

Summary of Pricing & Mitigation Approaches in Other Jurisdictions

The AESO has reviewed the mitigation and pricing approaches used by other electricity markets within the US, Australia and New Zealand. The review was conducted to better understand the approaches used in other jurisdictions, and determine whether there are elements of these frameworks that could be considered for inclusion in Alberta’s framework. Capacity markets are included but are not directly comparable to energy-only markets due to the way the capacity payment is meant to provide fixed-cost recovery.

| Jurisdiction | Mitigation Framework | Energy Market Pricing |
|---|---|--|
| Energy-only Market – Ex Post Mitigation | | |
| New Zealand¹ | <p>Discretion to investigate The Electricity Authority (EA) code provides discretion for the [MSA] to declare ‘undesirable trading situations’</p> <p>Time limitation The EA cannot initiate an investigation after more than 10 business days after the situation occurred</p> <p>Retroactive pricing EA may retroactively impose administered pricing</p> <p>Safe harbor for pivotal suppliers EA code defines ‘pivotal’ and provides a safe harbor for pivotal suppliers, which are generalized as:</p> <ul style="list-style-type: none"> - offers are deemed okay if a suppliers offers do not result in a price increase inconsistent with prices in an immediately preceding trading period or other comparable trading period or - the generator’s offers are generally consistent with offers it has made when it has not been pivotal; or - the generator does not benefit financially | <p>Offer cap No Offer cap</p> <p>Price cap with stop loss A price cap based on the value of lost load with a stop loss.</p> <p>If scarcity pricing is triggered, a generation weighted average spot price (GWAP) will first be calculated for the regions. If the GWAP is lower than \$10,000 NZD/MWh, all prices within the affected region(s) will be scaled up to NZ\$10,000 /MWh.</p> <p>If the GWAP based is more than NZ\$20,000/MWh, all prices will be scaled down so that GWAP is NZ\$20,000/MWh.</p> <p>A pricing mitigating mechanism will halt the application of scarcity pricing if the average price over any rolling seven day period is greater than NZ\$1,000/MWh.</p> <p>Price floor NZ\$0/MWh</p> |

¹ <https://www.ea.govt.nz/code-and-compliance/the-code/>

**Australia
National
Energy
Market**

Defined terms

Distinguish ‘substantial market power’ and ‘transient pricing power’.

Define *substantial market power* as the ability of a generator or group of generators to increase annual average wholesale prices to a level that exceeds long run marginal cost (LRMC), and sustain prices at that level due to the presence of significant barriers to entry.

Define *transient pricing power* as the ability to increase prices above estimates of costs for short periods of time. Transient pricing power, manifested through occasional price spikes, is an inherent feature of a workable competitive wholesale market and is only a concern if it occurs frequently enough to lead to average annual wholesale prices above LRMC of generation.²

Reporting

National Electricity Law requires the Australian Energy Regulator (AER) to monitor the wholesale market and report on its performance at least every two years, including whether there is ‘effective competition’.

The 2018 AER report concludes that while participants exercise market power, often it is only transient. AER does not have conclusive results of the exercise of substantial market power, but will closely monitor offer behaviour, fuel costs, changes to generation mix, and physical issues in states where electricity dispatch offers have increased.³

Price cap with stop loss

EUE based price cap of AUS\$14,700/MWh (2019-2020)⁴

Price cap lowered to AUS\$300/MWh if Cumulative Price Threshold (CPT) of AUS \$221,100 (2019-2020) is reached. That is – if the sum of spot prices for the previous seven days reaches the CPT, the market has provided the fixed cost recovery required for a peaker plant, and the price cap is lowered to AUS\$300/MWh.⁵

Price floor

AUS-\$1,000/MWh⁶

² <https://www.aemc.gov.au/sites/default/files/content/b0feca33-0630-45e8-9bfc-54dfa262acd0/Final-Determination.PDF>

³ <https://www.aer.gov.au/wholesale-markets/market-performance/aer-wholesale-electricity-market-performance-report-2018>

⁴ <https://aemo.com.au/Market-Notices?searchString=68807>

⁵ https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Dispatch/Policy_and_Process/Operation-of-the-administered-price-provisions-in-the-national-electricity-market.pdf

⁶ Section 3.9.6. <https://www.aemc.gov.au/sites/default/files/2020-03/NER%20-%20v136%20-%20Chapter%203.pdf>

| Energy-only Market – Ex Ante Mitigation | | |
|---|--|---|
| <p>Texas ERCOT⁷</p> | <p>Defined terms ‘Market power abuse’ and ‘withholding of production’ are defined in Texas Public Utility Code and are unacceptable behaviours</p> <p>Exceptions to market power Market power mitigation does not apply to ‘small fish’ - suppliers controlling less than 5% of installed capacity⁸</p> <p>Control limitations Installed capacity limit is 20%</p> <p>Mitigation plan Allows voluntary mitigation plan which when approved by the Public Utilities Commission provides an absolute defense against allegations of market power abuse.⁹</p> | <p>Offer cap High system wide-offer cap (HCAP) - \$9,000 USD/MWh Low system-wide offer cap (LCAP)– greater of \$2,000 USD/MWh and 50 times the natural gas price index¹⁰</p> <p>Price cap An operating reserve demand curve with the cap set at the value of lost load: \$9000 USD/MWh</p> <p>Price floor -\$251 USD/MWh¹¹</p> |
| Contracts for long term adequacy | | |
| <p>California CAISO¹²</p> | <p>Three pivotal supplier test Local market power mitigation based on assessment and designation of transmission constraints as competitive or non-competitive.</p> <p>Suppliers choose method of calculating default energy bid – variable cost option, negotiated rate option, or locational marginal price (LMP) option.</p> <p>Pivotal supplier’s incremental bids that relieve a binding transmission constraint are subject to mitigation.¹³</p> <p>CAISO market design assumes there are competitive conditions in the CAISO balancing area at the system level.¹⁴</p> | <p>Offer cap \$1,000 USD/MWh</p> <p>Price cap None, but highest shortage price is \$1,000 USD/MWh¹⁵</p> <p>Price floor -\$150 USD/MWh</p> |

⁷ TPUC code, chapter 25., <https://statutes.capitol.texas.gov/Docs/UT/htm/UT.39.htm>

⁸ <https://www.puc.texas.gov/agency/ruleslaws/subrules/electric/25.504/25.504.pdf>

⁹ <https://www.potomaceconomics.com/wp-content/uploads/2019/06/2018-State-of-the-Market-Report.pdf>

¹⁰System-wide offer cap set at HCAP at beginning of each calendar year and maintained at this level until the peaker net margin during a calendar year exceeds a threshold of three times the cost of new entry of new generation plants. <https://www.puc.texas.gov/agency/ruleslaws/subrules/electric/25.505/25.505.pdf>

¹¹ Section 4: Day-Ahead Operations, Current Protocols. <http://www.ercot.com/mktrules/nprotocols/current>

¹² CAISO Tariff Section 39 updated Sep 28, 2019, retrieved from: <http://www.caiso.com/Documents/Conformed-Tariff-asof-Sep28-2019.pdf>

CAISO Business Practice Manual for Market Instruments V55, retrieved from: https://bpmcm.caiso.com/BPM%20Document%20Library/Market%20Instruments/BPM_for_Market%20Instruments_V55_redline.pdf

¹³ <https://www.aeso.ca/assets/Uploads/4.2-Brattle-Paper-Mitigation.pdf>

¹⁴ <http://www.caiso.com/Documents/SystemMarketPowerAnalysis-May6-2019.pdf>

Capacity and Energy Markets

PJM Inter-connection LLC

Three pivotal supplier test

Uses a 3 pivotal supplier (TPS) test to identify pivotal suppliers

Pivotal supplier mitigation

Suppliers that fail the TPS test are subject to offers to a maximum reference price, i.e. an offer price level that includes only verifiable resource marginal costs. The independent market monitor is allowed to verify these costs¹⁶

PJM imposes mitigation on entire generating unit of pivotal supplier's incremental offer.¹⁷

Day-Ahead Market - offer caps are applied at the time of commitment and apply for the length of time the unit is scheduled in the Day-Ahead Market at the schedule that results in the lowest overall system

Real Time Market – offer caps are applied at the time of commitment and apply at the schedule that results in the lowest dispatch cost¹⁸

Offer cap

Offer cap \$1,000 USD/MWh, or cost-based incremental energy offer capped at \$2,000 USD/MWh for purpose of dispatch and calculating locational marginal price.¹⁹

Price cap

Shortage pricing capped at \$3,700 USD/MWh²⁰

Price floor

None

¹⁵ <https://www.aeso.ca/assets/Uploads/4.3-Brattle-Paper-Shortage-Pricing.pdf>

¹⁶ <https://www.pjm.com/-/media/documents/manuals/m15.ashx>

¹⁷ <https://www.aeso.ca/assets/Uploads/4.2-Brattle-Paper-Mitigation.pdf>

¹⁸ <https://www.pjm.com/-/media/documents/manuals/m11.ashx>

¹⁹ If verified cost-based incremental energy offer exceeds \$2,000/MWh, a resource may be eligible for a make-whole payment. <https://www.pjm.com/markets-and-operations/energy/energy-offer-verification.aspx>

²⁰ <https://www.pjm.com/-/media/documents/manuals/m11.ashx>

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| ISONE | <i>RSI combined with conduct and impact tests</i> | <i>Offer cap</i> |
| | Conduct and impact tests apply to a market participant that is determined to be a pivotal supplier | Offer cap currently \$1,000 USD/MWh, March 2020 implementation of verified cost-based incremental energy offers up to \$2,000 USD/MWh ²³ |
| | <i>Conduct test</i> | <i>Price cap</i> |
| | Non-constrained areas: suppliers must offer at the lower of 400% of their reference price or \$100/MWh above their reference price Constrained areas: suppliers must offer at the lower of 150% of their reference price or \$25/MWh above their reference price otherwise they fail conduct test | Fixed penalty factors for depletion of each type of reserve ²⁴ |
| | <i>Impact test</i> | <i>Price floor</i> |
| | Non-constrained areas: the supply offer cannot raise the clearing price by more than the lower of 200% or \$100/MWh Constrained areas: the supply offer cannot raise the clearing price by more than the lower of 50% or \$25/MWh ²¹ | -\$150 USD/MWh ²⁵ |
| | Failing both the conduct test and the impact test results in the resource's offer being replaced by its reference price. ²² | |

²¹ https://www.iso-ne.com/static-assets/documents/regulatory/tariff/sect_3/mr1_append_a.pdf

²² Reference price calculated by IMM, based on the following order: The lower of the mean and median of a resource's accepted offers in the last 90 days. This can be adjusted by fuel price if it is relevant. 25th percentile LMP at the resource's node during which the resource was dispatched at in the last 90 days. This can also be adjusted by fuel price if it is relevant. A fundamental ground-up calculation based upon plant characteristics, verifiable costs, and opportunity costs

²³ Per FERC Order 831 <https://www.iso-ne.com/participate/support/customer-readiness-outlook/>

²⁴ Section III.2.7A: https://www.iso-ne.com/static-assets/documents/2014/12/mr1_sec_1_12.pdf

²⁵ https://www.iso-ne.com/static-assets/documents/regulatory/tariff/sect_1/sect_i.pdf

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| <p>NYISO</p> | <p>Conduct and impact tests</p> | <p>Offer cap</p> |
| | <p>Conduct test Non-constrained area: the resources' offers cannot exceed its reference price by the lower of 400% of the reference price or \$100/MWh more than the reference price. Constrained area: conduct test based on the lower of non-constrained area thresholds and a formula where higher historical market prices increase the threshold and higher historical constrained hours decrease the threshold.²⁶</p> | <p>Offer cap \$1,000 USD/MWh, with no more than \$100 USD/MWh adder. If supported by cost the offer can be no more than \$2,000 USD/MWh</p> |
| | <p>Impact test Non-constrained area: the resource's offer price may not raise the clearing price by the lower of 200% or \$100/MWh more than the reference price. Constrained area: threshold determined in accordance with formula specified in the conduct test.</p> | <p>Price cap No price cap, but prices are limited by shortage costs. Operating Reserve Demand Curve for each operating reserve requirement²⁸</p> |
| | <p>Failing both the conduct test and the impact test results in the resource's offer being replaced by its reference price.²⁷</p> | <p>Price floor -\$1,000 USD/MWh²⁹</p> |

²⁶ Section 23.3.1.2.2.1 <https://nvisoviewer.etariff.biz/ViewerDocLibrary/MasterTariffs/9FullTariffNYISOMST.pdf>

²⁷ Reference price calculated by NYISO based on the following order: The lower of the mean and median of a resource's accepted offers in the last 90 days for hours between 7 am and 10 pm on working weekdays. This can be adjusted by fuel price if it is relevant. 50th percentile LMP at the resource's node during which the resource was dispatched at in the last 90 days. This can also be adjusted by fuel price if it is relevant. A fundamental ground-up calculation based upon plant characteristics, verifiable costs, and opportunity costs.

²⁸ <https://www.nyiso.com/documents/20142/2923301/ancserv.pdf/df83ac75-c616-8c89-c664-99dfea06fe2f>

²⁹ Section 21.4. <https://nvisoviewer.etariff.biz/ViewerDocLibrary/MasterTariffs/9FullTariff.pdf>

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| MISO | Conduct and impact tests | Offer cap |
| | <p>Conduct test: Broad Constrained Area: threshold is the lower of 400% of the reference price or \$100/MWh above each generating unit's reference level. Offers below \$25/MWh are not considered economic withholding.</p> <p>Narrow Constrained Area: threshold is net annual fixed costs of a new peaking generator divided by the total number of hours over the prior 12 months during which a binding transmission constrained occurred in the constrained area</p> | <p>Offer cap currently \$1,000 USD/MWh.</p> <p>Effective December 1, 2019, subject to FERC approval, implementation of verified cost-based energy offers up to \$2,000 USD/MWh.³¹</p> |
| | <p>Impact test: Broad Constrained Area: threshold is the lower of an increase of 200% or \$100/MWh in applied to the energy LMP.</p> <p>Narrow Constrained Area: threshold is the net annual fixed costs of a new peaking generator divided by the total number of hours over the prior 12 months during which a binding transmission constraint occurred in the constrained area applied to the energy LMP.</p> | <p>Price cap Operating reserve demand curve with cap set at VOLL \$3,500 USD/MWh³²</p> |
| | <p>Failing both the conduct test and the impact test results in the failing offers being replaced by the reference level price.³⁰</p> | <p>Price floor -\$500 USD/MWh³³</p> |

³⁰ Reference levels selected in order of precedence as: Offer-Based, LMP-Based, Cost-Based, Estimated, or Averaged. See MISO Market Monitoring and Mitigation Business Practices Manual, BPM-009-r15, Effective Date: July 9, 2019

³¹ <https://www.misoenergy.org/stakeholder-engagement/issue-tracking/increase-the-energy-offer-cap/>

³² https://www.potomaceconomics.com/wp-content/uploads/2018/07/2017-MISO-SOM_Report_6-26_Final.pdf

³³ Common Tariff Provisions: <https://cdn.misoenergy.org/Module%20A108022.pdf>