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Essential Services Commission

Level 37, 2 Lonsdale Street, Melbourne 3000 Suburb VIC 3000

Dear ESC team

Re: Victorian Default Offer. Wholesale Cost & Risk Calculation.

The purpose of the VDO is offer a fair price to Victoria residential and small business customers. However, if the VDO price is set at a level that is unstainable for retailers, it will deliver exactly the opposite result.

Based on the Victoria Energy Market Report 2017-18 released by ESC in Feb 2019, less than 7% of customers are on standing offers and paying a "loyalty tax". The vast majority are with the big 3 retailers. On the other hand, over 42% of small customers are with retailers other than the big 3. And based on the same ESC report, all of the lower market offers are actually provided by small and medium sized retailers. In fact, there is a further 30% savings available compared to the best market offers from the big 3 retailers.

Setting the VDO price at an unattainably low level will first destroy the small and medium retailers, leaving all customers with no choice but to accept the higher market offers from the big 3, resulting in higher energy bills for over 42% of small customers.

When setting the VDO price, it is important to remember we are only a retailer. We buy energy on the wholesale market, hedge risk, add a small margin, and arrive at our own retail price. Until the VDO, if wholesale prices go up, we could change our retail price accordingly. The VDO changes all this. It forces us to sell at a price not set by us. GloBird Energy would be happy to sell power at a price deemed fair by the government, so long as the wholesale cost is also set by the government accordingly.

The approach taken with the VDO so far is to lock the retailer price and leave wholesale costs unregulated. This is a serious worry, so it is essential that the VDO price is calculated based on actual Wholesale Energy Cost. The draft release raises grave concerns, because it shows that this has not been done appropriately. The cost of wholesale and risk management have been grossly underestimated by at least 15%.

The model developed by Frontier is academic and theoretical in nature. It does not stand up to real world scrutiny and is not supported by industry. It's easy to work out a perfect theoretical cost model using computer simulations and assume the future with follow exactly as planned. In reality, a retailer can't know with absolute certainty what will happen in the future. Instead we must allow for the kind of expected variances that come when forecasting future events and manage wholesale risk based on creditable stress test events.

Further, in the wholesale energy market, price & demand are not a flat line across the year, the customer peak demand and price risk are significantly higher in summer than other periods of the year. So, we need to use quarterly based load profiles and quarterly based prices to reflect the seasonal nature of energy. The Frontier Economics model uses a simple average price for all quarters, and an annualized load profile across the whole year. As a result, it ignores the significant load profile and cost differences in summer.

The model uses a very simplistic approach to quantify risk. In reality, we have to work out the risk of being exposed to spot market volatility (before it occurs). To do this, we look at historical market events to calculate a credible worst-case scenario in the future, for example the CPT event we had in January is something we must protect against. We then estimate our customer load, we do so knowing the estimate will not actually match exactly actual load. There will always be a variance. Frontier's model does not do this.

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The other factor to consider is that customer's actual demand changes throughout the day, as does the spot price. However, hedging is done at set levels, essentially a straight line across the whole day. This means costs are incurred when actual demand is higher (or lower) than the hedged demand. For example, when actual demand is lower than hedged demand a retailer must sell the excess energy back to the grid, receiving the spot price. If demand is low at that time of day, it follows logically that the spot price will also be low. This "Variance Cost" is not covered in the Strike model developed by Frontier Economics.

The draft release prompted us to compare the difference between the Frontier WEC and the actual WEC. There is a marked difference. When putting together an alternative model, we allowed for the way an actual retailer hedges risk. Importantly, our model considers:

1. The seasonal nature of electricity including summer, and how this effects price.
2. The kind of hedging products that are liquid and available.
3. The fact that forecast demand is an estimate, and we don't know actual demand until after the fact.
4. The cost when actual load and the hedged load differ.
5. The costs of transactions, for example brokerage and funding prudential requirements.
6. The important difference between Fin year and Cal year futures.

Each factor above has been fed into a simple equation. This is explained in more detail in our WEC model submission. If these costs are ignored or underestimated, then the VDO will be set too low. The result is catastrophic, especially for small retailers like us who are already delivery the most completive prices to consumers.

The VDO is singly the most significant piece of regulation that has ever been introduced into the energy market. The consequences of setting the VDO based on an unrealistically low Wholesale Energy Cost are very serious. More care must be paid to this component.

The model we have developed is open to scrutiny, verifiable, and transparent. It has growing industry support, and importantly, it better reflects the real WEC.

John McCluskey / Executive Manager
[redacted]

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3rd April 2019

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

Re- Submission to Victorian Default Offer – draft advice

GloBird Energy would like to propose an alternative Wholesale Energy Cost model to the *STRIKE* model used in the draft Victorian Default Offer.

As stated in the Draft advice, **"**the purpose of the VDO is to provide customers with universal access to a 'fair' price". In our understanding, a fair price is only sustainable if it has closely reflected the actual cost a retailer would have incurred in servicing the customer. While GloBird agrees with the principles and the futures product based approach set out in the draft advice when estimating the "**W**holesale **E**lectricity **C**ost", we are concerned that **the Strike model developed by Frontier Economics has a number of issues, the key issue being that it underestimates the wholesale risk a retailer faces and it underestimates the cost required to manage the risk, in detail:**

1) The model **lacks transparency**, as details are hidden in intellectual property, and the results cannot be independently verified by a third party.
2) The model is curve fitted and optimized from hindsight based on Monte Carlo simulations using retro-prospective data. It is, therefore, unrealistic, unpredictable and impractical.
3) The model uses standard deviations to measure risk and gives no consideration to credible stress testing events for the electricity wholesale market, for example, the CPT event in the wholesale electricity market which happened in Jan 2019. This deviation-based approach is inappropriate and dangerous, which has been highlighted by the collapse of Long Term Capital Management and Lehman Brothers.
4) Instead of using a quarterly based load profile and quarterly based price, the model uses a simple average price of all quarters and an annualized load profile across the whole year, missing the significant customer load profile and cost differences in summer.
5) The model uses minimal sample data, significantly underestimates the actual load shape dynamics in summer when the weather is at its most extreme.
6) The model uses a simple averaged futures price for a selected period, while in reality, it's difficult to achieve this when wholesale forward trading. Some buffer reflecting the bid-offer spread should be added into the average futures settlement pricing.

We strongly believe that the WEC should be based on standard industry practise that a prudent retailer could adopt, be transparent, repeatable, mechanic, practical to execute and third party

verifiable. More importantly, is forward looking, tradable and not optimized or curve fitted based on retro-prospective test results, in principle:

1) The hedge strategy should be based on the most commonly available futures contract, to avoid liquidity issues
2) The model should be based on the way a prudent retailer hedges its customer demand (both energy and capacity) **in full** via the futures market, so it is **NOT** heavily exposed to spot market volatility, and can satisfy most creditable stress test events.
3) In the energy retail market, the cost and customer load profile vary significantly between seasons. In line with the futures contract time period and the seasonality, the hedge portfolio should be estimated and adjusted on a quarterly basis

We propose an alternative model based on mainstream industry hedging practise, and mainstream products available, in detail:

1. The average customer demand is hedged using the base swap and potentially peak swap contracts, let's call it **Energy Hedging**. Due to market liquidity issues, we would only use Base Swap contracts for the purpose of this model.
2. The customer demand above the average demand and up to the maximum demand is hedged using the standard $300 Cap contracts, let's call it **Capacity Hedging.** However, it is important to remember that 'if it happened in the past, it will likely happen again'. Therefore, a prudent retailer should always have a **Capacity Hedge** based on its **highest historical demand.**
3. All customer demand is hedged quarterly using quarterly products based on forecasted demand and load profile for the quarter.
4. A number of input costs, including hedging and funding cost, should be fully included in the model [because they are directly linked to the customer's actual usage].
5. Some additional budget should be allocated to forecast, or execution variance compared to the theoretical perfect result. These include an actual achievable hedging price reflecting the bid/offer spread compared to the futures settlement price, and the difference in actual demand compared with the forecast demand. Keeping in mind that it is unlikely that the real result (without the benefit of hindsight) and a theoretical best-case result would ever be the same.

The actual Wholesale Energy Cost based on the hedging strategy model proposed, is the sum of the following:

1. The **Energy Hedging Cost** for the average demand
2. The **Capacity Hedging Cost** for the remaining demand up to the Maximum demand
3. The **Load Shape Variance Cost** due to the actual demand and price difference compared to the hedged volume and price. The futures contract is based on a flat demand shape across

the whole contract period. However, the customer's actual energy usage changes every trading period and is never a flat line. Therefore, even with Energy Hedging and Capacity Hedging in place, the retailer is still exposed to market pricing and customer demand uncertainty, which increases the retailer's actual cost, let's call this **Load Shape Variance Cost**. Based on historical testing done using VIC MRIM data since 2015 and the actual AEMO settlement price, this cost is about **20%** in addition to the average spot price.

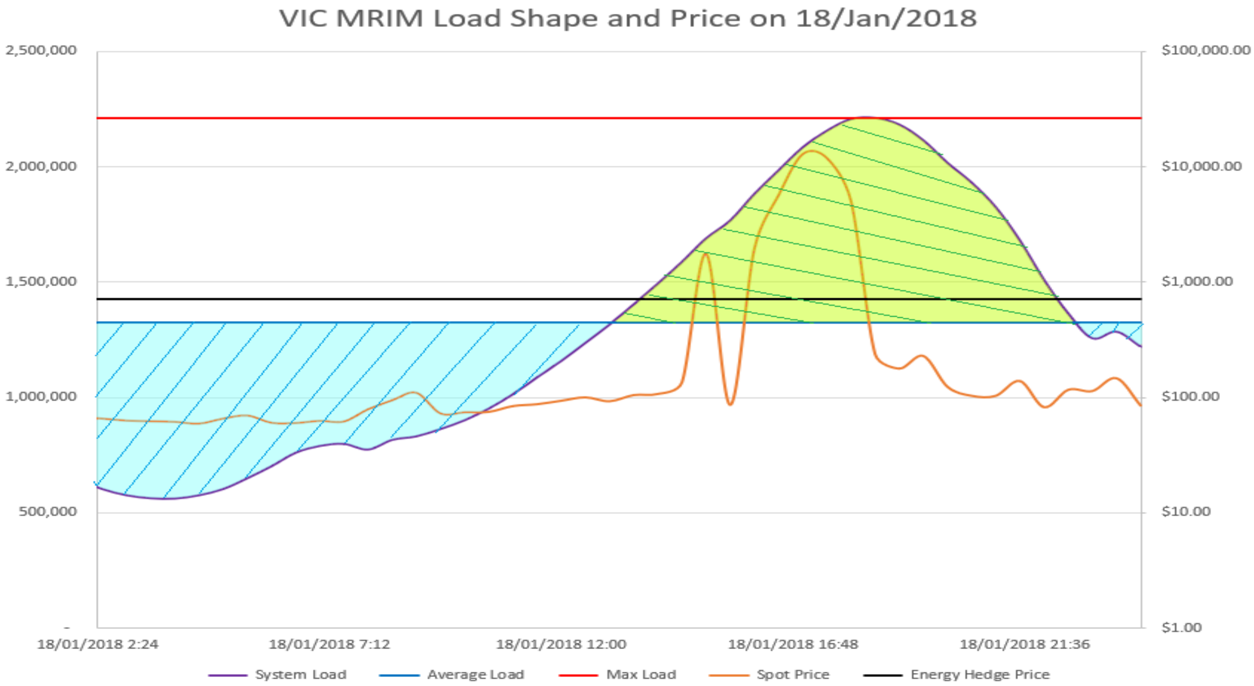

Figure 1 – 18 Jan 2018 VIC MRIM Load Shape and Spot Price

Figure 1 above shows the actual price and total VIC MRIM load on the 18th of Jan 2018. Assume the retailer has hedged its average demand using Base Swap contracts in advance, and also hedged the remaining demand up to the maximum demand using $300 Cap contracts. The retailer still incurs additional costs due to the usage difference between its actual load and the hedged load, and the price difference between the **Energy Hedging** price and the actual spot price, up to the capped price of $300/MWh.

The **Load Shape Variance Cost** consists of two components:

a. **Over Contracted Energy Cost:** As illustrated in Figure 1 in the lower // striped blue shaded area, it occurs when the actual demand is lower than the hedged energy demand, when this happens, a retailer must sell the excess energy back to the grid, receiving the spot price, but still paying the locked in **Energy Hedging** price. Below is the formula:

   As confirmed by Frontier Economics, the futures price often has a premium built in compared to the actual spot price. Therefore, when selling the excess energy into the grid, it makes sense that instead of using the average Spot Price as the purchase cost, it should use the Base Swap Contract price in the hedging portfolio, which is the average Spot Price plus the Futures Premium.

$$Over\ Contracted\ Energy\ Cost = \sum(Acutal\ Demand - Average\ Demand) * (AveragePrice + Futures\ Premium - Spot\ Price)$$

b. **Under Contracted Energy Cost**: As illustrated in Figure 1 in the upper \\ striped green shaded area, this occurs when the actual demand is higher than the hedged energy demand, the retailer has to buy from the grid for any shortfalls in energy compared to its hedge contract, pay the spot price, but with **Capacity Hedging** in place, the highest spot price a retailer would pay is capped at $300/MWh. Below is the formula:

$$Under\ Contracted\ Energy\ Cost = \sum(Acutal\ Demand - Average\ Demand) * Min(SpotPrice, 300)$$

Load Shape Variance Cost is the sum of the two cost items above:

$$Load\ Shape\ Variance\ Cost = Over\ Contracted\ Energy\ Cost + Under\ Contracted\ Energy\ Cost$$

4. In addition to the Load Shape Variance Cost, a retailer incurs additional costs when their actual average demand and actual max demand is different from forecast, resulting in a higher actual Load **Shape Variance Cost**
5. Apart from the Energy Cost, there are some **Wholesale Funding & Trading Cost** that is directly associated with wholesale hedging and wholesale trading, which include:
   a. AEMO prudential requirements funding cost. It's common to use reallocation contracts to satisfy AEMO's wholesale prudential requirements, the market price for the reallocation contract is between $1.40/MWh and $1.80/MWh, let's assume the average cost is $1.60/MWh
   b. The brokage fees for Futures Market which include costs for Energy Hedging and Capacity Hedging is approximately $0.18/MWh, but this cost applies to both Energy Hedging and Cap hedging. We assume this to be approximately $0.45/MWh
   c. The funding cost on the futures contract margin, based on 5% funding cost on the 11% credit support required in margin for the futures contract, again, this applies to both Energy Hedging and Cap Hedging, with the combined price of about $100/MWh, this costs a retailer approximately $0.55/MWh

6. And finally, when calculating the Energy Hedging and Capacity Hedging Cost, instead of using the simple average futures price for a selected period, we recommend using the average price plus one standard deviation. This is because no retailer can transact every

single trade in the market, therefore, from an execution point of view, it's impossible for any retailer to actually achieve the average price, the Average Price plus one standard deviation, which covers about 68% of the market, would be more appropriate.

In our proposed model, apart from the futures contract pricing and its standard deviation, a number of key parameters can be worked out using historical VIC MIRM data and the AEMO half hourly settlement price:

1) The **Energy Hedging** and **Capacity Hedging** volume can be calculated based on the historical Max Demand and Average Demand. For the Max demand, we suggest using the historical maximum value across all years is more appropriate.

2) **Load Shape Variance Cost** cannot be accurately estimated, however, assume the cost follows a similar previous pattern, with the cost moving up and down in the same ratio against historical quarters, we can calculate a benchmark (ratio) using historical load and spot price data, and apply the same ratio to future quarters. For instance, calculate the Load Shape Variance cost difference against the average spot price of each Q1 in previous years, the average ratio of all Q1s can be used as the benchmark to calculate the cost movement for the next Q1.

   In detail, based on the historical VIC MRIM data, for each quarter, calculate the **Load Shape Variance Cost** for each quarter, then divide the cost by the total energy consumption for the quarter, the result is a dollar per MWh price, being '**Load Shape Variance Price**', as defined in the formula below:

$$Load\ Shape\ Variance\ Price = \frac{Load\ Shape\ Variance\ Cost}{Total\ Load}$$

   Finally, if we divide the '**Load Shape Variance Price'** by the '**Average Spot Price**' in the quarter, we have a percentile value to indicate the actual cost variance compared to average spot price that a retailer incurs for its actual load shape against its average demand, let's call it **Load Shape Variance Cost Ratio**, in detail:

$$Load\ Shape\ Variance\ Cost\ Ratio = \frac{Load\ Shape\ Variance\ Price}{Average\ Price}$$

   The average values of the **Load Shape Variance Cost Ratio** for the same quarter in previous years can be used to calculate the '**Load Shape Variance Cost**', defined in the formula below:

$$Load\ Shape\ Variance\ Cost = Spot\ Price * \frac{\sum Historical\ Load\ Shape\ Vairance\ Ratio}{Number\ of\ Quarters\ in\ History\ data}$$

Therefore, we have the following formulas for calculating the WEC based on the model:

$$\begin{aligned}\boldsymbol{Wholesale\ Energy\ Cost} \\ &= Energy\ Hedge\ Cost + Capacity\ Hedge\ Cost + Load\ Shape\ Variance\ Cost \\ &+ Wholesale\ Trading\ and\ Funding\ Cost\end{aligned}$$

$$\begin{aligned}\boldsymbol{Wholesale\ Energy\ Cost\ Price} \\ &= Base\ Swap\ Price\ + \left(\frac{Max\ Demand}{Average\ Demand} - 1.0\right) * Cap\ Price \\ &+ Load\ Shape\ Variance\ Ratio * Spot\ Price + Wholesale\ Trading\ and\ Funding\ Cost\end{aligned}$$

Where:

$$Spot\ Price = Average\ Base\ Swap\ Price - Futures\ Premium$$

$$Base\ Swap\ Price = Average\ Base\ Swap\ Price + 1.0 * Base\ Swap\ Price\ Standard\ Deviation$$

$$Cap\ Price = Average\ Cap\ Price + 1.0 * Cap\ Price\ Standard\ Deviation$$

And the WEC for the year = the average of all quarters in the whole period

Calculating the FY19/20 WEC using our Model:

Using the formula above, and the same futures contract price, and the same futures premium (5%) as used in the draft VDO, assume one standard deviation is about 2.0% of the average price, our model shows the WEC for FY19/20 should be **$115.01**/MWh.

Below are the historical parameters based on the VIC MIRM data between Jan 2015 and Mar 2018:

Quarter	Max Demand VS Average Demand	Load Shape Variance Cost Ratio
1	3.05	20.19%
2	1.94	20.51%
3	1.79	17.68%
4	2.78	18.86%

Below is the calculation of the WEC for each quarter and the whole year for FY19/20.

Quarter	Base SWAP Price ($/MWh)	Peak SWAP Price ($/MWh)	Cap Price ($/MWh)	Futures Premium	Futures Price Standard Deviation (% Price)	Load Shape Cost Variance Ratio	Max Demand / Average Demand	Load Shape Variance Cost ($/MWh)	Wholesale Trading and Funding Cost ($/MWh)	WEC
1	$94.66	$131.04	$24.57	5%	2.0%	20.19%	3.05	$18.16	$2.60	$168.72
2	$71.62	$95.04	$4.62	5%	2.0%	20.51%	1.94	$13.95	$2.60	$94.04
3	$79.46	$94.05	$3.62	5%	2.0%	17.68%	1.79	$13.35	$2.60	$99.92
4	$69.96	$86.62	$5.99	5%	2.0%	18.86%	2.78	$12.53	$2.60	$97.37
Annual										**$115.01**

Further Issues to discuss:

Future Price - FY19 or Cal19

Most retailers in Victoria would have priced their customers at the beginning of 2019 for the whole calendar year, based on the futures price up to the end of 2018. Due to the seasonality of the electricity retail business, the wholesale cost for Q1 is always the highest across the year and a retailer would most likely lose money in summer 2019 with the expectation of recouping those losses in the remainder of the year. If the VDO price is based on the FY19/20 futures price, which is lower than the Cal19 price, a retailer would have to write off its losses in Q119, which would be very significant.

Solar Minimum FIT Wholesale Cost to Retailers

Similar to the Load Shape Variance Cost, a retailer will suffer financial gain/loss when selling back solar generation to the grid at the spot price, while paying the customer a fixed price. In addition, more roof top solar panels will reduce the average demand, this will increase the difference between Max demand compared to Average Demand, increase the cost on cap protections against the average demand, result in a higher risk management cost ratio against the retail revenue.

With increasing roof top solar panel installations and more renewable power generation plants being developed, this will become a significant cost for all retailers. Further analysis is required to estimate the actual cost of Solar Minimum FIT to the retailer and include the cost in the WEC.

Increased cost due to the Demand Forecast Variance

The model and formula assume perfect forecast and hedging of the average demand and max demand, which is impossible to achieve by any retailer. Having said that, we understand that it is hard to estimate the actual cost because the accuracy of the forecast is determined by each retailer’s capability to forecast. Regardless this should be contemplated when working out WEC.

Increase in wholesale cost and other cost

The VDO price will be available to any customers who requests it and the price is pre-set by the regulator in advance. If the wholesale market or other unforeseeable underlying cost rallies, the retailer will suffer financial losses for any new and the existing customers on VDO A protection mechanism should be implemented which will trigger an urgent VDO re-price when the underling wholesale cost increases by over a pre-defined threshold.

Recommendations:

GloBird recommends using its model as it closely tracks the actual hedging practice a retailer currently implements to cover real risk. The result is closer to the actual wholesale energy cost a retailer faces and the result can be easily verified by any third parties based on publicly available data. This reduces the uncertainly and technical difficulties in future years when setting the WEC in VDO.

To ensure the data is not skewed to the lower side by a few years of mild weather, GloBird also recommends using the VIC MIRM data from Jan 2015[#] up to latest available quarter when calculating the historical Maximum Demand, Average Demand and the Load Shape Variance cost. The WEC result using all VIC MIRM data since Jan 2015 is **$115.01/MWh**[*], which is approximately 15% higher than the WEC in the draft Victoria Default Offer advice, about **$60** increase in wholesale energy cost for a typical residential house consuming 4000KWh of electricity per year. The details of the calculation can be found in **Appendix 1**.

In addition, as we can see from Frontier Economics' Strike model result, the WEC difference between different network distributors is minimum, for the sake of simplicity and transparency, GloBird suggest adopting one single WEC across Victoria, apart from the different loss factors.

Further, GloBird recommends that intensive analysis should be conducted to identify the true cost of Solar FIT to retailers and include this cost in the WEC calculation.

And finally, GloBird recommend that the regulator review the VDO price on a quarterly basis and have it adjusted if the cost has gone up by a certain threshold compared to when it was set.

**: Assume 5% Futures Premium applied to the historical average spot price and 2% Standard Deviation on Futures Price*

#: Later years more appropriate due to the energy generation mix changes.

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Appendix 1:

Vic MIRM Data & AEMO Pool Pricing Stats – Jan 2015 to March 2018,

*Assume 5% Futures Premium when calculating the **Over Contracted Energy Cost***

Year	Quarter	Average Price	Load Weighted Price	Max Demand / Average Demand	Average Load	Load Variance Cost Price Ratio
2015	1	$26.60	$28.50	2.38	718,766	18.15%
2016	1	$42.93	$55.29	2.79	736,885	21.52%
2017	1	$79.34	$87.68	2.57	818,212	22.15%
2018	1	$102.45	$136.24	3.05	818,881	18.94%
			Max.	**3.05**	**Average:**	**20.19%**
2015	2	$31.04	$33.26	1.87	854,377	18.76%
2016	2	$64.17	$74.27	1.94	832,032	28.42%
2017	2	$104.91	$107.62	1.81	941,485	14.35%
			Max.	**1.94**	**Average:**	**20.51%**
2015	3	$38.04	$39.99	1.79	929,631	15.99%
2016	3	$49.73	$54.73	1.76	956,349	20.74%
2017	3	$100.03	$105.54	1.72	1,044,039	16.33%
			Max.	**1.79**	**Average:**	**17.68%**
2015	4	$39.57	$44.70	2.78	711,388	23.22%
2016	4	$33.02	$35.15	2.43	774,956	16.73%
2017	4	$84.44	$89.42	2.58	785,562	16.62%
			Max.	**2.78**	**Average:**	**18.86%**

WEC Price should be $115.01/MWh, if use VIC MRIN data from Jan 2015 to March 2018

Assume: 5% Futures Premium and 2% as Futures Price Standard Deviation

Quarter	Base SWAP Price ($/MWh)	Peak SWAP Price ($/MWh)	Cap Price ($/MWh)	Futures Premium	Futures Price Standard Deviation (% Price)	Load Shape Cost Variance Ratio	Max Demand / Average Demand	Load Shape Variance Cost ($/MWh)	Wholesale Trading and Funding Cost ($/MWh)	WEC
1	$94.66	$131.04	$24.57	5%	2.0%	20.19%	3.05	$18.16	$2.60	$168.72
2	$71.62	$95.04	$4.62	5%	2.0%	20.51%	1.94	$13.95	$2.60	$94.04
3	$79.46	$94.05	$3.62	5%	2.0%	17.68%	1.79	$13.35	$2.60	$99.92
4	$69.96	$86.62	$5.99	5%	2.0%	18.86%	2.78	$12.53	$2.60	$97.37
Annual										**$115.01**

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Appendix 2:

Actual Victoria System Load and Wholesale Spot Price during the Heatwave in Jan 2019

Actual example – 24 Jan 2019