Energy Market Mitigation
Completed Proposal and Supporting Data

EAS WG Meeting April 5, 2018

Agenda

- Market context
- Purpose of mitigation and design trade-offs
- Review of CMD1 proposal elements
- Issues for discussion today: Proposal elements
  - Pivotal Supplier Test
    - Net mitigation measure – measures incentives
  - No-look Scarcity Test
    - Mitigation is not necessary in very tight hours
  - Corollary for these tests for small firms
  - Reference Price
    - Opportunity cost exceptions
  - Rule and data publication changes

Market context

- Volumes at historic levels
  - Future volumes at 2015/2016 levels – very competitive
  - 2013 not expected to happen again with a capacity market
- With more NDV – expect increased cycling costs
- Market model influences mitigation levels

Alberta	**FERC / U.S. Eastern Markets**
Single-part bid	Three-part bid
Self commitment	SCUC: co-optimized, uplift
“At cost” needs to include minimum run time and no load, start up, and cycling costs	

- Revenue modelling
  - Capacity market provides return for some or all of fixed cost, depends on year and market conditions

Trade-offs in design

- The proposed approach to mitigation builds on the features of Alberta's competitive market design and existing processes
- Practical approach

Mitigation approach	**Competitive approach**	**Greater price regulation approach**
Features of proposal: Pivotal Supplier Test & Reference Price Level	Mitigate if RSI < 0.9 Reference Price to reflect short-run marginal cost based on market structure Consistent with structural approach to market power mitigation, practical implementation	Mitigate if RSI < 1.1 Reference Price cost based reflecting incremental uplift for some cost. Likely requires conduct & impact approach, which would require new tools and data collection processes
Other features of the market: Multiple part offers and unit commitment	One-part offers and bids Self-commitment model Historic capacity volumes	Would require multiple part offers and bids; uplift to cover non-energy part Central commitment likely needed to decide which firms to include

CMD 1.0:
Starting point for discussion today

- CMD 1.0 mitigation proposal elements
  - Pivotal Supplier Test
    - Ex ante calculation of Residual Supplier Index (RSI)
    - A firm would fail if its RSI < 0.9 and would then have their offer prices mitigated to a Reference Price
  - Reference Price
    - Three times short-run marginal cost
  - Ex post monitoring and mitigation would continue

Mitigation proposal
with supporting data and analysis

Energy market needs to provide signals

- Implementation of a capacity market will provide an additional revenue stream to participants
  - The implicit capacity payment provided by the exercise of market power in the past is no longer required to cover all fixed costs
  - A more statically efficient energy market will be possible
- Energy market provides critically-important operational and investment signals to market participants
  - Short-term production / cycling and consumption decisions
  - All operating costs should be recoverable from the energy market
    - These are costs that would be avoided by the generator if it did not run, including fuel, environmental, and commitment costs
  - Over time, valuing flexibility and other services has an impact on capital investment decisions

Scarcity signaled by price and mitigation focused on market power in non-scarce hours

- Maintain the real-time price as a signal of energy scarcity
  - High prices provide important incentives to all participants when energy is scarce; this is not market power
  - When energy is not scarce, price is expected to be relatively low
- Focus on mitigating market power in non-scarce hours
  - Capture hours most susceptible to exercises of market power
  - Less concern about price with supply cushion is very low as market prices will rise to reflect conditions
- It is not desirable to undermine, over time, the incentive for market participants to make use of and benefit from engaging in forward transactions to hedge price risk
  - Forward commitments meaningfully impact the incentive to exercise market power

Overview of energy mitigation proposal

- The AESO will conduct an hourly ex ante test of market power
  - The hourly test will be based on a Pivotal Supplier Test
  - The test will not be run when the market is notably scarce
- If a firm passes the test, they can submit offers at any price
- If a firm fails the test, all their offer price will be capped at fuel cost or opportunity cost based Reference Price
  - The Reference Price is based on an estimate for operating cost or opportunity cost to allow participants to recover costs
  - Allow the recovery of all operating costs in the context of single-part offers, no central UC and related uplift costs
- All energy will be paid or pay the energy market clearing price
- Ex post monitoring and mitigation would continue

Economic withholding in the new market and an appropriate definition of “costs”

- If a firm passes the test, they can submit offers at any price
  - Firms that pass the test are not pivotal and as such would be considered not to have market power
  - Prices along the supply curve aid in reflecting market conditions instead of the market swinging from SRMC to price cap
  - While this may be economic withholding, it is not an unacceptable exercise of market power as the associated market conditions are expected to be competitive and all offers are at risk of dispatch
- If a firm fails the test, they can submit offers up to a reference price that will be set higher than SRMC
  - Offers can reflect operating costs including cycling
  - The model allows for recovery of operating costs from the energy market, subject to competitive market prices

Summary of energy mitigation proposal

- Pivotal Supplier Test: Residual Supplier Index (RSI)
  - Capture hours most susceptible to exercises of market power
  - RSI measures the importance of each firm to serving load
  - RSI = 0.9 would capture most egregious potential market power
- No-look Scarcity Test
  - Allows for scarcity price when supply cushion is very low
  - 500 MW is a reasonable threshold
- Reference Price
  - Allow the recovery of all operating costs in the context of single-part offers, no central unit commitment and related uplift costs
  - Function of marginal and commitment costs, expected operating characteristics

Pivotal Supplier Test

Pivotal Supplier Test: How to decide which offers / bids to mitigate

- The goal of the test is to capture the key hours that are most susceptible to the exercise of market power and will have high impact
- Measures the importance of a firm to serve load
  - Does the market need a firm's energy to meet demand; i.e., system supply less a firm's supply as fraction of market demand
- Residual Supplier Index (RSI) is a relevant metric

$$RSI_{it} = \frac{\sum_{j=1}^{n} Supply_{jt} + Imp_t - (Supply_{it} + Imp_{it} - Oblig_{it})}{Total\ Alberta\ Demand_t + Exp_t + Reserves_t}$$

Pivotal Supplier Test: RSI < 0.9 in the most egregious hours

- Issue is how to choose the level of RSI at which to determine that offers / bids should be considered for mitigation
- Allows market-based competition in most hours by focusing on the key hours when the structural ability to exercise market power is greatest
- RSI at 0.9 achieves these objectives. The supporting analysis and evidence is in the forthcoming slides. At an RSI of 0.9, the data shows:

  (A) Historic offers as a significant multiple of short-run marginal cost

  (B) High pool price hours tend to be identified by this RSI threshold

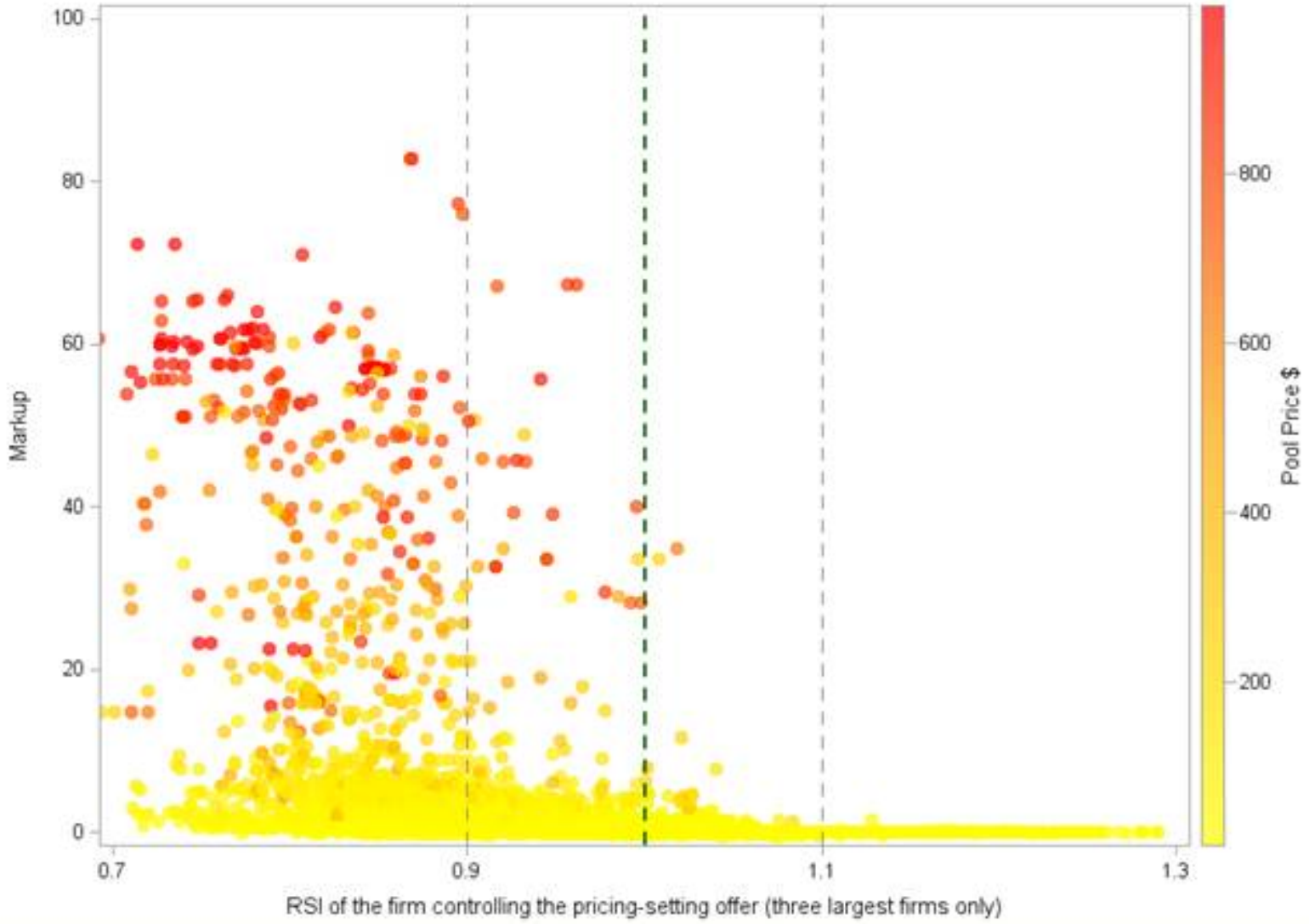
  - Few hours with high price-cost mark-ups as RSI increases

  (C) Larger firms fail the RSI test more often then smaller firms

Pivotal Supplier Test: (A) High mark-ups at low values of RSI

- Analysis using 2013 data demonstrated high mark-ups for low RSIs
- The figure on the next slide illustrates offer prices in 2013 as a multiple of short-run marginal cost (SRMC)
  - For each hour, the mark-up of the price-setting block is compared to the RSI of the firm that controlled this block
- Brattle considered that an RSI threshold between 0.9 and 1.1 would be necessary to identify firms with market power

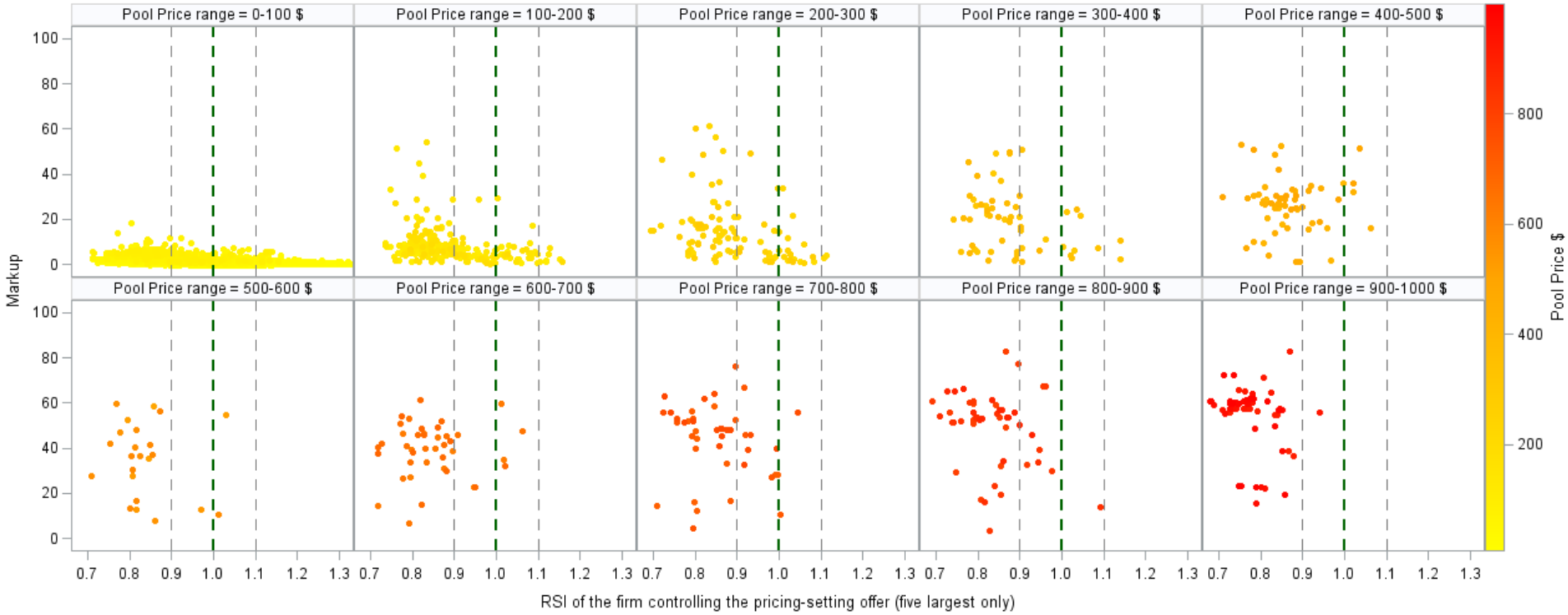
AESO Analysis: Pivotal Supplier Test: High mark-ups at low values of RSI



Pivotal Supplier Test:
(B) High pool prices at low values of RSI

- The figure on the next slide compares the RSI of the firm whose offer set the market price (if the firm was one of the largest five suppliers) to the mark-up of that offer (expressed as a multiple of SRMC)
  - Observations are organized into 10 bins by pool price
- High pool prices are more likely when the RSI of the price-setting firm is low
  - Relatively few hours with very high mark-ups that pass RSI test
  - At very high prices, most of the RSIs < 0.9 and would fail RSI test
  - At moderate prices, split of hours that pass and fail RSI test
  - At low prices, more are likely to have higher RSIs but many of these hours still have low RSIs (market power is present; many mark-ups exceed 10 times SRMC) and would fail the RSI test

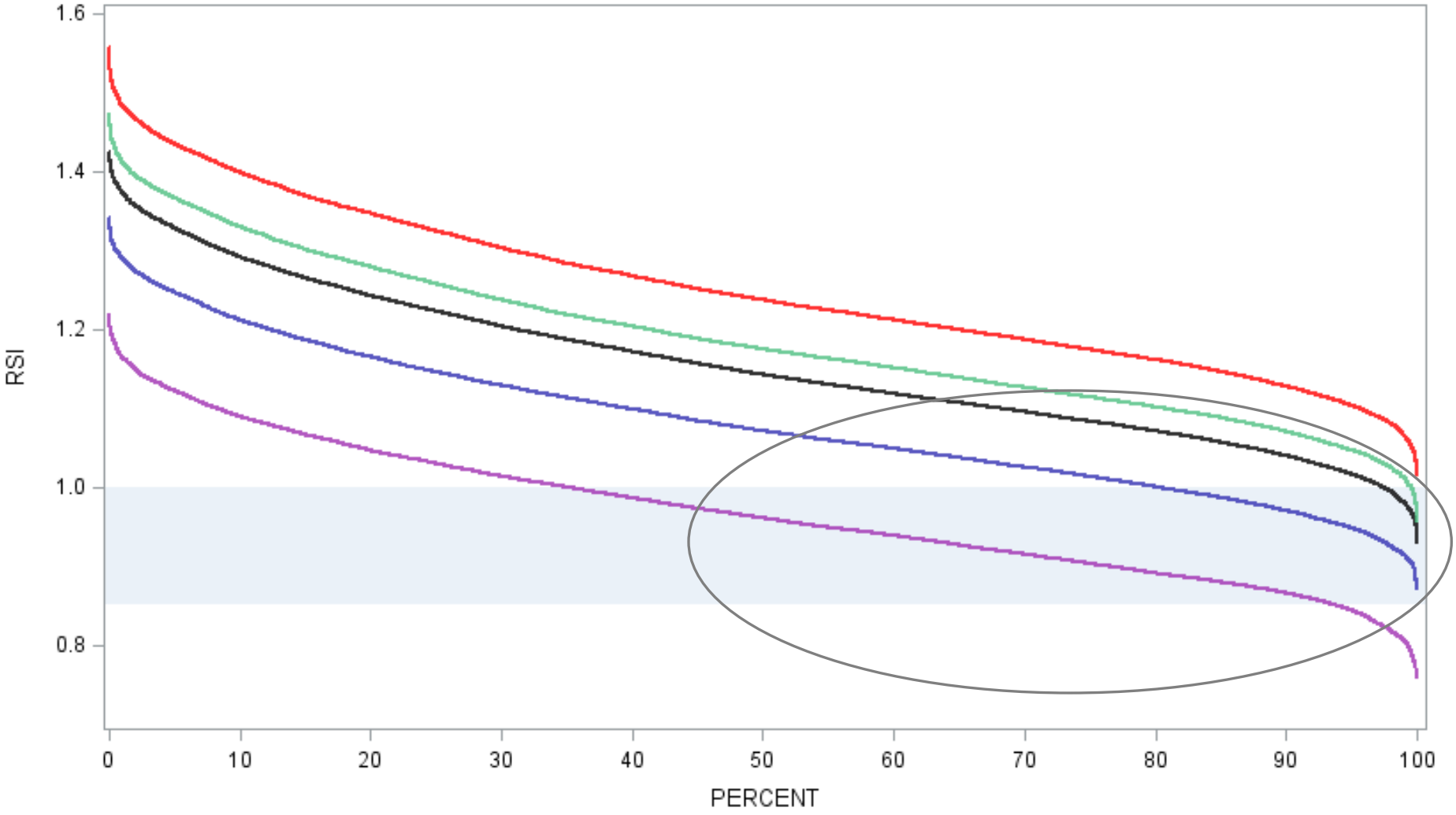
Pivotal Supplier Test:
High pool prices at low values of RSI



Pivotal Supplier Test: (C) Larger firms fail the test more often

- The next figure reports the RSI for each of the five largest firms
  - All hours of forecast year 2021: demand from AESO LTO (2017); offer control from MSA Market Share Offer Control Report (2017) with PPAs ignored; 1,200 MW of wind added
  - The shaded band is RSI from 0.85 to 1.0
- With RSI = 1.0:
  - Four largest firms fail the test in some hours; the fifth never does
  - Largest firm fails test in 65% of hours; historically market power was not significant in nearly this fraction of hours
- With RSI = 1.1:
  - All five firms fail test in some hours; largest in almost 90% of hours
  - Again, historically market power was not significant in nearly this fraction of hours

Pivotal Supplier Test:
Larger firms would fail the test more often



Pivotal Supplier Test: RSI = 0.9 captures most egregious hours

- With RSI = 0.9:
  - Only the three largest firms would ever fail the test
  - The largest firm would fail the test in ~25% of hours
- The AESO's view is that setting RSI = 0.9 would capture the hours with the most egregious potential for the exercise of market power
  - Larger firms would fail test more often
  - Only some firms will fail the test in a given hour
  - Higher RSI would limit large firms in more hours
  - There remains scope for competition in the energy market

Treatment of physical supply obligations in the calculation of Pivotal Supplier Test

- RSI will account for “net supply,” i.e., a firm’s supply net of its physical obligations
- Obligation reduces the ability to benefit from the exercise of market power
  - The inclusion of a physical obligation would be handled as set out in the RSI formula on an earlier slide
  - The impact of the inclusion of an obligation value would be to raise the value of RSI and make it more likely that a firm would pass the test
- Firms with quantifiable physical obligations such as dedicated supply (i.e., supplier purchases to serve its own load) can request pre-approval for their RSI calculations to be adjusted
- This request would be voluntary, monthly submissions and would be subject to verification / audit. A practical solution.

Pivotal Supplier Test: Summary

- Context is important: including single-part offers, no central UC and related uplift costs
  - Setting RSI threshold at 0.9 would capture the most egregious hours (as measured by, say, the price-cost mark-up)
  - Would not totally eliminate the exercise of market power or force the pool price to the marginal asset's SRMC
  - Low risk of harm from over-mitigation compared to higher RSI
    - With a higher RSI threshold, more hours would fail the test and potentially be subject to mitigation
- Process is available to adjust calculation for presence of a physical supply obligation

No-Look Scarcity Test

No-look Scarcity Test: Less concern when supply cushion is low

- If the supply cushion is low, essentially when D = S, the formula would fail all firms
  - Pivotal Supplier Test is ineffective as all firms become pivotal
- Preliminary step in monitoring and mitigation
  - When the energy market is relatively tight, we want and expect the pool price to reflect this scarcity by being relatively high
    - No further testing of market power if market is relatively tight
    - Price is still a result of competition; not at an administered price level
    - Note: These are not conditions where the market is physically short
- When the market is this tight (or nearly this tight), we want the market itself to price scarcity and not impede competition
  - Issue is finding a level that is reasonable
  - Visibility to market conditions required as well

No-look Scarcity Test: 500 MW is a reasonable threshold

- In scarcity situations:
  - All firms become pivotal as the supply cushion approaches zero, there is need for a preliminary step
  - At a supply cushion of zero, each firm's RSI is less than 1.0 (follows from the definition of RSI) and would fail the RSI test
- 500 MW is a reasonable threshold
  - Approximately equivalent to MSSC, but not so tight that we are near emergency conditions.
- Supporting analysis and evidence (forthcoming slides):

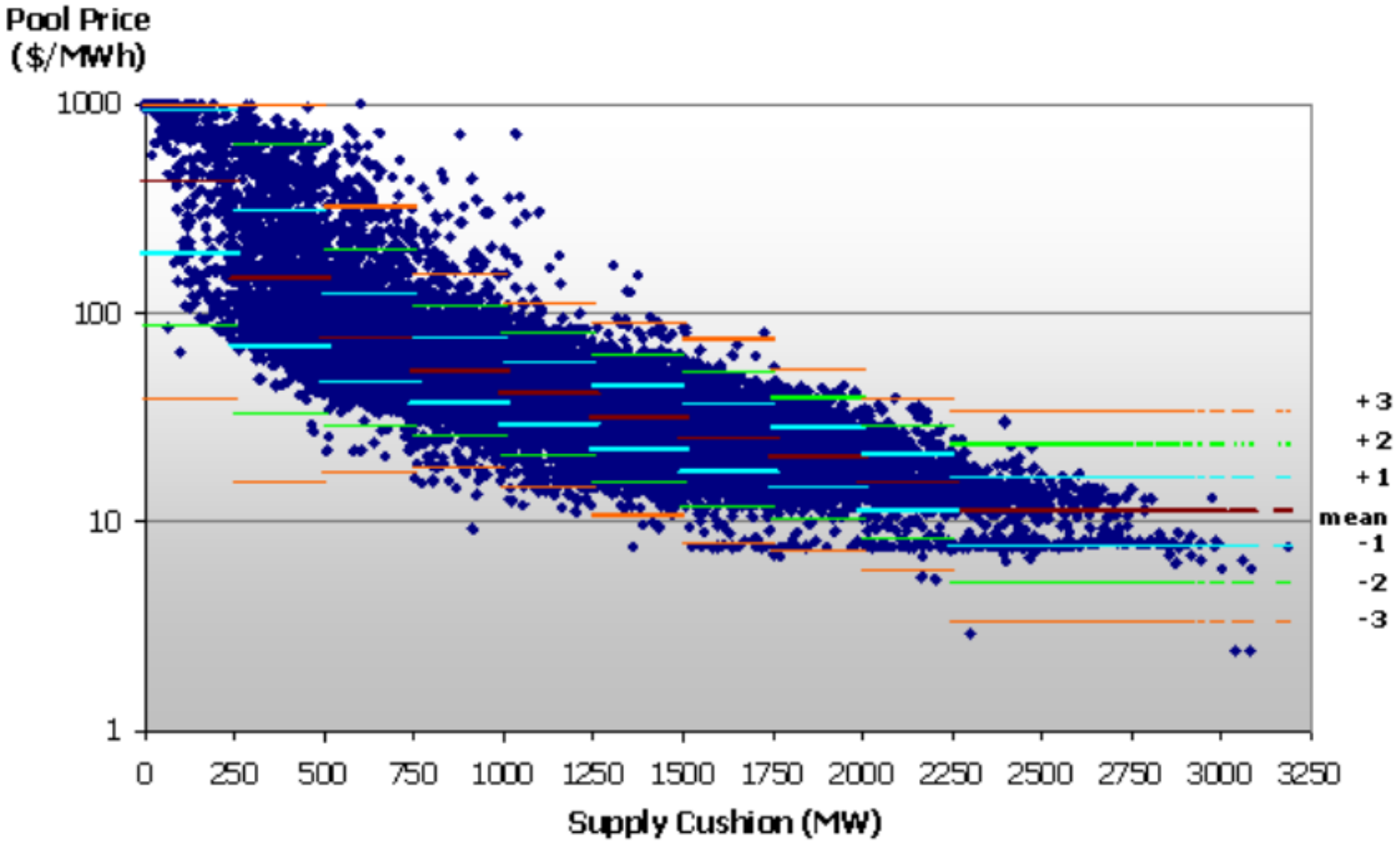
  (A) Assessment of pool price-supply cushion outliers in historical (mostly pre-OBEG era) market data

  (B) Assessment of supply cushion and RSI

No-look Scarcity Test: (A) No historical pool price outliers at low supply cushion

- The figure on the next slide compares historical pool price and supply cushion data
  - Variation of pool price within a set of supply cushion bins
  - Mean and standard deviations of pool price in each bin
- In low supply cushion bins, the market is competitive and prices reflect scarcity therefore there is no need to run a test
  - Three standard deviations above the mean includes the price cap for bins where supply cushion is less than 500 MW, i.e., no high pool price outliers in these hours meaning price reflects scarce supply
  - When supply cushion is greater than 500 MW there are high pool price outliers, i.e., pool prices greater than can be explained by scarce supply
  - Not related to the calculation of Reference Price
- 500 MW is a reasonable threshold

No-look Scarcity Test:
No historical pool price outliers at low SC

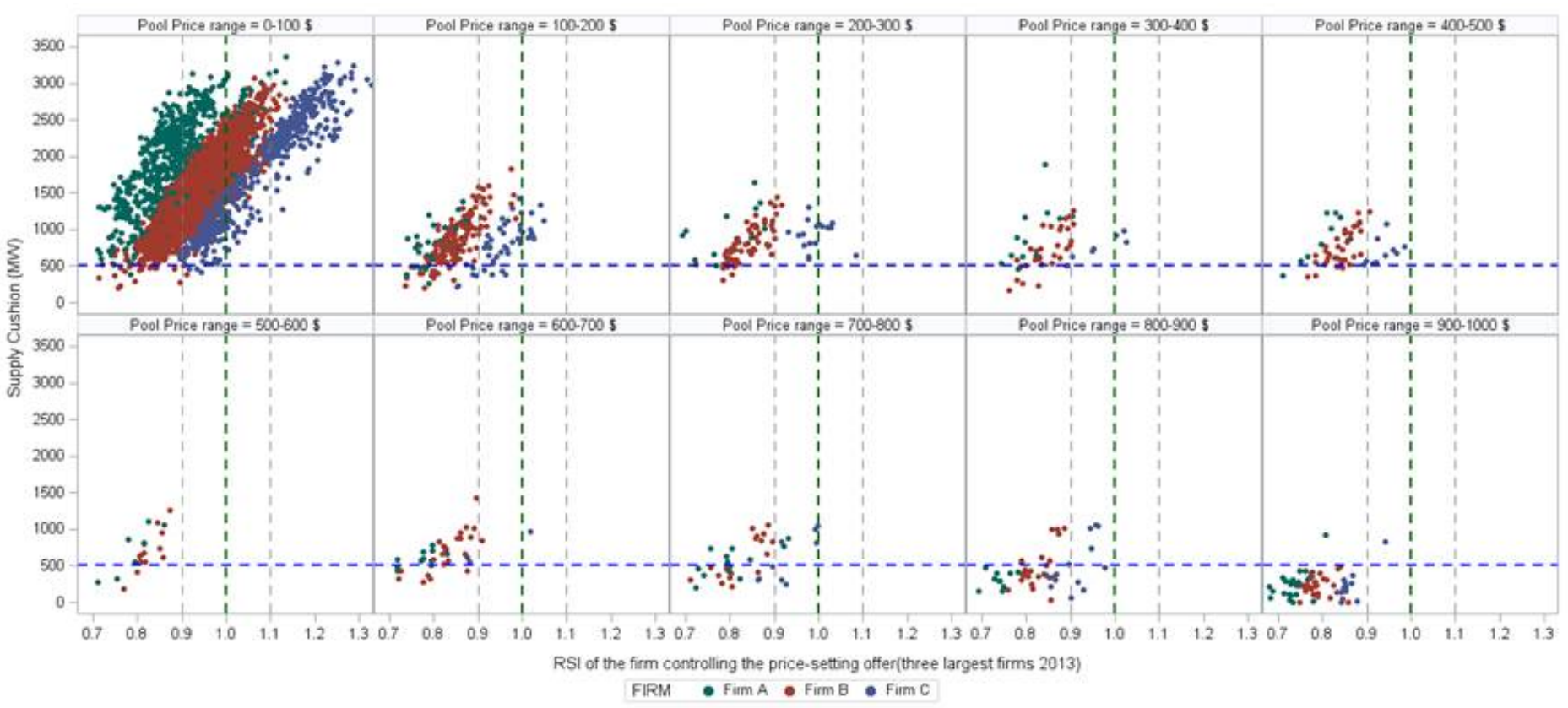


Source: MSA (2012)

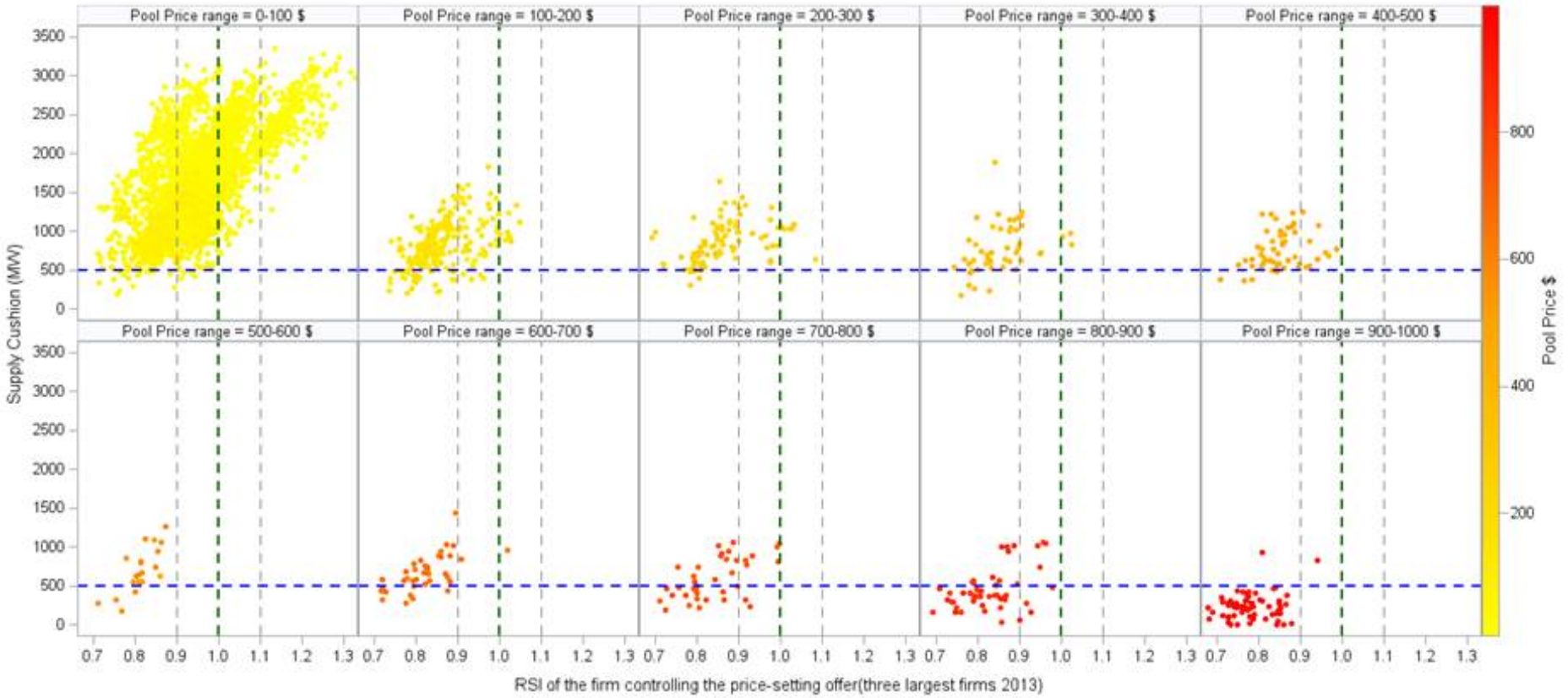
No-look Scarcity Test: (B) At low SC all firms become pivotal

- The figure on the next slide compares the RSI of the firm that controls the price-setting block (if they are one of the three largest firms) to the supply cushion using data from 2013
  - Data organized into groups by pool price ($0 to $99.99, and so on)
  - Relatively few hours have a supply cushion less than 500 MW
  - Most extremely high pool price hours would be exempted by the no-look scarcity test with a 500 MW threshold; however, nearly all of these have very low supply cushions
    - AESO does not want to risk over-mitigating in these hours
    - When the supply cushion is very low, a high pool price signals scarcity and provides a strong incentive for loads to avoid consumption, imports to be scheduled, and exports not to be scheduled
  - Hours that had moderately high pool prices would generally not be exempted from mitigation by the no-look scarcity test

No-look Scarcity Test:
At low SC all firms become pivotal



No-look Scarcity Test: High prices are set when SC is low and by firms with low RSI



Corollary of Pivotal Supplier and No-look Scarcity Tests: No mitigation of small firms

- Firms that have less capacity than the No-Look Scarcity level will not fail the Pivotal Supplier Test when the supply cushion is greater than the No-look Scarcity Level
  - Firms with less than 500 MW of capacity will not be subject to mitigation as they will always pass the RSI test at 0.9
  - No additional test is required for this result

Interaction of Pivotal Supplier Test and No-look Scarcity Test

- In CMD 1.0 the AESO proposed:
  - RSI threshold at 0.9, analysis on no-look scarcity test incomplete
- If the AESO is to proceed with a no-look scarcity test, setting the RSI threshold to 1.0 may be more appropriate
  - The no-look scarcity threshold at 500 MW avoids mitigation when the market is tight
  - Firms that pass the screen have historically been the firms that price up the curve to reflect changing market conditions
  - When the market is very competitive, the pool price is pressed toward SRMC

Interaction of Pivotal Supplier Test and No-look Scarcity Test

- RSI threshold to 1.0
  - Aligned with other jurisdictions (at 1.0 or 1.1)
  - The rate at which firms fail the RSI test would increase
  - In the 2013 supply cushion-to-RSI comparison:
    - The largest two firms would have failed this version of the RSI test in every hour in which the pool price exceeded $100/MWh
    - The third largest firm would have failed this version of the RSI test in most hours in which the pool price exceeded $100/MWh
  - In the 2013 mark-up-to-RSI comparison:
    - RSI = 1.0 would capture almost all hours where the price-setting block was marked-up to greater than five times its marginal cost

Reference Price

Reference Price for firms that fail the Pivotal Supplier Test

- A firm's offer prices are unmitigated if either or both:
  - They pass the Pivotal Supplier Test (RSI > 0.9)
    - These are small suppliers
  - Supply is scarce at the market level (supply cushion < 500 MW)
- Firms that fail the hourly RSI test will have their offer prices capped at an asset-specific Reference Price
  - Reference Price is based on operating costs
  - Data will be submitted to the AESO, including marginal cost (fuel, carbon, and VOM) and cycling costs as in the formula to follow
- Mitigated offer prices will be used in the energy market merit order and can set the System Marginal Price
  - All generation will be paid the pool price as today

Setting the Reference Price

- For mitigated firms, offers are accepted to a cost based reference level reflecting operating costs or opportunity costs.
- Setting an acceptable level
  - Called the Reference Price
- Context
  - Single-part offers / bids, i.e., no mechanism is being considered to provide out-of-market payments funded by an uplift charge for non-marginal operating costs such as commitment costs
  - Self-scheduling, i.e., firms decide on their own if energy market revenue is likely to be sufficient to recover commitment costs including cycling

Competitive energy market should allow the recovery of all operating costs

- Do not want to prevent operating costs from being recoverable from the energy market
  - These are costs that would be avoided by the generator if it did not run, including fuel, environmental, and commitment costs
  - Must be enough energy revenue to cover operating costs so to incentivize following dispatch
- If the market is competitive, firms should offer at prices equal to or less than the Reference Price on their own
  - Even if they fail the RSI test, their offers would not be changed

Reference Price:
Formula based on physical characteristics

- For thermal assets the Reference Price for asset *j* in delivery hour *t* (RP_{jt}) will be defined by the following formula:

$$RP_{jt} = \alpha * \left(HR_j * FP_{jt} + VOM_j + Carbon\ Cost_j\right)$$

  - HR_i is the heat rate of asset j
  - FP_{jt} is the fuel price relevant to asset j in delivery hour t
  - VOM_j is the variable operating and maintenance cost of asset j
  - $Carbon\ Cost_j$ is the marginal carbon cost of asset j

- The AESO proposes to have minimum Reference Price of $25/MWh
  - Want to avoid rare circumstances where the formula could set extremely low, perhaps even negative, reference prices; e.g., natural gas prices could be negative on a given day

Reference Price:
Formula based on physical characteristics

- Definition of *cost* must be consistent with market model: self-commitment and single part bid
- The parameter α is selected to recognize that a fuel based cost is insufficient to reflect other costs like cycling
  - Based on the following analysis, a reasonable value for α is 3
  - This is not a permissive view of market power; rather, it is a realistic approach to dealing with market power in the context of the market structure and tools that we actually have
- Supporting analysis and evidence (forthcoming slides):

  (A) Impact of mitigation on level of net CONE

  (B) Comparison of marginal and average cost
  - The need for average energy revenue per unit of production to exceed the marginal cost of energy

Reference Price:
(A) Impact of mitigation on level of net CONE

- In the table on the next slide, Brattle estimated the amount of net energy revenue would have been earned historically based various mitigation assumptions
  - Mitigation stabilizes net revenue across different types of years
  - Likely stabilizes expectations of net revenue in the future and therefore net CONE and capacity market prices
  - With mitigation as specified, net CONE is always positive
- The results show that this approach to mitigation provides for recovery of operating costs from the energy market

Reference Price:
Impact of mitigation on level of net CONE

Generic New Combined Cycle (heat rate = 6,700)

	[a]	Net Energy Revenues ($/kW-year)								Net CONE ($/kW-yr) = [a]-[b]							
	Gross CONE	At cost	1.2x Band	2x Band	3x Band	$400 Cap	$600 Cap	$800 Cap	Unmitigated	At cost	1.2x Band	2x Band	3x Band	$400 Cap	$600 Cap	$800 Cap	Unmitigated
2013	$190.0	$6.8	$15.0	$43.5	$79.4	$309.4	$388.9	$446.2	$474.9	$183.2	$175.0	$146.5	$110.6	-$119.4	-$198.9	-$256.2	-$284.9
2014	$190.0	$4.8	$11.6	$26.3	$44.5	$115.1	$144.6	$167.8	$176.2	$185.2	$178.4	$163.7	$145.5	$74.9	$45.4	$22.2	$13.8
2015	$190.0	$2.4	$6.4	$17.3	$25.2	$68.4	$87.4	$103.7	$110.4	$187.6	$183.6	$172.7	$164.8	$121.6	$102.6	$86.3	$79.6
2016	$190.0	$1.7	$4.0	$7.7	$9.1	$10.2	$10.6	$11.0	$11.4	$188.3	$186.0	$182.3	$180.9	$179.8	$179.4	$179.0	$178.6

Generic New Simple Cycle (heat rate = 9,600)

	[a]	Net Energy Revenues ($/kW-year)								Net CONE ($/kW-yr) = [a]-[b]							
	Gross CONE	At cost	1.2x Band	2x Band	3x Band	$400 Cap	$600 Cap	$800 Cap	Unmitigated	At cost	1.2x Band	2x Band	3x Band	$400 Cap	$600 Cap	$800 Cap	Unmitigated
2013	$140.0	$3.5	$7.2	$31.8	$60.0	$290.0	$369.5	$426.8	$455.5	$136.5	$132.8	$108.2	$80.0	-$150.0	-$229.5	-$286.8	-$315.5
2014	$140.0	$1.5	$4.0	$14.0	$23.6	$92.6	$122.0	$145.2	$153.7	$138.5	$136.0	$126.0	$116.4	$47.4	$18.0	-$5.2	-$13.7
2015	$140.0	$1.4	$3.4	$12.3	$19.2	$62.4	$81.4	$97.7	$104.4	$138.6	$136.6	$127.7	$120.8	$77.6	$58.6	$42.3	$35.6
2016	$140.0	$1.8	$3.1	$6.0	$7.0	$8.2	$8.6	$9.0	$9.3	$138.2	$136.9	$134.0	$133.0	$131.8	$131.4	$131.0	$130.7

Source: Brattle Group, “Assessment of bid mitigation options,” November 21, 2017, EAS WG #11

Reference Price Level:
(B) Comparison of average and marginal cost

- The table on the next slide reports a comparison of estimated commitment and marginal costs
  - Data in green are adapted from CMD 1.0 Rationale Document, Section 10, Table 1, p. 13
  - The AESO has added analysis of sensitivity of the ratio of average to marginal cost to change of the run time assumption
- Observations and results:
  - The key point is that with single-part offers and no uplift mechanism to recover start-up or other similar costs, generators which need to recover such costs will not be able to if they are only paid SRMC
  - Specifically, the marginal unit will need more; the infra-marginal units are already being paid a pool price that is greater than their offer price but even this may not allow cost recovery if their offer price is their SRMC

Ratio of average to marginal cost is highly sensitive to the run time assumption

- The longer the assumed run time, the lower the ratio of average to marginal cost
  - The reason is that the start-up and shut-down costs are averaged over a greater amount of production
- Simple cycle units typically have the highest ratio
  - Based on an assumed run-time of 30 minutes, ratio is 2.73
    - If this assumption is appropriate, then a reasonable value for α is 3
  - Based on an assumed run-time of 4 hours, ratio is 1.22
    - If other assumptions are appropriate, then the value of α that is most appropriate may be different
- The AESO is continuing to review the inputs to this analysis
  - Particular emphasis on what run times are reasonably expected to occur in the future

Reference Price:
Average cost is greater than marginal cost

Plant Type	Start-up Cost	Shut-down Cost	No-load Cost	Total Commit-ment Cost	Marginal Cost	Output @ Full Load	Average Incremental Output	Assumed Run Time @ Full Output	Total Cost	Average Cost	Ratio of Average to Marginal Cost
	$/cycle	$/cycle	$/cycle	$/cycle	$/MWh	MW	MW	hours	$/cycle	$/MWh	
CC (hot start)	$9,160	$2,062	$24,883	$36,105	$17.28	400	240	9	$73,430	$20.40	1.18
CC (hot start)	$9,160	$2,062	$44,237	$55,459	$17.28	400	240	16	$121,814	$19.03	1.10
CC (cold start)	$25,808	$2,062	$24,883	$52,753	$17.28	400	240	9	$90,078	$25.02	1.45
CC (cold start)	$25,808	$2,062	$44,237	$72,107	$17.28	400	240	16	$138,462	$21.63	1.25
Coal (hot start)	$14,688	$2,707	$1,528,320	$1,545,715	$15.92	400	240	600	$3,838,195	$15.99	1.00
Coal (hot start)	$14,688	$2,707	$764,160	$781,555	$15.92	400	240	300	$1,927,795	$16.06	1.01
Coal (cold start)	$39,708	$2,707	$2,044,128	$2,086,543	$15.92	400	186	600	$3,863,215	$16.10	1.01
Coal (cold start)	$39,708	$2,707	$1,022,064	$1,064,479	$15.92	400	186	300	$1,952,815	$16.27	1.02
SC	$2,146	$0	$0	$2,146	$24.88	100	100	0.25	$2,768	$110.72	4.45
SC	$2,146	$0	$0	$2,146	$24.88	100	100	0.5	$3,390	$67.80	2.73
SC	$2,146	$0	$0	$2,146	$24.88	100	100	1	$4,634	$46.34	1.86
SC	$2,146	$0	$0	$2,146	$24.88	100	100	2	$7,122	$35.61	1.43
SC	$2,146	$0	$0	$2,146	$24.88	100	100	4	$12,098	$30.25	1.22
SC	$2,146	$0	$0	$2,146	$24.88	100	100	6	$17,074	$28.46	1.14

Opportunity cost: Defining cost for non-thermal resources

- Opportunity cost methodology for non-thermal resources
  - Hydroelectric, imports, and storage
- Options for calculating opportunity cost include
  - Formula based on market prices in Alberta or elsewhere
  - Asset-specific modelling and/or submissions by market participant
- The AESO prefers a formula approach because:
  - It uses market-based parameters
    - Can be limited to use of publicly-available data
  - Is less intrusive and more objective, predictable, and transparent than modelling- and submission-based approaches

Potential methodologies for defining the Reference Price for non-thermal resources

- Based on recent historical or forward prices in Alberta
  - Proposal:

$$RP_{jt} = \mathrm{A} * (30\mathrm{Ravg})$$

  - where 30Ravg is the 30-Day Rolling Average Pool Price
  - For the reasons above, a reasonable value for A is 3
- Based on current prices elsewhere
  - One suggested approach

$$RP_{jt} = MidC(on\ peak) + \min\{100, 3 * MidC(on\ peak)\}$$

  - Subject to a minimum Reference Price of $25/MWh
- As with thermal assets, the AESO proposes to have minimum Reference Price of $25/MWh

Ex post monitoring would continue

- The existence of mitigation, whether it affects offer prices in a given delivery hour or not, does not remove the role of ex post monitoring
- Since the mitigation scheme is intended to be part of a competitive energy market that allocates resources efficiently, conduct whose purpose is to evade the mitigation scheme would not be consistent with supporting a fair, efficient and openly competitive electricity market

Implementation

Implementation: ISO rule changes

- Capacity-committed loads will have to declare offer control
- Earlier submission of offer control will be necessary for tests
- Offers with multiple offer control parties
- Voluntary treatment of obligations
- Calculation of Reference Price
- Mitigation process
  - Test run at T-2
  - Change offers if tests failed as soon as practical
  - Inform offer control parties of change
  - Use mitigated offers in energy market merit order

Implementation:
Market data and transparency

- Supply cushion report
- Merit Order Snapshot Report - Energy will include mitigated data
  - Should a column be added to indicate whether mitigation occurred?
    - Could reveal inputs of the Reference Price formula
  - Periodic reporting on scale and degree of mitigation (self-mitigation would be unobserved)
- Other reports?

Summary – Comment matrix

Comment matrix

- Concepts already discussed
  - Pivotal supplier test, scarcity screen, reference cost level
  - Threshold for RSI
  - Reference Price that allows recovery of operation costs
- Request input on
  - Nature of voluntary model for physical obligation submissions
  - Scarcity test set at 500 MW, based on market data
    - Change of RSI from 0.9 to 1.0
  - Opportunity cost based on formula
  - Modelling assumptions
  - Implementation
  - Reporting

Questions?

Thank you