IMM Quarterly Report: Summer 2020

MISO Independent Market Monitor

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Highlights and Findings: Summer 2020

- The MISO markets performed competitively this Summer, market power mitigation was infrequent, and conduct was competitive overall.
- A continuing trend of low natural gas prices in the first two months contributed to energy prices falling 6 percent compared to last summer.
  - ✓ Gas prices averaged less than $2 per MMBTU this quarter, rising in August.
- MISO's summer peak load slightly above 117 GW occurred on August 24.
  - ✓ Average load remained consistent with prior summers, as COVID-related impacts diminished and were offset by hotter temperatures.
- MISO experienced several significant events this summer.
  - ✓ In Michigan, MISO declared a Local Transmission Emergency in June and a Transmission System Emergency in July, resulting in very high congestion.
  - ✓ MISO experienced a week of hot temperatures in early July and on July 7, it declared a Maximum Generation Event in the Midwest region.
  - ✓ In Western WOTAB on Aug 27, MISO declared an emergency and cut load.
    - – Prices were finalized a week after the event and set at the VOLL.
  - ✓ MISO also declared on Local Transmission Emergency in Texas on August 28 that was caused by storm-related transmission outages.

Quarterly Summary

		Value	Change[1] Prior Qtr.	Change[1] Prior Year
RT Energy Prices ($/MWh)	🟣	$24.36	*32%*	*-6%*
Fuel Prices ($/MMBtu)				
Natural Gas - Chicago	🟣	$1.76	*8%*	*-15%*
Natural Gas - Henry Hub	🟣	$1.83	*7%*	*-19%*
Western Coal	🟢	$0.68	*-2%*	*-3%*
Eastern Coal	🟢	$1.24	*2%*	*-18%*
Load (GW)[2]				
Average Load	🟣	83.6	*29%*	*0%*
Peak Load	🟣	117.5	*28%*	*-3%*
% Scheduled DA (Peak Hour)	🟢	100.3%	98.8%	99.3%
Transmission Congestion ($M)				
Real-Time Congestion Value	🟣	$331.0	*41%*	*23%*
Day-Ahead Congestion Revenue	🟣	$222.6	*75%*	*47%*
Balancing Congestion Revenue[3]	🟢	$75.5	$6.5	$4.6
Ancillary Service Prices ($/MWh)				
Regulation	🟢	$7.86	*-2%*	*3%*
Spinning Reserves	🟢	$1.90	*-11%*	*-12%*
Supplemental Reserves	🟢	$0.30	*85%*	*-51%*

		Value	Change[1] Prior Qtr.	Change[1] Prior Year
FTR Funding (%)	🟢	101%	99%	96%
Wind Output (MW/hr)	🟣	6,128	*-25%*	*44%*
Guarantee Payments ($M)[4]				
Real-Time RSG	🟣	$16.6	*153%*	*14%*
Day-Ahead RSG	🟢	$5.7	*-9%*	*-1%*
Day-Ahead Margin Assurance	🟣	$10.9	*94%*	*173%*
Real-Time Offer Rev. Sufficiency	🟢	$1.1	*176%*	*55%*
Price Convergence[5]				
Market-wide DA Premium	🟢	-1.1%	2.6%	0.3%
Virtual Trading				
Cleared Quantity (MW/hr)	🟢	16,715	*-8%*	*4%*
% Price Insensitive	🟢	28%	33%	32%
% Screened for Review	🟢	1%	1%	1%
Profitability ($/MW)	🟢	$0.30	$0.70	$0.32
Dispatch of Peaking Units (MW/hr)	🟢	2,569	829	1775
Output Gap- Low Thresh. (MW/hr)	🟢	191	55	45
Other:				

Key:
- 🟢 Expected
- 🟣 Monitor/Discuss
- 🔴 Concern

Notes:
1. Values not in italics are the values for the past period rather than the change.
2. Comparisons adjusted for any change in membership.
3. Net real-time congestion collection, unadjusted for M2M settlements.
4. Includes effects of market power mitigation.
5. Values include allocation of RSG.

Highlights for Summer 2020

<u>Hot Week in Early July (Slides 21-25)</u>

- Between July 1-10, MISO issued Hot Weather Alerts and Capacity Advisories for the Midwest due to high temperatures and humidity.
- *Long-lead commitments*. On July 1, MISO forecasted operating margins in the Midwest of only 4 and 3 percent on July 6 and 7, respectively.
  - ✓ MISO committed long-lead time units in the South to ensure power could be transferred as needed to the Midwest – resulted in > $800,000 in RSG.
  - ✓ From July 1-9, more than 1,700 MW on average were trapped in the South in the peak hours between 2 p.m. and 4 p.m. so their usefulness was limited.
  - ✓ The implied VOLL for these commitments exceeded $40,000 per MWh. We have recommended VOLL for shortage pricing of $23,000 so we find these commitments conservative, but not unreasonable.
- *Forecast Errors*. MISO's load forecast was impacted on multiple days because of large storms, causing significant forecast errors.
  - ✓ Day-ahead forecast errors were as high as 8 and 7 percent on July 8 and 10.

Highlights for Summer 2020

<u>Hot Week in Early July (cont.)</u>

- *July 6.* Conditions were tighter on July 6 than any other day of the week.
  - ✓ Although temperatures and load were not quite as high on this day, wind output was very low.
  - ✓ MISO declared conservative operations but did not proceed to an emergency.
- *July 7.* At 1 p.m., MISO declared a Max Gen Event that quickly escalated to an Emergency Event in the North and Central Regions.
  - ✓ The emergency led to the commitment of all available resources.
  - ✓ Morning temperatures rose more than expected, but storms flattened the load.
  - ✓ Ultimately, this caused: a) the emergency declaration to be unnecessary and b) the 433 MW of emergency-only resources to not set prices.
- *July 8.* July 8 was the hottest day of the week and exhibited the highest day-ahead forecasted load.
  - ✓ Conditions ultimately were not tight because the load came in much lower than forecast; and
  - ✓ Wind output was very high and led to a large supply margin on this day.

Highlights for Summer 2020

<u>Summer Capacity Availability (Slides 26-28)</u>

- Currently, resource accreditation is based primarily on forced outages.
- In reality, a large share of the resources procured in the PRA are ultimately unavailable for reasons other than forced outage.
- On July 7, almost **15 GW** was unavailable because of outages and derates.
  - ✓ The largest share of the unavailable MWs were in Zone 7.
  - ✓ In MISO's 2020-2021 PRA, Zone 7 cleared at CONE ($257.53/MW-day).
  - ✓ Several capacity resources in Zone 7 were unavailable or derated during most of the summer, affecting congestion and prices in Michigan.
  - ✓ Two of these resources were together paid more than $154 million in the PRA.
- We continue to recommend that MISO reform capacity accreditation to reflect the actual availability of resources during MISO's tightest hours.
  - ✓ The average capacity derates in Zones 6 and 7 were 8.9 and 8.2 in the PRA.
  - ✓ The actual average derates (including outages) of conventional resources in the tightest hours in July in these zones were 23.5 and 28.4 percent, respectively.

Highlights for Summer 2020

<u>Increased Congestion and Michigan Tx Emergencies (Slides 27-28, 30-31)</u>

- Although gas prices remained low in June and July, day-ahead and real-time congestion rose 47 and 23 percent over last year, respectively.
- More than $45 million in increased congestion was attributable to low generation availability in Michigan, including almost $35 million on 2 days.
  - ✓ On June 10, MISO declared a Local Transmission Emergency from 11:25 a.m. to 5:20 p.m. to access 260 MW of emergency generation.
  - ✓ On July 9, MISO declared a Transmission System Emergency from 4:10 p.m. to 7 p.m. for two parallel constraints to access emergency ranges.
    - – IESO was in EEA 1 and had reduced imports to Michigan by 700 MW.
  - ✓ A critical unit that would have provided significant congestion relief was unavailable during both events because of a COVID outbreak at the unit.
- Over $10 million in day-ahead congestion accrued in Texas on August 28 because of the hurricane-related system effects.
- MISO has made progress in discussing TLR procedures with IESO.

Highlights for Summer 2020

<u>August Load Shed in the Western Load Pocket</u>

- On August 27, Hurricane Laura forced out several transmission lines and more than 6,000 MW of generation in Eastern Texas and Western Louisiana.
  - ✓ MISO declared an emergency and shed > 500 MW of firm load in the Western load pocket.
  - ✓ The results of this event raise energy and capacity market concerns.
- *Energy Market.* Ex ante prices averaged $15 per MWh throughout the event and did not reflect the shortages.
  - ✓ Operators had to manually re-dispatch multiple units.
  - ✓ MISO set ex post prices in the Western Load Pocket a week later to reflect the current value of lost load (VOLL) of $3,500 for several hours.
  - ✓ MISO’s current VOLL of $3,500 per MWh is inefficiently low. MISO would have lost of up to 830 MW from a key resource to ERCOT if it had been tight, since ERCOT will set prices up to $9,000 per MWh.
  - ✓ We have recommended that MISO update the VOLL used in shortage pricing based on data from the Midwest to $23,000 per MWh.

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Highlights for Summer 2020

<u>August Load Shed in Western Load Pocket (Cont.)</u>

- *Capacity Market.* We continue to be concerned that the capacity market zones do not reflect these load pockets that are very tight.
  - ✓ We have been recommending MISO define local capacity zones consistent with electrical constraints in order to send better economic signals.
  - ✓ The capacity market does not reflect the Western Load Pocket and, thus, produced inefficient results for this area in the 2020-2021 PRA.
    - – 885 MW of UCAP cleared at $6.88 per MW-day (very close to zero), down from almost 1,200 MW the prior year.
    - – A large resource that straddles MISO and ERCOT and could have provided an additional 800 MW of UCAP did not clear the 2020-2021 PRA.
  - ✓ Fortunately, this resource switched to MISO and provided energy to the pocket on August 27 or the load shed would have been larger.
- *Additional Effects of Laura.* On August 28, MISO declared an LTE from roughly 9:30 a.m to 7:30 p.m. in Eastern Texas due to damage from the hurricane.

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Highlights for Summer 2020

<u>Coal Commitment and Dispatch Study</u>

- We are completing a study of coal resource commitments and dispatch to evaluate recent concerns raised that they are running uneconomically.
- Our study finds that most coal resources are started economically:
  - ✓ 90 percent were economic in 2016-2018 on the day they started, with roughly half offered economically and half scheduled as "must-run".
  - ✓ This share fell in 2019 as natural gas prices declined, making it more difficult to predict when the coal resources will be economic.
  - ✓ Merchant resources started economically 99 percent of the days they started.
  - ✓ Roughly 20 percent of the uneconomic starts appeared to be economic based on the prices on the day prior to the start.

	2016-2018		2019	
	Starts	**% of Starts**	**Starts**	**% of Starts**
All Coal Resources	5882		1800	
Economic Starts	5270	90%	1497	83%
Offered Economically	*2553*	*43%*	*730*	*41%*
Must-Run and Economic	*2717*	*46%*	*767*	*43%*
Uneconomic Starts	612	10%	303	17%
Not Expected to be Economic	*491*	*8%*	*239*	*13%*
Expected to be Economic	*121*	*2%*	*64*	*4%*

Highlights for Summer 2020

<u>Coal Commitment and Dispatch Study (cont.)</u>

- The most significant decision coal resources make is whether to stay online each day after they start.
- This decision is complicated by the costs of cycling the units – when a unit turns off, it must then incur a start-up cost to come back on.
- We evaluated the decision to run each day and found:
  - ✓ The decision to stay on by integrated utilities was efficient **96** percent of the time, although they were only profitable on 80 percent of these days.
  - ✓ The unprofitable days that are efficient reflect periods when the transitory losses of staying on are less than the cycling costs of turning off.
  - ✓ Again, the conduct of merchant generators was more economic than their regulated counterparts.

Integrated Utilities

	Efficient	Not Efficient
Profitable	**80%**	**0%**
Unprofitable	**16%**	**4%**
	96%	**4%**

Merchants

	Efficient	Not Efficient
Profitable	**96%**	**0%**
Unprofitable	**4%**	**0%**
	100%	**0%**

Highlights for Summer 2020

<u>Progress on Improving Transmission Ratings</u>

- We continue to promote the use of ambient temperature-adjusted ratings (AARs) and short-term emergency ratings – as we've shown in our SOM reports, the benefits have averaged almost $150 million per year.
- We've been meeting with the TOs, individual states and OMS.
- The states are recognizing the value of fuller utilization of the transmission system for their customers, and on August 13, OMS issued a position Statement on Enhanced Line Ratings.** It calls for TOs to:
  - ✓ Provide greater transparency and consistency in line ratings and methods.
  - ✓ Provide both normal and emergency ratings to MISO per the TO Agreement.
  - ✓ Develop procedures for identifying facilities for enhanced line ratings.
- Although valuable discussions are taking place and there has been little technical disagreement, progress has been very limited to date.
- MISO has participated in some of the meetings but has devoted very few resources to this effort – more will be needed from MISO to make progress.

**https://www.misostates.org/images/PositionStatements/OMS_Position_Statement__Enhanced_Line_Ratings.pdf

Submittals to External Entities and Other Issues

- The IMM function has not experienced detrimental impacts from COVID-19.
- We responded to several FERC questions related to prior referrals and FERC investigations. We continued to meet with FERC on a weekly basis and we responded to several requests for information on market issues.
- In June, we presented a summary of MISO South market results and issues to the Entergy Regional State Committee.
- We filed comments in June in the FERC NOPR Incentives requesting FERC consider alternative incentives for existing transmission (other than ROE).
- In July, we presented the Spring Quarterly Report and the 2019 SOM Recommendations to the MSC.
- We participated in a FERC conference of the RTO market monitors in July, making presentations on FTR markets, RTO credit practices, and the evolving generation portfolios.

Submittals to External Entities and Other Issues

- We completed work with the SPP MMU and MISO on the Tier 1 and Tier 2 items and presented the results to the OMS.
  - ✓ We published the Tier 2 Interface Pricing study in August and presented it to OMS/RSC in September.
  - ✓ Additional items in Tier 2 and Tier 3 may be considered in the future if approved by the Markets Committee.
- We continue discussing issues with Emergency Pricing and Shortage Pricing with MISO and the MSC
  - ✓ These discussions included the elimination of offline ELMP pricing, which artificially mutes MISO's shortage pricing.
- We continued working with MISO on proposed improvements to the market power mitigation measures in Module D of the Tariff at the MSC.
  - ✓ We will also be supporting MISO's re-filing of the physical withholding provision in Module D with an affidavit.

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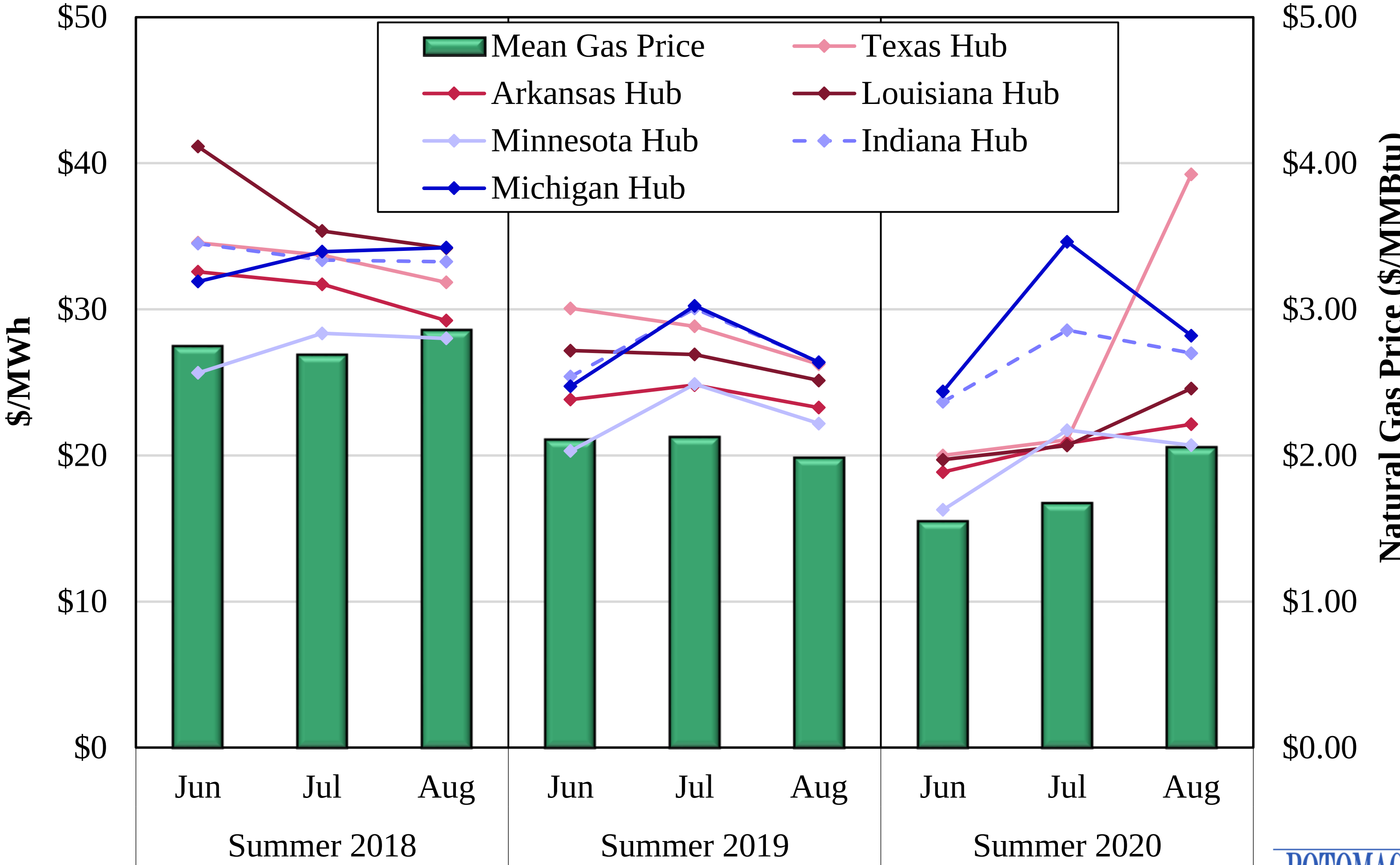
Day-Ahead Average Monthly Hub Prices Summer 2018-2020



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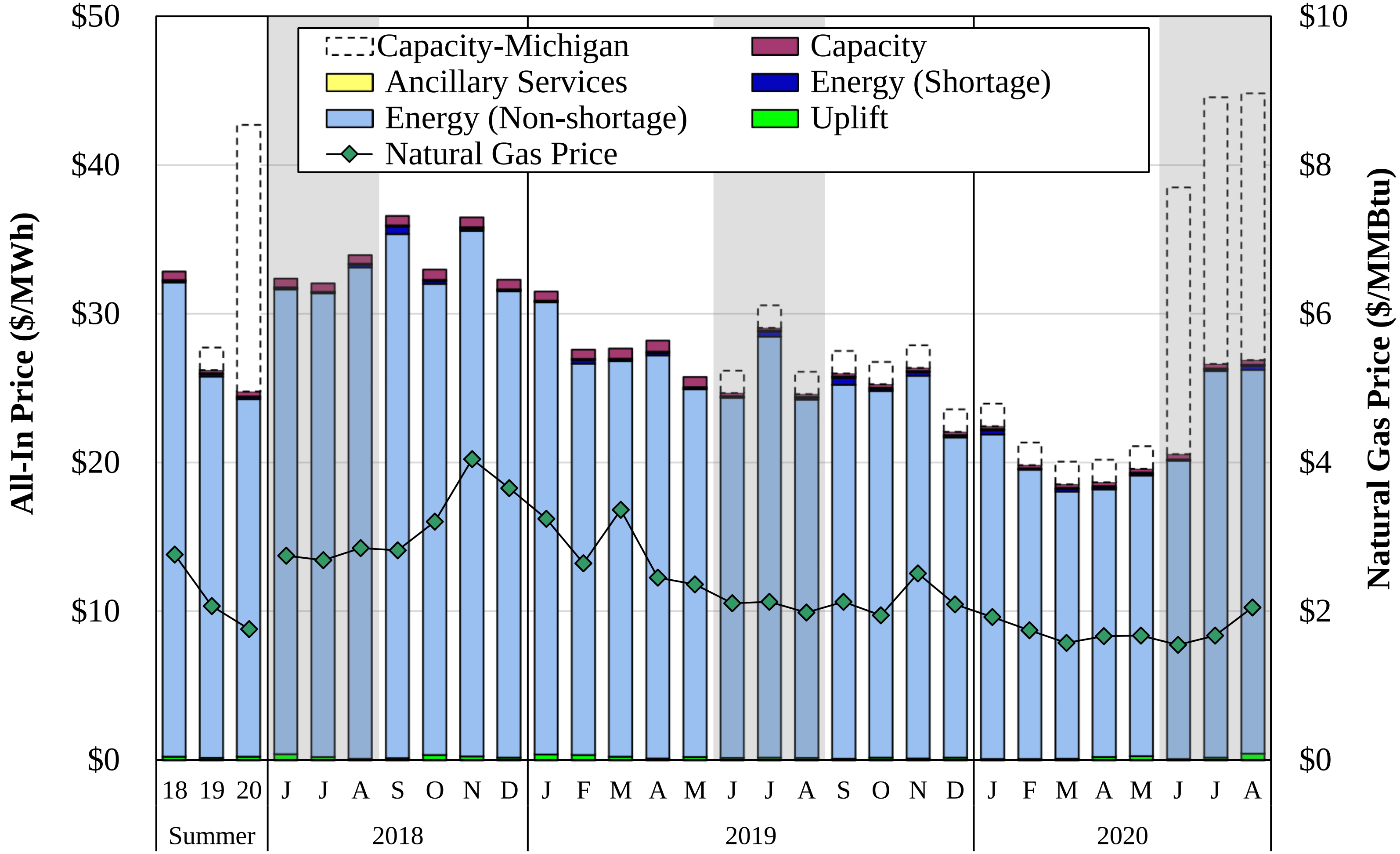
All-In Price 2018-2020



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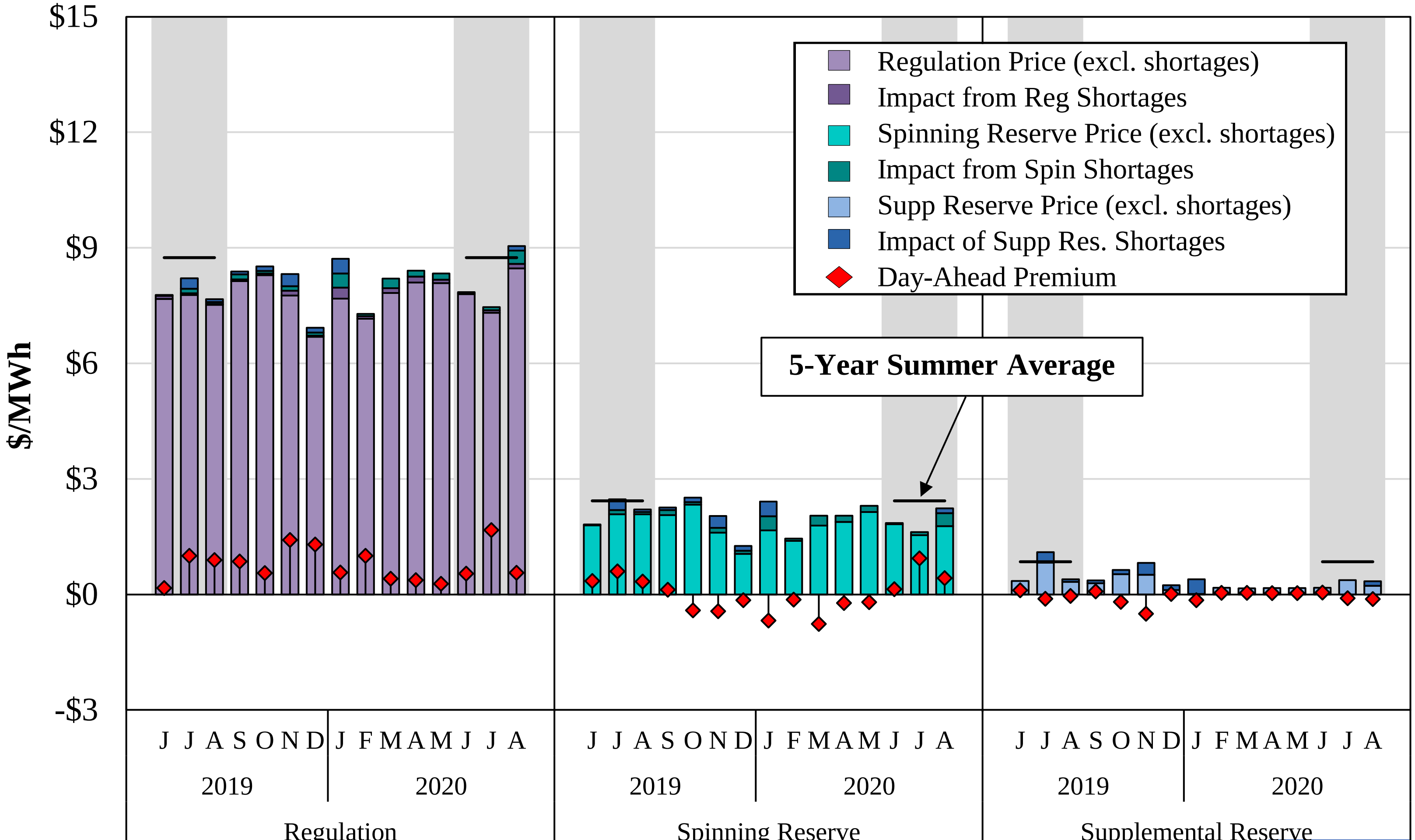
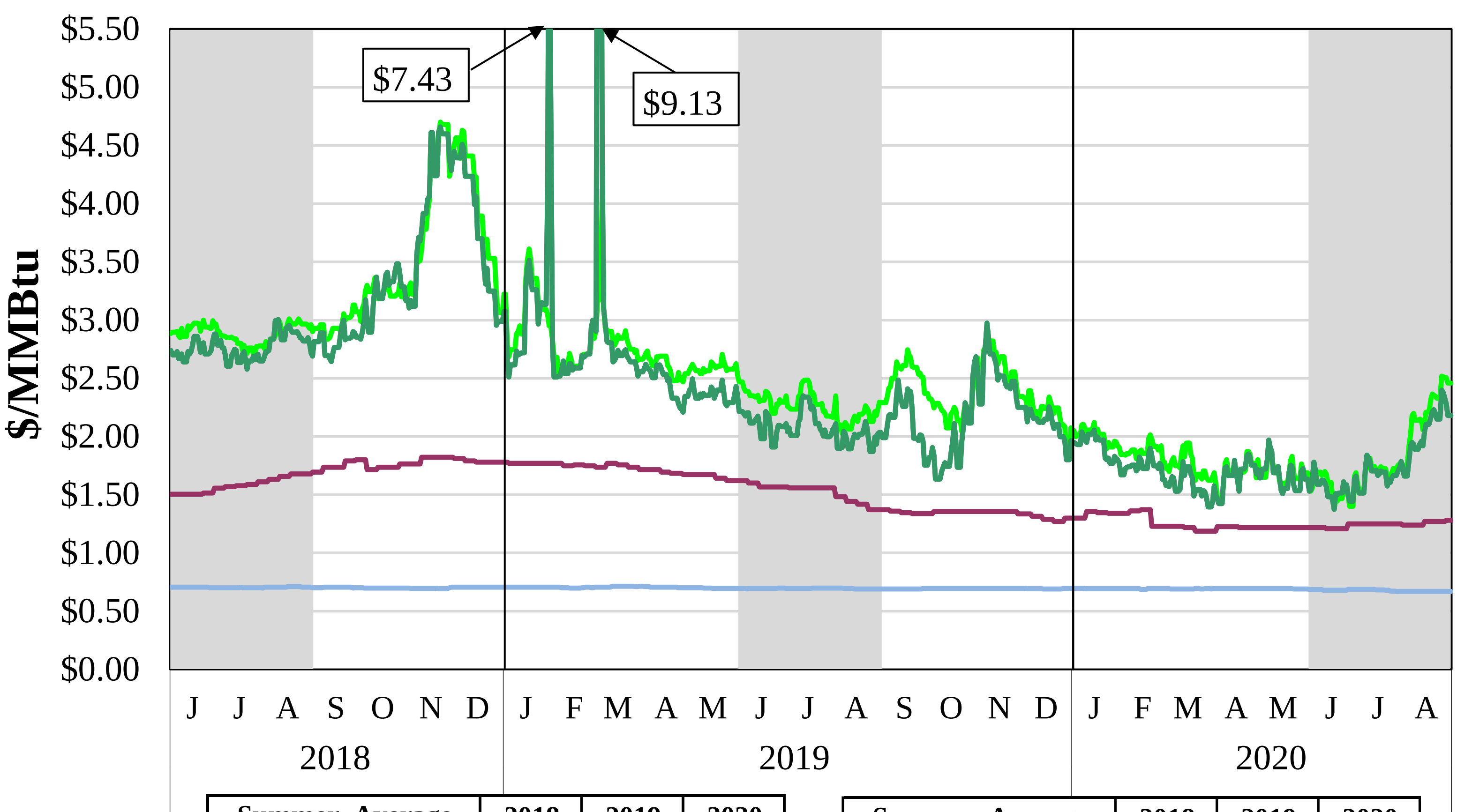
Ancillary Service Prices
Summer 2019 – 2020



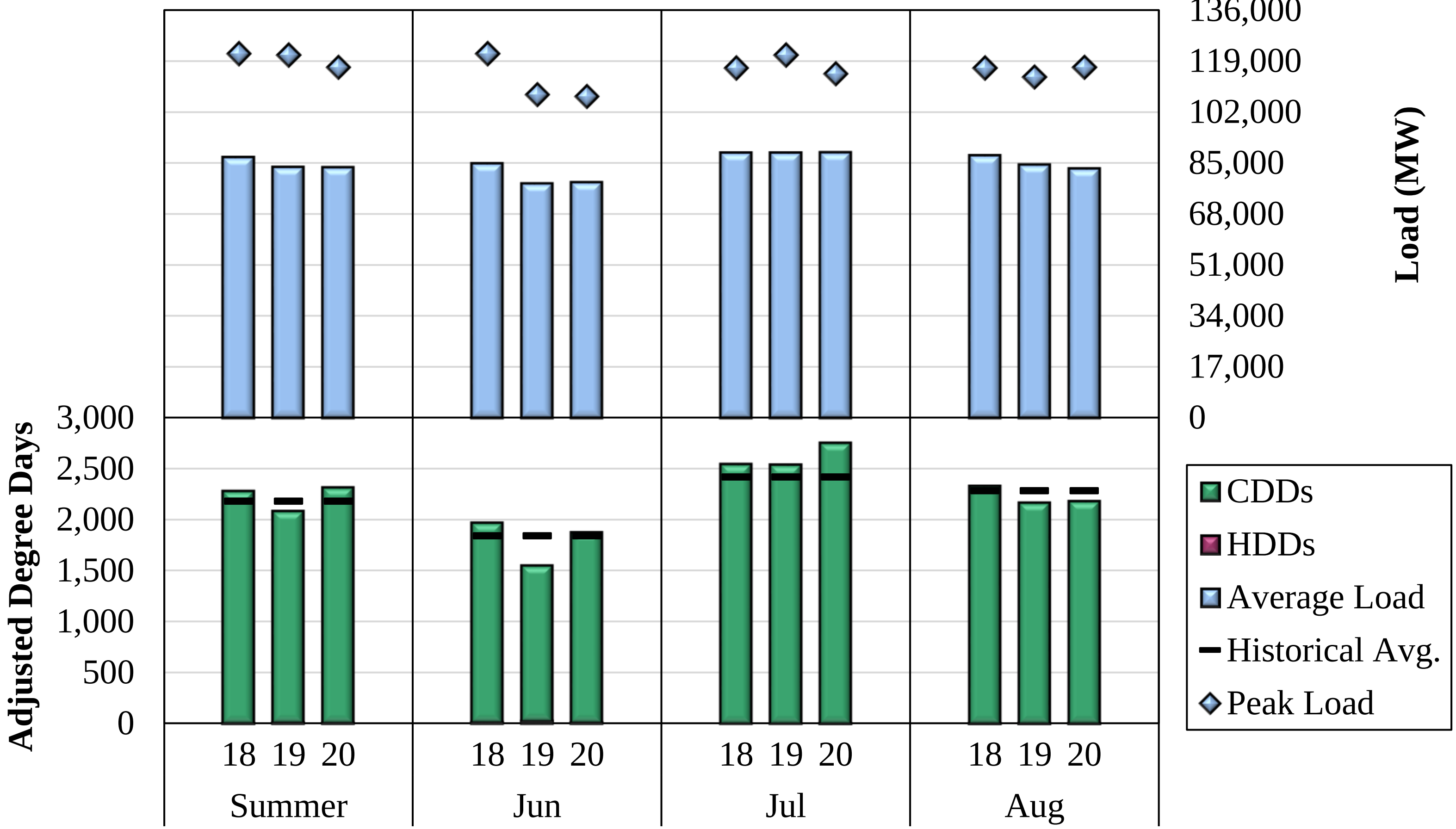
MISO Fuel Prices
Summer 2018-2020



Summer Average	2018	2019	2020
Chicago NG	$2.76	$2.07	$1.76
Henry NG	$2.89	$2.27	$1.83

Summer Average	2018	2019	2020
IB Coal	$1.58	$1.52	$1.24
PRB Coal	$0.71	$0.70	$0.68

Load and Weather Patterns
Summer 2018-2020



<u>Notes</u>: Midwest degree day calculations include four representative cities in the Midwest: Indianapolis, Detroit, Milwaukee and Minneapolis. The South region includes Little Rock and New Orleans.

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Capacity, Energy and Price Setting Share Summer 2019-2020

Summer	Unforced Capacity				Energy Output		Price Setting			
	Total (MW)		Share (%)		Share (%)		SMP (%)		LMP (%)	
	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
Nuclear	12,225	12,107	10%	9%	16%	15%	0%	0%	0%	0%
Coal	48,775	46,864	38%	37%	40%	38%	51%	43%	93%	90%
Natural Gas	55,240	56,673	43%	44%	35%	37%	46%	55%	98%	97%
Oil	1,691	1,568	1%	1%	0%	0%	0%	0%	0%	1%
Hydro	3,966	4,034	3%	3%	2%	2%	2%	1%	4%	4%
Wind	3,005	3,660	2%	3%	6%	8%	1%	0%	23%	50%
Other	2,678	2,703	2%	2%	1%	1%	0%	0%	2%	7%
Total	**127,580**	**127,608**								

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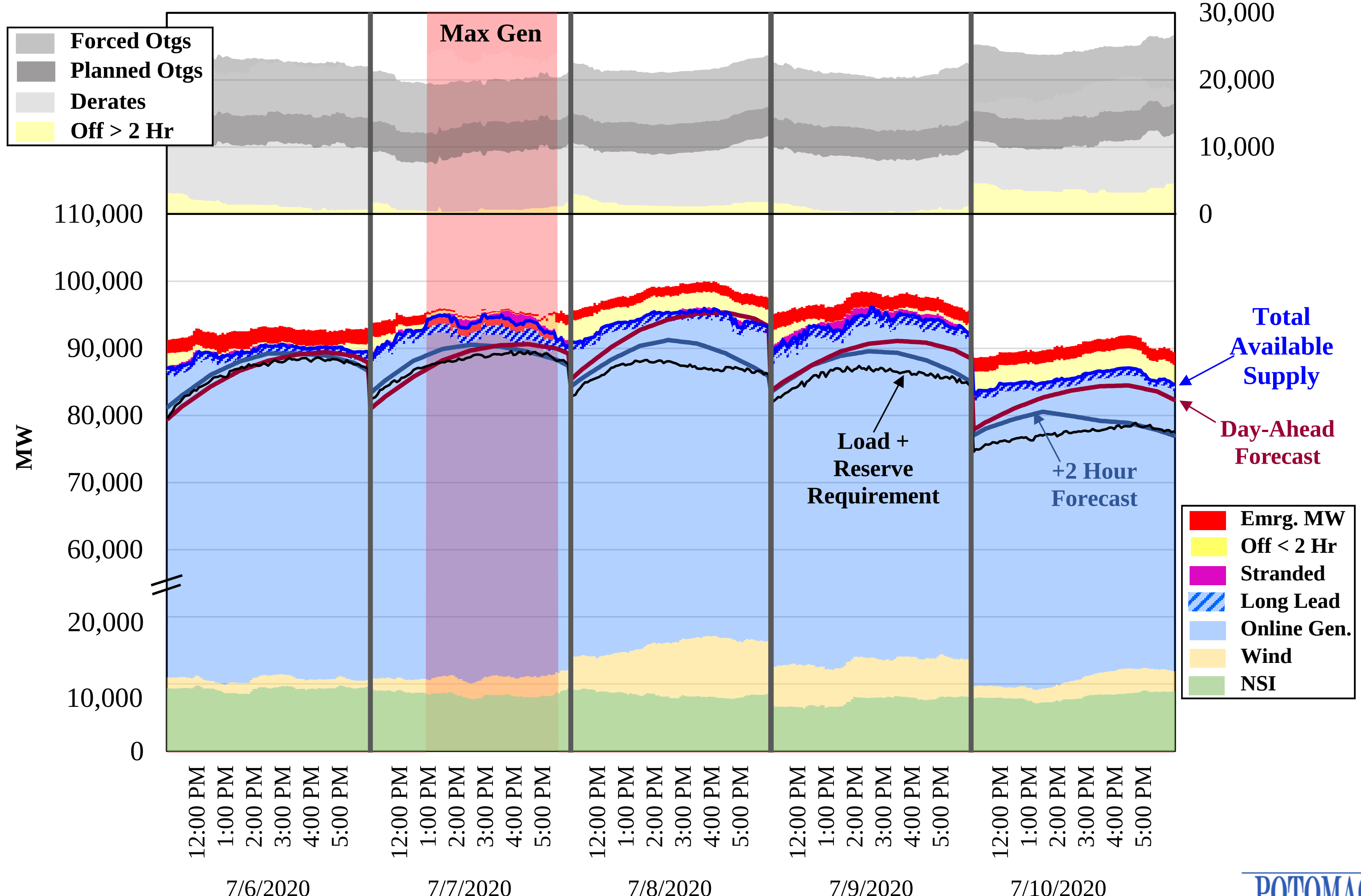
Hot Week in Early July
Daily High Temperatures

	Hist.	July			
	Avg.	6	7	8	9
Detroit	83	92	95	91	92
Indianapolis	85	92	91	94	91
Milwaukee	80	93	93	89	88
Minneapolis	84	86	88	93	82
Little Rock	92	92	91	88	90
New Orleans	92	82	88	94	96

Hot Week in Early July
Midwest Region



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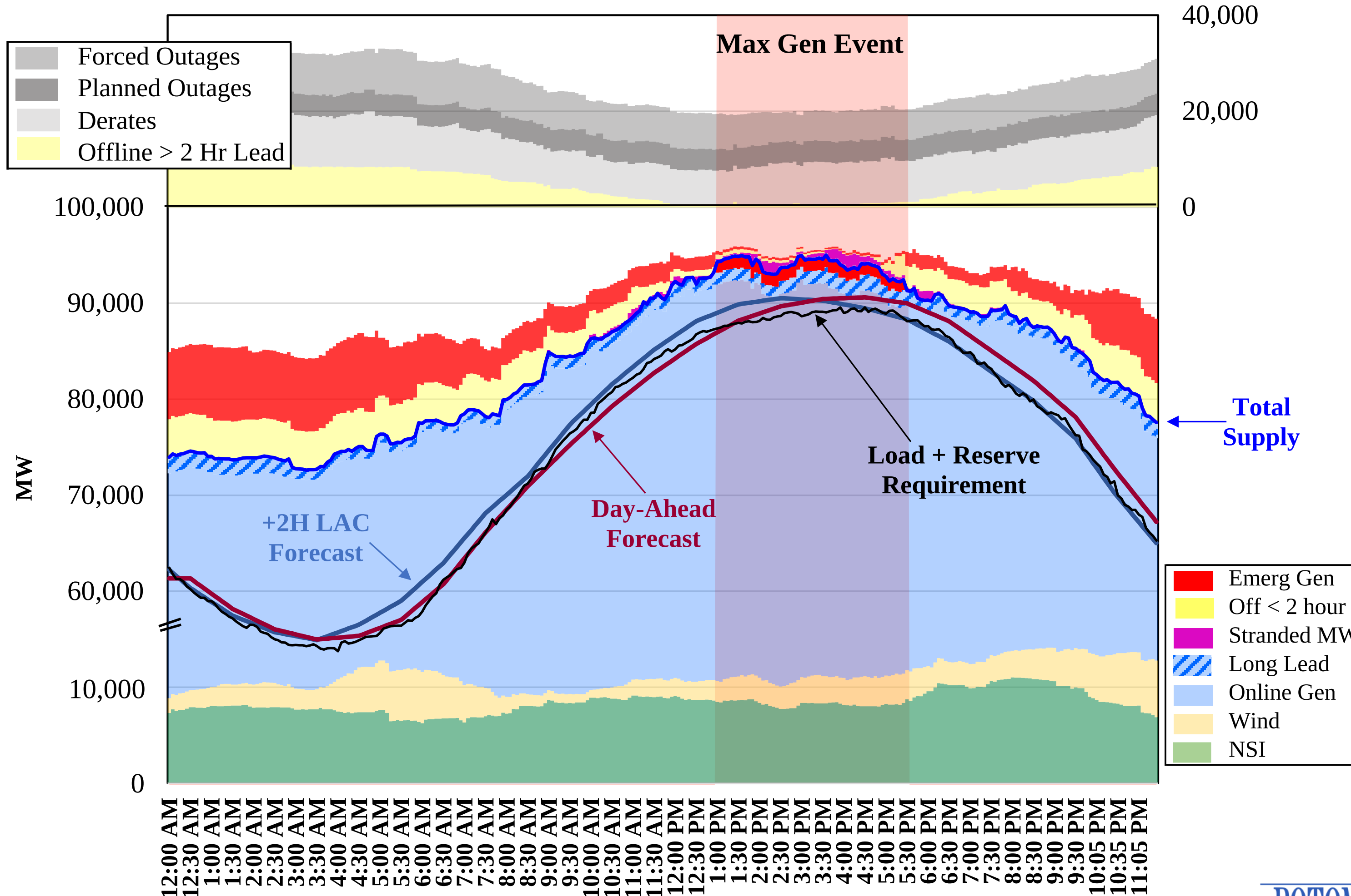
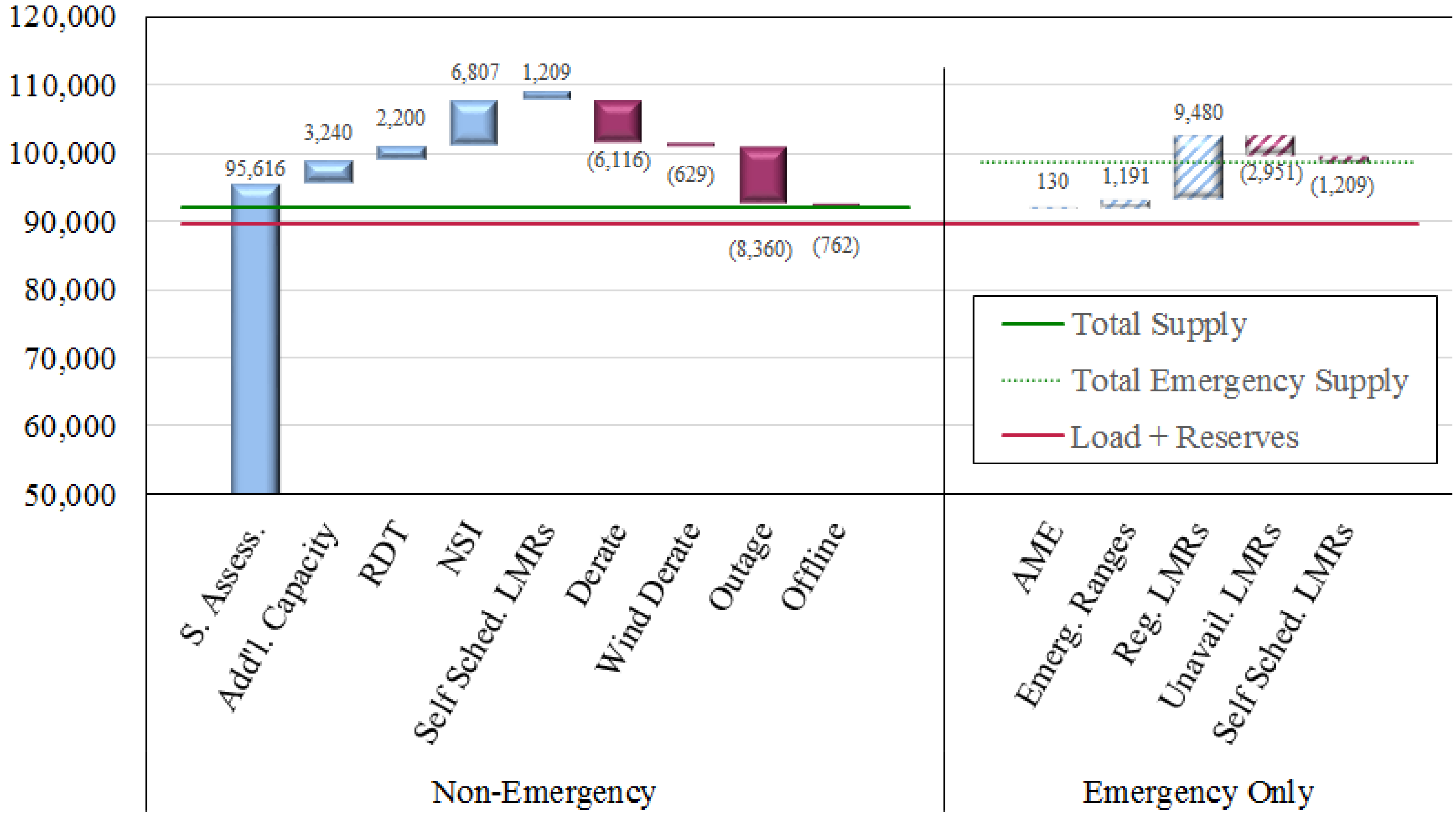
Maximum Generation Event on July 7, 2020 Midwest Region



Peak Hour Midwest Capacity Availability
Midwest Region - July 7, Hour 16



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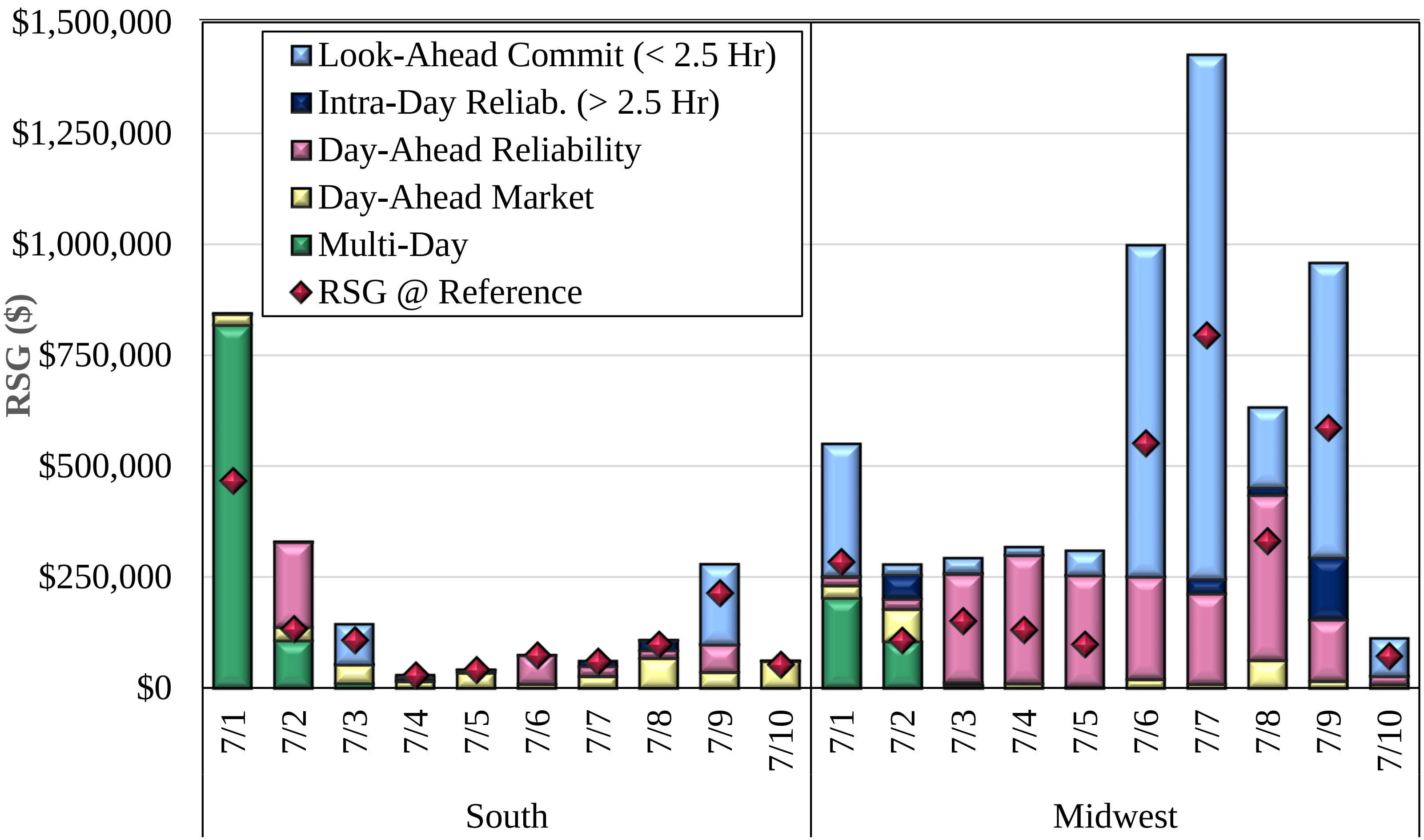
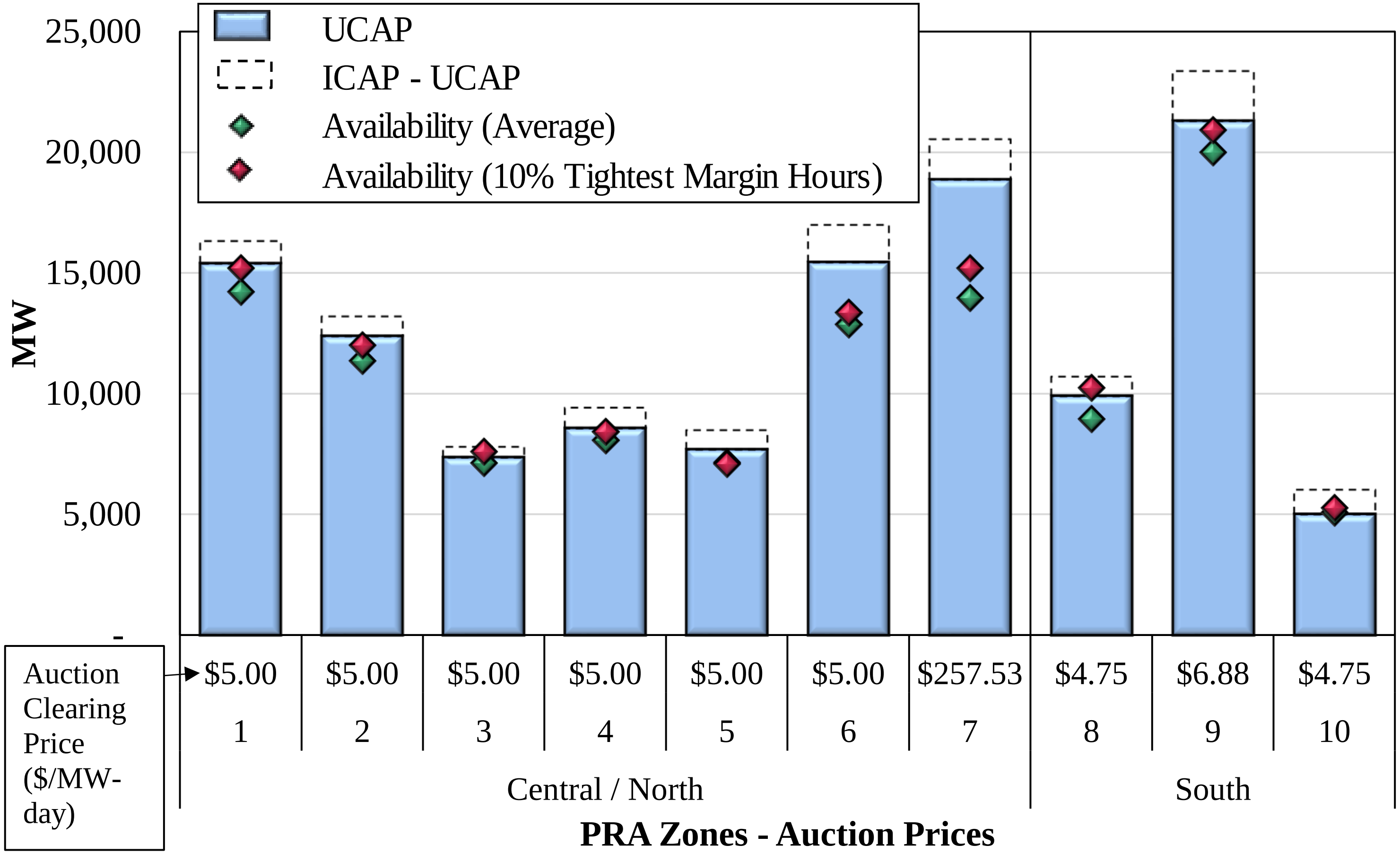
Uplift by Commitment Time
Hot Week in Early July

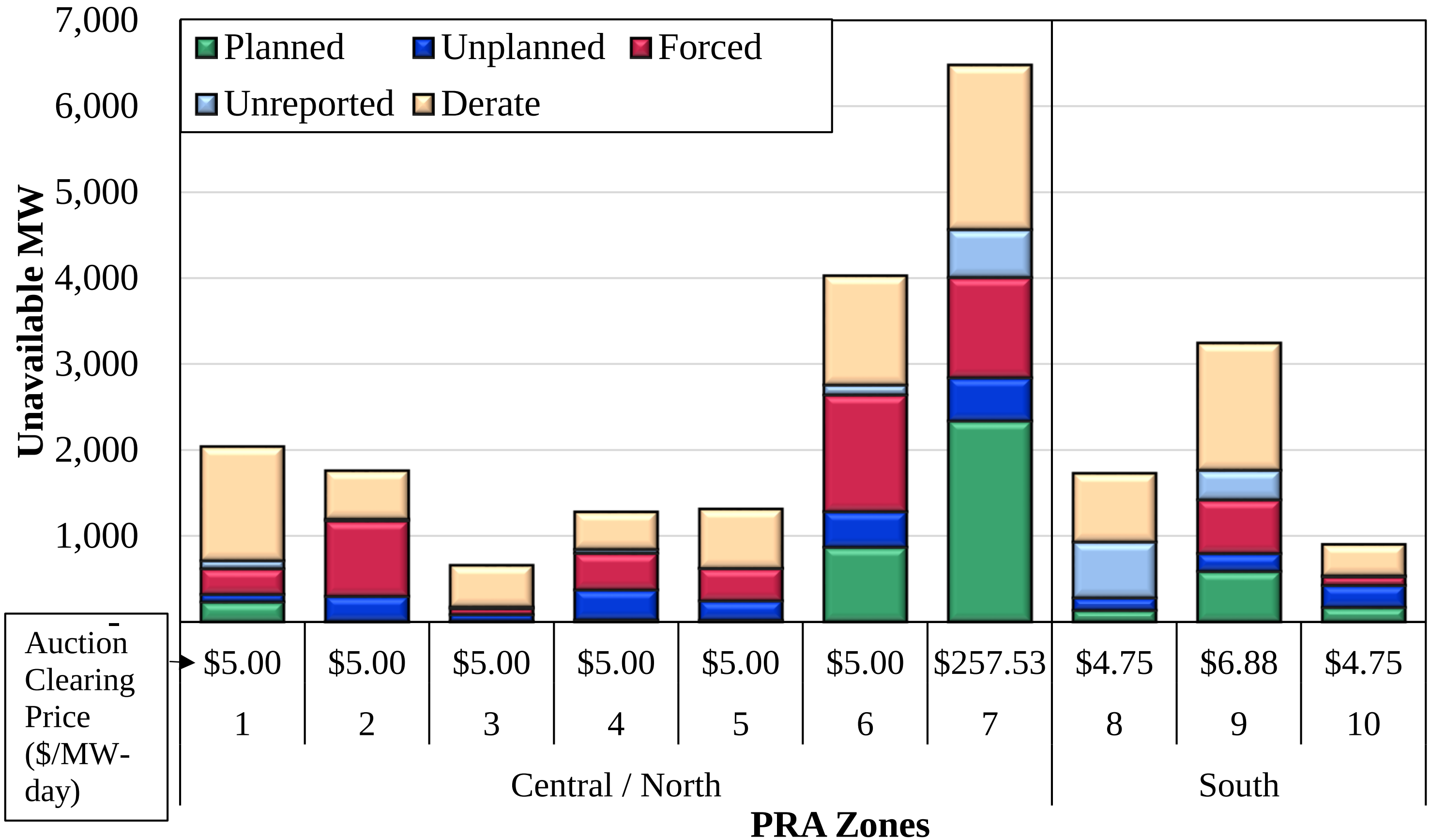


Planning Resource Availability July 2020



* ICAP and UCAP based on data from PRA for 20/21 PY. Excludes intermittent resources (e.g., wind, solar) and LMRs. Tightest margin hours in July based on difference between FRAC load forecast and max available MWs (including offline with less than 24-hour lead).

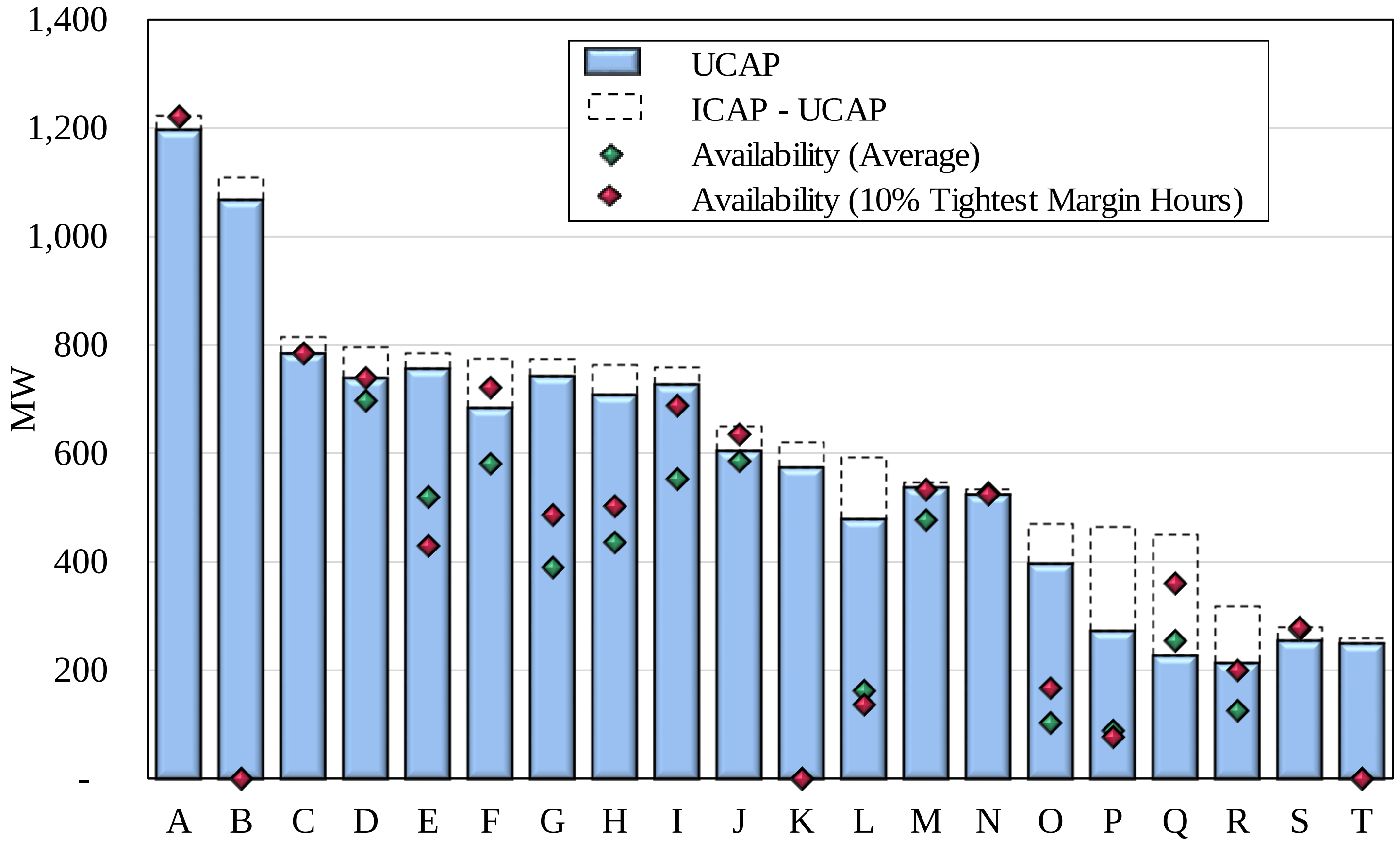
Resource Unavailability by Outage Category July 2020 – Hour 16



* Unavailable MW based on the difference between ICAP (20/21 PY) and actual available MW. Excludes intermittent resources (e.g., wind, solar) and LMRs.

POTOMAC ECONOMICS

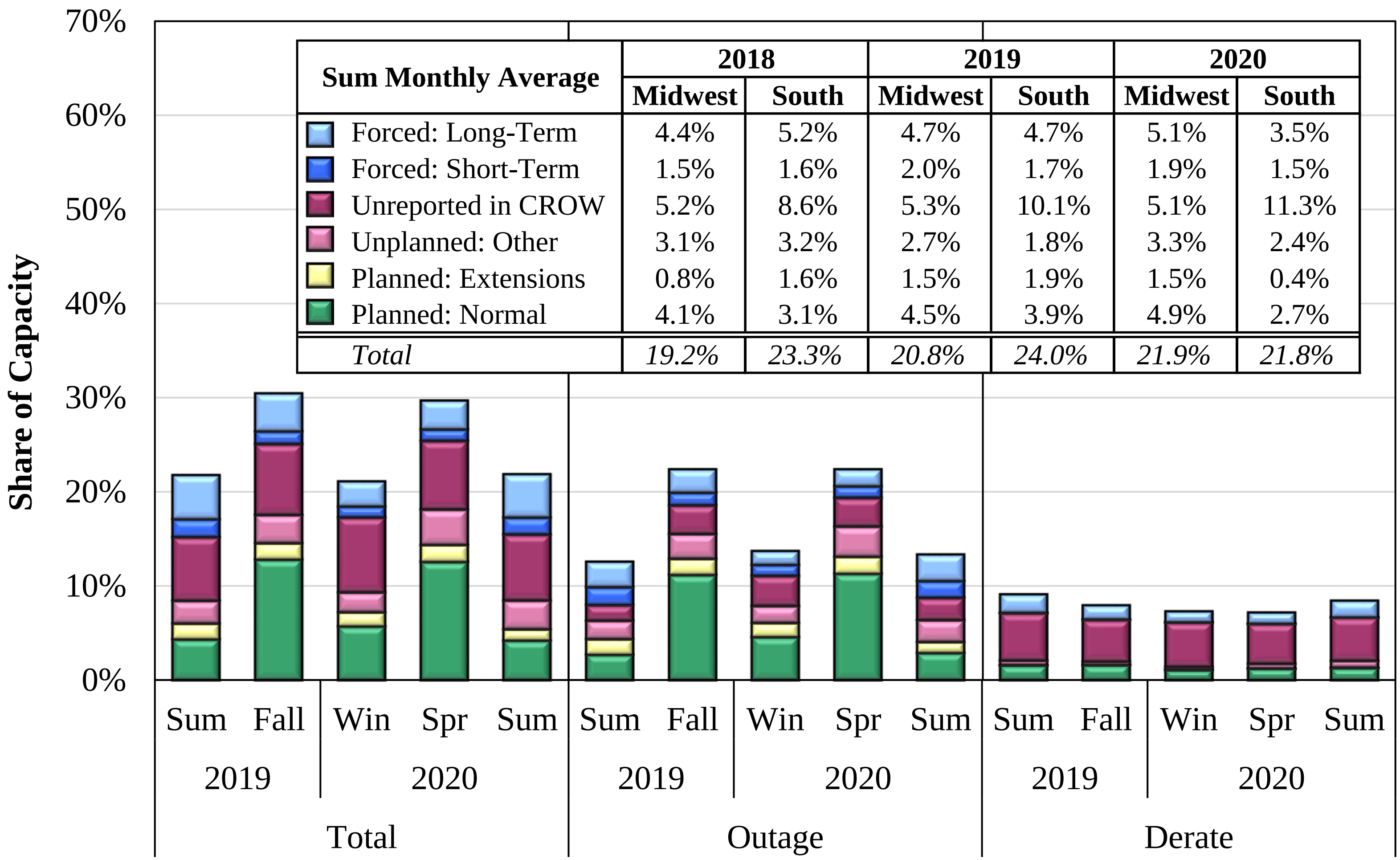
Planning Resource Availability in Zone 7
Largest 20 Units – July 2020



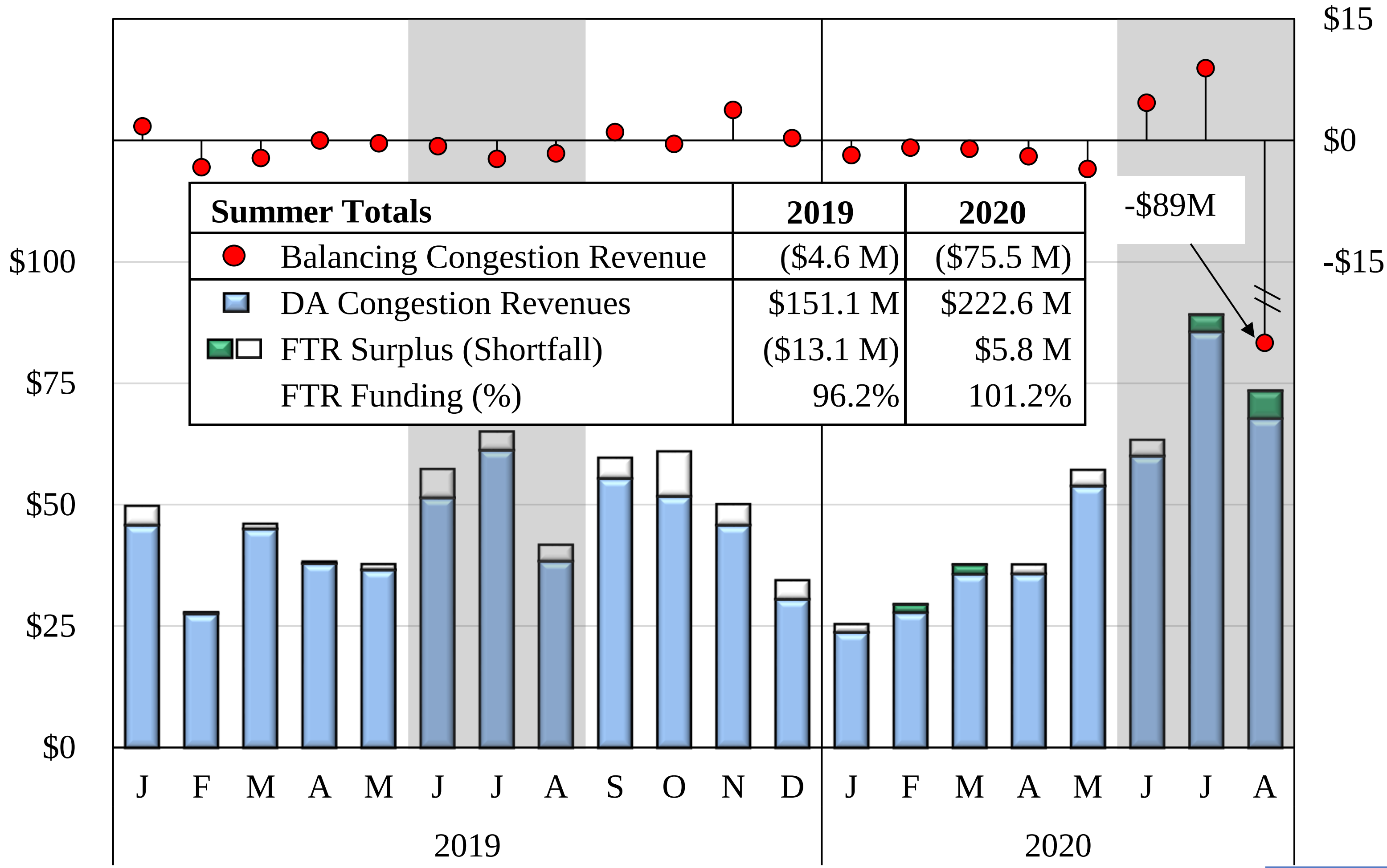
* ICAP and UCAP based on data from PRA for 20/21 PY. Excludes intermittent resources (e.g., wind, solar) and LMRs. Tightest margin hours in July based on difference between FRAC load forecast and max available MWs (including offline with less than 24-hour lead).

Generation Outages and Deratings Summer 2019-2020

Sum Monthly Average	2018 Midwest	2018 South	2019 Midwest	2019 South	2020 Midwest	2020 South
Forced: Long-Term	4.4%	5.2%	4.7%	4.7%	5.1%	3.5%
Forced: Short-Term	1.5%	1.6%	2.0%	1.7%	1.9%	1.5%
Unreported in CROW	5.2%	8.6%	5.3%	10.1%	5.1%	11.3%
Unplanned: Other	3.1%	3.2%	2.7%	1.8%	3.3%	2.4%
Planned: Extensions	0.8%	1.6%	1.5%	1.9%	1.5%	0.4%
Planned: Normal	4.1%	3.1%	4.5%	3.9%	4.9%	2.7%
Total	*19.2%*	*23.3%*	*20.8%*	*24.0%*	*21.9%*	*21.8%*

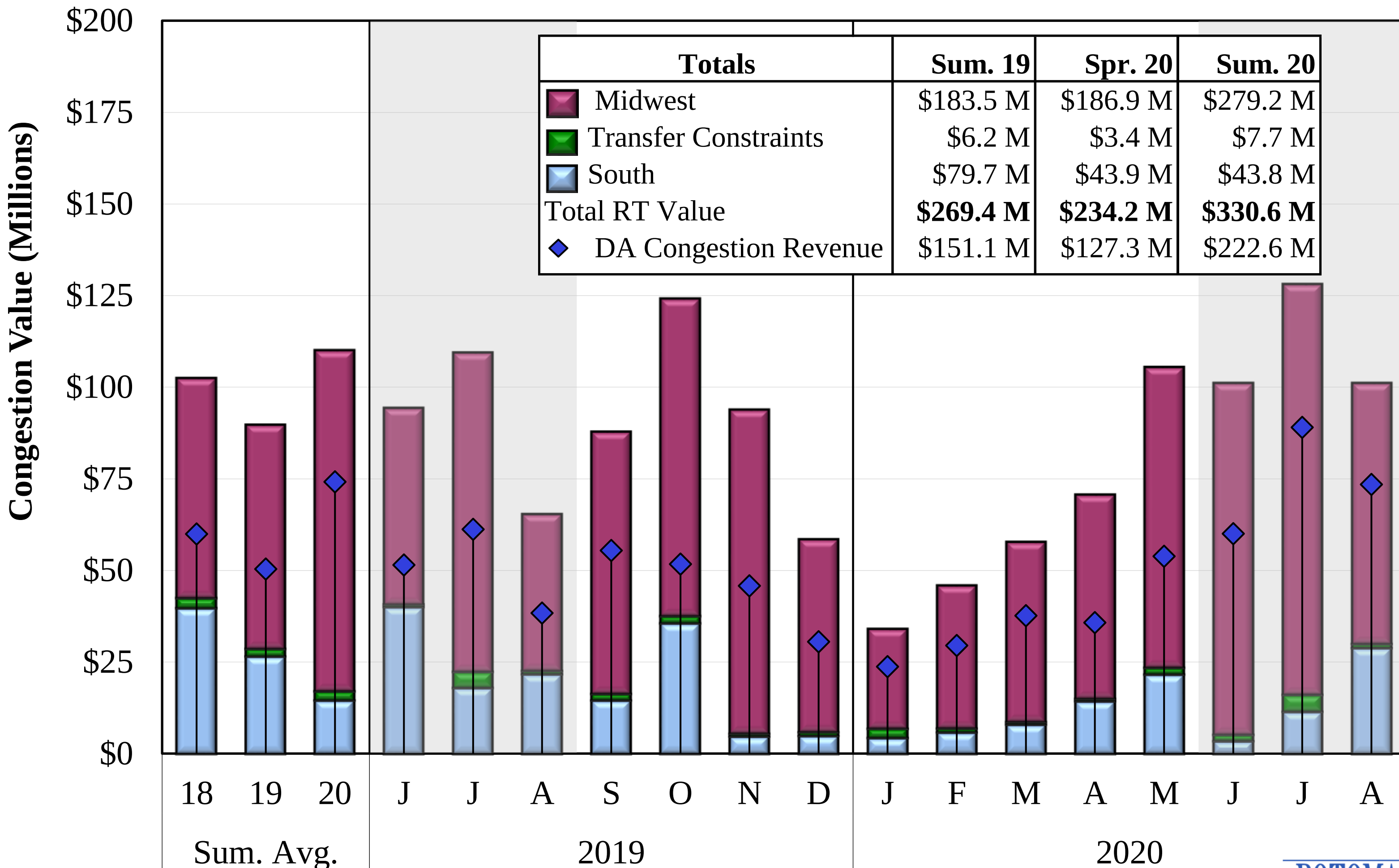


Day-Ahead Congestion, Balancing Congestion and FTR Underfunding



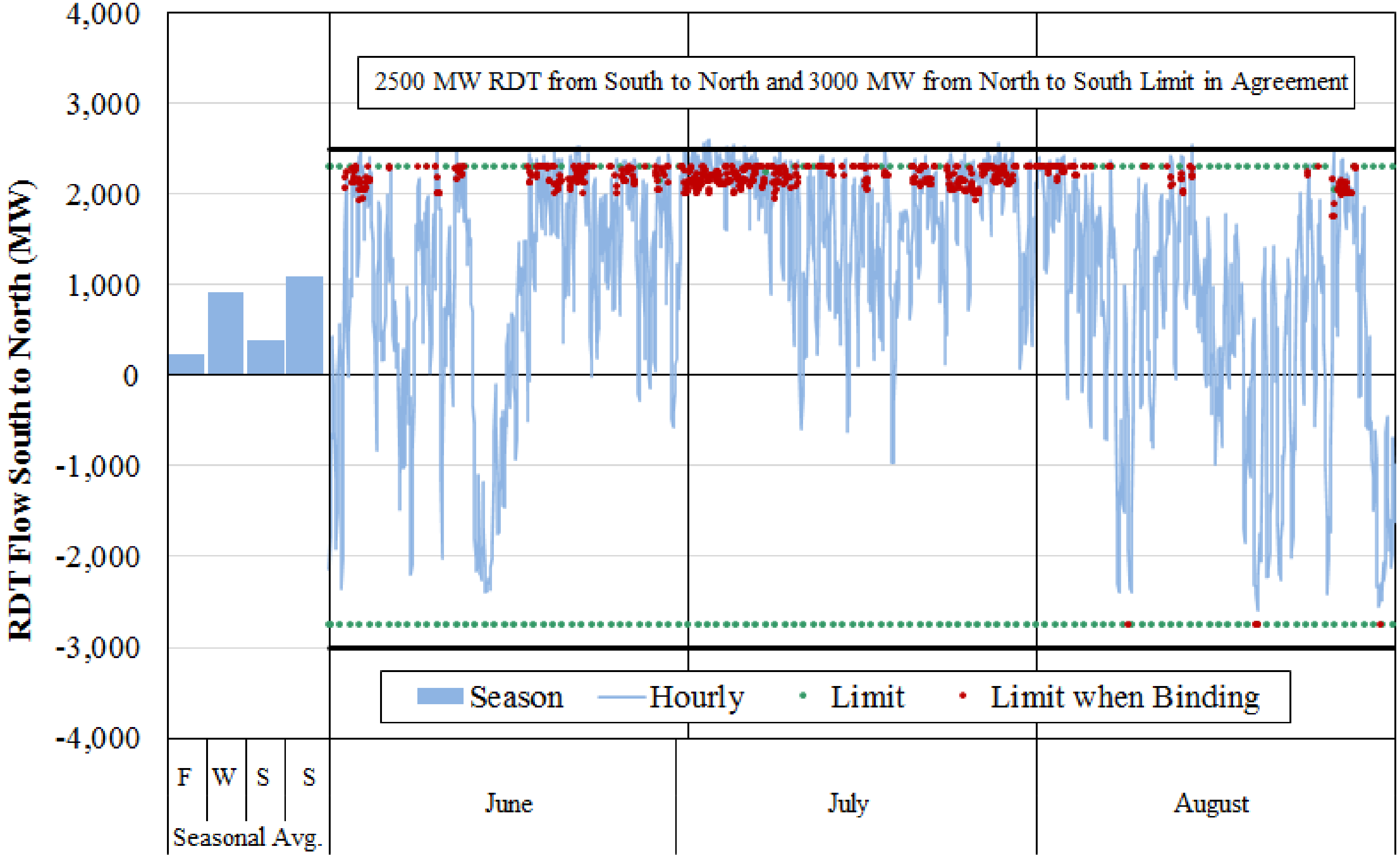
Summer Totals	2019	2020
Balancing Congestion Revenue	($4.6 M)	($75.5 M)
DA Congestion Revenues	$151.1 M	$222.6 M
FTR Surplus (Shortfall)	($13.1 M)	$5.8 M
FTR Funding (%)	96.2%	101.2%

Value of Real-Time Congestion
Summer 2019-2020

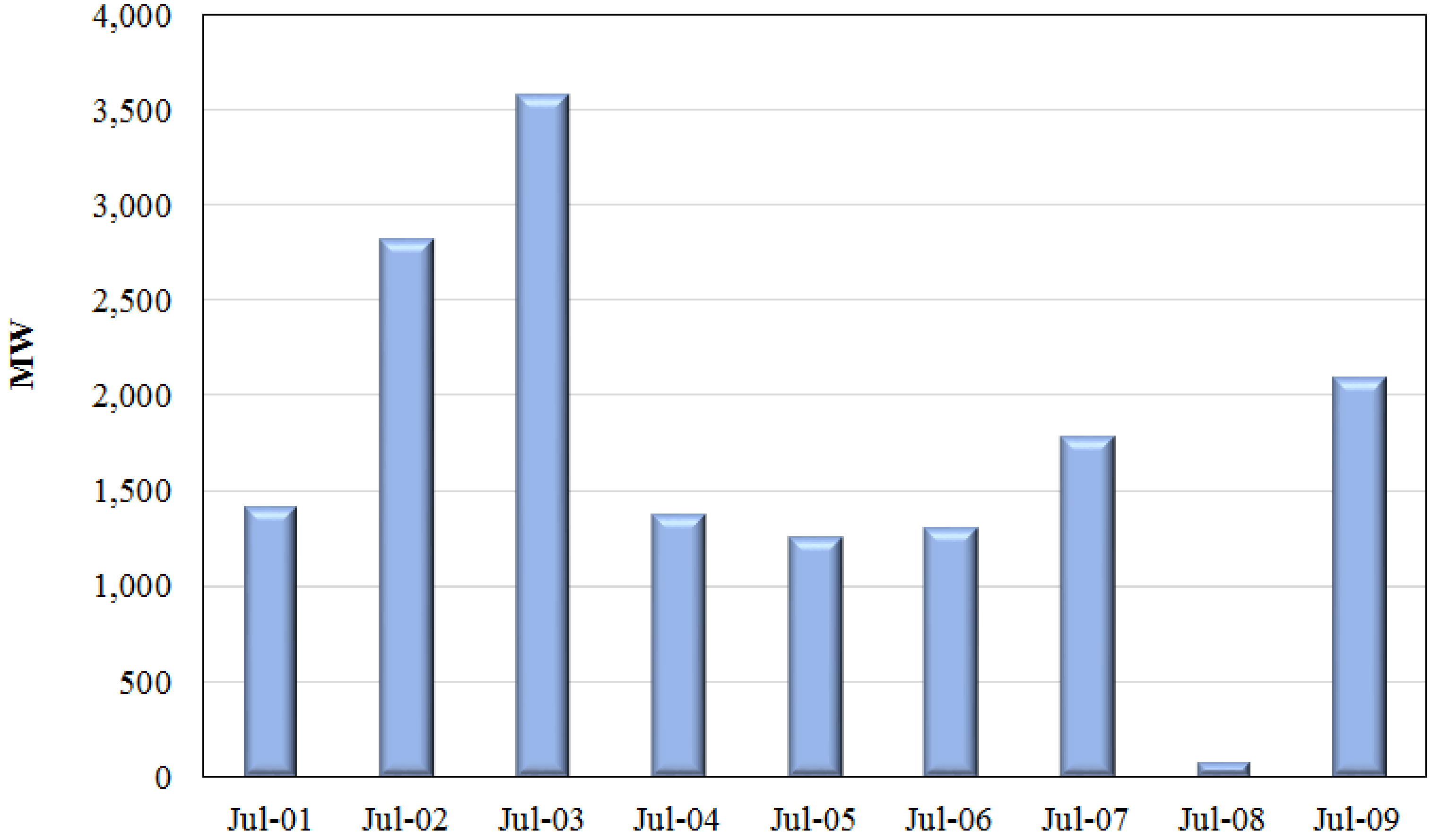


Totals	Sum. 19	Spr. 20	Sum. 20
Midwest	$183.5 M	$186.9 M	$279.2 M
Transfer Constraints	$6.2 M	$3.4 M	$7.7 M
South	$79.7 M	$43.9 M	$43.8 M
Total RT Value	**$269.4 M**	**$234.2 M**	**$330.6 M**
◆ DA Congestion Revenue	$151.1 M	$127.3 M	$222.6 M

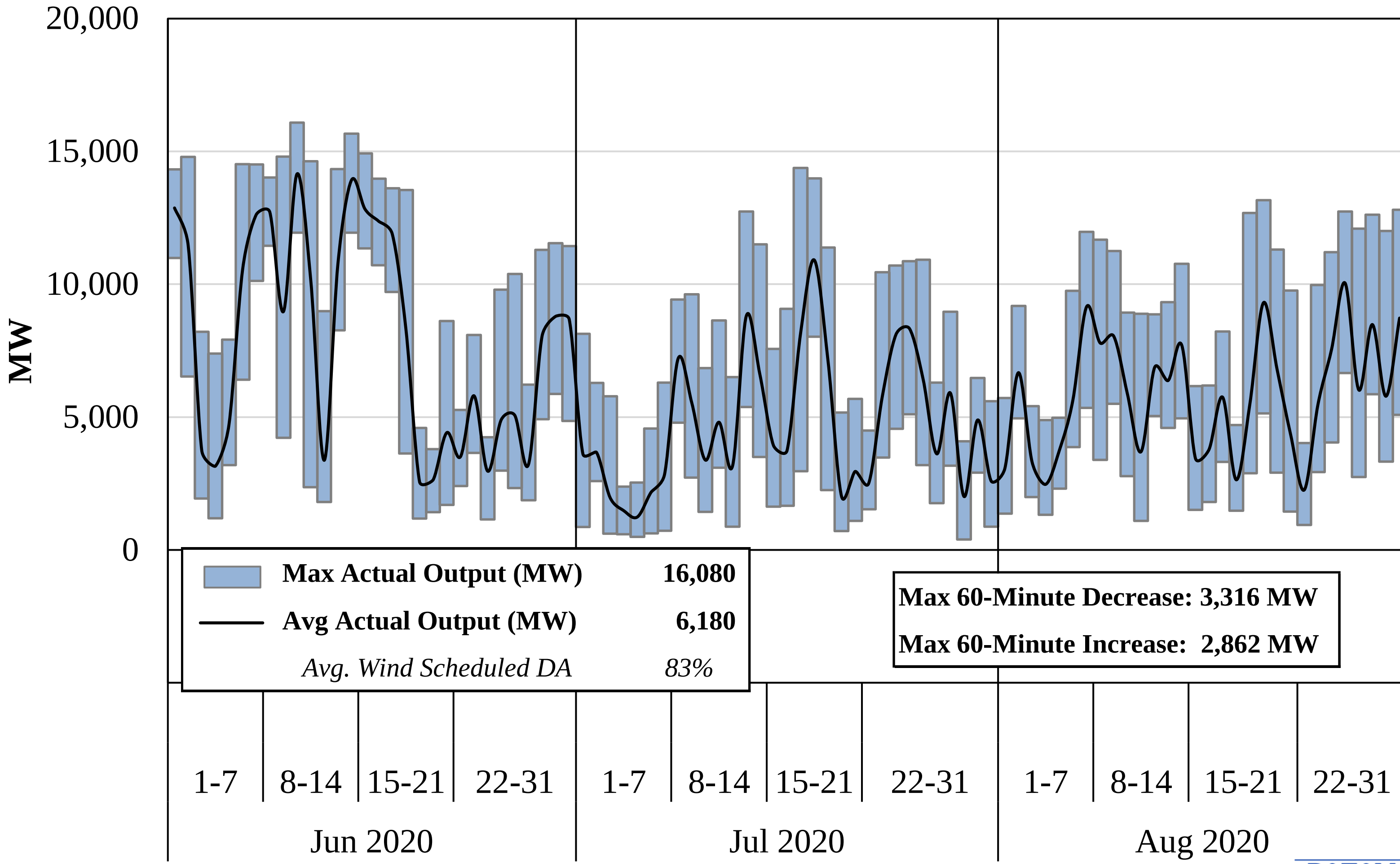
Real-Time Hourly Inter-Regional Flows Summer 2020



Trapped MW in MISO South Average, Hours Ending 15-17



Wind Output in Real-Time
Daily Range and Average

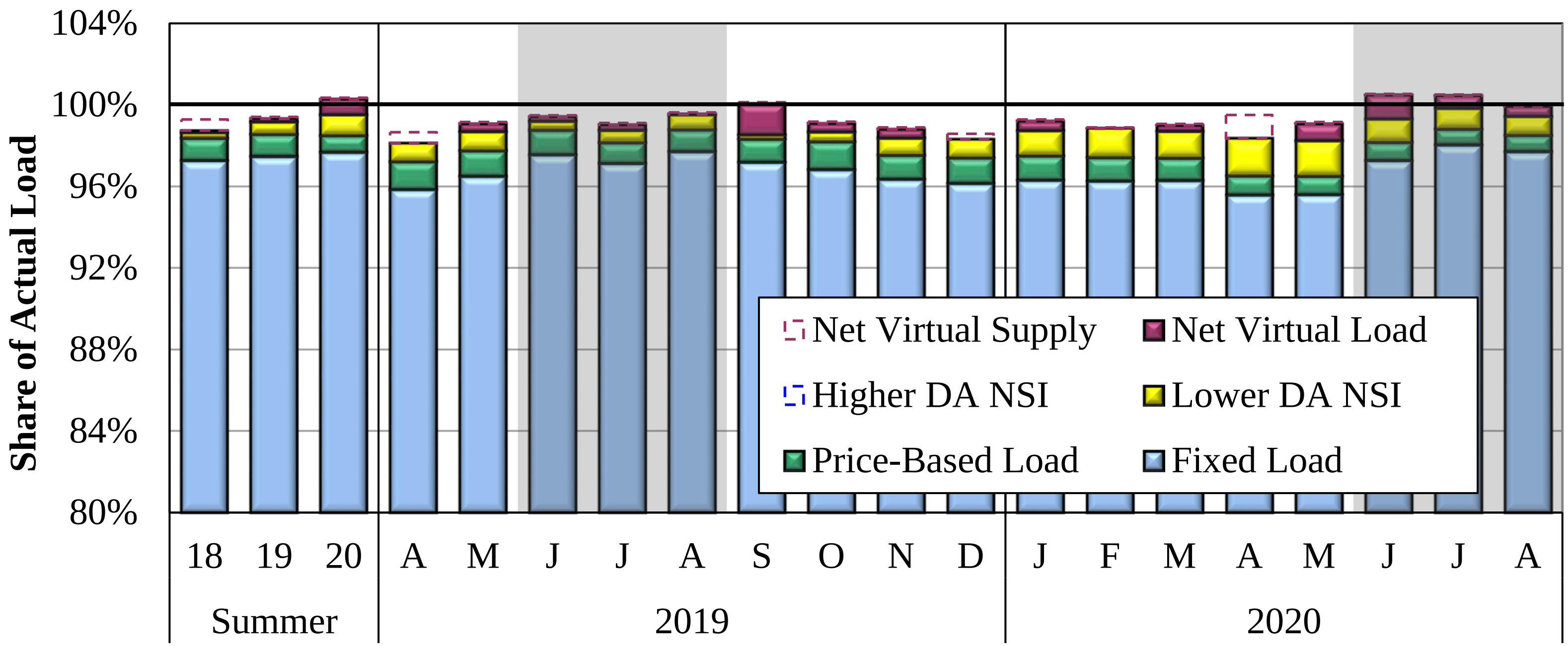


Day-Ahead and Real-Time Price Convergence Summer 2019-2020

Average DA-RT Price Difference Including RSG (% of Real-Time Price)

	Summer 19	Summer 20	2019 J	2019 J	2019 A	2019 S	2019 O	2019 N	2019 D	2020 J	2020 F	2020 M	2020 A	2020 M	2020 J	2020 J	2020 A
Indiana Hub	1	4	1	-1	4	-2	-4	-2	3	0	6	7	-3	0	8	-2	5
Michigan Hub	0	0	1	-5	4	1	-4	-1	3	-1	6	7	-6	4	3	-5	3
Minnesota Hub	1	-2	2	-3	6	1	0	2	5	-4	7	3	1	0	-5	-3	1
WUMS Area	-4	-1	-6	-11	6	4	-3	5	5	-1	3	6	2	1	1	-3	-2
Arkansas Hub	3	0	8	-1	2	-2	-4	-3	4	1	4	6	5	6	6	-7	2
Texas Hub	-4	-12	1	5	-18	1	-16	-1	4	1	6	10	5	13	7	2	-44
Louisiana Hub	5	2	10	0	6	2	1	-3	2	1	-2	12	4	5	6	1	0

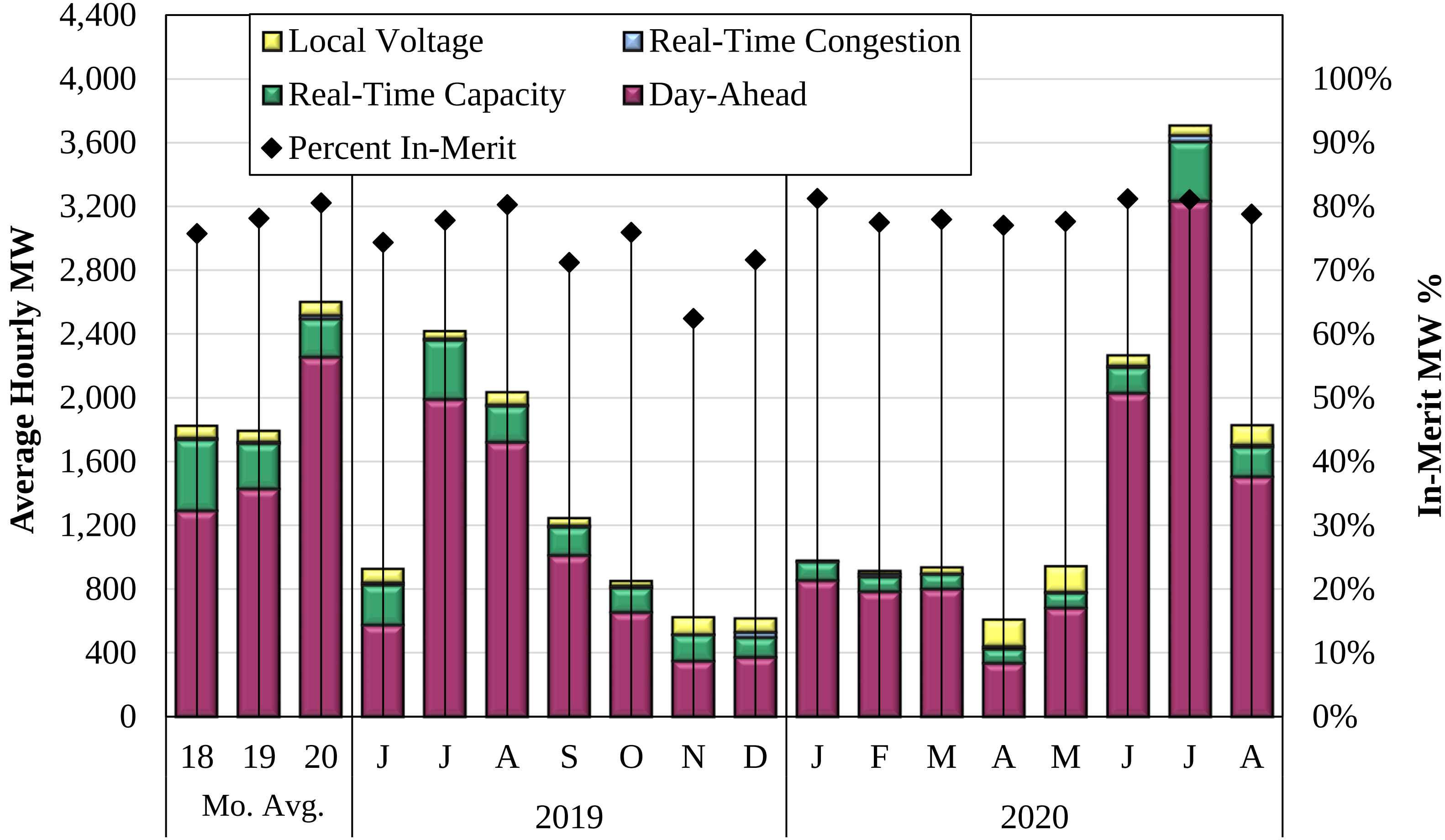
Day-Ahead Peak Hour Load Scheduling
Summer 2019-2020



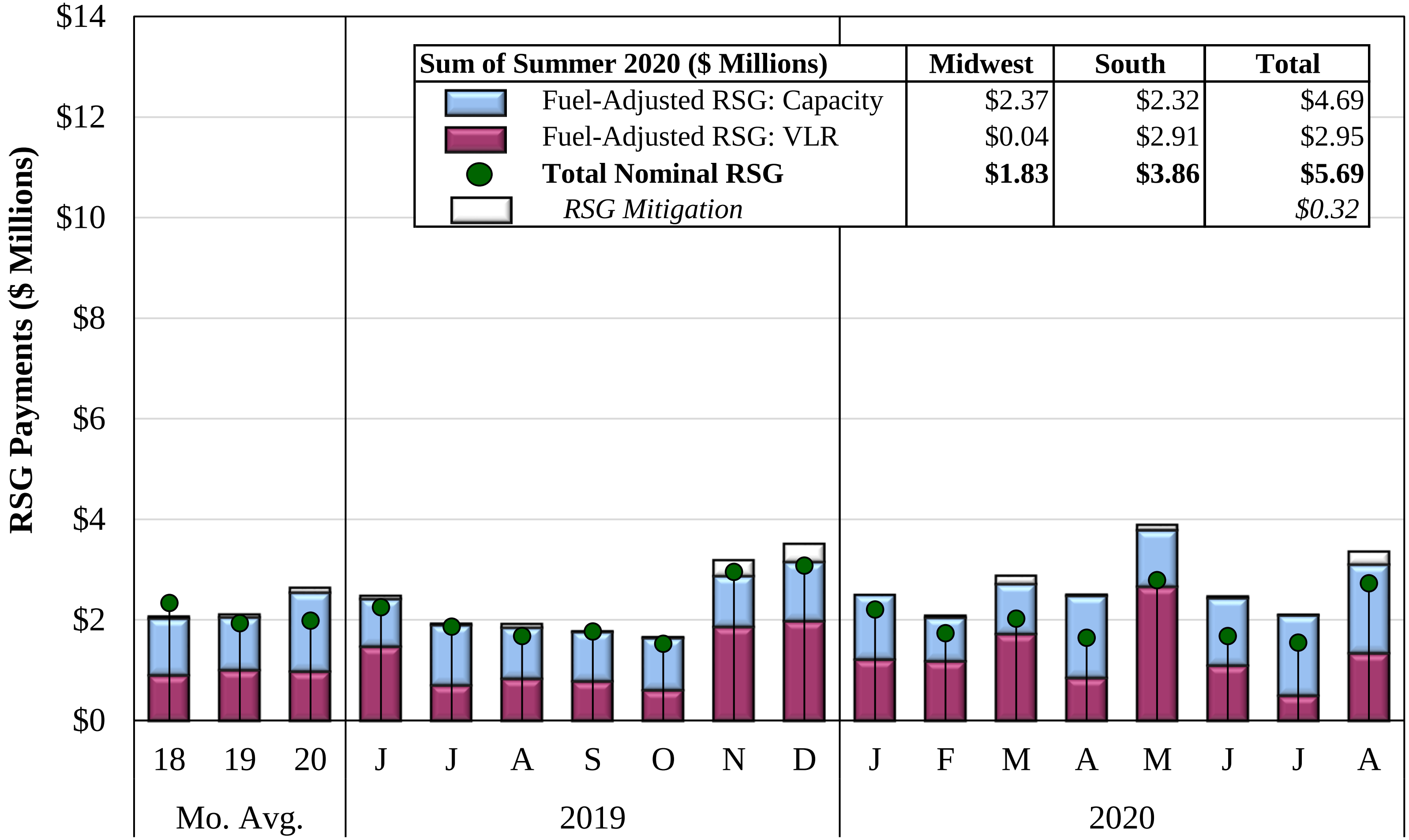
Share of Actual Load (%)

All Hours	99.5	99.8	100.9	98.5	99.0	99.6	99.9	100.1	100.0	98.9	98.5	98.2	99.5	99.0	98.9	99.0	99.5	100.4	101.5	101.0
Peak Hours Midwest	98.1	99.0	99.5	97.4	98.8	98.8	98.6	99.7	99.9	99.0	98.2	98.5	99.6	98.9	100.2	98.2	98.4	99.9	99.8	98.9
Peak Hours South	100.6	100.0	101.7	99.9	98.5	100.9	100.2	98.9	100.2	100.6	100.7	99.1	99.2	98.5	98.2	101.0	101.5	101.2	101.8	102.0

Peaking Resource Dispatch
Summer 2019-2020

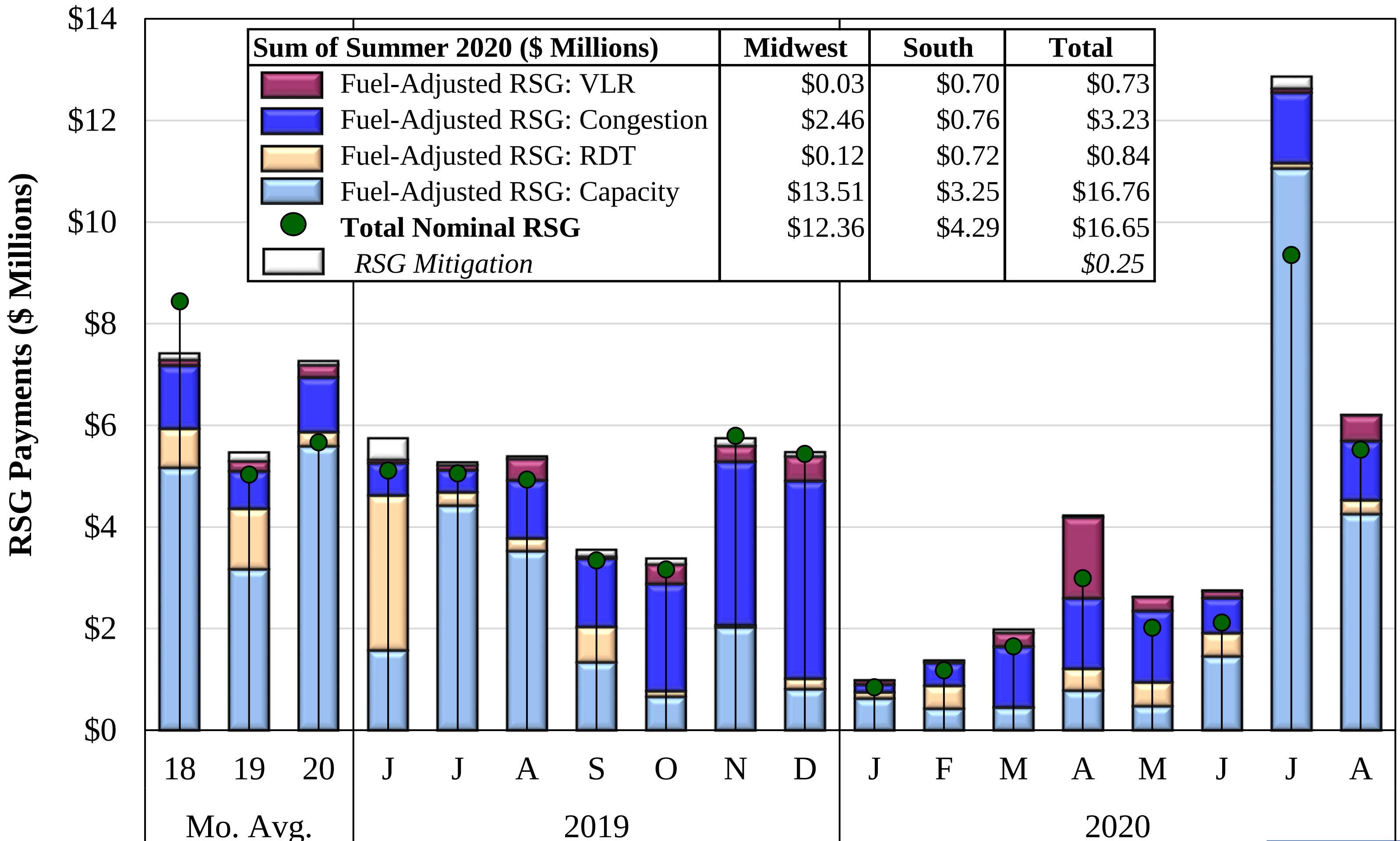


Day-Ahead RSG Payments
Summer 2019-2020



Sum of Summer 2020 ($ Millions)	Midwest	South	Total
Fuel-Adjusted RSG: Capacity	$2.37	$2.32	$4.69
Fuel-Adjusted RSG: VLR	$0.04	$2.91	$2.95
Total Nominal RSG	**$1.83**	**$3.86**	**$5.69**
RSG Mitigation			*$0.32*

Real-Time RSG Payments Summer 2019-2020



Sum of Summer 2020 ($ Millions)	Midwest	South	Total
Fuel-Adjusted RSG: VLR	$0.03	$0.70	$0.73
Fuel-Adjusted RSG: Congestion	$2.46	$0.76	$3.23
Fuel-Adjusted RSG: RDT	$0.12	$0.72	$0.84
Fuel-Adjusted RSG: Capacity	$13.51	$3.25	$16.76
Total Nominal RSG	$12.36	$4.29	$16.65
RSG Mitigation			*$0.25*

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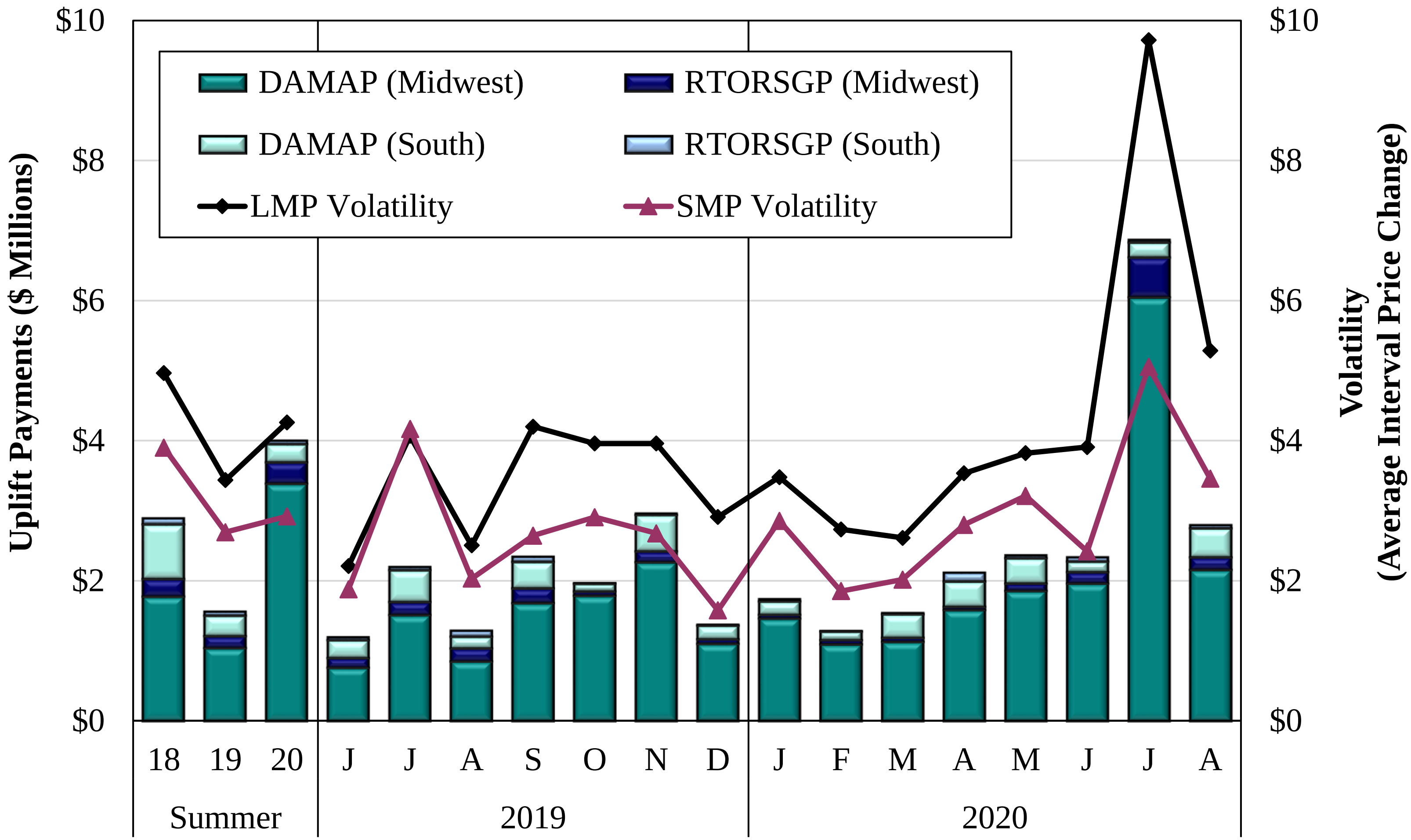
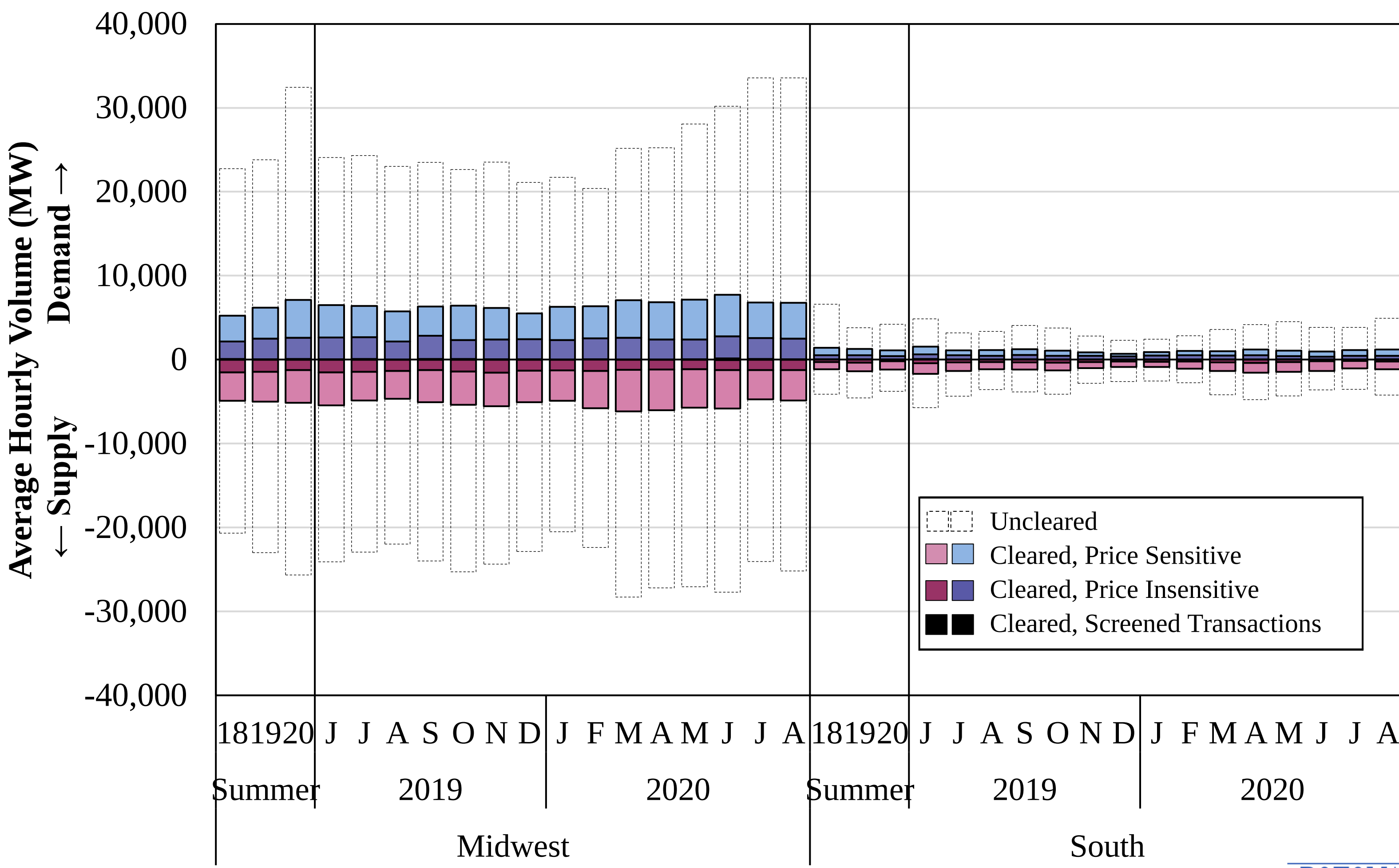
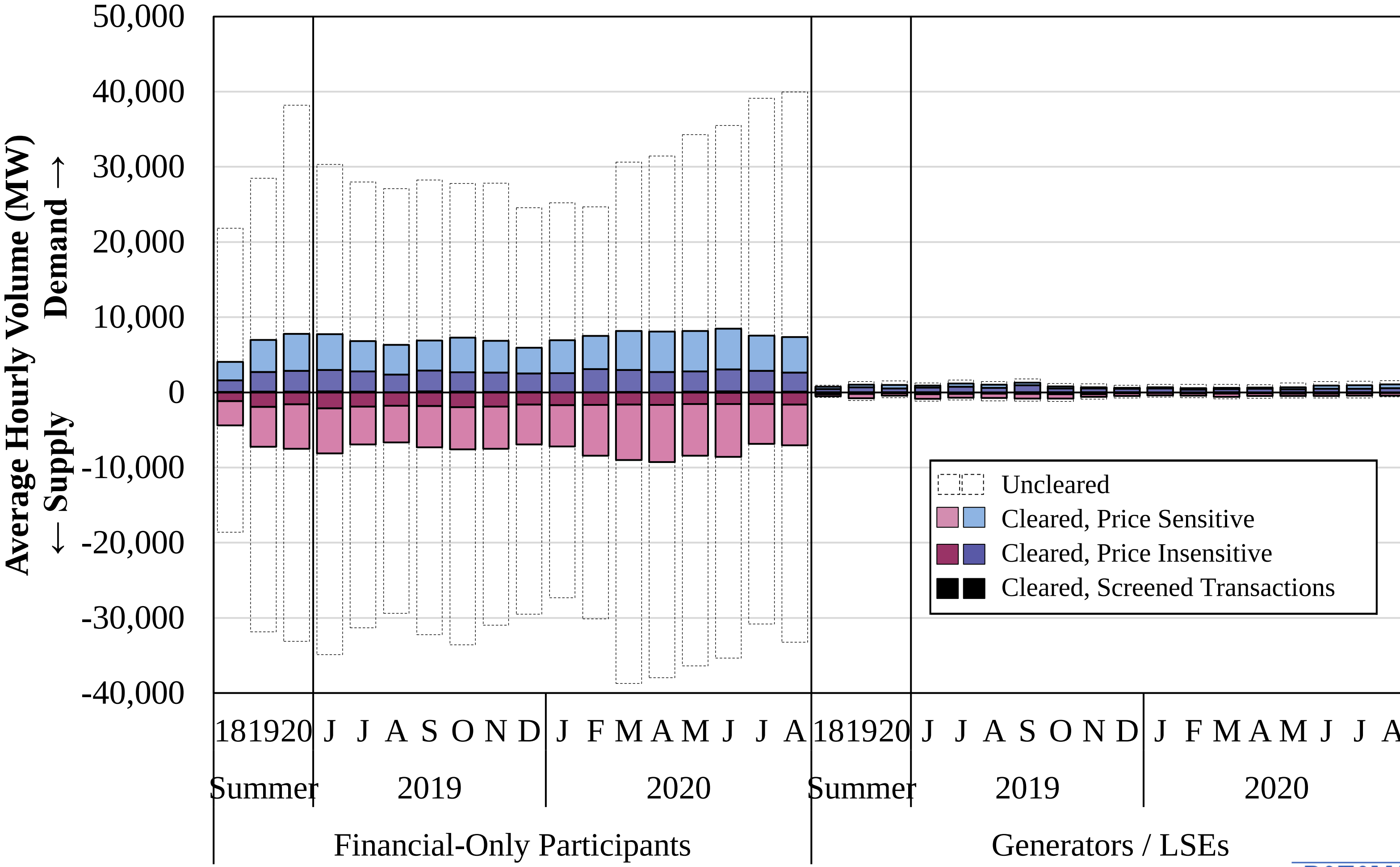
Price Volatility Make Whole Payments Summer 2019-2020



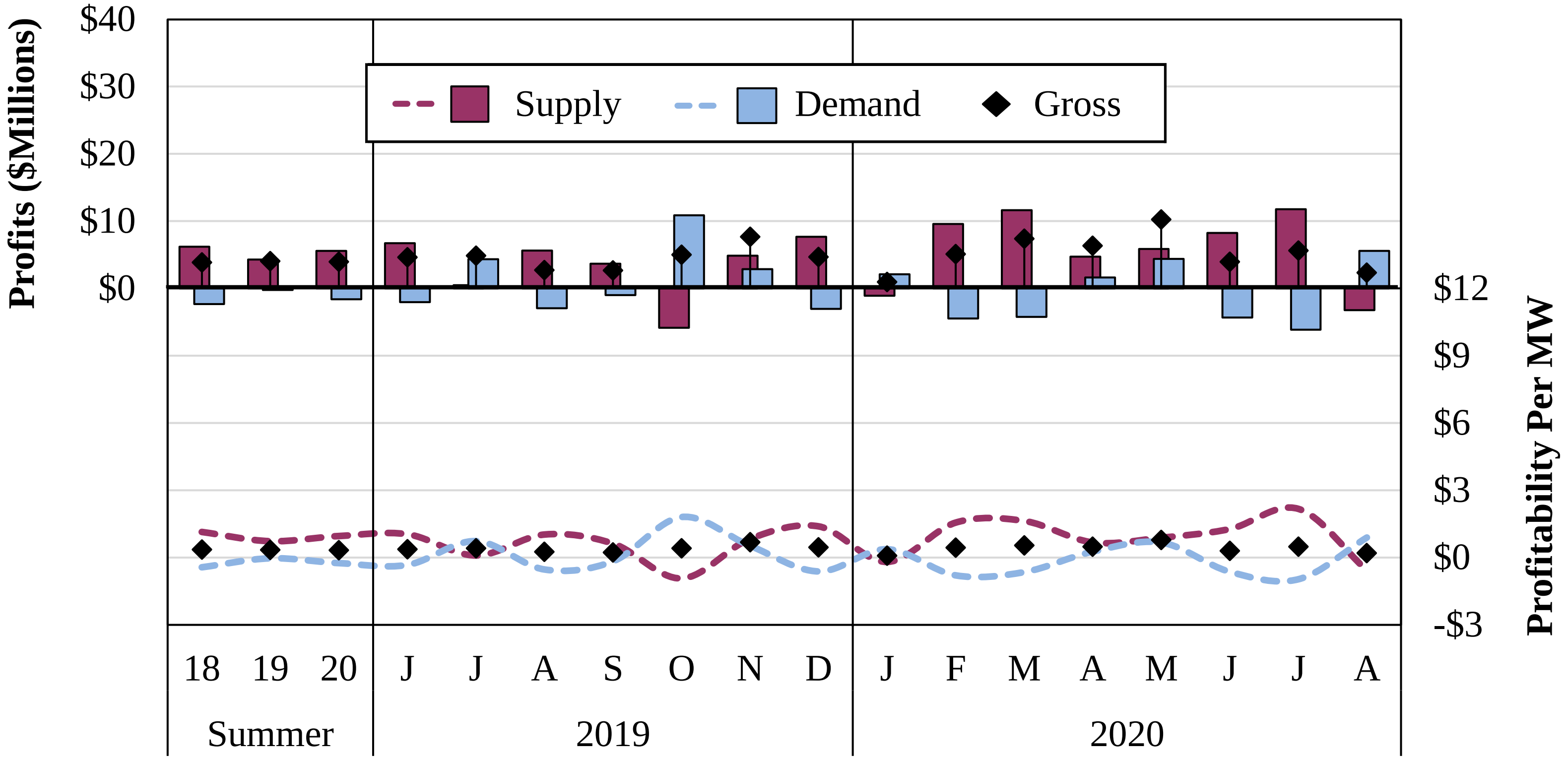
Virtual Load and Supply Summer 2019-2020



Virtual Load and Supply by Participant Type
Summer 2019-2020



Virtual Profitability
Summer 2019-2020



Percent Screened

Supply	0.3	0.2	0.4	0.2	0.3	0.2	0.4	0.3	0.3	0.1	0.2	0.1	0.2	0.2	0.4	0.5	0.3	0.3
Demand	1.9	1.0	1.3	1.4	1.1	0.5	1.6	1.1	0.9	0.7	0.4	0.5	0.5	0.4	0.9	1.6	1.2	1.1
Total	1.1	0.6	0.9	0.8	0.7	0.3	1.0	0.7	0.6	0.4	0.3	0.3	0.4	0.3	0.6	1.0	0.8	0.7

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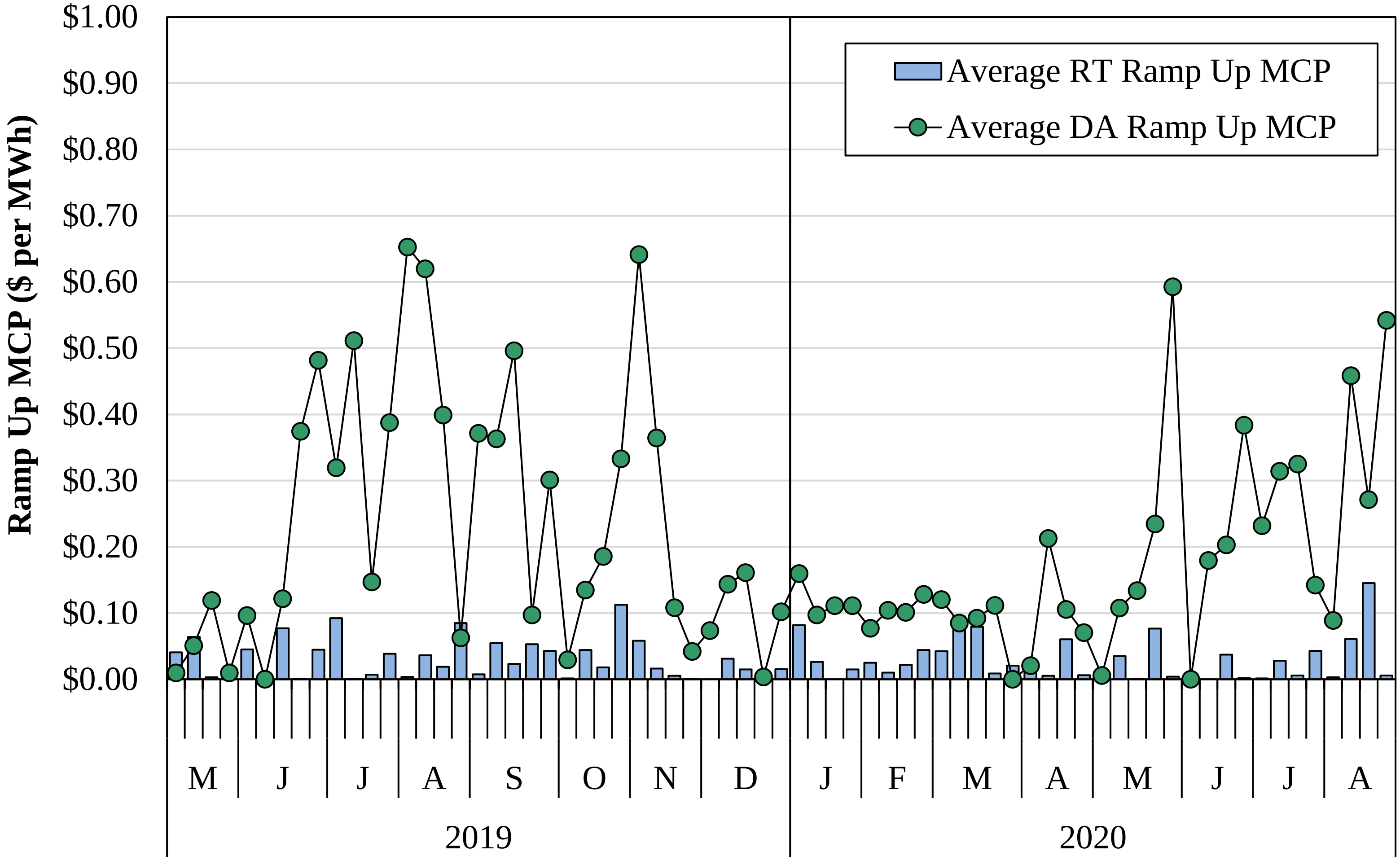
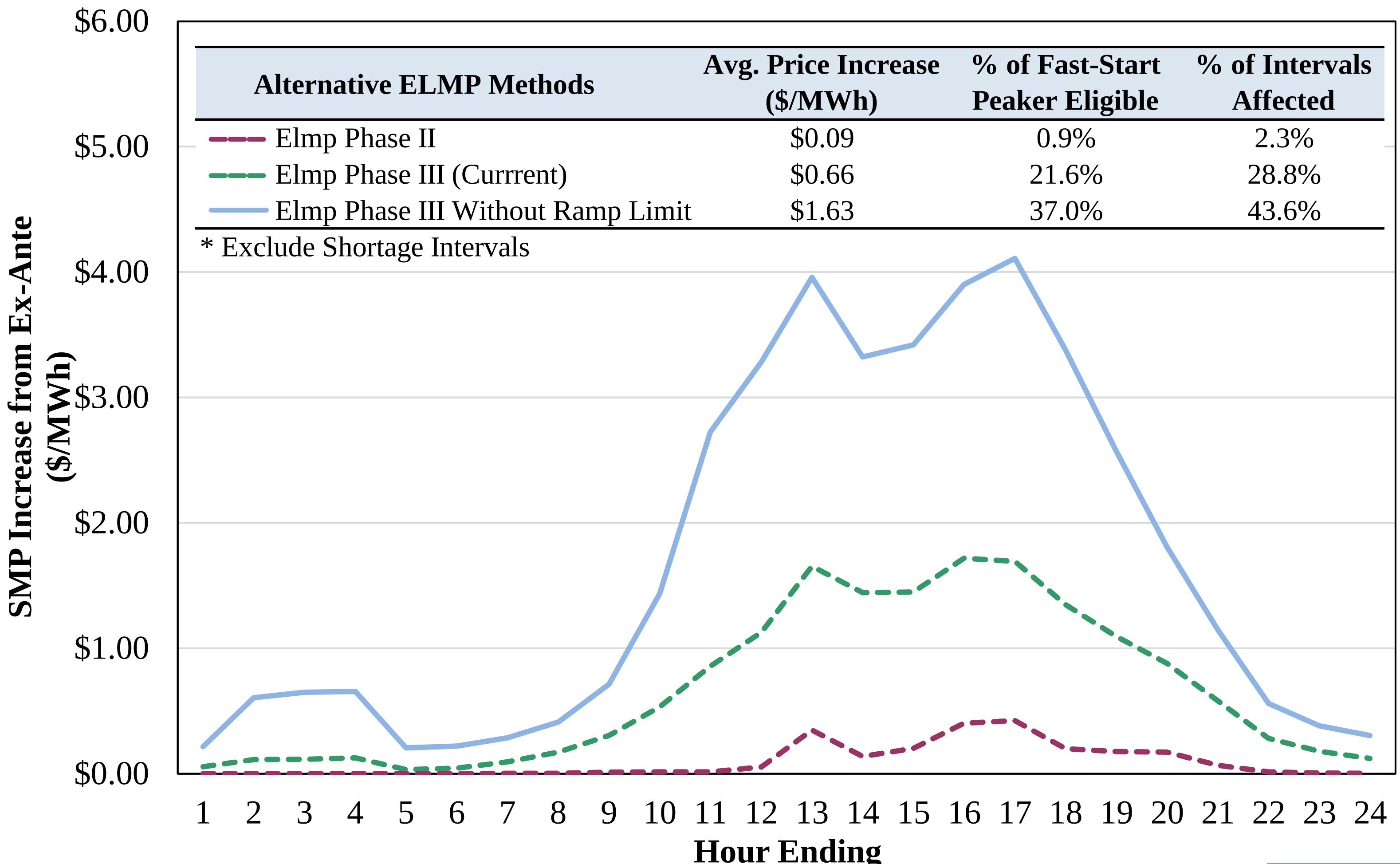
Day-Ahead and Real-Time Ramp Up Price 2019-2020



Evaluation of ELMP Assumptions Summer 2020



Alternative ELMP Methods	Avg. Price Increase ($/MWh)	% of Fast-Start Peaker Eligible	% of Intervals Affected
Elmp Phase II	$0.09	0.9%	2.3%
Elmp Phase III (Currrent)	$0.66	21.6%	28.8%
Elmp Phase III Without Ramp Limit	$1.63	37.0%	43.6%

* Exclude Shortage Intervals

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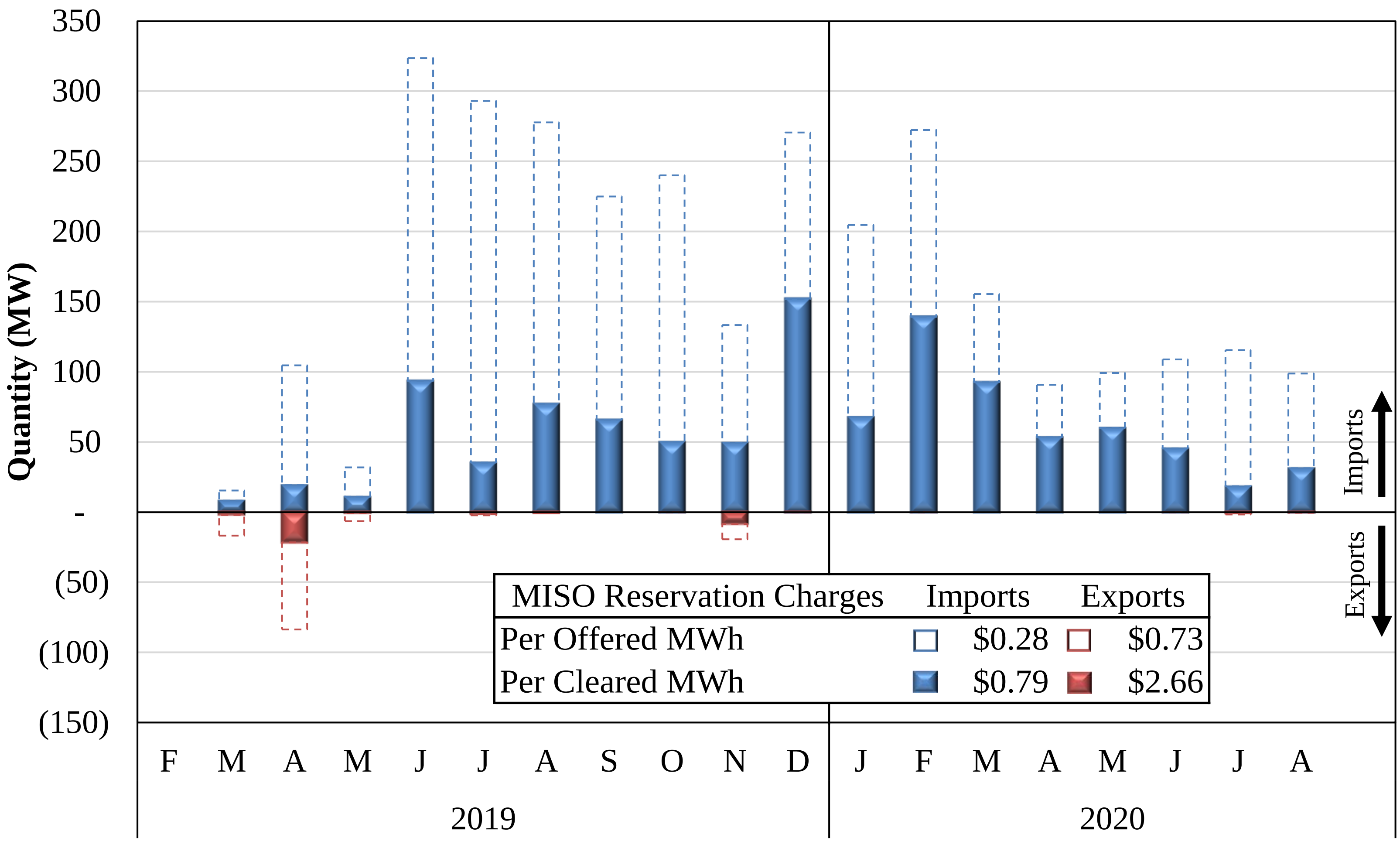
Coordinated Transaction Scheduling (CTS) 2019-2020



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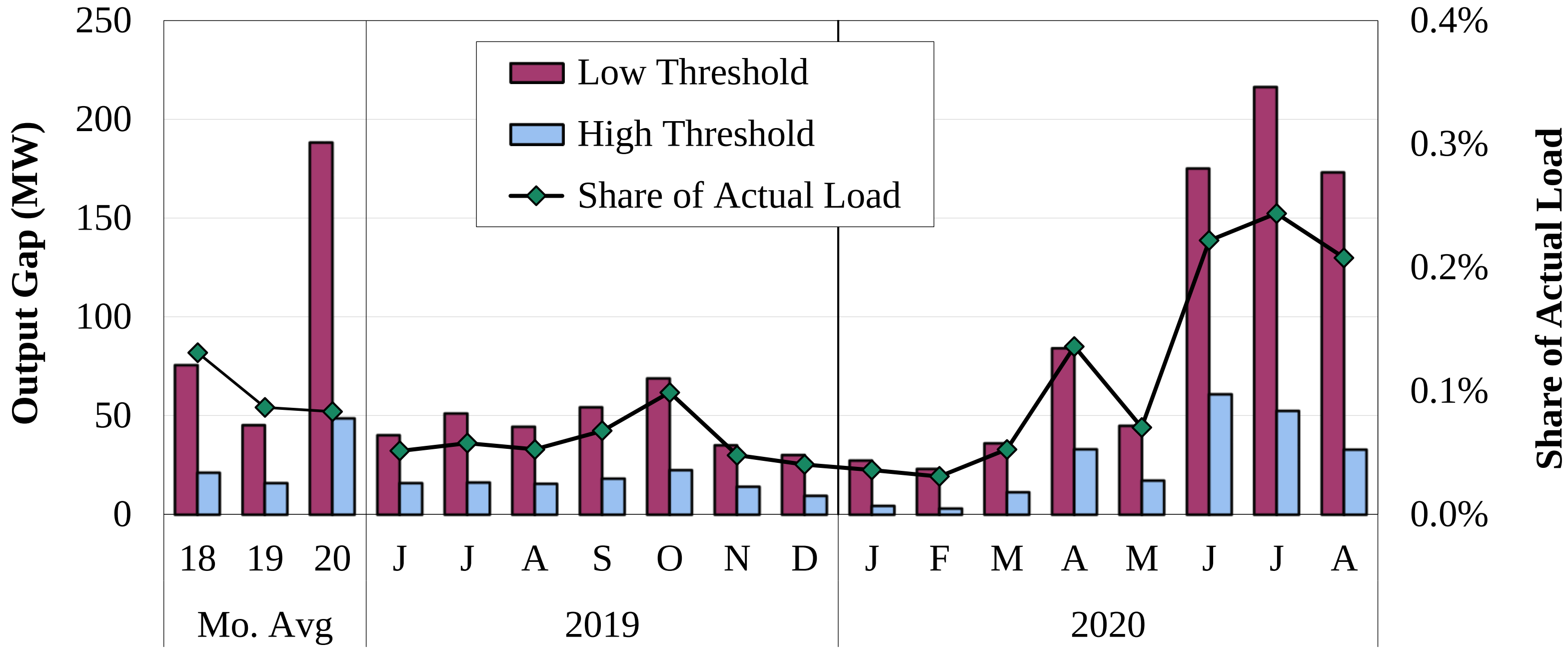
Monthly Output Gap
Summer 2019-2020



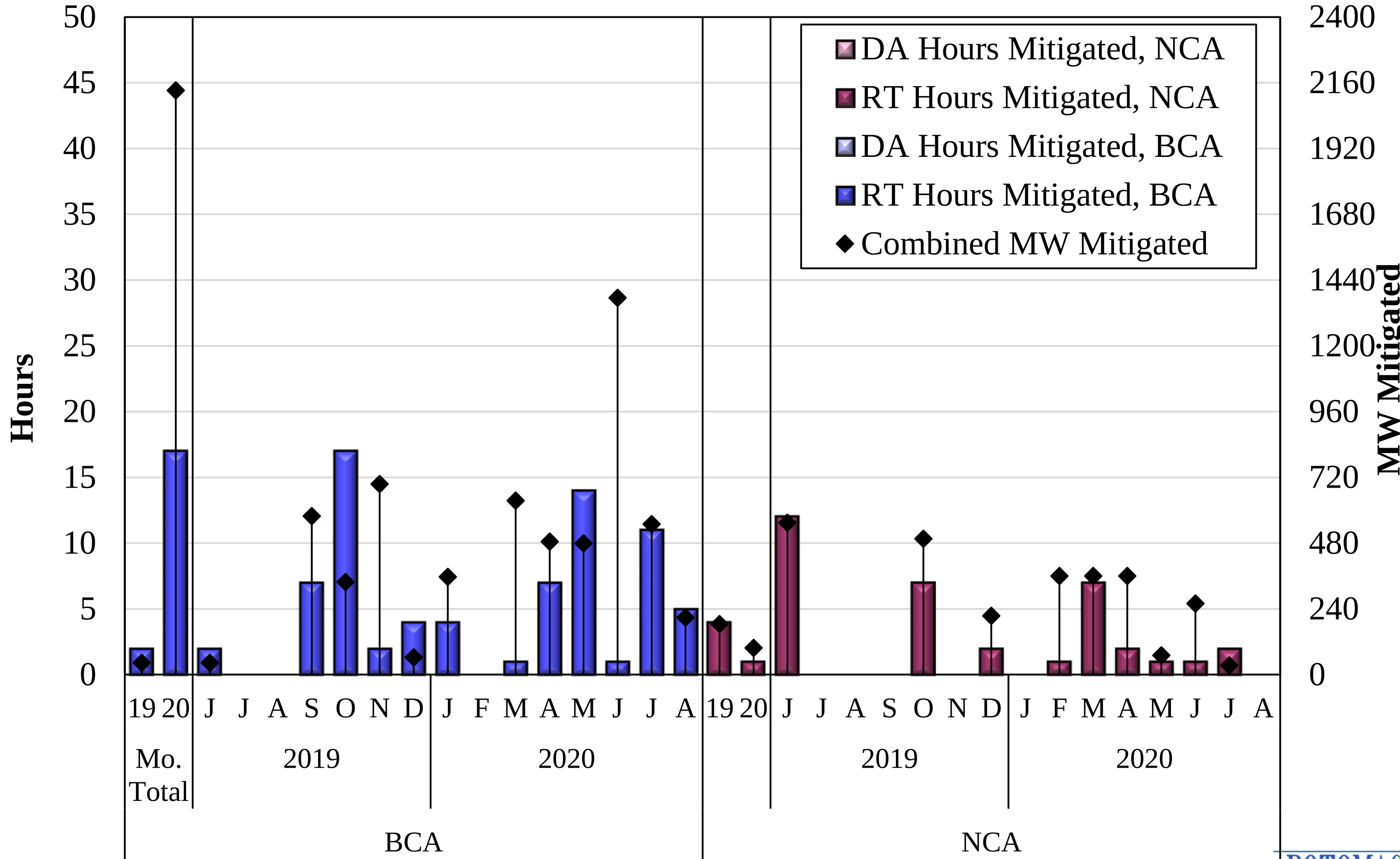
Low Threshold Results by Unit Status (MW)

	18	19	20	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A
Offline	8	8	22	8	9	9	10	15	10	5	0	0	0	0	3	12	36	18
Online	67	37	166	33	42	36	45	54	25	25	27	23	36	84	42	163	180	155

High Threshold Results by Unit Status (MW)

	18	19	20	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A
Offline	7	8	19	7	9	8	8	11	10	5	0	0	0	0	3	11	31	16
Online	14	8	29	9	8	7	10	12	4	4	5	3	11	33	15	50	21	17

Day-Ahead And Real-Time Energy Mitigation 2019-2020



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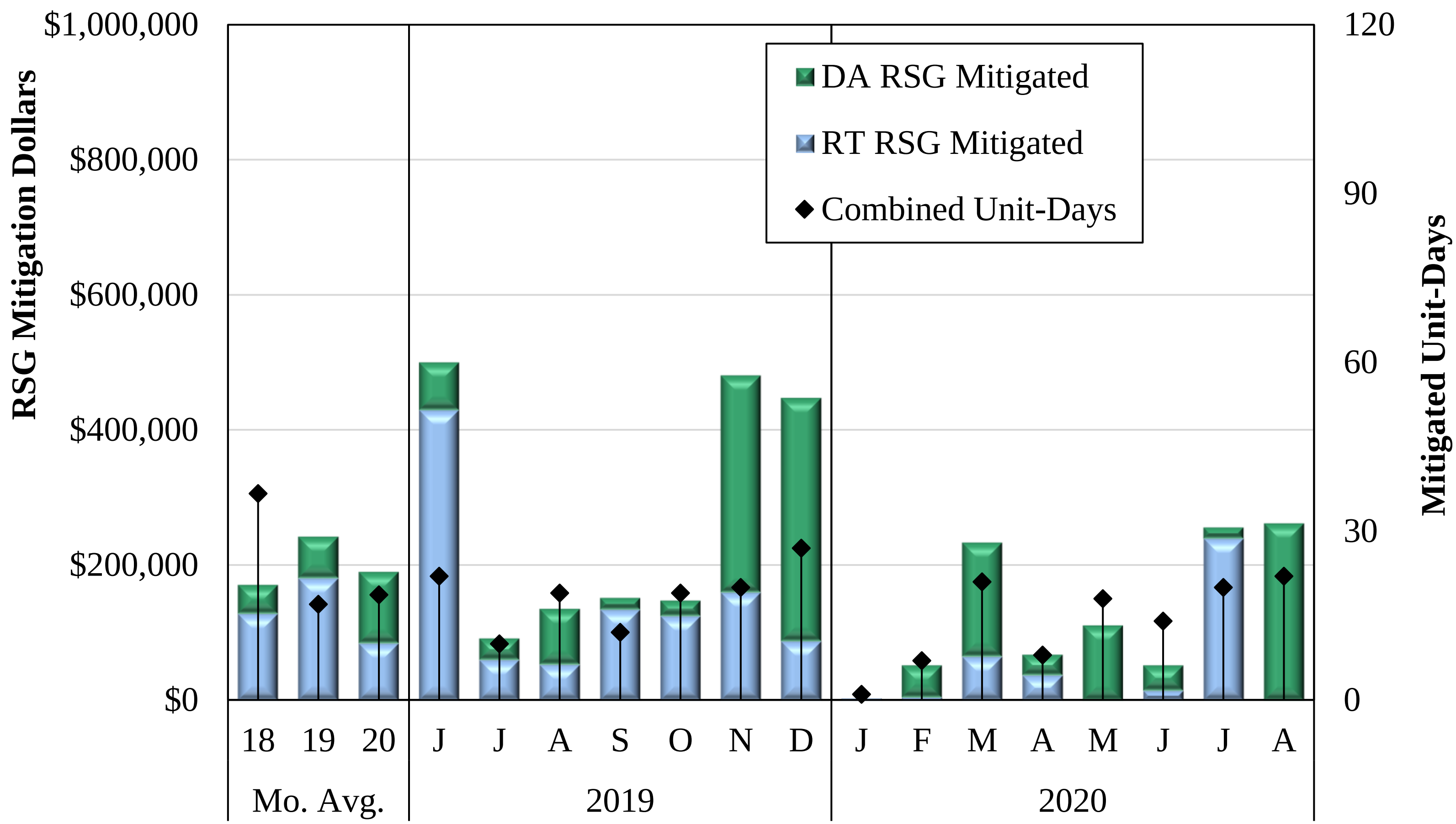
Day-Ahead and Real-Time RSG Mitigation Summer 2019-2020



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List of Acronyms

AAR	Ambient-Adjusted Ratings
AMP	Automated Mitigation Procedures
BCA	Broad Constrained Area
CDD	Cooling Degree Days
CMC	Constraint Management Charge
CTS	Coordinated Transaction Scheduling
DAMAP	Day-Ahead Margin Assurance Payment
DDC	Day-Ahead Deviation & Headroom Charge
DIR	Dispatchable Intermittent Resource
HDD	Heating Degree Days
ELMP	Extended Locational Marginal Price
JCM	Joint and Common Market Initiative
JOA	Joint Operating Agreement
LAC	Look-Ahead Commitment
LSE	Load-Serving Entities
M2M	Market-to-Market
MSC	MISO Market Subcommittee
NCA	Narrow Constrained Area
ORDC Curve	Operating Reserve Demand
PITT	Pseudo-Tie Issues Task Team
PRA	Planning Resource Auction
PVMWP	Price Volatility Make Whole Payment
RAC	Resource Adequacy Construct
RDT	Regional Directional Transfer
RSG	Revenue Sufficiency Guarantee
RTORSGP	Real-Time Offer Revenue Sufficiency Guarantee Payment
STE	Short-Term Emergency
SMP	System Marginal Price
SOM	State of the Market
TLR	Transmission Loading Relief
TCDC	Transmission Constraint Demand Curve
VLR	Voltage and Local Reliability
WUMS	Wisconsin Upper Michigan System