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April 27, 2011

Ms. Mary Jo Kunkle
Executive Secretary
Michigan Public Service Commission
6546 Mercantile Way
P.O. Box 30221
Lansing, MI 48909

RE: Case No. U-16932 – In the matter of the investigation, on the Commission's own motion, into the electric supply reliability plans of Michigan's electric utilities for the year 2012.

Dear Ms. Kunkle:

As directed by the Commission's December 20, 2011 Order in the above-referenced case, enclosed for filing is **MISO's 2012 Summer Resource Assessment**. Please also allow this to supplement MISO's April 20, 2012 filing of comments. Thank you.

Sincerely,

/s/ *Matthew Dorsett*

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Enclosures

Summer Assessment

MSC - May 1, 2012

Summary

MISO does not anticipate Environmental Regulations to have an impact during the 2012 summer season; however, MISO is currently evaluating these regulations' impacts on post 2012 summer seasons

MISO anticipates the system peak to occur during the month of July or August based on the Module E demand forecasts from Load Serving Entities and historical peaks *('05-Aug, '06-Jul, '07-Aug, '08-Jul*, '09-Jun, *'10-Aug, '11-Jul*)

MISO expects adequate resources to serve load during the 2012 summer; however, it is always possible for a combination of higher loads, higher forced outage rates, fuel limitations, low water levels and other factors to lead to curtailment of firm load; this is a low probability event for the 2012 summer

If MISO's system peak occurs in June, potentially tighter conditions than expected could occur due to lower amounts of designated resources and higher planned outages

2012 Forecasted Summer Demand

A load diversity value of 4.61 percent was calculated by observing the individual peaks of each Commercial Pricing Node and comparing them against the system peak.

- Excluded First Energy, Duke Kentucky, and Duke Ohio
- Observed system peak hours over last 7 years (2005-2011)
- Given the small dataset, this value represents an estimation of the true mean of MISO historical load diversity data with only a 10 percent chance of the true mean being lower.

Confidence Intervals		
Conf. Int.	Upper Bound	Lower Bound
80.0%	6.25%	**4.61%**
90.0%	6.54%	4.32%
95.0%	6.83%	4.03%
98.0%	7.23%	3.63%
99.0%	7.55%	3.31%
99.9%	8.84%	2.02%

Base Case

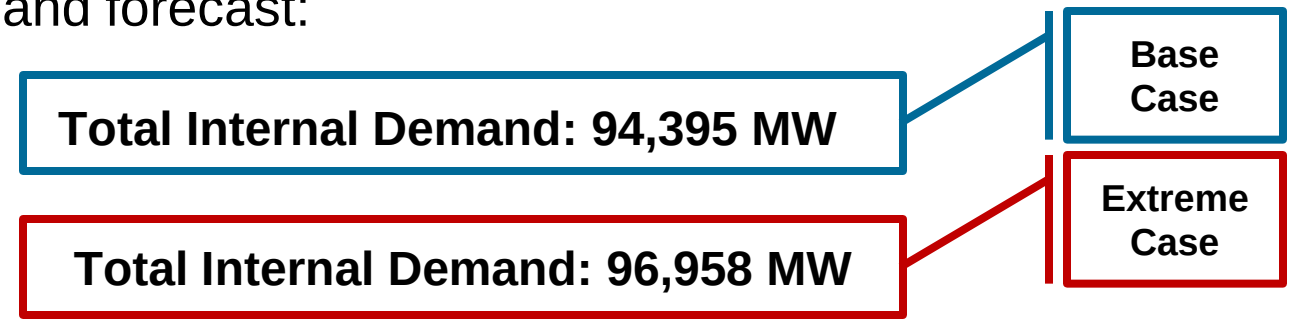
Extreme Case

2012 Forecasted Summer Demand
Expected Peak (July or August)

MISO Load Serving Entities provide non-coincident 50/50 weather normalized demand forecasts through the Module E process for the summer months.

- 2012 Forecasted Non-Coincident Peak = 98,957 MW
- MISO anticipates the system peak to occur during the month of July or August based on the Module E demand forecasts from Load Serving Entities and historical peaks (‘05-Aug, ‘06-Jul, ‘07-Aug, ‘08-Jul, ’09-Jun, ‘10-Aug, ‘11-Jul)

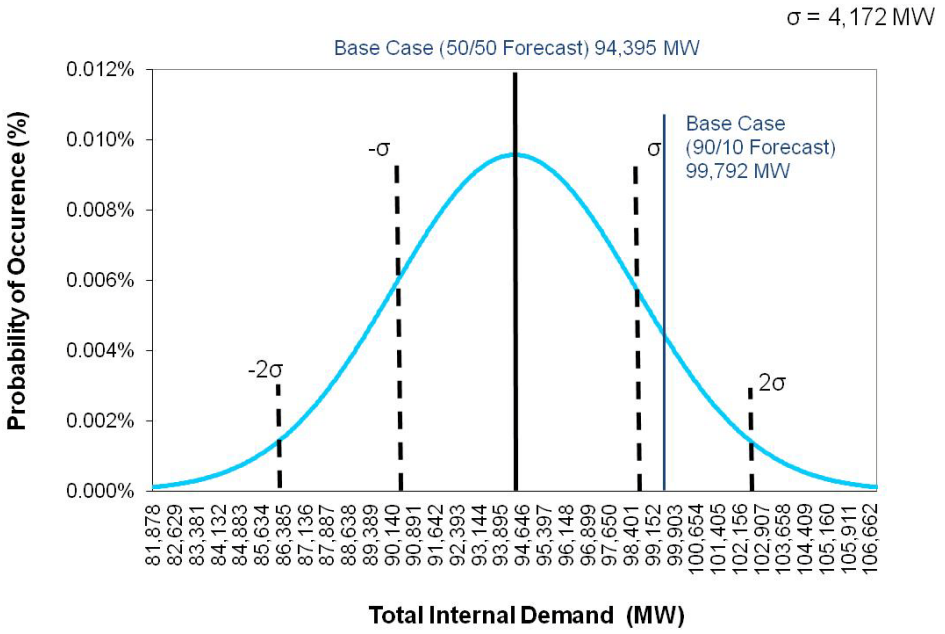
Applying MISO’s system-wide load diversity value to the non coincident load forecast results in a MISO coincident 50/50 demand forecast:



2012 Forecasted Summer Demand
Expected Peak (July or August)

Using the NERC Bandwidths Variance Calculation, a sigma value of 4.42% was determined for MISO's footprint.

This Load Forecast Uncertainty (LFU) was used to form a normal distribution around the 50/50 forecasted Total Internal Demand. Shown in graph to the right.



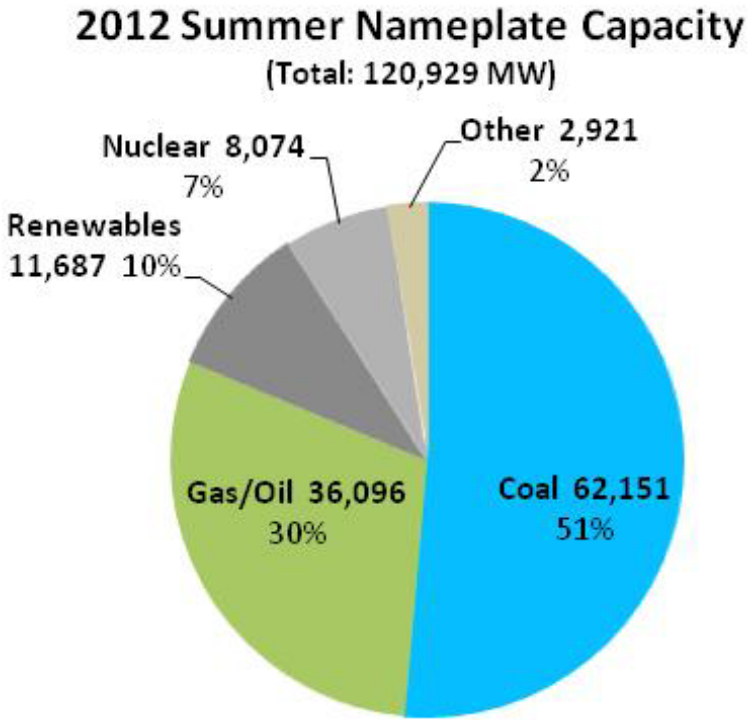
Total Internal Demand: 94,395 MW (50/50); 99,792 MW (90/10) — **Base Case**

Total Internal Demand: 96,958 MW (50/50); 102,450 MW (90/10) — **Extreme Case**

2012 Forecasted Summer Capacity

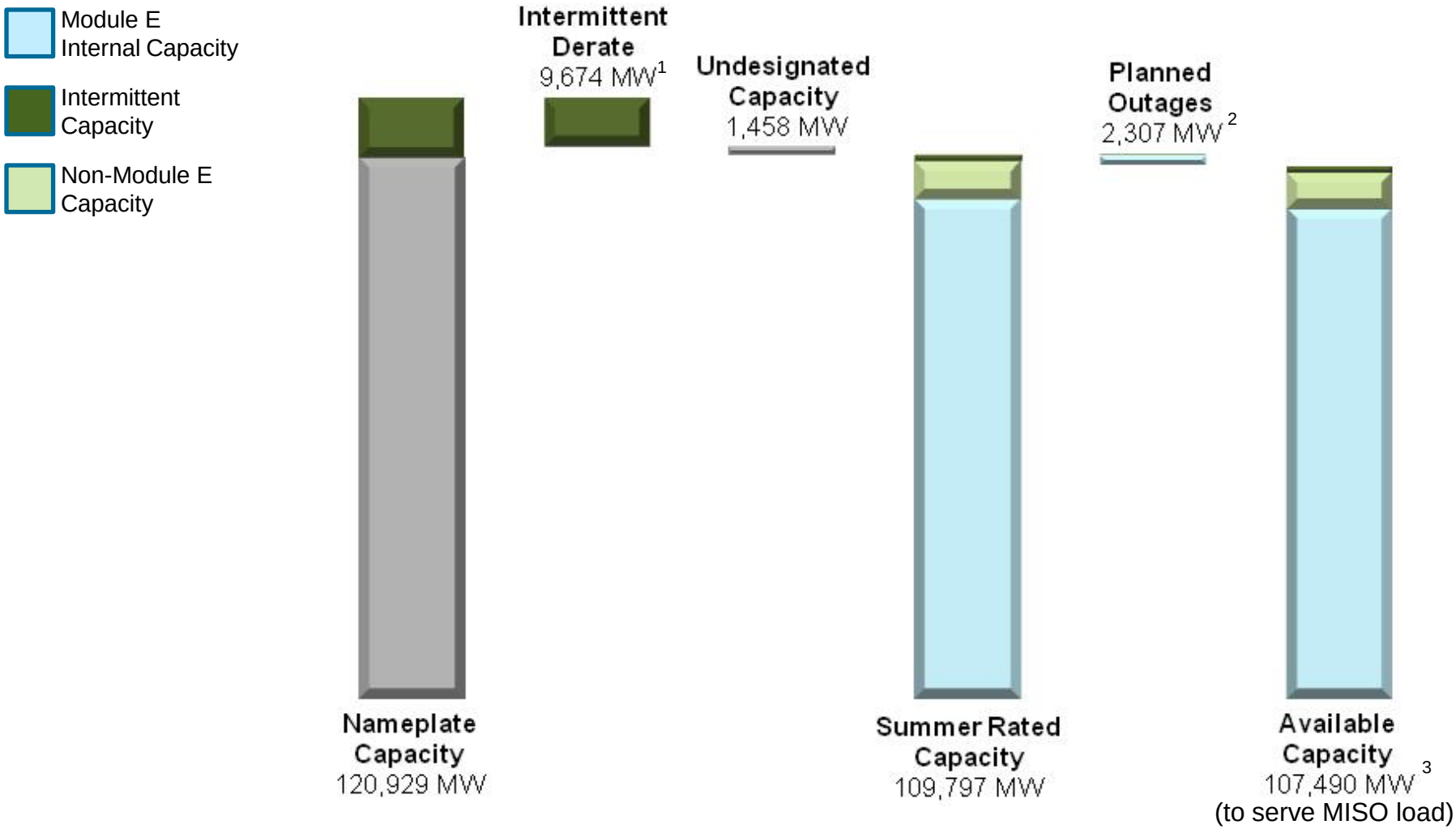
MISO's forecasted summer nameplate capacity is 120,929 MW

- Intermittent Renewable: 10,791 MW wind, 660 MW run-of-river hydro, 177 MW biomass/waste
- Non-intermittent Renewable: 59 MW biomass/waste



2012 Forecasted Summer Capacity

Expected Peak (July or August)



[1] 9,205 MW Wind; 305 MW run-of-river hydro; 50 MW biomass/waste ; 114 MW all other

[2] 1,935MW Module E and 372 MW Non-Module E

[3] Intermittent: 765 MW Wind; 355 MW run-of-river hydro; 123 MW biomass/waste; 69 MW all other
Module E: 98,839 MW; Non-Module E: 7,340 MW. Also see Supplemental Information

2012 Forecasted Summer Capacity

Wind Production at Peak				
Summer	Metered Wind MW at Peak Load	Registered Max MW	Potential Market Capacity Credit MW	Designated MW
2006	700	1,251	250	148
2007	44	2,064	413	147
2008	384	3,085	617	224
2009	78	5,636	1,127	290
2010	1,740	8,179	654	197
2011	4,492	9,107	1,175 [1]	382
2012	N/A	10,791 [2]	1,586 [3]	765 [4]

[1]12.9% Wind Capacity Credit applied to Registered Max MW
[2]March 2012 Commercial Model Registered Max MW
[3]14.7% Wind Capacity Credit applied to Registered Max MW
[4]Deliverable Wind at 14.7% Wind Capacity Credit

MISO

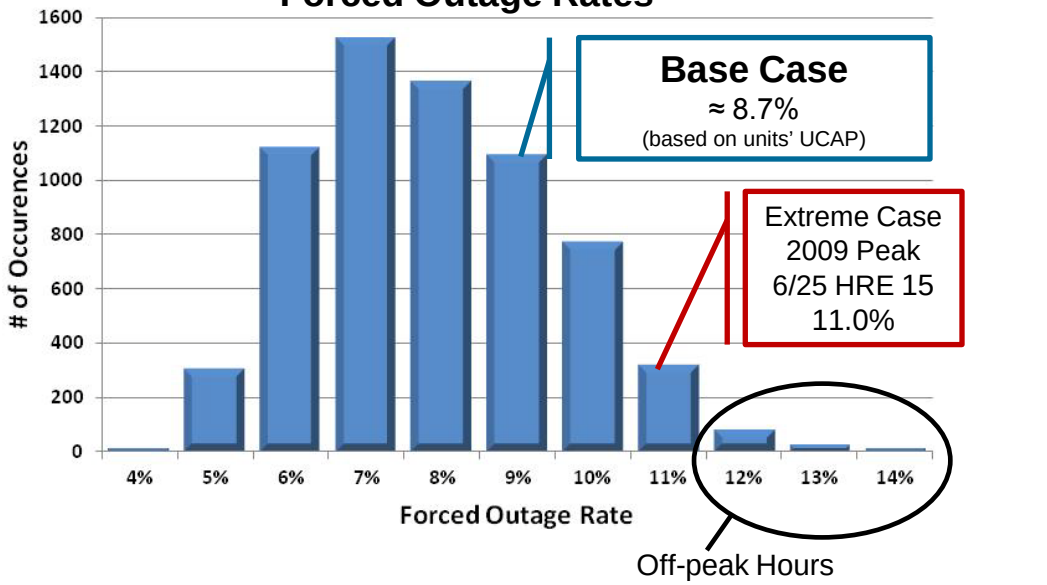
2012 Forecasted Summer Capacity

Expected Peak (July or August)

The distribution of hourly system forced outage rates (FOR) from summer months was analyzed over a three year period (2009-2011) seen in chart to the right.

UCAP rating uses each units' 5 year average Equivalent Forced Outage Rate Demand (EFORd)

2009-2011 Summer Distribution of Hourly Forced Outage Rates



Available Capacity: 107,490 MW; Internal Capacity Committed In Real-Time[1]: 98,162 MW

Base Case

Available Capacity: 107,490 MW; Internal Capacity Committed In Real-Time: 95,666 MW

Extreme Case

[1] Applying Forced Outage Rates to Available Capacity

2012 Planning Reserve Margin

- *Planning Reserve Margin* is the reserve level that MISO anticipates will be experienced based on MISO's Available Capacity, Behind-the-meter Generation, and Net Internal Demand

- At this reserve level, MISO has access to approximately 10,452 MW of resources[1] which are behind-the-curtain of Emergency Operating Procedures (EOPs)

- The Planning Reserve Margin should meet or exceed the Planning Reserve Margin Requirement of 16.7 percent for Planning Year 2012, from the 2012 LOLE Study Report posted on MISO's webpage.

[1] 8,052 Module E Load Modifying Resources (Direct Control Load Management and Interruptible Load reduce Total Internal Demand by 4,528 MW to Net Internal Demand, and Behind-the-meter Generation adds 3,524 MW to Available Capacity.
2,400 MW of Operating Reserves are fully utilized.

2012 Planning Reserve Margin Requirement (PRMR)

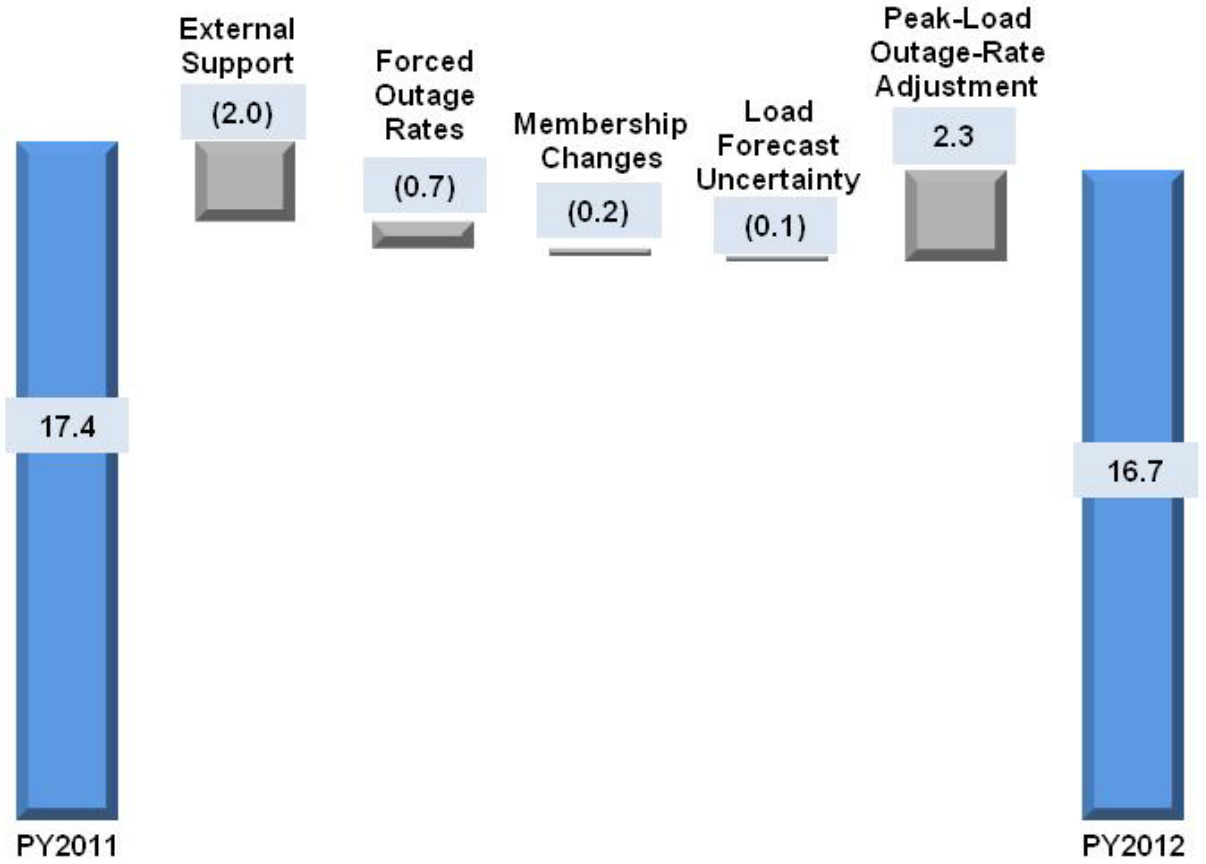
PRMR change from PY2011 to PY2012

MISO's Planning Year (PY) 2012 PRM requirement is 16.7 percent, 0.7 percentage points lower than the PY 2011 PRM requirement.

2.0 percentage point reduction due to enhanced modeling of external support.

0.7 percentage point reduction going from 3 year average to 5 year average Forced Outage Rates

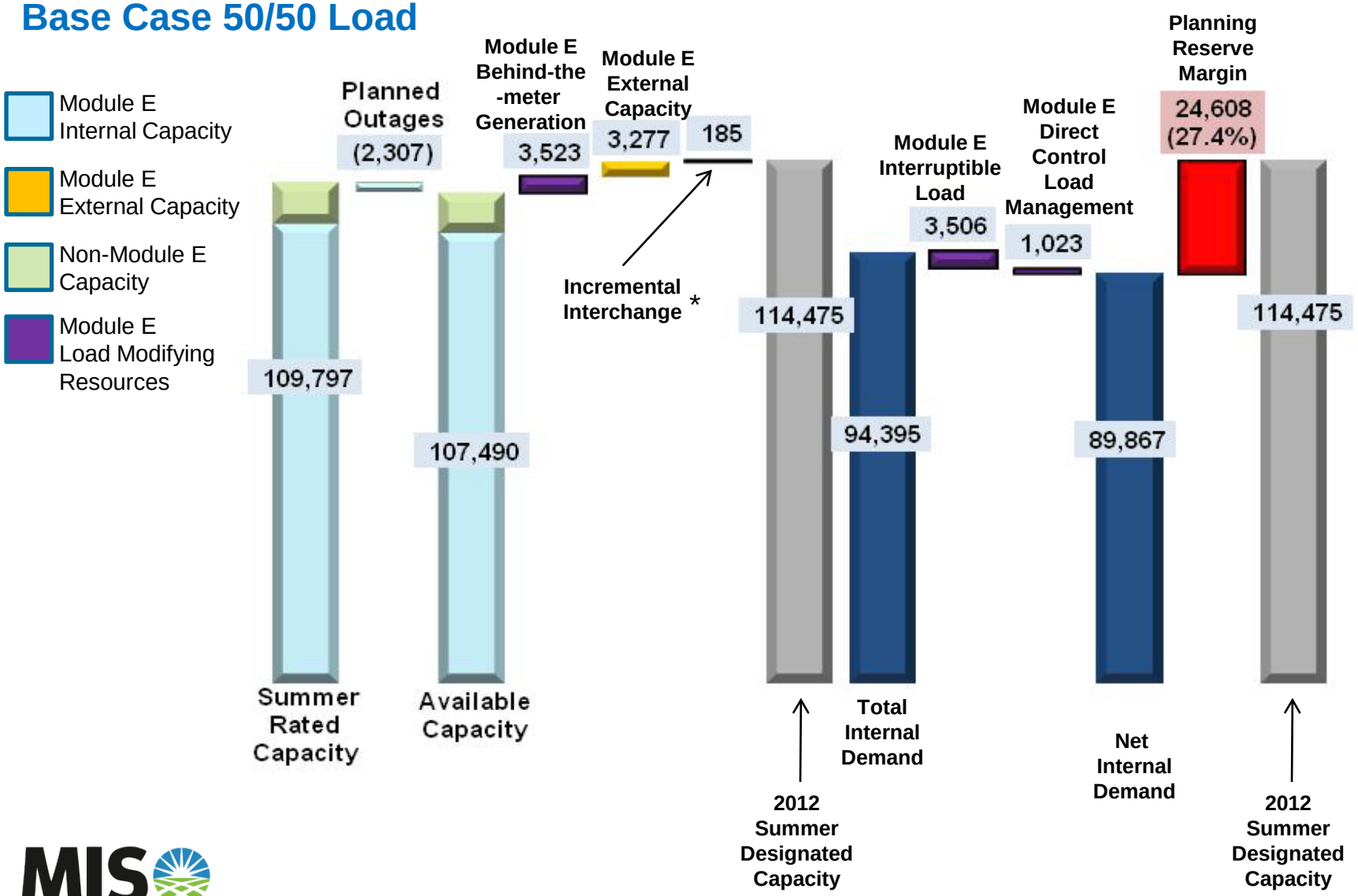
2.3 percentage point adjustment to reflect forced outage rates under peak load conditions



2012 Planning Reserve Margin Forecast

Expected Peak (July or August)

Base Case 50/50 Load

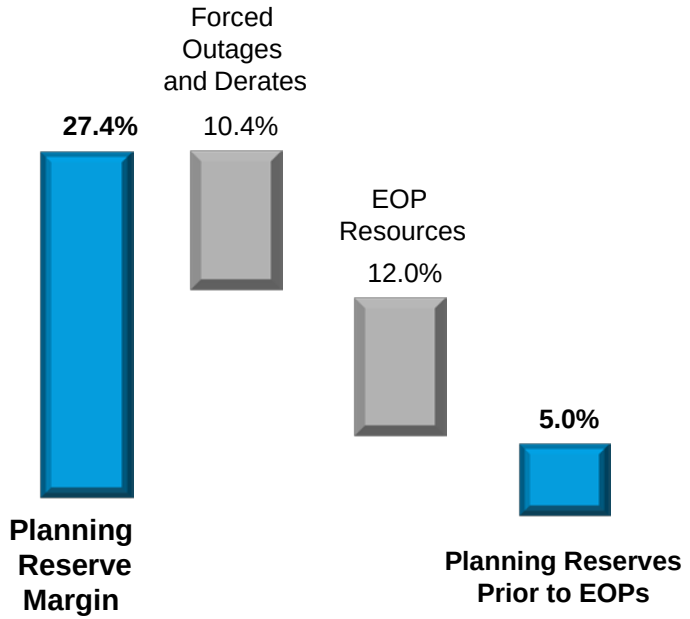


*Supplemental Information

Planning Reserves Prior to Emergency Operating Procedures (EOPs)

- This is the reserve level under Normal Operating Conditions
- Normal Operating Conditions refer to resource utilization without implementing Emergency Operating Procedures (EOPs)
- The actual 2011 Planning Reserve Margin was 26.6 percent (23.8 percent forecast)
- The actual 2011 Planning Reserves Prior to EOPs was 2.0 percent
  - 14,500 MW of EOP resources were not needed during last year's peak (July 20 HRE17)

Emergency Level Event	EOP Resources	Forecast Description
Step 1a	Emergency Resources	Would Vary[1]
Step 1b	Utilize Emergency Ranges	@ emergency rating[2]
Step 2b	Load Modifying Resources	Module E[3]
Step 2c	Emergency Demand Response	Would Vary
Step 2d	Emergency energy purchase	Would Vary
Step 3a	Utilize Spin and Supp	Approximate[4]
Step 4a	Reserve Call	Would Vary
Step 4b	Emergency energy purchase	Would Vary
Step 5a	Utilize Regulation	Approximate

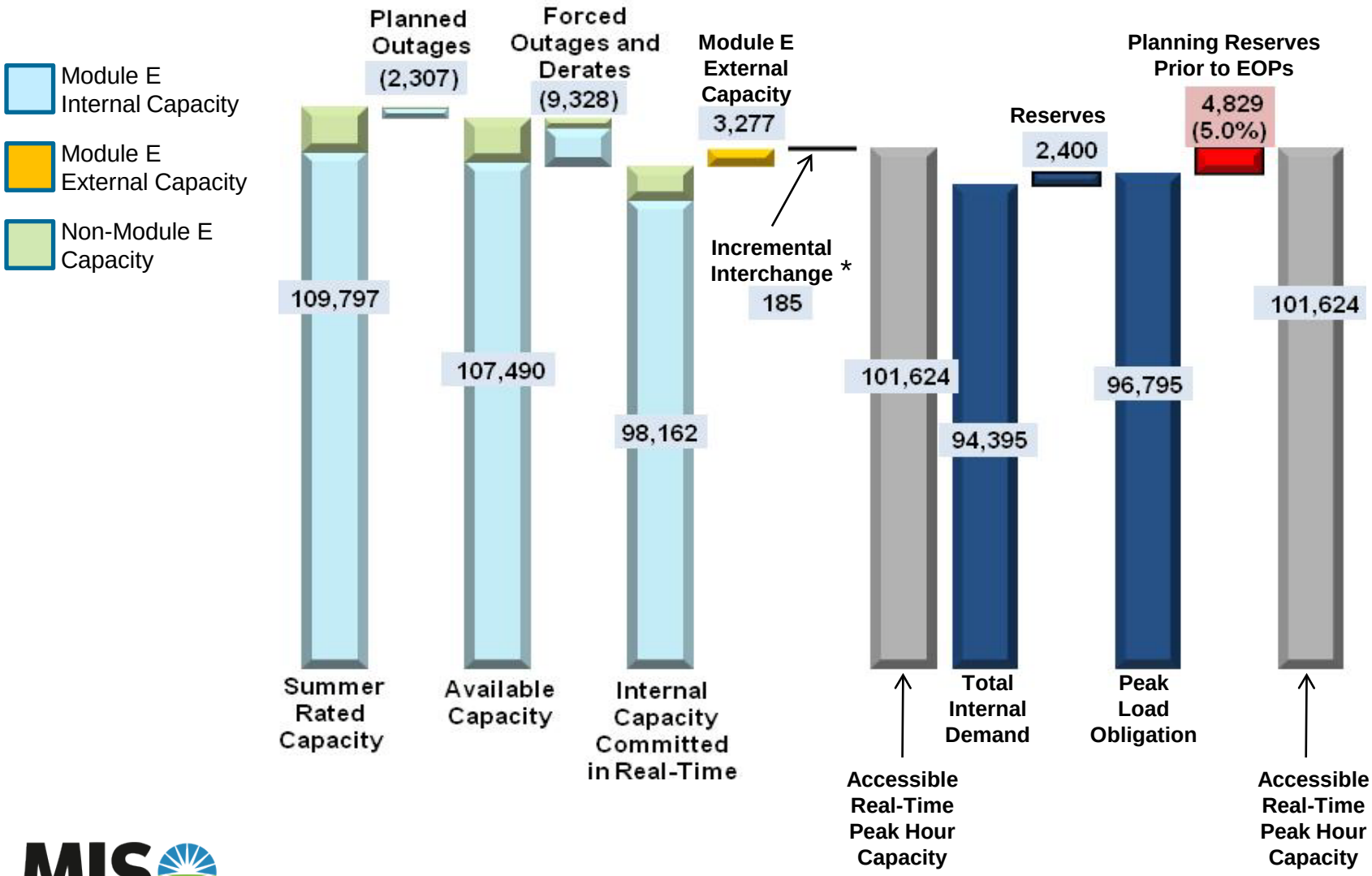


[1] Variable MW amount. Forecasted 0MW @ Step(s) 1a, 2c, 2d, 4a, & 4b
[2] Normal resource utilization forecasted at emergency rating. Forecasted 0MW @ Step(s) 1a
[3] Forecasted in Module E Capacity Tracking (MECT) tool. Module E process.
[4] Operating Reserves. Forecasted 2,400MW total @ Step(s) 3a & 5a

2012 Planning Reserves Prior to EOPs Forecast

Expected Peak (July or August)

Base Case 50/50 Load



*Supplemental Information

Risk Assessment

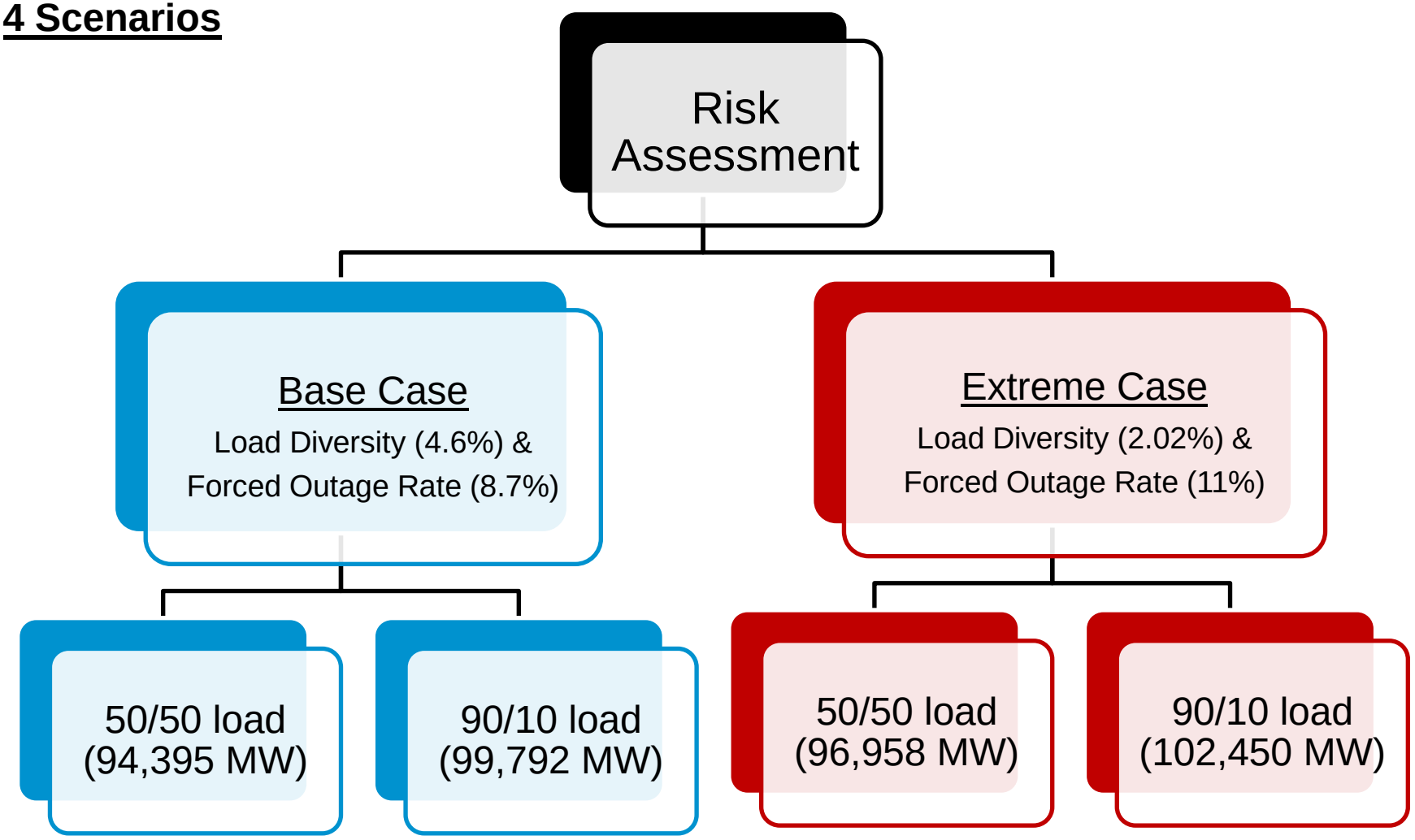
20 scenarios were evaluated to provide a range of possible risk levels for the upcoming summer peak

- 4 scenarios for the Expected Peak occurring in July or August
- 16 scenarios for June, evaluating typical system non-peak June demand and atypical July or August system peak demand realized in June
  - Many possible scenarios, most of which are low probability events for the 2012 summer season
- See Supplemental Information for more in depth explanation

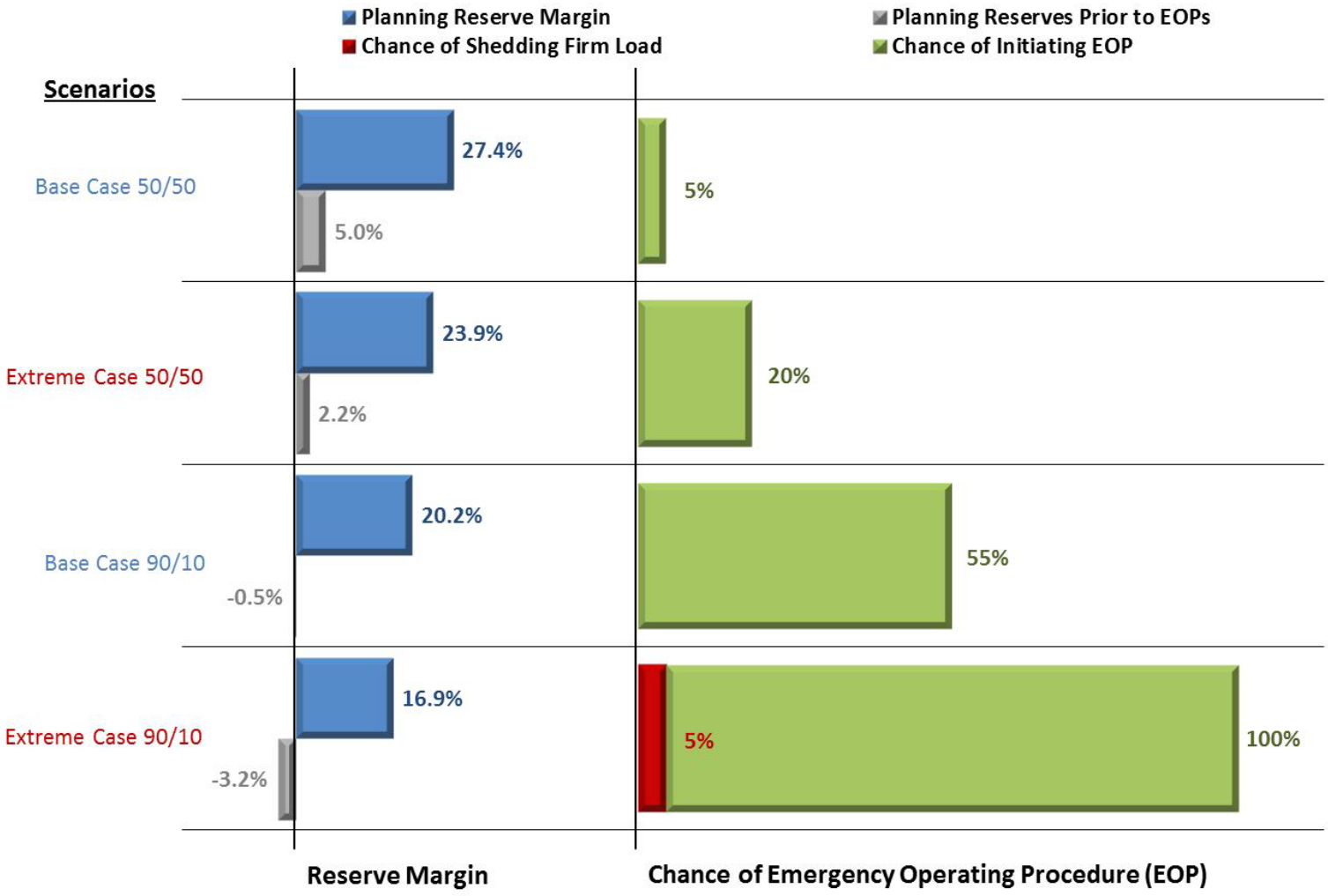
Risk Assessment - Decision Tree

Expected Peak (July or August)

4 Scenarios



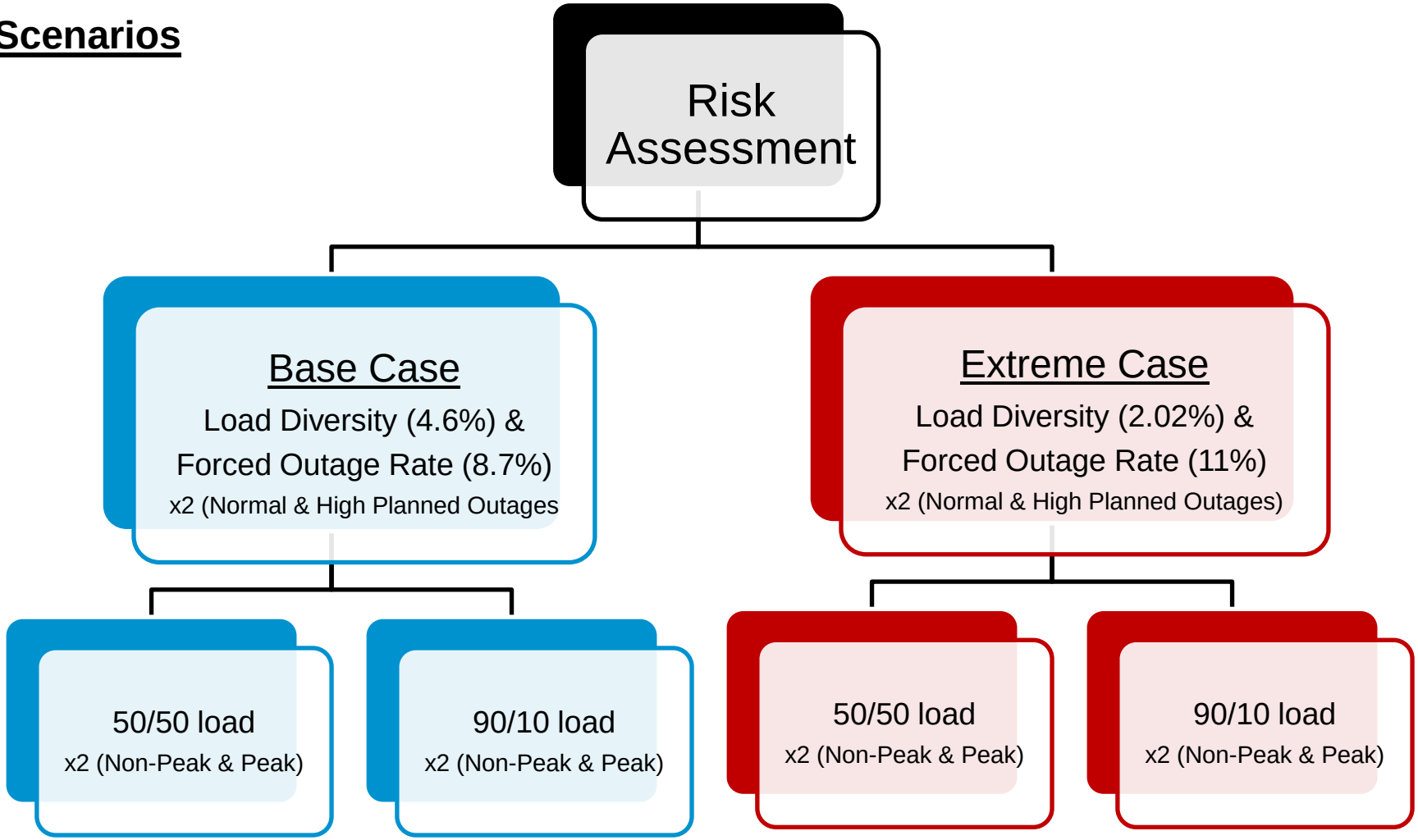
Risk Assessment
Expected Peak (July or August)



Risk Assessment - Decision Tree

June

16 Scenarios

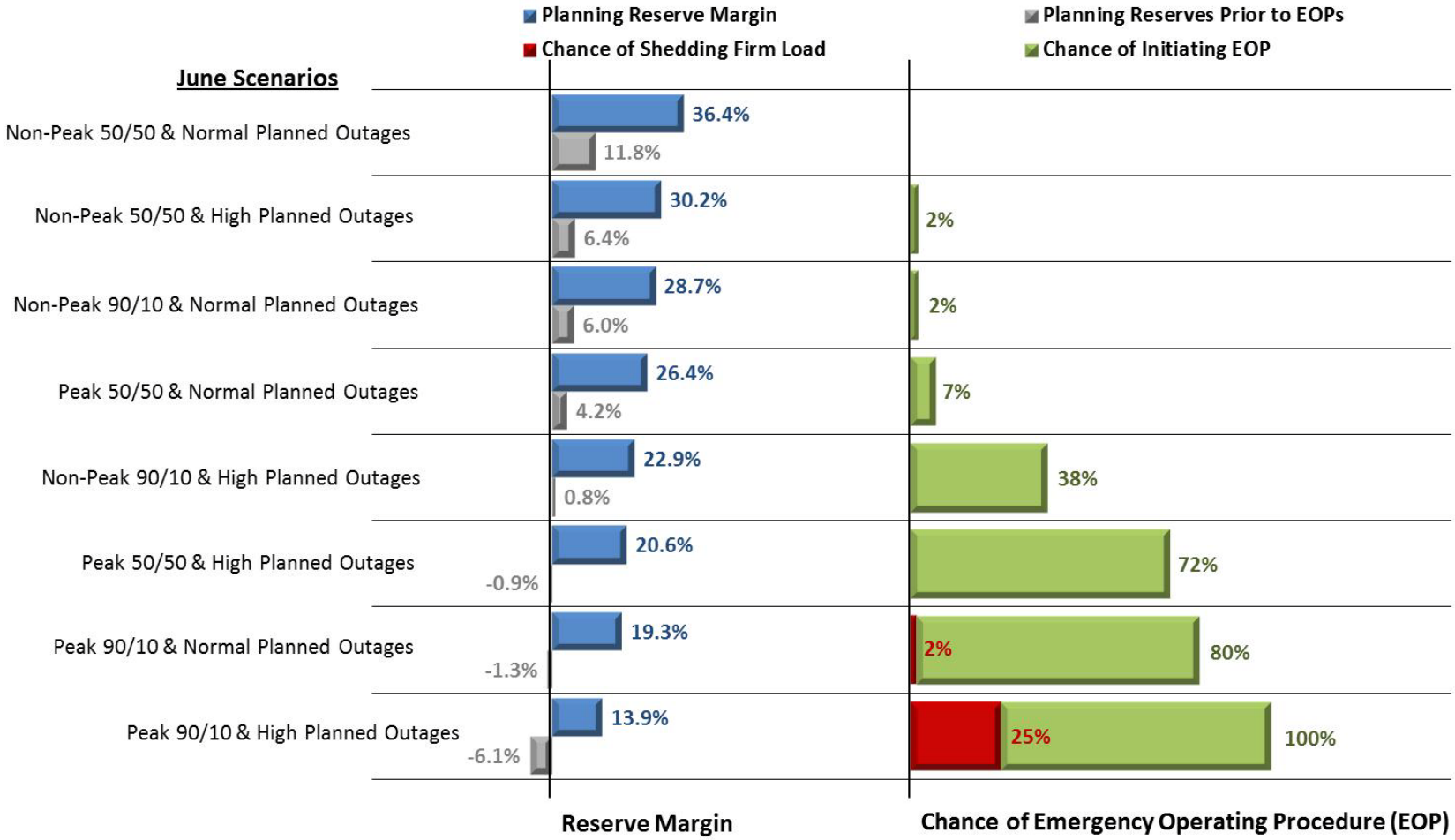


[1] Peak is July or Aug peak forecast realized in the month of June.
[2] Non-Peak is Module E forecasted demand for June.

Risk Assessment

June

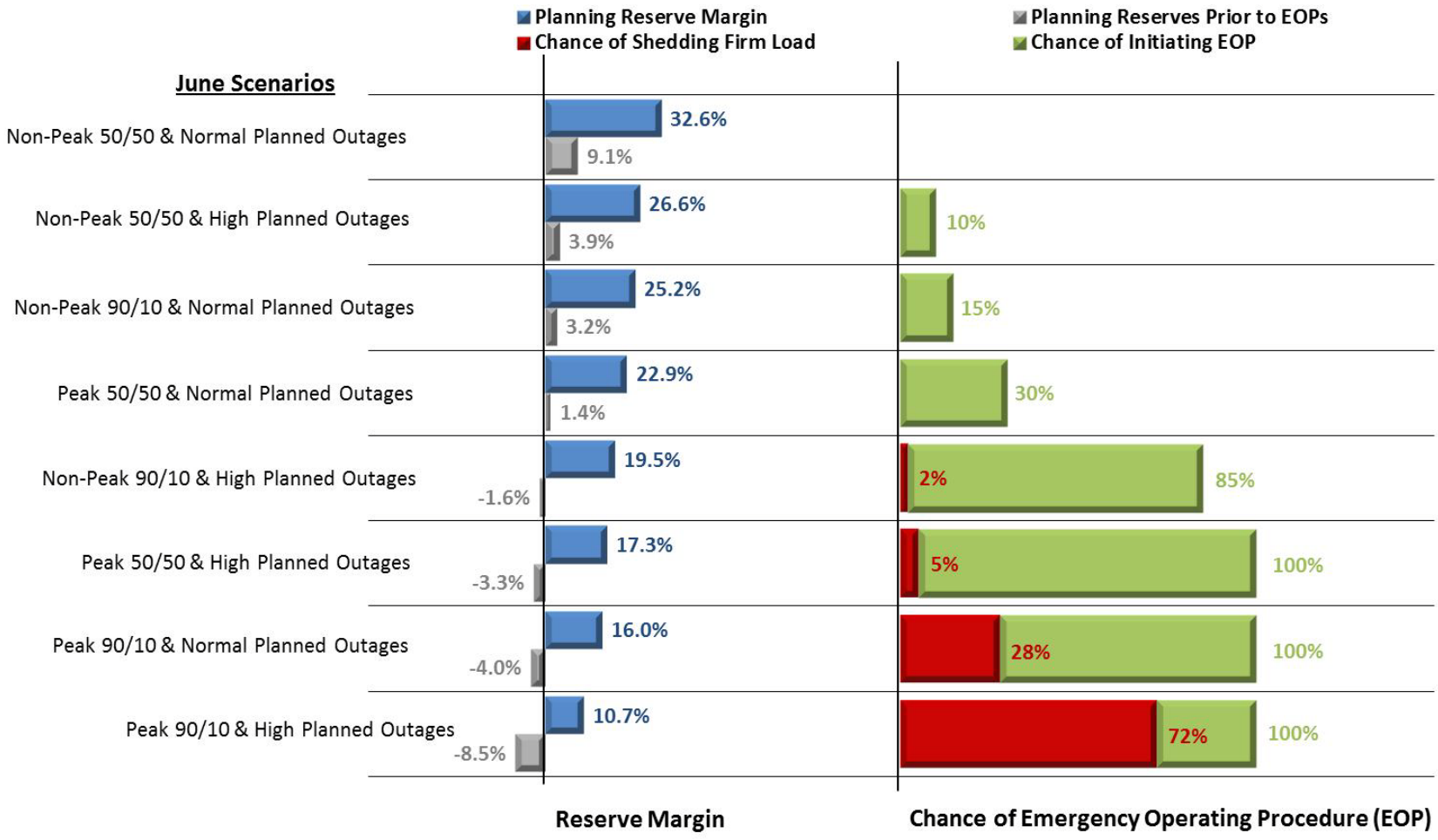
Base Case



Risk Assessment

June

Extreme Case



Conclusion

MISO expects to have sufficient resources to reliably serve load this summer with an anticipated Planning Reserve Margin of 27.4 percent for the 2012 summer peak hour

- 24,608 MW of installed capacity resources available to MISO prior to shedding firm load

MISO expects to have 5.0 percent Planning Reserves Prior to EOPs for the 2012 summer peak hour

- 4,829 MW of unforced capacity resources available to MISO prior to utilizing 10,452 MW of resources only callable by MISO during an emergency situation

However, it is always possible for a combination of higher loads, higher forced outage rates, fuel limitations, low water levels, and other factors to lead to firm load curtailment; This is a low probability event for the 2012 summer

Contact Info

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Supplemental Information

2012 Forecasted Summer Capacity
Expected Peak (July or August)

Source	MW
Module E Designated Capacity	100,774
Additional GADS Generator Verification Test Capacity (Non-Module E)	5,587
Additional March 2012 Commercial Model (Non-Module E)	2,125
Deliverable Wind at Capacity Credit of 14.7% (Intermittent)	765
Intermittent/Run-of-River Hydro Hourly Data (Intermittent)	546
Planned Outages	(2,307)
Module E Behind-the-meter Generation	3,523
Module E External Generation	3,277
Incremental Interchange	185

- Total is 2012 Summer Designated Capacity of **114,475 MW**
  (Used to calculate the Planning Reserve Margin)

2012 Incremental Interchange

MISO performed multiple regression analysis to forecast Net Actual Interchange (NAI).

- 2012 Summer Forecasted NAI = 3,462 MW

Comparison to Historical Summer Hourly NAI (2009-2011)

- All Summer Hours
  - Min: -631 MW Ave: 3,910 MW Max: 10,153 MW
- Peak Hours
  - Min: 3,320 MW Ave: 6,027 MW Max: 10,153 MW

Based on comparison of Forecasted NAI to Historical NAI, MISO anticipates that 3,462 MW is the minimum NAI to be expected during the 2012 summer peak.

- Incremental NAI = Forecasted NAI - Module E External Generation
  - 3,462 MW – 3,277 MW = <u>185 MW</u>

Risk Assessment

<u>20 scenarios</u> were evaluated to provide a range of possible risk levels for the upcoming summer peak

- Base Case: Utilizes 4.6 percent Estimated Diversity value and approximate 8.6 percent Forced Outage Rate (FOR), based on units' Unforced Capacity (UCAP) ratings
- Extreme Case: Utilizes 2.0 percent Estimated Diversity value and 11.0 percent FOR, based on three year FOR historical analysis
- **<u>4 scenarios</u>** evaluated for the expected peak hour occurring during the month of July or August
  - Each case (Base & Extreme) evaluated at a Mid Load (50/50) and a High Load (90/10) Demand Forecast
- **<u>16 scenarios</u>** evaluated for the expected off-peak summer month of June[1]
  - Each case (Base & Extreme) evaluated at a June 50/50 and June 90/10 Non-Peak Demand Forecast at a Normal Planned Outage and High Planned Outage level[2]
  - If MISO's system peak occurs in June (atypical)
    - Each case (Base & Extreme) evaluated at 50/50 and 90/10 Peak Demand Forecast at a Normal Outage an High Outage level

[1] 16 June scenarios all evaluated at June planned resource level which is lower than what is forecasted for the expected peak months of either July or August.

[2] Planned Outages from CROW Outage Scheduler as of March 1st 2012. Normal Planned Outage level is 3,175 MW pulled from CROW for days from mid to late June (typical June peak time). High Planned Outage level is 5,789 MW pulled from CROW for days during early June (atypical June peak time)

Risk Assessment

How to interpret the results (3 Examples):

- Expected Peak (July or August) Base Case 50/50 load
  - 27.4 percent Planning Reserve Margin
  - 5.0 percent Planning Reserves Prior to EOPs with an approximate 5.0 percent chance of initiating EOPs, with no chance of shedding firm load
    - Although forecasted to have excess resources before EOPs, LOLE analysis resulted in 5.0 percent chance due to uncertainty around the Forced Outage Rates, amount of External Support, and the load forecast
- Expected Peak (July or August) Base Case 90/10 load
  - 20.2 percent Planning Reserve Margin
  - -0.5 percent Planning Reserves Prior to EOPs with an approximate 55.0 percent chance of initiating EOPs, with no chance of shedding firm load
    - Although slightly negative, this does not necessarily mean MISO will initiate EOPs due to potential for lower Forced Outage Rates, more External Support, etc. which is realized in the LOLE analysis
- June (with High Planned Outages) Extreme Case Peak 90/10 load
  - 10.7 percent Planning Reserve Margin (below 16.7 percent requirement)
  - -8.5 percent Planning Reserves Prior to EOPs with a 100 percent chance of initiating EOPs, with 72 percent chance of shedding firm load
    - This scenario has an extremely low probability of occurring because it assumes MISO's system peaks at a 90/10 load level with little diversity and high unit forced outages during early June, while units are still coming off of spring maintenance