorians still see value in installing solar systems.

Some customers felt feed-in tariffs should equal retail rates

Some customers suggested that the minimum feed-in tariffs should equal or be a percentage of retail electricity rates. For example, one solar customer wrote:

‘The electricity we produce is worth less and less, our prices have gone up considerably since the installation. The money goes to the company not the producer. Yet the company can resell our electricity that we produce at a higher price. They are the winners, not the producers with panels. This is extremely unjust. Your report says that if the tariff is the same rate as electricity prices the companies would need to increase their prices to cover costs. I agree that they may incur a cost, which should be covered, but their prices compared to the feed-in tariff, are many times the cost of the feed-in tariff’.⁵⁰

Solar customers are electricity generators, not electricity retailers. The minimum feed-in tariff is a payment to solar customers for generating electricity.

⁴⁸ Anonymous 12 submission received 4 January 2022.

⁴⁹ Total solar installations in Victoria increased by 75 per cent from 2017 (336, 970) to 2021 (588,698). Source: Clean Energy Regulator, Post code data for small-scale installations, accessed 16 February 2021, <http://www.cleanenergyregulator.gov.au/RET/Forms-and-resources/Postcode-data-for-small-scale-installations>.

⁵⁰ Anonymous 15 submission received 9 January 2022.

When retailers provide electricity to their customers, they must cover the following costs:

- wholesale electricity costs,
- other energy market fees,
- hedging wholesale cost risks,
- transporting electricity (the poles and wires connecting customers to electricity generators),
- energy lost during transport,
- environmental programs, and
- retail overhead costs (for example, billing and revenue collection systems, information technology systems, call centre costs, human resources, finance, legal services, regulatory compliance costs, licence costs and marketing).

Figure 3.2 below shows these additional costs that retailers have, which solar customers do not.

We set the feed-in tariff to reflect the value of solar exports by building in the national electricity 'spot price' plus other avoided costs (social costs, market fees, and network losses). This means that solar customers are paid the value of their solar exports.

If the feed-in tariff was set to match the retail rate of energy, it would also make the energy that solar customers provide more expensive than energy bought in the National Electricity Market. Electricity retailers would need to recover these higher costs through higher retail rates for all energy consumers in Victoria. This would mean non-solar customers would be subsidising a high feed-in tariff.

Our objective when setting the minimum feed-in tariff is to promote the long term interests of Victorian energy consumers. This is achieved by the feed-in tariff reflecting the value of solar energy. This means solar customers receive the right incentives to export and Victorian customers pay no more than they need to for solar energy.

Forecast prices are the most appropriate method for determining wholesale prices

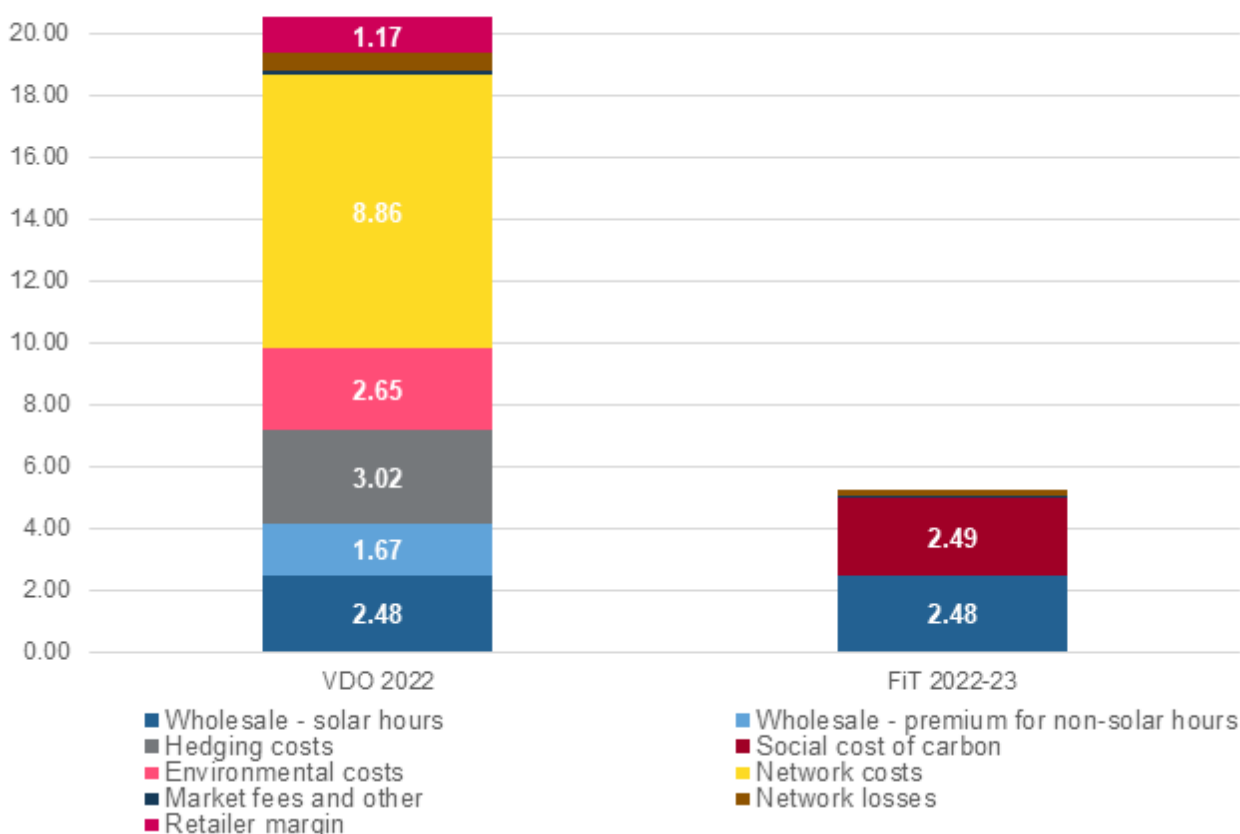
Some submissions questioned if the ASXEnergy contract prices are the most appropriate method for determining the wholesale price. They were concerned that solar customers would be disadvantaged if the spot price is lower than the forecast price. One customer wrote:

'You forecast what prices will be for the following year and set the FIT around this, what if these price reductions don't happen you have committed the retailer to a lower FIT'.⁵¹

⁵¹ Gordon McMenemy submission received 2 December 2021.

We remain of the view that the forecast prices are the best method for determining the wholesale price for the feed-in tariff. We consider that the ASXEnergy contract prices are the best method for determining the wholesale price as it is the best available guide to changes in the spot market.⁵² We also note that while the forecasts might be lower than actual spot prices sometimes at others they may be higher.

Figure 3.2: Comparison of costs included in variable charges: Victorian Default Offer and flat minimum feed-in tariff (c/kWh)



Avoided human health costs

Several stakeholders noted that the avoided human health costs component of the minimum feed-in tariff is not explicitly accounted for. These stakeholders doubted whether this truly reflects the costs to human health that are avoided when energy is sourced from solar panels. One solar customer wrote:

⁵² Frontier Economics, Wholesale price forecasts for calculating minimum feed-in tariff, final report for the Essential Services Commission, January 2022, chapter 2, p. 16.

‘The cost of climate change to all aspects of society and our environment is so underestimated.’⁵³

As discussed in chapter ‘How we set the minimum feed-in tariffs’ above there is no consensus on how these costs should be measured and there is some evidence that these costs are accounted for through the social cost of carbon.

Retailers consider feed-in tariffs should be lower

Simply Energy, Globird Energy and an anonymous energy retailer consider that the minimum feed-in tariffs should be lower. Their two main concerns are the cost of carbon and wholesale price components of the minimum feed-in tariffs.

Wholesale electricity prices have dropped further

Globird Energy proposed amending the wholesale price methodology so that the minimum feed-in tariff is

‘the most recent 12-month spot market solar export weighted average price based on the actual wholesale spot market prices and the actual solar generation data at the same time’.⁵⁴

GloBird Energy proposed this approach over the current methodology stating there was no guarantee that futures contract prices would match the spot prices.

Prices from the futures market are the most appropriate mechanism for forecasting the change in wholesale prices. Prices in the futures market reflect market participants’ views of how wholesale prices will change. The updated forecast wholesale electricity prices reflect the most recent market expectations in 2022–23. See section five of Frontier Economics’ report for details.⁵⁵

Retailers said the cost of carbon should be updated

Simply Energy and an anonymous energy retailer stated that the social cost of carbon is outdated, overstated, and needs to be reviewed by the Government. They submitted that this leads to inefficient feed-in tariffs which are not in the long term interests of consumers. Simply Energy wrote:

⁵³ Anonymous 9 submission received 21 December 2021.

⁵⁴ GloBird Energy submission received 10 January 2022 p.1.

⁵⁵ Frontier Economics, Wholesale price forecasts for calculating minimum feed-in tariff: Final report for the Essential Services Commission, January 2022, s.5.

‘As the avoided social cost of carbon now represents almost half of the value of the minimum feed-in tariff, Simply Energy is concerned that the minimum feed-in tariff will be significantly higher than the efficient value of solar exports. Maintaining this methodology going forward will likely result in non-solar customers subsidising solar customers through higher electricity prices’.⁵⁶

The Electricity Industry Act 2000 is specific in requiring the commission to have regard to the avoided social cost of carbon ‘determined in accordance with the methodology or factor specified in the Order for the relevant avoided costs’.⁵⁷

The concerns raised by energy retailers have been submitted to the Department of Land, Water and Planning who advises the Minister for Energy and Climate Change and Solar Homes on setting the social cost of carbon via an Order in Council.

Retailers suggested variable feed-in tariffs’ time blocks should match network tariffs

Simply Energy supported the decision to keep the time varying feed-in tariff optional but suggested matching these times blocks with the ones in time of use network tariffs. Simply Energy wrote:

‘To aid with customer understanding of time-varying tariffs, it may be beneficial if the Commission considered aligning the time-bands of the time-varying feed-in tariff with the time-bands of the residential two-part time-of-use network tariffs that were introduced on 1 July 2021’.⁵⁸

We acknowledge that aligning the time blocks could make it easier to understand variable feed-in tariffs. This is something we will investigate in future reviews.

Some solar consumers want more notice that feed-in tariffs could change

Some solar customers explained they are disappointed in the lack of information provided to them about potential changes to the minimum feed-in tariff when they installed solar panels. They believe new solar consumers would not install solar panels if they knew future decreases were coming. One solar customer said:

⁵⁶ Simply Energy submission received 5 January 2022.

⁵⁷ Electricity Industry Act 2000, s.40FBB(3)(c), 3A

⁵⁸ Simply Energy submission received 5 January 2022.

‘Let consumers know two to three years in advance of significant changes, i.e. tariff changes so they can plan solar system installs’.⁵⁹

We must determine the minimum feed in tariff for each financial year. Determining the minimum feed-in tariff the year before it applies makes our cost forecasts more accurate and thereby reduces the price risk for both solar customers and retailers. However, it does appear that some solar installers’ marketing about payback periods for solar systems could be creating unrealistic expectations amongst solar customers.

We have raised this matter with The Department of Environment Land Water and Planning and the Clean Energy Council.

⁵⁹ Theo Sougleris submission received 5 January 2022.

Appendix A – What is a feed-in tariff?

A feed-in tariff is the rate per kilowatt hour (kWh) that customers are credited when they export excess energy generation from their small-scale solar, wind, hydro or biomass generation sources. We set the minimum feed-in tariffs that energy retailers must pay solar customers for feeding their energy back into the grid.

How does solar energy fit into the broader energy market?

The electricity available for consumption in the National Electricity Market is a mix of primarily fossil fuels (coal, oil, and gas) and renewable energy.⁶⁰ This energy mix is supplied by electricity generators and the wholesale energy market matches generation with energy demand in real time.⁶¹

Energy retailers engage with the National Electricity Market to provide electricity to their customers and meet their demand. This means the electricity sold to all energy consumers in Victoria, regardless of having rooftop solar or not, is a mix of fossil fuels and renewable energy. Government subsidies such as the Small-scale Renewable Energy Scheme, Solar Homes Program provide a financial incentive to households and businesses in Victoria to install solar panels and generate renewable energy.^{62, 63, 64}

Solar customers use the energy they generate from their photovoltaic solar panels first, if demand for energy is low in the property at the time of generation, then any excess energy is exported to the grid. If a household needs energy when its solar panels are not generating sufficient electricity,

⁶⁰ Department of Industry, Science, Energy and Resources (2021), Australian Energy Statistics, Table C, accessed 27 January 2022, <https://www.energy.gov.au/data/energy-consumption>

⁶¹ Clean Energy Regulator 2021, Post code data for small-scale installations, accessed 27 January 2022, <http://www.cleanenergyregulator.gov.au/RET/Forms-and-resources/Postcode-data-for-small-scale-installations#SGU-Solar-Deemed>

⁶² Clean Energy Regulator 2021, Small-scale Renewable Energy Scheme, accessed 27 January 2022, <http://www.cleanenergyregulator.gov.au/RET/About-the-Renewable-Energy-Target/How-the-scheme-works/Small-scale-Renewable-Energy-Scheme>

⁶³ Solar Victoria 2021, Solar panel PV rebate, accessed 27 January 2022, <https://www.solar.vic.gov.au/solar-panel-rebate>.

⁶⁴ Department of Environment, Land, Water and Planning, Premium feed-in tariff, accessed 27 January 2022, <https://www.energy.vic.gov.au/renewable-energy/victorian-feed-in-tariff/premium-feed-in-tariff>.

for example when its cloudy or at night-time, customers import that energy from the grid and charged for that usage at retail tariff rates.⁶⁵

Before solar panels are installed some customers must seek pre-approval from their distributor to connect to the grid (a distributor is the business that owns and operates the poles and wires that transport energy). Most solar customers have a grid-connected solar system to ensure reliable access to energy at any time of day. However not everyone is able to export excess energy back to the grid, and customers can also experience export limits imposed by their distributor.⁶⁶

Export limitations can prevent a solar customer from exporting energy and receiving a feed-in tariff. Solar energy export limitations could also be affected by new rules governing the National Energy Market.^{67, 68, 69} For information on the Australian Energy Market Commission's new energy guide and changes to the National Electricity Rules visit <https://new-energy-guide.aemc.gov.au/>.

Who is eligible to receive minimum feed-in tariffs?

The minimum feed-in tariff applies to small renewable energy generation facilities with capacities of less than 100 kilowatts (kW), producing electricity using renewable energy sources such as wind, solar, hydro or biomass. An important exception is that a 'small renewable energy generation facility' does not include a generating facility that is under the premium or transitional solar feed-in tariff scheme.⁷⁰

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.⁷¹ No order has been issued on this to date.

⁶⁵ Solar Victoria 2021, Section 3: Grid-connected solar explained, accessed 27 January 2022, <https://www.solar.vic.gov.au/solar-panel-pv/section-3-grid-connected-solar-explained>.

⁶⁶ Powercor/Citipower 2021, Solar Energy, accessed 27 January 2022, <https://www.powercor.com.au/solar-energy/>.

⁶⁷ Australian Energy Market Commission 2021, The AEMC smart solar reforms, accessed 14 February 2022, <https://new-energy-guide.aemc.gov.au/preparing-the-grid-of-the-future#the-aemc-smart-solar-reforms>

⁶⁸ Australian Energy Market Commission 2020, Network planning and access for distributed energy resources, accessed 27 January 2022, <https://www.aemc.gov.au/rule-changes/network-planning-and-access-distributed-energy-resources>.

⁶⁹ On 12 August 2021 the Australian Energy Market Commission made a final determination on updates to the National Electricity Rules and National Energy Retail Rules to integrate distributed energy resources such as small-scale solar and batteries more efficiently into the electricity grid. Australian Energy Market Commission 2021, Access, pricing and incentive arrangements for distributed energy resources, access 14 February 2022, <https://www.aemc.gov.au/rule-changes/access-pricing-and-incentive-arrangements-distributed-energy-resources>

⁷⁰ Electricity Industry Act 2000, s. 40F(1).

⁷¹ Electricity Industry Act 2000, s. 40F(2).

Appendix A – What is a feed-in tariff?

Retailers may offer rates above the minimum feed-in tariffs and can offer either a flat tariff and/or a time-varying tariff. Since 2018–19, the commission has set the minimum tariffs for both the flat and time-varying feed-in tariffs that a retailer can offer.

Customers on the flat feed-in tariff are paid the same amount for their exports regardless of the time of day the energy is exported back to the grid. The time-varying feed-in tariffs are a day, early evening and overnight structure of rates. Both of these minimum feed-in tariff structures largely follow the cost of wholesale electricity.

The wholesale spot price of electricity is determined through an auction, which is conducted every five minutes by the Australian Energy Market Operator. However, due to a lack of historical data on five-minute settlements, we are continuing with the average price generators are paid every half hour in our future’s market approach to forecasting wholesale energy prices for 2022–23.

Figure A.1 and A.2 show the minimum flat and time-varying feed-in tariffs for 2022–23, on both weekdays and weekends.

Figure A.1: Weekday minimum flat and time-varying feed-in tariffs from 1 July 2022

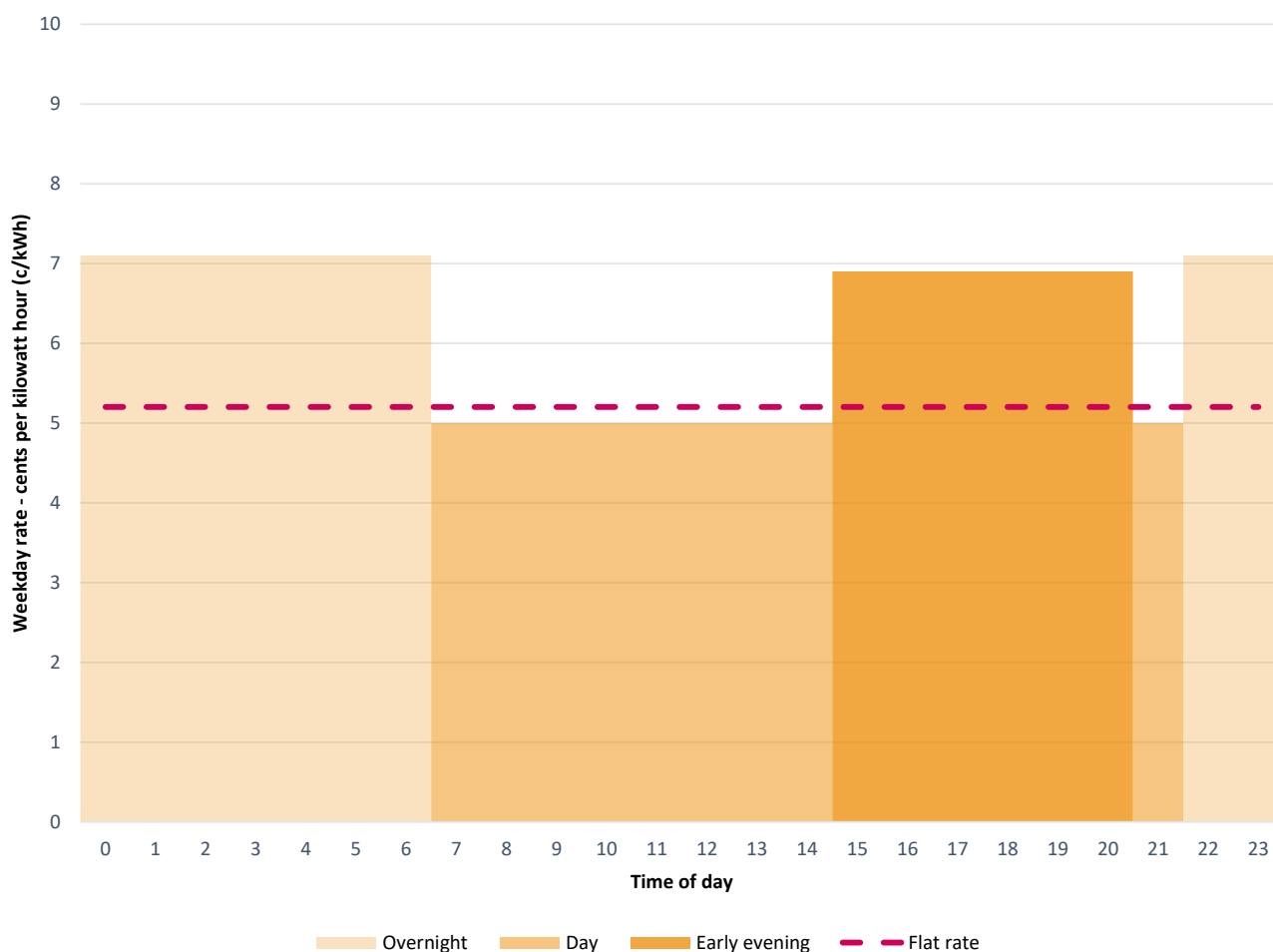
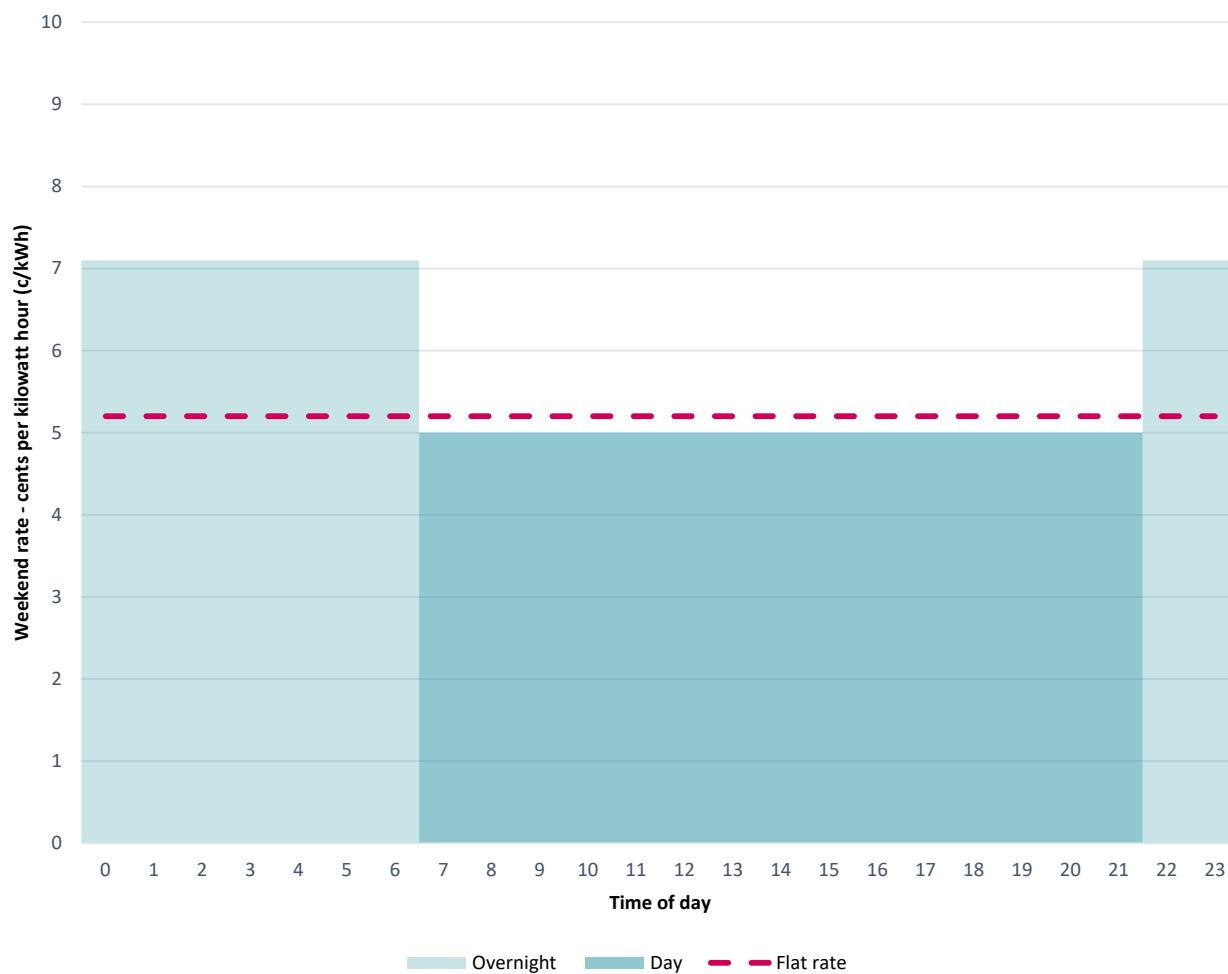


Figure A.2: Weekend minimum flat and time-varying feed-in tariffs from 1 July 2022



What is our role?

The Essential Services Commission is required under the Electricity Industry Act 2000 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.⁷²

When making the determination for the minimum feed-in tariff the commission must consider its objectives under the Essential Services Commission Act 2001 and the Electricity Industry Act 2000, which are:

- to promote the long-term interests of Victorian consumers, and

⁷² Electricity Industry Act 2000, s. 40FBB.

- to have regard to the price, quality, and reliability of electricity.

We must also pursue our objectives under the Electricity Industry Act 2000. Those most relevant to our role in setting the minimum feed-in tariff are:

- to promote the development of full retail competition, and
- to promote protections for customers, including in relation to assisting customers who are facing payment difficulties.⁷³

In addition to matters we must consider in seeking to achieve our objectives under the Essential Services Commission Act 2001, the commission must also consider specific factors in determining the minimum feed-in tariff under the Electricity Industry Act 2000.⁷⁴ These factors are:

- the prices of electricity in the wholesale electricity market,
- any distribution and transmission losses that are avoided in Victoria, because of small renewable energy generation,
- 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.⁷⁵

The Electricity Industry Act 2000 allows the Governor in Council to issue an order specifying a methodology or factors for determining the avoided social cost of carbon and avoided human health costs.⁷⁶ An order made in 2017 sets out factors and methodologies for determining avoided social cost of carbon including:

- methodologies for determining the number of units of carbon dioxide equivalent (CO₂e) reduced per unit of electricity exported from a small renewable energy generator, and
- the monetary value for each unit of CO₂e that is reduced because of the exports of a small renewable energy generator.⁷⁷

The order did not specify factors or methodologies for determining the avoided human health costs caused by a reduction in air pollution however we consider there is evidence to suggest human health costs are included in the value determined by the current Order in Council for the social cost of carbon.

⁷³ Electricity Industry Act 2000, s. 10.

⁷⁴ Essential Services Commission Act 2001, s. 8A.

⁷⁵ Electricity Industry Act 2000, s. 40FBB(3).

⁷⁶ Electricity Industry Act 2000, s. 40FBB(3B).

⁷⁷ Victorian Government 2017, Victoria Government Gazette No. Section 36, Tuesday 21 February 2017.

Each year, the commission determines the minimum feed-in tariffs for the forthcoming financial year. The feed-in tariffs described in this document will apply from 1 July 2022 to 30 June 2023.⁷⁸

Why is the retail rate higher than the feed-in tariff?

Solar customers are electricity generators, not electricity retailers. The minimum feed-in tariff is a payment solar customers receive for **generating** electricity.

When retailers provide electricity to their customers, they must cover the following costs:

- the 'spot price' of energy in the national electricity market paid to generators
- transporting electricity (the poles and wires connecting customers to electricity generators)
- complying with environmental programs, and
- operating a retail business (for example, managing energy market risk, billing and revenue collection systems, information technology systems, call centre costs, human resources, finance, legal services, regulatory compliance costs, licence costs and marketing).

These additional costs that retailers incur but solar customers do not, mean the minimum feed-in tariff will always be lower than the retail electricity tariff.

We set the feed-in tariff to reflect the value of solar exports as if they were bought from the National Electricity Market, by building in the 'spot price' plus avoided costs. This means that solar customers are paid the value of their solar exports.

If the feed-in tariff was set to match the retail rate of energy, it would also make the energy that solar customers provide more expensive than energy bought in the National Electricity Market. Electricity retailers would need to recover these higher costs through higher retail rates for all energy consumers in Victoria. This would mean non-solar customers would be subsidising a high feed-in tariff.

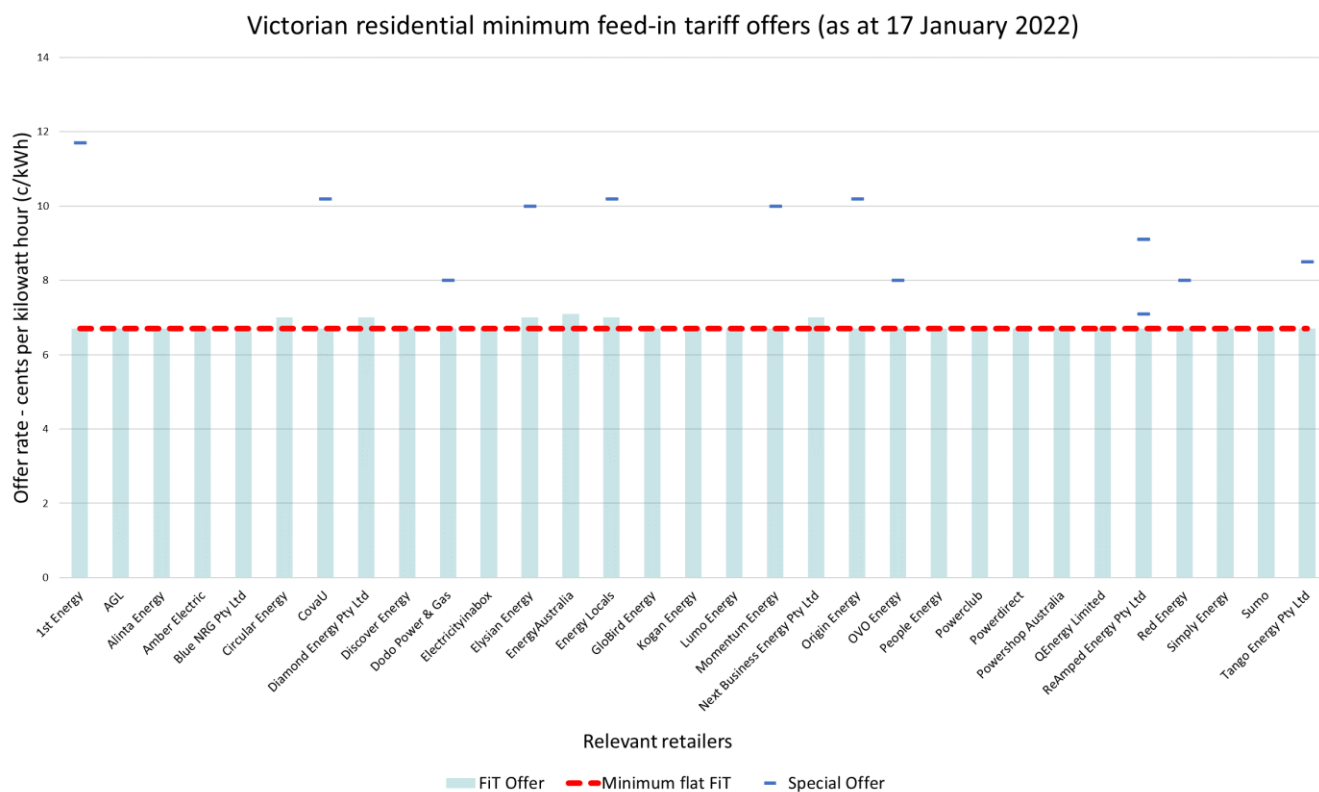
Our objective when setting the minimum feed-in tariff is to promote the long term interests of Victorian energy consumers. This is achieved by the feed-in tariff reflecting the value of solar energy. This means solar customers receive the right incentives to export and Victorian customers pay no more than they need to for solar energy.

⁷⁸ Amendments to Energy Legislation Amendment (Feed-in Tariffs and Improving Safety and Markets) Act 2017, assent date 14 February 2017, requires the commission to set one or more rates (Section 40FBB(2) of the Electricity Industry Act 2000) by 28 February in the financial year preceding the financial year in which it is to apply; previously determinations applied to the following calendar year.

What offers are currently in the market?

All relevant Victorian energy retailers are required to provide at least the minimum feed-in tariffs on all offers.⁷⁹ Retailers are free to offer a feed-in tariff above the minimum tariffs we set. We surveyed the flat feed-in tariffs available in the market in January 2022, see Figure A.3.⁸⁰

Figure A.3: Victorian feed-in tariff offers as at 17 January 2022



Source: Victorian Energy Compare survey of market offers performed 17 January 2022, <https://compare.energy.vic.gov.au>

Our research found six energy retailers offering flat feed-in tariffs higher than the current minimum 6.7 cents per kWh. All of these retailers offered a feed-in tariff that was only slightly higher than the minimum, offering around seven cents per kWh. Retailers could also offer higher feed-in tariffs throughout the year.

⁷⁹ The relevant electricity retailer is a person that holds a licence to sell electricity and sells to more than 5000 customers in Victoria. See section 40F Definitions of the Electricity Industry Act 2000. Not all Australian states mandate a feed-in tariff.

⁸⁰ Publicly available information submitted to the government energy price comparator website Victorian Energy Compare as of 17 December 2021, <https://compare.energy.vic.gov.au/>.

We found some retailers offer higher feed-in tariffs on certain plans or under special terms and conditions. For example, some retailers will offer customers higher feed-in tariffs if they export lower amounts of electricity, or if they purchase solar panels from the retailer.⁸¹

EnergyAustralia appears to be the only retailer to offer a time-varying feed-in tariff and a flat feed-in tariff as part of their electricity plans for Victorian customers. We will continue to monitor whether more retailers offer a time-varying feed-in tariff in the future.

Several other retailers offered contractual arrangements to battery owners which involved dynamic pricing of electricity exports. We will continue to monitor whether more retailers offer time-varying feed-in tariffs in the future.

The premium feed-in tariff (60 cents per kWh, which is closed to new customers), or any bonus that retailers may offer above this, is outside the scope of our role to set a minimum feed-in tariffs.

We encourage customers to shop around because some retailers offer feed-in tariffs higher than the minimum we set.

It is important to look at more than just the feed-in tariff when deciding on an electricity plan. Some plans which offer higher feed-in tariffs may have less competitive prices for the electricity you consume from the grid, and this may outweigh the benefit received from a higher feed-in tariff.

You should consider your energy consumption and generation as a whole when you choose an electricity plan: including your patterns of use, the rates you pay for the electricity you use and the electricity you export

How has the feed-in tariff changed over time?

The feed-in tariff has developed significantly since it started in 2008. Table A.1 below sets out the schemes that pre-date the minimum feed-in tariff.

Table A.1: Current and closed feed in tariff schemes since 2008

Tariff	Minimum Rate	Closed to New Applicants	Scheme End Date
Premium Feed-in Tariff for solar (PFiT)	60 cents per kWh	29 December 2011	2024

⁸¹ Origin Energy, Feed-in Tariff Rates, accessed 6 January 2021, <https://www.originenergy.com.au/solar/feed-in-tariff-rates/>

Standard Feed-in Tariff (SFIT)	"One for one", based on the customer's retail electricity rate	31 December 2012	31 December 2016
Transitional Feed-in Tariff for solar (TFiT)	25 cents per kWh	31 December 2012	31 December 2016
Minimum Feed-in Tariff	Updated annually (5.2 cents per kWh for 2022-23)	Ongoing	Ongoing

Source: Department of Environment, Land, Water and Planning, Closed feed-in tariff schemes, accessed 4 October 2021, <https://www.energy.vic.gov.au/renewable-energy/victorian-feed-in-tariff/closed-feed-in-tariff-schemes>

Premium feed-in tariff

To provide an incentive for households, small businesses and community groups to invest in small-scale solar systems, a premium feed-in tariff of at least 60 cents per kilowatt hour was also provided to customers from late 2009. This scheme closed to new applicants at the end of 2011, although customers signed up to premium scheme will remain eligible to receive the premium rate until 2024.⁸²

Standard feed-in tariff

Initially, the standard feed-in tariff was offered to customers from January 2008 until it was closed to new applicants at the end of 2012 and ended in 2016. The standard feed-in tariff provided a 'one-for-one' rate for excess renewable electricity generated by eligible properties across Victoria, based on the retail electricity rate paid by the customer.

Transitional feed-in tariff

The transitional feed-in tariff replaced the premium feed-in tariff in 2011 and closed to new customers at the end of 2012. This scheme provided customers with a minimum credit of 25 cents per kilowatt hour until the scheme ended on 31 December 2016.⁸³

⁸² Department of Environment, Land, Water and Planning, Standard feed-in tariff and transitional feed-in tariff, accessed 28 September 2021, <https://www.energy.vic.gov.au/renewable-energy/victorian-feed-in-tariff/standard-feed-in-tariff-and-transitional-feed-in-tariff>.

⁸³ Department of Environment, Land, Water and Planning, Premium feed-in tariff, accessed 28 September 2021, <https://www.energy.vic.gov.au/renewable-energy/victorian-feed-in-tariff/premium-feed-in-tariff>

Minimum feed-in tariff

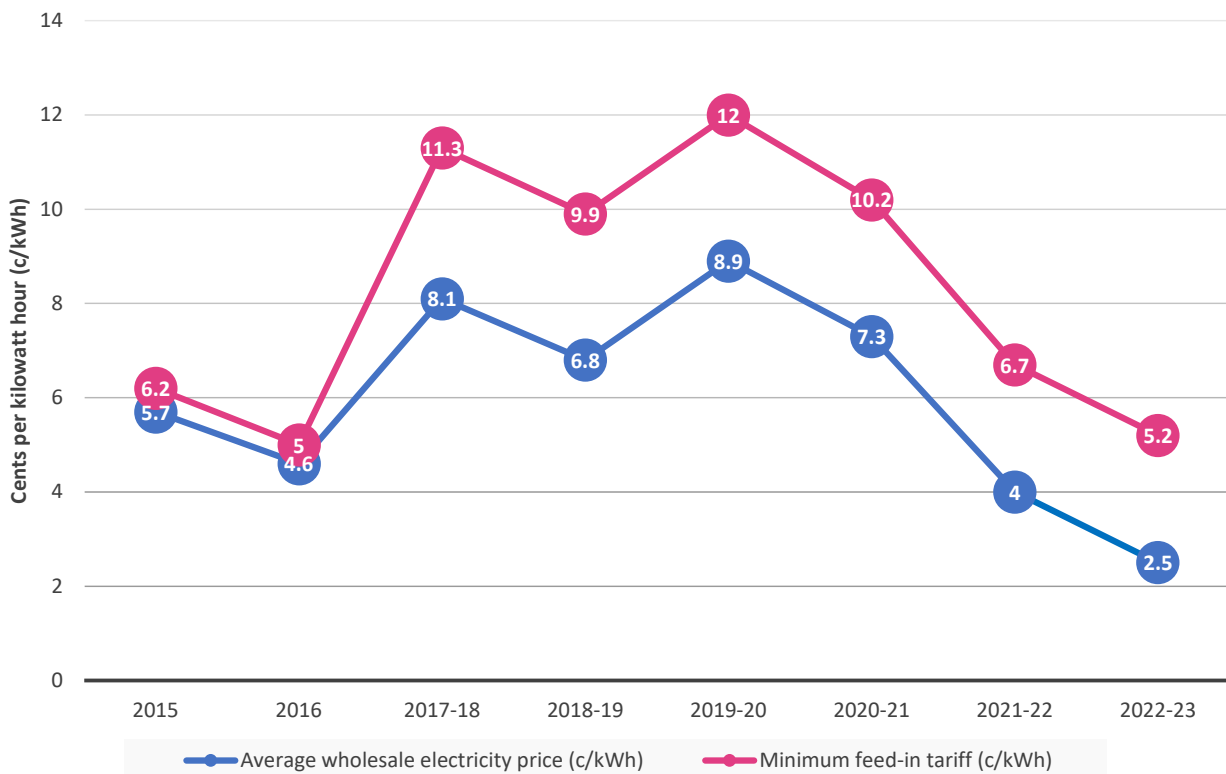
From 2014, the Essential Services Commission has determined the minimum feed-in tariffs that can be offered to customers by electricity retailers.

The Essential Services Commission must set the minimum feed-in tariffs based on costs set out in legislation. These costs represent the value of exports to society including wholesale prices and avoided distribution and transmission losses.

These minimum feed-in tariffs are updated on an annual basis to account for changes in costs over time. From 2017-18, legislation required that we take the avoided social cost of carbon (set at a rate of 2.5 cents per kWh) into account when determining the minimum feed-in tariff.

Figure A.4 below shows the gap between the wholesale electricity price and the minimum feed-in tariff coincides with the introduction of the 2.5 cents per kWh for the social cost of carbon in 2017.

Figure A.4: Comparison of flat feed-in tariffs and wholesale costs 2015-16 to 2022-23



In 2018-19, the Essential Services Commission introduced a minimum time-varying feed-in tariff, intended to reflect the underlying value of electricity more precisely as demand changes over the course of the day, as an alternative to the minimum flat feed-in tariff that was already in place. Retailers can choose to offer either flat, time-varying, or both feed-in tariffs to customers.

Appendix B – Historic feed-in tariffs

Comparison of 2022-23 minimum feed-in tariff with historical rates

Table B.1: Minimum flat feed-in tariff: 2015 – 2022 (cents per kWh)

Tariff component	2015 ⁸⁴	2016 ⁸⁵	2017–18 ⁸⁶	2018–19 ⁸⁷	2019–20 ⁸⁸	2020–21 ⁸⁹	2021–22 ⁹⁰	2022–23
Forecast solar-weighted average wholesale electricity price	5.7	4.6	8.1	6.8	8.9	7.3	3.9	2.5
Market fees and ancillary service charges	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Value of avoided transmission and distribution losses	0.4	0.3	0.6	0.5	0.5	0.3	0.2	0.2
Value of the avoided social cost of carbon	n/a	n/a	2.5	2.5	2.5	2.5	2.5	2.5
Minimum flat feed-in tariff	6.2	5.0	11.3	9.9	12.0	10.2	6.7	5.2

NB: Table may not add due to rounding

⁸⁴ Essential Services Commission 2014, Minimum feed-in tariff 2015: final decision, August 2014, p. 24.

⁸⁵ Essential Services Commission 2015, Minimum electricity feed-in tariff to apply from 1 January 2016 to 31 December 2016: final decision, August 2015, p.17.

⁸⁶ Essential Services Commission 2017, Minimum electricity feed-in tariff to apply from 1 July 2017: final decision, February 2017, p. 9.

⁸⁷ Essential Services Commission 2018, Minimum electricity feed-in tariffs to apply from 1 July 2018: final decision, 27 February 2018, p. 20.

⁸⁸ Essential Services Commission 2019, Minimum electricity feed-in tariffs to apply from 1 July 2019: final decision, 28 February 2019, p. 28.

⁸⁹ Essential Services Commission 2020, Minimum electricity feed-in tariff to apply from 1 July 2020: final decision, 25 February 2020, p. 31.

⁹⁰ Essential Services Commission 2021, Minimum electricity feed-in tariff to apply from 1 July 2021: final decision, 25 February 2021, p. 14.

Table B.2: Minimum time-varying feed-in tariffs: 2018 – 2022 (cents per kWh)⁹¹

Period	2018–19 ⁹²	2019–20 ⁹³	2020–21 ⁹⁴	2021–22 ⁹⁵	2022–23
Early evening	29.0	14.6	12.5	10.9	6.9
Day	10.3	11.6	9.8	6.1	5
Overnight	7.1	9.9	9.1	6.7	7.1

See chapter 5.1 of Frontier Economics’ report for details on the comparison of wholesale electricity price forecasts applied to the 2021–22 and 2022–23 minimum feed-in tariff decisions.⁹⁶

⁹¹ Optional time-varying feed-in tariffs were introduced in 2018–19. The time-varying feed-in tariff for 2018–19 and 2019–20 was time-weighted while the 2020–21 and 2021–22 rates are solar-weighted.

⁹² Essential Services Commission 2018, Minimum electricity feed-in tariffs to apply from 1 July 2018: final decision, 27 February 2018, p. 20.

⁹³ Essential Services Commission 2019, Minimum electricity feed-in tariffs to apply from 1 July 2019: final decision, 28 February 2019, p. 28.

⁹⁴ Essential Services Commission 2020, Minimum electricity feed-in tariff to apply from 1 July 2020: final decision, 25 February 2020, p. 31.

⁹⁵ Essential Services Commission 2021, Minimum electricity feed-in tariff to apply from 1 July 2021: final decision, 25 February 2021, p. 15.

⁹⁶ Frontier Economics, Wholesale Price Forecasts for Calculating Minimum Feed In Tariff: Final report for the Essential Services Commission, January 2022, p.27.

Appendix C – Feed-in tariffs in other jurisdictions

Other states also regulate their feed-in tariffs based on wholesale electricity prices

Different states have slightly different methodologies for calculating their regulated feed-in tariffs, but all set their rates primarily on forecast wholesale electricity prices (see Table C.1).

Wholesale electricity price component

New South Wales

New South Wales' methodology is very similar to Victoria's when forecasting future wholesale electricity prices. Independent Pricing and Regulatory Tribunal (IPART) sources price data from NSW baseload electricity futures contracts from the ASX for the previous 12 months. These values are averaged over 40 trading days to establish the top end of the benchmark range and are then reduced by five per cent for a contract premium. A volume weighted average of all historical trades available is used to establish the lower end of the range. These two approaches to setting each end of the benchmark range are used to represent the variation in price setting methodologies used by retailers, which can be based on either the market price of electricity or the actual cost avoided by purchasing solar exported electricity. A solar multiplier is then applied to adjust the forecast price to account for variation in the wholesale electricity price when solar exports occur.⁹⁷

Queensland

In Regional Queensland, the Queensland Competition Authority approximates the half-hourly usage of customers by considering the distribution network system load profile. They use this data and the trade-weighted average of the ASX Energy daily settlement prices of base, peak and cap contracts to estimate wholesale electricity costs. The wholesale electricity price for the upcoming period is then forecast by a third-party consultant through multiple simulations to cover a wide range of demand outcomes and potential risks.⁹⁸ Feed-in tariffs in the southeast Queensland electricity market are not regulated.

⁹⁷ IPART, Solar feed-in tariff benchmarks Final Report June 2021, accessed 27 January 2022, https://www.ipart.nsw.gov.au/sites/default/files/cm9_documents/Final-Report-Solar-feed-in-tariffs-benchmarks-2021-22-June-2021.PDF.

⁹⁸ Queensland Competition Authority, Regional Queensland 2021-22 Solar feed-in tariff Determination, accessed 27 January 2022, <https://www.qca.org.au/wp-content/uploads/2021/06/solar-feed-in-tariff-2021-22-report-1.pdf>.

Tasmania

To set the feed-in tariff at the appropriate rate, Tasmania uses the wholesale electricity price determined by the Tasmanian Economic Regulator for standing offer prices. However, if there is a Wholesale Electricity Price Order issued by the Treasurer, that wholesale electricity price is used to set the feed-in tariff.⁹⁹

Other jurisdictions

From our research, there is less publicly available data on the methodology adopted by Western Australia and the Northern Territory. Western Australia has introduced a time of export payment system to reflect the variation in the wholesale cost of electricity. The Distributed Energy Buyback Scheme was adopted in 2020 and applies to new solar customers.¹⁰⁰ The scheme was introduced to 'better represent the actual cost of electricity at different times of day'.¹⁰¹ The Northern Territory also seeks to provide a feed-in tariff which mirrors forecast wholesale electricity prices. The Northern Territory has closed its premium feed-in tariff offers to new entrants as of April 2020 and their feed-in tariff is set 'equivalent to the value of electricity exported to the grid'.¹⁰²

Other components

New South Wales, Queensland and Tasmania also explicitly factor in costs other than the wholesale price of energy to set the feed-in tariff. These include avoided network losses, avoided national energy market costs, and avoided ancillary costs.

Network costs, which are paid by retailers to the utilities that maintain and operate distribution networks, are an unavoidable cost for retailers. Our research indicates it is not added as a cost when setting feed-in tariffs in any jurisdiction including Victoria.

⁹⁹ Office of the Tasmanian Economic Regulator, Investigation to Determine the Regulated Feed-in Tariff Rate Final Report May 2019, accessed 27 January 2022, <https://www.economicregulator.tas.gov.au/Documents/19%20687%202019%20Regulated%20Feed-in%20Tariff%20Investigation%20Final%20Report.pdf>

¹⁰⁰ Western Australia government Energy Buyback Schemes, accessed 27 January 2022, <https://www.wa.gov.au/organisation/energy-policy-wa/energy-buyback-schemes>

¹⁰¹ Synergy, Distributed Energy Buyback Scheme (DEBS), accessed 27 January 2022, <https://www.synergy.net.au/Your-home/Manage-account/Solar-connections-and-upgrades/Distributed-Energy-Buyback-Scheme>.

¹⁰² Department of Trade, Business and Innovation, Changes to Feed in Tariffs, accessed 27 January 2022, https://industry.nt.gov.au/_data/assets/pdf_file/0008/811628/changes-to-feed-in-tariffs-fact-sheet.pdf.

Victoria is the only state with a social cost of carbon component

Victoria is the only jurisdiction which must consider the avoided social cost of carbon and avoided human health costs when setting a feed-in tariffs.

Table C.1: Regulated feed-in tariff methodology comparisons in other jurisdictions (excluding South Australia, ACT, and South-East Queensland)

State/Territory	Avoided wholesale electricity costs	Avoided network losses	Avoided ancillary & NEM costs	Avoided social cost of carbon and human health costs
Victoria	✓	✓	✓	✓
New South Wales	✓	✓	✓	✗
Queensland (excl. SEQ Queensland)	✓	✓	✓	✗
Tasmania	✓	✓	✓	✗
Western Australia ¹⁰³	✓	Uncertain	Uncertain	✗
Northern Territory ¹⁰⁴	✓	Uncertain	Uncertain	✗

The level of feed-in tariffs in other jurisdictions

Victoria's flat minimum feed-in tariff is currently higher than most other regulated flat feed-in tariffs, apart from Western Australia's peak time and the Northern Territory (whose feed-in tariff is updated less frequently than other jurisdictions and whose electricity generator is a government owned monopolist). Victoria's higher flat feed-in tariff is mainly due to the additional 2.5 cents per kilowatt hour for the avoided social cost of carbon which is accounted for when setting the feed-in tariff.

¹⁰³ It is unclear if Western Australia includes transmission and distribution losses, or market operator costs in its feed-in tariff.

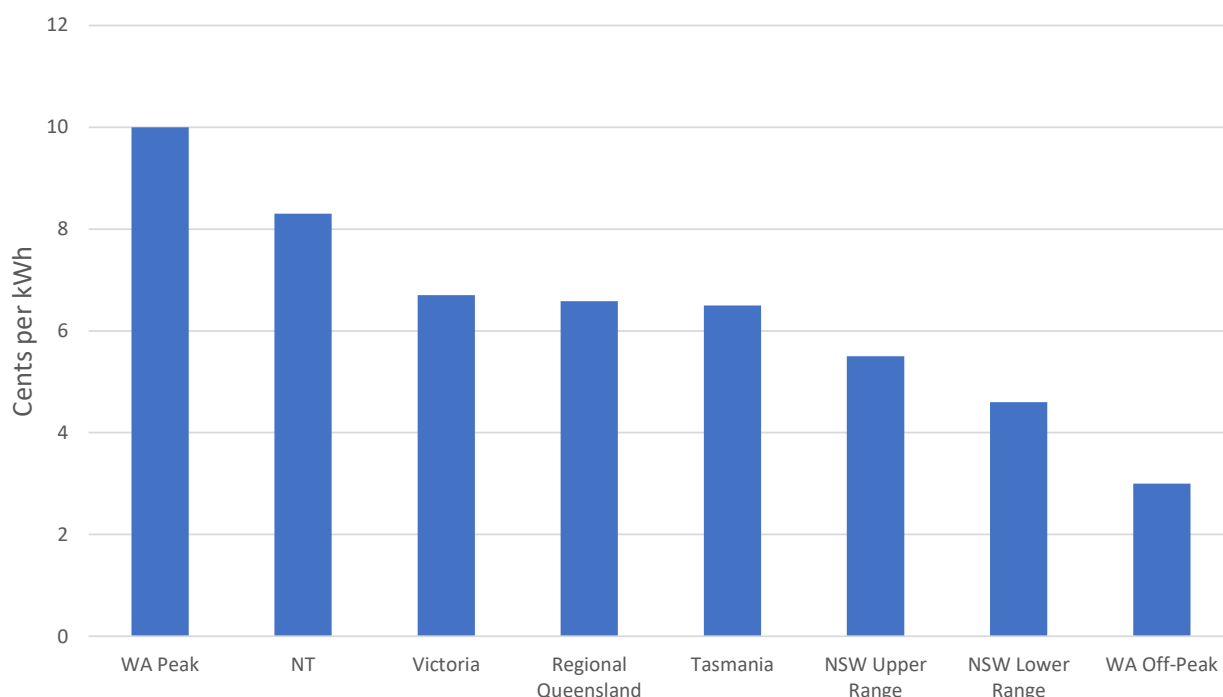
¹⁰⁴ It is unclear if the Northern Territory includes transmission and distribution losses, or market operator costs in its feed-in tariff.

Independent Pricing and Regulatory Tribunal (IPART), in New South Wales, also sets benchmarks for different periods of the day. This is to allow for fluctuations in the feed-in tariff when energy demand is lower during the day and solar exports are high, and in the evening when demand for electricity is high but solar has less capability to meet demand. As in Victoria, retailers do not have to offer time varying feed-in tariffs, and most do not.

Figure C.1 compares the regulated flat feed-in tariffs across Australia in December 2021. Tariffs are highest in the Northern Territory (8.3 cents per kWh), followed by peak times in Western Australia, Victoria, Queensland, Tasmania, and New South Wales.

The 10 cents per kWh (applies during peak times of 3pm-9pm) and three or 2.75 cents per kWh depending on the energy retailer (all other hours) under Western Australia’s Distributed Energy Buyback Scheme have been set to encourage households to either self-consume or store their solar energy generation in the middle of the day when it is plentiful and to install west facing panels.¹⁰⁵

Figure C.1: Feed-in tariff flat rates in other jurisdictions January 2022^{a, b, c}



¹⁰⁵ WA Synergy customers receive an off-peak feed in tariff of 2.75 cents per kWh, while WA Horizon Power customers receive 3 cents per kWh. Areas that Horizon Power services have higher costs to generate energy. Western Australia Energy Buyback Scheme, accessed 27 January 2022, <https://www.wa.gov.au/organisation/energy-policy-wa/energy-buyback-schemes>

^aVictoria also has time-varying feed-in tariffs ranging from 6.1 to 10.6 cents per kWh for July 2021 to June 2022.

^bWestern Australia's new Distributed Energy Buyback Scheme has two rates: 10 cents per kWh (Peak 3pm-9pm) and 3 or 2.75 cents per kWh (Off-Peak/all other times) depending on the energy retailer. *WA Synergy customers receive an off-peak feed in tariff of 2.75 cents per kWh, while WA Horizon Power customers receive 3 cents per kWh. ^cIPART also sets NSW benchmarks for time-varying feed-in tariffs at different times of the day, these range from 4.3 cents per kWh (8pm to 5am) and 14.5 cents per kWh (between 5pm-6pm).

Sample feed-in tariffs offered across Australia

In Victoria, most retailers offer the 6.7 c/kWh rate which match the current minimum feed-in tariff. In less regulated states, retailers tend to offer a wider range of feed-in tariffs, both below and above what is common in Victoria.

It is worth noting higher feed-in tariffs are normally conditional on purchasing solar panels from the retailer or new solar customers changing retailers, and caution should be taken when directly comparing feed-in tariffs. Some retailers also offer a higher feed-in tariff until a certain threshold of energy is exported; once the threshold is reached, the feed-in tariff is reduced.

Appendix D – Technical methodology

Our approach to determining the minimum feed-in tariffs for 2022–23 is largely the same as the approach used to set the minimum feed-in tariffs for 2021–22.

The methodology comprises the following components:

- The value of electricity sourced from small scale renewable generators, based on the avoided cost of purchasing an equal amount of electricity from the wholesale market, accounting for price changes throughout the day and seasonally, including:
 - both flat rate and time-varying rate wholesale electricity price forecasts
 - avoided market fees and ancillary service charges.
- Avoided transmission and distribution losses.
- Avoided social cost of carbon and avoided human health costs.

Table D.1 shows how the minimum feed-in tariff is calculated from these components.

Table D.1 – Calculating the minimum feed-in tariff

Component	Calculation	Flat rate	Overnight	Day	Early Evening
A: Wholesale electricity prices	Solar export-weighted average price forecast (cents per kWh)	2.48	4.27	2.28	4.05
B: Avoided market fees and ancillary service charges	Budget National Electricity Market fee for 2021-22 used as a best estimate for 2022-23 + Average of the ancillary service charges recovered from customers between week 44 of 2020 and week 45 of 2021 (cents per kWh)	0.09	0.09	0.09	0.09
C: Transmission and distribution loss adjustment	Multiply overall losses for each distribution business by the share of total customer numbers and sum these then make loss adjustment.	0.0582	0.0582	0.0582	0.0582
D: Value of avoided transmission and distribution losses	Multiply (A + B) by C	0.15	0.25	0.14	0.24

Component	Calculation	Flat rate	Overnight	Day	Early Evening
E: Value of avoided social cost of carbon and human health costs	Multiply the volume factor by the price factor – see Appendix F for more information.	2.49	2.49	2.49	2.49
Total (rounded to one decimal place)	A + B + D + E	5.2	7.1	5.0	6.9

Forecasting wholesale electricity prices

We have used a futures market approach to estimate wholesale electricity prices in 2022–23. This approach best meets our legislative objectives.

We used a futures market approach in previous feed-in tariff decisions. Benefits of using a futures market approach include:

- Providing more transparency to stakeholders than a market modelling approach.
- Ensuring our decision matches the view of ‘the market’ as represented by contract prices.

Increased transparency over the inputs for analysis is consistent with our objectives to promote protections for customers and to promote the long term interests of Victorian consumers.^{106, 107} Increased transparency gives stakeholders greater opportunities to understand and provide meaningful feedback on our decisions.

Wholesale price forecasts for 2022–23

We engaged Frontier Economics to forecast wholesale electricity prices for 2022–23 using a futures market approach. The following section outlines the approach.

Wholesale price forecast for the flat feed-in tariff

Forecasting the relevant wholesale price for the minimum flat feed-in tariff involves five steps. The purpose of this is to estimate what retailers would pay for customers’ solar exports if this electricity were sold in the wholesale spot market in 2022–23 in the same way as other generators’ do.

¹⁰⁶ Electricity Industry Act 2000, s. 10(c).

¹⁰⁷ Essential Services Commission Act 2001, s. 8.

1. Calculating the price level for 2022–23. Using the average price of 2022–23 quarterly baseload future swaps from the Australian Stock Exchange (after adjusting for an assumed contract premium of five per cent) weighted by traded volume across the most recent 12 months up to a particular date (for this final decision this was 14 January 2022). The 12-month average price is reflective of retailers’ approach to buying contracts.

Table D.2 provides the value of these contracts over the 12 months up to and including 14 January 2022.¹⁰⁸ Frontier Economics has updated these estimates from our December 2021 draft decision, to reflect current market expectations. These updates are different to the estimates contained in our draft decision.

Table D.2 – Average baseload swap prices for 2022–23 (less 5 per cent premium)

Calendar quarter	Trade-weighted average price in 12 months to 14 January 2022 (cents per kWh)
Q3 2022	4.462
Q4 2022	3.459
Q1 2023	5.281
Q2 2023	4.004

Source: Base swap price data from ASX Energy and analysis from Frontier Economics.¹⁰⁹

2. Selecting the appropriate historical prices and export profile. The commission received half-hourly actual export data for customers across each Victorian electricity distribution network for the period from 1 July 2020 to 30 June 2021. The most recent data is likely to be the best indicator of solar export profiles in 2022–23. Similarly, corresponding spot price data for the same time period is available from the Australian Energy Market Operator.
3. Scaling historical prices to 2022–23 levels. After averaging prices for each quarter for the relevant historical base year, they are compared to the quarterly futures prices in step 1 to determine a scaling factor for each quarter.
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 forecast the half-hourly prices expected in 2022–23.

¹⁰⁸ 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.

¹⁰⁹ Frontier Economics, Wholesale Price Forecasts for Calculating Minimum Feed-In Tariff: Final Report for the Essential Services Commission, 27 January 2022, p. 6.

5. Calculate the flat feed-in tariff. The wholesale electricity component of the flat feed-in tariff is calculated by averaging the half-hourly prices from step 4, weighted according to the time of solar exports from step 2. The formula for this is:

$$\text{Flat FiT wholesale price} = \frac{\sum_{t=1}^{17,568} \text{Expected price } 2022 - 23_t \times \text{Exports } 2020 - 21_t}{\sum_{t=1}^{17,568} \text{Exports } 2020 - 21_t}$$

Wholesale price forecast for the time-varying feed-in tariffs

Steps 1 to 4 of forecasting the time-varying feed-in tariffs are the same for forecasting the flat feed-in tariff. Like the flat feed-in tariff approach, the commission has set the time-varying feed-in tariffs using weighting based on solar export profiles. For step 5, the only difference is that the above weighting is done three times, once for each time block, using only the expected prices and solar exports from the relevant time block.

Estimate of market fees and ancillary service charges

When retailers purchase energy from the wholesale market, they must pay market fees and ancillary service charges to the Australian Energy Market Operator (market operator). The market operator charges these fees based on the amount of electricity that retailers purchase from the wholesale market. Retailers can avoid them if they get electricity from small scale renewable generators.

We have included these fees and charges (shown in Table D.3 below) in our calculation of avoided costs. The total value of market fees and ancillary services are 0.09 cents per kWh.

Table D.3 – Market fees and ancillary service charges

Item	Fee	
	\$/MWh	cents per kWh
National Electricity Market fees	0.55	0.055
Ancillary service charges	0.34	0.034
Total	0.89	0.089

Source: AEMO, 2021-22 Budget and Fees report and ancillary services recovery summaries for 2021

Market fees

The National Electricity Market fee levied by the market operator is set in advance of each year through its annual budgeting process. However, the 2021–22 the market operator Budget and

Fees paper does not provide an estimate of the fee for 2022–23. Therefore, we have used the 2021–22 market fee of 0.055 cents per kWh for retailers as a best estimate for 2022–23.¹¹⁰

For 2021-22, the market operator levied two new, additional fees on market customers to recover the consolidated costs of the Five-Minute and Global Settlements.¹¹¹ We have included these new fees in our calculation of the market fees component of the minimum feed-in tariff. The above changes only have a minor impact on the feed-in tariffs.

Ancillary services

The market operator recovers the cost of providing ancillary services from market participants (retailers) and publishes the recovery rate of ancillary service charges on a weekly basis. In determining feed-in tariffs that apply from 1 July 2022, we have assumed that the average cost of ancillary services in 2022–23 will be consistent with its average over the 2021 calendar year.¹¹²

Estimate of the avoided transmission and distribution losses

Electricity supplied to the wholesale market is often produced by large generators located some distance away from the point of consumption. Electricity is transported to households and businesses via a transmission and distribution network (also known as the 'grid'). During this process, a small portion of electricity originally exported to the grid is lost as heat and sound. This is referred to as network or line losses.

Small scale renewable generation reduces network losses because the generated electricity is typically consumed close by. The extent of the associated cost saving varies depending on the location of the generation facility (among other factors such as the quality of the line and the amount of electricity flowing through it). We have incorporated this cost saving into the feed-in tariffs by applying a 'loss factor' to the avoided cost of purchasing electricity in the wholesale market, including market fees and ancillary service charges.

¹¹⁰ Australian Energy Market Operator 2021, 2021-22 AEMO Budget and Fees, accessed 24 January 2022, https://aemo.com.au/-/media/files/about_aemo/energy_market_budget_and_fees/2021/aemo-2021-22-budget-and-fees.pdf?la=en.

¹¹¹ Australian Energy Market Operator 2021, 2021-22 AEMO Budget and Fees, accessed 11 February 2022, https://aemo.com.au/-/media/files/about_aemo/energy_market_budget_and_fees/2021/aemo-2021-22-budget-and-fees.pdf?la=en, p. 10-11.

¹¹² Australian Energy Market Operator 2021, Ancillary services payments and recovery, AS Recovery Summary File 2022 accessed 24 January 2022, https://www.nemweb.com.au/REPORTS/CURRENT/Ancillary_Services_Payments/AS_RECOVERY_SUMMARY_2021.CSV.

Using the market operator’s estimates of distribution loss factors for 2021-22 and their preliminary estimates of marginal loss factors for 2022–23, we have estimated a flat customer share-weighted loss factor of 1.058 for Victoria. We have then applied this loss factor to derive the value of avoided network losses used in the minimum feed-in tariff calculations. Table D.4 below sets out the inputs to the loss factor calculation which are publicly available on the market operator’s website.

In this review, we have used the same approach to network losses as we have in the Victorian Default Offer. We have taken the load weighted average of the short and long sub-transmission distribution loss factors and calculated the transmission loss factors by taking a simple average of the marginal loss factors across each distribution area (after removing some nodes that have no residential or small business load).^{113, 114} These factors are then weighted by the number of low voltage residential and non-residential customers in each distribution zone to develop a Victoria wide loss factor.¹¹⁵

Table D.4 – Inputs for calculating loss factors

Distribution business	Distribution loss factor	Average marginal loss factor	Total loss factor	Number of customers
CitiPower	1.0500	0.9980	1.0479	341,617
Powercor	1.0782	0.9846	1.0616	854,215
United Energy	1.0525	0.9964	1.0487	693,275
AusNet Services	1.0734	1.0016	1.0751	767,797
Jemena	1.0430	0.9996	1.0426	362,266
Customer share-weighted			1.0582	

¹¹³ Australian Energy Market Operator 2021, Distribution Loss Factors for the 2021/22 Financial Year, accessed 25 January 2022 https://www.aemo.com.au/-/media/files/electricity/nem/security_and_reliability/loss_factors_and_regional_boundaries/2021-22/distribution-loss-factors-for-the-2021-22-financial-year.pdf?la=en.

¹¹⁴ Australian Energy Market Operator 2021, Preliminary Marginal Loss Factors for the 2022-23 Financial Year, accessed 25 January 2022, https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/loss_factors_and_regional_boundaries/2022-23/preliminary-marginal-loss-factors-for-the-2022-to-23-financial-year.xlsx?la=en.

¹¹⁵ Australian Energy Regulator, Performance reporting, accessed 25 January 2022, <https://www.aer.gov.au/networks-pipelines/performance-reporting>.

Estimate of the avoided social cost of carbon

In February 2017, the Victorian Government issued an Order in Council (“Order”) specifying a methodology for determining the social cost of carbon and the factors we must consider when applying this methodology.¹¹⁶

It defines the avoided social cost of carbon as the avoided ‘cost per kilowatt-hour (kWh) of small renewable energy generation electricity purchased by a relevant licensee’ (e.g., retailer), determined in accordance with the following methodology and factors:

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

The volume factor, in the Order is an emissions intensity coefficient factor of 1.27 kilograms (kg) of carbon dioxide equivalent (CO₂e) per kWh of electricity exported by a small renewable energy generator. This means that 1.27 kg (or 0.00127 tonne) of CO₂e is assumed to be avoided for each kWh of electricity exported by a small renewable energy generator.

For the price factor, we have used the method specified in the Order to determine the value of a tonne of CO₂e. It results in a value of \$19.63 per tonne of CO₂e.

The resulting avoided social cost of carbon is 2.5 cents per kWh.

Human health costs

The Victorian Government has not made a separate Order in Council that specifies a factor or method for determining avoided human health costs attributable to a reduction in air pollution.

We reviewed the associated health benefits as part of our inquiry into the energy value of distributed generation in 2016.¹¹⁷ We have also re-examined this matter a number of times since. However, due to a lack of sufficient evidence and data, we could not reliably place a separate monetary value on the avoided human health costs. Additionally, there is no consensus on the appropriate methodology to estimate the health benefits attributable to a reduction in air pollution.

¹¹⁶ 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).

¹¹⁷ Essential Services Commission 2016, The energy value of distributed generation, August 2016, pp. 62-63, <https://www.esc.vic.gov.au/sites/default/files/documents/Distributed-Generation-Inquiry-Stage-1-Final-Report-Energy-Value-FINAL-20160916.pdf>.

The Department of Environment, Land, Water and Planning has noted similar issues around data and raised concerns about reliably estimating these health costs in a Victorian context.¹¹⁸

We also note that there is some evidence that the human health benefits are already accounted for through the avoided social cost of carbon. As a result, in the absence of one definitive and reliable quantification methodology and data source, our decision is to set the stand-alone avoided human health costs at 0 cents per kWh.

Structuring the time-varying feed-in tariff

We have also set a time-varying feed-in tariff with overnight, day and early evening periods. The time periods – or ‘time blocks structure’ – for the time-varying feed-in tariff are set out in Table C.5.

Table D.5 – Time block structure for time-varying feed-in tariff 2022-23

Period	Weekday	Weekend
Overnight	10pm-7am	10pm-7am
Day	7am-3pm, 9pm-10pm	7am-10pm
Early evening	3pm-9pm	n/a

¹¹⁸ Department of Environment, Land, Water and Planning 2019, Estimating the health costs of air pollution in Victoria, pp. 3-5, https://www.climatechange.vic.gov.au/_data/assets/pdf_file/0022/421717/Final_Health-costs-of-air-pollution-in-Victoria.pdf.

Appendix E – Legislation on setting feed-in tariffs

Table E.1 – Relevant sections of the Essential Services Commission Act 2001

Section	
s. 8(1)	<p>Objective of the Commission</p> <p>In performing its functions and exercising its powers, the objective of the Commission is to promote the long term interests of Victorian consumers.</p>
s. 8(2)	<p>Without derogating from subsection (1), in performing its functions and exercising its powers in relation to essential services, the Commission must in seeking to achieve the objective specified in subsection (1) have regard to the price, quality and reliability of essential services.</p>
s. 8A(1)	<p>Matters which the Commission must have regard to</p> <p>In seeking to achieve the objective specified in section 8, the Commission must have regard to the following matters to the extent that they are relevant in any particular case—</p> <ul style="list-style-type: none"> (a) efficiency in the industry and incentives for long term investment; (b) the financial viability of the industry; (c) the degree of, and scope for, competition within the industry, including countervailing market power and information asymmetries; (d) the relevant health, safety, environmental and social legislation applying to the industry; (e) the benefits and costs of regulation (including externalities and the gains from competition and efficiency) for— <ul style="list-style-type: none"> (i) consumers and users of products or services (including low income and vulnerable consumers); (ii) regulated entities [electricity distributors and retailers]; (f) consistency in regulation between States and on a national basis; (g) any matters specified in the empowering instrument [in this case, the Electricity Industry Act (the Act)].
s. 8A(2)	<p>Without derogating from section 8 or subsection (1), the Commission must also when performing its functions and exercising its powers in relation to a regulated industry do so in a manner that the Commission considers best achieves any objectives specified in the empowering instrument [the Act].</p>

Table E.2 – Relevant sections of the Electricity Industry Act 2000

Section	
s. 10	<p>Objectives of the Commission</p> <p>The objectives of the Commission under this Act are—</p>

- (a) to the extent that it is efficient and practicable to do so, to promote a consistent regulatory approach between the electricity industry and the gas industry; and
- (b) to promote the development of full retail competition; and
- (c) to promote protections for customers, including in relation to assisting customers who are facing payment difficulties.

s. 40F(1)

Definitions

In this Division—

biomass energy generation facility means a generation facility that generates electricity by utilising energy from the combustion of—

- (a) biomass; or
- (b) biogas;

general renewable energy feed-in terms and conditions has the meaning given by section 40FB;

hydro generation facility means a generation facility that generates electricity by utilising the energy from moving water;

non-complying licensee means—

- (a) a relevant licensee that has not complied with a condition set out in section 40FF(1) or 40G(1); or
- (b) a small retail licensee that has not complied with the condition set out in section 40FG(3);

qualifying customer, of a relevant licensee or small retail licensee, means a person who—

- (a) purchases electricity from that relevant licensee or small retail licensee; and
- (b) engages in the generation of electricity—
 - (i) at a property that the person occupies as their principal place of residence by means of one qualifying solar energy generating facility at the property; or
 - (ii) at one or more properties—
 - (A) that the person occupies, otherwise than as a place of residence, by means of one qualifying solar energy generating facility at each of those properties; and
 - (B) at which the person's annual consumption rate of electricity is 100 megawatt hours or less; and
- (c) has been exempted by Order under section 17 from the requirement to hold a licence in respect of the generation of electricity for supply and sale;

qualifying solar energy generating facility means a photovoltaic generation facility that—

- (a) has an installed or name-plate generating capacity of 5 kilowatts or less; and
- (b) is connected to a distribution system;

qualifying solar energy generation electricity means electricity that a qualifying customer generates and does not use;

relevant generator means—

- (a) a generation company; or
- (b) a person engaging in the generation of electricity for supply or sale that has been exempted by Order under section 17 from the requirement to hold a licence in respect of that activity;

relevant licensee means a person that—

- (a) holds a licence to sell electricity; and
- (b) sells electricity to more than 5000 customers;

small renewable energy generation electricity means non-pool electricity supplied by a relevant generator from a small renewable energy generation facility operated by that generator;

small renewable energy generation facility means a facility of the following kind, connected to a distribution system, that generates electricity and has an installed or name-plate generating capacity of less than 100 kilowatts—

- (a) a wind energy generation facility;
- (b) a solar energy generation facility;
- (c) a hydro generation facility;
- (d) a biomass energy generation facility;
- (e) a facility or class of facility specified for the purposes of this definition under subsection (2)—

but does not include a qualifying solar energy generating facility or a TFiT scheme generating facility that is connected to a distribution system under the premium solar feed-in tariff scheme or TFiT scheme;

small retail licensee means a person that—

- (a) holds a licence to sell electricity; and
- (b) sells electricity to 5000 or less customers;

solar energy generation facility means a generation facility that generates electricity by converting solar energy into electricity;

feed-in tariff

wind energy generation facility means a generation facility that generates electricity by converting wind energy into electricity.

s. 40F(2)

The Governor in Council, by Order published in the Government Gazette, may, for the purposes of paragraph (e) of the definition of **small renewable energy generation facility**, specify a facility or class of facility that

generates electricity in any way as a small renewable energy generation facility.

s. 40FB(1) **Meaning of general renewable energy feed-in terms and conditions**

General renewable energy feed-in terms and conditions are the prices, terms and conditions comprising an offer under which a relevant licensee will purchase, from a relevant generator, **small renewable energy generation electricity**.

s. 40FB(2) Without limiting subsection (1), on and after the commencement of section 4 of the **Energy Legislation Amendment (Feed-in Tariffs and Other Matters) Act 2013**, general renewable energy feed-in terms and conditions must, as a minimum, include terms and conditions under which—

(a) an amount, specified for a financial year under section 40FBA, is credited against the charges payable to the relevant licensee by a customer who is a relevant generator for electricity the licensee supplies to the customer (a **general renewable energy credit**); and

(b) a general renewable energy credit that arises during a period of supply of electricity to that customer is included in the electricity bill of that customer that relates to that period of supply; and

(c) if, in a period of supply of electricity to the customer, a general renewable energy credit exceeds the amount owed by that customer for electricity supplied to that customer in that period of supply, the excess general renewable energy credit amount is—

(i) credited against the charges payable to the relevant licensee by that customer for electricity the licensee supplies to that customer in the next period of supply of electricity to that customer; and

(ii) included in that customer's electricity bill that relates to that period of supply of electricity; and

(d) any excess general renewable energy credit amount referred to in paragraph (c) is extinguished on the day the contract for the supply of electricity by the relevant licensee to the customer ends.

s. 40FBA **Rates for purchases of small renewable energy generation electricity**

For the purposes of section 40FB(2)(a), in each financial year the amount to be credited against the charges payable to a relevant licensee by a customer who is a relevant generator is determined at—

(a) the rate or rates determined by the Commission under section 40FBB for that financial year; or

(b) if the Commission has not determined one or more rates under section 40FBB for that financial year—the rate or rates that applied immediately before the commencement of that financial year.

s. FBB(1) **Commission to determine one or more rates for purchases of small renewable energy generation electricity**

The Commission may determine one or more rates for the purposes of section 40FBA(a).

- s. FBB(2) A rate determined under subsection (1) must be—
- (a) determined not later than 28 February in the financial year preceding the financial year in which it is to apply; and
 - (b) published in the Government Gazette not later than that date.
- s. FBB(3) In determining a rate for the purposes of section 40FBA(a), the Commission must have regard to—
- (a) prices of electricity in the wholesale electricity market; and
 - (b) any distribution and transmission losses avoided in Victoria by the supply of small renewable energy generation electricity; and
 - (c) the following avoided costs—
 - (i) the avoided social cost of carbon;
 - (ii) the avoided human health costs attributable to a reduction in air pollution.
- s. FBB(3A) If an Order under subsection (3B) is in effect, the avoided costs that the Commission must have regard to under subsection (3) are the avoided costs determined in accordance with the methodology or factor specified in the Order for the relevant avoided costs.
- s. 40FBB(3B) The Governor in Council, by Order published in the Government Gazette, may specify a methodology or factor for the determination of—
- (a) the avoided social cost of carbon; or
 - (b) the avoided human health costs attributable to a reduction in air pollution.
- s. 40FBB(4) A determination of the Commission under this section is not a determination for the purposes of the **Essential Services Commission Act 2001**.

Appendix F – Order in council – avoided social cost of carbon



Victoria Government Gazette

No. S 36 Tuesday 21 February 2017
By Authority of Victorian Government Printer

Electricity Industry Act 2000

ORDER SPECIFYING A METHODOLOGY AND FACTORS FOR THE DETERMINATION OF THE AVOIDED SOCIAL COST OF CARBON

Order in Council

The Governor in Council makes the following Order:

1. **Purpose**

The purpose of this Order is to specify a methodology and factors for the determination of the avoided social cost of carbon which the Essential Services Commission (ESC) must have regard to under section 40FBB(3)(c) of the *Electricity Industry Act 2000*.
2. **Authorising provision**

This Order is made under section 40FBB(3B) of the *Electricity Industry Act 2000*.
3. **Commencement**

This Order takes effect on the day it is published in the *Victoria Government Gazette*.
4. **Definitions**

In this Order –

 - avoided*, in relation to CO₂e, has the meaning given by clause 5;
 - CO₂e* has the same meaning as *carbon dioxide equivalent of a greenhouse gas* (as defined in section 3(3) of the *Victorian Energy Efficiency Target Act 2007*);
 - relevant financial year* means the 2017/18 financial year, for which a rate or rates determined under section 40FBB of the *Electricity Industry Act 2000* will apply;
 - relevant period* means the five-year period ending on 31 December of the calendar year that ends 6 months prior to the commencement of the relevant financial year.
5. **Meaning of avoided (in relation to CO₂e)**

For the purposes of this Order, CO₂e is *avoided* if demand for electricity generated by a generation facility that is not a small renewable energy generation facility falls because of the export of small renewable energy generation electricity.
6. **Methodology and factors for determining social cost of carbon**

For the purposes of section 40FBB(3)(c)(i) of the *Electricity Industry Act 2000*, the avoided social cost of carbon for the relevant financial year is the cost per kilowatt-hour of small renewable energy generation electricity purchased by a relevant licensee, determined in accordance with the following methodology and factors –

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

where –

 - Avoided social cost of carbon** is the cost per kilowatt-hour of small renewable energy generation electricity purchased by a relevant licensee, expressed in dollars;
 - Volume factor** is the volume of CO₂e that is avoided by each kilowatt-hour of small renewable energy generation electricity purchased by a relevant licensee, expressed in tonnes and calculated in accordance with the formula in clause 7; and
 - Price factor** is the value of a tonne of CO₂e for the relevant financial year, expressed in dollars and calculated in accordance with the formula in clause 8.

SPECIAL

7. Formula for calculating Volume factor

For the purposes of clause 6, the Volume factor must be calculated in accordance with the following formula –

$$\text{Volume factor} = \frac{\text{Coefficient factor} \times X}{1000}$$

where –

Volume factor is the volume of CO₂e that is avoided by each kilowatt-hour of small renewable energy generation electricity purchased by a relevant licensee, expressed in tonnes; and
X is 1 (representing 1 kilowatt-hour of electricity exported by a small renewable energy generation facility); and

Coefficient factor is 1.27 (reflecting that 1.27 kilograms of CO₂e are avoided by the export of every kilowatt-hour of small renewable energy generation electricity).

8. Formula for calculating Price factor

(1) For the purposes of clause 6, the Price factor must be calculated in accordance with the following formula –

$$\text{Price factor} = \left(\sum_{m=1}^q P_m \right) \div q$$

where there are *q* months within the relevant period and –

Price factor is the value of a tonne of CO₂e for the relevant financial year, expressed in dollars; and

P_m is the VEET average market spot price of one tonne of CO₂e for month *m* of the relevant period.

(2) For the purposes of subclause (1), the *VEET average market spot price* is, for a month specified in column 1 of the following Table, the corresponding amount specified in column 2 of the Table opposite that month.

Table

Column 1	Column 2
Month	VEET average market spot price
Jan 2012	\$ 33.51
Feb 2012	\$ 23.81
Mar 2012	\$ 22.09
Apr 2012	\$ 21.89
May 2012	\$ 23.71
Jun 2012	\$ 23.95
Jul 2012	\$ 21.32
Aug 2012	\$ 21.17
Sep 2012	\$ 22.55
Oct 2012	\$ 21.56
Nov 2012	\$ 20.00
Dec 2012	\$ 20.00

Column 1	Column 2
Month	VEET average market spot price
Jan 2013	\$ 19.85
Feb 2013	\$ 18.13
Mar 2013	\$ 17.19
Apr 2013	\$ 17.60
May 2013	\$ 17.10
Jun 2013	\$ 14.80
Jul 2013	\$ 13.88
Aug 2013	\$ 14.84
Sep 2013	\$ 13.65
Oct 2013	\$ 12.64
Nov 2013	\$ 15.25
Dec 2013	\$ 16.59
Jan 2014	\$ 16.21
Feb 2014	\$ 18.38
Mar 2014	\$ 19.70
Apr 2014	\$ 19.13
May 2014	\$ 18.41
Jun 2014	\$ 19.29
Jul 2014	\$ 17.40
Aug 2014	\$ 15.76
Sep 2014	\$ 14.48
Oct 2014	\$ 14.37
Nov 2014	\$ 17.25
Dec 2014	\$ 19.96
Jan 2015	\$ 18.36
Feb 2015	\$ 18.42
Mar 2015	\$ 18.76
Apr 2015	\$ 18.73
May 2015	\$ 18.90
Jun 2015	\$ 19.24
Jul 2015	\$ 20.69
Aug 2015	\$ 26.10
Sep 2015	\$ 32.73
Oct 2015	\$ 32.97
Nov 2015	\$ 27.20
Dec 2015	\$ 27.25

Appendix F – Order in council - avoided social cost of carbon

Essential Services Commission **Minimum electricity feed-in tariff to apply from 1 July 2022**

Column 1	Column 2
Month	VEET average market spot price
Jan 2016	\$ 24.76
Feb 2016	\$ 23.07
Mar 2016	\$ 22.51
Apr 2016	\$ 20.87
May 2016	\$ 18.84
Jun 2016	\$ 17.78
Jul 2016	\$ 16.62
Aug 2016	\$ 14.61
Sep 2016	\$ 14.37
Oct 2016	\$ 16.13
Nov 2016	\$ 15.80
Dec 2016	\$ 15.40

Dated 21 February 2017

Responsible Minister:

HON LILY D'AMBROSIO MP

Minister for Energy, Environment and Climate Change

MONICA BIRD

Acting Clerk of the Executive Council

Appendix G – List of stakeholders who have made submission

Confidential submissions are not listed

Submissions received via Engage Victoria (in alphabetical order)
Alan Tam
Andrew Martin
Anonymous (15 submissions)
Brian Golland
Brian Humphries
Charles Spicer
David Blum
Globird Energy
Gordon McMenemy
Ian Clusker
Jorge Rosales
Michael Brand
Rebecca Cheong
Robert Hughes (two submissions)
Simply Energy
Surendra Talasila
Theo Sougleris