MRES® Municipal Power
LEARNING ACADEMY

Meeting Your Utility's Energy Needs

Wendy Solheim

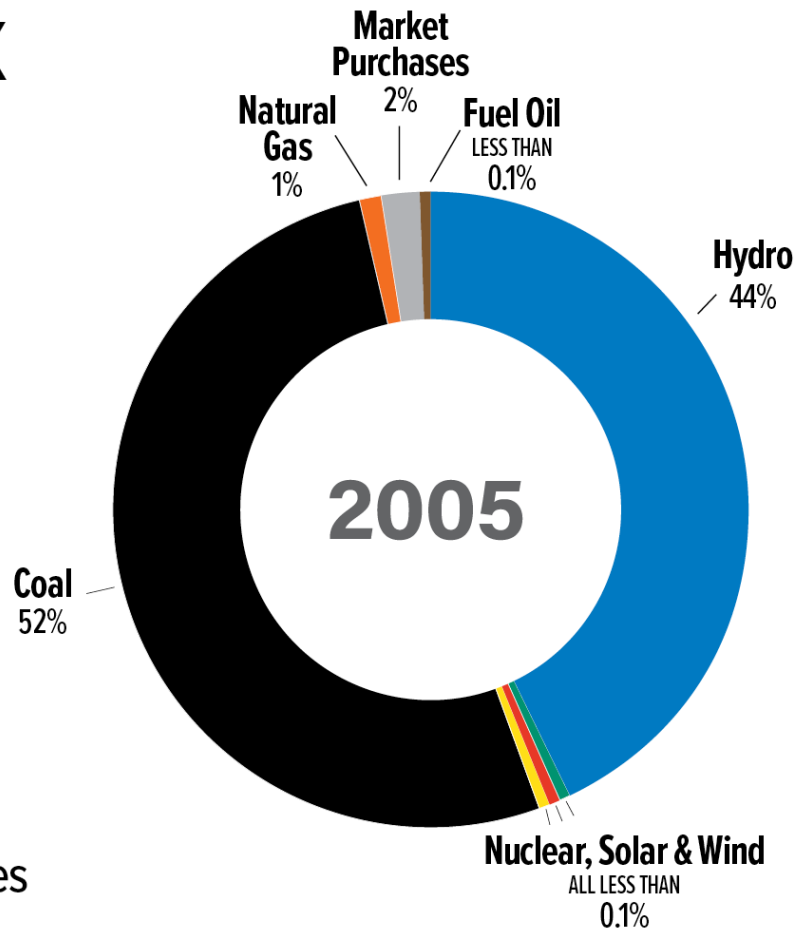
Operations Supervisor

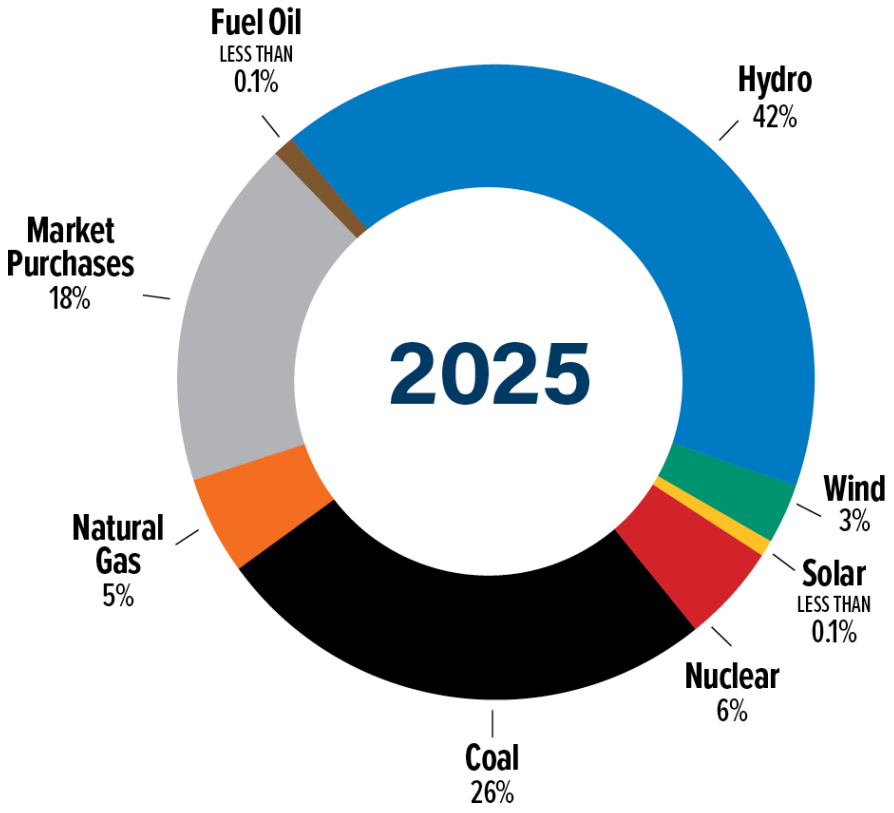
MISSOURI RIVER® ENERGY SERVICES

MRES POWER

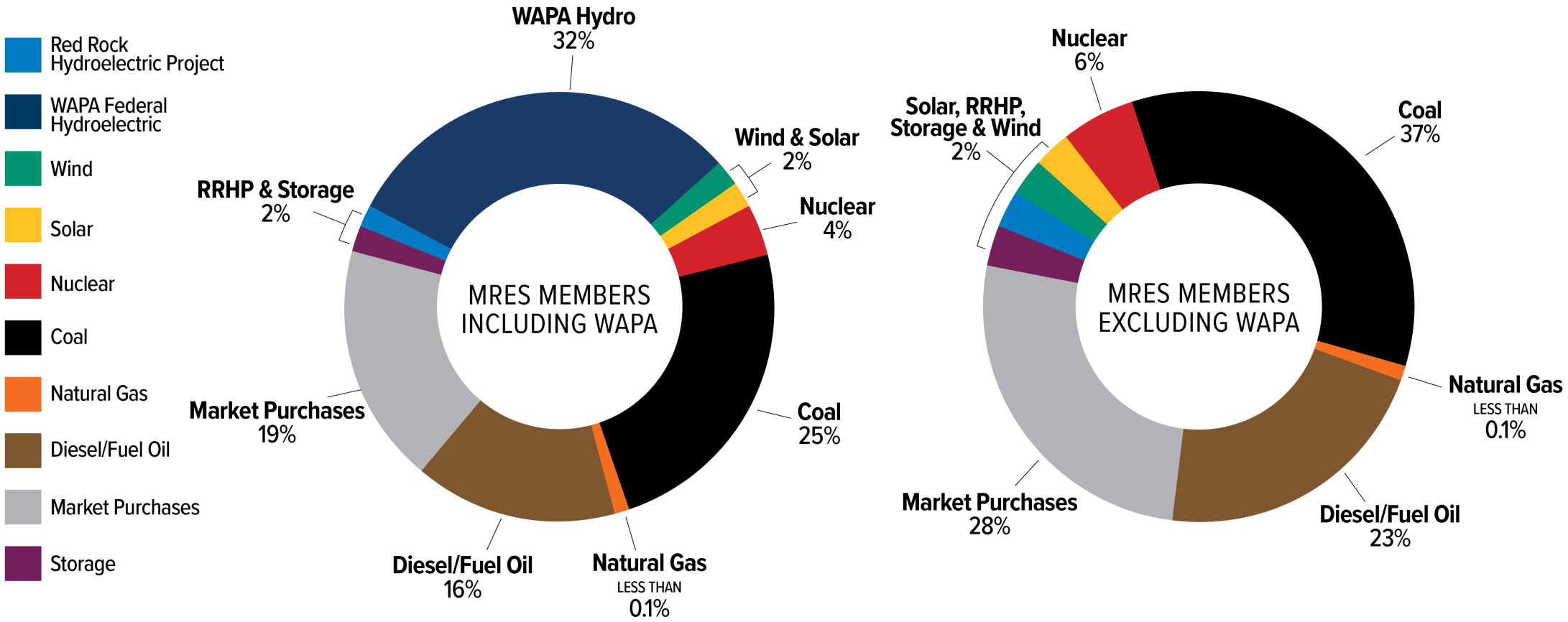
SUPPLY MIX

- Hydro
- Wind
- Solar
- Nuclear
- Coal
- Natural Gas
- Diesel/Fuel Oil
- Market Purchases

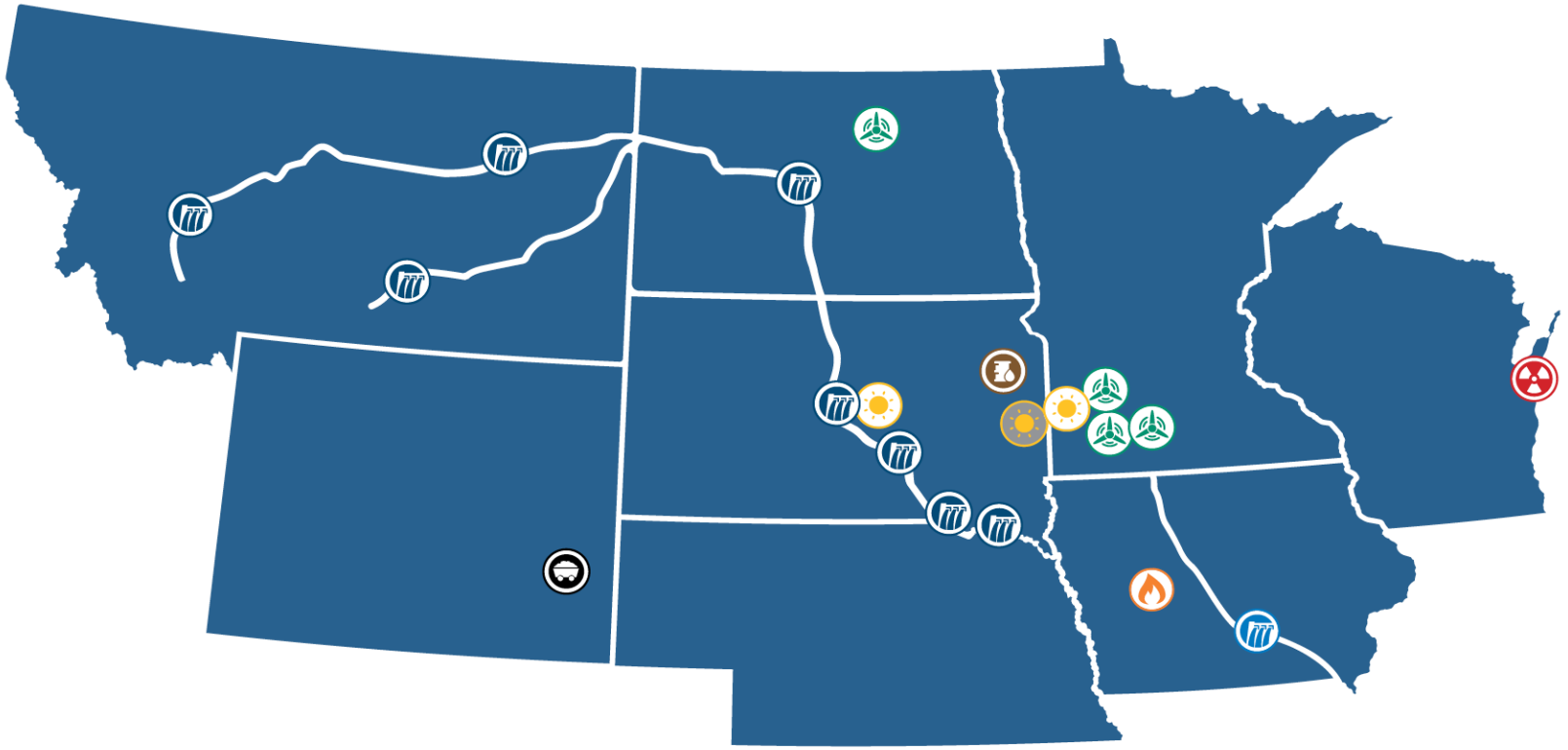




2025 POWER SUPPLY MIX: CAPACITY



Generation Facilities



Western Area Power Administration's Hydroelectric Facilities
353 MW

Laramie River Station
280 MW
Coal-fired

Exira Station
140 MW
Natural gas/Fuel oil

Wind Projects
87.4 MW
- Rugby (ND) - 40 MW
- Odin (MN) - 20 MW
- Marshall (MN) - 18.7 MW
- Worthington (MN) - 3.7 MW

Watertown Power Plant
65 MW
Fuel oil

Red Rock Hydroelectric Project
43.1 MW

Point Beach Nuclear Plant
33.8 MW
Nuclear

Solar Projects
16 MW
- Pierre (SD) - 1 MW
- Marshall (MN) - 10 MW
  + 5 MW battery storage

Reserved Capacity Agreements with various members
Fuel oil
155.8 MW

Solar Under Construction
5 MW
- Brookings

3/2026

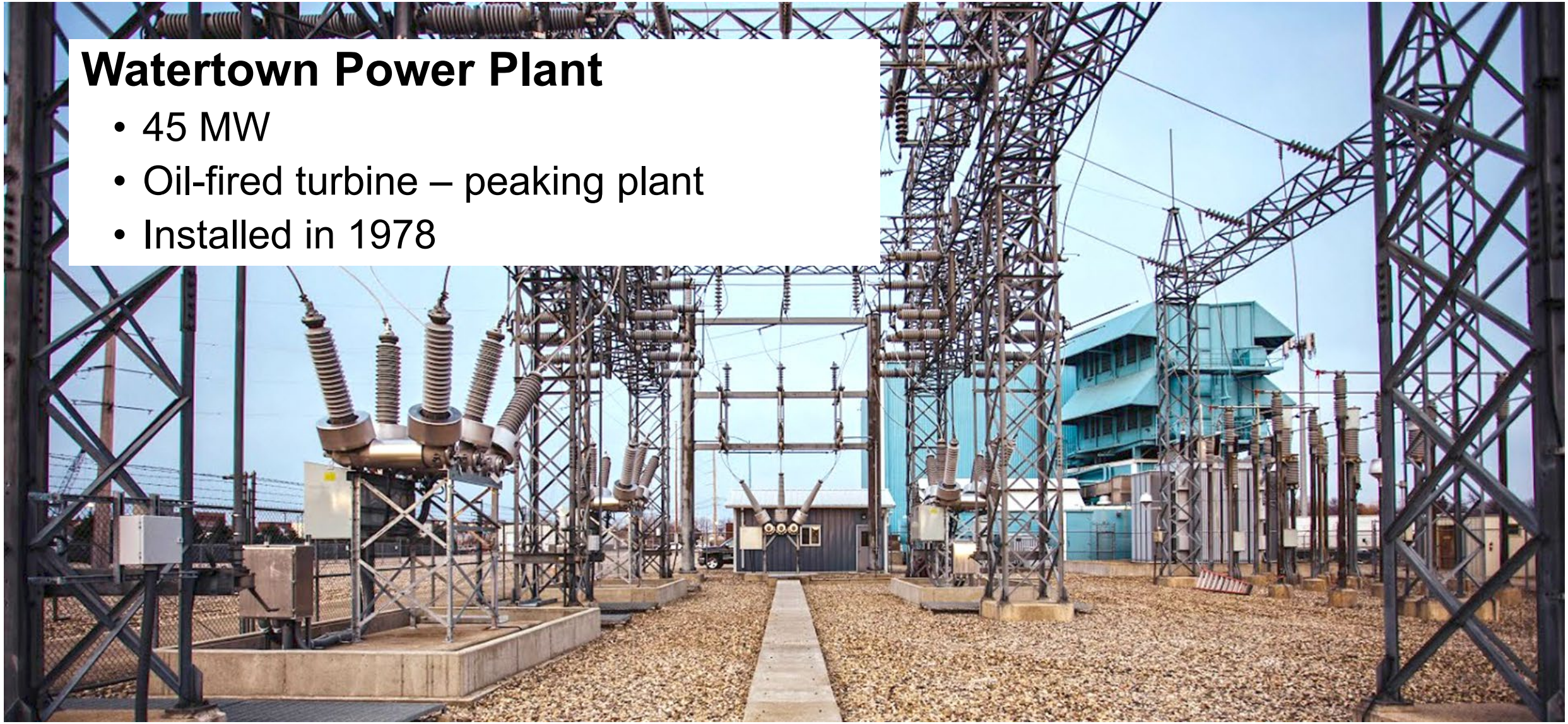
Laramie River Station

- 1,700 MW Plant
- 280 MW MRES share (~50% of U1)
- Coal-fired steam turbine-baseload
- Installed in 1981



Watertown Power Plant

- 45 MW
- Oil-fired turbine – peaking plant
- Installed in 1978



Exira Station

- 140 MW – 3 Units
- Natural gas / fuel oil peaking plant
- Installed in 2004 and 2007





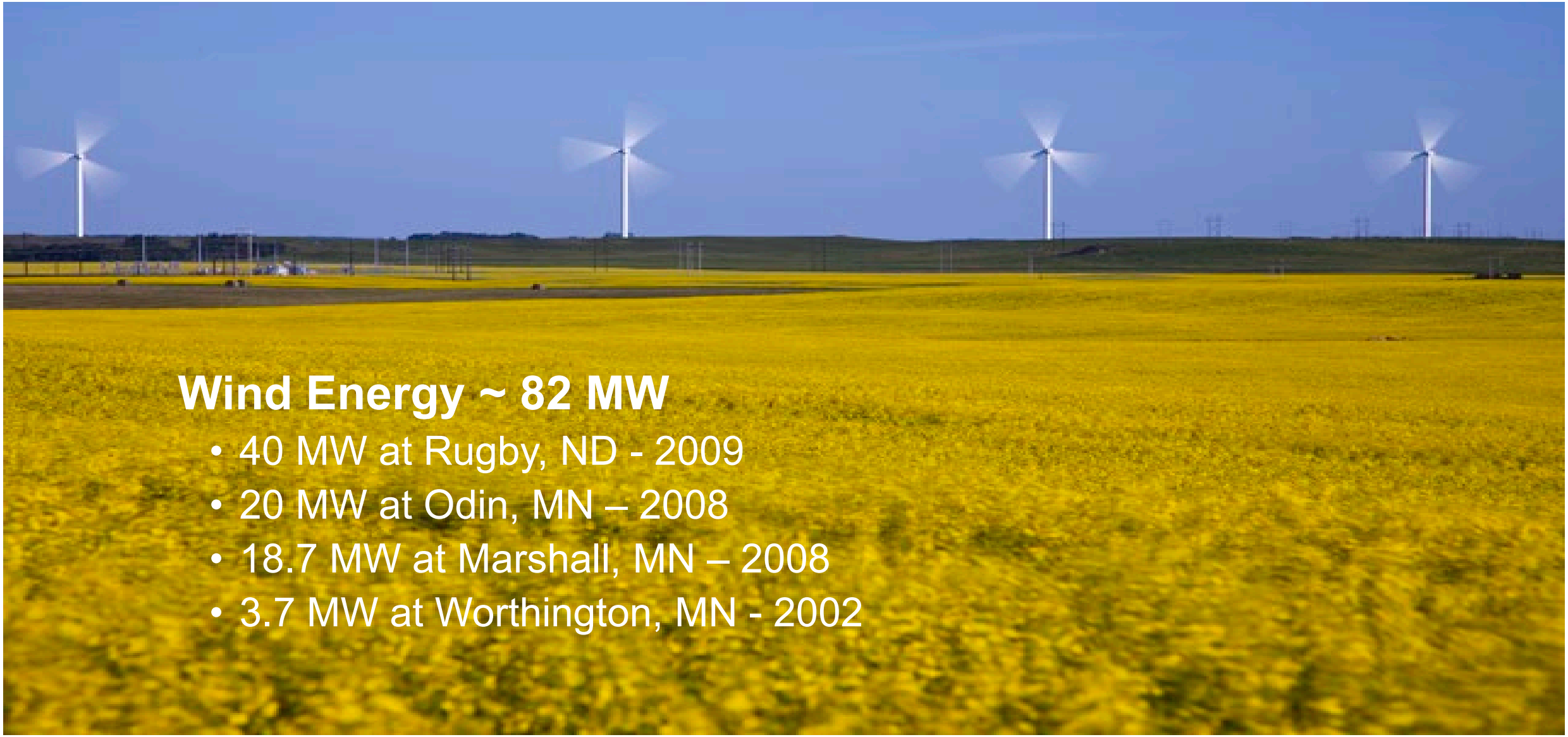
Member municipal generation

- 155+ MW – contracts with 19 members
- Oil-fired internal combustion-peaking
- Currently registered behind the meter



Point Beach Nuclear Plant

- 33 MW committed to MRES
- Baseload



Wind Energy ~ 82 MW

- 40 MW at Rugby, ND - 2009
- 20 MW at Odin, MN – 2008
- 18.7 MW at Marshall, MN – 2008
- 3.7 MW at Worthington, MN - 2002



Red Rock Hydroelectric Project

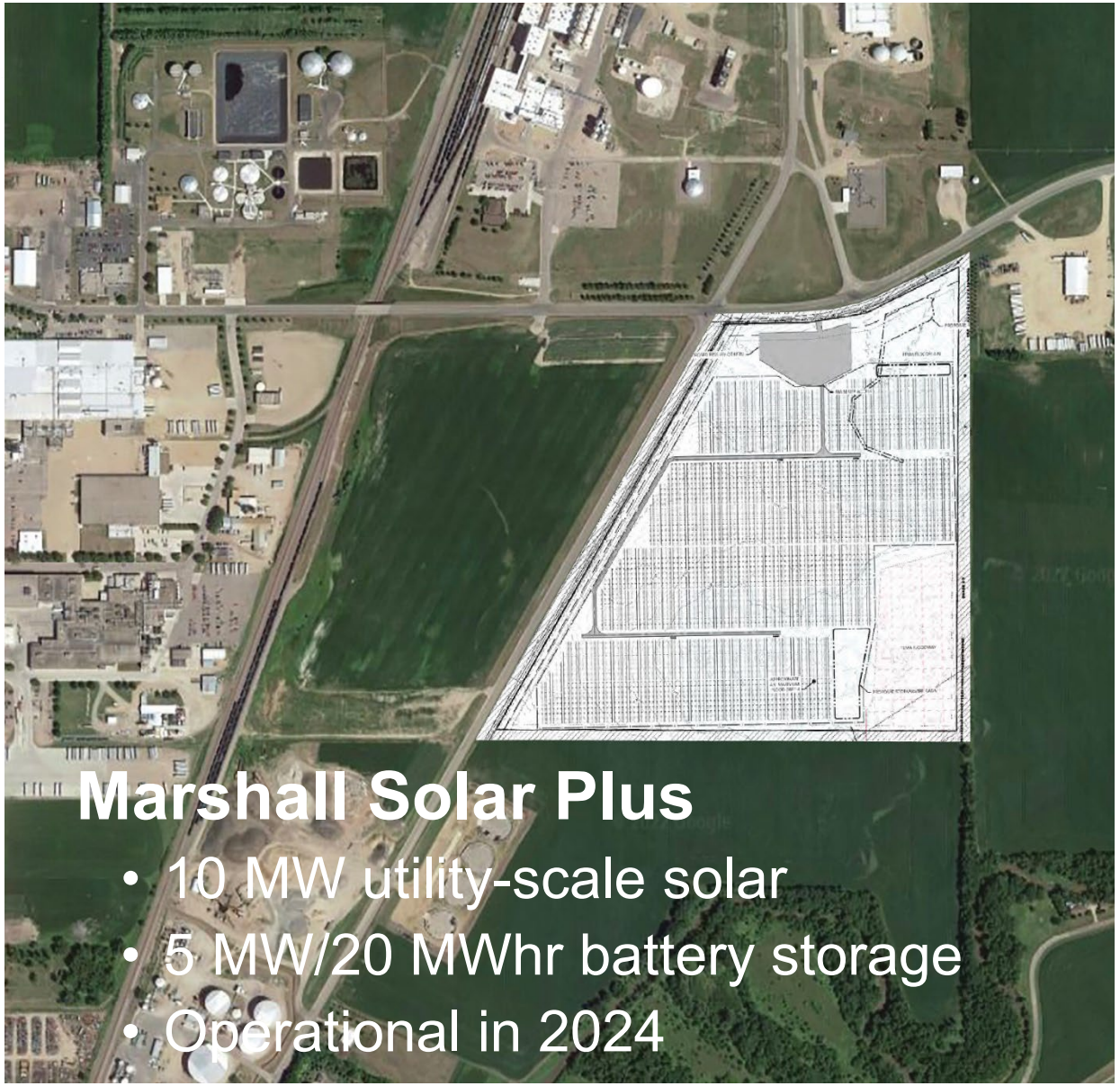
- 43.1 MW
- Run of flow
- Operational in 2021



Pierre Solar Project

- 1 MW utility-scale solar
- Distributed generation
- Operational in 2016



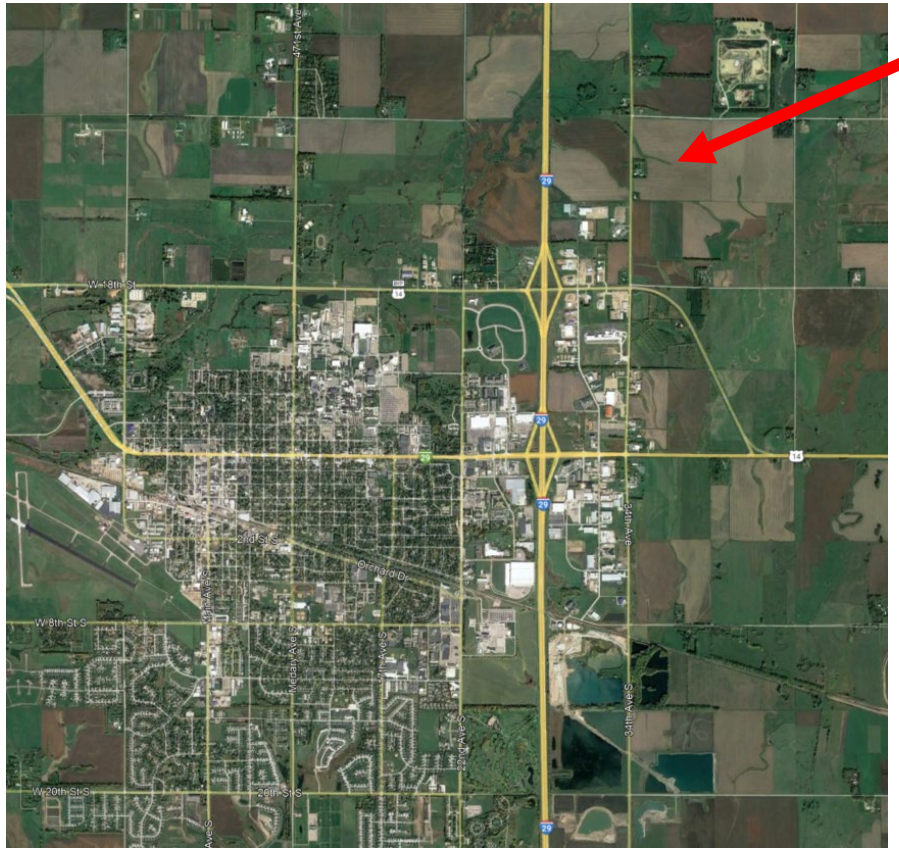


Marshall Solar Plus

- 10 MW utility-scale solar
- 5 MW/20 MWhr battery storage
- Operational in 2024

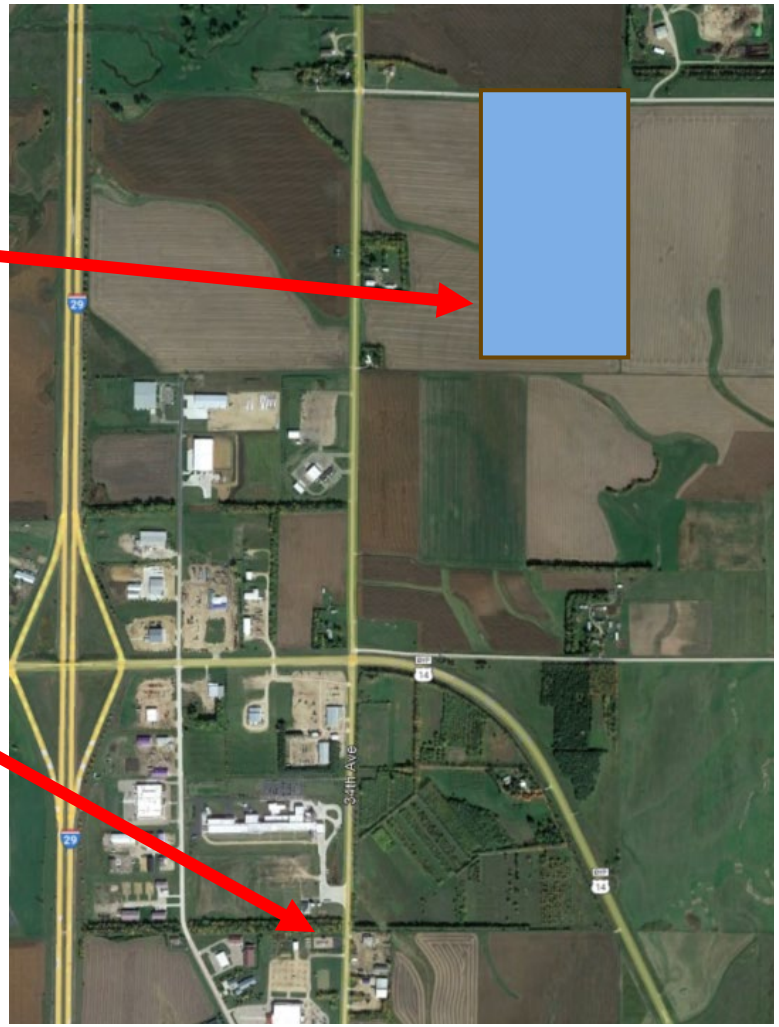
Brookings Solar

- 5 MW utility-scale solar
- Distributed generation
- Operational 3rd QTR 2026



75 acres

34th Ave Substation



History of Energy Markets

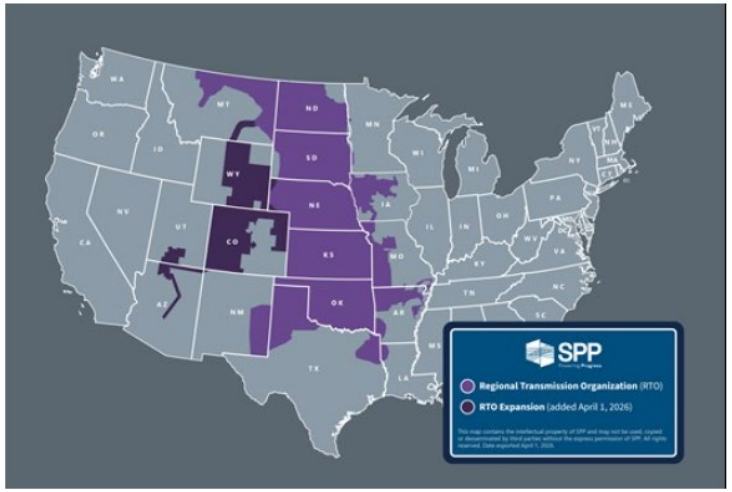
- MRES Scheduling Practices prior to regional transmission operator (RTO) markets:
  - Electric system was based on physical systems/contract path when original power sale agreements (S-1) drafted ~1976
  - Physically matched generation to load on an hour-by-hour basis
    - Forecasted member total load – split between MRES and WAPA
    - Scheduled MRES owned generation; balanced load/generation D/A and R/T
    - Negotiated with regional utilities/marketers to buy/sell energy based on position
    - Implemented physical schedules to account for any imbalance
  - Labor-intensive, inefficient process

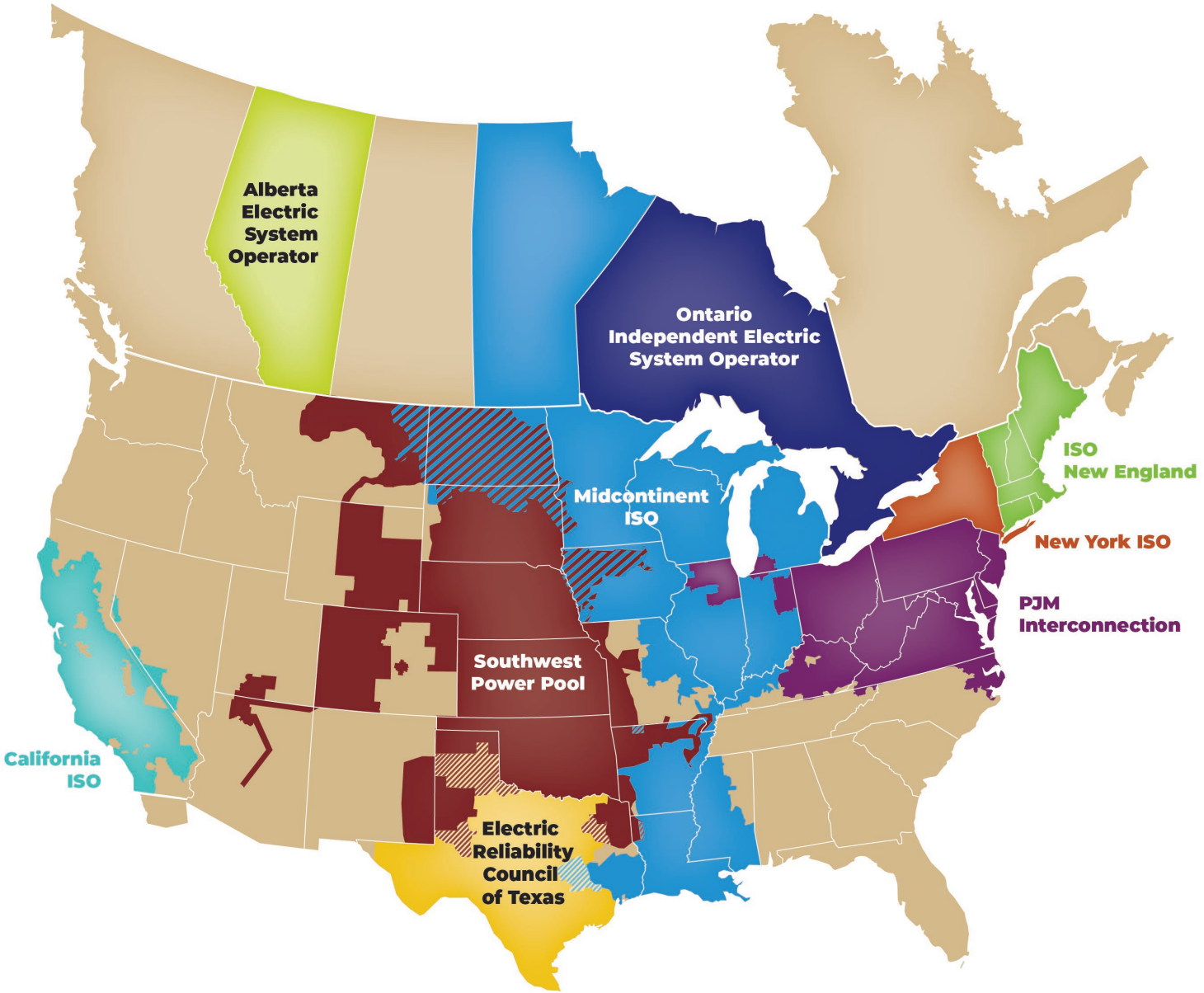
History of Energy Markets

- FERC Order 888 issued April 1996 permitted transmission owners to recover prudent and verifiable costs for service – goal was to remove obstacles to a wholesale power market leading to the eventual development of RTOs
- Electric markets are now financial, not physical.
  - Regional Transmission Organizations (RTOs) MRES operates:
    - Midcontinent Independent System Operator (MISO) – market started 2005
    - WAPA moved into Southwest Power Pool (SPP) – October 2015
  - Markets better reflect the way energy flows in the electric grid. Promotes efficiency and competition in wholesale electric markets
  - RTOs create markets for energy products: Capacity, energy, and ancillary services

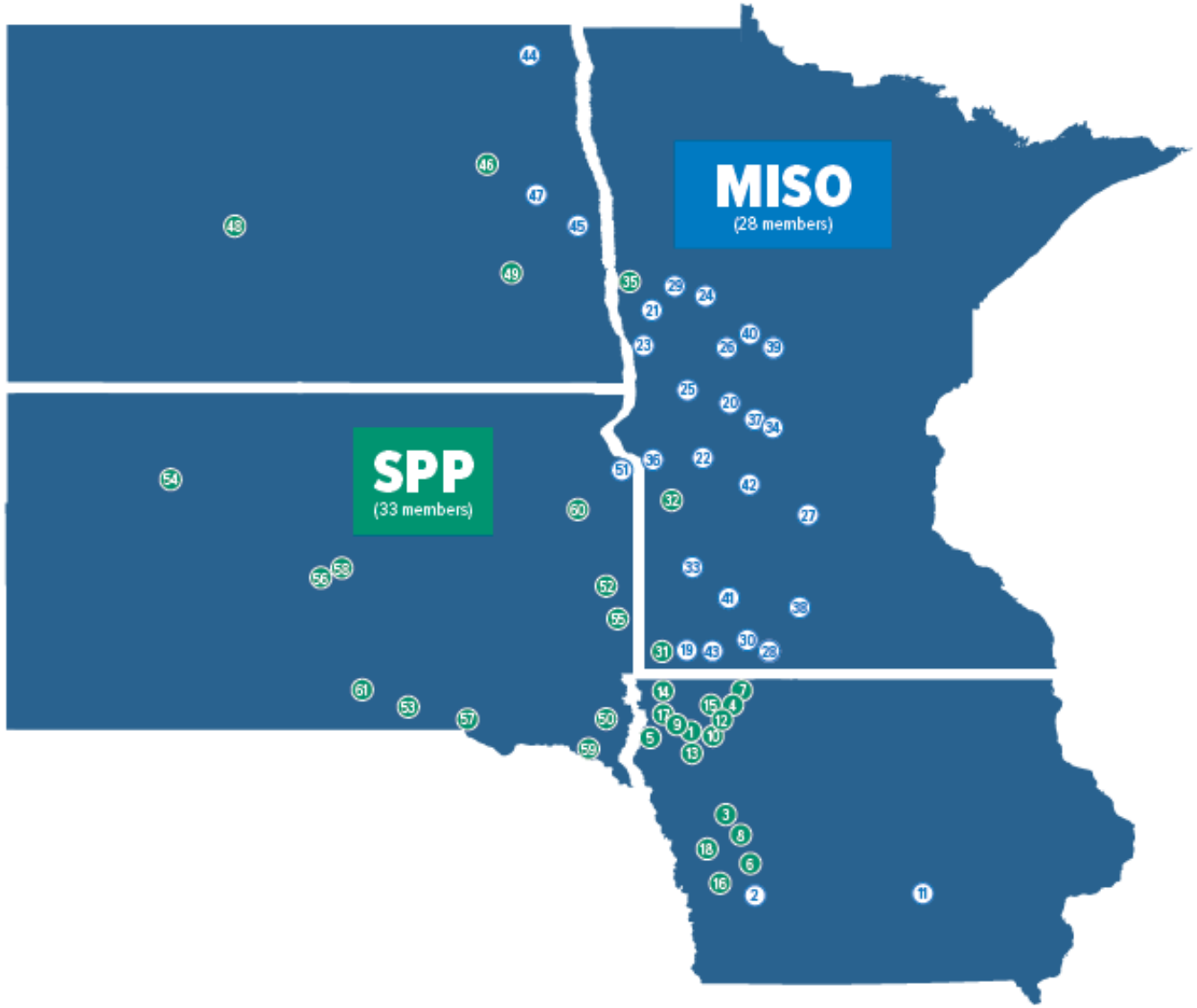
Regional Transmission Organizations

- MRES: SPP and MISO





MRES Members in MISO & SPP



IOWA

1. Alton
2. Atlantic
3. Denison
4. Hartley
5. Hawarden
6. Kimballton
7. Lake Park
8. Manilla
9. Orange City
10. Paullina
11. Pella
12. Primghar
13. Remsen
14. Rock Rapids
15. Sanborn
16. Shelby
17. Sioux Center
18. Woodbine

MINNESOTA

19. Adrian
20. Alexandria
21. Barnesville
22. Benson
23. Breckenridge
24. Detroit Lakes
25. Elbow Lake
26. Henning
27. Hutchinson
28. Jackson
29. Lake Park
30. Lakefield
31. Luverne
32. Madison
33. Marshall
34. Melrose
35. Moorhead
36. Ortonville
37. Sauk Centre
38. St. James
39. Staples
40. Wadena
41. Westbrook
42. Willmar
43. Worthington

NORTH DAKOTA

44. Cavalier
45. Hillsboro
46. Lakota
47. Northwood
48. Riverdale
49. Valley City

SOUTH DAKOTA

50. Beresford
51. Big Stone City
52. Brookings
53. Burke
54. Faith
55. Flandreau
56. Fort Pierre
57. Pickstown
58. Pierre
59. Vermillion
60. Watertown
61. Winner

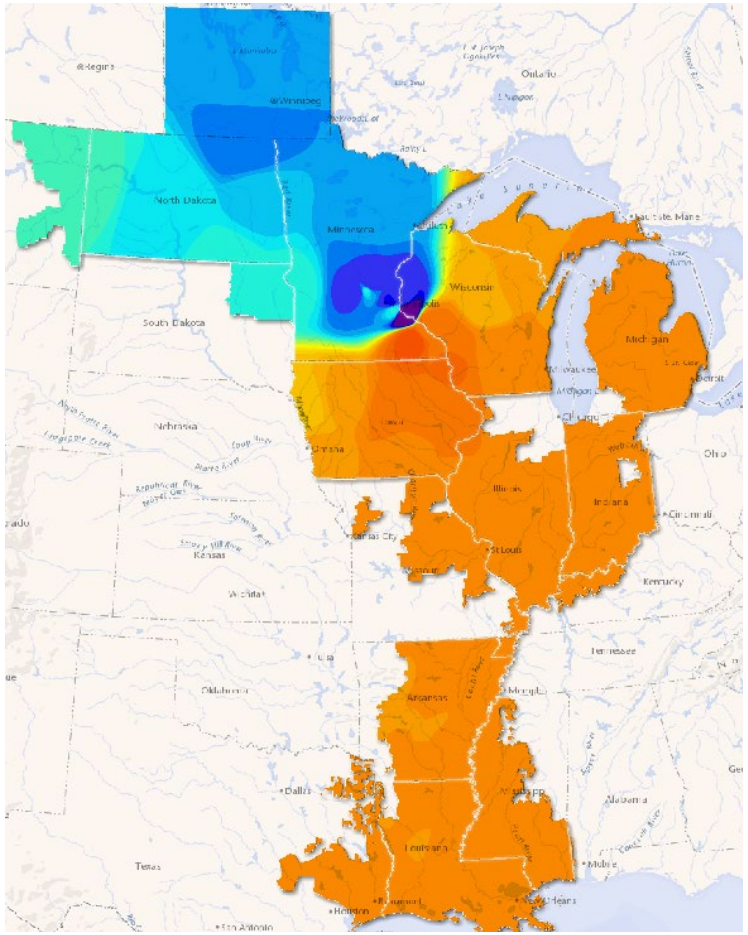
Day-Ahead/Real-Time Markets

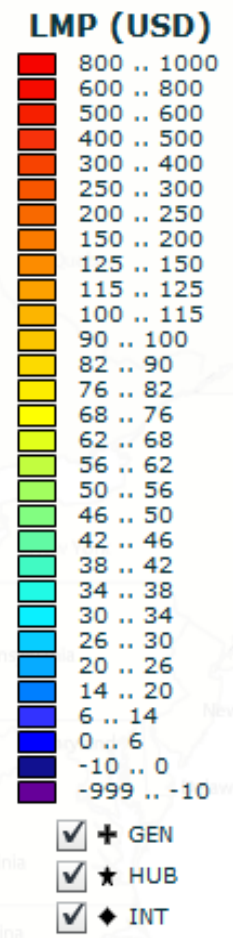
- Day-Ahead (DA) market is a forward, financially binding market
  - Based on generation offers and demand bids (9:30 am market close in both RTOs)
  - Market participants (MP) are financially bound by their bids and offers
  - If a unit unable to perform to its DA award, MP subject to volatility of RT pricing
- Real-Time (RT) market is a balancing market that responds to deviations
  - RT pricing is based on actual loads and RT offers
- DA/RT clearing process determines which generators operate and what levels they are dispatched
- Markets select the least cost resources first – generally wind, solar, nuclear, and hydro. When loads high and these resources unavailable, markets commit more $$ expensive resources i.e. fuel oil units

RT MISO locational marginal price (LMP) contour map

August Peak – 10:00 am

5-min price signals

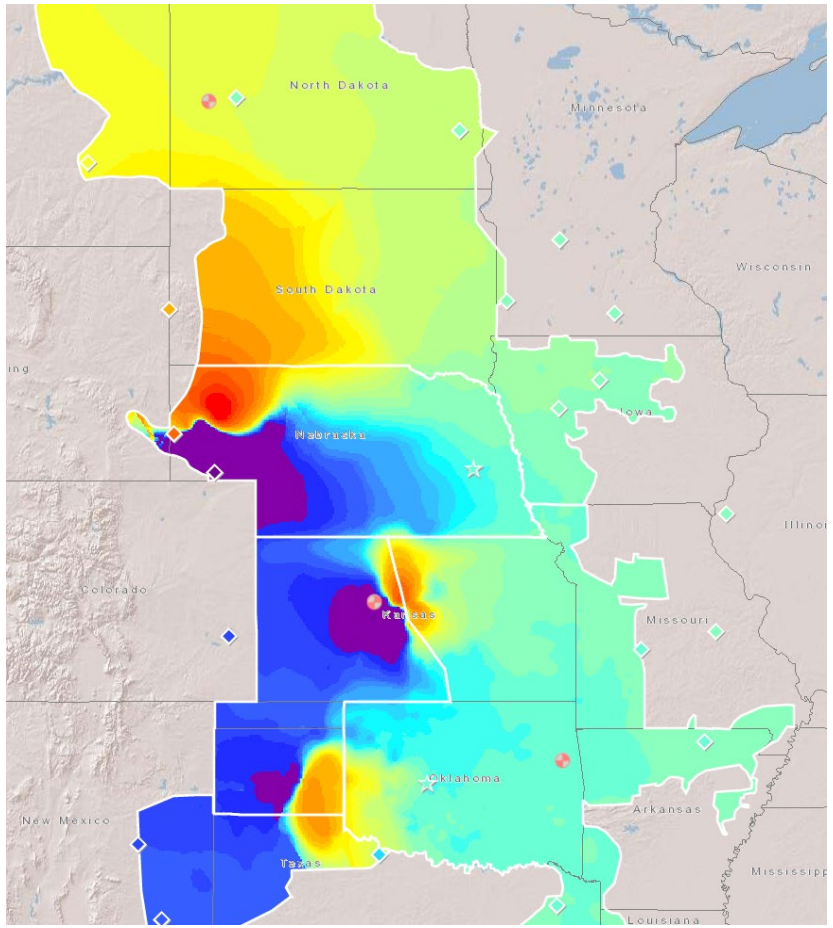




RT SPP LMP contour map

November – 8:00 am

5-min price signals

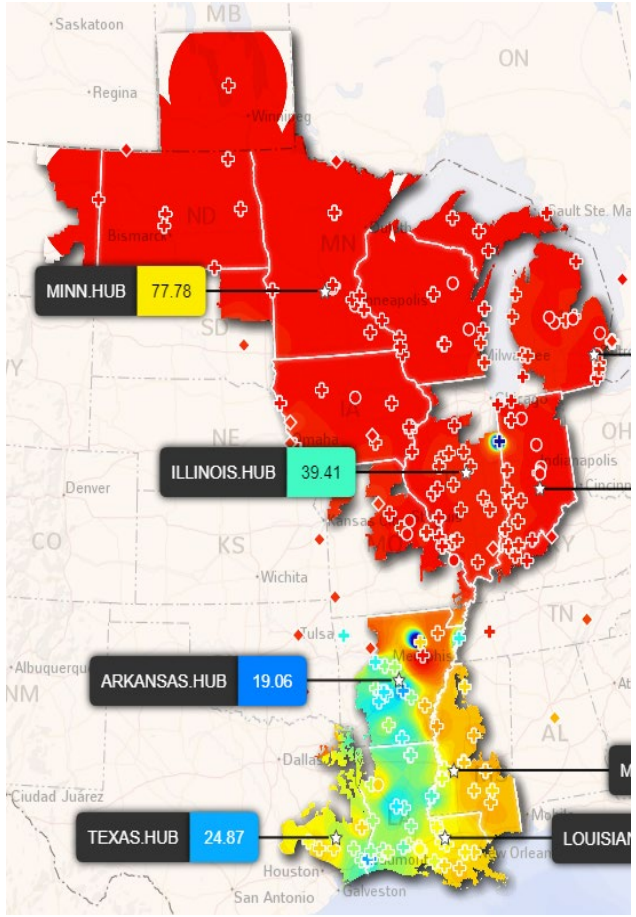


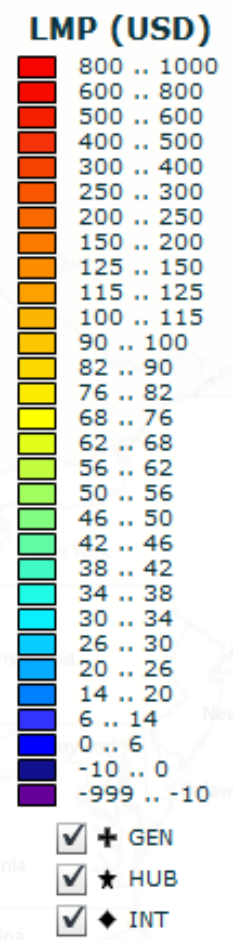


RT MISO LMP contour map

January Peak – 8:15 am

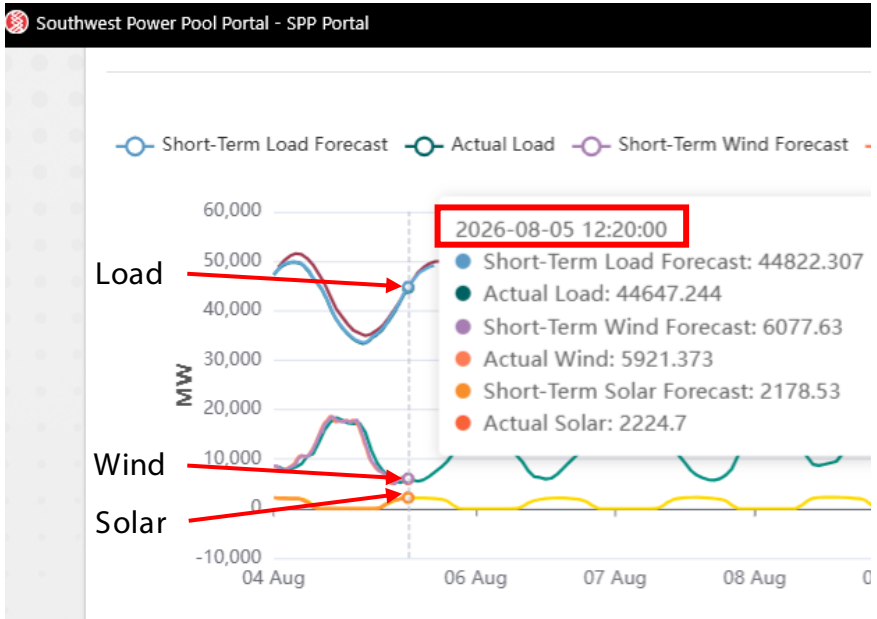
5-min price signals





Impacts of Wind/Solar on RTO Markets

Market/Node		Avg	Peak	Off	HE1	HE2	HE3	HE4	HE5	HE6	HE7	HE8	HE9	HE10	HE11	HE12	HE13	HE14	HE15	HE16	HE17	HE18	HE19	HE20	HE21	HE22	HE23	HE24
LMP Main																												
SPPIM MISO	RT LMP	30.00	37.00	20.67	20.52	19.23	**16.34**	16.46	23.08	28.38	27.22	26.53	33.64	34.40	30.16	41.75	**68.80**	33.46										
	DA LMP	33.42	39.30	21.64	22.53	20.81	19.08	**18.54**	20.35	21.52	23.36	25.41	28.45	29.29	32.03	35.37	37.38	39.64	41.22	45.76	49.67	54.97	54.70	**55.98**	43.55	32.03	29.57	20.74



SPP – 8/5 12:20 pm

Decrease in solar/wind with increase in loads leads to higher $$ LMP prices and commitments of more expensive units potentially on fuel oil

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Questions?

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