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Longer Term Reliability Outlook

Challenges in the Electric-Gas Energy System

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CURENT 2024 Industry Conference

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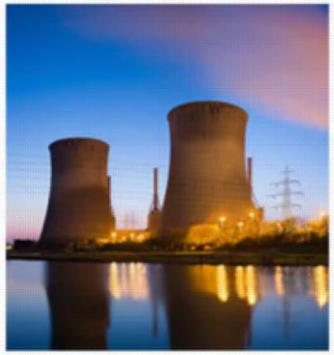
RELIABILITY | RESILIENCE | SECURITY

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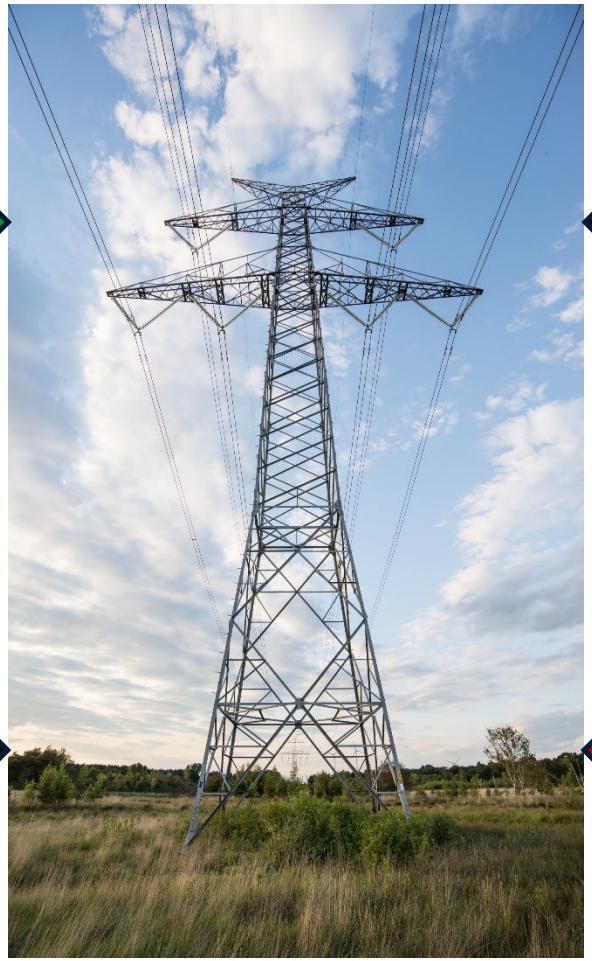
Hyper Complex Risk Environment

Rapidly Changing Resource Mix

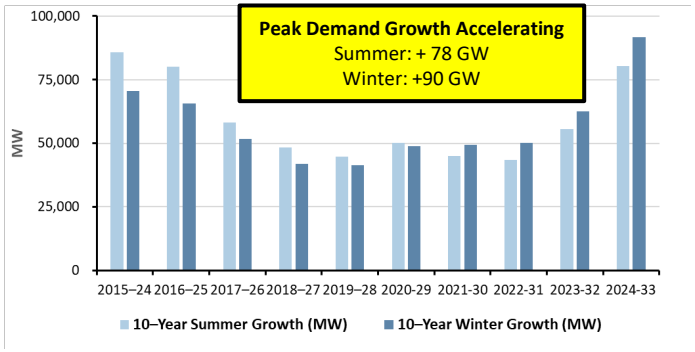
Policy-enabled Growth



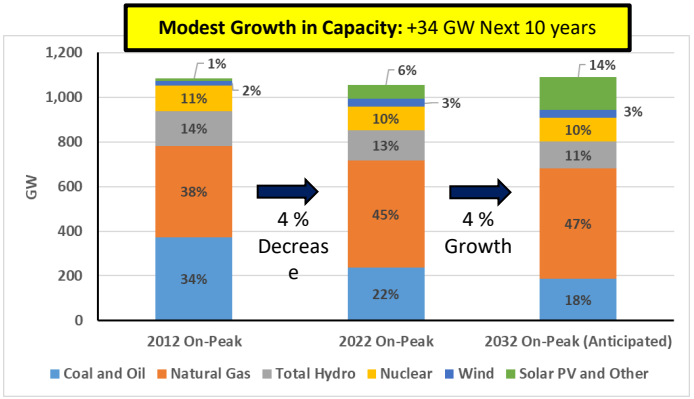
Extreme Weather Complexities

"Toxic Soup" Threat landscape

Trend: Demand Growth Outpacing Resources



10-year Peak Demand Growth Projection



Generation On-Peak Capacity

Demand

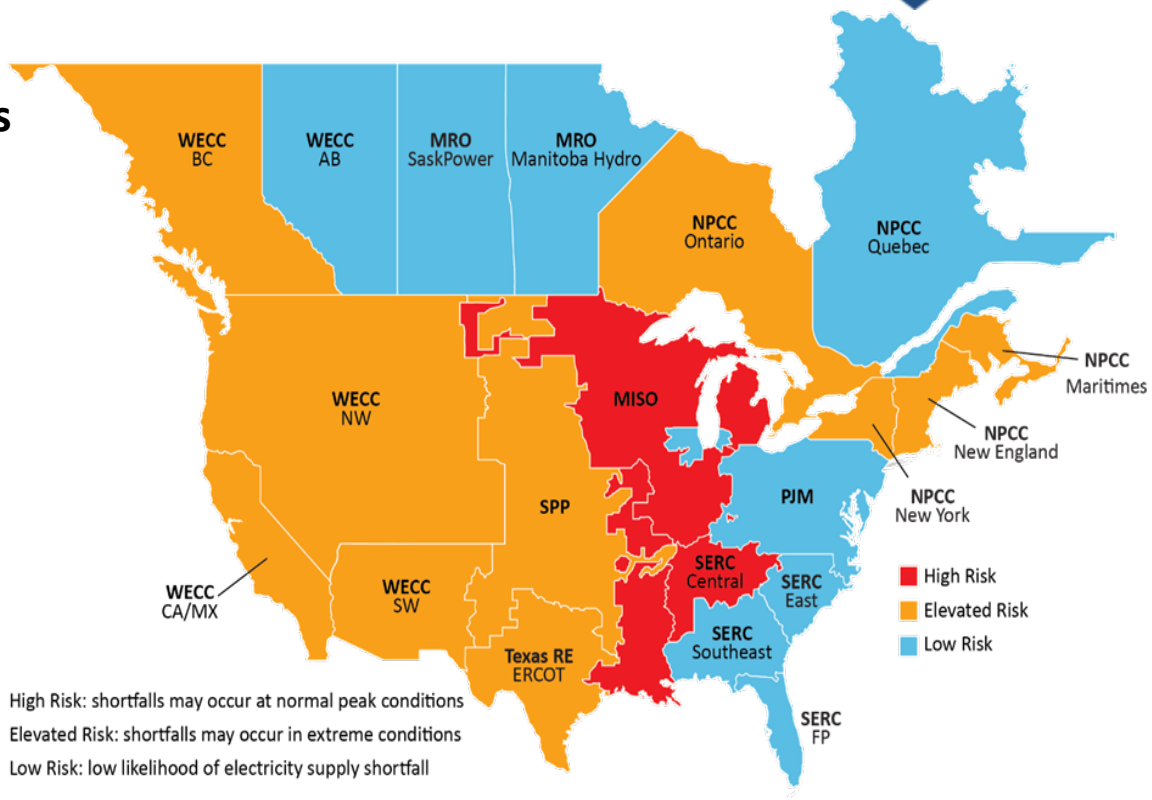
- Highest demand and energy growth rates in recent years
- Northeast and Southeast become winter peaking as early as 2028
- New load behavior is changing daily load profile, challenges operational forecasting

Supply

- Total capacity growth of 34 GW over next 10 years (Tier 1 additions – retirements)
- Most additions are Solar (69 GW)
- Retirements: 83 GW through 2033
- New emissions regulations likely to prompt additional retirements

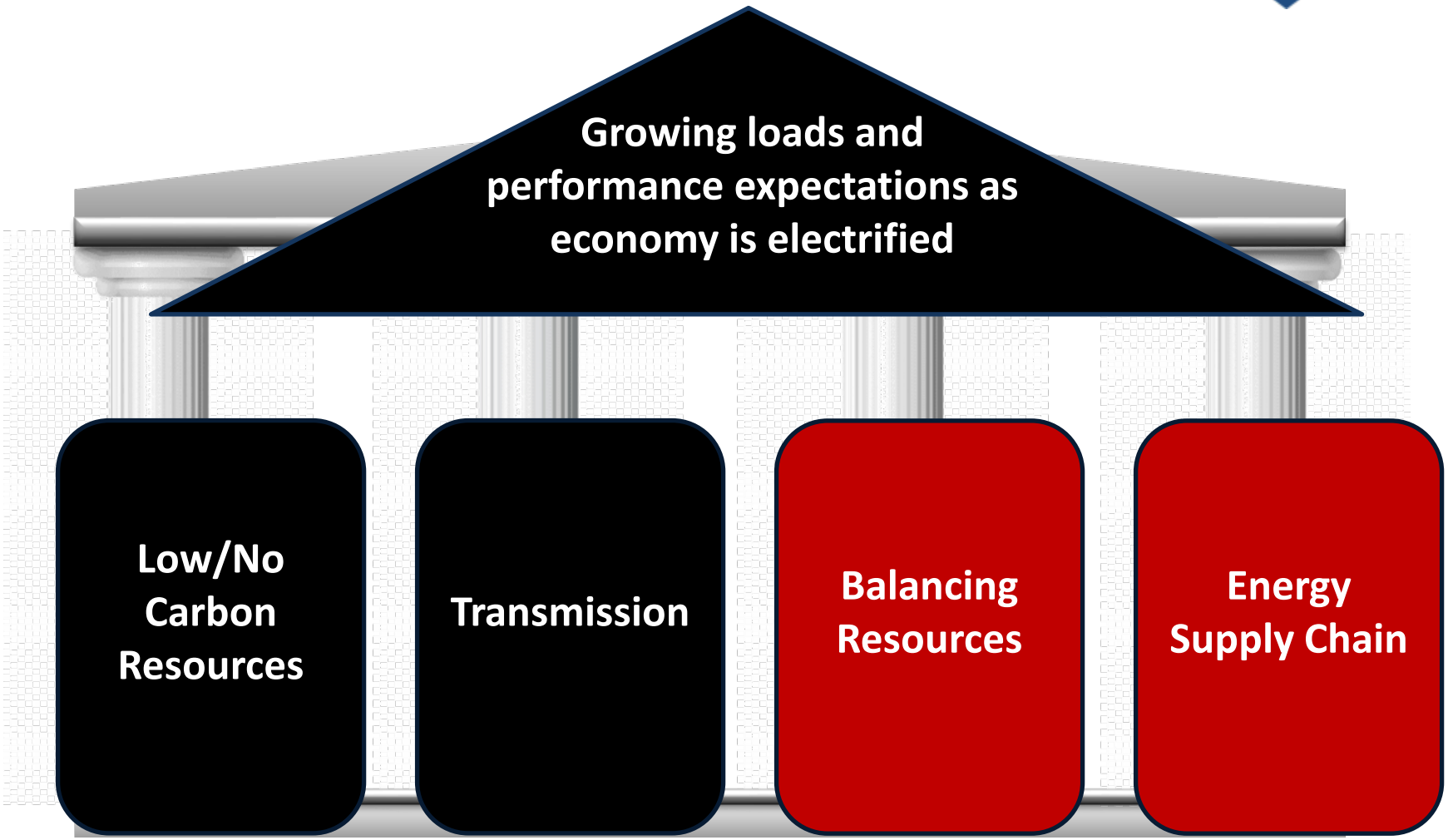
2023 LTRA Preliminary Findings

- **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 be balanced between dispatchable and variable energy resources
- Risk assessment accounts for over 80 GW in generator retirements



Risk Area Summary 2024-2033

Four Pillars of the Energy Transition



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Gas Supply Implications

SITUATION

Electricity is fundamental to society

Gas and electric systems are inextricably linked

- Uri and Elliott reviews show this in technicolor

Natural gas generation is increasingly key to electric reliability

- Flexibility to balance variable wind and solar
- Dispatchability with highly reliable availability *for the most part*
- Bulk supply of kWh (40/40)

Gas is generally the marginal fuel for power supply

COMPLICATIONS

Summer events are challenging; winter events are especially complex

Gas-electric model and conventions do not support reliability during extreme conditions

- Wellhead freeze offs
- Equipment failures
- Demand spikes

Restructured electricity markets aren't to blame

Hour to hour demand for gas (fuel) is highly uncertain, even on "good" days

PATH TO RESOLUTION

More infrastructure

- Increase deliverability
- Local storage (LNG or oil) to balance swings

Better information sharing

- Enable joint planning
- Improve situation awareness

Updated commercial practices/ conventions

Creation of a Reliability Authority (GRO)

- Functional model
- Performance based standards
- Real time coordination and prioritization

Emergency condition conservation measures

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Questions and Answers