NARUC Summer Policy Summit

Subcommittee on Clean Coal and Carbon Management
Sunday, July 14 | 4:00 – 5:00 pm ET

Safeguarding Grid Reliability in a New Era of Load Growth

Moderator: Hon. Mary Throne, Wyoming

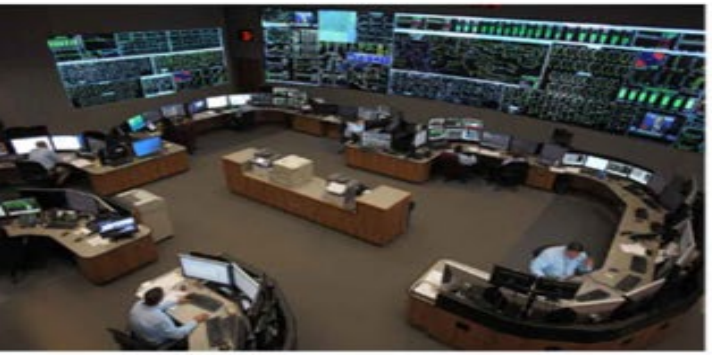
Panelists:
Fritz Hirst, North American Electric Reliability Corporation
Rob Gramlich, Grid Strategies LLC
Jean Schafer, Basin Electric Power Cooperative
Michelle Bloodworth, America's Power

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

2023 Long-Term Reliability Assessment Overview

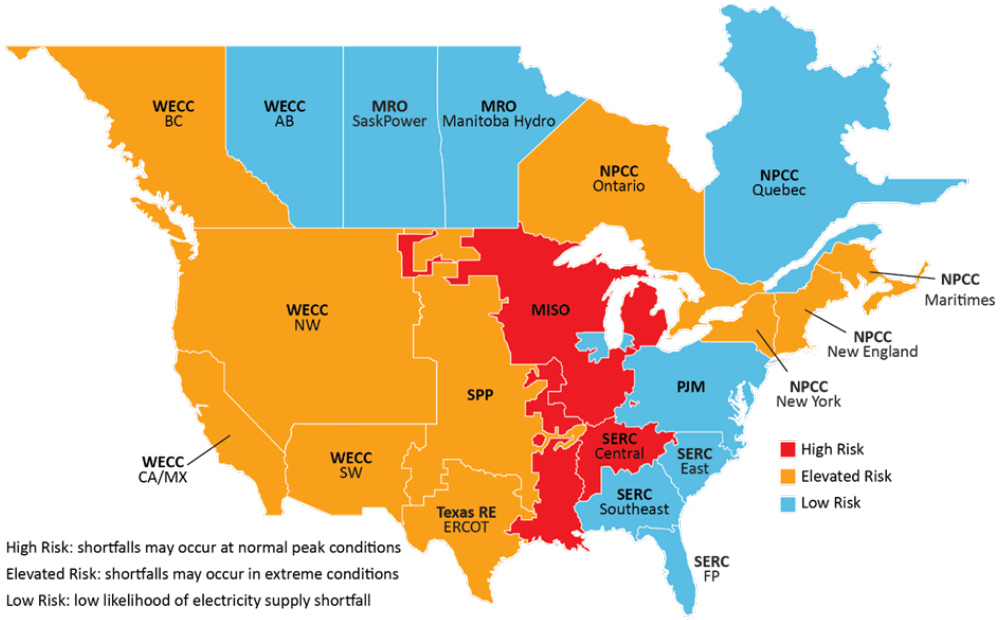
Fritz Hirst, Vice President, Government Affairs
NARUC Subcommittee/Staff Subcommittee on Clean Coal and Carbon Management
July 21, 2024

RELIABILITY | RESILIENCE | SECURITY



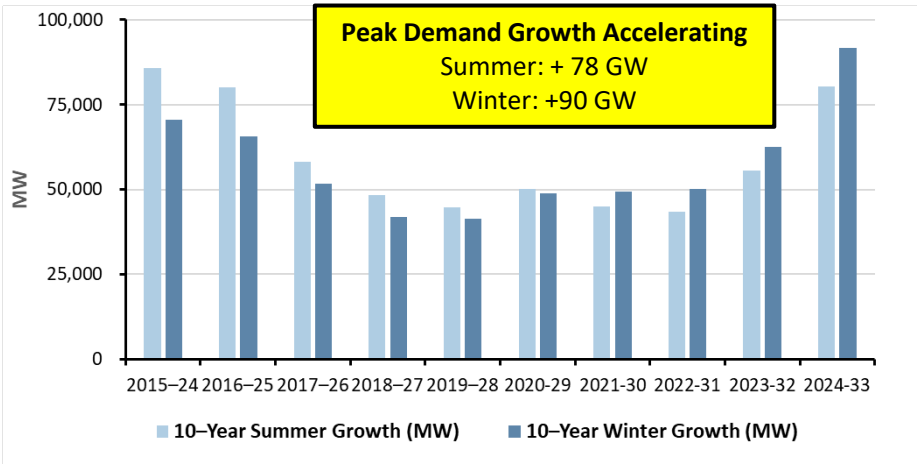

2023 LTRA Findings

- Growing number of areas face capacity and energy risks in the next 10 years
  - Generator retirements expected before sufficient replacement resources will be in service
  - Energy risks identified in areas where future resource mix is not balanced between dispatchable and variable energy resources
- **Higher demand forecasts, additional generator retirements, and changing resource mix contribute to expanding risk area**

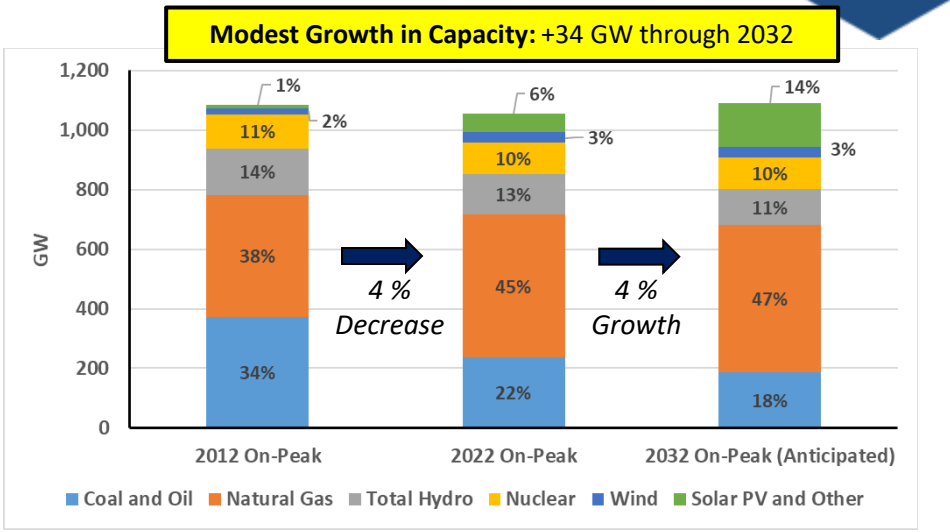


Risk Area Summary 2024-2033

Past…Present…Future



10-year Peak Demand Growth Projection



Generation On-Peak Capacity

Demand

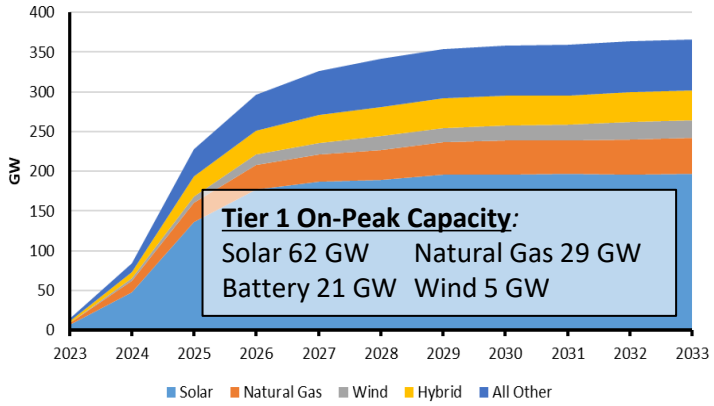
- Highest demand and energy growth rates in recent years
- Northeast and Southeast become winter peaking in late years
- New load behavior is changing daily load profile, challenges operational forecasting

Supply

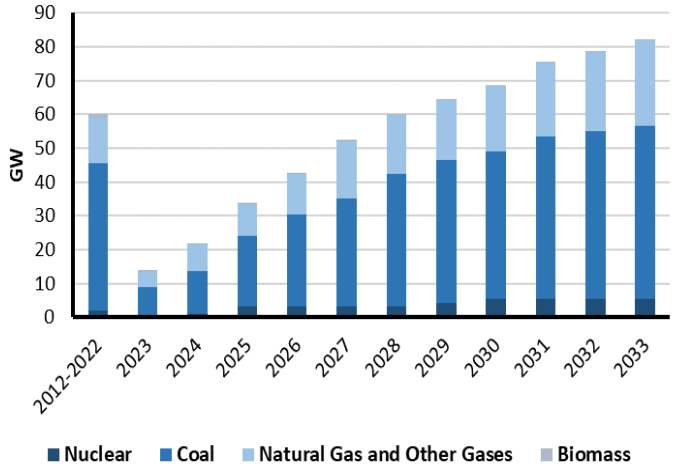
- Total capacity growth of 34 GW over next 10 years (additions – retirements)
- Most additions are Solar (69 GW)
- Retirements: 83 GW through 2033
- Anticipated additions and retirements reflect current planning

Changing Resource Mix

- Resource changes in the LTRA Risk Assessment (through 2033):
  - 117 GW of new resource additions (Tier 1)
  - 83 GW of fossil-fired and nuclear generator retirements
  - Reflects additions and retirements with the highest confidence
- More resources in early planning (Tier 2)
  - Solar, battery, and wind
- More fossil-fired retirements are likely
- Imbalance of generator retirements and resource additions challenges the ability to serve growing demand



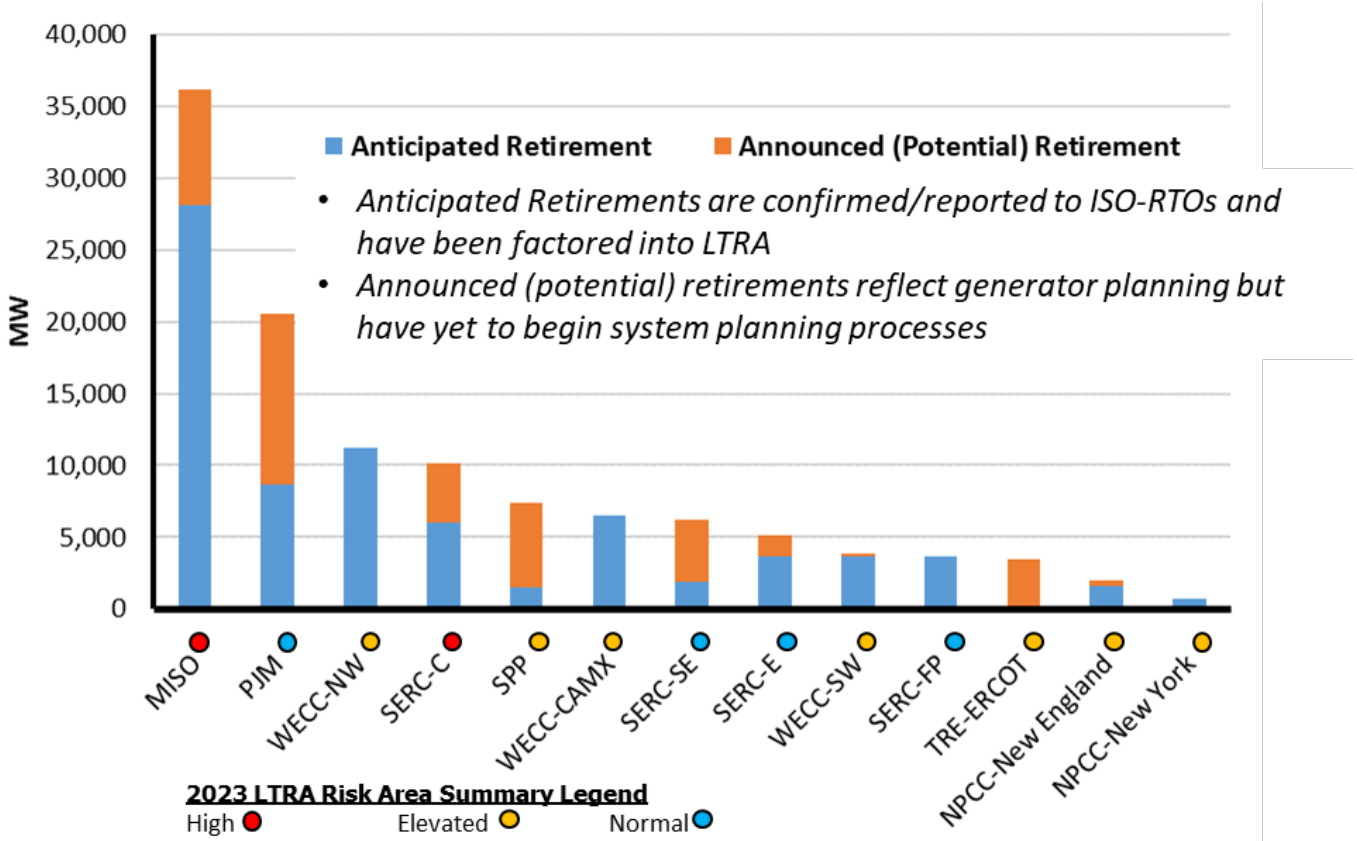
Tier 1 and 2 Resource Additions



Anticipated Generation Retirement Capacity

Generator Retirements Analyzed

- Many areas where future capacity and energy shortfalls are projected are facing additional generator retirements



Anticipated and Potential Generator Retirement Capacity through 2033

Recommendations

The *2023 LTRA* contains actionable recommendations to meet accelerating demand growth as grid transformation continues

1. Add new resources with needed reliability attributes, manage retirements, and make existing resources more dependable
2. Expand the transmission network to deliver supplies from new resources and locations to serve changing loads
3. Adapt BPS planning, operations, and resource procurement markets and processes for a more complex power system
4. Strengthen relationships among policymakers and reliability stakeholders

Questions and Answers

NARUC Summer Policy Summit

Subcommittee on Clean Coal and Carbon Management
Sunday, July 14 | 4:00 – 5:00 pm ET

Safeguarding Grid Reliability in a New Era of Load Growth

Moderator: Hon. Mary Throne, Wyoming

Panelists:
Fritz Hirst, North American Electric Reliability Corporation
Rob Gramlich, Grid Strategies LLC
Jean Schafer, Basin Electric Power Cooperative
Michelle Bloodworth, America's Power

Safeguarding Reliability

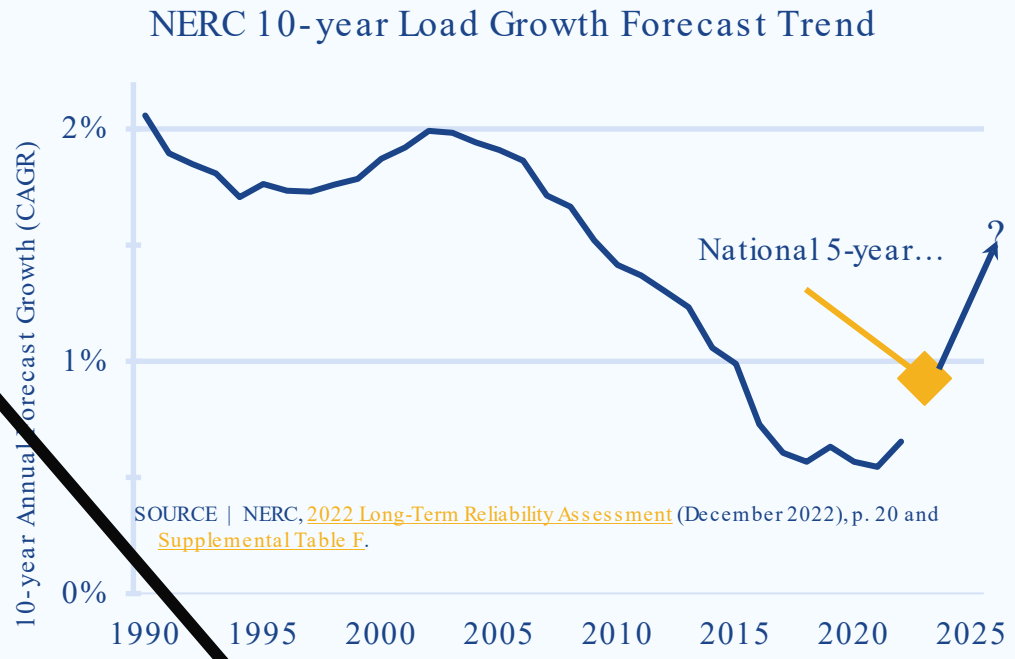
Rob Gramlich

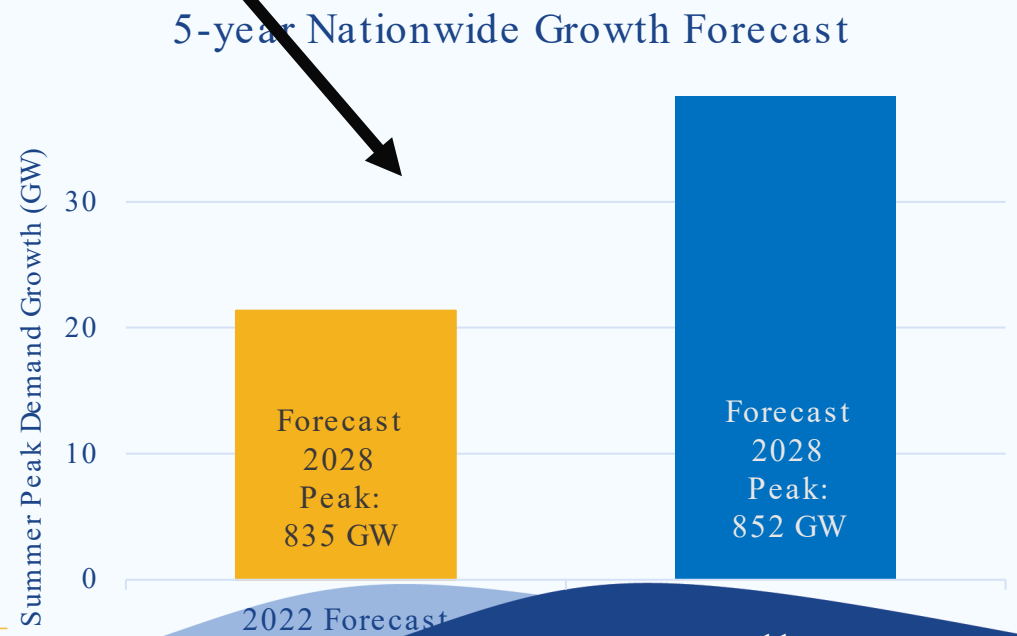
NARUC Summer Meetings July 2024

The Era of Flat Power Demand is Over

- 5-yr US load growth forecast doubled in 1 yr
- >=3%/yr growth: GP, Dominion, APS, ERCOT.
- Drivers: new manufacturing, industrial, data centers, EVs, heat pumps.
- Manufacturing: $481 billion in commitments since 2021 - over 200 facilities announced in 2023
- Data center growth alone may contribute 1% per year

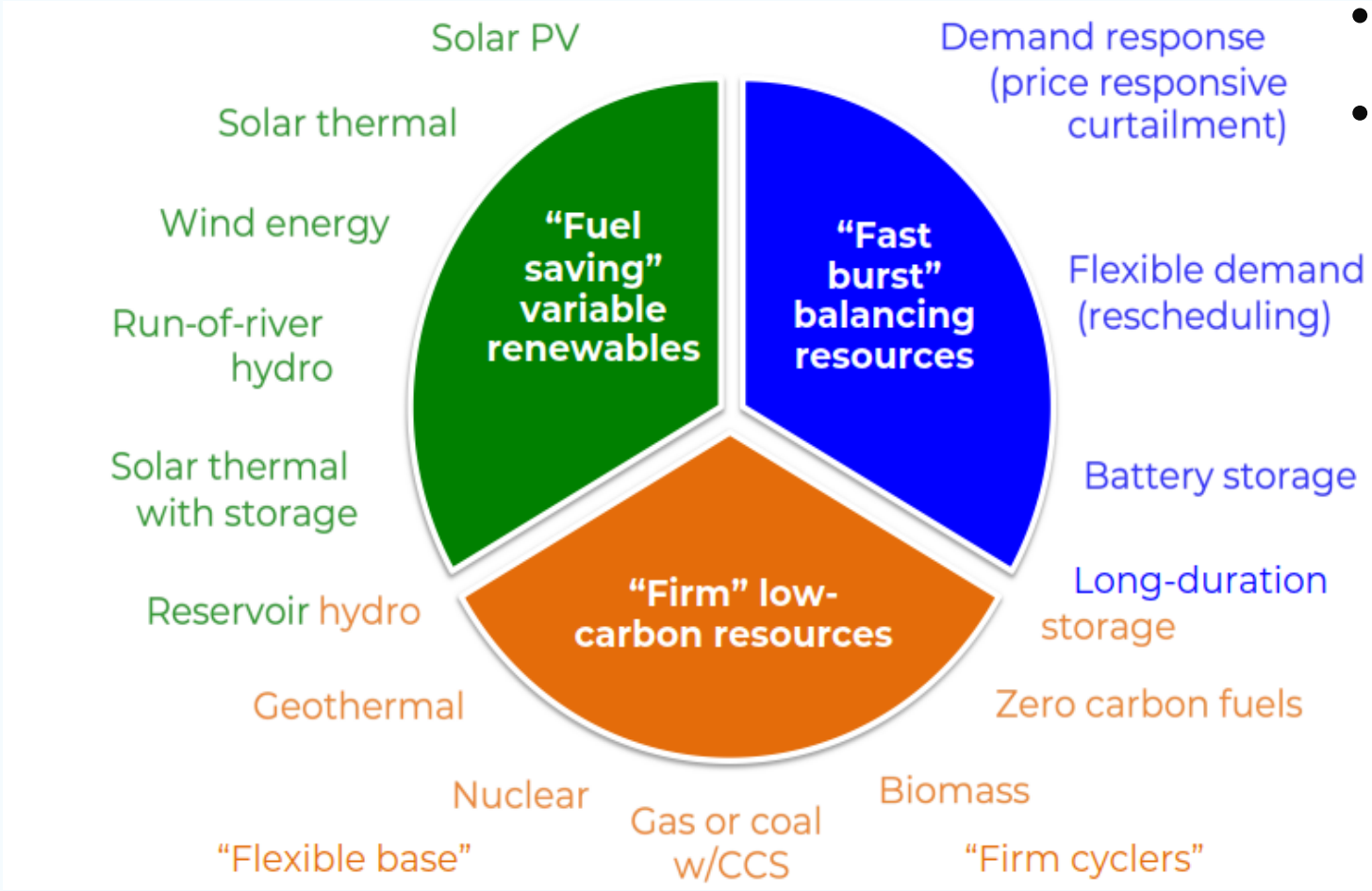
https://gridstrategiesllc.com/wp-content/uploads/2023/12/National-Load-Growth-Report-2023.pdf



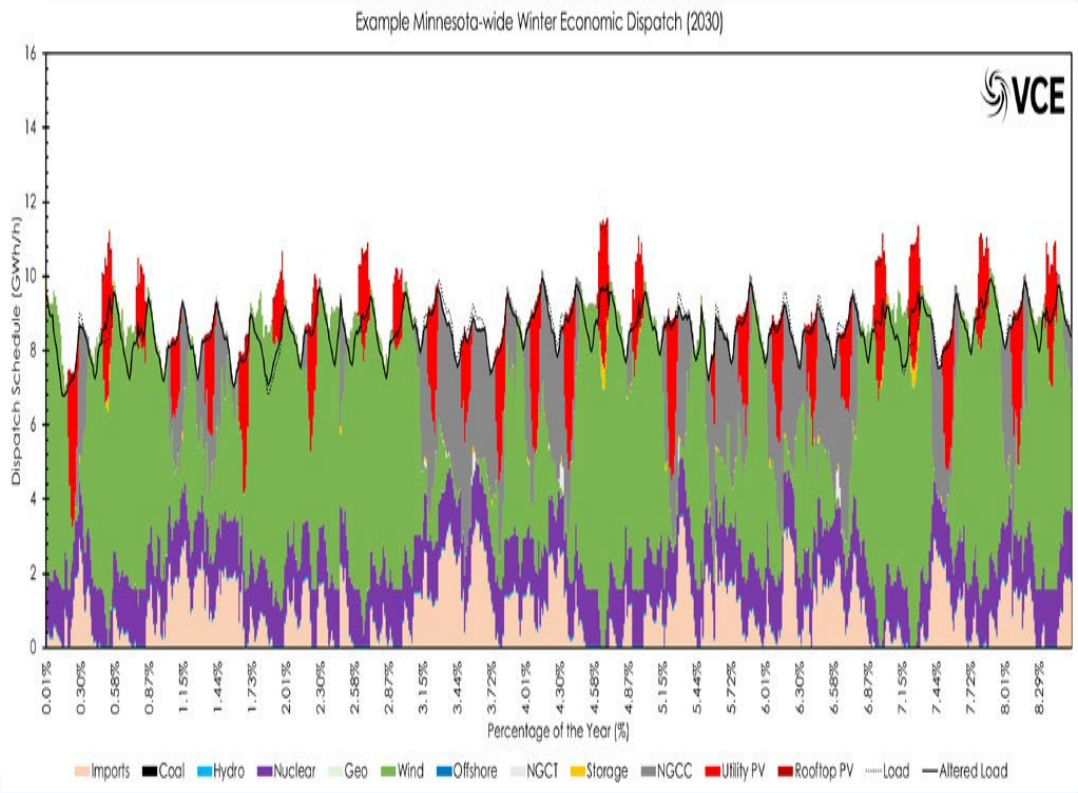


GridStrategies

Resource Adequacy Requires Balanced Generation Portfolios



- Wind, solar, imports serve most load
- Also need firm resources



Sepulveda, N., Jenkins, J.D., et al. (2018), "The role of firm low-carbon resources in deep decarbonization of electric power systems," Joule 2(11).

Top 10 Actions that Improve Reliability

1. Harden distribution systems
2. Gas reliability oversight, standards
3. Expand transmission—best insurance
   - HVDC, advanced transmission tech
4. Environmental regulation flexibility
   - Allow capacity, regulate output
5. Probabilistic, scenario capacity planning
6. Shift to "energy adequacy" (24x7x365) vs peak load adequacy
7. Inertia preservation and expansion
   - Synchronous condensers, grid forming inverters, inverter-based resource frequency support, minimum inertia.
8. Use existing mechanisms: IRPs, NERC standards, RTO protocols
9. Increase flexibility/ramping capacity
   - Accurate pricing of flexibility, ancillary services. Scarcity pricing.
   - Faster dispatch increments (5 minutes or less)
   - Grid-Enhancing Technologies (sometimes line ratings are over-stated)
   - Geographically broad regional markets
   - Flexible demand—state PUC actions
10. Long term generation procurement by LSEs

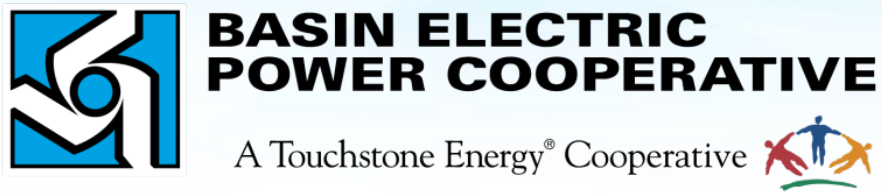
NARUC Summer Policy Summit

Subcommittee on Clean Coal and Carbon Management
Sunday, July 14 | 4:00 – 5:00 pm ET

Safeguarding Grid Reliability in a New Era of Load Growth

Moderator: Hon. Mary Throne, Wyoming

Panelists:
Fritz Hirst, North American Electric Reliability Corporation
Rob Gramlich, Grid Strategies LLC
Jean Schafer, Basin Electric Power Cooperative
Michelle Bloodworth, America's Power



Generation Attributes and Markets

Jean Schafer

Senior Legislative Representative

Basin Electric Snapshot

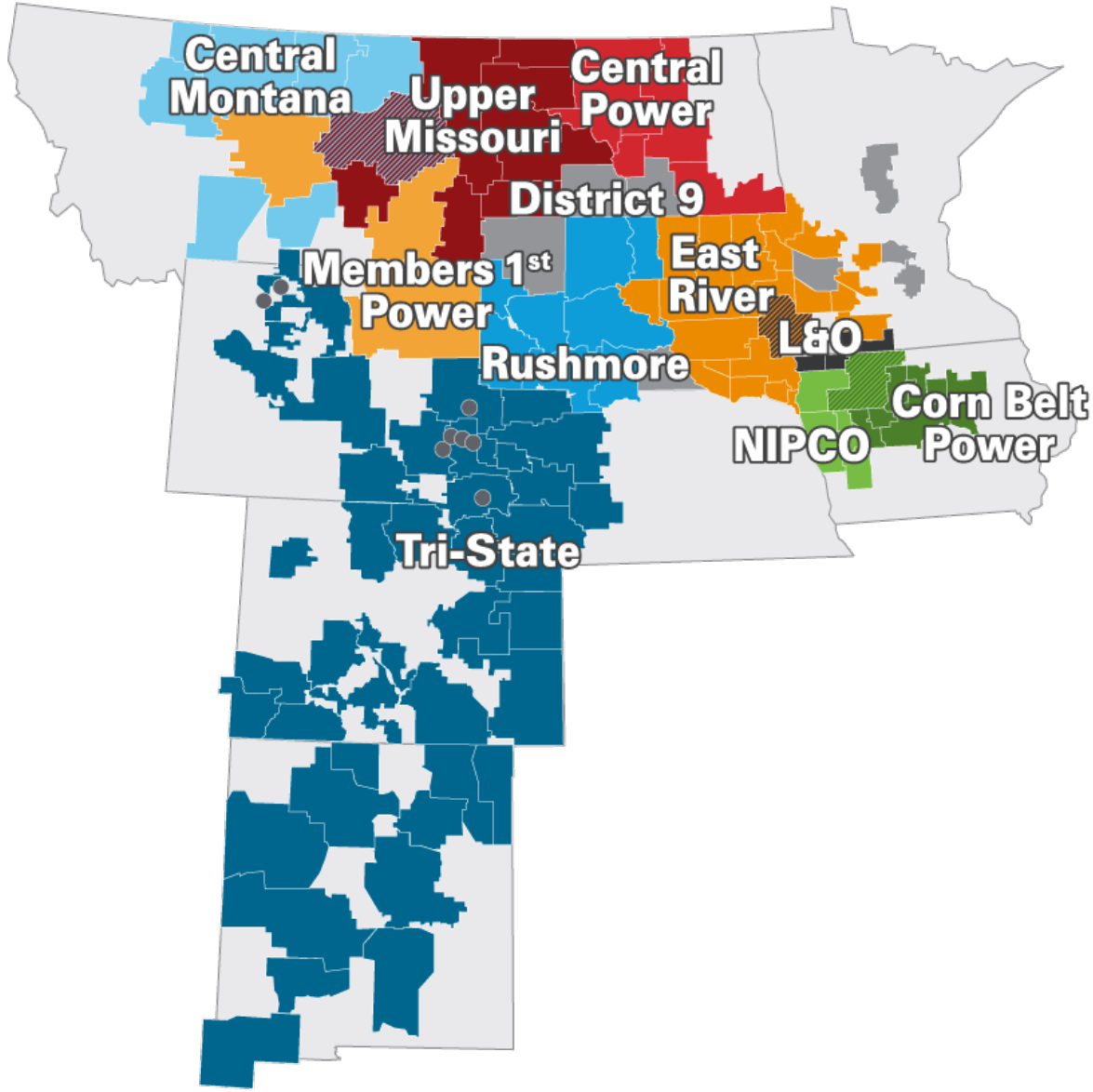
140 Members in 9 States

3 million consumer-owners

Over 7,000 megawatts of winter capability

Largest G&T by operating revenues, MWhs and geographic territory served

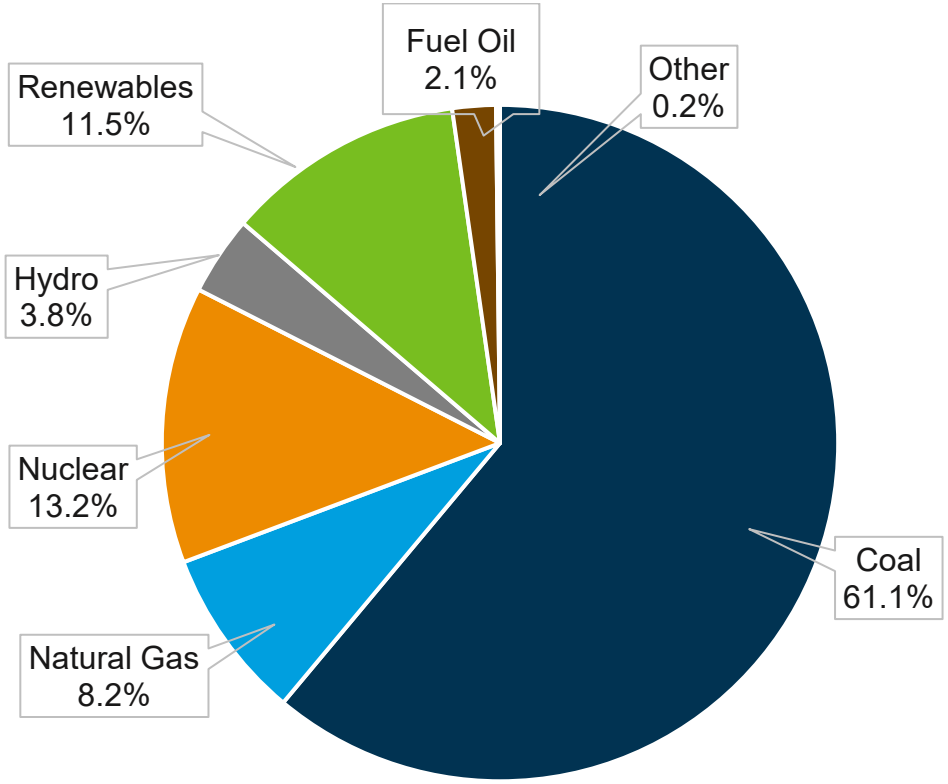
2nd largest G&T by assets



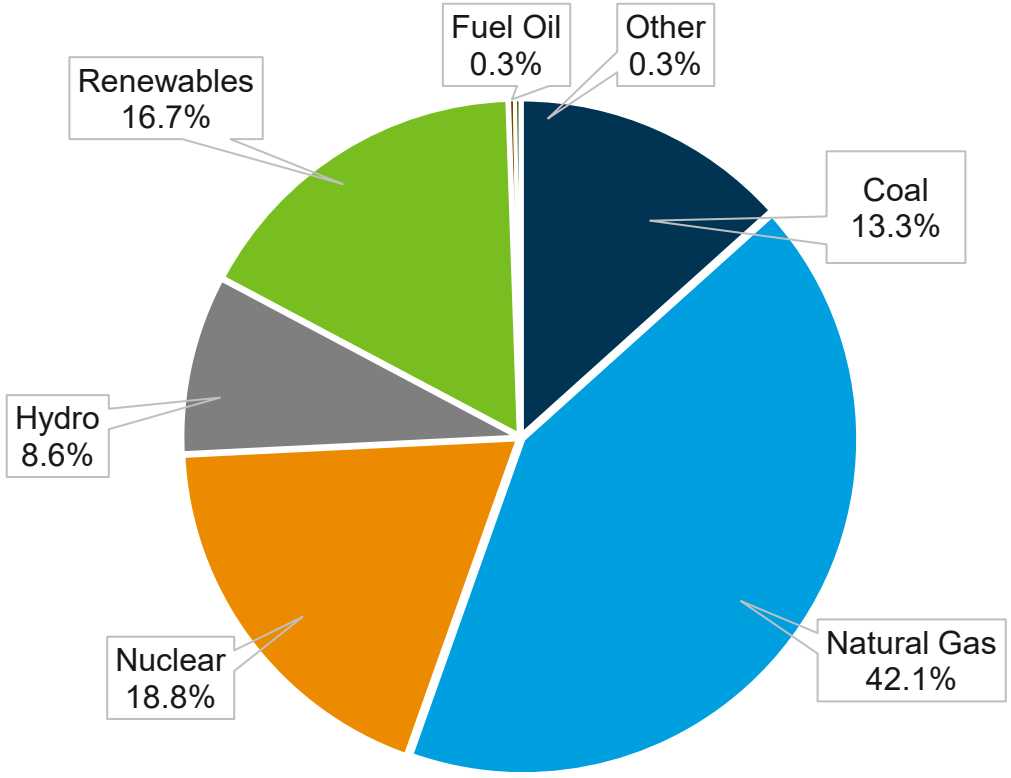
Mix of Generation Resources

The mix of resources used to generate electricity is changing dramatically…

2001 Net Generation, All Sectors



2023 Net Generation, All Sectors *(May)*



Source: Department of Energy, Energy Information Administration

Generation Attributes

Attributes of Baseload

- Coal and nuclear generation are 24/7 dispatchable and rampable power production
- 70-95% Capacity Factor

Coal

- Coal plants are less flexible than gas generation – fixed fuel cost
- It can take several hours, possibly days, to completely shut down and startup a coal plant
  - If a coal plant is not price competitive it will normally reduce output to minimum levels instead of shutting down – 40% capacity
  - Potentially selling power at a loss until the market price increases (loads increase or wind generation reduces)
  - Occurring less frequent with Economic Dispatch
  - Fuel is onsite – 30- 45-day supply

Attributes of Natural Gas

Natural gas generation can be used for:

- Peaking
- Intermediate
- Baseload
- 5-90% Capacity Factor (price and supply)

Natural Gas

- Natural gas can be a very low-cost fuel source - fluctuates
- Natural gas has the ability to respond faster to load changes than coal-based generation
- Depending on price, natural gas generation can be dispatched before or after coal generation
- Natural gas has higher transportation interruption risks than coal

Attributes of Renewables

- Wind and solar are intermittent power with annual capacity factors of 20-50% (less up north)

Wind

- Wind has zero variable (fuel) cost and priced into the market at zero, or below all other generation costs
  - Use Production tax credits (PTCs)
    - Wind owners benefit for 10 years
    - All Federal taxpayers fund PTCs
    - Possible for negative pricing due to “take or pay provisions”
  - Generally, wind is dispatched when it runs
    - Recent RTO changes have shifted wind to curtailable
    - All SPP projects are converted
  - Wind facilities lifespan are 20-30 years
    - Repowering of projects is starting to occur

Electricity Markets

Southwest Power Pool (SPP)

- 105,454 MW Capacity
- 31,217 MW Wind
- Large penetration of wind generation
- *Basin Electric units are in SPP*

Midcontinent Independent System Operator (MISO)

- 190,000 MW Capacity
- 30,400 MW Wind
- Has capacity for more wind generation

Utility Concerns…

- Generators, like baseload coal and nuclear, are not being adequately compensated for the services, such as 24/7 operation
  - Baseload units retiring without adequate replacements
- RTO rules are shifting to allow more diverse market-based incentives
  - Developing policies to enhance reliability – **takes time**
- Newest - Cost impacts of transmission capacity for new generation

Questions?

SPP Concurrent Rule Revisions

- Performance Based Accreditation
  - Values – conventional resources that are reliable and available to perform when needed most
  - Incents – underperforming resources to improve
- Increased Planning Reserve Margin
  - 12-15% in 2023
- Winter Requirement – separate from summer
- Effective Load Carrying Capability Accreditation – Renewables vs Baseload
- Demand Response Accreditation
- Outage Policy – All units can't go down at once
- Weighted Performance Based Accreditation – North vs South
- GI Queue Backlog Mitigation
- Transmission Evaluation

NARUC Summer Policy Summit

Subcommittee on Clean Coal and Carbon Management
Sunday, July 14 | 4:00 – 5:00 pm ET

Safeguarding Grid Reliability in a New Era of Load Growth

Moderator: Hon. Mary Throne, Wyoming

Panelists:
Fritz Hirst, North American Electric Reliability Corporation
Rob Gramlich, Grid Strategies LLC
Jean Schafer, Basin Electric Power Cooperative
Michelle Bloodworth, America's Power

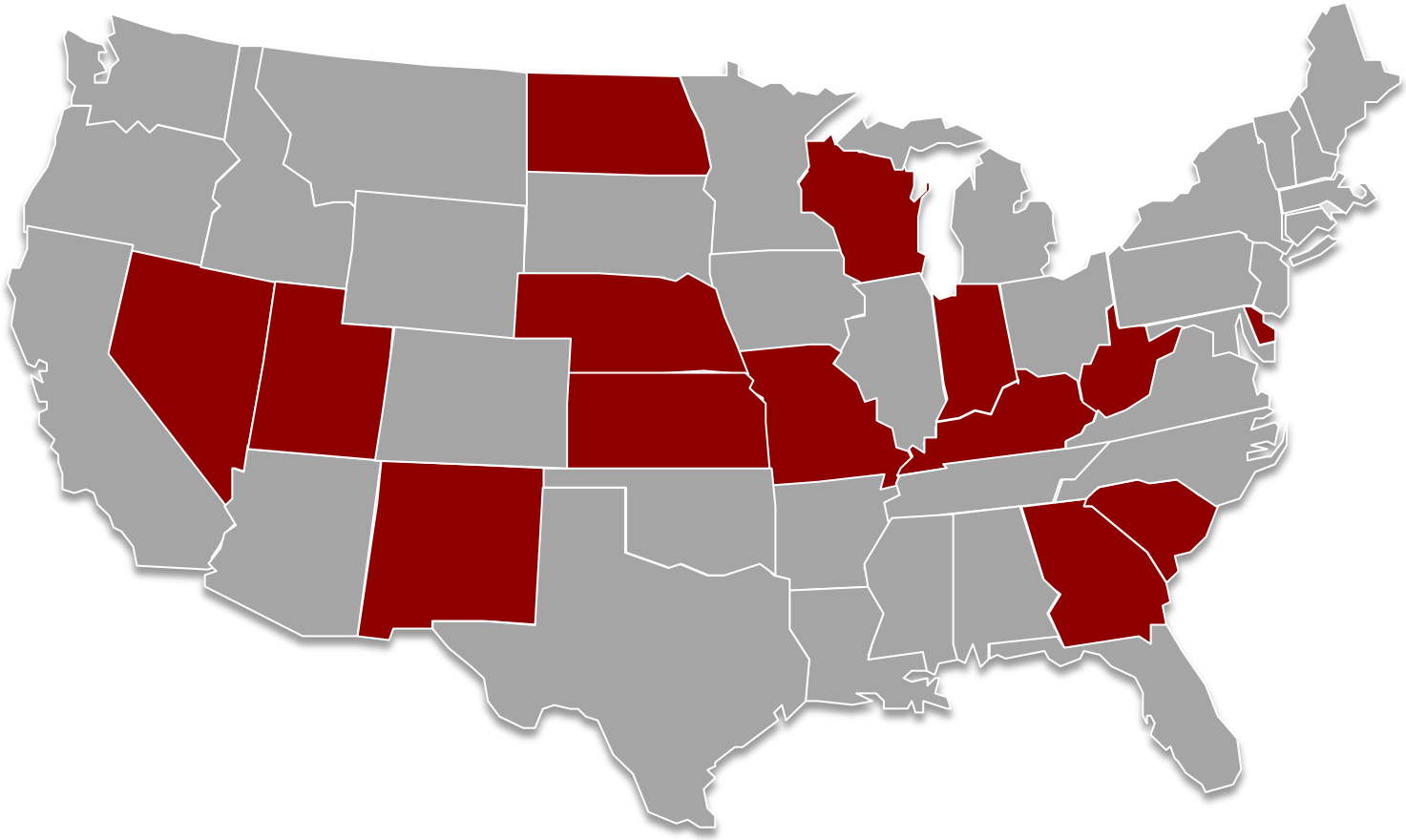
Safeguarding Grid Reliability in a New Era of Load Growth

NARUC Summer Policy Summit

July 14, 2024

Michelle Bloodworth
President and CEO, America's Power

Utilities in 14 states (red) have reversed or delayed over 14,000 MW of coal retirements because of reliability concerns or load growth



Reliability attributes

Grid operators are concerned about maintaining reliability attributes as the grid transitions. MISO is considering six reliability attributes. The coal fleet is a "strong provider" of five.*

- **Fuel assurance**
- **Availability**
- **Long duration at high output**
- **Voltage stability**
- **Ramping**
- **Rapid startup**

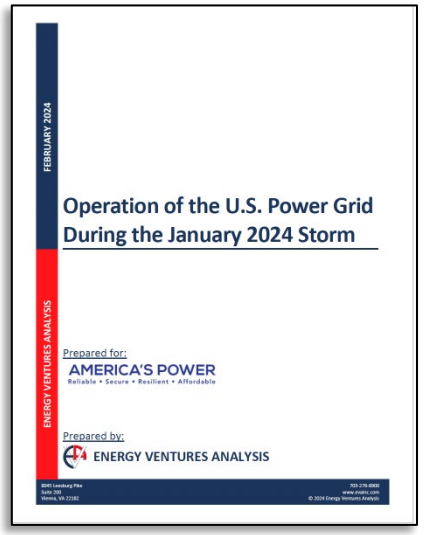
*MISO "System Attributes Stakeholder Workshop," September 21, 2022, and "Mind the Gap – OMS Resource Adequacy Summit," August 8, 2022.

Increased electricity output during recent winter storms

- Across the most impacted five regions of the US, 82% of the additional electricity needed during the January 2024 winter storm came from fossil fuels.

- Across the regions, 40% of this additional electricity came from coal.

87% from coal	53% from coal
13-State PJM region	15-State MISO region



January 2024 storm figures include increased generation in ERCOT, MISO, PJM, SPP, and SERC at peak hour.

Six EPA rules will cause more coal retirements unless overturned in court or by Congress

• Carbon Rule	Finalized April 2024
• Mercury and Air Toxics Standards	Finalized April 2024
• Effluent Limitations Guidelines	Finalized April 2024
• Ozone Transport Rule	Stayed by Supreme Court
• Coal Combustion Residuals	Being implemented
• Regional Haze	Being implemented

Reliability mechanisms for coal units

- Up to 1-year extension of the compliance deadline for affected units that encounter unavoidable delays in installing controls
  - Available to units that co-fire or install CCS
  - *Not available to units that commit to retire before 2032*
- "Remaining useful life and other factors" (RULOF) can be used to extend compliance deadlines or lessen the stringency of performance standards for affected units
  - Available to units that co-fire or install CCS
  - *Not available to units that commit to retire before 2032*
- Less stringent standard for affected units during short-term emergencies (Emergency Action Levels 2 or 3)
  - Available to units that co-fire or install CCS
  - *Not available to units that commit to retire before 2032*
- Up to 1-year extension of the retirement deadline to address reliability concerns for coal units committing to retire before 2032, co-fire with gas before 2039, or have a RULOF retirement date. (This is different from the 1-year extension in the first bullet above.)

We have been promoting five measures to avoid a reliability crisis

- Dispatchable generating capacity should not retire until replacement capacity is in operation.
- The replacement capacity should have at least the same accredited capacity and other reliability attributes as the retiring capacity.
- Any electric transmission that is needed because of the replacement capacity should be built, not simply planned or under construction. (The cost of new transmission should be considered in deciding whether it is economical to retire existing capacity.)
- Grid operators should identify and value all attributes that are necessary to maintain grid reliability.
- EPA should properly analyze the reliability impacts of its rules and design them to ensure they will not undermine reliability.

DEPENDABLE POWER FIRST

For more information, please contact

mbloodworth@americaspower.org

NARUC Summer Policy Summit

Subcommittee on Clean Coal and Carbon Management
Sunday, July 14 | 4:00 – 5:00 pm ET

Safeguarding Grid Reliability in a New Era of Load Growth

Moderator: Hon. Mary Throne, Wyoming

Panelists:
Fritz Hirst, North American Electric Reliability Corporation
Rob Gramlich, Grid Strategies LLC
Jean Schafer, Basin Electric Power Cooperative
Michelle Bloodworth, America's Power

NARUC Summer Policy Summit

This session has concluded.

The welcome reception begins at 5:00 pm in the Grand Ballroom.