Fast start pricing issues and analysis

Body of State Regulators
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Background

- Fast start units are gas turbines with:
  - Start time ≤ 30 to 60 minutes
  - Minimum operating time ≤ 1 hour
  - Relatively high minimum operating level
    - e.g., 50 MW peaker with 20 MW minimum operating level
- All markets based on Locational Marginal Pricing (LMP) use 3-part bids to determine optimal unit commitment and energy dispatch:
  - Startup costs
  - Minimum operating cost (e.g., @ 20 MW)
  - Energy bids (e.g., for output from 21-50 MW)
- Fast start issue:
  - Fast start units that are committed to operate must run at their minimum operating level for their minimal run time (e.g., 20 MW for 1 hour)
  - LMPs set by energy bid price of marginal units each 15 and 5 minute interval (e.g., bid price for energy output from 21-50 MW)
  - LMPs can sometimes be lower than unit's total costs (startup, minimum load and energy) over its 1 hour minimum time
  - If energy revenues do not cover full startup and minimum load bid costs after being committed, unit receives bid cost recovery (BCR) payments

What is fast start pricing?

- Designed to allow LMPs in the 15-minute and 5-minute markets to be set based on the “hourly cost” of fast start units (including startup and minimum load costs)
- FSP does not change how units are actually committed or dispatched by the market software
  - Scheduling run continues to use 3-part bids to minimize total accepted bid costs needed met demand
- Pricing run of market software is performed to determine prices paid for energy schedules from scheduling run
  - 3-part bids for fast-start units converted into a single energy bid curve
  - Constraint representing minimum operating level of each fast start unit is removed from market optimization model
  - This allows the market model to “pretend” that fast start units could be operated at or below their minimum operating level during minimum operating period
  - Market is re-run with adjusted (higher) energy bids for fast start units
  - LMPs can increase in pricing run due to higher bid prices for fast start units

Proponents of fast start pricing (FSP) contend that higher prices from FSP would have numerous benefits

- FSP results in “improved” price signal (i.e., higher prices when fast start peakers needed to meet demand)
- Increased efficiency from increased offers from importers and other resources (not already offering) in real-time market.
- Decrease bid cost recovery
- Support investment in new supply and ramping capacity
- Higher prices can increase demand response?
- Decrease emissions by reducing use of peakers?
- Higher prices create more incentive to deliver scheduled energy?
- Other ISOs have FSP ─ so the WEIM should also

Opponents of fast start pricing …

- FSP does not change how units are actually committed or dispatched by the market software
- Any benefits from increased efficiency, imports or reduced emissions are based on assumption “that bids and offers respond to improved [higher] price signal”
- FSP creates inconsistency between LMPs and the bid prices of supply and demand
  - LMPs higher than the marginal cost (or bids) than supply that is not scheduled to operate
  - LMPs higher than the bid price of some load/exports that clear the market
- Decrease bid cost recovery from FSP likely to be very limited
- Increase in LMP due to FSP not enough to incentivize any more demand response or investment in new supply

Fast start units account for a small portion of bid cost recovery payments

Total bid cost recovery payments to fast start gas units

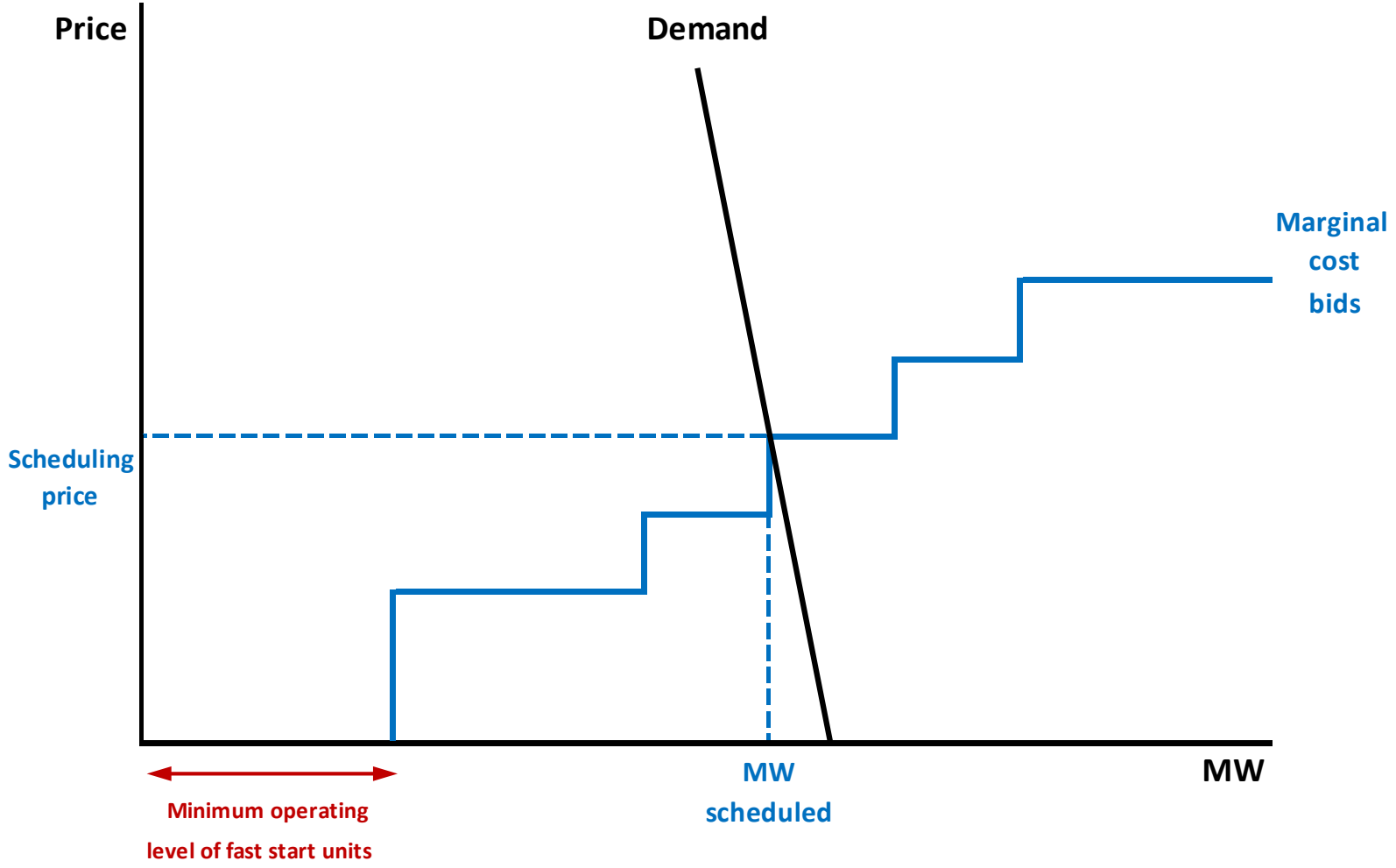
	CAISO		Rest of WEIM	
	millions	% total	millions	% total
2021	$19	12%	$0.5	3%
2022	$33	13%	$1.0	2%
2023	$27	10%	$1.3	4%

- Based on 2022 analysis, DMM estimated that less than half of bid cost recovery payments to fast start units in CAISO are from commitment of fast start units (excluding out-of-market commitments made for special reliability requirements that would not set price under fast start pricing).

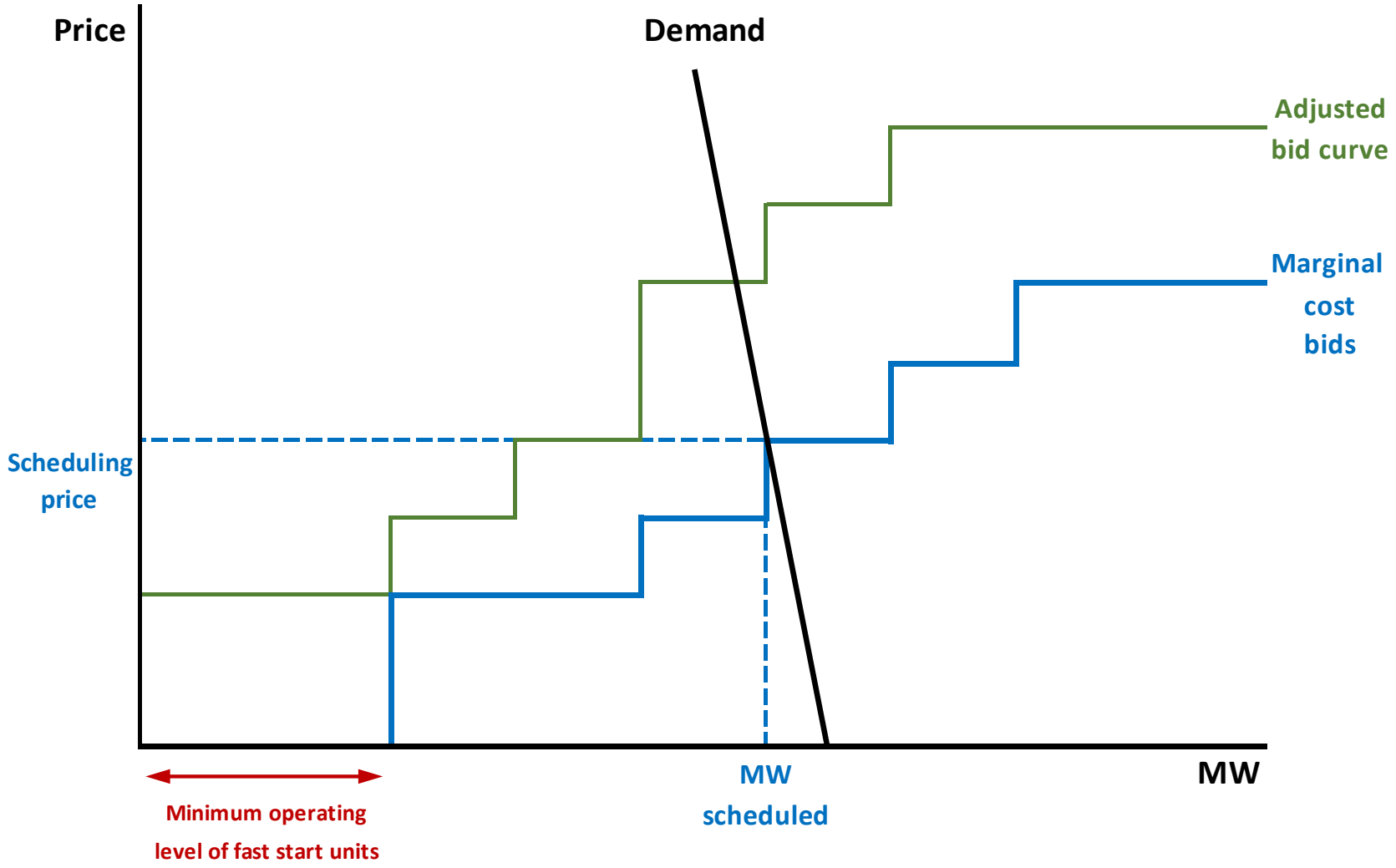
DMM comments and observations

- FSP is inconsistent with fundamental principles of locational marginal pricing – and will not increase overall market efficiency.
- DMM understands that in response to requests from numerous stakeholders, CAISO is examining the possibility of some form of FSP in the WEIM.
- FSP needs further evaluation of costs and benefits, which depend on the specific FSP design and its interaction with existing WEIM market features.
- Initial CAISO analysis suggests FSP won't have significant impact on overall prices, but could increase prices during some peak net load hours,
- FSP is relatively complicated, and should be much lower priority that other potential market enhancements
- Higher priority should be placed on real time market product for managing uncertainty and ramping capacity.
  - Need product with longer forward time horizon than current 15-minute flexible ramping product.
  - Uncertainty/ramping product would provide better price signals and revenues more directly targeted at highly flexible resources needed to integrate renewables.

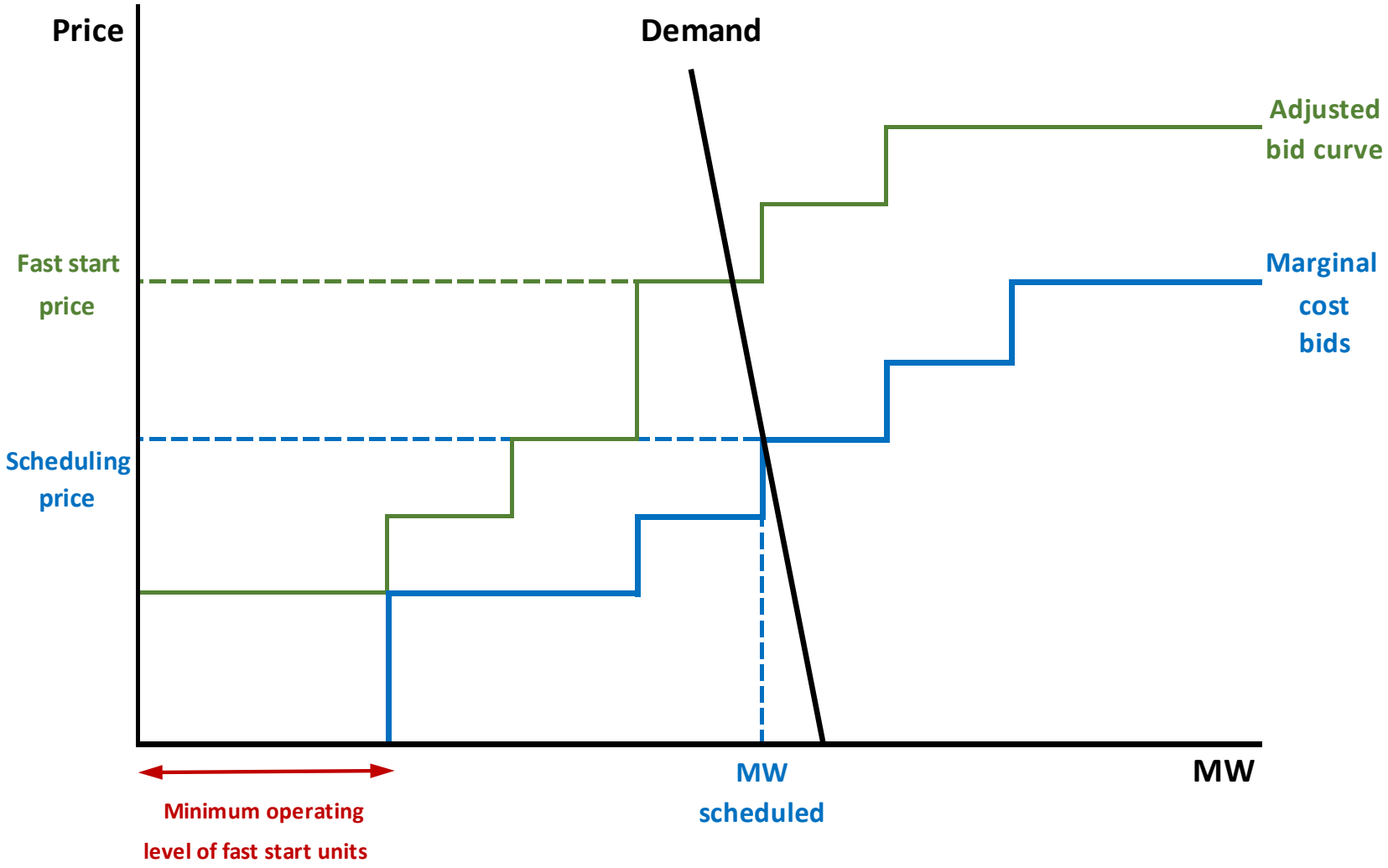
With FSP, market schedules are still determined based on 3-part bids submitted by each resource (start-up, min operating cost and energy)



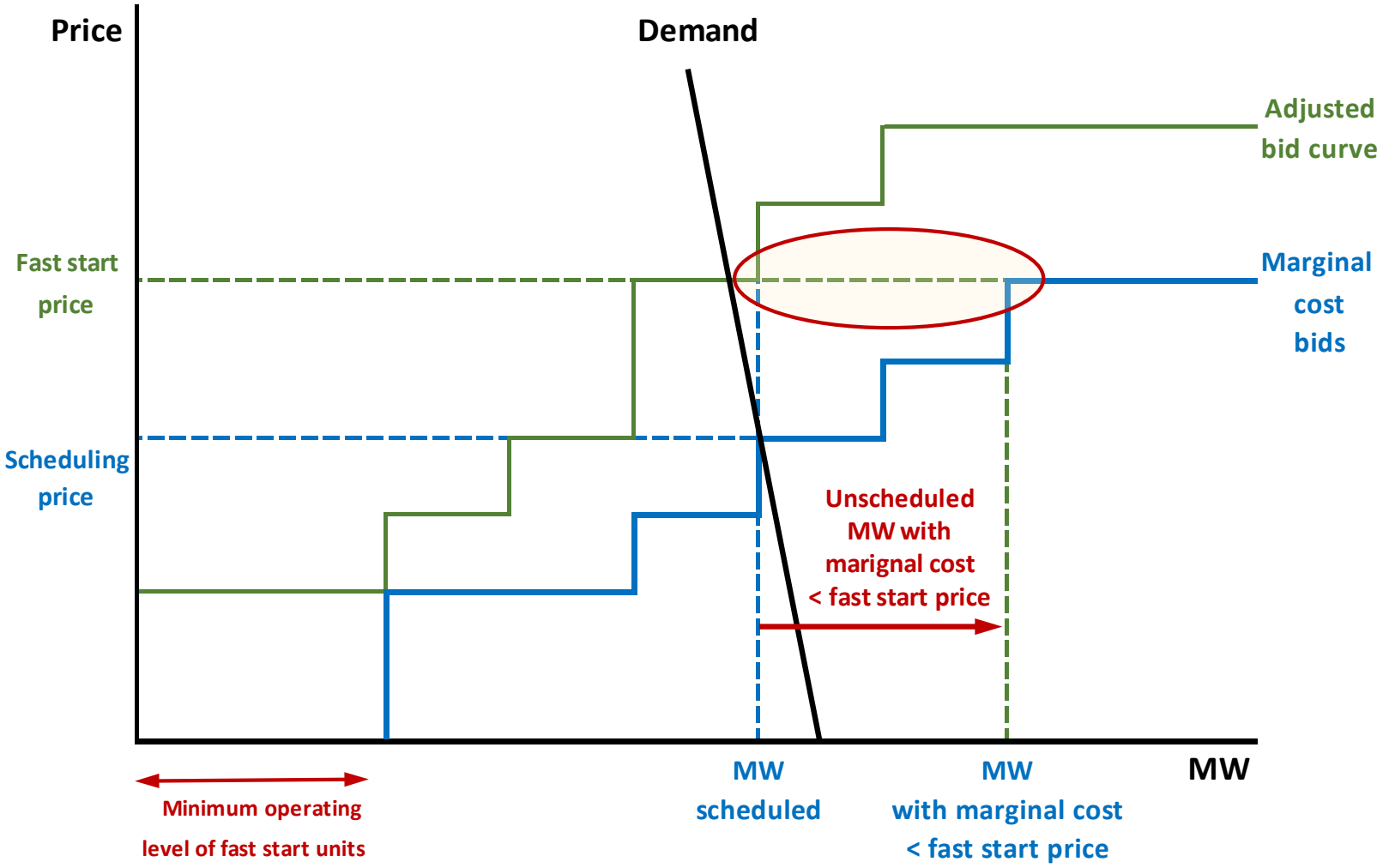
For pricing run, an adjusted energy bid curve is calculated for fast start units that includes start-up and minimum load bid costs



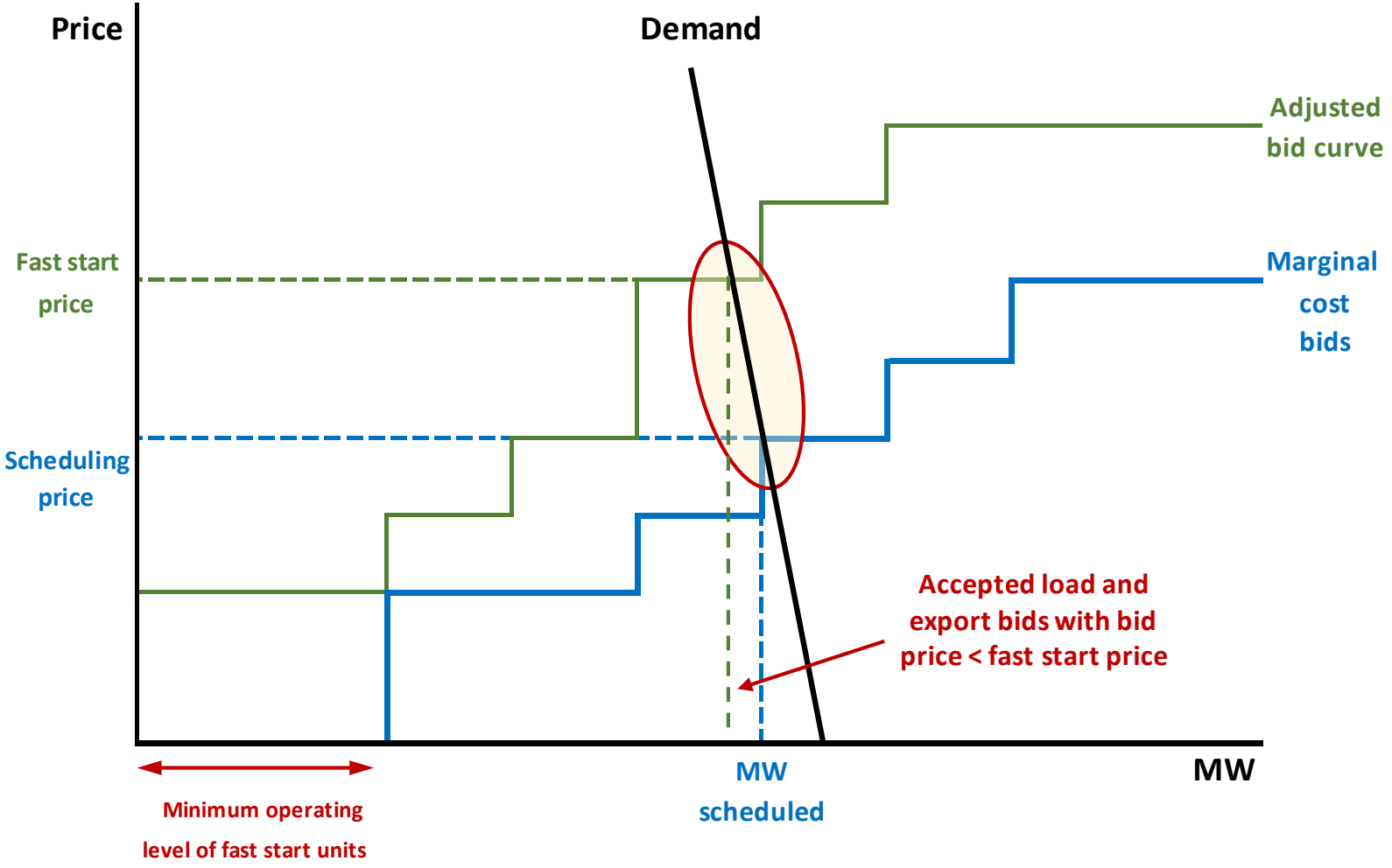
Final LMPs are calculated using the adjusted bid curve, and "pretending" that fast start units do not have minimum operating level constraints



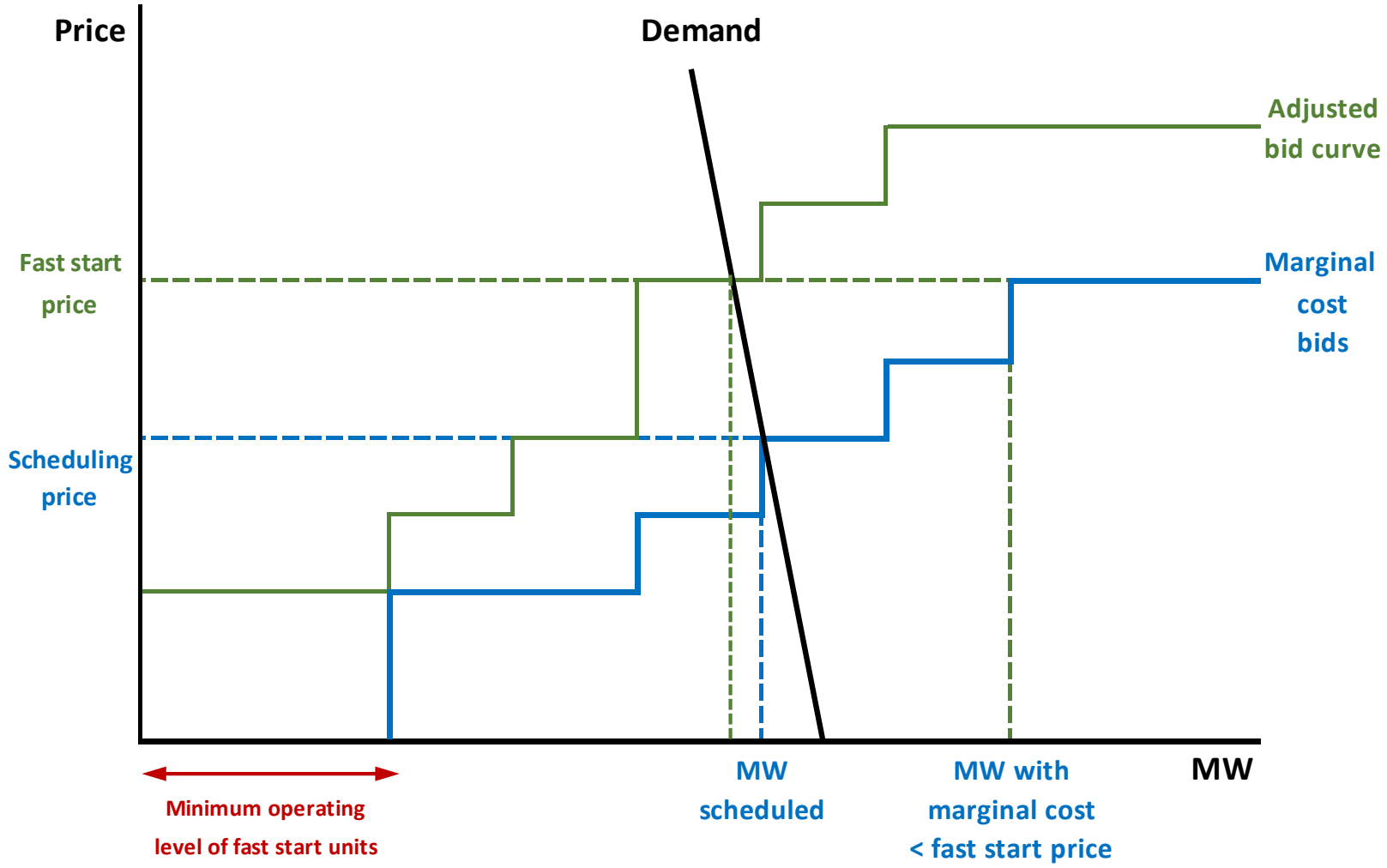
Fast start pricing creates market price greater than cost of some unscheduled supply



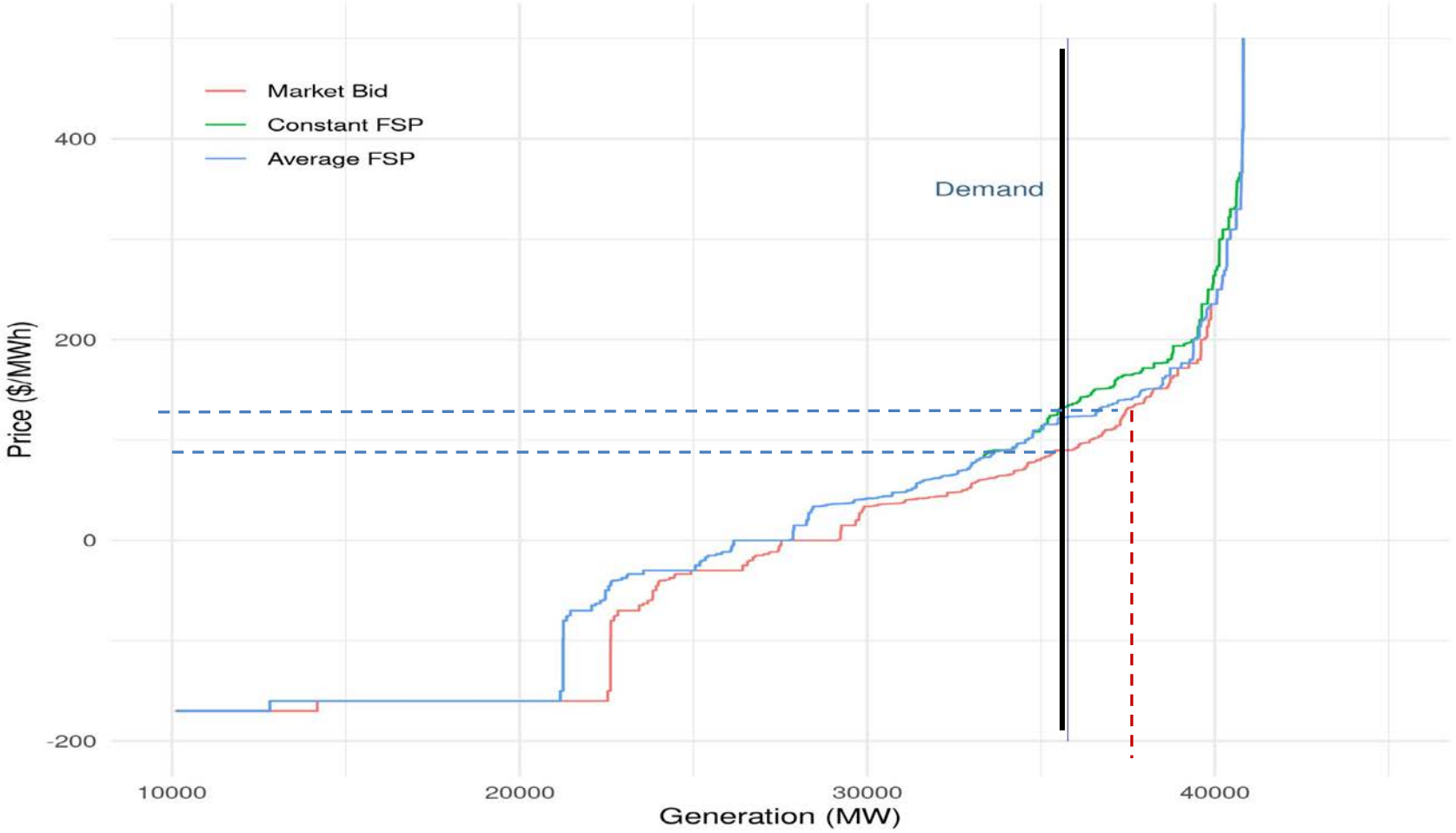
Fast start pricing creates market price greater than bid price of some load/exports that are accepted in scheduling run



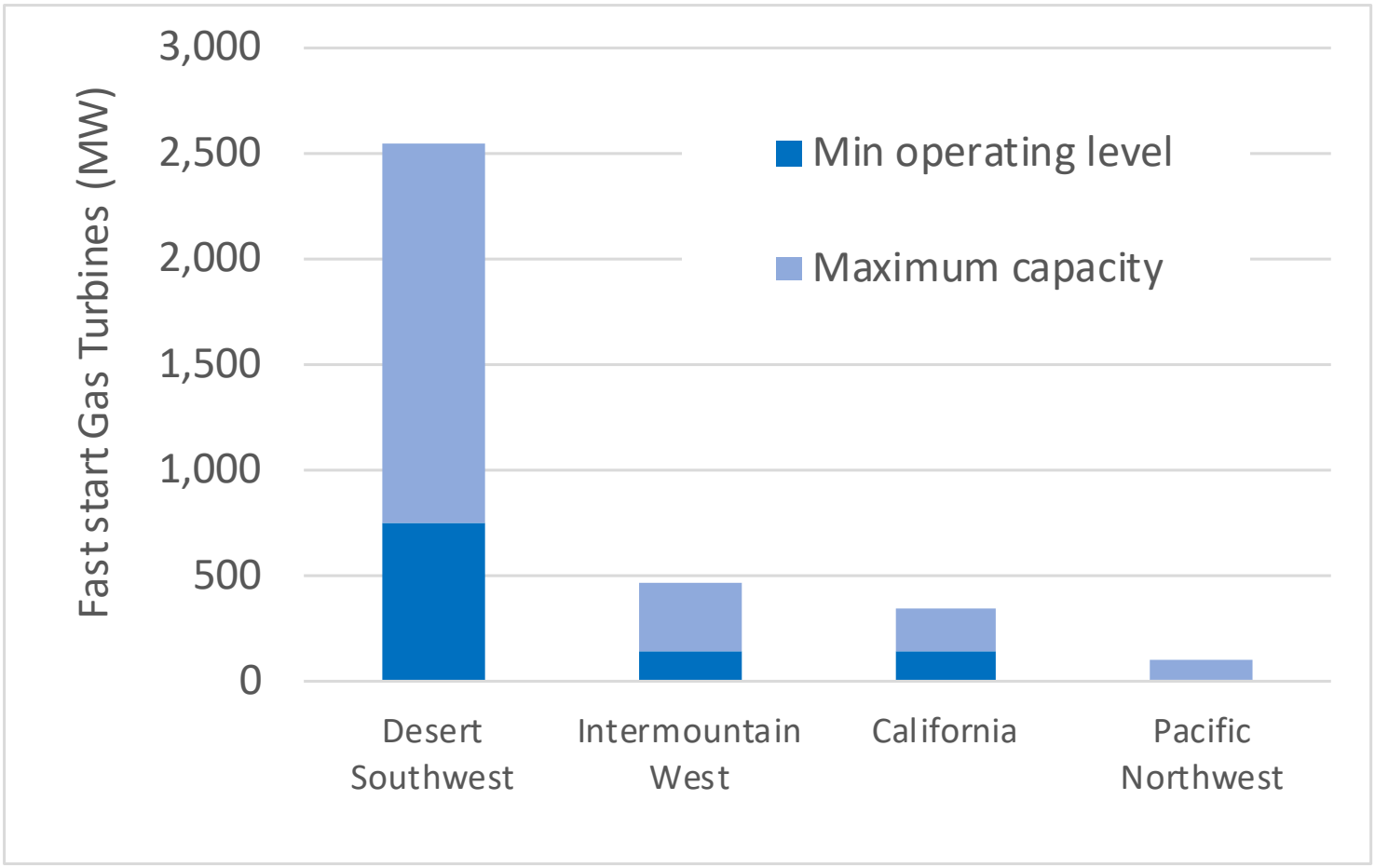
FSP creates inconsistency between LMPs and bid prices of some supply and demand – which creates incentives for some supply and exports to not follow market schedules



CAISO has analyzed potential impact of FSP in each BAA from 2022-2023 using simplified model with actual bid data.



CAISO analysis shows FSP having highest impact on prices in Desert Southwest



CAISO's analysis of FSP impacts by balancing area

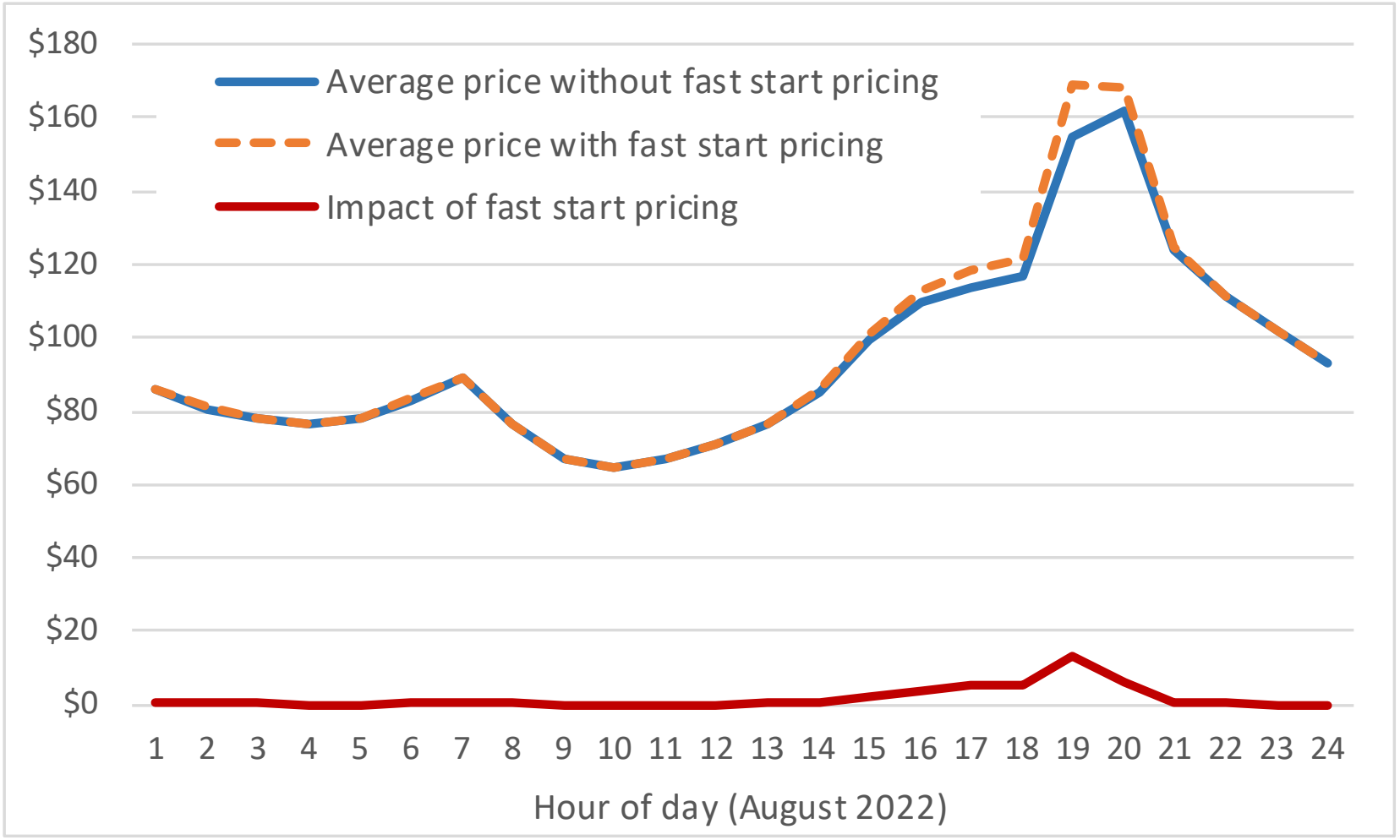
	2022			2023		
	Avg LMP	FSP impact		Avg LMP	FSP impact	
California ISO	$78.40	$1.05	1.3%	$52.56	$ .47	.9%
Desert Southwest						
AZPS	$64.16	$ .02	.0%	$32.81	$ .02	.1%
NEVP	$69.50	$1.33	1.9%	$41.20	$1.19	2.9%
PNM	$63.57	$ .26	.4%	$39.51	$ .62	1.6%
SRP	$51.22	$1.78	3.5%	$25.37	$ .98	3.8%
TEPC	$80.33	$1.63	2.0%	$33.94	$1.05	3.1%
Intermountain West						
AVA	$69.57	$ .46	.7%	$53.80	$ .14	.3%
IPCO	$59.16	$ .64	1.1%	$43.39	$ .06	.1%
NWMT	$53.51	$ .36	.7%	$35.87	$ .54	1.5%
PACE	$47.18	$ .15	.3%	$40.19	$ .06	.1%
Pacific Northwest						
BPAT	$88.08	$ .00	.0%	$74.20	$ .00	.0%
PACW	$52.35	$ .00	.0%	$42.38	$ .00	.0%
PGE	$60.74	$ .13	.2%	$49.22	$ .07	.1%
PSEI	$58.42	$ .05	.1%	$46.17	$ .03	.1%
SCL	$38.92	$ .06	.2%	$18.67	$ .04	.2%
TPWR	$56.51	$ .01	.0%	$32.33	$ .00	.0%

- CAISO analysis shows higher fast start pricing impacts in the Desert Southwest.
- Analysis of individual BAAs may overestimate impact of FSP, since it assumes no additional transfers between different BAAs.
- CAISO area is the largest footprint analyzed, and results likely to be highly representative of trends in other BAAs (e.g., monthly and hourly price variations).

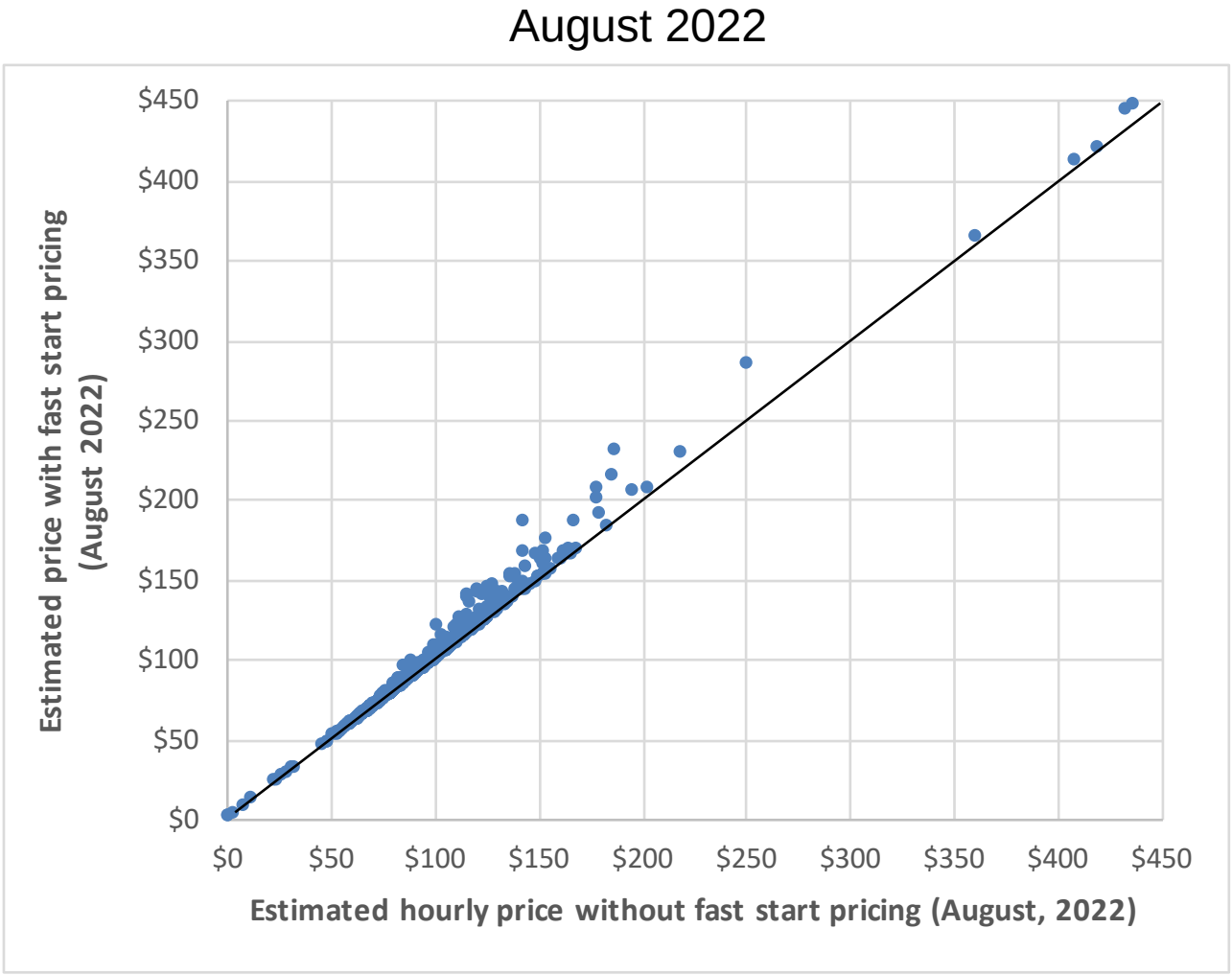
CAISO's analysis of 2022-2023 shows higher impacts during summer months and peak net load hours

	2022			2023		
Month	Avg price	FSP impact		Avg price	FSP impact	
Jan	$48	$ .62	1.3%	$137	$ .45	.3%
Feb	$42	$ .45	1.1%	$63	$ .40	.6%
Mar	$36	$ .93	2.6%	$60	$ .57	1.0%
Apr	$46	$1.17	2.6%	$41	$ .82	2.0%
May	$52	$1.19	2.3%	$14	$ .55	3.8%
Jun	$64	$1.49	2.3%	$23	$ .18	.8%
Jul	$71	$1.10	1.5%	$56	$ .81	1.4%
Aug	$94	$1.67	1.8%	$57	$ .66	1.2%
Sep	$103	$1.27	1.2%	$36	$ .37	1.0%
Oct	$62	$ .60	1.0%	$47	$ .51	1.1%
Nov	$82	$ .68	.8%	$51	$ .22	.4%
Dec	$237	$1.35	.6%	$45	$ .10	.2%
	$78	**$1.05**	**1.3%**	**$52**	**$ .47**	**.9%**

CAISO's analysis of shows fast start pricing having highest price impact in peak net load hours in August 2022



Estimated hourly impact of fast start pricing would not be enough to incent more demand response or imports not currently being made available in WEIM



Questions?

References on fast start pricing

DMM comments on CAISO stakeholder process

- dmm-comments-on-price-formation-enhancements-october-12-2023-working-group-nov-2-2023.pdf
- https://www.caiso.com/documents/dmm-comments-price-formation-enhancements-issue-paper-aug-11-2022.pdf

WEM Market Expert presentation on fast start pricing

- https://www.westerneim.com/Documents/BriefingbyWEMGoverningBodyMarketExpertonFast-StartPricing-Presentation-Mar2024.pdf

DMM comments on FERC's 2017 NOPR on fast start pricing

- https://www.caiso.com/Documents/Feb28_2017_DMMComments-Fast-StartPricingNOPR_RM17-3.pdf