Education: Schedule Selection and Market Power Mitigation

MIC Special Session

March 30, 2023

IMM

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Schedule Types

- Cost-based offers are used when a seller is determined to have local market power based on the Three Pivotal Supplier (TPS) test.
  - flexible parameter restrictions
  - offers based on defined short run marginal costs
- Parameter limited offers (Price PLS) are used during hot/cold weather alerts and emergencies.
  - the same flexible parameter restrictions as cost-based offers without the restrictions on the offer dollar values
- Price based offers are used by default.
  - limited restrictions on offers and parameters

Schedule Selection

- **Cost-based schedules and parameter limited schedules are eligible for selection, but are not required to be selected, when a resource fails the TPS test or during weather alerts and emergencies.**
- **The requirement is that the lower cost offer must be selected.**
- **But the rules defining the lower cost schedule are flawed.**

Schedule Selection

- As a result, cost-based offers may or may not be selected when a resource fails the TPS test.
- As a result, Price PLS offers may or may not be selected during weather alerts and emergencies.

- Resources that fail the TPS test may:
  - Set price with a positive markup,
  - Receive uplift based on a price-based offer that is more expensive and/or less flexible than the cost-based offer,
  - Withhold energy through markup or inflexibility.

Schedule Selection

- **In weather alerts and emergencies resources may:**
  - **Set price with a positive markup,**
  - **Receive uplift based on a price-based offer that is more expensive and/or less flexible than the cost-based offer,**
  - **Withhold energy through markup or inflexibility.**

- **The schedule selection process has the same flaws and implications for Price PLS as for cost-based offers.**

Schedule Characteristics and Selection

Price offer characteristics	Less Flexible Parameters	More Flexible Parameters	Mixed Flexibility
Positive Markup	Cost-based offer selected	Unclear schedule selection	Unclear schedule selection
Negative Markup	Unclear schedule selection	Price-based offer selected	Unclear schedule selection
Mixed Markup	Unclear schedule selection	Unclear schedule selection	Unclear schedule selection

The rows and columns of the table are characteristics of the price offer vs. the cost offer.
The center cells are the outcomes of the current schedule selection process.

Schedule Characteristics and Selection

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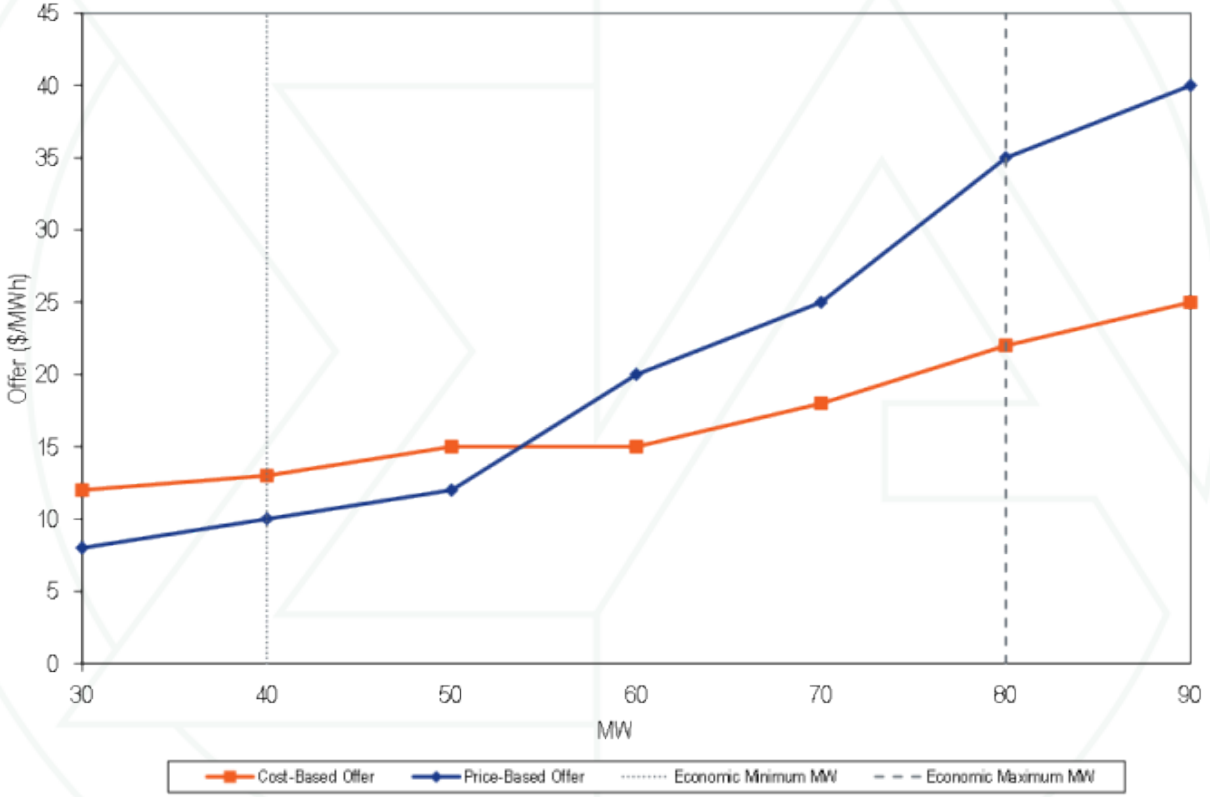
Offer Scenarios

- **The IMM has identified multiple scenarios that occur in the market that result in offers selected with positive markup even though the unit failed the TPS test.**
  - **Crossing offer curves**
  - **Short min run time paired with markup**
  - **Low eco min paired with markup**
  - **Mismatched fuel types**
  - **Negative markup paired with long min down times**

Crossing Offer Curves



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Crossing Offer Curves

- **Real-time definition of lower cost offer**
  - **Defined only at economic minimum**
  - **Crossing curves unit that fails the TPS test is not mitigated.**
  - **Failure of TPS does not result in use of lower cost schedule.**
- **Day-ahead definition of lower cost offer**
  - **Evaluation of full schedules**
  - **Some units with crossing curves are mitigated.**
  - **Crossing curves frequently result in day-ahead dispatch only up to the positive markup segment and no mitigation.**

Crossing Offer Curves

- The result in the real time market is:
  - Selection of higher cost offer
  - Market power in real-time market when unit dispatched into the positive markup segment
- The result in the day-ahead market is:
  - Selection of higher cost offer in some cases
  - Commitment of unit on higher cost schedule
  - Day-ahead dispatch only up to the positive markup segment.
  - Market power in real-time market when unit dispatched into the positive markup segment

Frequency of Crossing Curves

	Day-Ahead			Real-Time		
2022	Number of Schedule Hours with Crossing Curves	Total Number of Cost Schedule Hours Offered by Price Based Units	Percent of Schedule Hours with Crossing Curves	Number of Schedule Hours with Crossing Curves	Total Number of Cost Schedule Hours Offered by Price Based Units	Percent of Schedule Hours with Crossing Curves
Jan	80,695	852,120	9.5%	69,275	799,250	8.7%
Feb	71,587	778,104	9.2%	60,587	713,491	8.5%
Mar	81,695	873,766	9.3%	62,118	738,675	8.4%
Apr	86,781	848,640	10.2%	64,661	682,293	9.5%
May	102,572	875,112	11.7%	78,010	750,802	10.4%
Jun	98,680	832,128	11.9%	82,437	770,067	10.7%
Jul	115,403	858,624	13.4%	102,174	814,863	12.5%
Aug	120,562	857,832	14.1%	104,894	810,338	12.9%
Sep	113,028	827,616	13.7%	97,403	743,300	13.1%
Oct	105,114	848,664	12.4%	78,744	680,764	11.6%
Nov	88,644	813,839	10.9%	63,481	671,225	9.5%
Dec	84,884	834,000	10.2%	68,332	743,994	9.2%
Total	1,149,645	10,100,445	11.4%	932,116	8,919,062	10.5%

Shorter Min Run Time and Positive Markup

- Flexible parameters paired with price markup
- Price-based offer
  - Shorter minimum run time
  - Markup in price offer over cost offer
- Cost-based offer
  - Longer minimum run time
  - Lower cost than the price offer
- In both the day ahead and real time markets, the shorter minimum run time can offset the markup in the schedule selection evaluation, avoiding mitigation.

Shorter Min Run Time and Positive Markup

- **The result is:**
  - **Selection of higher price offer for shorter duration**
  - **Exercise of market power in day-ahead market**
    - if setting price or receiving uplift
  - **Exercise of market power in real-time market**
    - if setting price or receiving uplift

Frequency of Shorter Min Run Time and Positive Markup

	Day-Ahead			Real-Time		
2022	Number of Schedule Hours with Lower Min Run Time in Price Compared to Cost	Total Number of Cost Schedule Hours Offered by Price Based Units	Percent of Schedule Hours with Lower Min Run Time in Price Compared to Cost	Number of Schedule Hours with Lower Min Run Time in Price Compared to Cost	Total Number of Cost Schedule Hours Offered by Price Based Units	Percent of Schedule Hours with Lower Min Run Time in Price Compared to Cost
Jan	5,821	852,120	0.7%	4,948	799,250	0.6%
Feb	4,838	778,104	0.6%	4,158	713,491	0.6%
Mar	7,678	873,766	0.9%	6,523	738,675	0.9%
Apr	8,662	848,640	1.0%	7,171	682,293	1.1%
May	10,132	875,112	1.2%	9,449	750,802	1.3%
Jun	9,897	832,128	1.2%	9,599	770,067	1.2%
Jul	10,656	858,624	1.2%	10,578	814,863	1.3%
Aug	11,416	857,832	1.3%	11,337	810,338	1.4%
Sep	10,680	827,616	1.3%	9,117	743,300	1.2%
Oct	11,616	848,664	1.4%	9,049	680,764	1.3%
Nov	10,415	813,839	1.3%	8,868	671,225	1.3%
Dec	10,778	834,000	1.3%	9,122	743,994	1.2%
Total	112,589	10,100,445	1.1%	99,919	8,919,062	1.1%

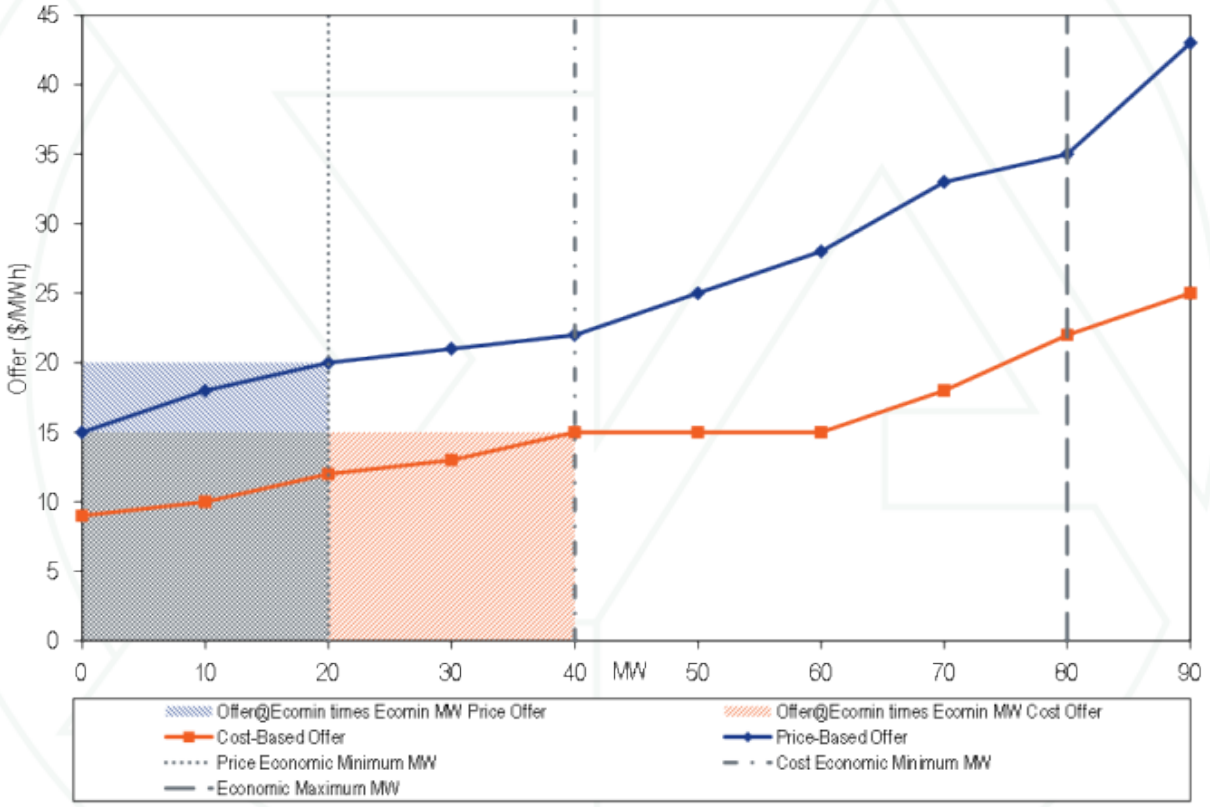
Lower Eco Min and Positive Markup

- Flexible parameters paired with price markup
- Price-based offer
  - Lower economic minimum MW limit
  - Markup in price offer over cost offer
- Cost-based offer
  - Higher economics minimum MW limit
  - Lower cost than the price offer
- In both the day ahead and real time markets, the lower eco min can offset the markup in the schedule selection evaluation, avoiding mitigation.

Lower Eco Min and Positive Markup

- **The result is:**
  - **Selection of higher price offer with lower eco min**
  - **Exercise of market power in day-ahead market**
    - if setting price or receiving uplift
  - **Exercise of market power in real-time market**
    - if setting price or receiving uplift

Positive Markup and Lower Eco Min MW



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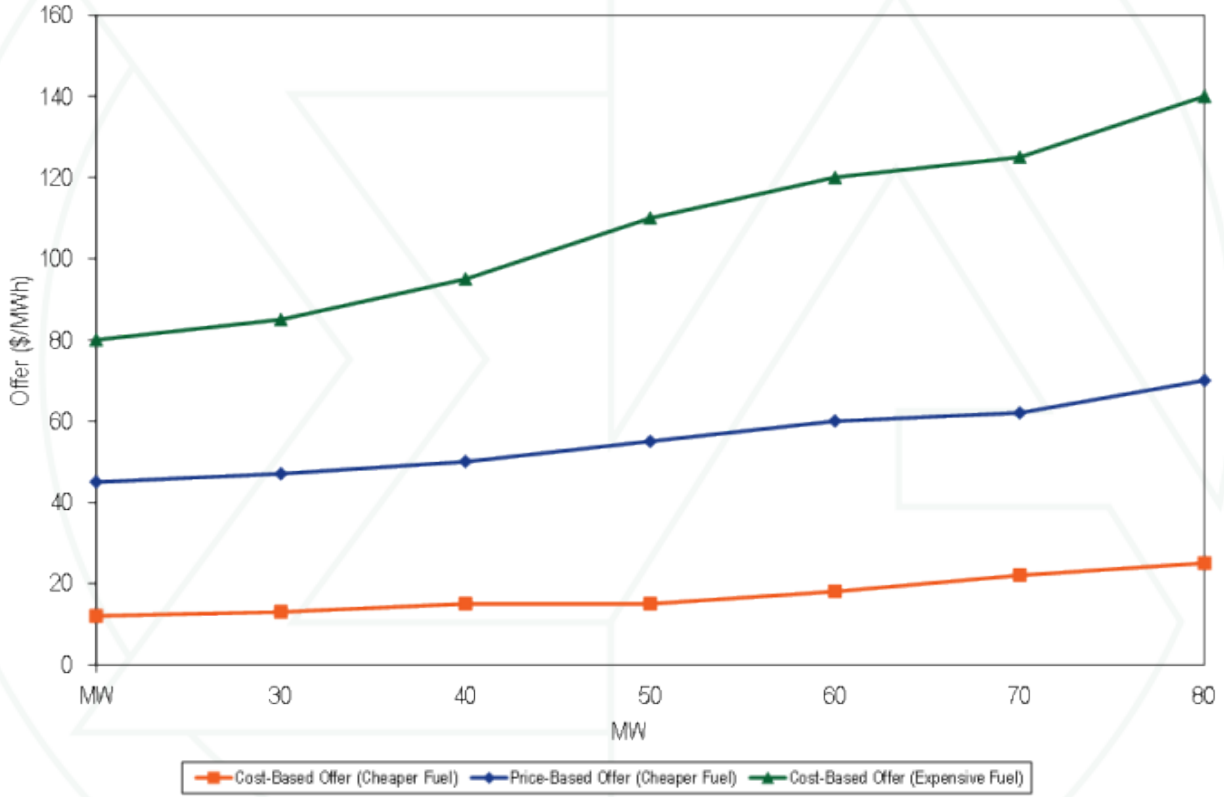
Frequency of Lower Eco Min and Positive Markup

	Day-Ahead			Real-Time		
2022	Number of Schedule Hours with Lower Economic Minimum MW in Price Compared to Cost	Total Number of Cost Schedule Hours Offered by Price Based Units	Percent of Schedule Hours with Lower Economic Minimum MW in Price Compared to Cost	Number of Schedule Hours with Lower Economic Minimum MW in Price Compared to Cost	Total Number of Cost Schedule Hours Offered by Price Based Units	Percent of Schedule Hours with Lower Economic Minimum MW in Price Compared to Cost
Jan	0	852,120	0.0%	0	799,250	0.0%
Feb	0	778,104	0.0%	0	713,491	0.0%
Mar	0	873,766	0.0%	0	738,675	0.0%
Apr	0	848,640	0.0%	0	682,293	0.0%
May	0	875,112	0.0%	0	750,802	0.0%
Jun	336	832,128	0.0%	312	770,067	0.0%
Jul	264	858,624	0.0%	264	814,863	0.0%
Aug	336	857,832	0.0%	333	810,338	0.0%
Sep	216	827,616	0.0%	168	743,300	0.0%
Oct	0	848,664	0.0%	0	680,764	0.0%
Nov	0	813,839	0.0%	0	671,225	0.0%
Dec	192	834,000	0.0%	112	743,994	0.0%
Total	1,344	10,100,445	0.0%	1,189	8,919,062	0.0%

Mismatched Fuel Types

- **Some units submit a cost-based offer on a more expensive fuel than the price-based offer.**
  - **There is no legitimate comparison in the offer selection process.**
  - **For example, price offer uses gas and cost offer uses oil.**
- **This Issue is not solved by the schedule selection process.**
- **This should be explicitly addressed with a requirement to submit a cost offer matching the fuel type of the price offer.**

More Expensive Fuel on Cost Offer



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Frequency of More Expensive Fuel on Cost Offer

	Day-Ahead			Real-Time		
2022	Number of Unit Hours With Negative Markup And No Matching Fuel on Cost	Total Number of Unit Hours By Units With Multiple Fuels	Percent Unit Hours With Negative Markup And No Matching Fuel on Cost	Number of Unit Hours With Negative Markup And No Matching Fuel on Cost	Total Number of Unit Hours By Units With Multiple Fuels	Percent Unit Hours With Negative Markup And No Matching Fuel on Cost
Jan	6,496	198,768	3.3%	6,496	191,950	3.4%
Feb	6,904	185,328	3.7%	6,904	172,135	4.0%
Mar	6,099	207,881	2.9%	6,099	168,266	3.6%
Apr	3,998	205,968	1.9%	3,998	167,623	2.4%
May	9,494	205,368	4.6%	9,494	184,625	5.1%
Jun	11,758	193,320	6.1%	11,758	182,862	6.4%
Jul	8,073	200,568	4.0%	8,073	195,537	4.1%
Aug	6,710	199,320	3.4%	6,710	192,313	3.5%
Sep	5,865	188,256	3.1%	5,865	173,195	3.4%
Oct	4,310	188,976	2.3%	4,310	150,515	2.9%
Nov	5,311	176,170	3.0%	5,311	138,928	3.8%
Dec	8,038	180,576	4.5%	8,038	165,460	4.9%
Total	83,056	2,330,499	3.6%	83,056	2,083,409	4.0%

Results

- The results of these flaws in the rules are that resources with market power are not mitigated.
- Resources exercise market power.
- Market power mitigation occurs in two scenarios
  - when a unit fails the TPS test
  - on emergency and alert days
- Results of market power
  - Prices exceed competitive level: markup
  - Uplift payments exceed competitive level: markup

Marginal Unit Markup by TPS Test Status: 2022

	Day-ahead Market			Real-time Market		
Markup Category	Not Failing TPS Test	Failing TPS Test	Percent in Category	Not Failing TPS Test	Failing TPS Test	Percent in Category
Negative Markup	22.3%	4.1%	26.4%	30.8%	7.9%	38.7%
Zero Markup	15.7%	4.8%	20.5%	15.2%	8.5%	23.7%
$0 to $5	12.3%	1.4%	13.6%	15.5%	3.0%	18.5%
$5 to $10	7.6%	1.1%	8.6%	6.1%	0.8%	6.9%
$10 to $15	6.6%	0.9%	7.5%	2.9%	0.4%	3.4%
$15 to $20	5.2%	0.6%	5.8%	2.5%	0.3%	2.8%
$20 to $25	4.5%	0.5%	5.0%	1.5%	0.2%	1.8%
$25 to $50	7.3%	1.1%	8.3%	2.4%	0.5%	2.9%
$50 to $75	2.2%	0.5%	2.7%	0.5%	0.2%	0.7%
$75 to $100	0.6%	0.1%	0.8%	0.2%	0.1%	0.3%
Above $100	0.5%	0.1%	0.6%	0.2%	0.2%	0.4%
Total Positive Markup	46.7%	6.4%	53.1%	31.9%	5.8%	37.7%
Total	84.8%	15.2%	100.0%	77.9%	22.1%	100.0%

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Parameter Mitigation for TPS Test Failures: 2022

Day-ahead Commitment For Units That Failed TPS Test	Day-ahead Unit Hours	Percent Day-ahead
Committed on price schedule less flexible than cost	28,640	30.6%
Committed on price schedule as flexible as cost	4,178	4.5%
Total committed on price schedule without parameter limits	32,818	35.1%
Committed on cost (cost capped)	58,538	62.5%
Committed on price PLS	2,257	2.4%
Total committed on PLS schedules (cost or price PLS)	60,795	64.9%

Parameter Mitigation for Weather Alerts: 2022

Day-ahead Commitment During Hot And Cold Weather Alerts	Day-ahead Unit Hours	Percent Day-ahead Unit Hours
Committed on price schedule less flexible than PLS	74,703	33.4%
Committed on price schedule as flexible as PLS	22,384	10.0%
Total committed on price schedule without parameter limits	97,087	43.4%
Committed on cost (cost capped)	7,058	3.2%
Committed on price PLS	119,805	53.5%
Total committed on PLS schedules (cost or price PLS)	126,863	56.6%

Uplift by Offer Type: 2022

Offer Type	Day Ahead Operating Reserve Credits (Millions)	Balancing Operating Reserve Credits (Millions)	Day Ahead Reactive Credits (Millions)	Real Time Reactive Credits (Millions)	Total
Cost	$29.7	$59.5	$0.6	$0.3	$90.1
Price	$27.9	$94.1	$0.3	$0.1	$122.3
Price PLS	$1.2	$22.8	$0.0	$0.0	$24.0
Cost & Price	$0.0	$4.0	$0.0	$0.0	$4.0
Cost & PLS	$0.0	$0.7	$0.0	$0.0	$0.7
Price & PLS	$0.0	$0.6	$0.0	$0.0	$0.6
Total	$58.8	$181.7	$0.9	$0.4	$241.8
Share	24.3%	75.2%	0.4%	0.2%	100.0%

Uplift During Weather Alerts: 2022

Commitment Type During Hot and Cold Weather Alerts	Day Ahead Operating Reserve Credits	Share of DAOR during Hot and Cold Weather Alerts
Committed on cost (cost capped)	$20,558,079	56.3%
Committed on price schedule as flexible as PLS	$292,010	0.8%
Committed on price schedule less flexible than PLS	$14,325,612	39.2%
Committed on price PLS	$1,335,186	3.7%
Total	$36,510,887	100.0%

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