

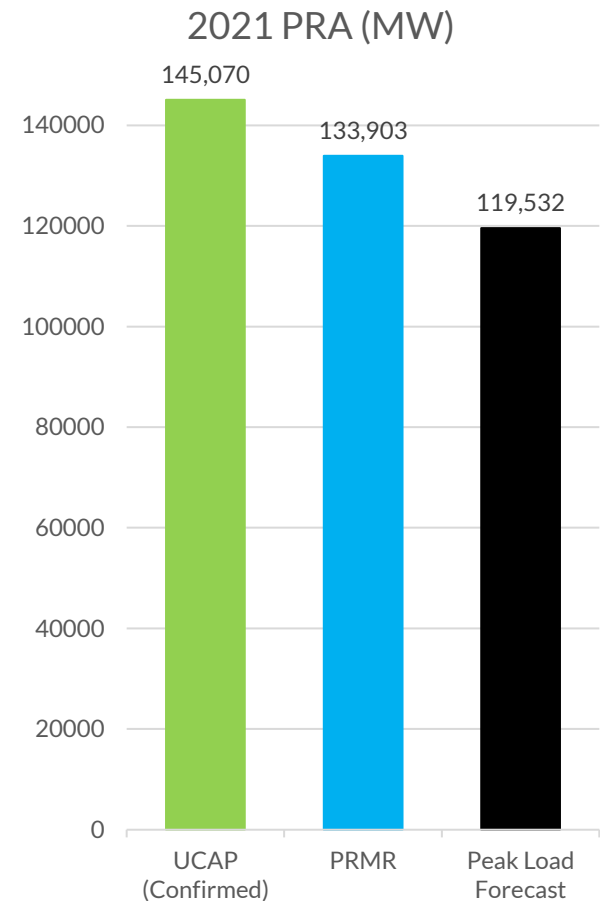


2021/2022 Planning Resource Auction (PRA) Results

April 15, 2021

MISO region has adequate reserves to meet its 134 GW Planning Reserve Requirement

- Zones 1-7 cleared at **\$5.00/MW-day**, while Zones 8-10 cleared at **\$0.01/MW-day**. Compared to last year, lower prices in Zones 7-10 are a result of a combination of lower peak demand or additional supply
- PRA enhancements implemented in the past year did not directly impact clearing prices
- Cleared capacity showed continued trend to non-conventional resources, which along with resource performance in tight conditions, is the basis for Reliability Imperative efforts
- Regional generation supply was consistent with the 2020 OMS-MISO Survey



MISO's RA construct combines regional and local criteria to achieve a least-cost solution for the region

Multiple options exist for Load-Serving Entities to demonstrate Resource Adequacy:

- Submit a Fixed Resource Adequacy Plan (FRAP)
- Utilize bilateral contracts with another resource owner
- Participate in the Planning Resource Auction (PRA)

The Independent Market Monitor (IMM) reviews the auction results for physical and economic withholding

Inputs

- Local Clearing Requirement (LCR) = capacity required from within each zone
- MISO-wide reserve margin requirements, which can be shared among the Zones, and Zones may import capacity to meet this requirement above LCR
- Capacity Import/Export Limits (CIL/CEL) = Zonal transmission limitations
- Sub-Regional contractual limitations such as between MISO's South and Central/North Regions

Outputs

- Commitment of capacity to the MISO region, including performance obligations
- Capacity price (ACP = Auction Clearing Price) for each Zone
- ACP price drives the settlements process
- Load pays the Auction Clearing Price for the Zone in which it is physically located
- Cleared capacity is paid the Auction Clearing Price for the Zone where it is physically located

Primary changes since 2020 Auction

Conventional Deliverable ICAP (ER20-1942)

FERC accepted a Tariff filing on October 27, 2020 to increase the deliverability requirements for Capacity Resources and related conversion of Capacity to Zonal Resource Credits (“ZRCs”) in MISO’s Planning Resource Auction. This filing addresses the deliverability and conversion rules applicable to conventional resources. In order to obtain full capacity credit, the resource must be fully deliverable.

Intermittent Deliverable ICAP (ER20-2005)

FERC accepted a Tariff filing on November 13, 2020 to increase the deliverability requirements for Capacity Resources and related conversion of Capacity to Zonal Resource Credits (“ZRCs”) in MISO’s Planning Resource Auction. Amount of capacity eligible to be converted into ZRCs depends on the performance and deliverability level of the intermittent resource.

Annual CIL/CEL Study’s Voltage Stability Analysis Methodology (LOLEWG)

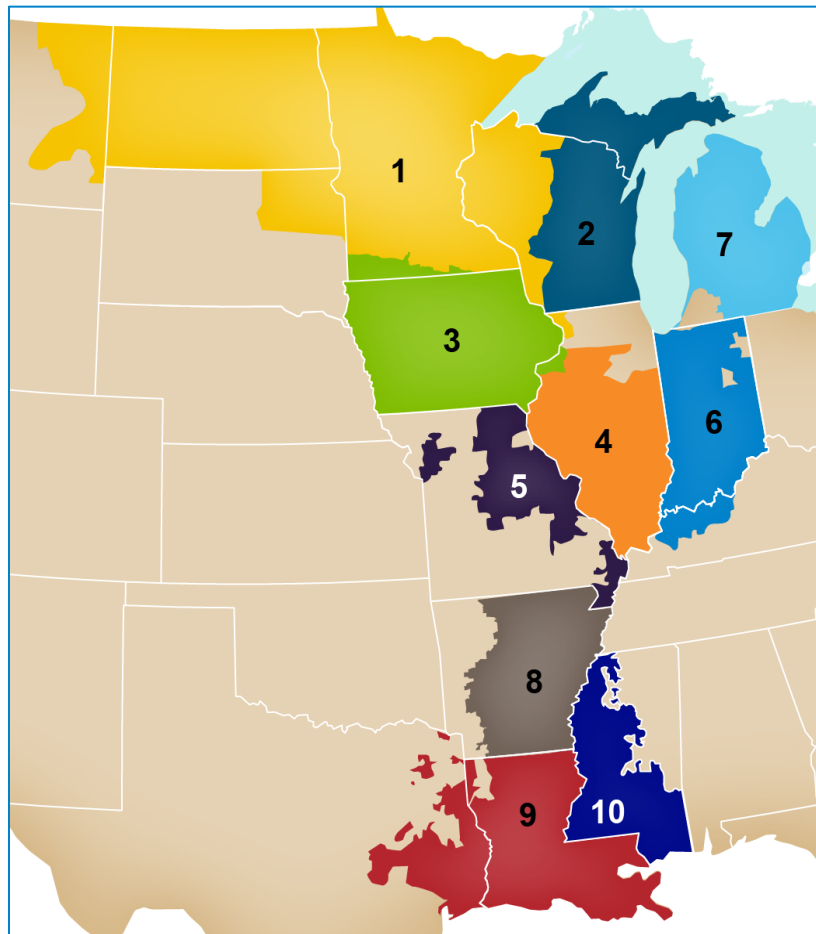
CIL/CEL studies utilize generator to generator transfers, however Zonal imports may be limited by voltage constraints. For additional voltage analyses, the PY 21/22 transfer utilizes a gen-gen transfer methodology, whereas the previous PY utilized a load-load transfer method. Gen to Gen transfer is more reflective of system capability at peak hour.

Ongoing Fleet Change

The auction results reflect the industry’s ongoing shift away from coal-fired generation and increasing reliance on gas-fired resources and renewables, as well as other trends discussed in our [MISO Forward report](#).

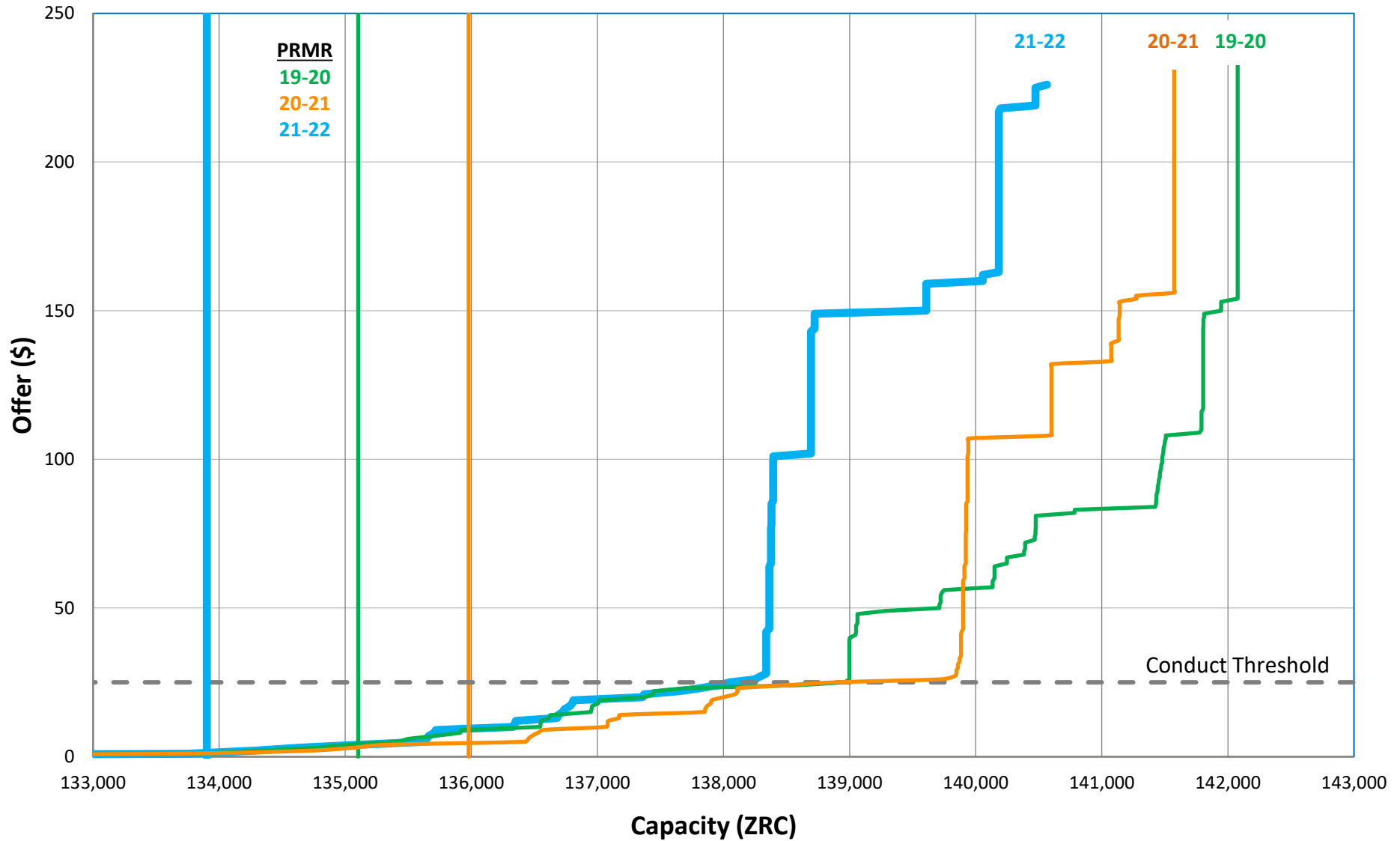
South to North capacity transfer limit reached causing price separation of \$4.99

Zone	Local Balancing Authorities	Price \$/MW-Day
1	DPC, GRE, MDU, MP, NSP, OTP, SMP	\$5.00
2	ALTE, MGE, UPPC, WEC, WPS, MIUP	\$5.00
3	ALTW, MEC, MPW	\$5.00
4	AMIL, CWLP, SIPC, GLH	\$5.00
5	AMMO, CWLD	\$5.00
6	BREC, CIN, HE, IPL, NIPS, SIGE	\$5.00
7	CONS, DECO	\$5.00
8	EAI	\$0.01
9	CLEC, EES, LAFA, LAGN, LEPA	\$0.01
10	EMBA, SME	\$0.01
ERZ	KCPL, OPPD, WAUE (SPP), PJM, OVEC, LGEE, AEI, SPA, TVA	\$2.78-5.00



ERZ = External Resource Zones

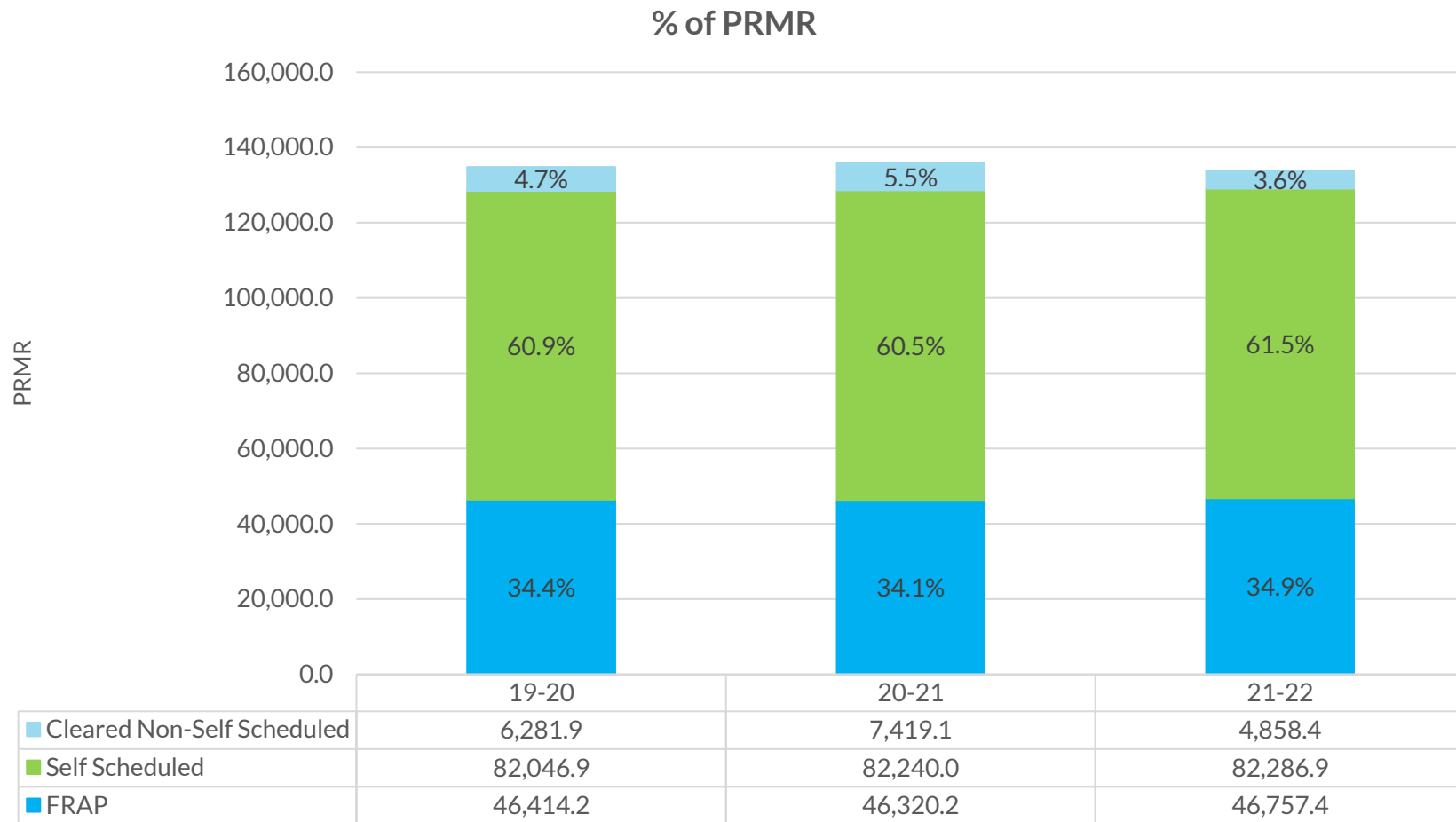
2021-22 Offer Curve



2021/22 PRA Results by Zone

	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	Z9	Z10	ERZ	System
PRMR	18,359.0	13,616.5	10,279.5	9,852.5	8,246.8	18,145.8	21,459.2	7,827.8	21,282.6	4,833.0	N/A	133,902.7
Offer Submitted (Including FRAP)	20,289.3	13,979.9	10,826.7	9,506.1	7,811.4	15,832.2	21,666.3	10,642.5	23,017.4	5,353.8	1,639.4	140,565.0
FRAP	14,408.1	11,657.8	4,159.9	669.0	0.0	1,519.7	12,186.4	513.5	174.7	1,374.2	94.1	46,757.4
Self Scheduled (SS)	3,507.4	2,290.3	6,097.5	6,327.8	7,811.4	12,519.4	9,295.5	9,299.4	20,151.5	3,591.7	1,395.0	82,286.9
Non-SS Offer Cleared	772.0	0.0	454.3	1,335.2	0.0	1,706.8	67.5	116.6	308.1	0.0	97.9	4,858.4
Committed (Offer Cleared + FRAP)	18,687.5	13,948.1	10,711.7	8,332.0	7,811.4	15,745.9	21,549.4	9,929.5	20,634.3	4,965.9	1,587.0	133,902.7
LCR	14,875.1	10,670.0	6,713.7	6,450.4	5,282.8	12,166.3	19,710.1	4,988.4	19,404.2	3,632.8	-	N/A
CIL	5,061	3,599	4,620	NLF*	4,384	7,138	4,888	5,203	4,096	3,283	-	N/A
ZIA	5059	3599	4556	5141	4384	6738	4888	5155	3284	3283	-	N/A
Import	0.0	0.0	0.0	1,520.5	435.4	2,399.9	0.0	0.0	648.3	0.0	-	5,004.1
CEL	2,474.0	3,488.0	NLF*	4,912.0	NLF*	4,595.0	NLF*	NLF*	1,978.0	1,369.0	1,452.2	N/A
Export	328.5	331.6	432.2	0.0	0.0	0.0	90.2	2,101.7	0.0	132.9	1,587.0	5,004.1
ACP (\$/MW-Day)	5.00	5.00	5.00	5.00	5.00	5.00	5.00	0.01	0.01	0.01	2.78 to 5.00	N/A

Members continue to use FRAP and Self Schedule to meet Resource Adequacy Requirements



Historical Auction Clearing Price Comparison

PY	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Zone 9	Zone 10	ERZs	
2015-2016	\$3.48			\$150.00		\$3.48		\$3.29		N/A	N/A	
2016-2017	\$19.72	\$72.00							\$2.99		N/A	
2017-2018	\$1.50										N/A	
2018-2019	\$1.00	\$10.00										N/A
2019-2020	\$2.99						\$24.30	\$2.99				
2020-2021	\$5.00						\$257.53	\$4.75	\$6.88	\$4.75	\$4.89-\$5.00	
2021-2022	\$5.00							\$0.01			\$2.78-\$5.00	

IMM Conduct Threshold	25.43	24.92	23.92	24.86	26.67	24.42	25.97	23.09	22.90	22.86	26.67
Cost of New Entry	254.27	249.15	239.21	248.55	266.68	244.16	259.73	230.93	229.04	228.55	266.68

- Auction Clearing Prices shown in \$/MW-day
- Conduct Threshold is 10% of Cost of New Entry (CONE)

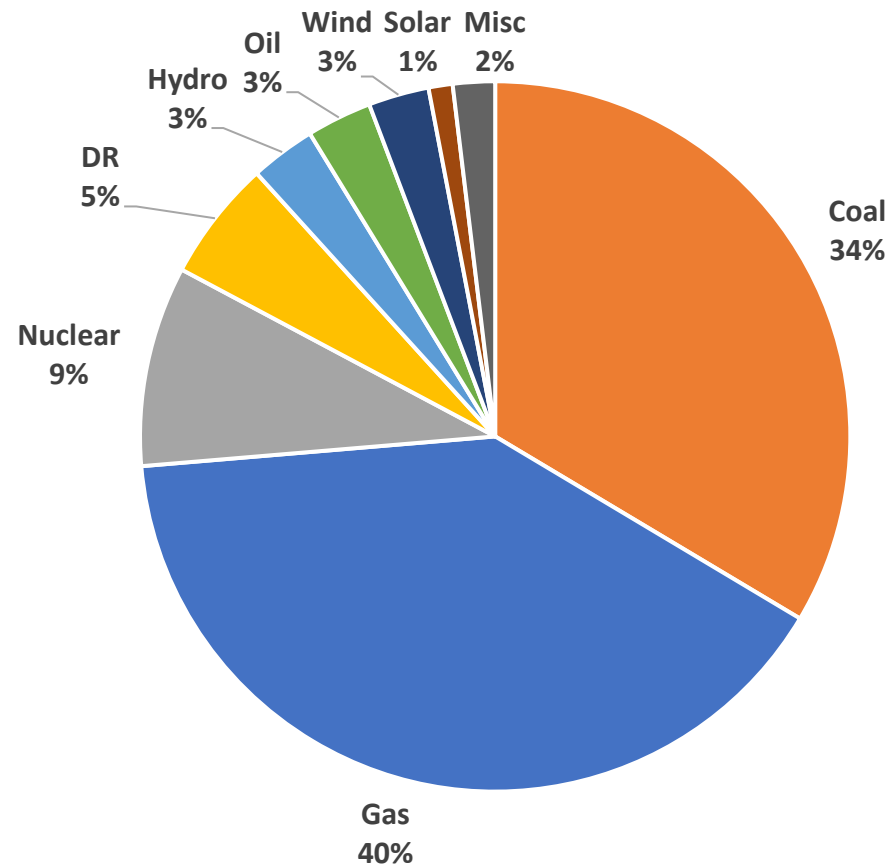
Supply Offered & Cleared

Planning Resource	Offered (ZRC)			Cleared (ZRC)		
	2019-20	2020-21	2021-22	2019-20	2020-21	2021-22
Generation	125,290	125,341	125,225	119,779	120,143	118,884
External Resources	4,402	3,832	3,914	3,183	3,736	3,798
Behind the Meter Generation	4,202	3,997	4,131	4,097	3,892	4,068
Demand Resources	7,876	7,754	7,294	7,372	7,557	7,152
Energy Efficiency	312	650	0	312	650	0
Total	142,082	141,574	140,564	134,743	135,979	133,903

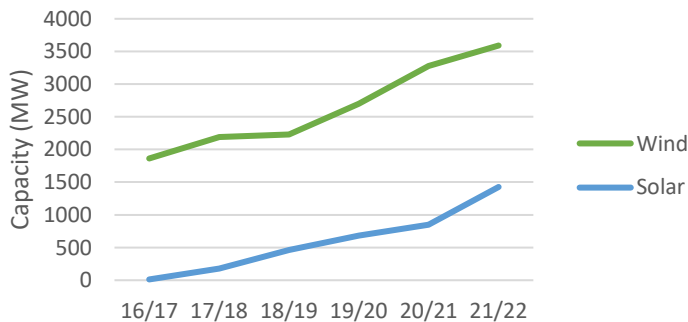
Conventional generation provides majority of capacity, while wind and solar continue to grow

- 1,426 MW of solar cleared this year's auction—an increase of 68% from PY 2020-21 (850 MW).
- Similarly, 3,590 MW of wind cleared this year, an increase of 10% compared to last year (3,275 MW).

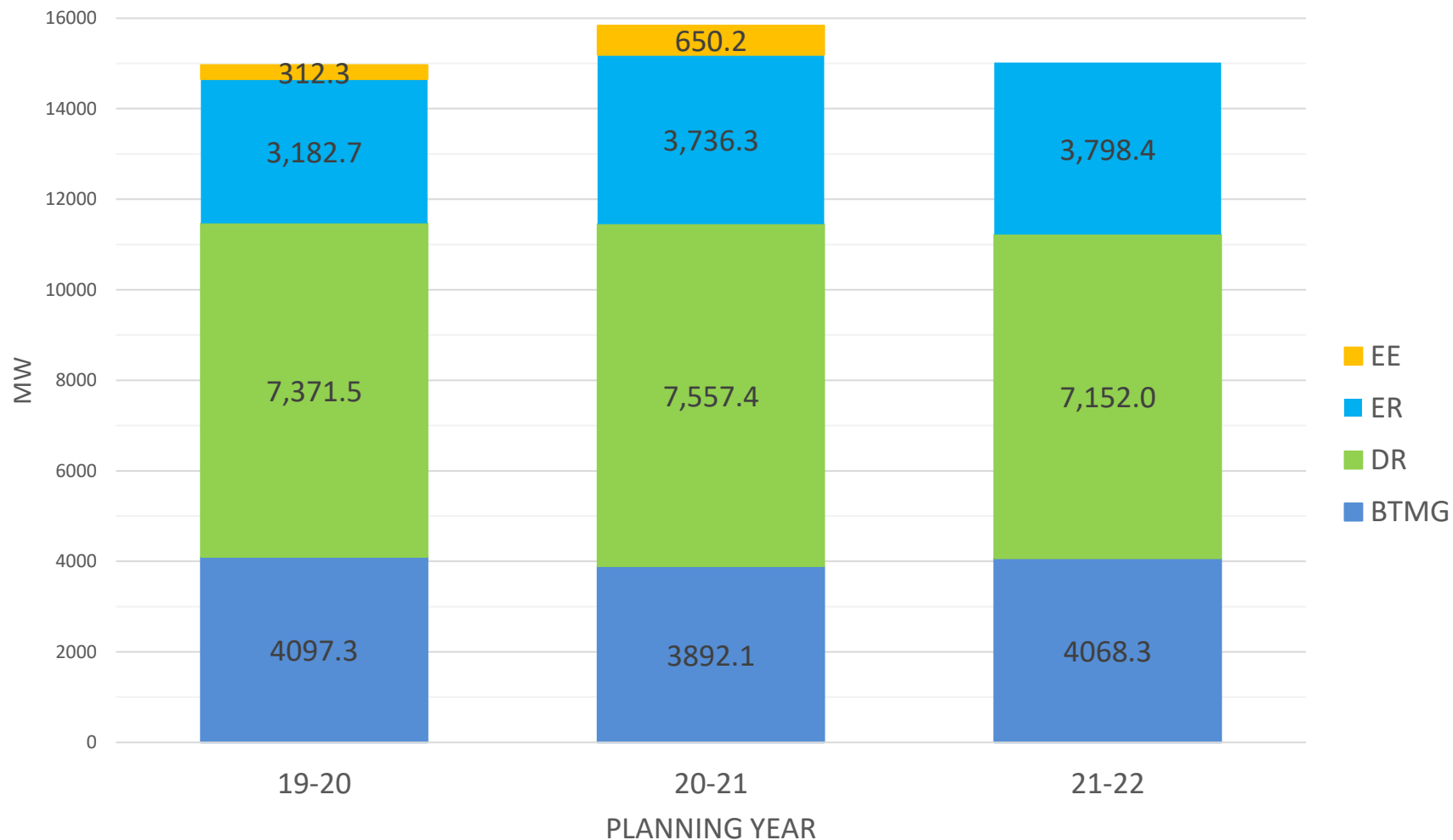
133.9GW Cleared Capacity by %



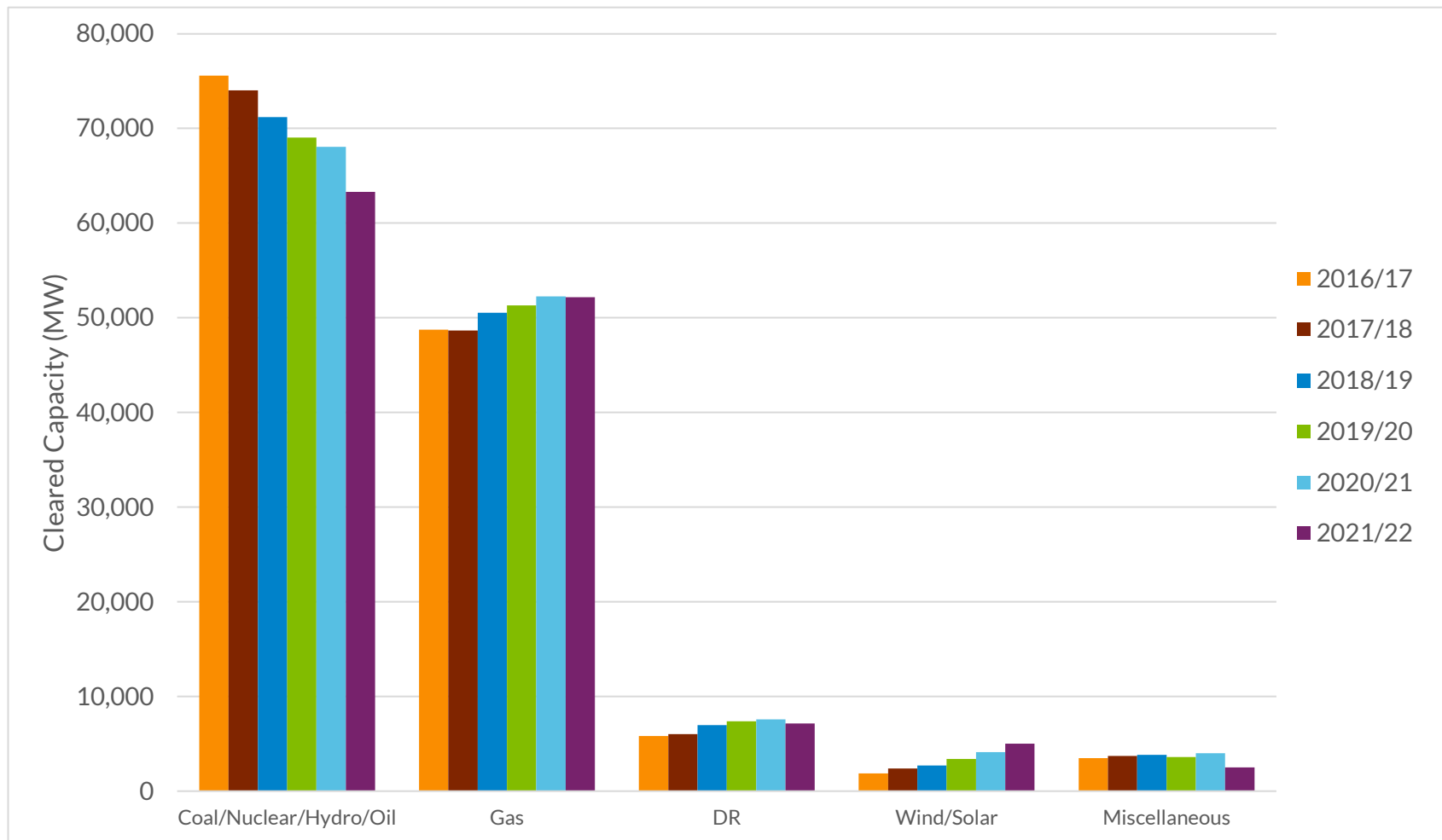
Wind & Solar Cleared UCAP



Demand-based resources declined due to lack of qualified Energy Efficiency



Planning resource mix continues the multi-year trend of less solid fuel and increased gas and non-conventional



Next Steps

- **APR 15** – Conference call presentation of PRA results
- **MAY 12** – Zonal Deliverability Benefits and additional PRA analytics at the May RASC
- **MAY 14** – Posting of PRA masked offer data
- **MAY 25** – MISO published cleared LMRs to the MCS
- **MAY 28** – MPs submit ICAP and DR Testing Deferral info
- **JUN 1** – New Planning Year starts

Appendix

Acronyms

ACP: Auction Clearing Price

ARC: Aggregator of Retail Customers

BTMG: Behind the Meter Generator

CIL: Capacity Import Limit

CEL: Capacity Export Limit

CONE: Cost of New Entry

DR: Demand Resource

EE: Energy Efficiency

ER: External Resource

ERZ: External Resource Zones

FRAP: Fixed Resource Adequacy Plan

ICAP: Installed Capacity

IMM: Independent Market Monitor

LCR: Local Clearing Requirement

LMR: Load Modifying Resource

LRZ: Local Resource Zone

LSE: Load Serving Entity

PRA: Planning Resource Auction

PRM: Planning Reserve Margin

PRMR: Planning Reserve Margin Requirement

RASC: Resource Adequacy Sub-Committee

SS: Self Schedule

SFT: Simultaneous Feasibility Test

UCAP: Unforced Capacity

ZIA: Zonal Import Ability

ZRC: Zonal Resource Credit



RAdequacy@misoenergy.org