Anomalies and Remaining Sensitivities

NEEM-TX Subteam
SSC Meeting
Sept 25, 2011

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Anomalies

- Southwest Wind
- Midwest Wind
- Midwest Gas
- Other Anomalies

- Sub-team has focused on possible anomalies in Phase II Scenario Task Force recommended Sensitivities

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Summary

- Southwest wind and Midwest wind builds are not clearly anomalous
- MISO CT build is clearly anomalous and there is a simple solution
- MISO CC build appears somewhat anomalous and there are not easy solutions

- Sub-team has developed two options for the SSC
  - Option 1: Do not address possible MISO CC anomaly
  - Option 2: Address possible MISO CC anomaly through use of a test sensitivity

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Southwest Wind

- More Wind being placed in SPP_S despite similar costs and capacity factors
- But much more retirements in SPP_S and much more load in SPP_S

	2030 Cumulative Wind Build			2030 Cumulative Retirements			2030 Demand (TWh)		
	F1S3	F610	F8S1	F1S3	F610	F8S1	F1S3	F610	F8S1
Nebraska	202	2,346	14,871	270	0	3,466	37.5	41.26	30.37
SPP N	210	10,724	41,473	462	767	9,632	92.7	97.82	76.45
SPP S	3,347	24,076	45,663	4,594	3,323	23,938	193.7	195.45	154.39

- Sub-team does not believe the Southwest wind build is clearly anomalous and recommends no adjustments be made

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Midwest Wind

- Possible Anomaly
  - Model appears to place almost all new wind builds in MISO_W (Minn, Iowa and Dakotas)

	New Wind			Forced Wind
	F1S3	F610	F8S1	
MISO IN	0	0	29,432	0
MISO MI	2,600	2,449	2,600	2,000
MISO MO	300	300	6,017	300
MISO W	8,770	17,688	60,831	2,801
MISO WUMS	969	969	1,419	969
MISO	12,639	21,406	100,299	6,069

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Midwest Wind

- However, almost all Class 4+ MISO wind potential is in MISO_W

	Class 4 CF	Class 4 Potential	Class 3 CF	Class 3 Potential
MISO IN	33.1%	16	29.4%	102,337
MISO MI	30.5%	632	27.0%	56,833
MISO MO	35.0%	5,867	31.1%	105,738
MISO W	37.7%	1,199,936	31.7%	775,035
MISO WUMS	32.6%	284	28.4%	16,528

- Given that MISO_W has much higher quality wind, the Sub-Team does not believe that the MISO_W wind build is anomalous

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MISO_IN in F8?

- Why does MISO_IN get a huge wind build in F8?
- Large Retirements, no low carbon gen in comparison to other MISO regions
- Transmission Restrictions
  - MISO_IN wind build greatly decreases in OL25 Case
- Sub-team does not believe MISO_IN wind build is anomalous given these conditions

	2015 Coal	2015 Nuke	2015 Hydro	2030 Coal	New Gas	New Wind
MISO IN	9,104	0	75	126	16,662	29,432
MISO MI	4,452	1,889	141	0	735	2,600
MISO MO	11,552	2,233	352	1,990	0	6,017
MISO W	10,209	2,361	497	800	0	60,831
MISO WUMS	3,969	1,817	336	1,767	5,400	1,419

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Midwest Gas - CTs

- Massive CT Build build in MISO_WUMS in F6S10, somewhat smaller build in F1S3
- Appears necessary to meet MISO reserve margins, not MISO_WUMS Load
  - CT's are rarely used and other unused peaking resources exist
  - CT's do not contribute to inter-NEEM region transmission build
- CT's placed in WUMS due to lowest Cost Multiplier

	CT Cost Mult	New CT		CT CF	
		F1S3	F6S10	F1S3	F6S10
MISO IN	1.017	0	0	0.0%	0.0%
MISO MI	0.970	0	0	0.0%	0.0%
MISO MO	1.010	0	0	0.0%	0.0%
MISO W	0.994	0	0	0.0%	0.0%
MISO WUMS	0.948	4,597	11,689	0.3%	0.4%

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Midwest Gas - CTs

- Sub-Team believes that the MISO_WUMS CT build is anomalous
- Sub-Team recommends redistributing the CT build around the MISO regions
  - Sub-team is consulting with PAs on best method for CT redistribution
    - One method involves redistribution based on Peak Load
    - Another method involves redistributing half the CTs evenly across MISO and half the CTs proportionally to 2030 wind installed capacity to aid in system balancing
    - Methods will not differ substantially

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Midwest Gas – CCs

- Are WUMS and IN building CCs for export to other MISO regions?

	CC Cost Mult	2030 Summer Gas Prices	2030 Winter Gas Prices	New CC		CC CF	
				F1S3	F8S1	F1S3	F8S1
MISO IN	1.009	5.57	6.17	3,543	16,662	57.4%	55.1%
MISO MI	1.053	5.58	6.04	0	735	24.7%	20.2%
MISO MO	1.056	5.71	6.35	0	0	26.4%	10.6%
MISO W	1.045	5.85	6.56	0	0	21.9%	7.5%
MISO WUMS	0.987	5.52	6.11	3,652	5,400	55.3%	46.5%

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Midwest Gas – CCs

- Maybe
  - CC build seems driven by CC Cost multiplier
  - MISO_IN is exporting a lot of energy in F8 (~75 TWh vs 92 TWh of demand)
- However
  - Hard to determine how CCs are contributing to IN and WUMS internal needs
    - IN has much less nuclear
    - IN and WUMS have relatively smaller 2015 installed capacity compared to other MISO regions given load size
  - Hard to differentiate whether exports are wind-driven or gas-driven

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Midwest Gas – CCs

- Sub-team could not come to agreement on the appropriate manner of addressing the MISO CC anomaly
- A decision item on this issue has been prepared
  - Option 1: Make no adjustment for possible MISO CC anomaly
  - Option 2: Test possible correction for MISO CC cost multiplier
    - Run one test sensitivity with equalized MISO CC cost multiplier
    - If results of test sensitivity sufficiently eliminate anomaly, use equalized MISO CC cost multiplier for other sensitivities as well
    - If results of test sensitivity do not eliminate anomaly or create other unforeseen anomaly, do not use equalized MISO CC cost multiplier for remaining sensitivities
    - Certain stakeholders also believe this option should equalize MISO region gas prices to pre-emptively address the source of another possible anomaly

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Other Anomalies

- SPP Wind Reserve Contribution
  - F1S3 (and other F1 sensitivities) used a 6% wind reserve contribution
  - Wind reserve contribution was increased to 15% for remaining futures on advice of SPP
  - Sub-team recommends adjusting SPP wind reserve contribution to 15% for F1S3
- Small Transfer Limit Increases
  - Based on EIPC advice, sub-team does not recommend adjusting <50 MW transfer limit increases as these will be dealt with appropriately in Phase II process

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Use of Remaining Sensitivities

- Sub-team recommended the following adjustments
  - Use 15% wind reserve contribution for SPP in F1S3
  - Adjust CT build in F1S3 and F6S10
- Sub-team presents a decision option relating to Midwest CC Build
- Sub-team recommendations on remaining sensitivities dependent upon SSC concurrence with Phase II Scenario TF recommendations
  - Should SSC choose different scenarios, sub-team envisions similar recommended adjustments

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Remaining Sensitivities Option 1

- Sensitivity A: BAU – F1S3x
  - SPP's Reserve Contribution from Renewables 6% to 15%
  - Redistribute MISO Combustion Turbine build
- Sensitivity B: National – F8x
  - F8 – "hardened pipes" & CO2 "flat" after 2030
- Sensitivity C: Regional – F6S10x
  - Redistribute MISO Combustion Turbine build
- Sensitivity D: Reserved

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Remaining Sensitivities Option 2

- Sensitivity A: National – F8x1
  - F8 – "hardened pipes" & CO2 "flat" after 2030
  - Average MISO CC Cost Multiplier
  - Possibly also equalize MISO gas prices
- Examine Results

If anomaly is corrected

- Sensitivity B: BAU F1S3x
  - SPP's Reserve Contribution from Renewables 6% to 15%
  - Redistribute MISO Combustion Turbine build
  - Use Average MISO CC Cost Multiplier
- Sensitivity C: Regional F6S10x
  - Redistribute MISO Combustion Turbine build
  - Use Average MISO CC Cost Multiplier
- Sensitivity D: Reserved

If anomaly is not corrected

- Sensitivity B: Sensitivity A: BAU – F1S3x
  - SPP's Reserve Contribution from Renewables 6% to 15%
  - Redistribute MISO Combustion Turbine build
  - No adjustment to MISO CC Cost Multiplier
- Sensitivity C: National – F8x2
  - F8 – "hardened pipes" & CO2 "flat" after 2030
  - No adjustment to MISO CC Cost Multiplier
- Sensitivity D: Regional – F6S10x
  - Redistribute MISO Combustion Turbine build
  - No adjustment to MISO CC Cost Multiplier

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Option 1 Pros and Cons

Pros

- Simplifies process
  - We'll be finished now
- Ensures a reserve sensitivity is available for SSC or EIPC use

Cons

- Phase II scenarios will be developed with likely somewhat anomalous WUMS and IN CC build

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Option 2 Pros and Cons

Pros

- Provides more information on MISO CC development
- Could correct for IN and WUMS anomalous CC build
  - If so, Phase II result will be more robust and defensible
- Is the best identified approach for dealing with the MISO CC anomaly given the sensitivity constraints

Cons

- No guarantee that anomaly will be corrected
  - Adjustment could have no effect on anomaly or could create a new anomalous CC build in some other MISO region
- Adjustment will compromise "optimality" of transfer limit expansions
  - TX expansions will have been based on futures with different MISO CC multipliers and different CC builds
  - There are not enough remaining sensitivities to re-run soft constraints
- Could leave us without a reserve sensitivity
- Could require another SSC decision
  - Who decides whether test case "fixes" anomalies?

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