Offer Price Mitigation in the Western EIM

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Folsom, California
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TOPICS

- Conduct and Impact Test in NYISO and MISO
- Competitive LMP Mitigation Floor
- Offer Price Mitigation in the Western EIM

CONDUCT AND IMPACT TEST MITIGATION

The NYISO and MISO apply distinct conduct and impact test based market power mitigation designs to resources located in constrained regions (termed NCAs in MISO) and to resources located in relatively unconstrained regions (termed BCAs in MISO).

- The conduct and impact thresholds applied to resources located outside constrained regions are significantly wider than those applied within constrained regions.

NYISO THRESHOLDS

The NYISO has conduct and impact thresholds for generators located outside constrained areas. This mitigation can only be applied after the fact: [1]

- Energy and minimum load bids – an increase exceeding 300% or $100 per megawatt hours, whichever is lower, except for offers less than $25 per megawatt hour;

- Start up costs – a 50% increase over reference;

The impact thresholds are the same as the conduct thresholds. [2]

1. NYISO Tariff, Attachment H, Section 23.3.1.2.1
2. NYISO Tariff, Attachment H, Section 23.3.2.1

NYISO THRESHOLDS

The NYISO's conduct and impact thresholds for energy and minimum load bids in constrained areas are defined by the formula: [1]

(2% * Average price *8760)/constrained hours

For energy and minimum load bids for the day-ahead and real-time markets, where:

- The average price is the fuel price adjusted average price over the prior 12 months for the real-time or day-ahead market as applicable during intervals when an interface or constraint into the area is binding

- Constrained hours is the number of hours in the prior year when an interface or constraint into the area was binding.

1. NYISO Tariff, Attachment H, Sections 23.3.1.2.2.1 and 23.3.2.1

NYISO THRESHOLDS

The real-time thresholds for November 2016 calculated using the formula above are shown below.

REAL TIME IN CITY LOAD POCKET THRESHOLDS			
Name	Adjusted LPTs from 11/15/16 HB 0 through Future	Weighted Price from 11/1/15 through 10/31/16	Constrained Hours from 11/1/15 through 10/31/16
DUNWOODIE SOUTH	$51.77	$20.56	141
STATEN ISLAND	$36.80	$20.21	195
EAST RIVER	$46.30	$18.39	141
IN CITY 345/138	$24.25	$21.44	314
ASTORIA EAST/COR/JAMAICA	$20.69	$18.31	314
ASTOR WEST/QUEENB/VERNON	$19.70	$18.48	333
ASTORIA WEST/QUEENSBRIDG	$19.66	$18.45	333
VERNON/GREENWOOD	$26.25	$23.21	314
GREENWOOD/STATEN ISLAND	$9.80	$23.87	864

http://www.nyiso.com/public/webdocs/markets_operations/services/market_monitoring/Load_Pocket_Thresholds/Real-Time/2016/RT_LPTs_November_2016_WEB.pdf

NYISO THRESHOLDS

The real-time thresholds for June 2018 calculated using the formula above are shown below.

REAL TIME IN CITY LOAD POCKET THRESHOLDS			
Name	Adjusted LPTs from 6/15/18 HB 11 through Future	Weighted Price from 6/1/17 through 5/31/18	Constrained Hours from 6/1/17 though 5/31/18
DUNWOODIE SOUTH	$6.38	$31.83	916
STATEN ISLAND	$6.10	$31.05	934
EAST RIVER	$5.76	$28.74	916
IN CITY 345/138	$4.13	$33.06	1471
ASTORIA EAST/COR/JAMAICA	$3.54	$28.49	1475
ASTOR WEST/QUEENB/VERNON	$3.64	$29.39	1482
ASTORIA WEST/QUEENSBRIDG	$3.62	$29.29	1482
VERNON/GREENWOOD	$4.44	$35.63	1471
GREENWOOD/STATEN ISLAND	$3.38	$36.46	1978

http://www.nyiso.com/public/webdocs/markets_operations/services/market_monitoring/Load_Pocket_Thresholds/Real-Time/2018/RT-LPTs-June-2018-WEBpdf

MISO THRESHOLDS

MISO conduct and impact thresholds are similar to those of the NYISO. The conduct thresholds for Broad Constrained Areas are: [1]

- Energy and minimum generation offers – a 300% or $100 per megawatt hour increase, whichever is lower, excluding offers of less than $25 per megawatt hour;

The impact test is an increase of 200% or $100 per megawatt hour, whichever is lower, for price impacts in a Broad Constrained Area. [2]

1. MISO Module D, Section 64.1.2a
2. MISO Module D, Section 64.2.1

MISO THRESHOLDS

The MISO also has conduct and impact thresholds for energy offer prices in narrow constrained areas.

Both the conduct and impact thresholds for narrow constrained areas are determined based on the formula: [1]

(Net annual fixed costs per megawatt hour for a new peaking unit) /(total number of constrained hours for the narrow constrained area over the period 12 month period).

The fixed costs are calculated net of energy and ancillary service market revenues and resource adequacy revenues.

The number of constrained hours used in the denominator is capped at 2000 hours.

1. MISO Module D Section 64.1.2c and MISO Module D, Section 64.2.1

MISO THRESHOLDS

MISO Narrow Competitive Area Thresholds 2014-2018

($ per megawatt hour)

	2014	2015	2016	2017	2018
WUMS	$87.31	$47.86	$25.73	$28.42	$27.74
North WUMS	$62.08	$26.74	$22.31	$25.88	$19.63
SE Minnesota/N Iowa/ SW Wisconsin	$23.78	$31.88	$43.83	$46.64	$61.52
Amite South	$31.20	$50.74	$100.00	$100.00	$100.00
WOTAB	$30.89	$19.04	$31.86	$62.49	$53.19

https://cdn.misoenergy.org/2018_NCA_Threshold_Update210208.pdf
https://cdn.misoenergy.org/2017%20NCA%20Threshold102560.pdf
https://cdn.misoenergy.org/2016%20NCA%20Thresholds102555.pdf

MISO THRESHOLDS

The NYISO and MISO constrained areas correspond to congestion within a region similar in size to an EIM balancing area.

- The MISO WUMS region is similar in size to many EIM BAAs, with a forecast coincident peak load of 12,203.6 megawatts. [1]
- Zone J in New York is comparable in size to many EIM balancing areas with 9666.5 megawatts of generating capacity as of summer 2018 and an expected non-coincident peak load of 11,539 megawatts for summer 2018. [2]

1. See MISO, Final PRA Preliminary Data, March 16, 2018., p. 4.
2. Source: NYISO 2018 Load & Capacity Data (Gold Book) Tables I-4a and III-3A

CONDUCT AND IMPACT DESIGNS

Additional information pertaining to conduct and impact test thresholds in SPP and ISO New England, as well as in NYISO and MISO, is available in a presentation prepared for the Ontario IESO at:

http://www.ieso.ca/en/sector-participants/market-renewal/market-renewal-single-schedule-market

Scott Harvey and Susan Pope, Module G: Market Power Mitigation Appendix, June 29, 2017

COMPETITIVE LMP

The competitive constraint LMP mitigation floor is an important element of the overall California ISO market power mitigation design. It is intended to place a floor on mitigated offer prices at the price level that would have prevailed if the non-competitive constraint did not bind.

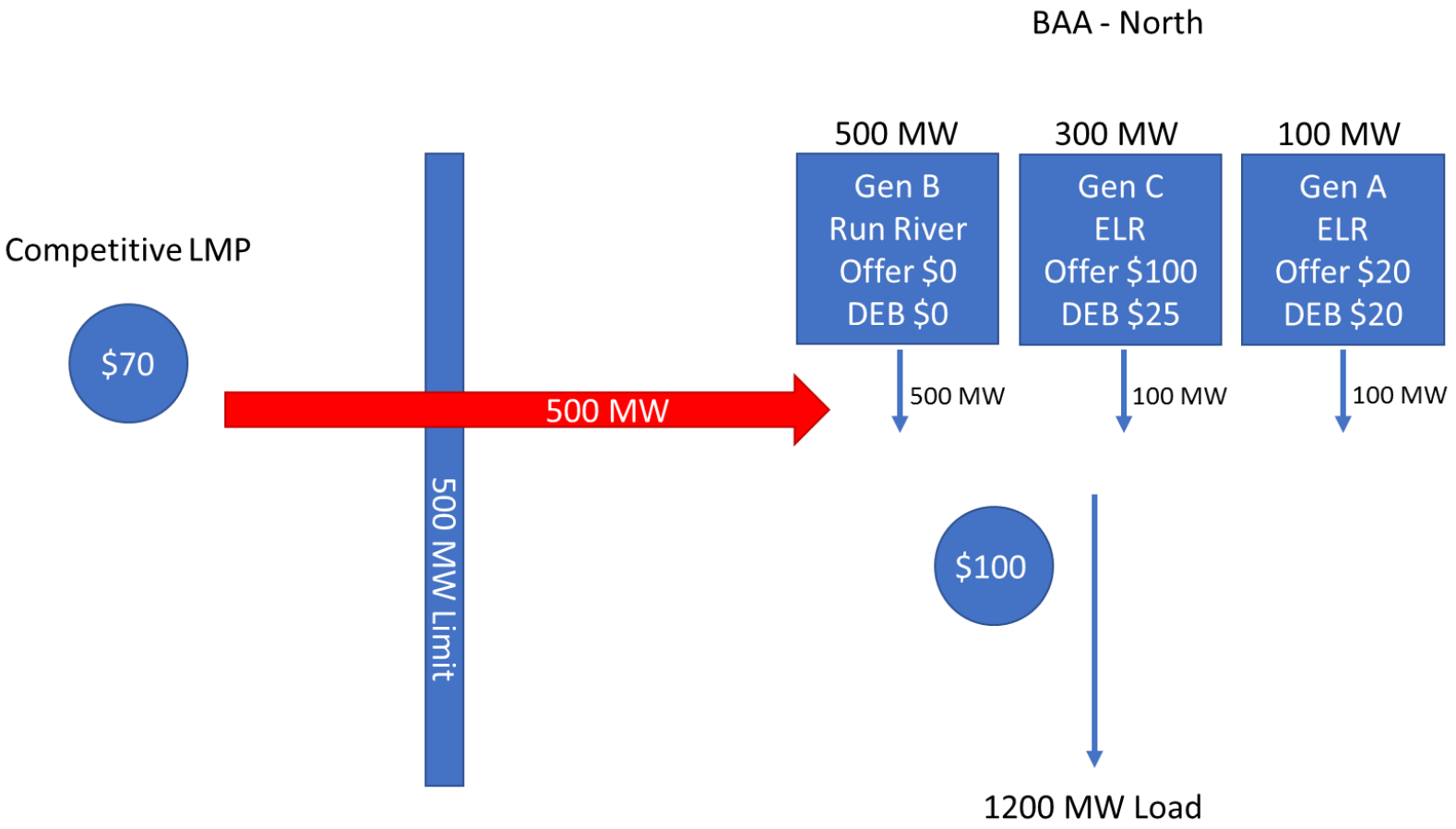
- This design would avoid the application of offer price mitigation within an import constrained BAA having the effect of reducing offer prices below the price level outside the BAA, (with the result that imports into the BAA would be reduced and possibly even turned into exports in the mitigated dispatch).

- This outcome appears, however, to be precisely what is happening in the Western EIM, with the offer prices of resources located within a constrained area being mitigated to such a low level that the import constraint that triggered mitigation does not even bind in the mitigated dispatch.

COMPETITIVE LMP

In this example, the competitive LMP in the unmitigated pass, setting the shadow price of the BAA constraint to $0, would be $70.

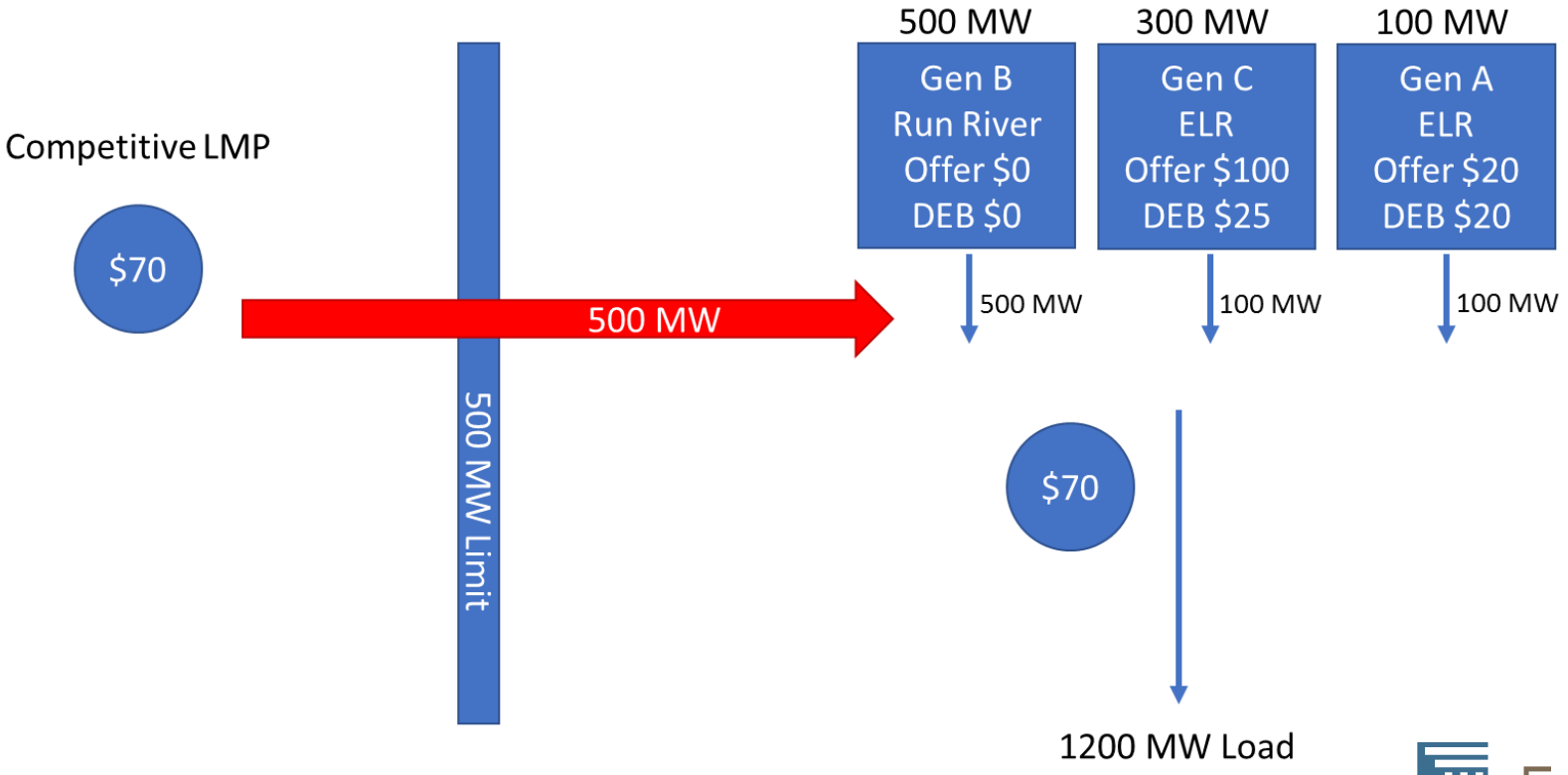
Figure 1



COMPETITIVE LMP

If the $70 competitive LMP were used for mitigation, the energy limited resource C would be dispatched in the mitigated dispatch at an offer price of $70, rather than $100, lowering the LMP price within the BAA.

Figure 2



COMPETITIVE LMP

If the $70 competitive LMP in the binding interval were used for mitigation, factors such as flat portions of the import supply curve, MIP gap, and similar special considerations could cause the import constraint to not bind in the mitigated dispatch, but imports in the mitigated dispatch would generally be very close to the level in the unmitigated dispatch.

- The primary impact of mitigation would be on the settlement price.
- There could also be changes in the dispatch order within the constrained region as a result of mitigation.

COMPETITIVE LMP

The intent of the competitive constraint LMP mitigation floor is to avoid the application of offer price mitigation within an import constrained BAA having the effect of reducing offer prices below the price level outside the BAA.

- This appears, however, to be what is happening in the Western EIM, with the offer prices of resources located within a constrained area being mitigated to such a low level that the constraint no longer binds or the constrained area even becomes an export area in the mitigated dispatch.

- It is important to understand why the competitive constraint LMP mitigation floor is not operating as intended so these unintended outcomes can be avoided or at least reduced.

COMPETITIVE LMP

Avoiding undue latency in the real-time dispatch requires that mitigation be applied based on the advisory dispatch interval of the prior RTD run.

- With this design there is an inherent potential for the competitive LMP used for mitigation to be somewhat higher or lower than what the competitive LMP in the binding interval would have been.
- In the current, California ISO implementation, however, the competitive LMP may be calculated for a completely different dispatch interval, possibly 40 or more minutes earlier.
- During periods when the dispatch price is rising, such as during the evening ramp, this implementation design can result in a mitigation floor that is materially less than the competitive LMP in the binding or advisory RTD dispatch interval.

COMPETITIVE LMP

There are several elements of the California ISO tariff that create this disconnect between the competitive LMP used for mitigation and what the actual competitive LMP in the RTD interval would have been.

Section 34.1.5.4 “If a Bid is mitigated in the MPM process for the first five (5) minute interval for an applicable fifteen-minute (15) RTUC interval, the mitigated Bid will be utilized for all the corresponding RTD intervals in that fifteen-minute (15) RTUC interval.”
Section 34.1.5.2 “For each Trading Hour, any Bid mitigated in a prior fifteen (15) minute interval of that Trading Hour will continue to be mitigated in subsequent intervals of that Trading Hour and may be further mitigated as determined in the MPM runs for any subsequent fifteen (15) minute interval.”
It is my understanding that in the current California ISO software the competitive LMP calculated for the first RTUC interval of the hour would be used through the hour, in every RTD interval, if mitigation were triggered in the first RTUC interval.

COMPETITIVE LMP

This approach to calculating the competitive LMP means that RTD offer prices for intervals 45-50; 50-55 and 55-60 could be calculated based on the competitive LMP for interval 0-15, calculated in the RTUC run initiating at t-37.5.

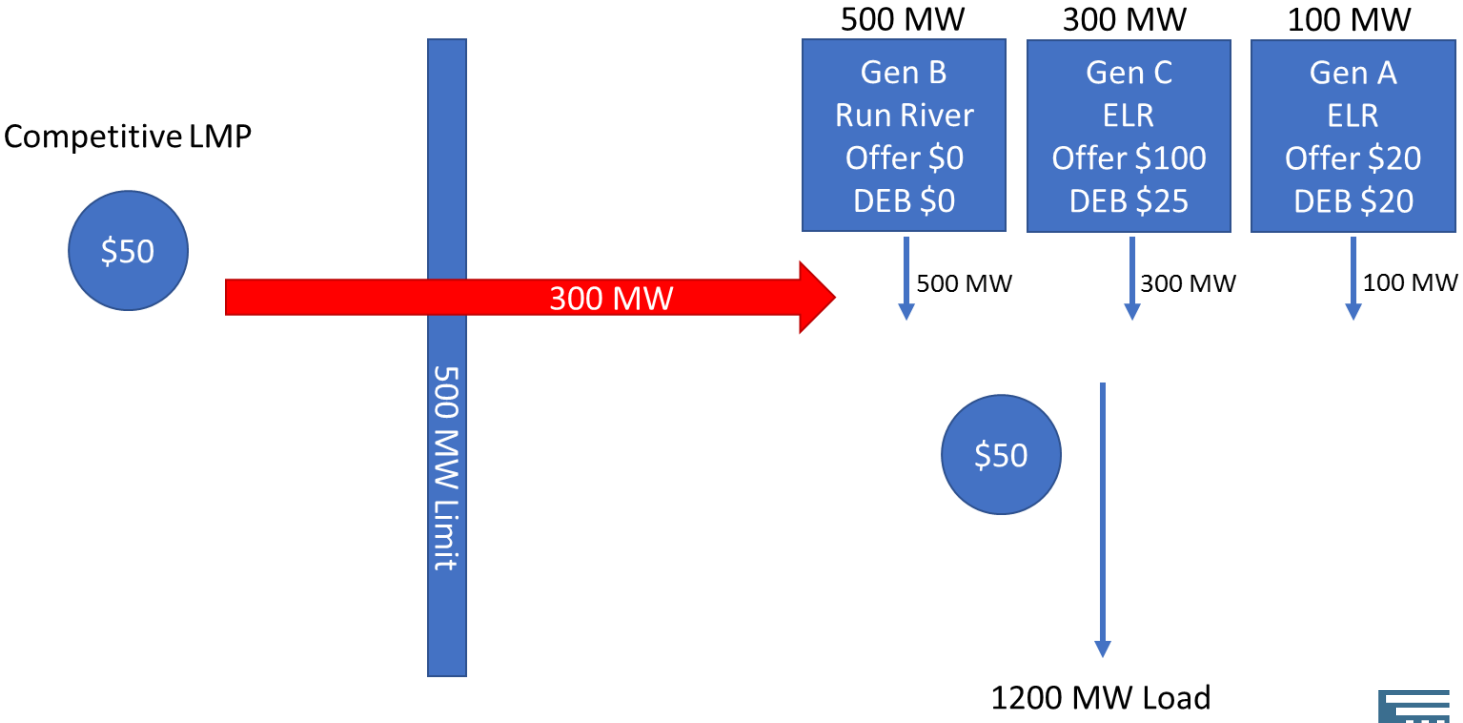
- Mitigation could be triggered in the first RTUC interval for the entire hour and the competitive LMP would be calculated for the 1st 15 minutes of the hour based on a very different supply demand balance than prevails at the end of the hour.

- The difference between the competitive LMP calculated in an RTUC run at the beginning of the hour and the actual competitive LMP in an RTD interval at the end of the hour could be particularly large during the evening ramp.

COMPETITIVE LMP

If the competitive LMP is calculated in a prior RTUC interval, 20, 30 or more minutes prior to the dispatch interval, the mitigation floor could be set materially below the cost of import supply, resulting in mitigated resources being dispatched to reduce imports, just as EIM participants have observed.

Figure 3



COMPETITIVE LMP

While inter-temporal impacts may make it appropriate to apply mitigation throughout an hour or throughout an RTUC interval if mitigation is triggered in a particular RTD interval, this does not require applying the same competitive constraint LMP price throughout the hour or RTUC interval.

- Calculating the competitive constraint LMP price based on the dispatch solution for the binding interval would require two binding dispatch passes (one to calculate the competitive constraint LMP price and one to dispatch the system using the mitigated offer prices) which would increase RTD solution time.

- The competitive constraint LMP price could be calculated for each RTD dispatch interval based on the prior advisory dispatch solution for that dispatch interval. Such an approach should calculate a competitive constraint LMP price for mitigation that would generally be close to the actual competitive constraint LMP price in the binding interval.

COMPETITIVE LMP

- If mitigation were triggered in the first RTUC interval of the hour, the competitive LMP for the RTD dispatch interval 55-60 that initialized at 47.5 would today be calculated in the RTUC run that initialized at t – 37.5 and based on a net load forecast from 85 minutes earlier.

- Moreover, the competitive LMP calculated in RTUC would have been calculated for the RTUC interval from 0-15, hence would based on a net load forecast for a period that ended 40 minutes earlier.

- If the competitive constraint LMP price were instead calculated based on the advisory dispatch solution for the binding interval, this would allow use of a net load forecast from only 5 minutes earlier than the forecast used in the binding dispatch and the forecast would cover the same period of time as the binding dispatch.

COMPETITIVE LMP

The CAISO mentioned in its filing letter that if an offer price were mitigated to a lower level in RTUC than in RTD, the seller could have to buy back its Fifteen Minute Market schedule at the RTD price. [1]

- The CAISO described this outcome as “untenable,” but this outcome would be preferable to the outcome in which the resource is dispatched based on a mitigated price that is lower than the competitive LMP price.
- In example 3, the BAA uses 200 megawatts of water worth $100 a megawatt hour when its value is only $50 a megawatt hour in the real time dispatch. This dispatch would result in a $10,000 reduction in social welfare, and the power is not available for use in the future.
- If the BAA had to buy this power back in RTD at $70 a megawatt hour as in example 2, the reduction in social welfare would be only $20 a megawatt hour, or $4000, and the power would be available for use in the future.

1. See California ISO filing letter in Docket ER16-1983, June 21, 2016 p. 8.

COMPETITIVE LMP

The California ISO filing letter also referred to the possibility of highly variable dispatch for a resource if its mitigated offer varied from interval to interval.

- However, setting the mitigated offer at a fixed value when the competitive LMP is rising can have precisely this effect, causing the mitigated resource's dispatch to rise much more than if the mitigated offer were adjusted to reflect the competitive LMP in the advisory interval. This is because the use of a fixed value for mitigation can cause a resource's mitigated offer price to fall further and further below the prevailing market price outside the constrained region.

- Setting the mitigated offer at a fixed value based on the competitive LMP when the constraint first binds in the hour conversely has the potential to fail to appropriately mitigate resource offer prices when the competitive LMP is falling over the hour.

COMPETITIVE LMP

Changes to how the competitive LMP is calculated, such as basing the competitive LMP in RTD on the competitive LMP in the advisory interval and basing the competitive LMP in RTUC on the competitive LMP calculated for the appropriate RTUC interval, would better align the competitive LMP used in the binding dispatch and settlements with the actual competitive LMP in the binding interval.

- Such a change should materially reduce the frequency and degree to which the application of market power mitigation to resources within a constrained region materially reduces imports (and possibly triggers exports), without any changes to DEB calculation methodology.
- It should be possible to empirically assess how often the competitive LMP in the RTD dispatch has been set in a much earlier RTUC interval.
- Recalculating what the competitive LMP would have been if it were calculated in the advisory RTD interval would require rerunning the RTD dispatch for the advisory interval which might require a significant effort but could perhaps be carried out for a study period.

TRIGGERING MITIGATION

Core questions raised by the CAISO's application of market power mitigation in the Western EIM include:

- Should offer price mitigation be applied to resources within an import constrained region and potentially change the dispatch if there is no imbalance energy demand or wholesale load located within the constrained region? [Figure 4]

- If a balancing area operator agrees to sell imbalance energy at a regulated rate, at the competitive LMP, or at another non-market based rate, should balancing area resources be subjected to offer price mitigation that could impact which resources are dispatched to meet imbalance demand?[Figure 5]

- Should offer price mitigation be applied to energy limited resources within an import constrained region in order to sell economy energy to other balancing areas within the constrained region? [Figure 6]

TRIGGERING MITIGATION

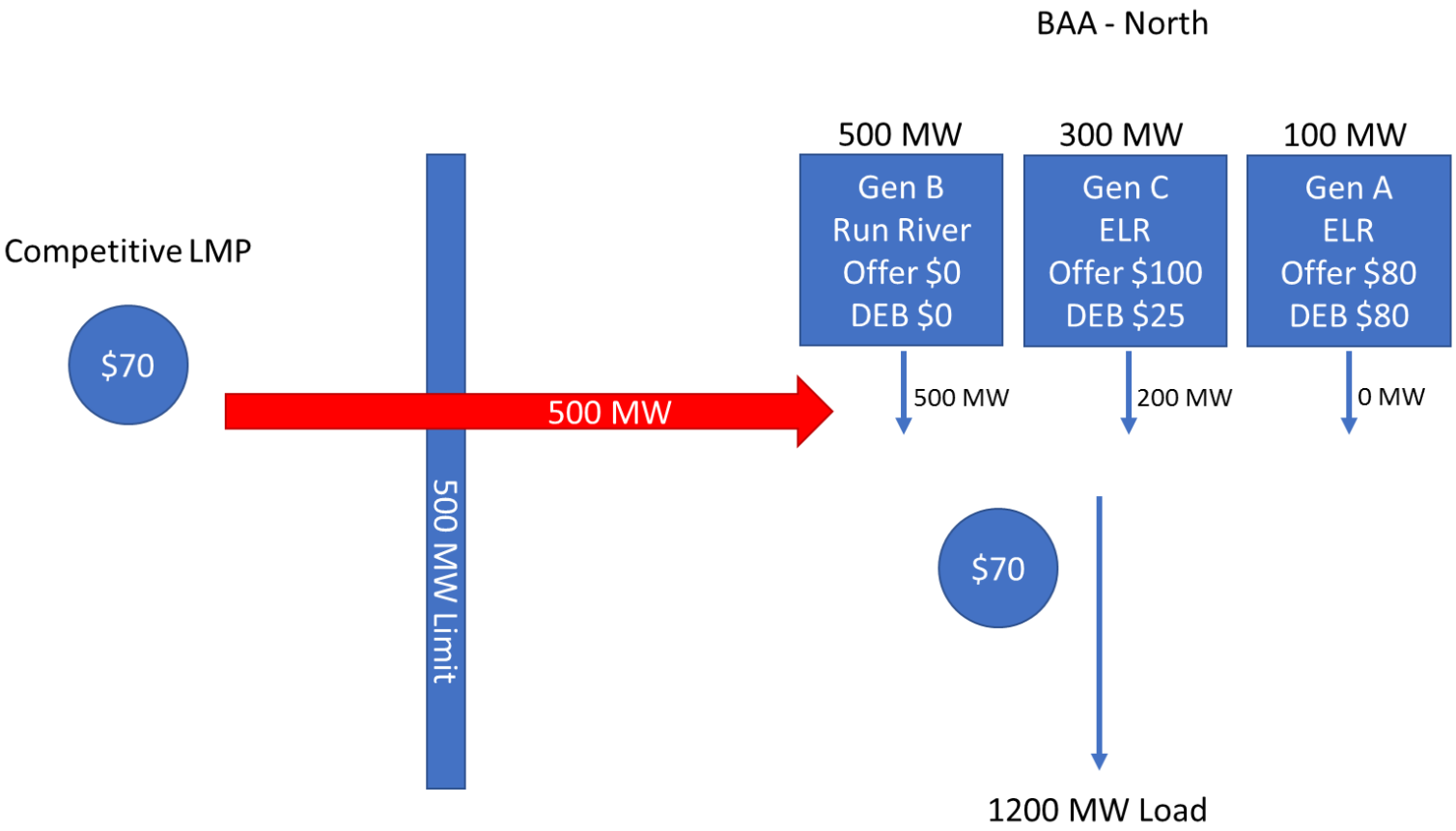
- If the flexible capacity provided by a balancing authority area operator is supplied by energy limited resources with high opportunity costs of energy, has the BAA brought the same value to the EIM as do BAAs that meet their flexible capacity requirement with capacity having lower offer prices? [Figure 7]

- If a balancing authority operator meets its flexible capacity requirement with low priced flexible capacity, should it be able to offer the output of additional energy limited resources at unmitigated offer prices?

COMPETITIVE LMP

If there is no imbalance or wholesale load within the BAA, why should mitigation be applied and potentially change the dispatch order?

Figure 4



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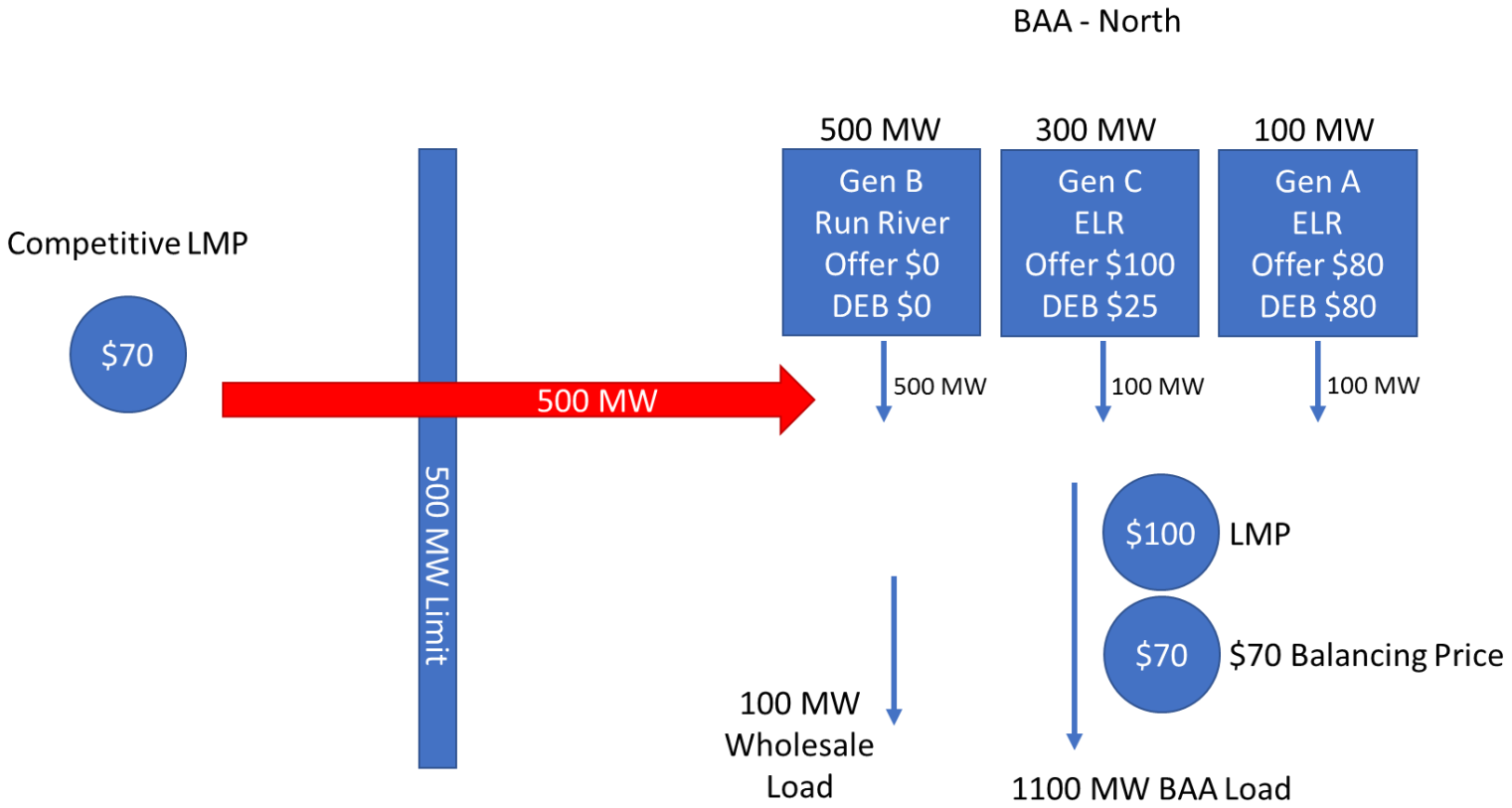
COMPETITIVE LMP

If the BAA operator agrees to sell energy to meet imbalances and wholesale buyer demand at the competitive LMP price, why should the offer prices of its resources be subject to mitigation and potentially change the dispatch order.

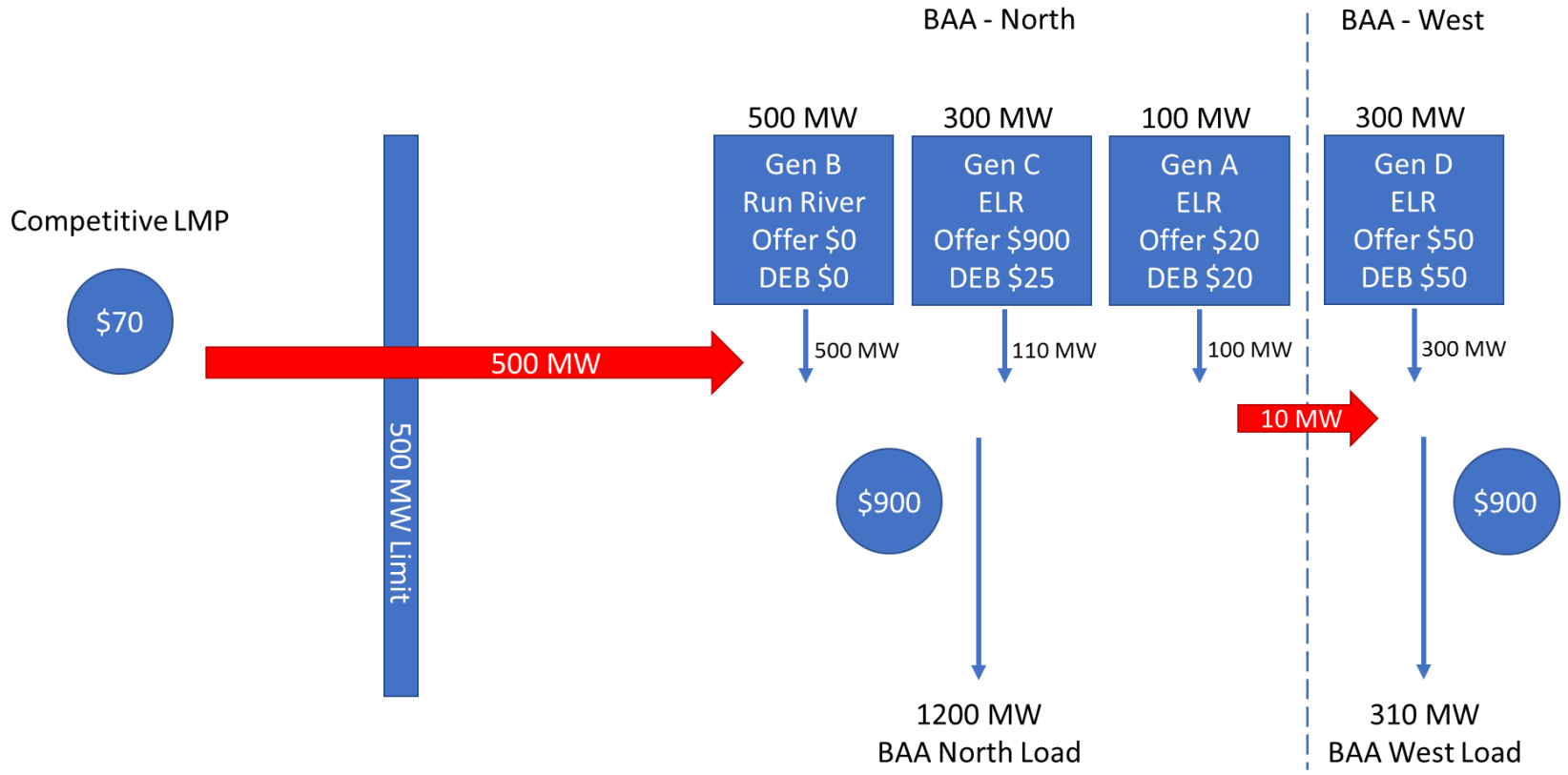
Figure 5



COMPETITIVE LMP

Offer price mitigation is appropriate when there are multiple BAAs within a constrained region and a BAA operator within the constrained region offers flexible capacity at inflated offer prices.

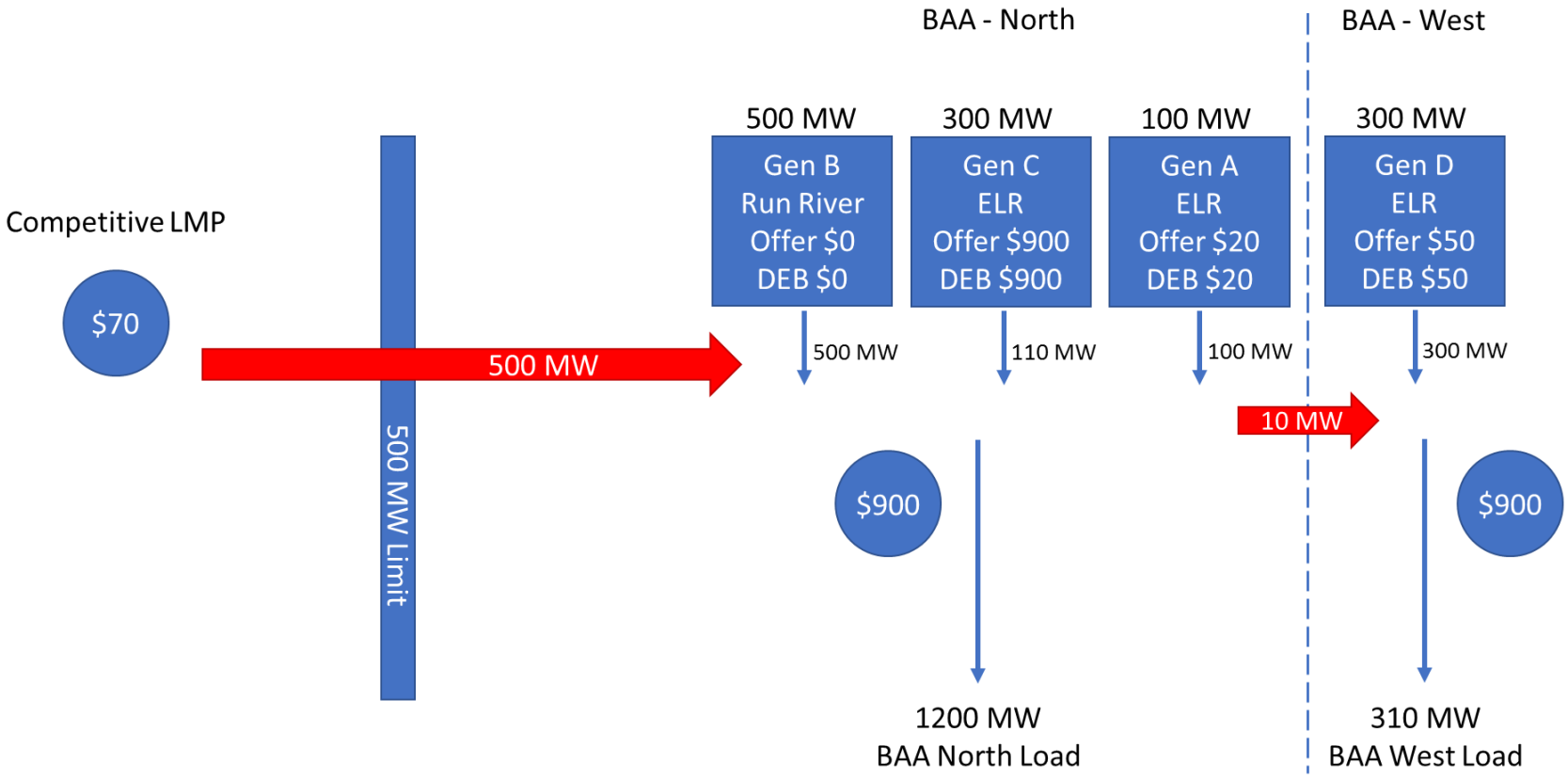
Figure 6



COMPETITIVE LMP

Is the situation different if the flexible capacity offered by one BAA is supplied by energy limited resources with very high opportunity costs?

Figure 7



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