2020 Energy price limits decision

August 2020

Economic Regulation Authority

WESTERN AUSTRALIA

D218272

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1. Decision

Pursuant to clause 2.26 of the Wholesale Electricity Market Rules, the Economic Regulation Authority approves:

- The proposed revised value for the Maximum Short Term Energy (STEM) Price of $267.14/MWh.
- The proposed price components for the Alternative Maximum STEM Price of:

  $145.28/MWh + 19.808 multiplied by the net ex-terminal distillate fuel cost in $/GJ.[1]

As stipulated by clause 6.20.11 of the Market Rules, these changes will apply once the Australian Energy Market Operator (AEMO) has posted a notice on the market website:

> A proposed revised value for any energy price limit replaces the previous value after:
>
> (a) the Economic Regulation Authority has approved that value in accordance with clause 2.26; and
>
> (b) AEMO has posted a notice on the market web site of the new value of the applicable energy price limit,
>
> with effect from the time specified in AEMO's notice.[2]

[1] Net ex-terminal price represents the wholesale price for distillate in Perth, Western Australia after deduction of fuel excise rebate and excluding GST. This price does not include road freight costs.

[2] Wholesale Electricity Market Rules (WA), 21 July 2020, Clause 6.20.11.

2. Background

In the Wholesale Electricity Market (WEM), participants offer energy and ancillary services to meet real-time demand for energy. Offers into the energy markets (STEM and balancing market) are based on the cost of supply and are subject to a set of price limits to mitigate the exercise of market power.[3] These price limits are set based on the short run marginal cost of the highest cost generating works in the South West Interconnected System (SWIS).[4] The energy price limits comprise:

- The Maximum STEM Price: this applies to the generation of electricity from all facilities except those using distillate as the fuel source.[5,6]
- The Alternative Maximum STEM Price: this applies to generators that use distillate as a fuel source, which typically have a higher cost of supply than generators that use fuel sources other than distillate.[7]
- The Minimum STEM Price: this is fixed by the Market Rules at negative $1,000/MWh and is not part of this review.[8]

Using the method described in the Market Rules, AEMO annually reviews the energy price limits and may propose revised values for the Maximum STEM Price and the Alternative Maximum STEM Price.[9]

The Market Rules require revised values to be based on AEMO's estimate of the short run marginal cost of the highest cost generating works in the SWIS according to the following formula:

$$Dispatch\ Cost = (1 + Risk\ Margin) \times \frac{Variable\ O\&M + (Heat\ Rate \times Fuel\ Cost)}{Loss\ Factor} \quad \text{(Eq. 1)}$$

where,

$Risk\ Margin$ is a measure of uncertainty in the assessment of the mean short run average cost of a 40 MW open cycle gas turbine generating station, expressed as a fraction.[10]

$Variable\ O\&M$ is the mean variable operating and maintenance (O&M) cost for a 40 MW open cycle turbine generating station, expressed in $/MWh, and includes, but is not limited to, start-up related costs.[11]

3 Other market power mitigation mechanisms in the WEM include mandatory provision of capacity in the energy markets and ex post market monitoring.

4 Short run marginal cost is the additional cost of producing one more unit of output from an existing generation plant. In the context of this paper, SRMC refers to the increase in the total production cost arising from the production of one extra unit of electricity and is measured in $/MWh.

5 Wholesale Electricity Market Rules (WA), 21 July 2020, Chapter 11, 'Maximum STEM Price'.

6 Ibid, Clause 6.20.1.

7 Ibid, Chapter 11, 'Alternative Maximum STEM Price'.

8 Ibid, Chapter 11, 'Minimum STEM Price'.

9 Ibid, Clause 6.20.6.

10 Ibid, Clause 6.20.7(b)(i).

11 Ibid, Clause 6.20.7(b)(ii).

$Heat\ Rate$ is the mean heat rate at minimum capacity for a 40 MW open cycle gas turbine generating station, expressed in $/GJ.[12]

$Fuel\ Cost$ is the average unit fixed and variable fuel cost of a 40 MW open cycle gas turbine generating station, expressed in $/GJ.[13]

$Loss\ Factor$ is the marginal loss factor of a 40 MW open cycle gas turbine generating station relative to the reference node.[14]

The Market Rules stipulate that:

> In conducting the review required by clause 6.20.6, AEMO must prepare a draft report describing how it arrived at a proposed revised value of an Energy Price Limit. The draft report must also include details of how AEMO determined the appropriate values to apply for the factors described in clause 6.20.7(b)(i) to (v). AEMO must publish the draft report on the Market Web Site and advertise the report in newspapers widely published in Western Australia and request submissions from all sectors of the Western Australia energy industry, including end-users, within six weeks of the date of the publication.[15]
>
> After considering the submissions on the draft report described in clause 6.20.9, and any submissions received under clause 6.20.9A, AEMO must propose a final revised value for any proposed change to an Energy Price Limit and submit those values and its final report, including any submissions received, to the Economic Regulation Authority for approval.[16]
>
> Where AEMO has proposed a revised value for the Benchmark Reserve Capacity Price in accordance with section 4.16 or a change in the value of one or more Energy Price Limits in accordance with section 6.20, the Economic Regulation Authority must:
>
> a) review the report provided by AEMO, including all submissions received by AEMO in preparation of the report;
>
> b) make a decision as to whether or not to approve the revised value for the Benchmark Reserve Capacity Price or any value comprising the Energy Price Limits;
>
> c) in making its decision, only consider:
>
> i. whether the proposed revised value for the Benchmark Reserve Capacity Price or Energy Price Limit proposed by AEMO reasonably reflects the application of the method and guiding principles described in clauses 4.16 or 6.20 (as applicable);
>
> ii. whether AEMO has carried out an adequate public consultation process; and
>
> d) notify AEMO as to whether or not it has approved the revised value.[17]

12 Ibid, Clause 6.20.7(b)(iii).

13 Ibid, Clause 6.20.7(b)(iv).

14 Ibid, Clause 6.20.7(b)(v).

15 Ibid, Clause 6.20.9.

16 Ibid, Clause 6.20.10.

17 Ibid, Clause 2.26.1.

3. AEMO's process and results

AEMO engaged Marsden Jacob Associates to conduct analysis and modelling for the 2020 review of energy price limits. Marsden Jacob took the following approach:

1. Identify candidate generators that fulfil the criteria for "the highest cost generating works in the SWIS" as required by clause 6.20.7 of the Market Rules.[18]

2. Obtain data on input variables such as average variable O&M cost, fuel cost, heat rate and loss factor for each of the candidate generators.

3. Undertake Monte Carlo modelling simulations to develop a probability distribution of the candidate generators' average variable cost distribution.[19]

4. Calculate the Maximum STEM Price and Alternative Maximum STEM Price for the candidate generators by selecting the 80th percentile of the probability distribution. The difference between the mean and the 80th percentile accounts for the risk margin.

5. Compare the energy price limits calculated in this review to those calculated in the previous review.

Marsden Jacob prepared the draft report on the energy price limits determination on behalf of AEMO.[20] On 9 April 2020, AEMO released this draft report for a six-week public consultation. The ERA Secretariat raised concerns that the distillate price used in the calculation of the energy price limits had fallen significantly since the report was prepared in March 2020 as a result of COVID-19. Following this feedback, AEMO published a revised draft report on 21 May 2020 and extended the public consultation period by three weeks to 12 June 2020.[21] AEMO received three submissions from Alinta Energy, the Australian Energy Council and Synergy.[22,23,24] All three stakeholders opposed the use of spot prices from gasTrading Australia to forecast the gas commodity price and recommended that average natural gas prices published by the Department of Mines, Industry Regulation and Safety (DMIRS) be adopted instead.

On 21 July 2020, AEMO provided the ERA with its final proposed values for the energy price limits and recommended that the proposed energy price limits take effect from 1 September 2020.[25]

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18 The highest cost generator must be 40 MW open cycle gas turbine generator. Wholesale Electricity Market Rules (WA), 21 July 2020, Clause 6.20.7(a)(i).

19 Monte Carlo simulations are used to model the probability of different outcomes and understand the effect of uncertainty in forecasting models. Monte Carlo simulation models possible outcomes by randomly drawing samples from a probability distribution for input variables with inherent uncertainty. It calculates a probability distribution for results over many sampling iterations.

20 AEMO, 9 April 2020, *2020-21 Energy Price Limits Review Draft Report (V1)*. Report prepared by Marsden Jacob Associates, (online).

21 AEMO, 21 May 2020, *2020-21 Energy Price Limits Review – Revised Draft Report (V2)*. Report prepared by Marsden Jacob Associates, (online).

22 Alinta Energy, 2020, *2020 Energy Price Limits Review*, (online).

23 Australian Energy Council, 2020, *2020 Energy Price Limits Review*, (online).

24 Synergy, 2020, *2020 Energy Price Limits Review*, (online).

25 AEMO, 21 July 2020, *2020-21 Energy Price Limits Review – Final Report*. Report prepared by Marsden Jacob Associates, (online).

3.1 Maximum STEM Price

The Maximum STEM Price is to be based on AEMO's estimate of the short run marginal cost of the highest cost generating works in the SWIS fuelled by natural gas.[26] Table 1 shows the existing and proposed Maximum STEM Price.

Table 1: Existing and proposed Maximum STEM Price

Effective date	Maximum STEM Price ($/MWh)
1 July 2019 (approved)	234.57
1 September 2020 (proposed)	267.14
Variance	32.57

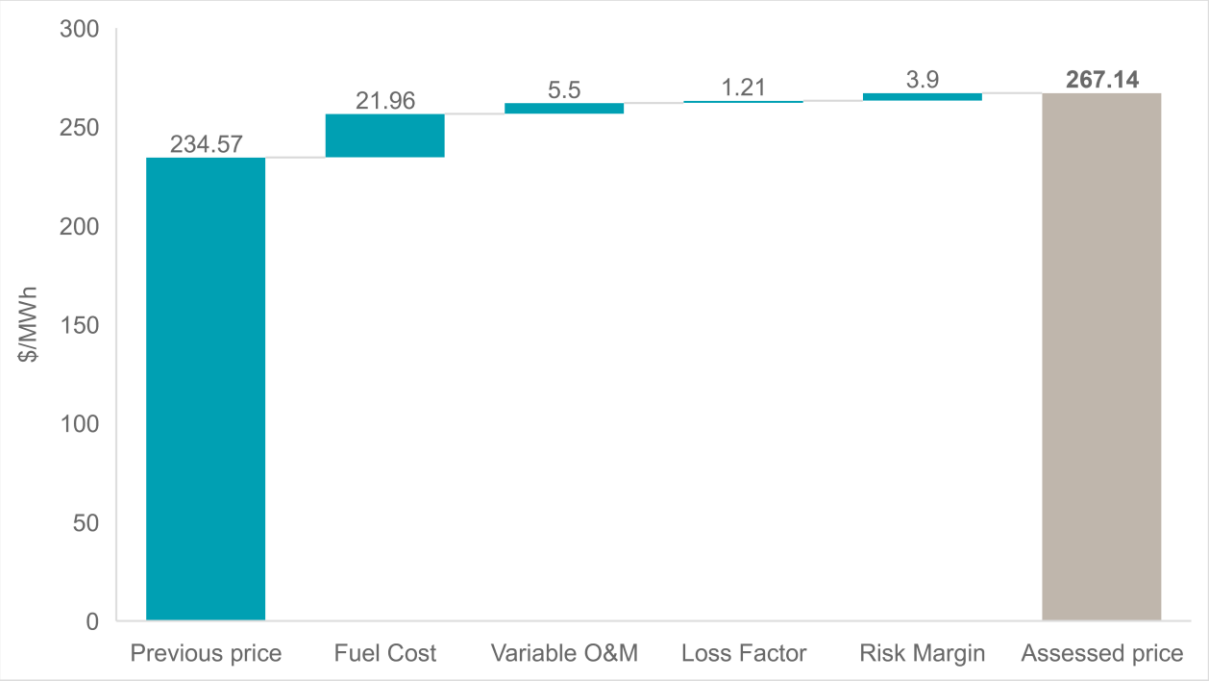
The factors contributing to the change in the proposed Maximum STEM Price compared to the previous year's review are summarised below and explained in more detail in section 4:

- A higher average fuel cost ($21.96/MWh higher in 2020/21). Following feedback from stakeholders, AEMO changed the input source for calculating fuel cost. Marsden Jacob forecast the average delivered cost of gas to be $7.03/GJ for 2020/21, compared to their forecast of $5.45/GJ for 2019/20. This is explained in more detail in section 4.6.
- An increase in the variable O&M costs ($5.50/MWh higher in 2020/21) because of a higher variable O&M cost per start. The calculations of the mean variable O&M cost for the Pinjar units have been highly variable in past years. To a large extent, this has occurred due to changes in the underlying modelling rather than reflecting changes to the actual costs of maintaining the Pinjar units. This is explained in more detail in section 4.4.
- An increase in the risk margin ($3.90/MWh higher in 2020/21) due to a greater variation in the distribution of Maximum STEM Price input components. This is explained in more detail in section 4.8.
- A marginal decline in the loss factor ($0.01/MWh lower in 2020/21). This is explained in more detail in section 4.7.

Figure 1 shows the effect of these contributing factors on the proposed Maximum STEM Price compared to the previous year.

[26] Wholesale Electricity Market Rules (WA), 21 July 2020, Clause 6.20.7(a)(i).

Figure 1: Factors contributing to the change in the proposed Maximum STEM Price compared to 2019/20



Source: Marsden Jacob analysis, 2020.[27]

3.2 Alternative Maximum STEM Price

The Alternative Maximum STEM Price is based on AEMO's estimate of the short run marginal cost of the highest cost generating works in the SWIS fuelled by distillate.[28] AEMO calculates the Alternative Maximum STEM Price each month using a linear equation and a monthly forecast of the distillate price:

$$Alternative\ Maximum\ STEM\ Price = (Fuel\ Coefficient \times Distillate\ Price) + Non\ Fuel\ Coefficient \quad (\text{Eq. } 2)$$

The Alternative Maximum STEM Price varies each month based on the price of distillate derived from Perth Diesel Terminal Gate Prices. The other two components of the equation – the fuel and the non-fuel coefficients – are updated in AEMO's annual review of energy price limits.

The Alternative Maximum STEM Price is calculated monthly using:

- The fuel coefficient, which is multiplied by the distillate fuel price to estimate the contribution of distillate price to the Alternative Maximum STEM Price.
- The non-fuel coefficient, which captures the contribution of variable O&M costs and fuel transport costs.

Separating the components that depend on fuel cost from those that do not is intended to limit possible distortions from fluctuations of the distillate price.

[27] AEMO, 21 July 2020, *2020-21 Energy Price Limits Review – Final Report*. Report prepared by Marsden Jacob Associates, p. 13, (online).

[28] Wholesale Electricity Market Rules (WA), 21 July 2020, clause 6.20.7(a)(ii).

In the annual review of energy price limits, AEMO proposes revised values of the two coefficients used to calculate the Alternative Maximum STEM Price each month (refer to Table 2). Once the ERA has approved the revised coefficients, AEMO will input the distillate price into Equation 2 every month to derive the Alternative Maximum STEM Price.

Table 2: Existing and proposed coefficients of the Alternative Maximum STEM Price

Effective date	Non-fuel coefficient ($/MWh)	Fuel coefficient
1 July 2019 (approved)	120.72	21.230
1 September 2020 (proposed)	145.28	19.808
Variance	24.56	(1.422)

Using the proposed components in Table 2 and a projected distillate price of $12.02/GJ (46.40 cents/litre), Marsden Jacob estimated an Alternative Maximum STEM Price of $383/MWh. This was much lower than the Alternative Maximum STEM Price of $567/MWh, estimated in June 2019 for the 2019/2020 energy price limit review.

The factors contributing to the change in the proposed components of the Alternative Maximum STEM Price are summarised below and explained in more detail in Section 4:

- A significant decline in fuel cost ($201.69/MWh lower in 2020/21). Crude oil prices declined by 35 per cent because of the COVID-19 pandemic, which lowered the distillate fuel price forecast.
- An increase in variable O&M costs ($5.50/MWh higher in 2020/21).
- An increase in the risk margin ($1.98/MWh higher in 2020/21).
- A marginal decline in the loss factor ($0.01/MWh in 2020/21).

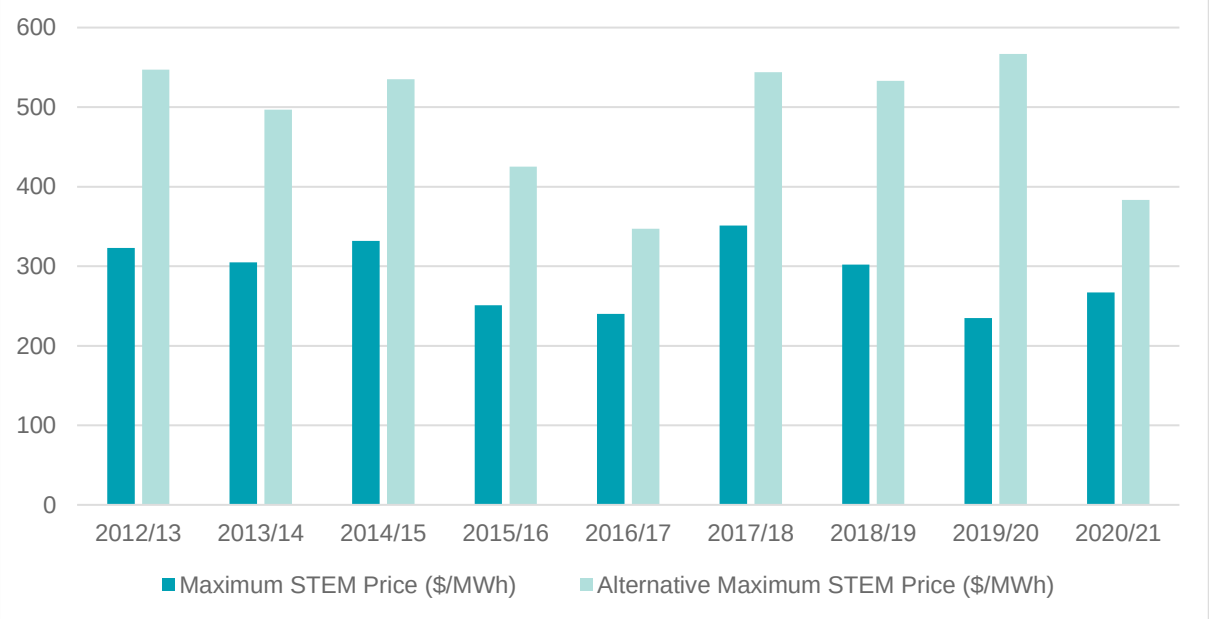
Figure 2 shows the effect of these contributing factors on the proposed Alternative Maximum STEM Price compared to the previous year.

Figure 2: Factors contributing to the change in the proposed Maximum STEM Price compared to 2019/20

Source: Marsden Jacob analysis, 2020.[29]

Historically, the Maximum STEM Price and Alternative Maximum STEM Price have varied significantly. Figure 3 shows historical upper energy price limits and the proposed revised energy price limits for 2020/21 in comparison.

Figure 3: Comparison of proposed and historical upper energy price limits



Source: Marsden Jacob analysis, 2020.[30]

[29] AEMO, 21 July 2020, *2020-21 Energy Price Limits Review – Final Report*. Report prepared by Marsden Jacob Associates, p. 13, (online).

[30] Ibid, p. 58.

4. The ERA's assessment

4.1 Background

The ERA is required to consider "whether the proposed revised value for the energy price limit proposed by AEMO reasonably reflects the application of the method and guiding principles" outlined in clause 6.20 of the Market Rules.[31]

To be effective, the energy price limits must be:

- Low enough to limit the ability of generators with market power to charge price mark-ups above their reasonable expectation of the short run marginal cost of the electricity supplied. This protects market customers from high prices that could result from generators exercising market power in the energy markets.
- High enough so that the high-cost generators in the SWIS can recover their costs of electricity supply.
- High enough so that short-term gas price variations do not force facilities with dual fuel capability to regularly switch from using gas to using liquid fuel in order to recover their supply costs.

The calculation of the energy price limits is based on extremely high cost operating conditions of the highest cost 40 MW turbine generator in the system. The supply cost is typically higher when:

- The generator starts from zero output to reach the lowest level at which its output is stable.
- The generator remains in operation for a short period of time.

Apart from recovering variable costs, the generator would need to recover its substantial start-up costs by spreading the cost over a relatively small amount of energy dispatched during such short dispatch cycle.

This decision paper provides detail on the main points in the proposed revised values when compared to last year's review. Where parts of the review are similar to previous years, only a short summary is provided.

When considering the proposed energy price limits, the ERA must also assess "whether AEMO has carried out an adequate public consultation process".[32] This assessment is provided in section 5.

4.2 Selection of the highest cost generating works

As required by the Market Rules, AEMO estimated the energy price limits based on its estimate of the short run marginal cost of the highest cost 40 MW open cycle gas turbine generator in the SWIS.[33] AEMO identified two candidate generators:

[31] Wholesale Electricity Market Rules (WA), 21 July 2020, Clause 2.26.1(c)(i).

[32] Ibid, Clause 2.26.1(c)(ii).

[33] The highest cost generator must be 40 MW open cycle gas turbine generator. Wholesale Electricity Market Rules (WA), 21 July 2020, Clause 6.20.7(a)(i).

- The Pinjar gas turbine units 1 to 5 and 7 (Pinjar units).
- The Parkeston aero-derivative gas turbine units 1 to 3 (Parkeston units).

The two gas turbine units at the Mungarra Power Station (Mungarra units) were also eligible. However, these units will not be dispatched in the WEM except under the terms of the Network Control Services arrangement.[34] As a result, the Mungarra units were not suitable for selection and were excluded as candidates for this review.

Marsden Jacob estimated average variable costs for the Pinjar and Parkeston units and determined that the Pinjar units would be the highest cost generators, on gas and distillate fuel, in the SWIS.[35]

Table 3 compares the implied energy price limits based on gas and distillate fuels, given differing assumptions on maintenance and variable O&M costs as provided by Synergy (for Pinjar units) and Goldfields Power Pty Ltd (for Parkeston units) respectively.

Table 3: Comparison of energy limits based on the costs of the Pinjar and Parkeston units

Unit (assuming full maintenance cycle)	Price limit based on natural gas ($/MWh)	Price limit based on distillate ($/MWh)
Pinjar units	267.14	383.28
Parkeston units	148.34	238.34

Given this analysis, the ERA agrees with the selection of the Pinjar units as the highest cost generators in the SWIS for the calculation of the Maximum STEM Price and Alternative Maximum STEM Price.

4.3 Main cost parameters for the Pinjar units

Marsden Jacob's review generally followed the same approach to calculating energy price limits as it used for the 2019/20 review. The exceptions were the calculation of variable O&M costs for the Pinjar units and the gas price forecast. These changes are discussed in sections 4.4 and 4.6.1 respectively.

The loss factor, a fixed input to the energy price limit calculation, is published by Western Power. [36]

All the other parameters in the energy price limits are variable. Marsden Jacobs developed probability distributions to accommodate the uncertainty inherent in each parameter. Using

[34] The Ministerial direction specifies that the Mungarra units cannot be dispatched in the wholesale energy market, except by AEMO when the SWIS is in an emergency operating state (the balancing price is paid for the energy), or following a direction from Western Power to provide network control services under a contract to support the network. Western Power pays for this service.

[35] The consultant estimated average variable cost instead of short run marginal cost (SRMC) consistent with the requirement of the Market Rules. Generators incur substantial start-up costs under the high cost conditions on which the energy price limit calculations are based. With substantial start-up costs, the AVC of the generator is higher that the SRMC and thus the generator would need to offer its production to the market at its AVC to ensure it can recover its costs. The formula in Equation 1 calculates a generator's AVC. For more information on AVC and SRMC in the WEM, see: ERA, 2019, *Guideline to inform Balancing Market Offers*, p. 3, (online).

[36] Western Power calculates loss factors in accordance with section 4.1 of the Market Procedures. Western Power, 2020/21 Loss Factor Report, (online).

Monte Carlo analysis, Marsden Jacob generated distributions of the candidate generators' average variable costs under high cost operating conditions and then chose the 80th percentile level to derive the price limit. The risk margin is an output of the probability distribution and is chosen as the difference between the mean and the 80th percentile.

Table 4 sets out the proposed values for the main parameters used in the calculation of the Maximum STEM Price using the formula shown in Equation 1.

Table 4: Main parameters used for the calculation of the Maximum STEM Price

Parameter	Unit	Approved (effective 1 July 2019)	Proposed (effective 1 September 2020)
Mean variable O&M cost	$/MWh	104.98	110.48
Mean heat rate	GJ/MWh	20.62	19.19
Mean fuel cost (heat rate adjusted)	$/MWh	113.02	134.98
Loss factor	-	1.0369	1.0274
Risk margin added	$/MWh	24.33	28.23
Implied risk margin value*	%	11.57	11.82
Maximum STEM Price	**$/MWh**	**234.57**	**267.14**

*Based on the model developed, the risk margin is added as an output of the calculation rather than an input in determining the energy price limit.

Based on these values and Equation 1, the Maximum STEM Price can be calculated:

$$Maximum\ STEM\ Price = (1 + 0.1182) \times \frac{110.48 + 134.98}{1.0274} = 267.14$$

The parameters required to calculate the Alternative Maximum STEM Price are the same as those above except for the heat rate and fuel cost values that reflect the use of distillate rather than gas. These are shown in Table 5.

Table 5: Main parameters used for the calculation of the Alternative Maximum STEM Price

Parameter	Unit	Approved (effective 1 July 2019)	Proposed (effective 1 September 2020)
Mean variable O&M cost	$/MWh	104.98	110.48
Mean heat rate	GJ/MWh	20.62	19.07
Mean fuel cost (heat rate adjusted)	$/MWh	437.11	235.42
Loss factor	-	1.0369	1.0274
Risk margin added	$/MWh	44.63	46.61
Implied risk margin value*	%	8.54	13.84
Alternative Maximum STEM Price	**$/MWh**	**567.42****	**383.28*****

Parameter	Unit	Approved (effective 1 July 2019)	Proposed (effective 1 September 2020)

*Based on the model developed, the risk margin is added as an output of the calculation rather than an input in determining the energy price limit.

** Based on a projected distillate price of $21.10/GJ.

*** The ERA approves the fuel and non-fuel price components of the Alternative Maximum STEM Price only. Marsden Jacob estimated this price cap by substituting the projected distillate price of $12.02/GJ (46.40 cents/litre) in the relevant linear equation.

Based on these values and Equation 1, the dispatch cost for the Alternative Maximum STEM Price can be calculated:

$$Alternative\ Maximum\ STEM\ Price = (1 + 0.1384) \times \frac{110.48 + 235.42}{1.0274} = 383.28$$

The ERA only approves the fuel and non-fuel coefficients that calculate the Alternative Maximum STEM Price (see Equation 2). The calculated price limit of $383/MWh is based on the average fuel cost of $12.02/GJ derived in July 2020 and is subject to change monthly.

The modelling methodology and values for each of the parameters is discussed in the next section.

4.4 Variable O&M costs

Variable O&M costs include variable operating labour costs, usage-related maintenance costs such as labour and materials, and non-fuel inputs which include lubricants and water.

Variable O&M costs vary with electricity generation. These costs increase when there is an increase in usage-related maintenance because of more frequent generator start-ups or shorter dispatch durations.

Marsden Jacob estimated variable O&M costs as follows, it:

1. Obtained:
    a. Confidential cost data from Synergy and Goldfields Power, such as point estimates of maintenance costs per start and significant overhaul costs.
    b. Other cost and engineering data available, such as the study on power generation costs in Australia conducted by the Electric Power Research Institute and market studies in the National Electricity Market and the Northern Territory.
    c. Data from past reviews of energy price limits.
2. Determined a point estimate of maintenance costs per start based on confidential data obtained from Synergy and Goldfields Power.
3. Created a distribution of start costs given that the number of starts per year can vary, which will change the duration of the overhaul maintenance cycle and thus the variable O&M costs per start.
4. Determined the relationship between the number of starts – the dominant driver for maintenance overhaul costs – and overhaul costs. These maintenance overhaul costs

were annualised across the remaining operating years of the plant. For the Parkeston units, the annualised costs were calculated using a bottom-up model that amortised overhaul costs over each start of the machine.[37] For the Pinjar units, the annualised costs were based on the annual maintenance costs per unit provided by Synergy.

5. Determined the distribution of generation dispatch events in MWh, for durations equal to or less than six hours.[38] The dispatch of the Pinjar units is based on the generation dispatch profile of all six units over the period 1 January 2014 to 31 December 2019.

6. Undertook a Monte Carlo simulation using a distribution of start costs and dispatch events to develop a distribution of variable O&M costs ($/MWh).

7. Increased the above (primarily maintenance) costs by $1.50/MWh to ensure that variable O&M costs cover the costs of other inputs such as water, labour and lubricants. This is based on Marsden Jacob's assessment of costs for an open-cycle gas turbine unit and is consistent with previous reviews.

To summarise, the average variable O&M cost ($/MWh) is calculated based on the following formula:

$$Average\ variable\ O\&M\ cost = \frac{Average\ variable\ O\&M\ cost\ per\ start}{Energy\ dispatch\ per\ start} + \$1.50/MWh \qquad Eq.3$$

The methodology adopted by Marsden Jacob is similar to previous years except for variations in the calculation method for two parameters:

- In step 4, using an estimate of annual maintenance cost to derive the variable O&M per start cost distribution for the Pinjar units instead of updating costs from previous years.
- In step 5, fitting the dispatch events to a gamma distribution instead of a normal distribution.[39]

The changes in step 4 are discussed below.

4.4.1 Variable O&M cost per start

In previous annual reviews of the energy price limits, the overhaul costs for the Pinjar unit were based on costs provided in earlier reviews that were updated annually to account for exchange rate movements (which affect the cost of imported parts) and local inflation (which affect cost of local labour and recycled parts). Periodically, the consultant would also conduct comprehensive reviews of all costs.

In preparation for the 2020/21 review, Synergy provided Marsden Jacob with an estimate of annual maintenance costs per unit for the Pinjar units. Marsden Jacob used this annual estimate to derive the average variable cost per start but did not provide details on its

[37] In its data submission to AEMO, Goldfields Power did not provide annualised maintenance costs for the Parkeston units.

[38] In previous reviews of the energy price limits, it was considered that the Maximum STEM Price needs to cover short dispatch periods (less than six hours) with high prices, rather than considering longer dispatch intervals with lower prices.

[39] Marsden Jacob indicated that the data was fitted to a gamma distribution as the higher generation levels of the Pinjar units fit better with a less symmetrical gamma distribution compared to a symmetrical normal distribution.

calculation. In previous reviews, AEMO's consultants had used a bottom-up model to amortise overhaul costs over each start of the machine.

As a result, the model inputs and the method of deriving the variable O&M cost probability distribution have changed from previous years. The resulting average cost per start calculated in the 2020/21 review is higher compared to the 2019/20 review.

The ERA does not have access to Marsden Jacob's model or Synergy's cost estimates for the Pinjar units. AEMO cannot compel market participants to provide any data as part of the annual review of energy price limits, so any information provided by market participants is voluntary and may not be in the format requested by AEMO. Marsden Jacob has estimated the Pinjar units' variable O&M costs per start based on data provided by Synergy. Marsden Jacob tested the accuracy of the data provided by Synergy by comparing the data to its own calculations.

The ERA recommends that AEMO, through its consultant, provide evidence of its analysis in future reviews so the ERA can better review whether the approach taken to calculating the variable O&M cost input of the energy price limits calculation was reasonable.

The increase in the average variable cost per start resulted in an increase of $5.50/MWh in the average variable O&M cost compared to value calculated in the 2019/20 review.

4.5 Heat rate

A generator's average heat rate is the amount of fuel required to generate one unit of electricity, and a lower heat rate means lower fuel costs. Actual heat rates of a generator can vary based on generator load, temperature, humidity and atmospheric pressure.

Marsden Jacob calculated the heat rates using the average generation output of dispatch events with a duration of less than six hours. This was based on historic generation from 2014 to 2019 for the Pinjar units and from 2019 for the Parkeston units. Fuel start-up costs have been factored into the plant heat rates, including the fuel needed to start up the unit (cold start), and the fuel needed for idling, and ramping up to minimum generation levels.

There has been a marginal decline in the average heat rate component of the Maximum STEM and Alternative Maximum STEM price limits in 2020/21.

4.6 Fuel cost

The mean fuel cost is the mean unit fixed and variable fuel cost for a 40 MW open cycle gas turbine generating station.[40] The price forecasts for the two fuel types – natural gas and distillate – are discussed below.

4.6.1 Gas price

The Maximum STEM Price is calculated based on the dispatch costs of the highest cost 40 MW open cycle gas turbine in the SWIS that uses natural gas as a fuel source.

Compared to previous reviews of the energy price limits, Marsden Jacob used a different input source to forecast the gas commodity price.

[40] Wholesale Electricity Market Rules (WA), 21 July 2020, Clause 6.20.7(b)(iv).

In the 2019/20 review of the energy price limits, Marsden Jacob used the July 2012 to February 2019 maximum monthly spot prices from gasTrading Australia. AEMO's consultant fitted a standard time series model to this data to forecast gas prices. If the same method was adopted in the 2020/21 review, the resulting mean fuel cost would be $5.67/GJ.

In the 2020/21 review of the energy price limits, Marsden Jacob used the average quarterly natural gas price in Western Australia from September 2016 to December 2019, derived from DMIRS.[41] This data was inputted in a standard time series model. The resulting mean fuel cost was forecast as $7.03/GJ in the 2020/21 review.

Globally, gas prices have declined following the economic downturn caused by COVID-19 due to weakened demand and ample domestic gas supply.[42] It therefore follows that the gas price input to the calculation of the Maximum STEM Price would also decline compared to last year.

In a memo to the ERA Secretariat, Marsden Jacob advised that the gas price projections were not reassessed following the economic downturn caused by COVID-19 for two reasons:

- Marsden Jacob considered that gas prices are already very low compared to historic averages and are currently at the lowest level over the last ten years. In the longer term, Marsden Jacob predicts supply projects to be delayed or cancelled, resulting in a tightening of the market.
- Marsden Jacob advised that gas transport costs account for a significant proportion of the delivered gas price. Therefore, any reduction in the gas price forecast would have a limited effect on the total gas price.

Marsden Jacob calculated a higher average fuel cost in the 2020/21 review than in 2019/20 review. The increase in fuel cost projections is largely because of the change in source data for gas prices from spot prices sourced from gasTrading to average prices from DMIRS. If the source of gas price data used to calculate the mean fuel cost of the Maximum STEM Price had not changed from previous years, then the mean fuel cost would have declined.[43]

The change in input source followed feedback from stakeholders during the consultation period. The Australian Energy Council, Alinta Energy and Synergy opposed the use of spot prices from gasTrading Australia and recommended the use of quarterly average gas prices from DMIRS. It is unsurprising that generators support a change to an input source that increases the energy price limits.

To make its decision, the ERA has considered the features of both gas price data sources. There are advantages and disadvantages of using either source to forecast gas prices.

The prices from DMIRS reflect the volume weighted average gas sales from producers into the domestic market and is heavily weighted by gas prices set under bilateral contracts. Historical contracts reflect past market conditions, not current conditions. The DMIRS data does not capture trades between non-producers, such as swaps and most spot sales. There is also a significant time lag as the DMIRS data is published only biannually with a quarterly

41 DMIRS, 2020, Latest statistics release – 2019 major commodities resources data, (online). The published WA domestic gas price is an average derived from the total value of domestic gas sales divided by the total volume of domestic gas sales at the point of entry into the Dampier to Bunbury Natural Gas Pipeline or, where applicable, the Parmelia and Goldfields pipeline.

42 The World Bank, 2020, *Commodity Markets Outlook – Implications of COVID-19 for Commodities*, (online).

43 In Marsden Jacob's 2020/21 revised draft report (online), the mean fuel cost for the Pinjar unit was calculated as $108.78/MWh for 2020/21 when spot prices from gasTrading were used as the input source. This is lower than the mean fuel cost calculated in the 2019/20 review as $113.02/MWh, which also used spot prices from gasTrading as the input source.

lag.[44] Recent market shocks, notably the economic downturn from COVID-19 pandemic, will not be visible in the movement of average prices from DMIRS for some time, partly because of the lag in publication and partly because of the weighting of historical contracts in the data. The gasTrading platform provides a spot market for participants to trade gas and may better reflect the current market price of gas. Spot prices are available daily and reflect a range of prices from a series of bilateral transactions. The rapid nature of spot price changes means that they are likely to be more responsive to changes in the market.

The range and volume of data also differs between the two sources. The gas price data from DMIRS is collected for the purposes of calculating and paying royalties, so only domestic gas sales that attract a royalty are included. Prices over the last two years have ranged from $3.98/GJ to $4.26/GJ. The gas price data from gasTrading is based on spot trading of approximately 2 per cent of Western Australian domestic gas volumes with prices ranging from $2.50/GJ to $4.15/GJ over the last two years. The average spot price in Marsden Jacob's analysis in 2019/20 was $3.41/GJ, based on data published April 2019. The average spot price published April 2020 for 2020/21 was $2.61/GJ.[45] The monthly average spot prices appear to be recovering with the monthly average spot price in July 2020 calculated as $2.83/GJ.[46]

To calculate the inputs for the revised energy price limits, AEMO relies on public sources of information and any information provided voluntarily by market participants.[47] Market participants have indicated that average prices from DMIRS reflect the fuel costs borne by generators. AEMO evaluated the feedback from stakeholders, reviewed the available data and concluded that the fuel price data from the DMIRS source is representative of the prices at which gas generators have been able to obtain gas.

As an input to the energy price limits calculation, the average fuel cost should represent the likely market price for gas over the coming year. This determines the opportunity cost of using gas for electricity generation. For a generator, the next best alternative to generating electricity is to on-sell its gas (for example, already obtained through contracts) at the prevailing market price of gas.

The pricing data from DMIRS is heavily weighted by gas prices set under bilateral contracts. Contract prices do not necessarily represent the current or future market price of gas. In principle, expectations of the future price of gas may underpin a contract gas price. For example, a market participant setting a contract gas price in June 2020 for delivery in December 2021 is basing the contract price on its expectations of gas prices in December 2021. However, the actual price of gas in December 2021 may be higher or lower than the expected prices that underpinned the contract price. Therefore, average contract prices from DMIRS may not be a reliable proxy to determine the expected market price of gas next year. The spot market provided by gasTrading may better reflect the current market price of gas and indicate future trends.

AEMO does not have access to the true fuel costs of market participants or the actual opportunity cost of gas. However, both spot prices from gasTrading and average prices from DMIRS are publicly available sources of data. AEMO has used the data that was available

[44] The data on natural gas prices from DMIRS is updated twice a year – in March for the previous calendar year (i.e. data for the period January 2019 to December 2019 is released in March 2020), and in September for the previous financial year (i.e. data for the period July 2019 to June 2020 will be released in September 2020).

[45] gasTrading Australia, 2020, *Price history table,* April 2020, (online).

[46] Ibid, July 2020.

[47] There is no obligation on market participants to provide AEMO with data to undertake the calculation of the energy price limits. AEMO does not have any information-gathering powers to compel market participants to provide any data to calculate the energy price limits.

and which it considers will appropriately calculate the average fuel cost input into the calculation of energy price limits.

There is an inconsistency in the treatment of gas and distillate prices for calculating the fuel cost inputs of the energy price limits. The distillate price is based on future expectations of oil prices whereas the gas price is set using historic assumptions of bilateral contracts. The ERA would prefer the same approach (forward-looking or retrospective) be adopted for both gas and distillate projections. However, given the limitations of both data sources, AEMO is unable to adopt consistent and robust approaches for both gas and distillate prices.

In fulfilling its obligations under the Market Rules, the ERA must consider whether the revised energy price limits proposed by AEMO "reasonably reflect the application of the method and guiding principles" described in clause 6.20 of the Market Rules. It is AEMO's role to determine values for the inputs in the formula that calculates the energy price limits (Equation 1 in Appendix 3). The ERA's role is to review whether the individual input values have been determined appropriately. The ERA understands there may be several accepted ways to determine an input value. The data source used may be different to sources used in previous calculations, but still be valid and reasonable. If each input has been determined by a valid and reasonable method, then the ERA must approve the revised energy price limits.

Calculation of gas transmission costs was consistent with the method approved in previous years. Marsden Jacob calculated the gas transport charges as $1.95/GJ with a standard deviation of $0.15/GJ.

Clause 2.26.3 of the Market Rules stipulates that "the ERA must review the methodology for setting the energy price limits".[48] The ERA has suspended its next review because of overlaps with the State Government's Energy Transformation program.[49] However, the method review could consider and provide guidance to AEMO on calculating the fuel cost used in the calculation of energy price limits.

4.6.2 Distillate price

The Alternative Maximum STEM Price is calculated based on the dispatch costs of the highest cost 40 MW open cycle gas turbine in the SWIS that uses distillate fuel.

Under the Market Rules, AEMO calculates the Alternative Maximum STEM Price based on "the average of the Singapore gas-oil (0.5% sulphur) price … or the average of another suitable published price as determined by AEMO" each month.[50] AEMO does not use the Singapore gas-oil price as it is no longer widely used and instead uses the Perth Terminal Gate Price (net of goods and services tax and excise). Consistent with AEMO's current practice, Marsden Jacob based its estimate on the Perth Terminal Gate Price of distillate.

Consistent with the approach taken for the 2019/20 energy price limits review, Marsden Jacob developed a forecast distribution model for the distillate price. It used this model to determine a price ceiling for the distribution of gas prices, so that modelled gas prices did not exceed the distillate price.

48 Wholesale Electricity Market Rules (WA), 21 July 2020, Clause 2.26.3.

49 ERA, 2020, *Review of the methods used to calculate the benchmark reserve capacity price and energy price limits – Suspension of the method reviews*, (online).

50 Wholesale Electricity Market Rules (WA), 21 July 2020, Clause 6.20.3(b).

In its first draft report, Marsden Jacob estimated a delivered distillate price forecast of $22.06/GJ (85.2 cents/litre) based on historical data up to and including 7 March 2020.[51] Since then, fuel prices and exchange rates, both used in the calculation of energy price limits, have fallen significantly as a result of the COVID-19 pandemic.

As a result, Marsden Jacob revised down its delivered distillate price forecast to $12.02/GJ with a standard deviation of $0.68/GJ. This represents a lower average distillate price and reduced volatility of distillate prices when compared to estimates from the 2019/20 review; a mean distillate price as $21.10/GJ and standard deviation of $1.31/GJ respectively.

The revised forecast this year reflects subdued oil prices that are likely to take some time to recover to the levels prior to the COVID-19 pandemic. In its final report, Marsden Jacob concluded that LNG and oil prices are expected to remain low over the next 12 months but will recover as the level of LNG oversupply and the economic effects of COVID-19 diminish.[52]

Marsden Jacob's approach to estimated delivered distillate prices for use in determining the Alternative Maximum STEM Price is reasonable. If oil prices recover over the coming year and distillate prices rise, the Alternative Maximum STEM Price will rise.

4.7 Loss factor

Loss factors are calculated as the average marginal loss for power injected by a generator into the transmission network relative to a reference node. The SWIS has only one reference node, the Muja 330 bus-bar.[53] A loss factor greater than one implies that more electricity is delivered to the reference node than what was injected into the transmission network.

In general, loss factors increase with demand at a node and decrease with increasing generation at a node. An increase in the loss factor will reduce the price caps and vice versa (holding all other variables constant).

Marsden Jacob used the value of loss factor as determined by Western Power and provided to AEMO on 3 June 2020.[54] Based on the 2020/21 data, the loss factor for the Pinjar unit is 1.0274 and for the Parkeston unit is 1.1234. These figures are extracted from the loss factors published by Western Power annually.

The loss factors calculated by Western Power for both Pinjar and Parkeston units in 2020/21 have marginally decreased compared to 2019/20.

[51] AEMO, 9 April 2020, *2020-21 Energy Price Limits Review Draft Report (V1)*. Report prepared by Marsden Jacob Associates, (online).

[52] AEMO, 21 July 2020, *2020-21 Energy Price Limits Review – Final Report*. Report prepared by Marsden Jacob Associates, (online).

[53] The reference node is defined as the Muja 330 bus-bar. Wholesale Electricity Market Rules (WA), 21 July 2020, Chapter 11, "Reference Node".

[54] Western Power calculates loss factors in accordance with section 4.1 of the market procedures. Western Power, 2020/21 Loss Factor Report, (online).

Table 6: Loss factors for Pinjar and Parkeston units

	Pinjar	Parkeston
2020/21	1.0274	1.1234
2019/20	1.0369	1.1633
Variance	(0.0095)	(0.0399)

4.8 Risk margin

The risk margin is "a measure of uncertainty in the assessment of the mean short run average cost of a 40 MW open cycle gas turbine generating station."[55]

The Market Rules do not specify the method for calculating the risk margin. The Market Rules specify that for the purposes of the formula in clause 6.20.7(b) (Equation 1 in this report), the mean variable O&M cost, mean fuel cost and mean heat rate are used to determine the mean short run average cost.[56]

As these input cost components are uncertain, Equation 1 uses the risk margin to account for this uncertainty.

In practice, AEMO's consultant generates distributions for the variable parameters in the calculation and determines a distribution for the short run average variable cost and then calculates:

- The 80th percentile of the short run average variable cost distribution as the price limit.
- The difference between the mean and the 80th percentile of the distribution as the risk margin.

Marsden Jacob followed the same approach as previous years in calculating the risk margin. The risk margin increased for each maximum price limits this year, reflecting higher volatility in the estimated average variable cost.

4.9 Coefficients for the Alternative Maximum STEM Price

The Alternative Maximum STEM Price is calculated using the following steps:

1. The dispatch cost (using Equation 1) is calculated for a fixed distillate price.

2. The 80th percentile cost of the calculated dispatch cost is then inputted into a Monte Carlo simulation and repeated over an appropriate range of distillate prices.

3. A regression equation is determined with a fuel independent ("non-fuel") component plus a "fuel" cost component that is proportional to the net ex-terminal distillate price. Each

[55] Wholesale Electricity Market Rules (WA), 21 July 2020, Clause 6.20.7(b)(i).

[56] Short run average cost represents the cost of starting a generating unit, running it to produce electricity for a short period of time and then shutting it down, divided by the amount of electricity produced during that period. Short run marginal cost represents the additional cost of producing one more unit of electricity from an existing plant. Both costs are measured in $/MWh.

month the Alternative Maximum STEM Price is determined by substituting the current net ex-distillate price into Equation 2.

The Alternative Maximum STEM Price is revised monthly according to changes in the distillate price. The Alternative Maximum STEM Price will increase if the distillate price increases.

Marsden Jacob has calculated the coefficients in line with the method used in previous reviews. Marsden Jacob's approach to derive the fuel and non-fuel components of the Alternative Maximum STEM Price is reasonable.

5. Public consultation

To make its decision on whether to approve or reject the energy price limits proposed by AEMO, the Market Rules require that the ERA consider "whether AEMO has carried out an adequate public consultation process."[57]

The Market Rules also stipulate that:

> AEMO must publish the draft report on the Market Web Site and advertise the report in newspapers widely published in Western Australia and request submissions from all sectors of the Western Australia energy industry, including end-users, within six weeks of the date of the publication.[58]

AEMO published the draft report on the Market Web Site and invited stakeholders to provide feedback. AEMO also published a notice in The West Australian newspaper on 6 April 2020.

AEMO hosted a virtual public consultation on 6 May 2020 where Marsden Jacob presented the findings from the draft report to market participants and provided participants with an opportunity to ask questions and provide feedback.

After publishing a revised draft report, AEMO extended the consultation period by three weeks to provide participants with adequate opportunity to provide feedback on the report. AEMO received three submissions from Alinta Energy, Synergy and Australian Energy Council.

All submissions opposed the approach of using previous maximum gas prices from the gasTrading platform to forecast the 2020/21 commodity price and recommended that AEMO use the gas price published by DMIRS to forecast the 2020/21 gas price instead.[59] The three submission included the following reasons to support the recommendations:

- The Australian Energy Council (AEC) noted that "WEM generators are required to have a level of firm fuel contracts to receive capacity credits. These contract fuel prices are generally fixed at higher historical prices and also contain a premium over spot prices to cover the additional risk of fixing the price. As a result, spot prices simply do not reflect the actual fuel costs for WEM generators and a regression analysis of previous spot prices understates the fuel costs."[60] This reasoning was echoed in submissions by Alinta Energy and Synergy.
  - The ERA notes that there is no requirement in the Market Rules for generators to have a firm gas contract; however, AEMO does consider fuel contracts when registering new facilities. It is not unreasonable for a commercial entity to contract for gas as a hedge against volatility in gas prices.
- Alinta Energy and the AEC considered that regression analysis of previous spot prices does not incorporate major market changes and projects under development. Alinta Energy reasoned that "the conclusion of long-term North West Shelf [NWS] contracts in 2020, the deferral of projects which were previously expected to backfill for NWS (including Browse and Scarborough) and the depletion of reserves at existing gas production facilities are likely to drive substantial upward pressure on gas prices over the forecast period."[61] Alinta Energy and the AEC suggested that the prices published

57 Wholesale Electricity Market Rules (WA), 21 July 2020, Clause 2.26.1(c)(ii).

58 Ibid, Clause 6.20.9.

59 DMIRS, 2020, Latest statistics release – 2019 major commodities resources data, (online).

60 Australian Energy Council, 2020, *2020 Energy Price Limits Review*, (online).

61 Alinta Energy, 2020, *2020 Energy Price Limits Review*, (online).

by DMIRS show long-term prices and are thus more likely to factor changes in market conditions compared to spot prices.

  - The ERA notes that there is a significant time lag in the data published by DMIRS as the average gas prices are published only biannually with a quarterly lag. Changes in market conditions would not be visible in the movement of average prices for some time.

- The AEC reasoned that data from the gasTrading platform "reflects only a fraction of the market and does not provide an accurate sample of spot gas prices. Most gas is traded via long-term bilateral contracts or short-term private sales. The price published by DMIRS uses data provided by all gas suppliers, making it a much broad sample compared to the limited gasTrading website".[62] This reasoning was reinforced by Alinta Energy who stated that "most spot prices are conducted privately and the gasTrading platform tends to be used by a limited number of traders for specific purposes" and by Synergy who stated that the spot prices are "based on a single data source for non-firm gas and is based on a very small volume".[63, 64]
- Alinta Energy noted that the use of gas pricing data provided by DMIRS "would be consistent with previous regulatory processes. The ERA used this data to benchmark AEMO's gas price assumptions in its most recent ancillary services parameters determination".[65] Synergy also noted that "the figures published by DMIRS are referenced in the 2019 Western Australian Gas Statement of Opportunities (2019 GSOO) as a representation of 'actual WA domestic gas prices'".[66]
  - In its margin value and load rejection reserve determination for 2020/21, the ERA used both DMIRS and spot market gas prices to consider which of the three gas price assumptions AEMO used in its submission was the most reasonable.[67]

Marsden Jacob evaluated the feedback from the three submissions, reviewed the available data and concluded that the price data from the gasTrading platform is no longer representative of the prices at which gas generators have been able to obtain gas.[68] In its final report, Marsden Jacob used the prices from DMIRS in the projection of gas prices as recommended by stakeholders.

The ERA does not agree with all the reasons provided in the submissions and in AEMO's submission to support changing the input source in calculating the commodity price forecast. The ERA has evaluated the features of both data sources and made its decision according to its obligations under the Market Rules. The ERA considers that the public consultation process by AEMO was adequate, as required by the Market Rules.

62 Australian Energy Council, 2020, *2020 Energy Price Limits Review*, (online).

63 Alinta Energy, 2020, *2020 Energy Price Limits Review*, (online).

64 Synergy, 2020, *2020 Energy Price Limits Review*, (online).

65 Alinta Energy, 2020, *2020 Energy Price Limits Review*, (online).

66 AEMO, 2019, Western Australian Gas Statement of Opportunities, p. 62 (online) cited in Synergy, 2020, *2020 Energy Price Limits Review*, (online).

67 ERA, 2020, *Ancillary service parameters: spinning reserve margins, load rejection reserve and system restart costs for 2020/21,* pp. 11-13 (online).

68 AEMO, 21 July 2020, *2020-21 Energy Price Limits Review – Final Report*, p. 37. Report prepared by Marsden Jacob Associates, (online).

6. Conclusion

The ERA considers that:

- AEMO's calculations of the energy price limits reasonably reflects the method and guiding principles outlined in the Market Rules.
- AEMO has carried out an adequate public consultation process.

For the reasons outlined in this decision paper, the ERA approves AEMO's proposed revised values for the Maximum STEM Price and the components of the Alternative Maximum STEM Price.

Appendix 1 List of Tables

Appendix 2 List of Figures

Appendix 3 List of equations

Equation 1

$$Dispatch\ Cost = (1 + Risk\ Margin) \times \frac{Variable\ O\&M + (Heat\ Rate \times Fuel\ Cost)}{Loss\ Factor} \quad \text{(Eq. 1)}$$

Equation 2

$$Alternative\ Maximum\ STEM\ Price = (Fuel\ Coefficient \times Distillate\ Price) + Non\ Fuel\ Efficient \quad \text{(Eq. 2)}$$

Equation 3

$$Average\ variable\ O\&M\ cost = \frac{Average\ variable\ O\&M\ cost\ per\ start}{Dispatch\ event\ MWh\ per\ start} + \$1.50/MWh \quad \text{(Eq. 3)}$$

Appendix 4 Submissions received

Stakeholder	Summary of submission
Alinta Energy	Alinta Energy does not support the approach of using previous maximum gas prices from the gasTrading platform to forecast the 2020/21 commodity price for the following reasons: 1. WEM generators are required to have a level of firm fuel contracts to receive capacity credits. These contract fuel prices are generally fixed at higher historical prices and also contain a premium over spot prices to cover the additional risk of fixing the price. As a result, spot prices do not reflect the actual fuel costs for WEM generators, and the current methodology understates the fuel costs. 2. Regression analysis of previous spot prices does not incorporate major market changes and projects under development, such as Browse, Scarborough and West Erregulla, which are likely to put substantial upward pressure on gas prices over the 2020/21 period. 3. Data from the gasTrading platform reflects only a fraction of the market and does not provide an accurate sample of spot gas prices. Most gas is traded via long-term bilateral contracts or short-term private sales which are not captured in the data available on the gasTrading platform. Alinta recommends that AEMO use the weighted average contract price published by the Department of Mines, Industry, Regulation and Safety (DMIRS). Alinta outlines three benefits to this approach: 1. Facilities are required to contract firm fuel supplies, meaning that weighted average contract prices will better represent fuel costs compared to spot prices. 2. The prices published by DMIRS show long-term prices and are thus more likely to factor changes in market conditions compared to spot prices. 3. The price published by DMIRS is calculated on data provided by all gas supplier, thus representing a broader sample size compared to the gasTrading platform. 4. The use of gas pricing data provided by DMIRS would be consistent with previous regulatory processes as the ERA has previously used this data to benchmark AEMO's gas price assumptions in the ERA's ancillary services parameters determination. Alinta also notes that the gas transport costs for the Parkeston unit may be understated as there is no spot capacity remaining on the Goldfields Gas Pipeline, meaning the published uncovered rate would apply. Secondly, the Parkeston facility would also have to pay part haul rates on the DBNGP.
Australian Energy Council	The Australian Energy Council (AEC) does not support the use of spot prices or the prices from the gasTrading platform to forecast the 2020/21 gas fuel costs for the same three reasons outlined in Alinta Energy's submission. AEC recommends that the annual price published by DMIRS be used to forecast the 2020/21 gas price instead as it is far more reflective of the true fuel costs facing generators in the WEM. AEC outlines four benefits to this approach: 1. Same as reasons 1-3 in Alinta's submission.

	4. AEMO uses gas pricing data from DMIRS in its annual Western Australian Gas Statement of Opportunities (WA GSOO) as a representation of "actual WA domestic gas prices".[69]
Synergy	Synergy is strongly opposed to the approach adopted by Marsden Jacob in using the historical average maximum monthly gas prices (spot prices) from the gasTrading website to forecast the 2020/21 gas commodity price due to the following reasons: 1. Same as reasons 1-3 provided by Alinta Energy and AEC above. 4. Using an estimate of spot prices for non-firm gas as the price of gas fuel in the 2020/21 energy price limits is inconsistent with clause 6.20.7 of the Market Rules, which requires AEMO to set the gas facility price cap based on the actual costs of gas used in gas fired facilities. 5. If the gas price cap is set too low to reflect a market participant's actual costs, the market participant could also be in a position where it may breach the market power mitigation measures in the Competition and Consumer Act. 6. Using gas prices materially below actual gas prices may render market participants who do not have access to gas at these low prices ($2/GJ) non-compliant with clauses 6.6.3, 7A.1.5 and 7A.2.8(c).[70, 71] Synergy strongly recommends that AEMO forecast the gas commodity price based on gas costs provided by market participants or the quarterly prices published by DMIRS.

69 AEMO, 2019, Western Australian Gas Statement of Opportunities, p. 62 (online).

70 Clause 6.6.3 of the Market Rules prohibit market participants from offering prices in the STEM that are above or below their reasonable estimate of short run marginal cost.

71 Clauses 7A.1.5 and 7A.2.8(c) of the Market Rules require market participants to take the balancing market objectives into account when they undertake obligations under Chapter 7A of the Market Rules. This means that market participants must establish a balancing price which is consistent with dispatch (clause 7A.1.5) and market participants must submit prices that accurately reflect the prices they intend to have their facilities participate in the balancing market (clause 7A.2.8(c)).