A Tale of Two Markets? Analyzing S-N Power Balance in Summer 2025

MISO Fall 2025 Outlook

Tuesday, 26th August 2025

Presenters

Jefferson Rhoads
Senior Meteorologist

Varun Bharathidasan
Senior Research Manager, MISO/PJM

Cole Kroninger
MISO Team Lead

Hui Dong
Power Market Associate

Benjamin Parker
Power Market Analyst

Wood Mackenzie

Ask us a question!

Ask a Question

Ask a Question

Send

▸ Total Answered Questions: 0

This webinar is being recorded. For details on how your data is used and stored, see our Privacy Notice. This content is for the purpose of the webinar only; it is not for use in any publication or for posting online.

Webcast by GlobalMeet

Wood Mackenzie

Agenda

Summer Scorecard

Wood Mackenzie

INDY Summer 2025 Scorecard

Overall prices settled slightly weaker than expected apart from June

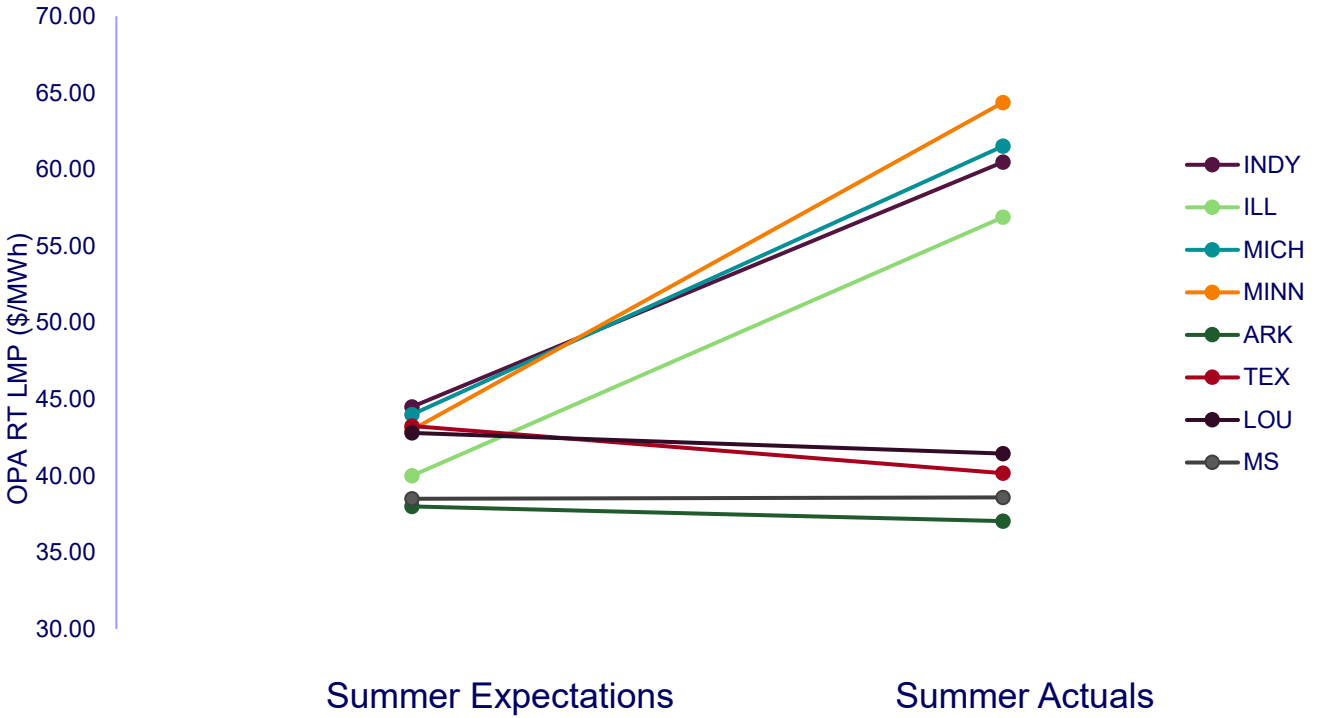
	2024 RT OPA	CME 2025 RT OPA	WoodMac Rec.	Actual 2025 RT OPA
June	37.61	49.85	SELL	61.93 ✗
July	40.40	73.90	SELL	68.02 ✓
August	32.24	61.90	SELL	47.97 ✓

	2024 DA OPA	CME 2025 DA OPA	WoodMac Rec.	Actual 2025 DA OPA
June	40.50	50.35	SELL	53.48 ✗
July	43.95	74.40	SELL	71.06 ✓
August	37.63	62.40	SELL	54.03 ✓

Summer prices from CME Group as of 08/24/2025
Summer Actuals as of 08/25/2025

Summer 2025 On-Peak Average RT Hub LMPs

Weak wind alongside energy volatility brought up the Classic hubs, while the South footprint saw aggressive S-N Power Balance all summer.



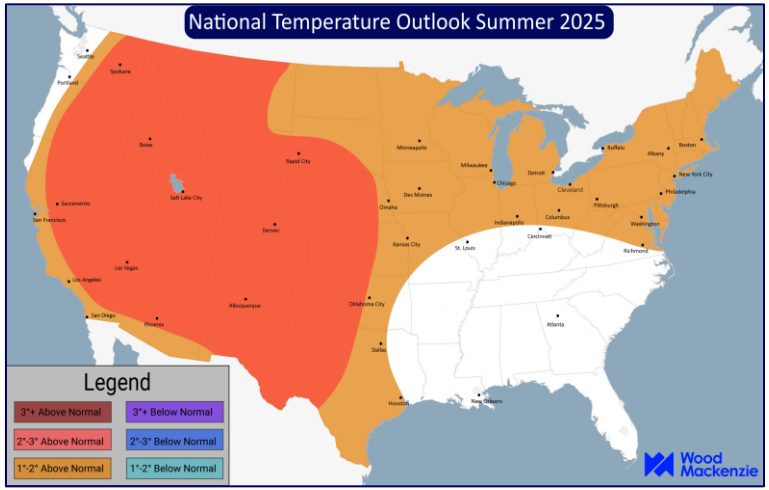
Summer Actuals are as of 08/25/2025

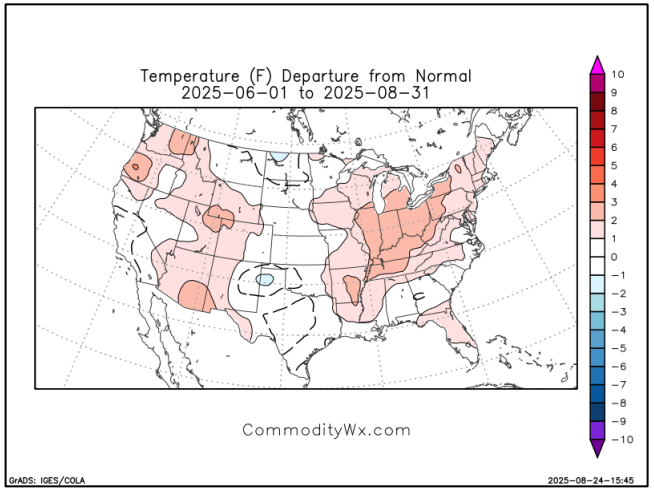
Weather

Wood Mackenzie

Summer 2025 Weather Recap

- Temperature verification was mixed for the summer
    - South verified warmer than forecast across the interior of the region
    - Both Central and North verified warmer than average
        - Pockets of warmer than forecast temperatures developed for portions of Central



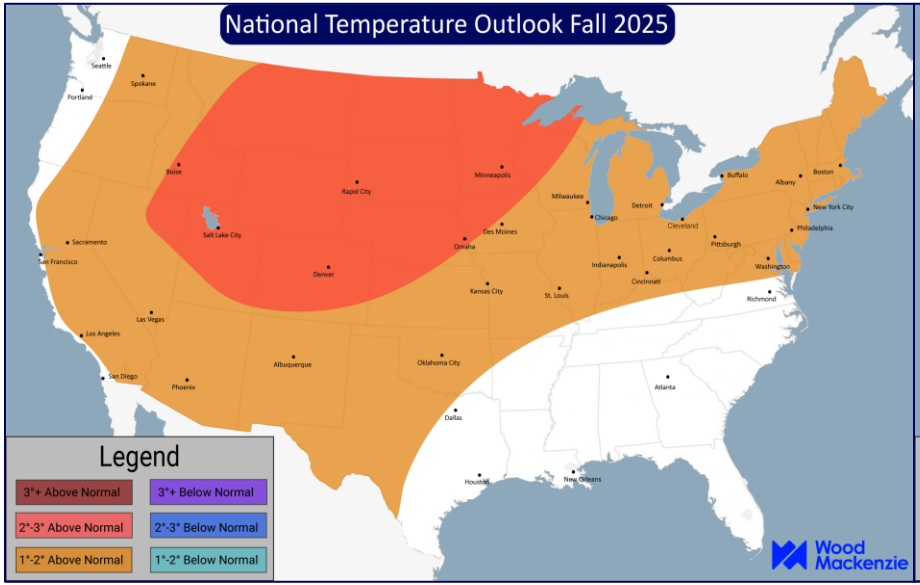


Summer 2025 Demand Recap

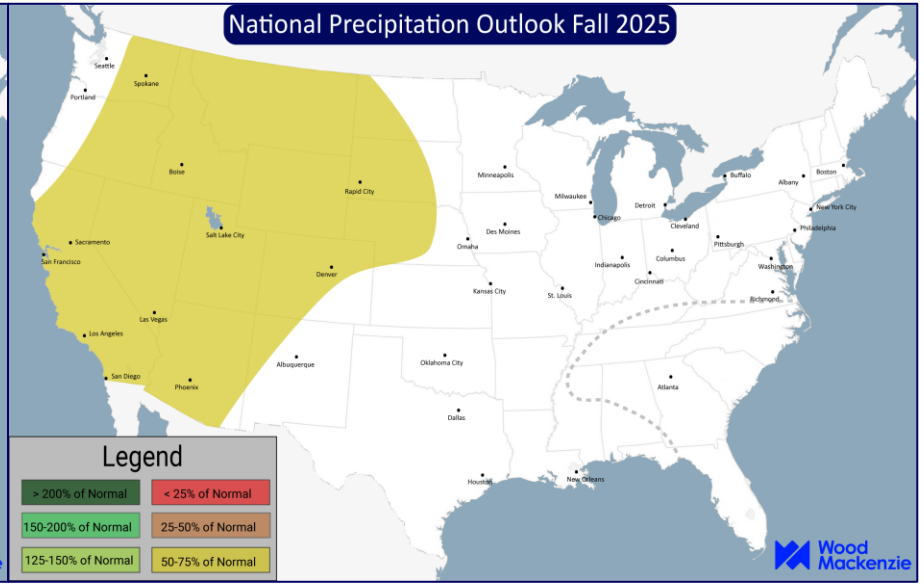
- A strong start to the season drove June demand well above forecast
- Both July and August saw demand verify in line with forecast, with a summer peak developing in July

		June	July	August
2025 Peak Hourly Demand (GW)	Actuals	119.4	120.9	117.8
2025 Peak Hourly Demand (GW)	Forecast	113	**122** ✓	**118** ✓
	Warmer Scenario	**114** ↑↑	123	120
	Cooler Scenario	110	118	117

Fall 2025 Temperature Outlook

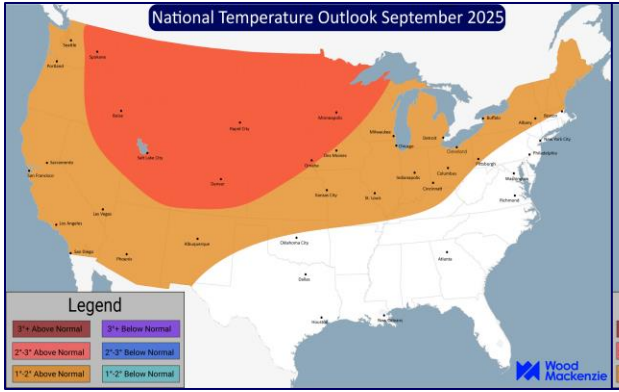


SLIGHT BULLISH WITH RESPECT TO DEMAND

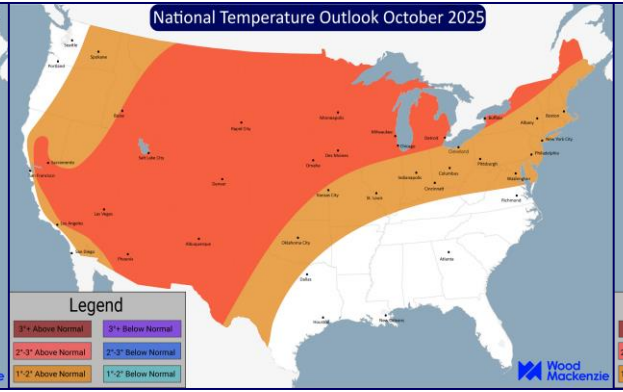


NEUTRAL WITH RESPECT TO DEMAND

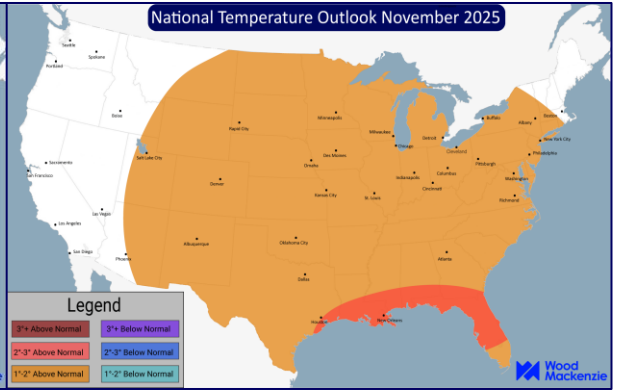
Monthly Temperature Outlook



BULLISH WITH RESPECT TO DEMAND



SLIGHT BULLISH WITH RESPECT TO DEMAND



BEARISH WITH RESPECT TO DEMAND

Fall 2025 Demand Forecast

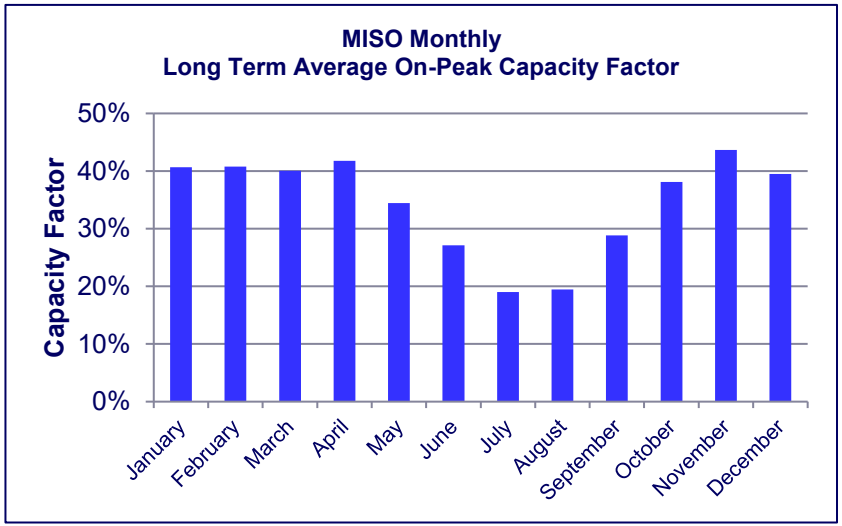
		September	October	November
2024 Peak Hourly Demand (GW)	Actuals	105.3	83.5	80.5
2025 Peak Hourly Demand (GW)	Current Forecast	106	83	81
	Warmer Scenario	108	84	80
	Cooler Scenario	102	81	84

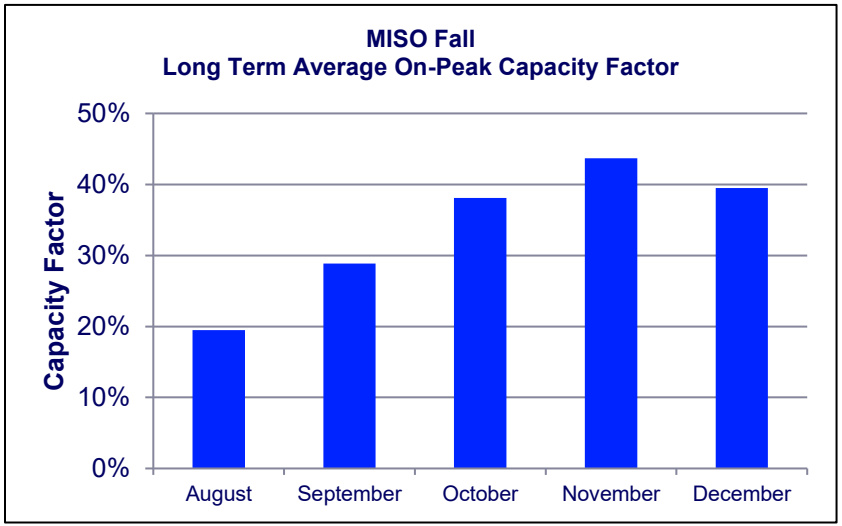
Fall 2025 Weather and Demand Outlook

- The forecast for the fall brings warmer than average temperatures into the MISO footprint
  - Lingering warmth with associated cooling load risk is focused on the Midwest through September and October
  - South will see the highest forecast uncertainty, with a near average temperature forecast, and potential tropical threats over the first half of the season
  - Warmer than average temperatures during November would potentially delay the onset of heating load season for the Midwest
- Compared to other national forecast vendors, the forecast is similar for the Midwest and cooler for South

Fall 2025 Wind Generation

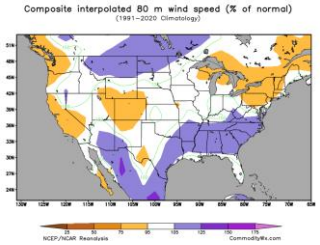
- Wind generation will be rapidly accelerating as the season progresses
- Near average generation is expected for the September to November period
  - Central will see a slight risk for below average generation during October



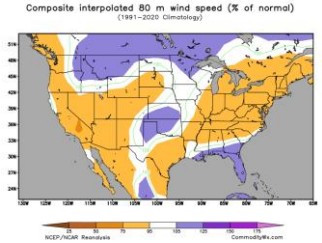


Fall 2025 Wind Outlook

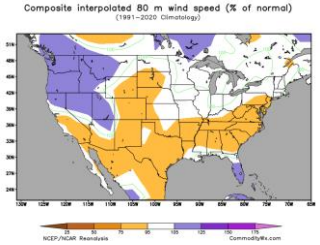
September



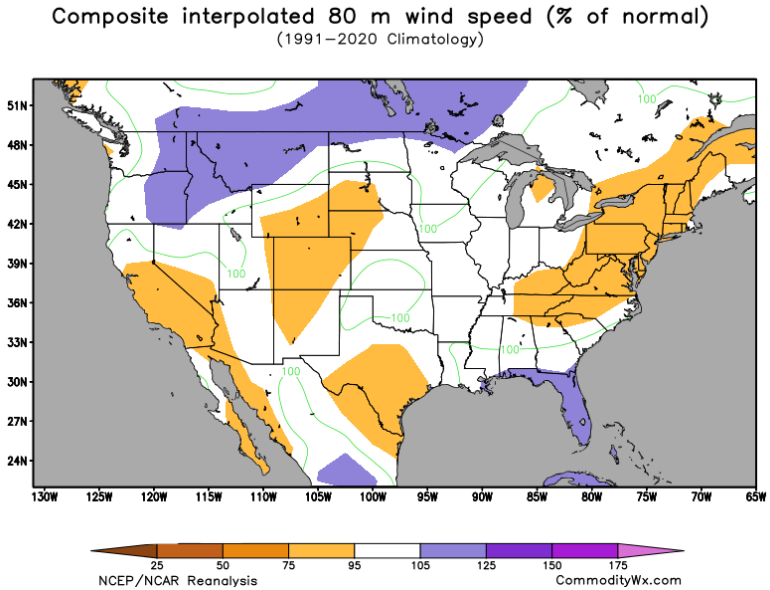
October



November



Full Season



Wood Mackenzie

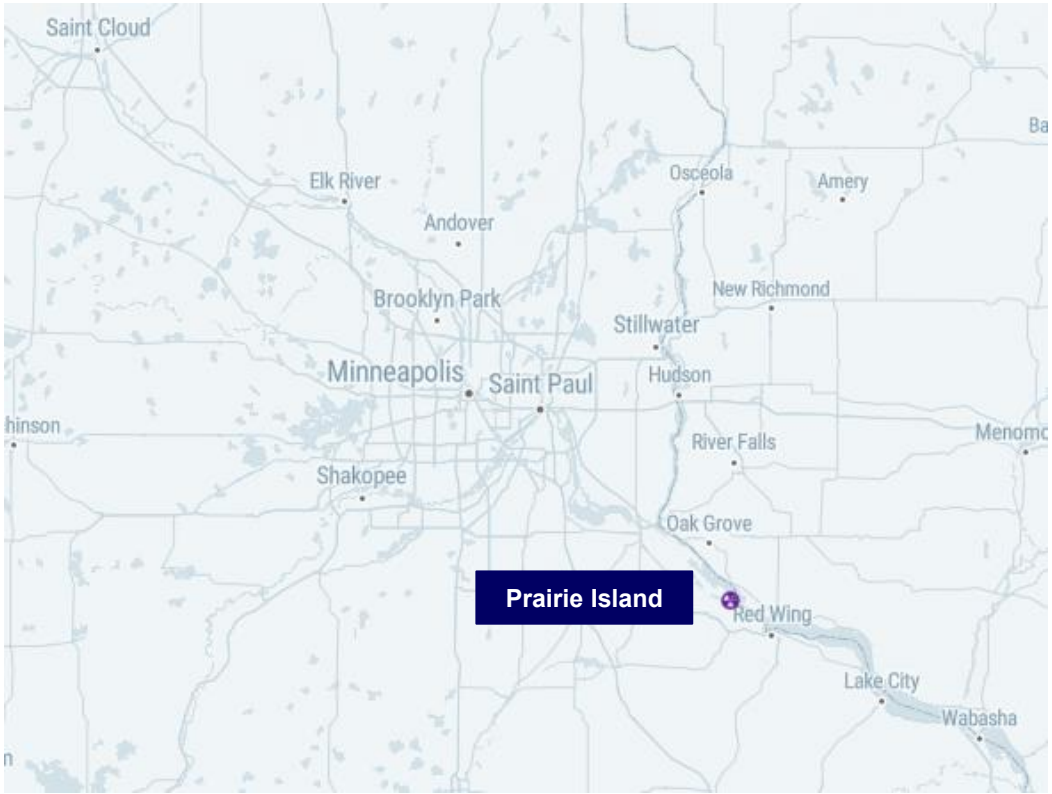
Nuclear Outages

Wood Mackenzie

North Nuclear Outages: Minnesota

Expect an increase in congestion flowing towards Minneapolis

Prairie Island (10-14, estimated 25 days)			
Risk	**Constraint**	**SF%**	**Hub Impacts**
▲	Helena – Sheas Lake 345 kV	19	↑: MINN ↓: Central hubs
	Sheas Lake – Wilmarth 345 kV	18	None
	Red Rock – King 345 kV	17	None
	Adams XF 345/161 kV	17	↓: MINN
▼	Raun – Ft Calhoun 345 kV	7	↑: INDY, South hubs ↓: MINN
	Red Rock – Prairie Island 345 kV	18	None



Central Nuclear Outages: Michigan

Flows out of ComEd will see elevated activity

DC Cook 2 (09-14, estimated 30 days)			
Risk	**Constraint**	**SF%**	**Hub Impacts**
▲	Benton Harbor – Crystal 138 kV	7.38	↑: MICH
	Dune Acres – Michigan City 138 kV	3.54	↑: INDY, MICH ↓: MINN, ILL
	Chicago Avenue – Praxair 138 kV	1.52	↑: MICH
▼	Cook – Olive 345 kV	19.26	↑: MINN, ILL ↓: MICH
	Dumont – Stillwell 345 kV	17.38	↑: MINN, ILL ↓: MICH, INDY
	Allen – Robert P Mone 345 kV	5.8	↓: INDY

Wood Mackenzie

South Nuclear Outages: Arkansas

Days of wind strength in Oklahoma will bring in bullish activity at ARK hub

ANO 2 (10/11, estimated 30 days)			
Risk	**Constraint**	**SF%**	**Hub Impacts**
▲	Ft. Smith XF 500/345 kV	11.84	↑: South hubs ↓: MINN
	Ft. Smith XF 345/161 kV	10.21	↑: South hubs ↓: MINN
	ANO XF 500/161 kV	57.12	↑: ARK, MS
▼	ANO – Mablevale 500 kV	33.5	↑: ARK
	Ft. Smith XF 500/161 kV	12.22	↑: Central hubs ↓: ARK, TEX, LOU

Potential Nuclear Outages

Fermi 2 (10/20, estimated 40 days)			
Risk	**Constraint**	**SF%**	**Hub Impacts**
▲	Monroe – Brownstown 345 kV	20	↑: MICH ↓: MINN, ILL, INDY
▼	Monroe – Lallendorf 345 kV	33	↑: All Other Hubs ↓: MICH

Clinton (09/18, estimated 30 days)			
Risk	**Constraint**	**SF%**	**Hub Impacts**
▲	Marblehead XF 161/138 kV	3	↑: ILL, INDY ↓: MINN
▼	Maroa – Goose Creek 345 kV	28	↑: MICH, INDY ↓: MINN, ILL

Grand Gulf (09/09, estimated 35 days)			
Risk	**Constraint**	**SF%**	**Hub Impacts**
▲	Perryville – Baxter Wilson 500 kV	30.2	↑: LOU, TEX
▼	Franklin XF 500/115 kV	18.8	None

New Generators Entering Service

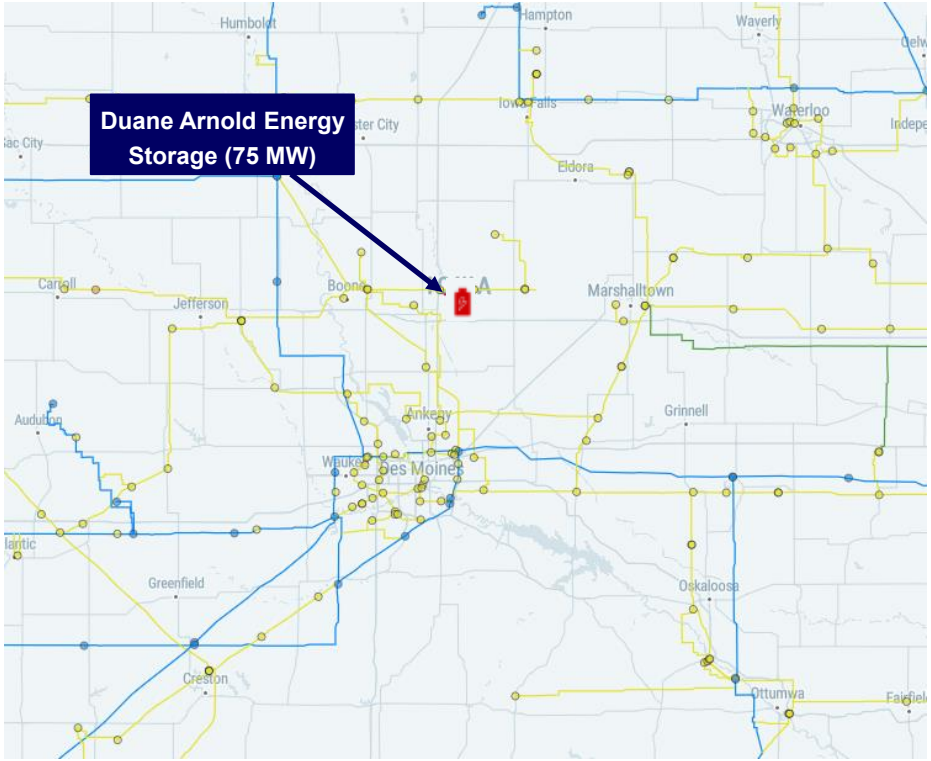
Wood Mackenzie

Iowa Additions

Duane Arnold Energy Storage

- The battery unit will tie into the existing Arnold substation which housed the retired Arnold nuclear unit, which currently houses a 200 MW solar unit
- The addition of this unit will aid congestion activity on days of strong wind in Iowa while on days of weak wind will help alleviate activity

Duane Arnold Energy Storage (Est: 09/2025)			
Risk	**Constraint**	**SF%**	**Hub Impacts**
▲	Laurel – Jasper 161 kV	5.79	None
	Prairie Creek – Marshalltown 161 kV	5.23	None
	Irvine – Beacon 161 kV	4.02	↑: ILL ↓: MINN
▼	Abbott – Traer 161 kV	14.2	None
	Quad Cities – Rock Creek 345 kV	11.93	↑: ILL, INDY, MICH ↓: MINN
	Quad Cities –Sub 91 345 kV	7.76	↑: ILL ↓: MINN



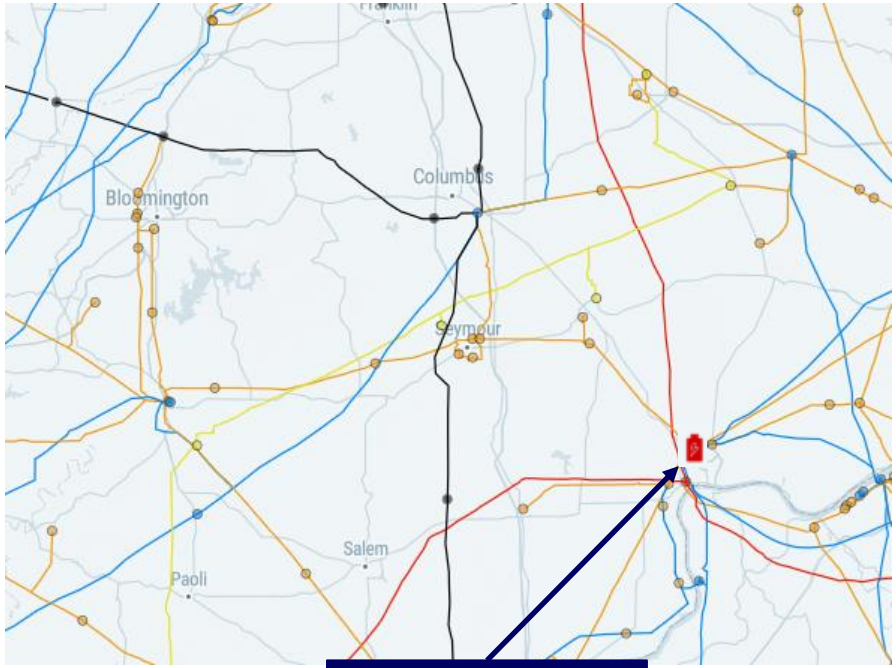
*Note: The analysis is done considering the battery unit is dispatching power into the grid

Indiana Additions

Williams Power Energy Storage

- The new battery unit will tie into the existing Decatur County – Napoleon 161 kV line is southern Indiana
- The unit will sit on the source for W-E flow congestion activity between Indiana and Ohio and will be a sink for N-S flow congestion into southern Indiana

Williams Power Energy Storage (Est: 11/2025)			
Risk	**Constraint**	**SF%**	**Hub Impacts**
▲	Batesville – Hubble 138 kV	22.06	↑: INDY ↓: MINN, ILL
▲	Tanners Creek – Miami Fort 345 kV	3.97	None
▲	Five Points – Brandywine 138 kV	2.67	↑: INDY
▼	Ratts – Apollo 161 kV	5.47	None
▼	Kokomo – Tipton 230 kV	3.06	↓: INDY



*Note: The analysis is done considering the battery unit is dispatching power into the grid

Indiana Additions

Heirloom Solar

- In southern Indiana, a 60 MW solar farm is built in Pike, Indiana, tying into Jefferson – Rockport 765 kV line, and is planned to come online in September
- The addition will slightly heighten E-W flows from Wisconsin/MISO Central into MISO North on weak wind days in the North footprint. However, W-E flows towards Indiana will be weakened by the unit.

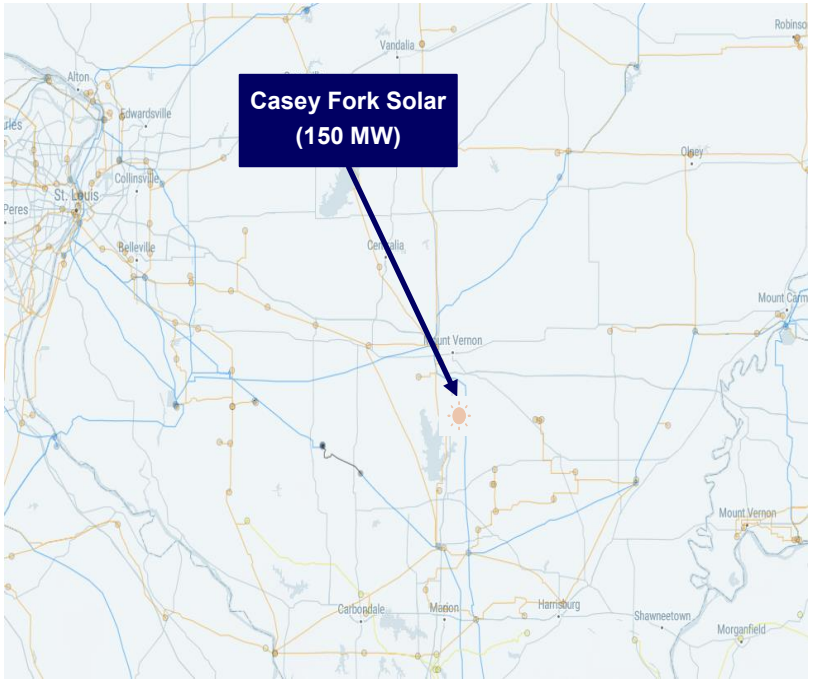
Heirloom Solar (Est: 09.2025)			
Risk	**Constraint**	**SF%**	**Hub Impacts**
▲	Quad City - Rock Creek 345 kV	2.11	↑: MINN ↓: MICH, INDY, ILL
	Werner West - N Appleton 345kV	2.06	None
▼	Bunsonville - Eugene 345 kV	5.15	↑: INDY, MICH, South hubs ↓: ILL, MINN
	Stillwell - Dumont 345 kV	3.35	↑: MICH, INDY, South hubs ↓: ILL, MINN

Illinois Additions

Casey Fork Solar

- In southern Illinois, a 150 MW of solar farm is planned to be released in November in Jefferson county, connecting into the West Mt Vernon - Xenia 345kV line
- The addition will add risks for W-E flows across Illinois and Indiana especially on days of demand strength Indiana while decreasing W-E flows into St. Louis

Casey Fork Solar (Est: 11/2025)			
Risk	**Constraint**	**SF%**	**Hub Impacts**
▲	Bunsonville - Eugene 345 kV	6.76	↑: INDY, MICH, South hubs ↓: ILL, MINN
▲	Sugar Creek - Dresser 345 kV	4.14	↑: INDY
▼	Sioux - Roxford 345 kV	9.05	None
▼	Labadie - Gray Summit 345 kV	4.86	↑: INDY ↓: MINN
▼	Montgomery - Spencer Creek 345 kV	4.4	None



Wood Mackenzie

Additional Generation Likely to Come Online in Fall 2025

- Over 1.3 GW of delayed additions are likely to come online and have been included in previous outlooks

Plant	Capacity (MW)	State	Increased Congestion	Decreased Congestion
Magnolia Power	708.2	LA	Willow Glen XF 550/230 kV	Angie – Marion 230 kV
A.B. Brown Units 6	248.3	IN	A.B. Brown – A.B. Brown 138 kV	Gibson – Francisco 345 kV
Ratts 1 Solar	150	INDY	Petersburg – Cato Tap 138 kV	Ratts – Apollo 138 kV
Flat Fork Solar	200	ARK	Brinkley E. – Lee 115 kV	Brinkley E. – Palestine 161 kV

MISO Regional Outlooks

Wood Mackenzie

Fall 2024 Top 10 RT Constraints

Constraint Name	Shadow Price	Hub Impacts	Region	Driver	Timing	Fall 2025 Risk
Pleasant Lake - Leeds 115 kV	$(2,087,099)	None	North	Strong demand around the east of Devils Lake Strong wind generation in northcentral North Dakota (Rugby, Borders Wind, New Frontier)	All season	Low
Forman – Forman 115 kV	$(1,374,730)	None	North	Ellendale - Ellendale 230 kV outage Strong wind at Foxtail and Tatanka wind farms Strong eastern North Dakota and Minnesota load	All season	High
Prest – Tibbs 138 kV	$(1,357,306)	↓: ILL	Central	W Frankfort E - Mt. Vernon W 345 kV outage Generation strength at Pinckneyville and Central wind strength Generation weakness at Grand Tower	All season	High
Sheffield – Amoco 138 kV	$(1,333,306)	↓: ILL, MINN	Central	Multiple Line Outages Strong wind in MISO North Strong load in ComEd and northern Indiana driving W-E flows	November	Medium
Raun – Tekamah 161 kV	$(1,330,688)	↑: South hubs ↓: MINN	North	Multiple Line Outages Wind and demand imbalance between Nebraska and Kansas Generation weakness at Walter Scott and Nebraska City Omaha demand strength	All season	High
Granite Falls – Blair 230 kV	$(864,122)	↑: MINN	North	Multiple Line Outages West-east flow from SPP northern Plains towards Minnesota, driven by strong northern SPP wind production	September	Medium
Oahe – Sully Buttes 230 kV	$(755,371)	↑: MINN	North	S-N wind imbalance between North Dakota and South Dakota Strong demand in the Dakotas Cold North Dakota temps, and weak gen at Coal Creek	All season	Medium
Wilmarth – Swan Lake 115 kV	$(709,456)	↑: MINN	North	Wilmarth – Mankatec 345 kV outage Strong wind generation in southern Minnesota Generation strength at Wilmarth	All season	High
Brookings – Aurora 115 kV	$(701,360)	↓: MINN	North	Weak NW Iowa wind Demand gradient between Dakotas/MN and Omaha/Kansas City Suspected generation imbalance between Deer Creek/Groton and Angus Anson	September	Low
Mauer Lake – Carrolton 161 kV	$(665,886)	↓: MINN	North	Strong wind generation in Minnesota and Iowa Generation weakness in eastern Missouri and western Illinois Weak Kansas City load and SPP wind strength	All season	Medium

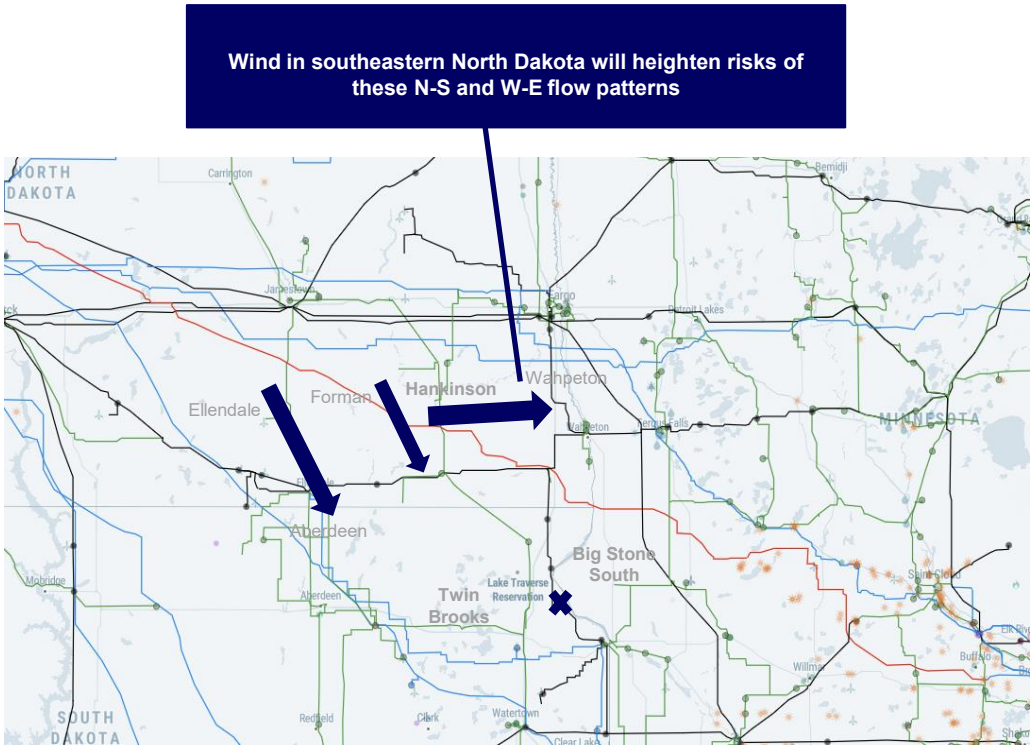
North

North Dakota Congestion

- The Twin Brooks – Big Stone South outage will span a few days in the middle of October, also increasing risks over Hankinson – Wahpeton in addition to two other wind-driven constraints

Congestion Risk	Hub Impacts
Ellendale – Aberdeen 115 kV	↓ MINN
Forman – Forman 115 kV	None
Hankinson – Wahpeton 230 kV	↑ MINN

Equipment Outages		
Twin Brooks – Big Stone South 345 kV	10-13	10-17



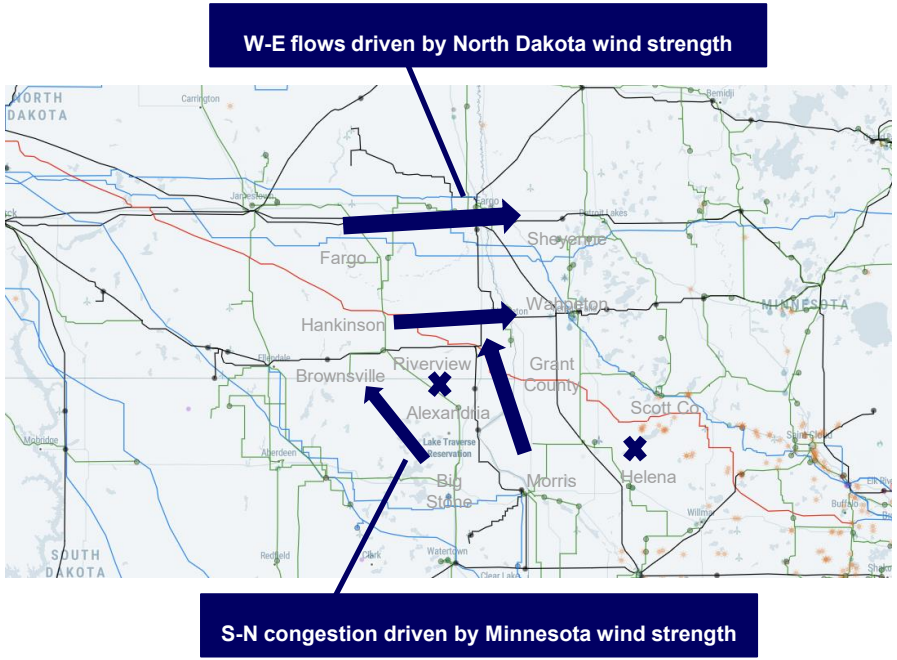
Wood Mackenzie

North Dakota - Minnesota Congestion

- The Riverview – MRES Alexandria outage will start at the beginning of September and persist through the fall, heightening risks over several wind-driven flows
- Helena – Scott County will also increase risks over several wind-driven flows in the North footprint during the second half of September

Congestion Risk	Hub Impacts
Big Stone – Brownsville 230 kV	⬆ MINN
Fargo – Sheyenne 345 kV	⬆ MINN
Hankinson – Wahpeton 230 kV	⬆ MINN
Morris – Grant County 115 kV	⬆ MINN

Equipment Outages		
Riverview – MRES Alexandria 345 kV	09-03	03-06
Helena – Scott County 345 kV	09-15	09-26



Wood Mackenzie

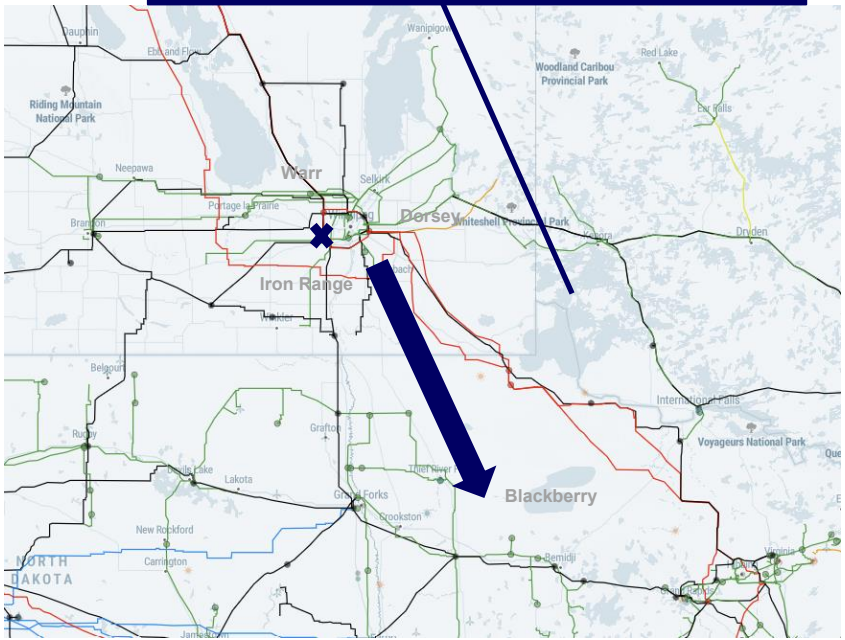
Manitoba – Minnesota Congestion

- Iron Range – Blackberry, a N-S flows from Manitoba into Minnesota will see heightened risks from two 500 kV line outages that will each span several days during different parts of the season

Congestion Risk	Hub Impacts
Iron Range – Blackberry 230 kV	None

Equipment Outages		
Warr – Dorsey 500 kV	09-13	09-19
Roseau County – Riel 500 kV	10-25	11-01

Strong imports from Manitoba driving N-S flows into Minnesota



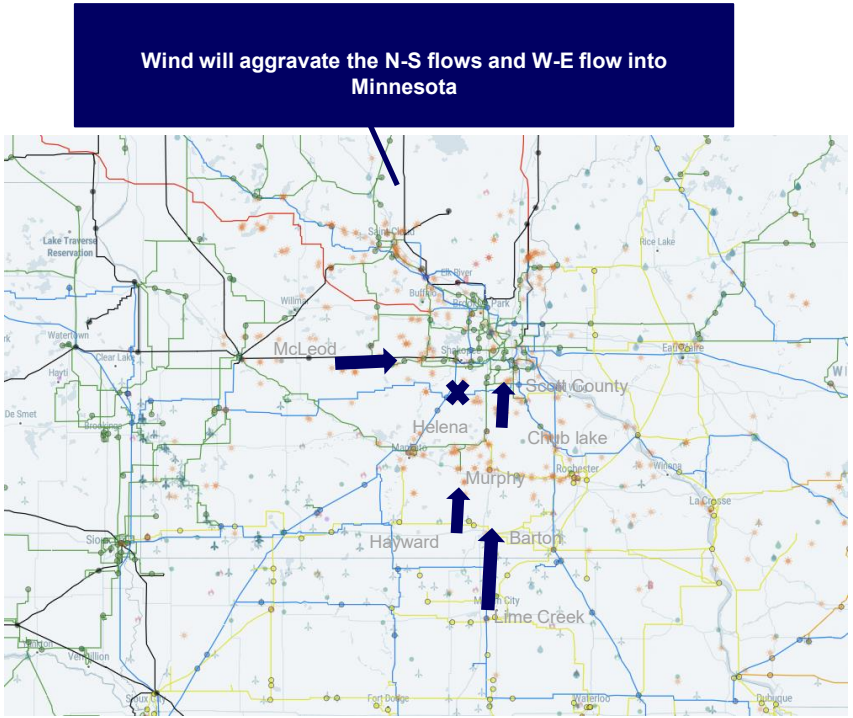
Wood Mackenzie

Minnesota – Iowa Congestion

- Four systemic, wind-driven constraints near the in northern Iowa and southern Minnesota border will see heightened flows from the Helena – Scott County outage in the second half of September

Congestion Risk	Hub Impacts
Chub Lake XF 345/115 kV	⬆ MINN
Lime Creek – Barton 161 kV	⬆ MINN
McLeod XF 230/115 kV	⬆ MINN
Murphy Creek – Hayward 161 kV	⬆ MINN

Equipment Outages		
Helena – Scott County 345 kV	09-15	09-26



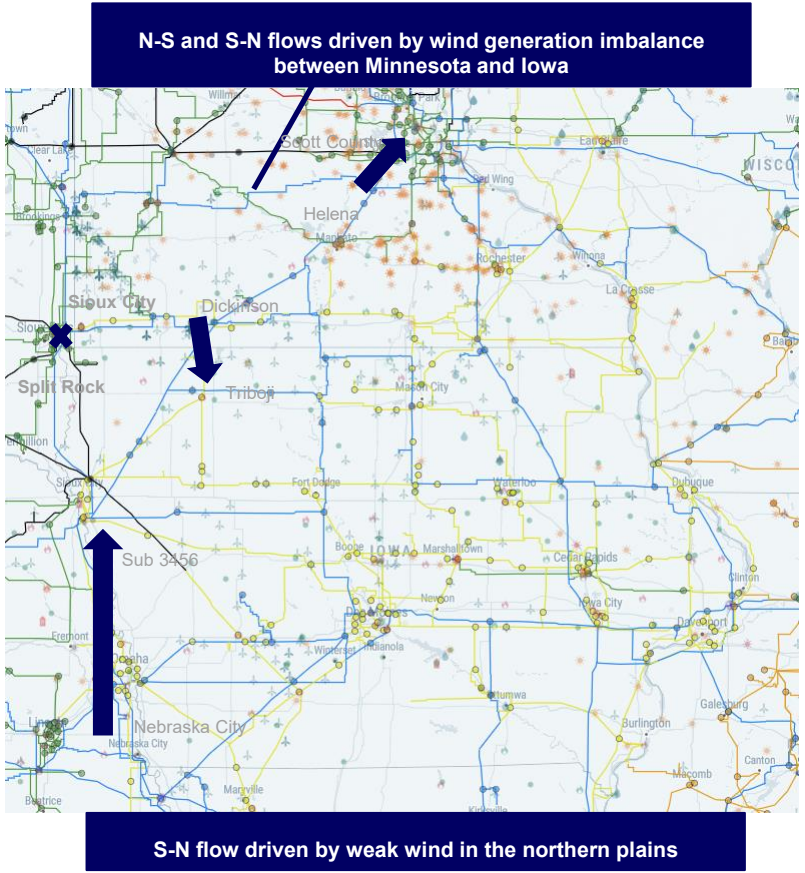
Wood Mackenzie

Minnesota – Iowa – Nebraska Congestion

- The Split Rock – Sioux City outage will span 11 days in the middle of November, increasing flows over wind-driven constraints in Minnesota, Iowa, and Nebraska

Congestion Risk	Hub Impacts
Dicksinon – Triboji 161 kV	↓ MINN
Helena – Scott County 345 kV	↑ MINN
Nebraska City – Sub 3456 kV	↑ MINN

Equipment Outages		
Split Rock – Sioux City 345 kV	11-10	11-21



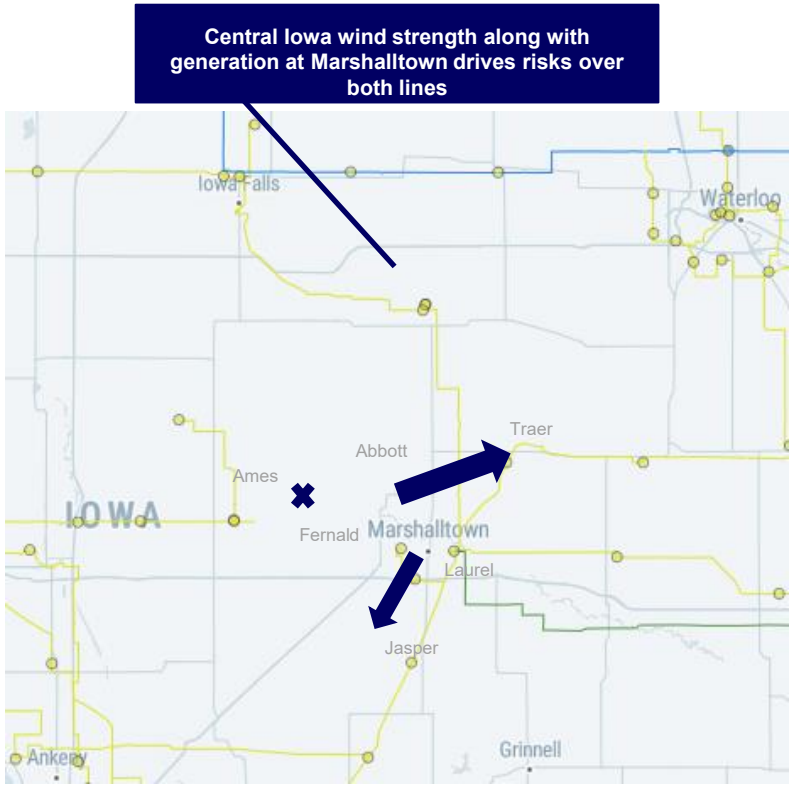
Wood Mackenzie

Iowa Congestion

- Fernald – Ames will be out for a week in the beginning of September and again in late September and early October, heightening risks over wind-driven flows in central Iowa

Congestion Risk	Hub Impacts
Abbot – Traer 161 kV	None
Laurel – Jasper 161 kV	None

Equipment Outages		
Fernald – Ames 161 kV	09-02 09-22	09-09 10-24



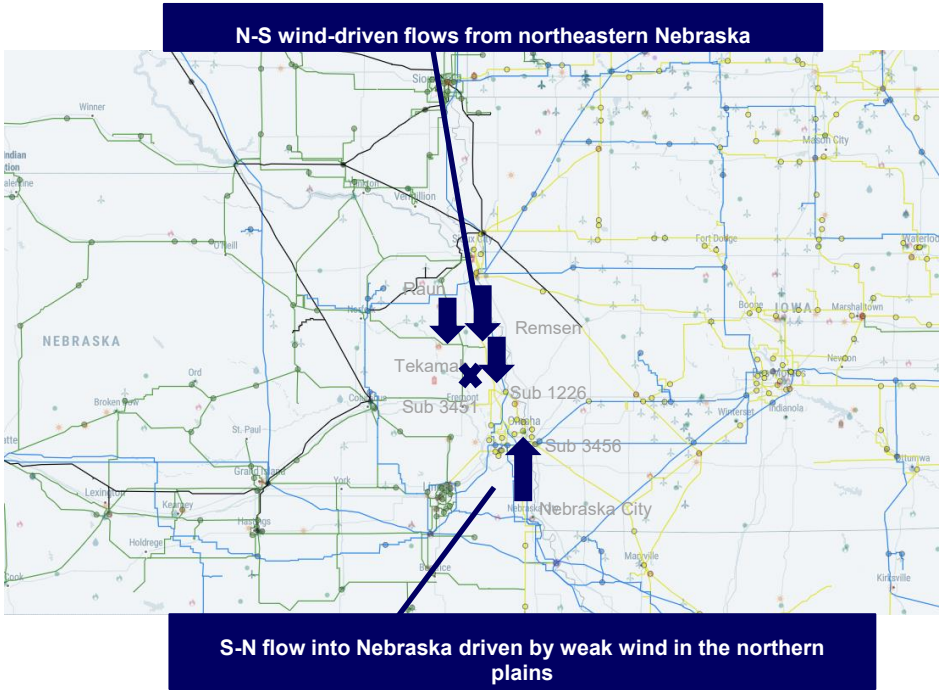
Wood Mackenzie

Nebraska Congestion

- The Raun – Sub 3451 outage will start in mid-September and span over a month and a half, increasing S-N flows over Nebraska City – Sub 3456 and N-S flows around the Raun and Tekamah substations

Congestion Risk	Hub Impacts
Nebraska City – Sub 3456 kV	↑ MINN
Raun – Tekamah 161 kV	↓ MINN
Raun – Remsen 345 kV	↓ MINN
Tekamah – Sub 1226 161 kV	↓ MINN

Equipment Outages		
Raun – Sub 3451 345 kV	09-15	11-07



Wood Mackenzie

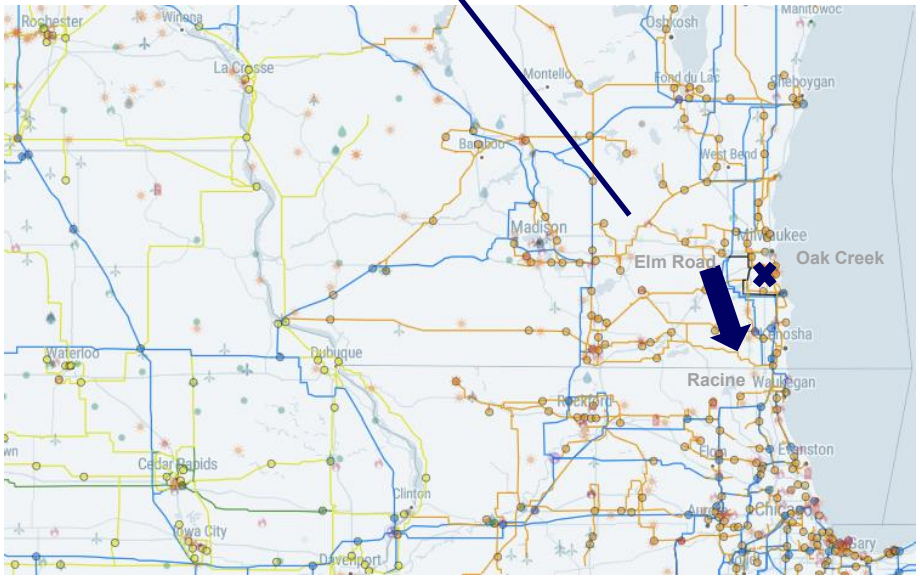
Wisconsin Congestion

- A two-week outage at the Oak Creek Transformer will increase risks over Elm Road – Racine in the end of October and beginning of November
- Look for risks over the line when there is a N-S generation imbalance between Wisconsin and Illinois, with generation strength at Oak Creek

Congestion Risk	Hub Impacts
Elm Road – Racine 345 kV	↕ Central, South hubs MINN

Equipment Outages		
Oak Creek XF 345/138 kV	10-24	11-07

Driven by strong generation at Oak Creek and a general N-S generation imbalance between Wisconsin and Illinois



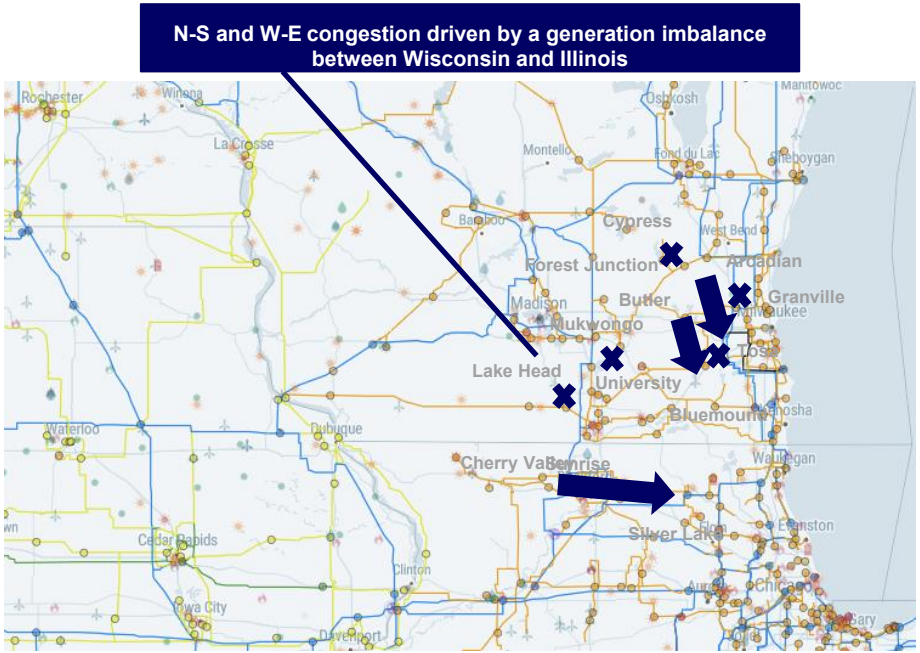
Wood Mackenzie

Wisconsin – Illinois Congestion

- Cherry Valley – Silver Lake will see risks throughout much of the fall due to several outages, with Arcadian – Granville also increasing flows over both Bluemond – Butler and Granville - Tosa

Congestion Risk	Hub Impacts
Bluemond – Butler 138 kV	↑ Central hubs ↓ MINN
Cherry Valley – Silver Lake 345 kV	↑ Central hubs ↓ MINN
Granville – Tosa 138 kV	↑ Central, South hubs ↓ MINN

Equipment Outages		
Sunrise – Lake Head 138 kV	09-02	09-14
Cypress – Forest Junction 345 kV	09-22	10-03
Mukwongo – University 138 kV	09-22	10-31
Racine – Elm Road	09-25	10-05
Arcadian – Granville 345 kV	11-03	11-21



Wood Mackenzie

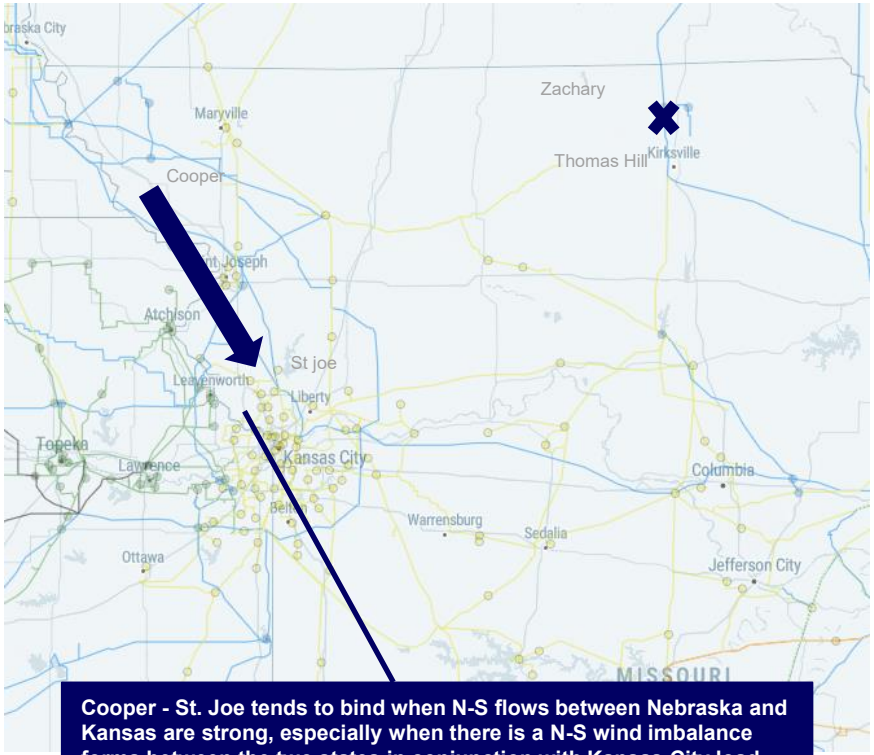
Central

Missouri Congestion (1/3)

- Zachary – Hughes 345 kV will go on outage from mid-September, bumping up flows through Cooper – St. Joe for a month
- Adair – Thomas Hill 161 kV will aggravate risks over Cooper – St. Joe, a week after the disconnection of Zachary – Hughes 345 kV line

Congestion Risk	Hub Impacts
Cooper – St. Joe 345 kV	↑ INDY, South hubs ↓ MINN

Equipment Outages		
Zachary – Hughes 345 kV	09-15	10-16
Adair - Thomas Hill 161 kV	09-23	10-03



Cooper - St. Joe tends to bind when N-S flows between Nebraska and Kansas are strong, especially when there is a N-S wind imbalance forms between the two states in conjunction with Kansas City load strength

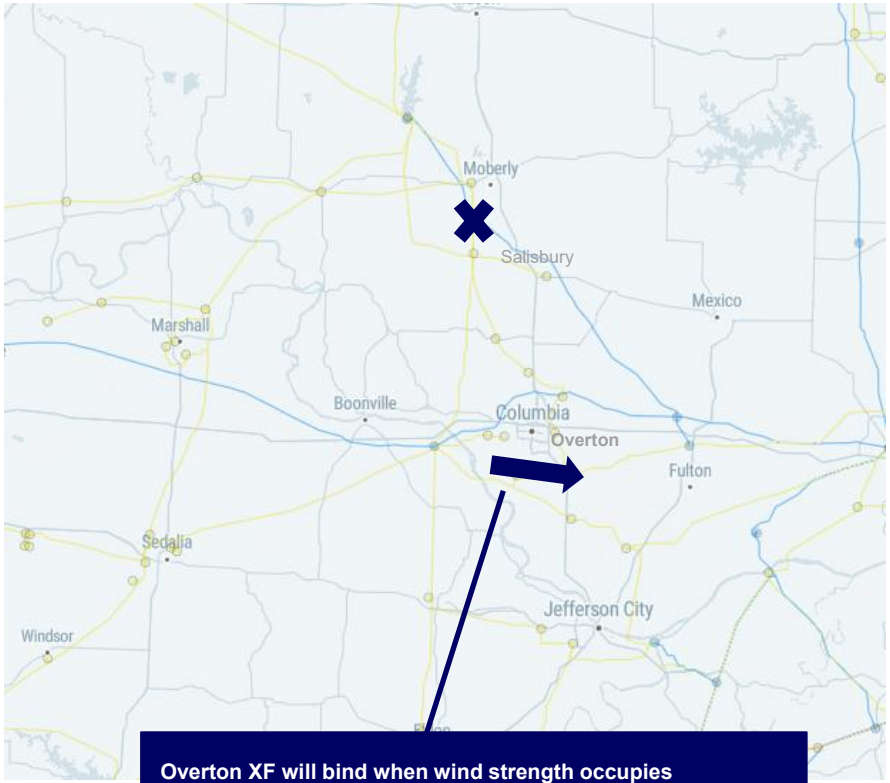
Wood Mackenzie

Missouri Congestion (2/3)

- Moberly – Salisbury 161 kV is scheduled to go out in late September, adding additional flows at Overton XF till late October

Congestion Risk	Hub Impacts
Overton XF 345/161 kV	↑ Central hubs ↓ MINN,ARK

Equipment Outages		
Moberly – Salisbury 161 kV	09-29	10-24



Overton XF will bind when wind strength occupies southwestern Iowa and northwestern Missouri. St. Louis demand strength will exacerbate W-E risks at the transformer

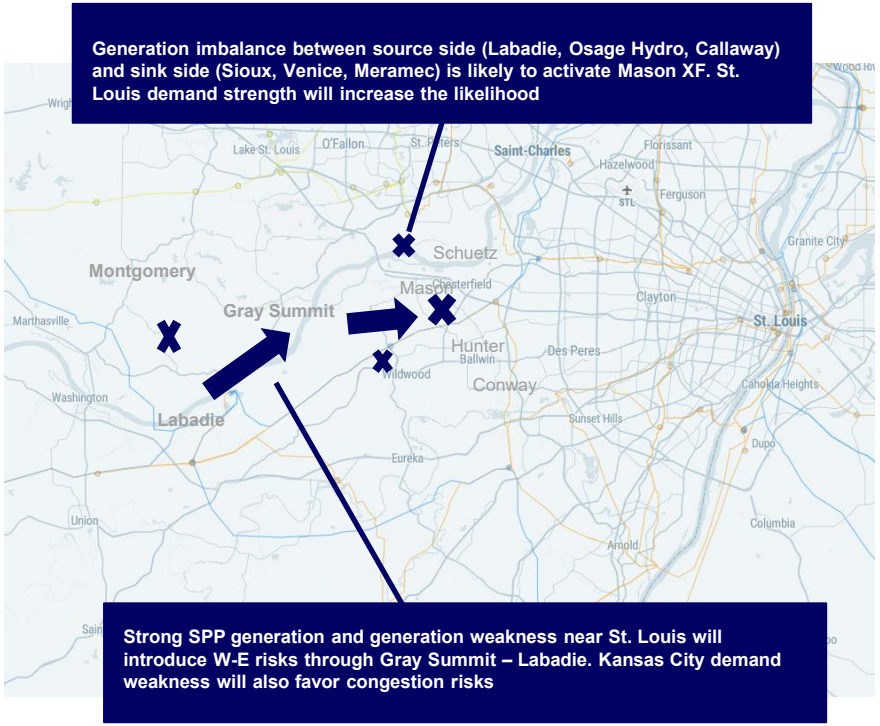
Wood Mackenzie

Missouri Congestion (3/3)

Congestion Risk	Hub Impacts
Labadie - Gray Summit 345 kV	INDY MINN
Mason XF 345/138 kV	None

Equipment Outages		
Wildwood Tap – Labadie 345 kV	09-29	12-02
Labadie – Montgomery 345 kV	09-03	10-15
Mason – Barett Tap 345 kV	09-08	09-30
Conway Tap – Mason 138 kV	09-18	09-30
Conway Tap – Mason 138 kV (Parallel line)	09-19	10-01
Hunter – Mason Tap 138 kV	09-10 11-24	09-29 12-02
Barett Tap – Mason 138 kV	09-10 11-24	09-29 12-02
Mason – Schuetz 138 kV	09-10 11-24	09-29 12-02
Mason XF 345/138 kV	09-10 11-24	09-29 12-02
Wildwood XF 345/138 kV	11-24	12-02
Wildwood Tap – Mason 345 kV	11-24	12-02

- Wildwood – Labadie 345 kV outage will start in late September, significantly increasing risks through Gray Summit – Labadie while another outage at Labadie – Montogomery 345 kV will counteract impacts till mid-October. An outage set near the Mason substation will extend risks at the constraint till December
- Mason XF will see elevated risks from the second week of September till the first day of October driven by outages between Barett Tap – Mason 345 kV, Conway Tap – Mason 138 kV and a set near the Mason substation



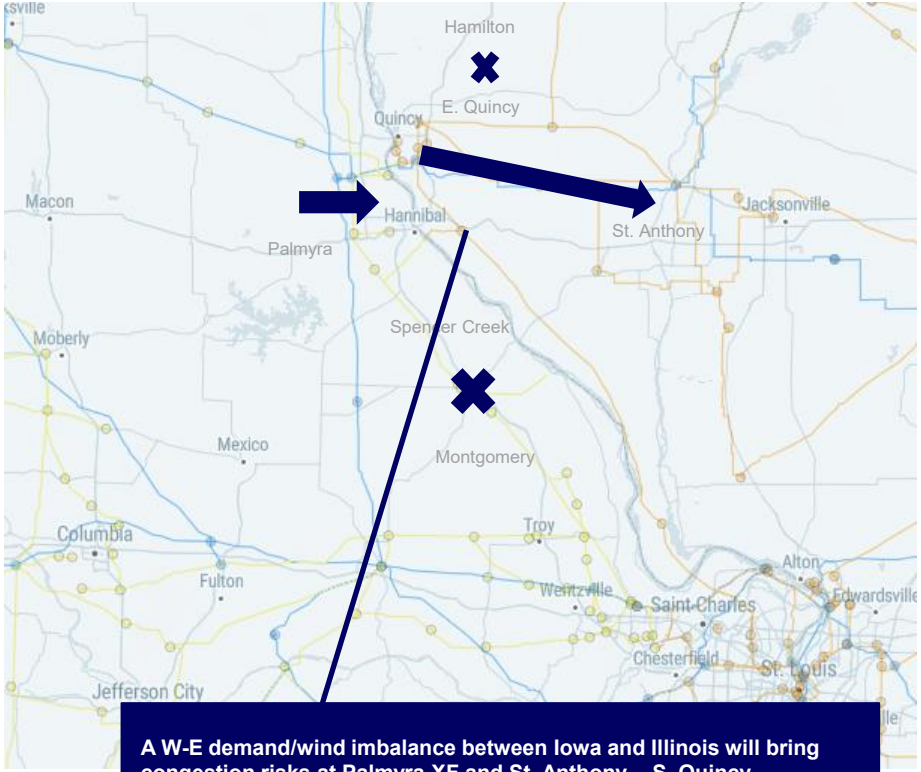
Wood Mackenzie

Illinois Congestion (1/2)

- Montgomery – Spencer Creek 345 kV is scheduled to go out in September for two weeks, doubling flows through Palmyra XF
- A set of outages near the E. Quincy substation will pose risks at St. Anthony – S. Quincy 138 kV in October

Congestion Risk	Hub Impacts
St. Anthony - S. Quincy 138 kV	↕ Central hubs MINN
Palmyra XF 345/161 kV	↕ ILL, INDY MINN

Equipment Outages		
E. Quincy – Hamilton 138 kV	10-06	10-17
E. Quincy – E. Quincy 138 kV	10-06	10-17
Montgomery – Spencer Creek 345 kV	09-10	09-24



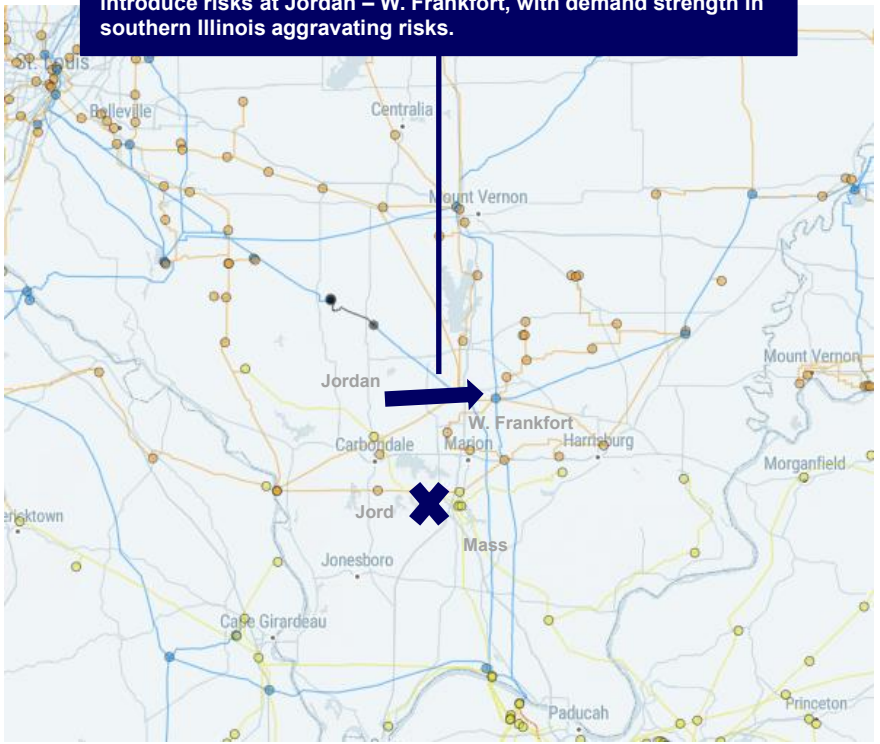
Wood Mackenzie

Illinois Congestion (2/2)

- Two outages near the Mass substation will go offline in separate from late September till mid-October, adding risks through Jordan – W. Frankfort

Congestion Risk	Hub Impacts
Jordan - W. Frankfort 138 kV	⬆ MICH,INDY ⬇ MINN, ILL

Equipment Outages		
Jord – Mass 345 kV	09-29	10-02
Joppa – Mass 345 kV	10-03	10-15



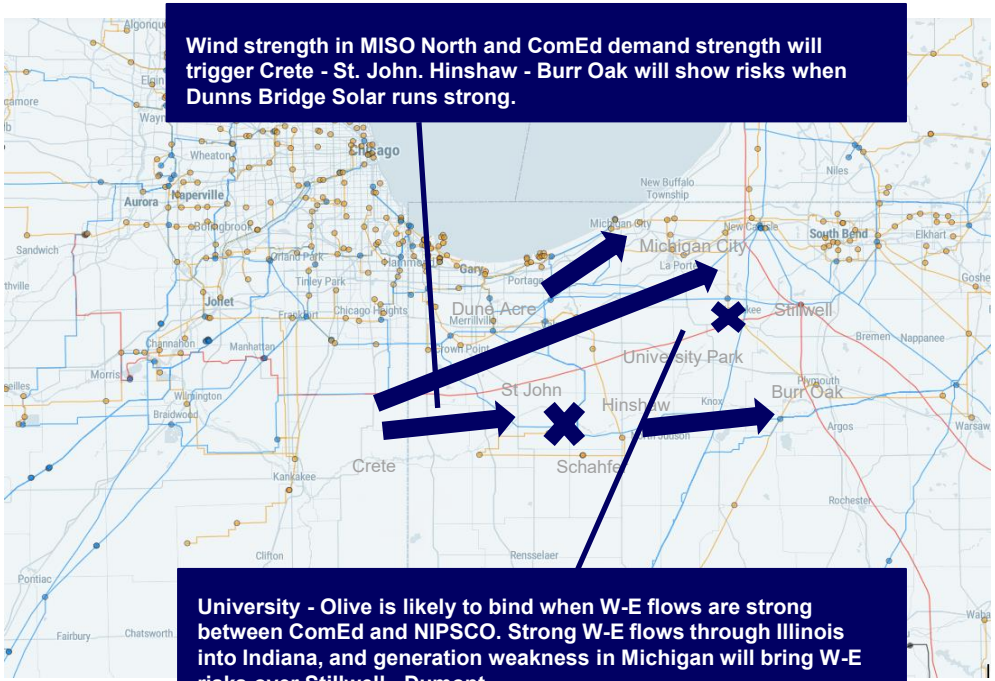
Wood Mackenzie

Illinois – Indiana Congestion

- Schaffer - St. John 345 kV will be offline till late September, driving risks at multiple market-to-market constraints between MISO and PJM, especially through Crete - St. John and Hinshaw - Burr Oak. However, Crete – St. John will go out mid-September eliminating risks at the constraint
- Both outages near the St. John substation will increase Olive – University Park risks in September and November
- Stillwell XF 345/138 kV outage will also facilitate W-E flows over Burr Oak – Hinshaw and Dumont – Stillwell in late October

Congestion Risk	Hub Impacts
University Park - Olive 345 kV	None
Crete - St. John 345 kV	↑ INDY, MICH ↓ MINN ILL
Hinshaw - Burr Oak 345 kV	↑ INDY, MICH, South hubs ↓ MINN, ILL
Stillwell - Dumont 345 kV	↑ MICH, INDY, South hubs ↓ ILL, MINN

Equipment Outages		
Schahfer – St. John 345 kV	09-01	09-26
Crete – St. John 345 kV	09-14 11-20	10-06 04-06 (2026)
Stillwell XF 345/138 kV	10-20 10-27	10-24 10-31



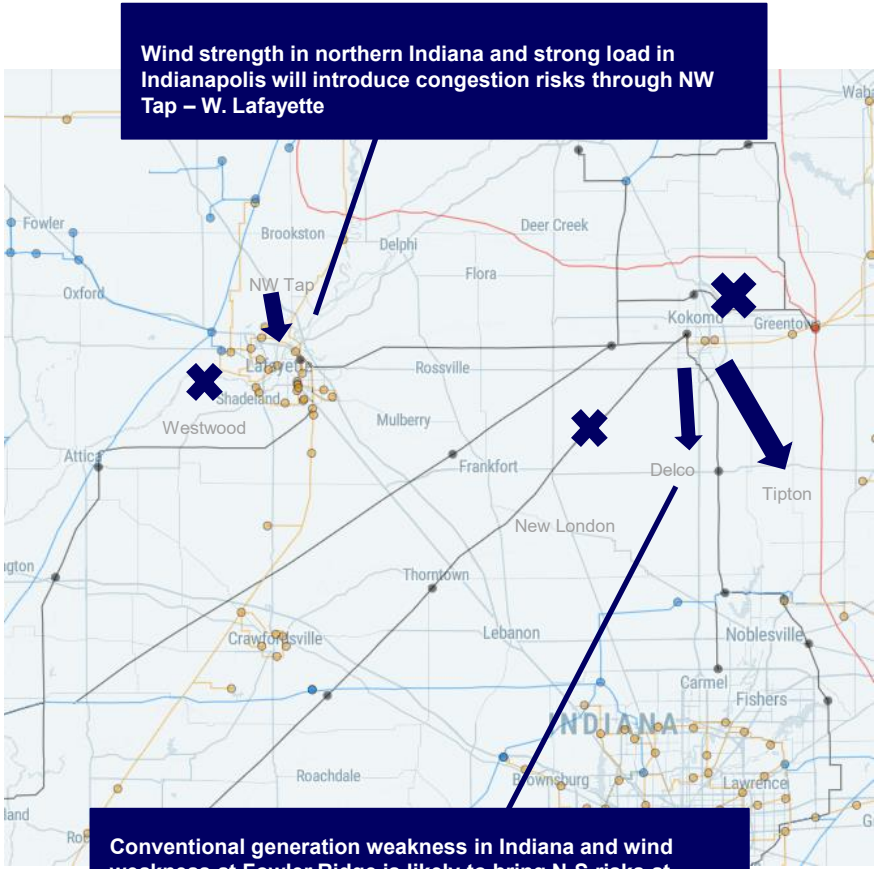
Wood Mackenzie

Indiana Congestion (1/2)

- Westwood – S. Prairie 138 kV outage will aggravate risks at NW Tap – W. Lafayette from August to the first half month of September. New London – Westwood 138 kV outage will extend the constraint risks till mid-October.
- Kokomo XF 230/138 kV outage will add risks to a couple of lines near Kokomo substation

Congestion Risk	Hub Impacts
NW Tap - W. Lafayette 138 kV	↑ INDY ↓ MICH
Kokomo – Delco 138 kV	↑ ILL, INDY ↓ MICH
Kokomo - Tipton 230 kV	↓ INDY,ILL,MINN

Equipment Outages		
Westwood – S. Prairie 138 kV	08-18	09-12
Westwood – New London 138 kV	09-15	10-17
Kokomo XF 230/138 kV	11-03	11-21



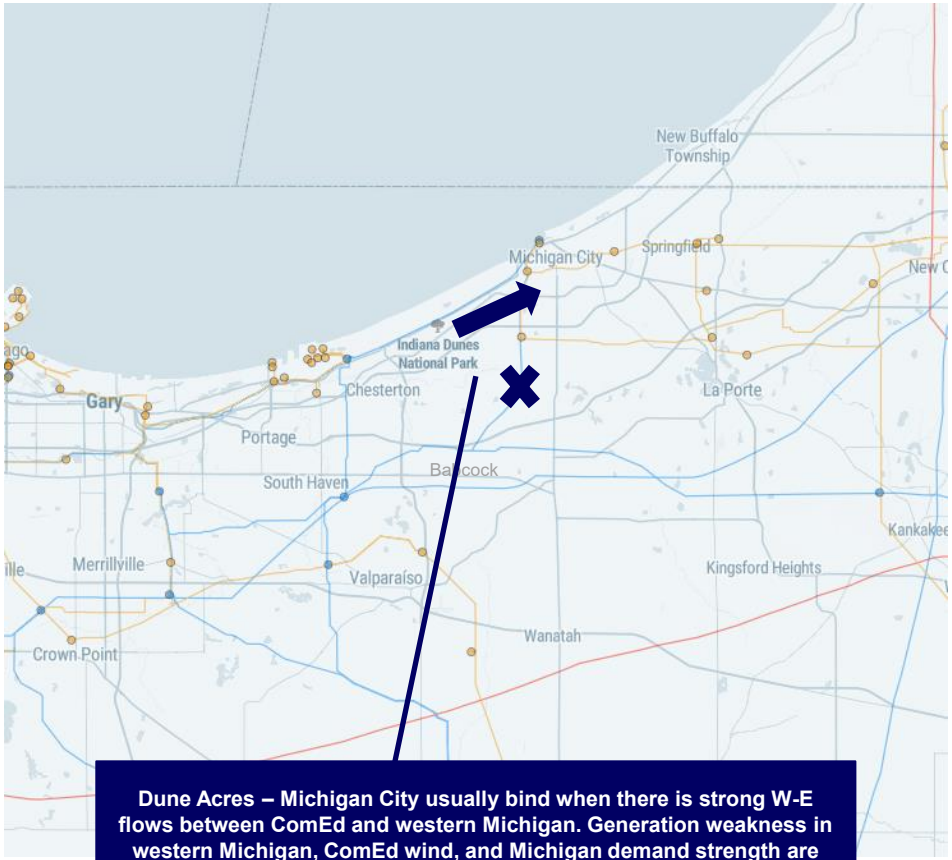
Wood Mackenzie

Indiana Congestion (2/2)

- An outage set near the Babcock substation will increase risks at Dune Acre – Michigan City from mid-September to late October
- The outage at Michigan City – Babcock 345 kV will double flows at the constraint line

Congestion Risk	Hub Impacts
Dune Acre – Michigan City 138 kV	⬆ INDY, MICH ⬇ ILL, MINN

Equipment Outages		
Babcock – Dune Acre 138 kV	09-15	10-29
Babcock – Dune Acre 345 kV	09-15	10-29
Babcock XF 138/69 kV	09-15	10-29
Babcock – Michigan City 345 kV	10-20	11-21



Dune Acres – Michigan City usually bind when there is strong W-E flows between ComEd and western Michigan. Generation weakness in western Michigan, ComEd wind, and Michigan demand strength are likely to trigger congestion risks

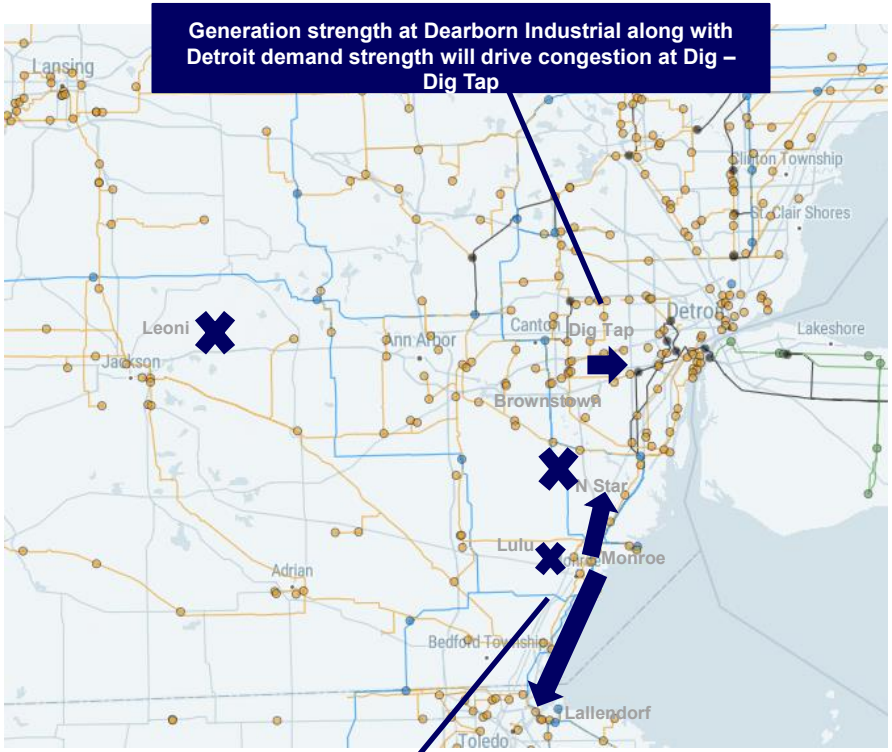
Wood Mackenzie

Michigan Congestion (1/3)

- A pair of outages near the Dig Tap substation will largely increase risks at Dig – Dig Tap in September. An outage set near the Brownstown substation will aid the constraint risks around the second half of the month along with congestion risks at Monroe – Lallendorf
- Leoni – Parr Road 138 kV will go out from mid-September, adding risks at Monroe – N. Star till October. Lulu – Monroe 345 kV outage will also increase risks at Monroe – N Star in November

Congestion Risk	Hub Impacts
Dig - Dig Tap 230 kV	None
Monroe – Lallendorf 345 kV	↑ All other hubs ↓ MICH
Monroe – N Star 120 kV	↓ MICH

Equipment Outages		
Leoni – Parr Rd 138 kV	09-15	10-10
Brownstown - Elm 230 kV	09-15	09-25
Brownstown XF 345/230 kV	09-15	09-25
Brownstown – Oak Ridge 120 kV	09-15	09-25
Monroe – Lulu 345 kV	11-10	12-04
Dig Tap – Navarre 230 kV	09-02 09-17	09-08 09-30
Dig Tap – Waterman 230 kV	09-02 09-17	09-08 09-30

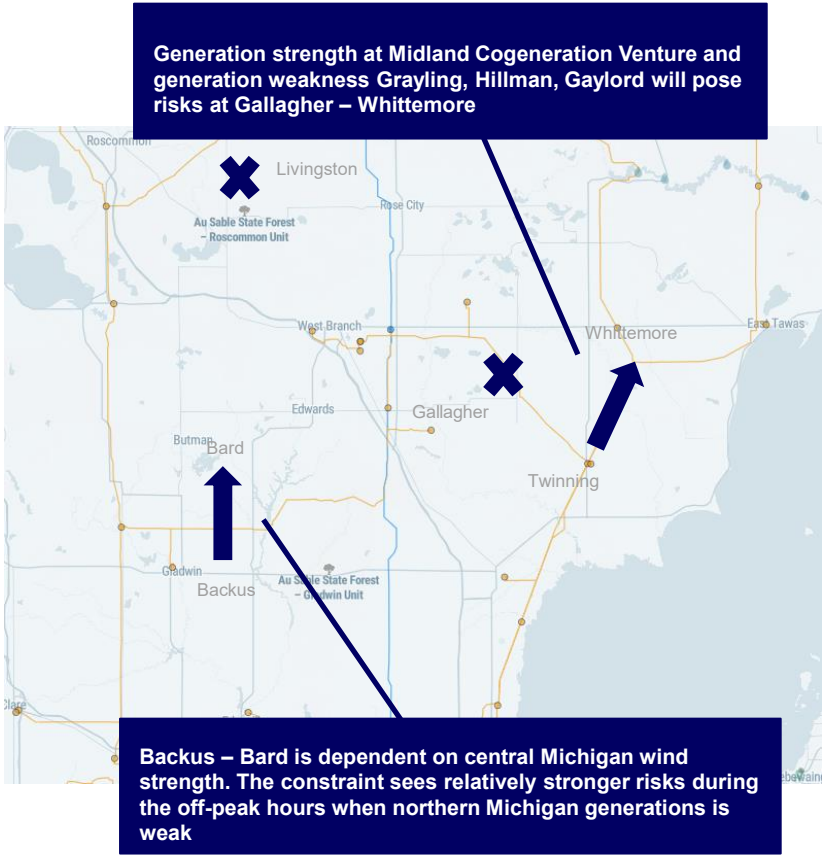


Michigan Congestion (2/3)

- In northern Michigan, Gallagher – Whittemore 138 kV outage will add pressure on its neighboring line Twinning – Whittemore
- Gallagher – Livingston 345 kV outage will extend risks at the constraint after two weeks and also aggravates risks at Backus - Bard

Congestion Risk	Hub Impacts
Twining - Whittemore 138 kV	None
Backus – Bard 138 kV	None

Equipment Outages		
Gallagher – Whittemore 138 kV	09-15	10-03
Gallagher – Livingston 345 kV	10-16	11-04



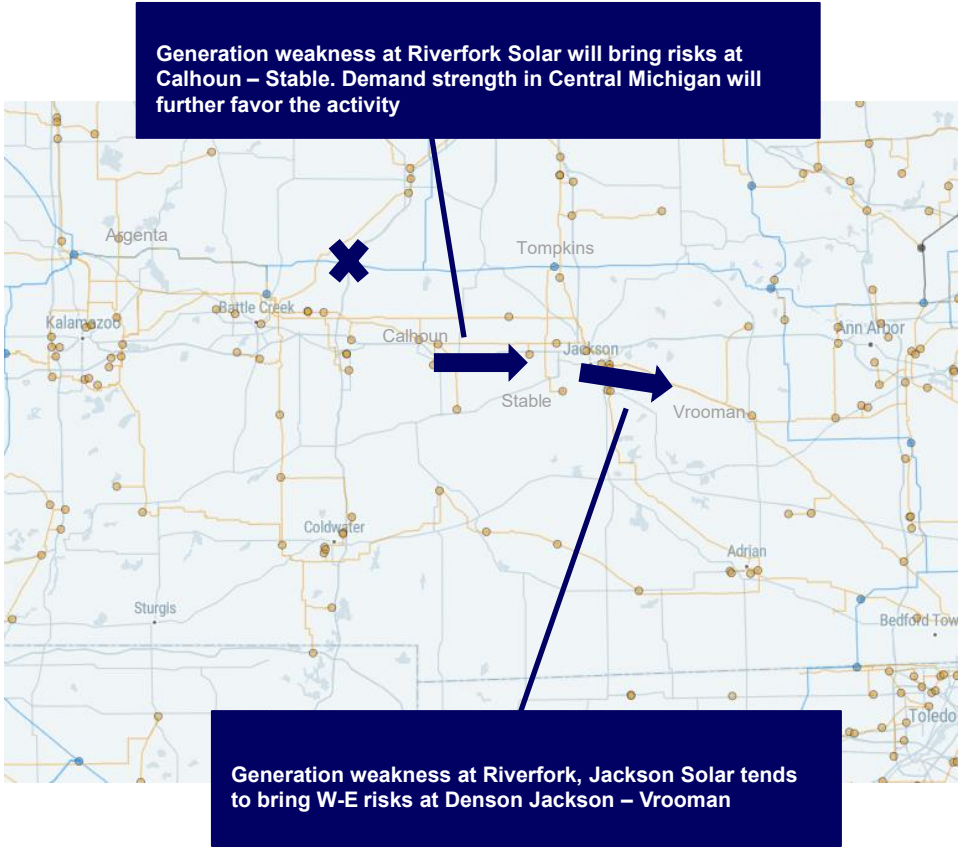
Wood Mackenzie

Michigan Congestion (3/3)

- A long outage at Argenta – Tompkin 345 kV will largely increase risks through Denson Jackson – Vrooman and Calhoun – Stable during periods of solar strength

Congestion Risk	Hub Impacts
Denso Jackson- Vrooman 138 kV	None
Calhoun - Stable 138 kV	↑ MICH

Equipment Outages		
Argenta – Tompkins 345 kV	10-01	12-31



Wood Mackenzie

South

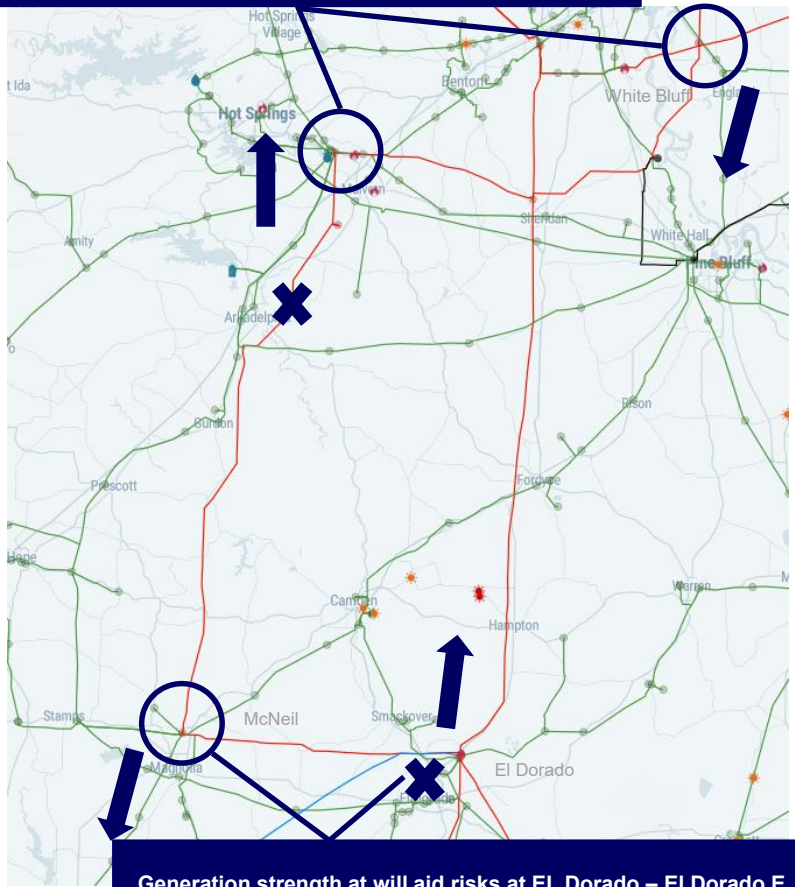
Arkansas Congestion

- Highly impactful transmission line and transformer outages in the network connecting Arkansas and Louisiana will drive plenty of activity through mid fall
- Days of S-N flows will see congestion activity at El Dorado – El Dorado E and Hot Springs XF while N-S flows will bring in McNeil XF and White Bluff XF

Congestion Risk	Hub Impacts
El Dorado – El Dorado E 115 kV	↑ South hubs
Hot Springs XF 500/115 kV	↑ ARK ↓ MS, TEX, LOU
McNeil XF 500/115 kV	↓ ARK
White Bluff XF 500/115 kV	None

Equipment Outages		
El Dorado – Donan 115 kV	10-27	10-30
Hot Springs XF 500/115 kV (Parallel)	10-27	12-12
White Bluff XF 500/230 kV (Parallel)	11-03	11-06
Woodward XF 230/115 kV	11-04	11-13
Hot Springs – Etta 500 kV	10-15	10-24

Outages at the transformer at Hot Springs and White Bluff will drive risks at the remaining parallel transformer



Generation strength at will aid risks at EL Dorado – El Dorado E while weakness will favor McNeil XF

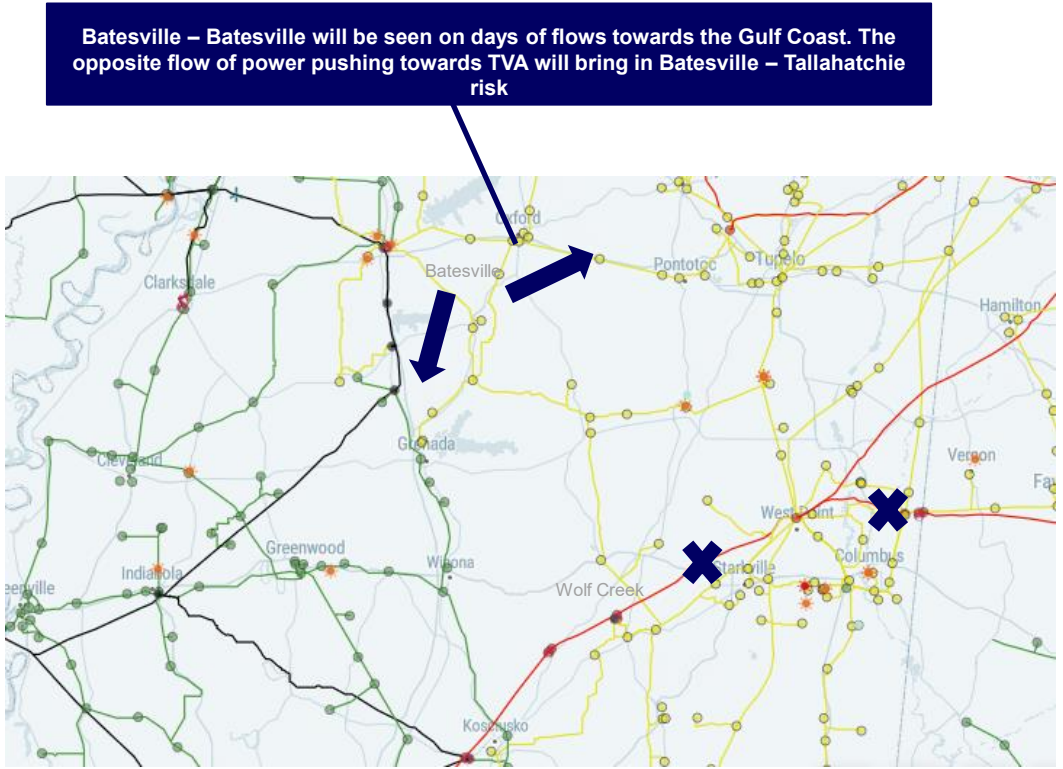
Wood Mackenzie

Mississippi Congestion (1/2)

- A couple of outages along the 500 kV network connecting Mississippi to Kentucky and Tennessee will bring in congestion activity around the Batesville substation
- Generation strength at Batesville will be required for both constraints to bind

Congestion Risk	Hub Impacts
Batesville – Batesville 161 kV	↑ South hubs
Batesville – Tallahatchie 161 kV	↑ INDY ↓ South hubs

Equipment Outages		
Wolf Creek – French Camp 500 kV	10-13	10-24
Reliant – French Camp 500 kV	10-24	11-14



Wood Mackenzie

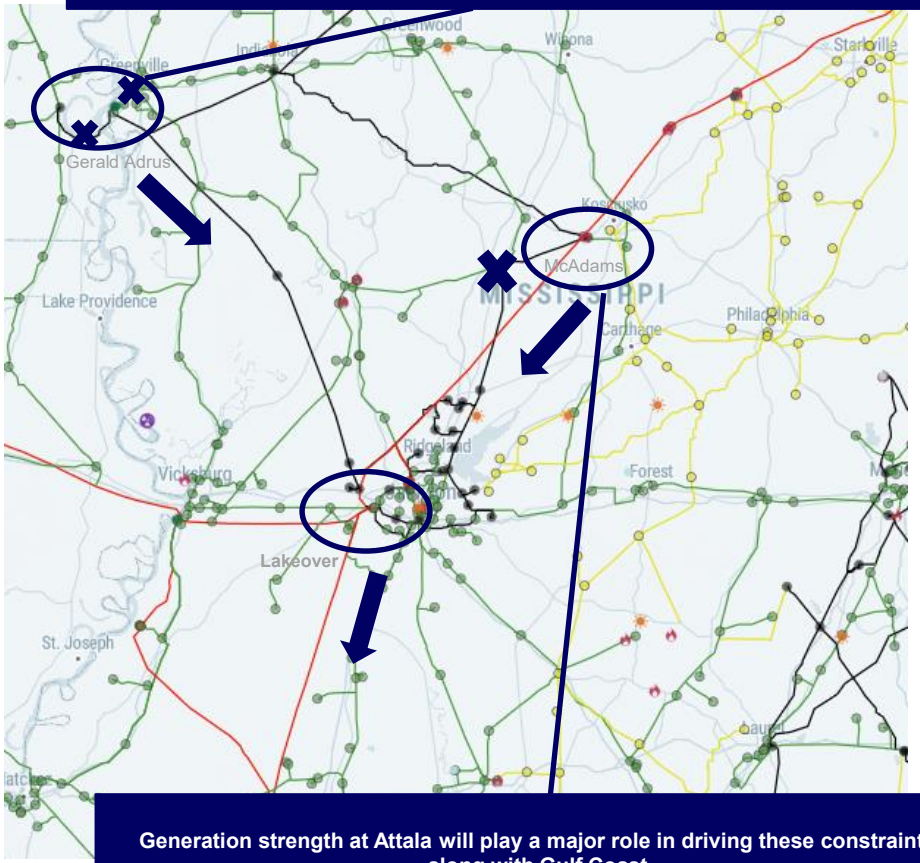
Mississippi Congestion (2/2)

- A set of outages near the Lakeover substation will bring in plenty of activity at Lakeover XF and Lakeover – Rex Brown during periods of N-S flows towards the Gulf Coast
- The outages will restrict pathways for power to step down from the 500 kV network and will drive risks

Congestion Risk	Hub Impacts
Lakeover XF 500/115 kV	↑ South hubs ↓ INDY, MICH, ILL
Lakeover – Rex Brown 230 kV	↑ South hubs ↓ INDY, MICH, ILL
Andrus XF 230/115 kV	None
McAdams XF 500/230 kV	↑ South hubs ↓ Classic hubs

Equipment Outages		
Franklin – Ray Braswell 500 kV	09-29 10-06 11-03	10-03 10-10 11-14
Andrus – Bagby 230 kV	08-18	09-05
Lakeover – Sunny Brook 115 kV	09-13	10-16
Lake Castle – Lakeover 230 kV	10-04	10-13
Lakeover - Charity Church 230 kV	09-03 10-14	09-06 10-23
Andrus – Indinola 230 kV	09-08	10-30
Picken XF 230/115 kV	10-06	11-28

Andrus – Indianola will go on outage every Monday – Thursday during the period indicated



Generation strength at Attala will play a major role in driving these constraints along with Gulf Coast

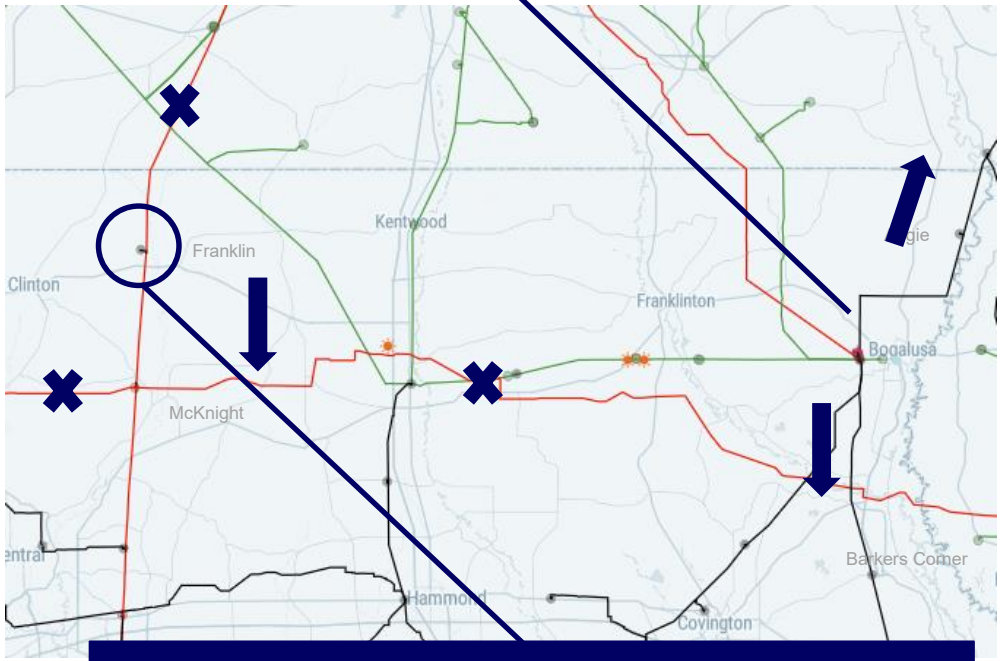
Louisiana – Mississippi Congestion

- A set of outages along the 500 kV network connecting Mississippi to Louisiana, specifically NOLA, will drive plenty of activity.
- N-S and S-N flows will both be affected, resulting in mixed impacts across the South footprint and beyond.

Congestion Risk	Hub Impacts
Barkers Corner – Bogalusa 230 kV	↑ LOU, TEX ↓ MS, ARK, Classic hubs
Adams Creek – Angie 230 kV	↑ Classic hubs ↓ South hubs
Franklin XF 500/115 kV	↑ LOU, TEX

Equipment Outages		
Franklin – Ray Braswell 500 kV	09-29 10-06 11-03 11-10	10-03 10-10 11-07 11-14
Fancy Point – McKnight 500 kV	11-10	11-21
McKnight – Daniel 500 kV	11-10	11-14

Barkers Corner – Bogalusa will be a risk on days of flows towards the Gulf Coast. On the other hand, Adams Creek – Angie sees risks when units in southern Mississippi run weak, prompting flows from the coast up north.



The last week of outages around the McKnight substation will bring in congestion risks at Franklin XF during days of N-S flows

Wood Mackenzie

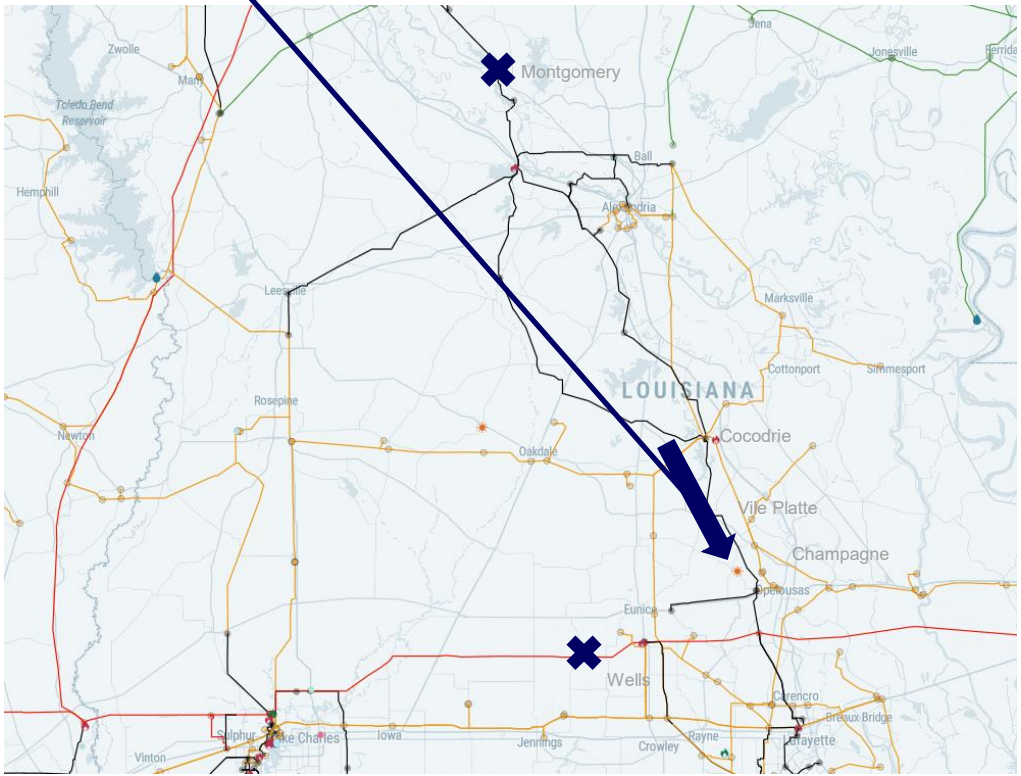
Louisiana Congestion (1/2)

- Outages in northern Louisiana will impact N-S flows within the region, especially on strong demand days
- LOU hub will see bullish impacts through the second half of October when the Richard – Wells 500 kV line goes out of service

Congestion Risk	Hub Impacts
Cocodrie – Vile Platte 230 kV	⬆ LOU
Champagne – Bobcat 138 kV	⬆ MS, LOU ⬇ TEX, ARK

Equipment Outages		
Clarendon - Montgomery – Colfax 230 kV	11-10	11-13
Richard – Wells 500 kV	10-13 10-27	10-22 11-05

Demand strength in New Orleans plays a major role in driving congestion, with generation strength at Coughlin aiding risks



Wood Mackenzie

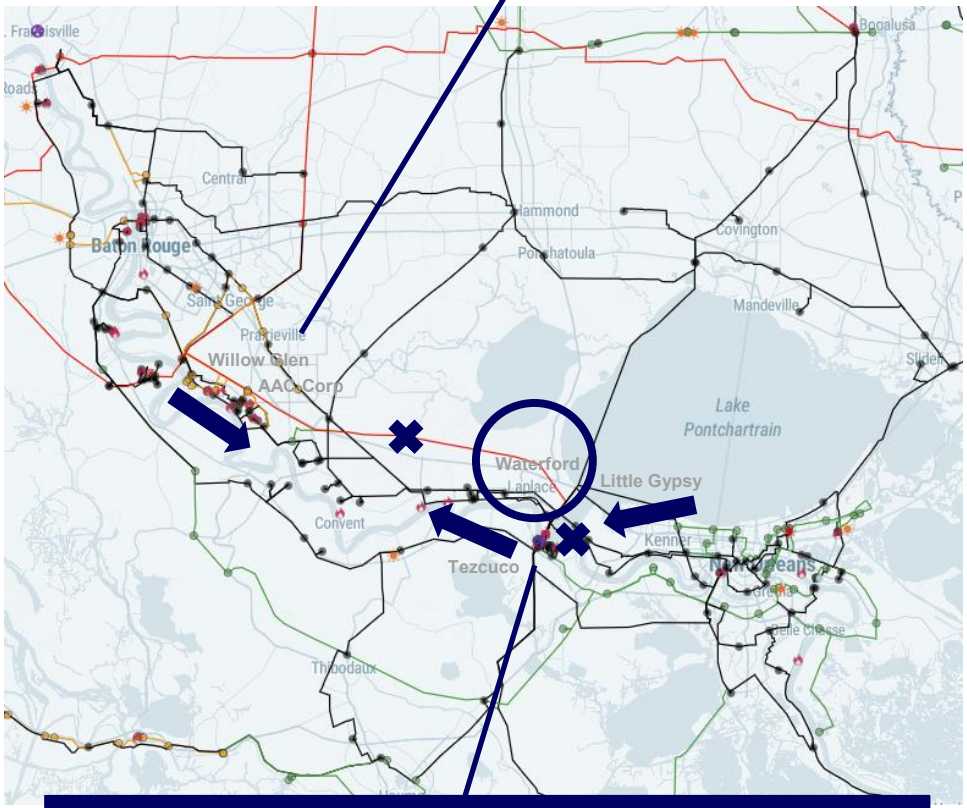
Louisiana Congestion (2/2)

- Outages along the 500 kV network in NOLA will drive risks of congestion at the start of September
- An additional outage at the Waterford substation will compound risks around the area during periods of demand strength

Congestion Risk	Hub Impacts
Little Gypsy – Waterford 230 kV	↓ LOU, TEX
St Gabriel – ACC Corp 230 kV	↑ LOU ↓ ARK, TEX
Tezcuco – Frisco 230 kV	↑ LOU, TEX

Equipment Outages		
Willow Glen – Waterford 500 kV	09-01	09-17
Waterford XF 500/230 kV	09-01	09-17
Prospect – Good Hope 230 kV	10-06	10-09
Raceland – Waterford 230 kV	10-06	11-21

The outage at Willow Glen – Waterford will push more power onto the 230 kV network and will aid all activity during periods of demand strength



Little Gypsy – Waterford tends to bind when there is an imbalance between the Little Gypsy and Waterford units while strength at both units will tend to favour Tezcuco - Frisco

Wood Mackenzie

S-N Power Balance in Summer 2025

Wood Mackenzie

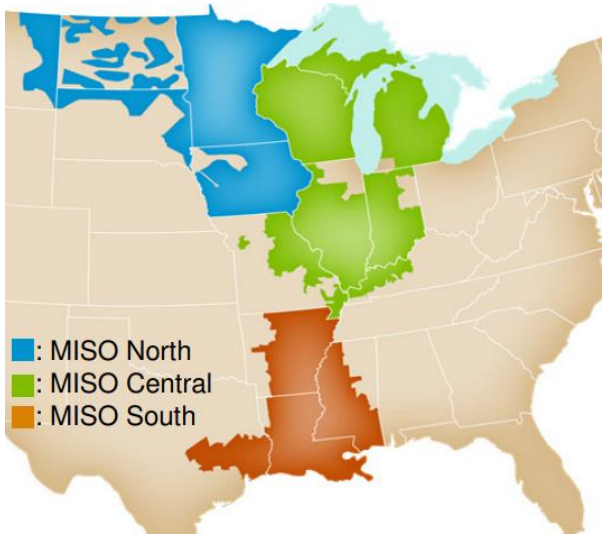
Sub-Regional Power Balance Overview

Limited Transfer Capacity Between Classic and South

- Transfer capacity between regions is **only 3,000 MW** (1,000 MW owned by MISO + 2,000 MW from agreement with surrounding entities)
- **Sub-Regional Power Balance Constraint** keeps flows below limit
  - Sub-Regional Power Balance (RDT) = South Load – South Generation + South Exports – South Imports
  - Opposite calculation can be performed using Classic load, generation, & interchange
- Power Balance Limits:
  - RDT_MW_SO (North-South) = 3,000 MW
  - RDT_MW_SO (South-North) = 2,500 MW
- Price Impacts

Exceedance % Compared to Limit	Maximum Shadow Price
≥ 100% and < 102%	$40.00
≥ 102%	$500.00

  - Power Balance constraint has a **100% shift factor on all MISO South nodes**
  - Does not impact Classic nodes

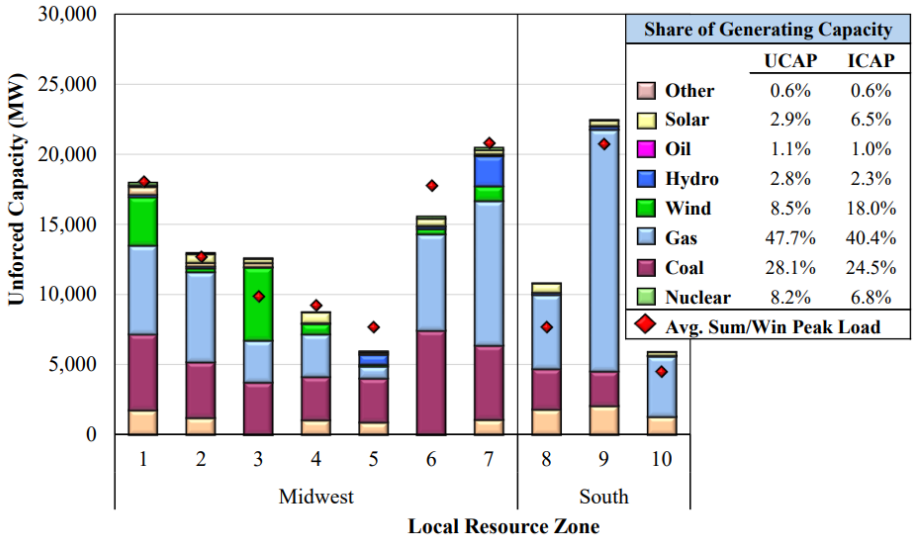


Source: WoodMac

Typical Factors Impacting Interregional Flows

Factors that Affect Prices Influence Generation Dispatch in Each Region

- **Gas prices:**
  - South has proportionately higher level of gas generation than other fuel types, so cheaper gas prices will result in more South generator dispatchment
- **Wind generation in North/Central:**
  - S-N interregional flows are more likely during days of weak wind generation
- **North/Central demand and interchange**
- **Regional capacity on outage**
- **Congestion**

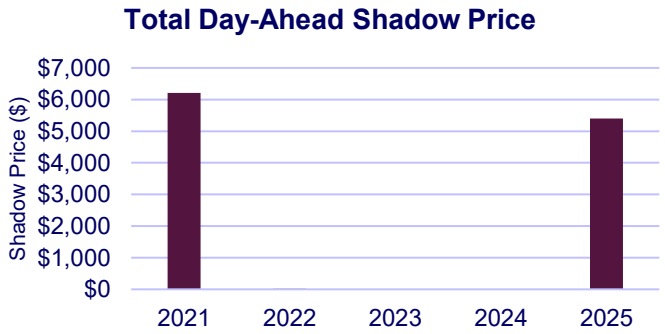


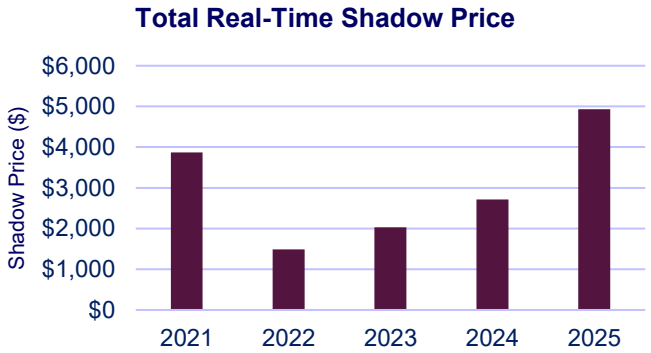
Source: WoodMac, Potomac Economics

S-N Power Balance in Summer 2025

Barring 2021, S-N Interregional Flows are Significantly Higher Compared to Past Summers

- Total Day-Ahead shadow prices have **exceeded $5,300** from the start of June through August 23rd
  - DA coverage of S-N Power Balance in from 2022-2024 were close to $0
- Total Real-Time shadow prices have **exceeded $5,000** since the beginning of June
  - Summer 2025 total is more than double that of summers of 2022 and 2023
  - Summer 2025 total is more than $1,000 above summer 2021, which saw a significant impact in flows from Hurricane Ida in August



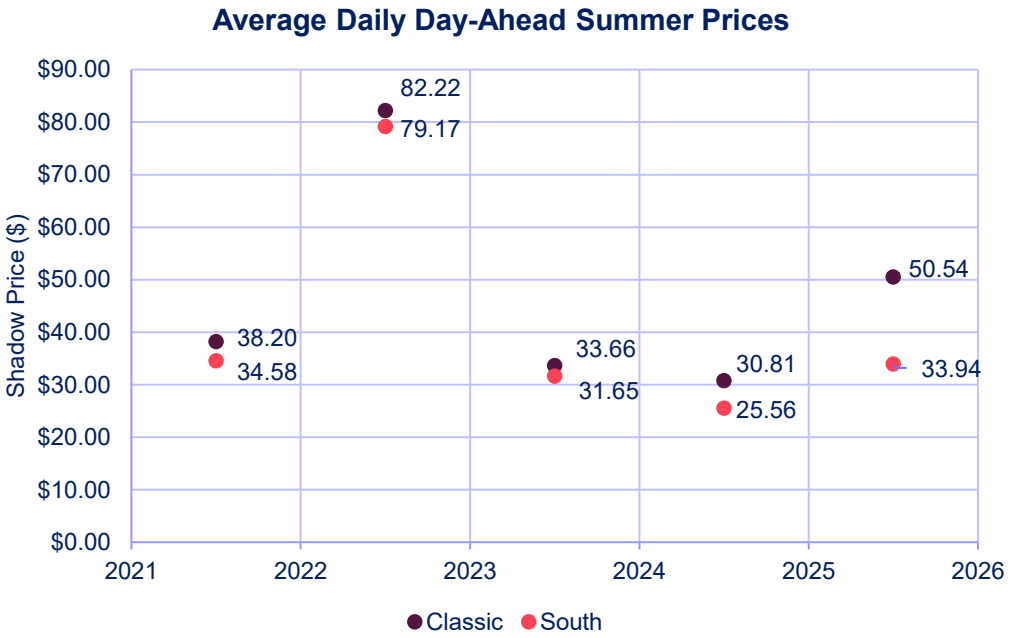


Source: WoodMac

Day-Ahead Price Spread Between Classic & South

Daily DA prices at MISO Classic hubs have been about $15 above prices at South hubs

- Prices in MISO Classic have been significantly higher than MISO South on average
- Summer 2024 had the second highest spread out of previous summers, with Classic averaging about $5 more than South
- Regional spread in prior summers was around $2-3

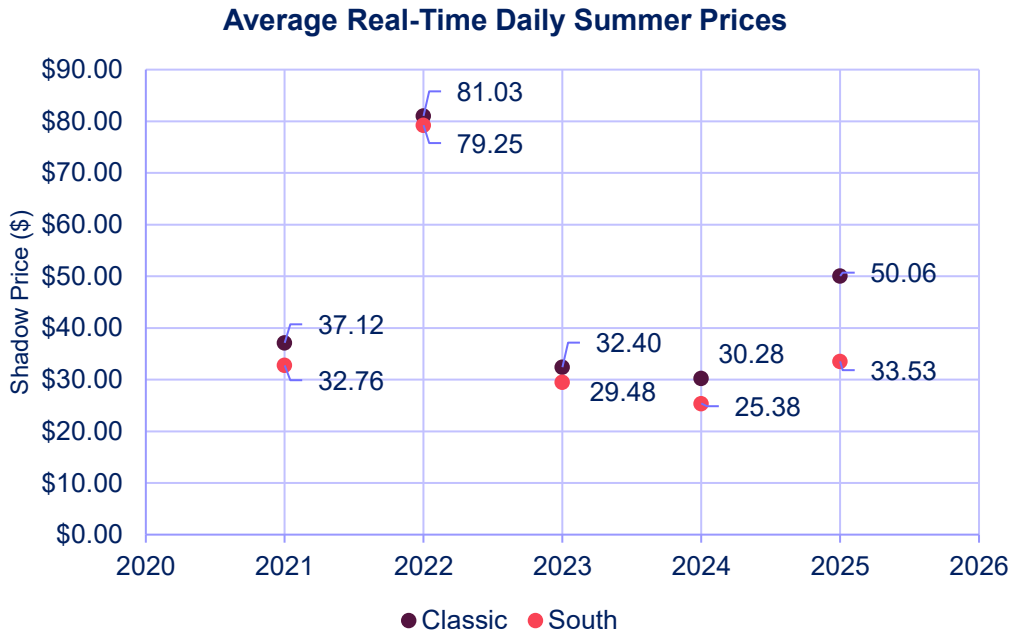


Source: WoodMac

Real-Time Price Spread Between Classic & South

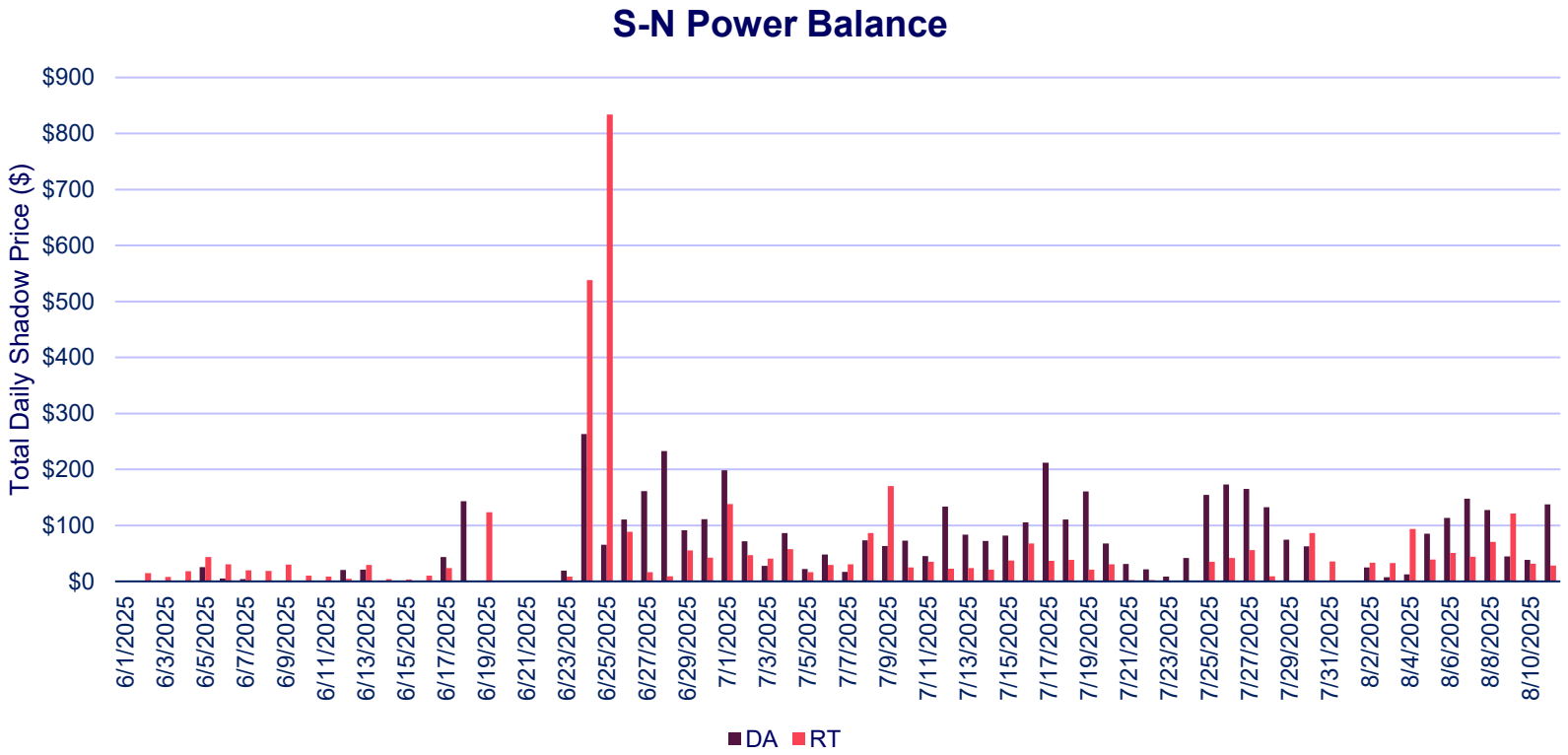
Daily RT prices at MISO Classic hubs have also been about $15 above prices at South hubs

- Similar pricing spread has been seen in the real-time market as well
- Summer 2024 also had the second highest RT spread out of previous summers, with Classic averaging slightly below $5 more than South
- Regional spread in prior summers was around $2-3



Source: WoodMac

A Closer Look at Summer 2025

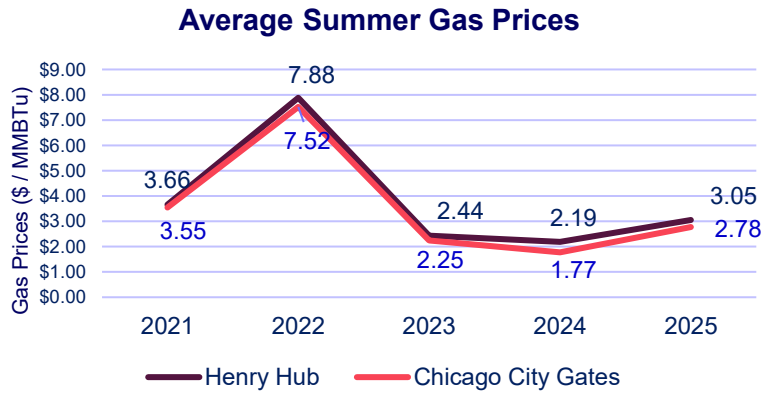


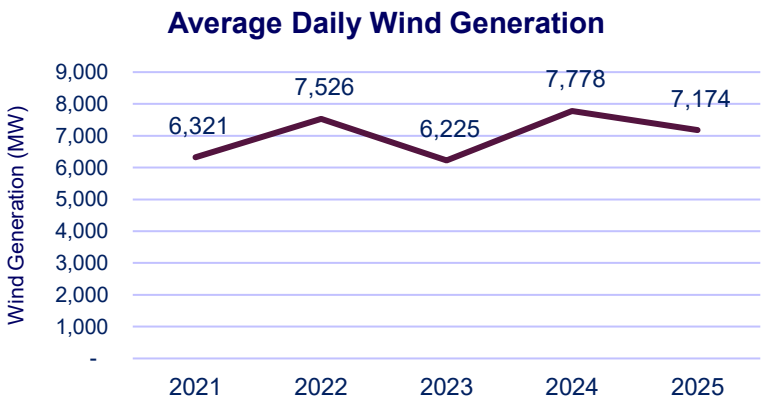
Source: WoodMac

What's Driving S-N Power Balance in Summer 2025?

Gas Prices and Wind Generation Are Not Notable Drivers

- Henry Hub and Chicago City Gate **prices are higher** this summer than previous two summers, which saw significantly lower S-N interregional flows
- Wind appears to be a factor for S-N interregional flows in 2021, but 2025 has seen slightly **above average wind generation** in context of last few summers
- Both gas prices and wind generation would likely be lower if they played a significant role in S-N flows



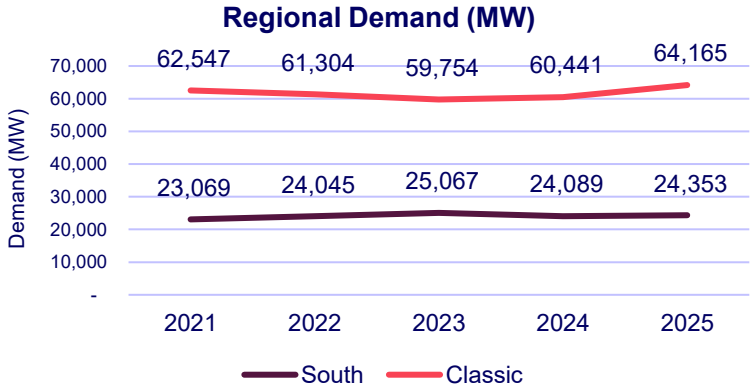


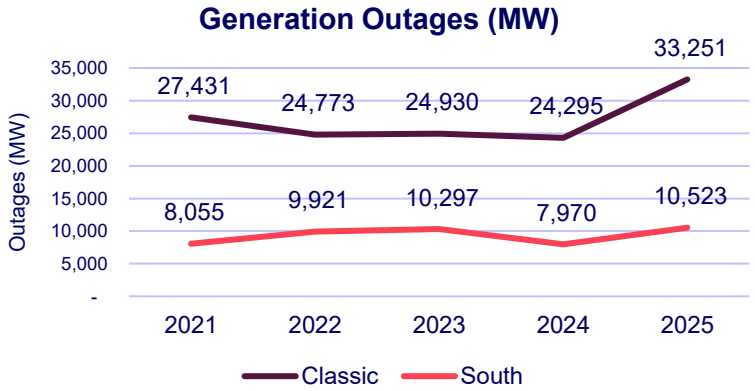
Wood Mackenzie

What's Driving S-N Power Balance in Summer 2025?

Demand & Generation Outages Are Likely Suspects

- Average daily demand in the Classic footprint **has been higher** than last few summers
- Generation outages in the Classic **footprint have increased significantly** on average, with elevated levels sustained throughout the summer
  - **Classic outages were around 9 GW greater than past three summers and close to 6 GW above 2021 levels**
  - **Possible drivers:**
    - **Supply chain issues** limiting ability to do maintenance
    - **Strain on old generators** from hot temperatures and increase in variable generation sources



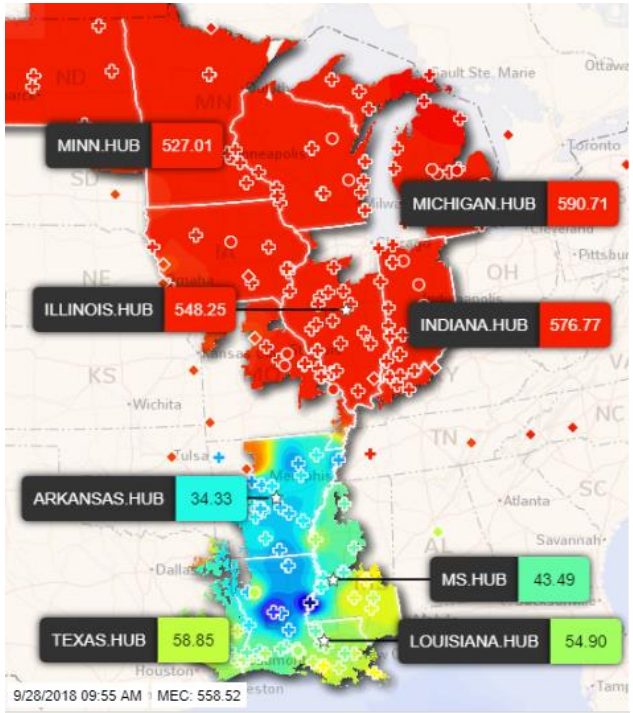


Wood Mackenzie

What to Expect Going Forward

As Resource Inadequacy Persists in Classic, S-N Interregional Flows will be a Systemic Risk

- Interregional flows will likely ease going into the fall given strengthening wind generation and declining temperatures
  - However, bullish demand expectations in the Classic footprint will continue to pose risks of above-average S-N interregional flows, especially in September and October
- Key factor to watch out for will be generation outages
  - Capacity on outage tends to increase during shoulder seasons and unprecedent S-N flows will be a risk if significant outages persist



Power Balance Binding at $500 of Shadow Price

Pricing Expectations for Fall 2025

Wood Mackenzie

INDY Fall 2025 Expectations

Similar year-over-year demand forecasts result in hold recommendation

	2024 RT OPA	CME 2025 RT OPA	WoodMac Rec.
September	40.62	52.55	SELL
October	32.99	47.65	SELL
November	28.74	50.25	SELL

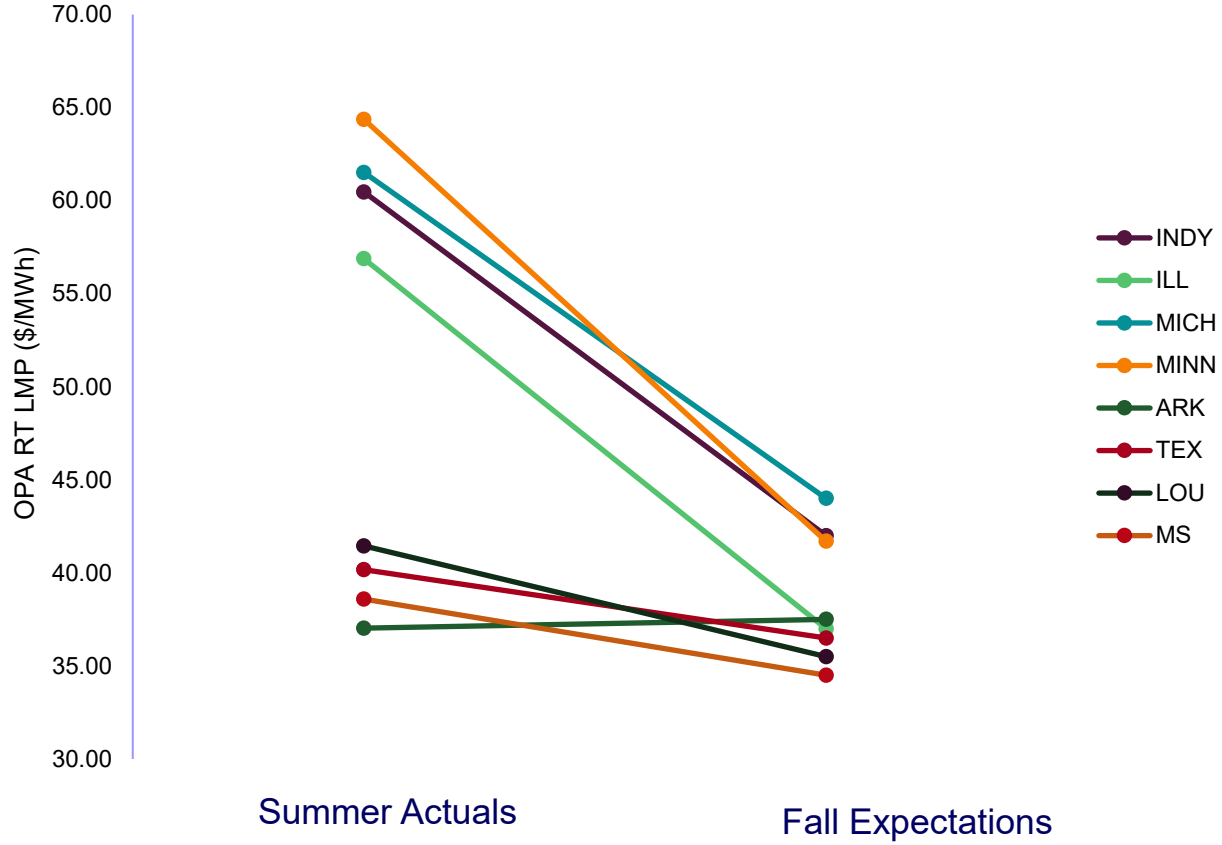
	2024 DA OPA	CME 2025 DA OPA	WoodMac Rec.
September	36.83	53.05	SELL
October	34.13	48.15	SELL
November	29.52	50.75	SELL

Wood Mackenzie

Fall prices from CME Group as of 08/24/2025

Fall 2025 RT LMP Expectations

Expect wind and outage-driven congestion to play a stronger role in hub pricing



Summer Actuals are as of 08/25/2025

Q&A

Wood Mackenzie

Contacts

To learn more about our products or to speak with an expert, please click here:

https://www.genscape.com/products/power/poweriq

PJM/MISO Research Manager

Varun Bharathidasan

T 617 779 0918
E Varun.Bharathidasan@woodmac.com

Wood Mackenzie

Disclaimer

These materials, including any updates to them, are published by and remain subject to the copyright of the Wood Mackenzie group ("Wood Mackenzie"), or its third-party licensors (“Licensors”) as relevant, and are made available to clients of Wood Mackenzie under terms agreed between Wood Mackenzie and those clients. The use of these materials is governed by the terms and conditions of the agreement under which they were provided. The content and conclusions contained are confidential and may not be disclosed to any other person without Wood Mackenzie's prior written permission. Wood Mackenzie makes no warranty or representation about the accuracy or completeness of the information and data contained in these materials, which are provided 'as is'. The opinions expressed in these materials are those of Wood Mackenzie, and do not necessarily represent our Licensors’ position or views. Nothing contained in them constitutes an offer to buy or to sell securities, or investment advice. Wood Mackenzie's products do not provide a comprehensive analysis of the financial position or prospects of any company or entity and nothing in any such product should be taken as comment regarding the value of the securities of any entity. If, notwithstanding the foregoing, you or any other person relies upon these materials in any way, Wood Mackenzie does not accept, and hereby disclaims to the extent permitted by law, all liability for any loss and damage suffered arising in connection with such reliance.

Wood Mackenzie

Europe	+44 131 243 4477
Americas	+1 713 470 1700
Asia Pacific	+65 6518 0888
Email	contactus@woodmac.com
Website	www.woodmac.com