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Assuring a Reliable BPS through the Expansion of Interregional Transfer Capability: NERC ITCS

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MGA
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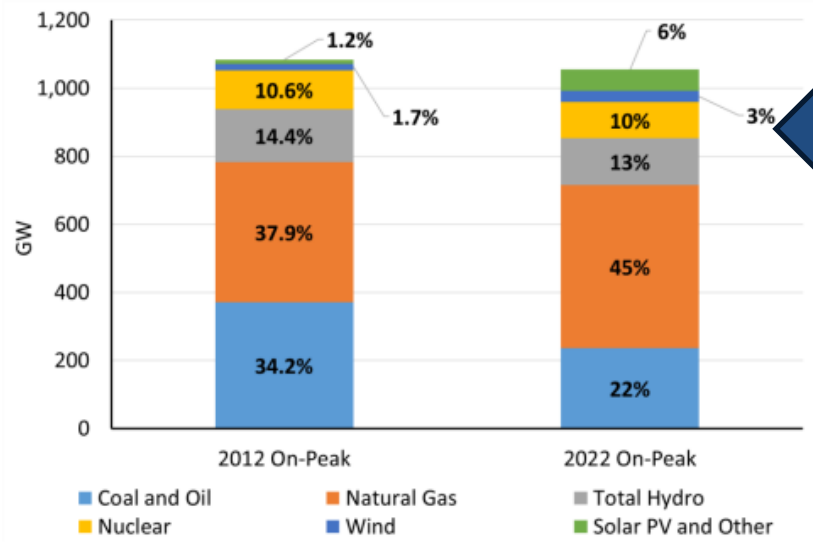
RELIABILITY | RESILIENCE | SECURITY



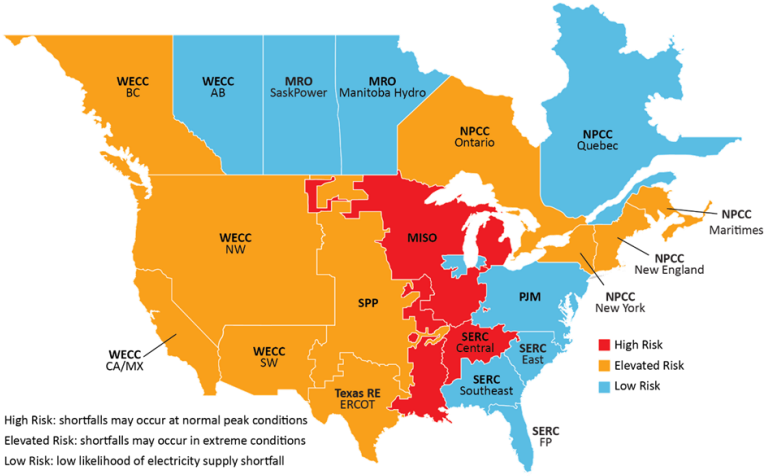

Across an Interconnected System:
Less Resources Means More Reliance on Neighbors

2012 and 2022 Peak Capacity Resource Mix NERC-Wide

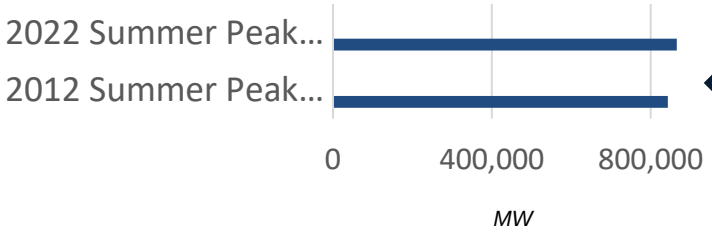


4% Decrease

2024-2033 Risk Areas

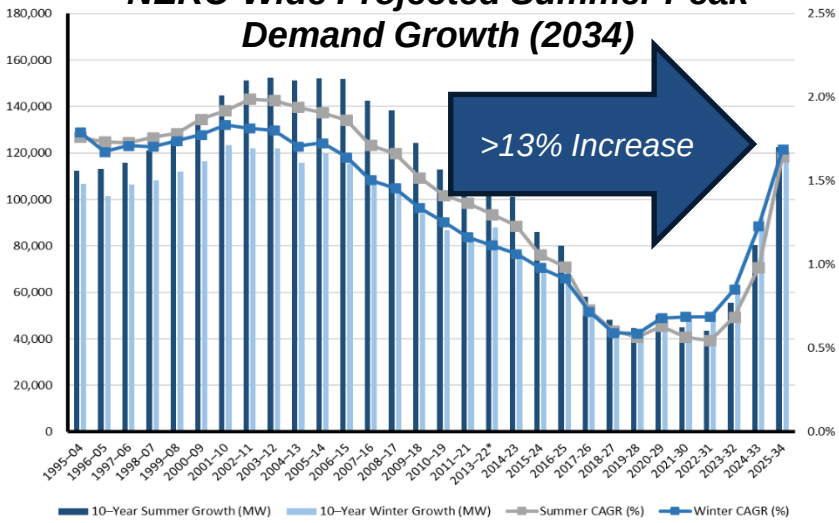


NERC-Wide Summer Peak Demand Changes 2012 and 2022



3% Increase

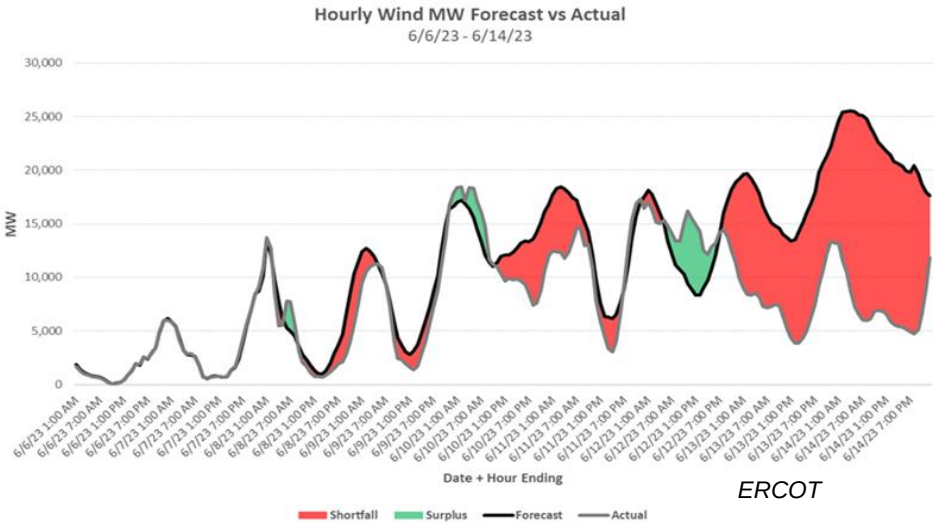
NERC-Wide Projected Summer Peak Demand Growth (2034)



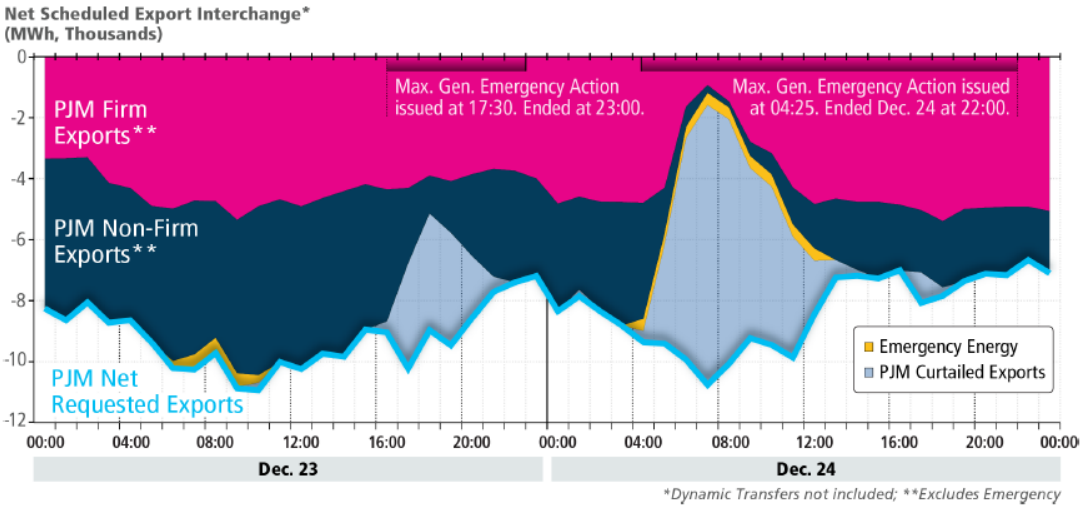
>13% Increase

Recent Examples Highlight Need for Wide-Area Energy Assessments

June 6, 2023: ERCOT, SPP, MISO: *A "wind drought" caused 60 GW of installed wind capacity to generate 300 MW*



ERCOT



December 24, 2022: PJM: *Transmission system during extreme cold weather limited the ability to export to support southern neighbors*

FRA of 2023: Required Study Elements

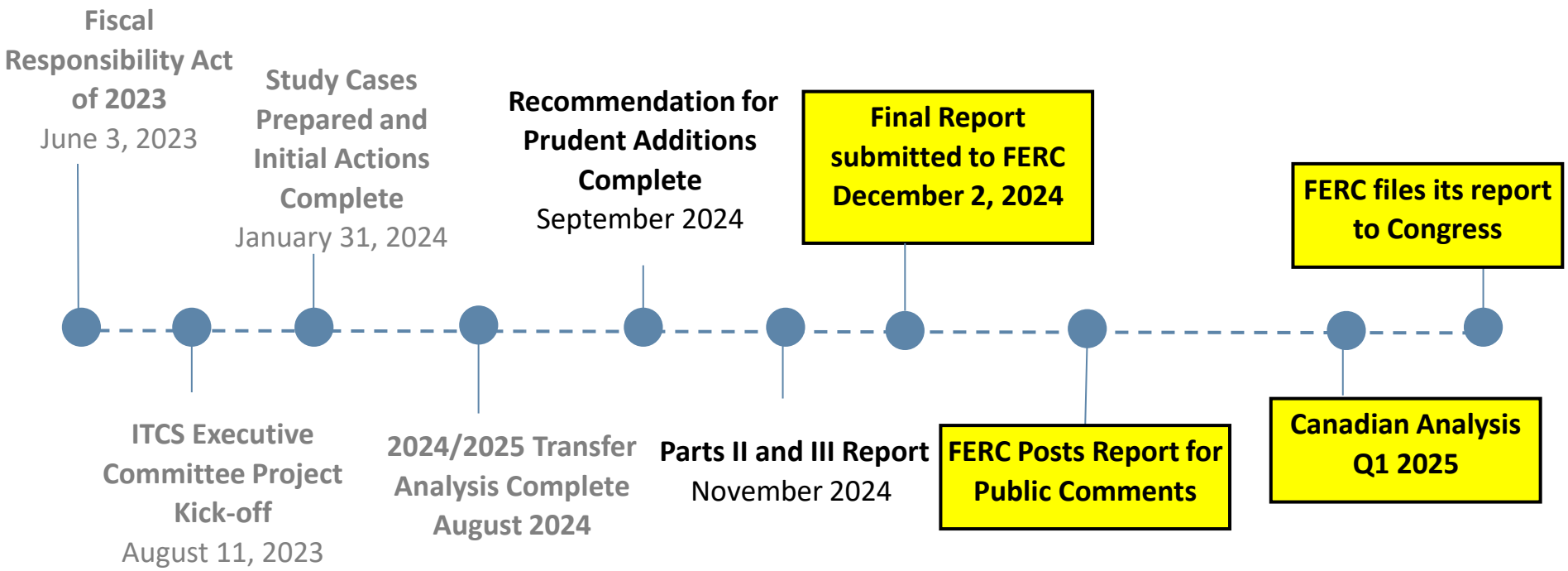
Fiscal Responsibility Act (FRA), Section 322

In consultation with the Regional Entities and transmitting utilities, NERC shall conduct a study containing three elements:

1. **Current total transfer capability,** between each pair of neighboring transmission planning regions.
2. A recommendation of **prudent additions to total transfer capability** between each pair of neighboring transmission planning regions that would demonstrably strengthen reliability within and among such neighboring transmission planning regions.
3. Recommendations on **how to meet and maintain the identified total transfer capability**, together with the prudent recommended additions in #2.

ITCS Timeline Overview

The following is a timeline of upcoming key activities:



ITCS Study Overview

What the Study is:

- Assessed adequacy of North American interregional transmission system
- Foundational, Groundbreaking Work
- Identifies areas that may suffer energy deficiencies under extreme weather and will benefit from additional transfer capability
- Credible technical analysis, with consistent assumptions, and results that are coordinated with the industry
- Sets the stage for more in-depth studies in future

What the Study is NOT:

- Does not match every planning region's modeling approaches
- Does not prescribe specific projects
- Does not prescribe the "how", but "what" may be needed
- Does not evaluate market-based dispatched, or operational mitigations
- Is not the final step in the process (FERC will request public comments)
- Does not evaluate economics or policy
- A complete planning study

Transfer Capability Observations and Findings

Varies Widely

- Current transfer capability changes (TTC) as percentage of peak load = 1% to 92% between regions, varying greatly depending on season and online generation dispatch

Transmission May Not Always be a Solution

- New transmission will not always increase transfer capability
- Voltage and dynamic stability limitations will determine how much power can be transferred

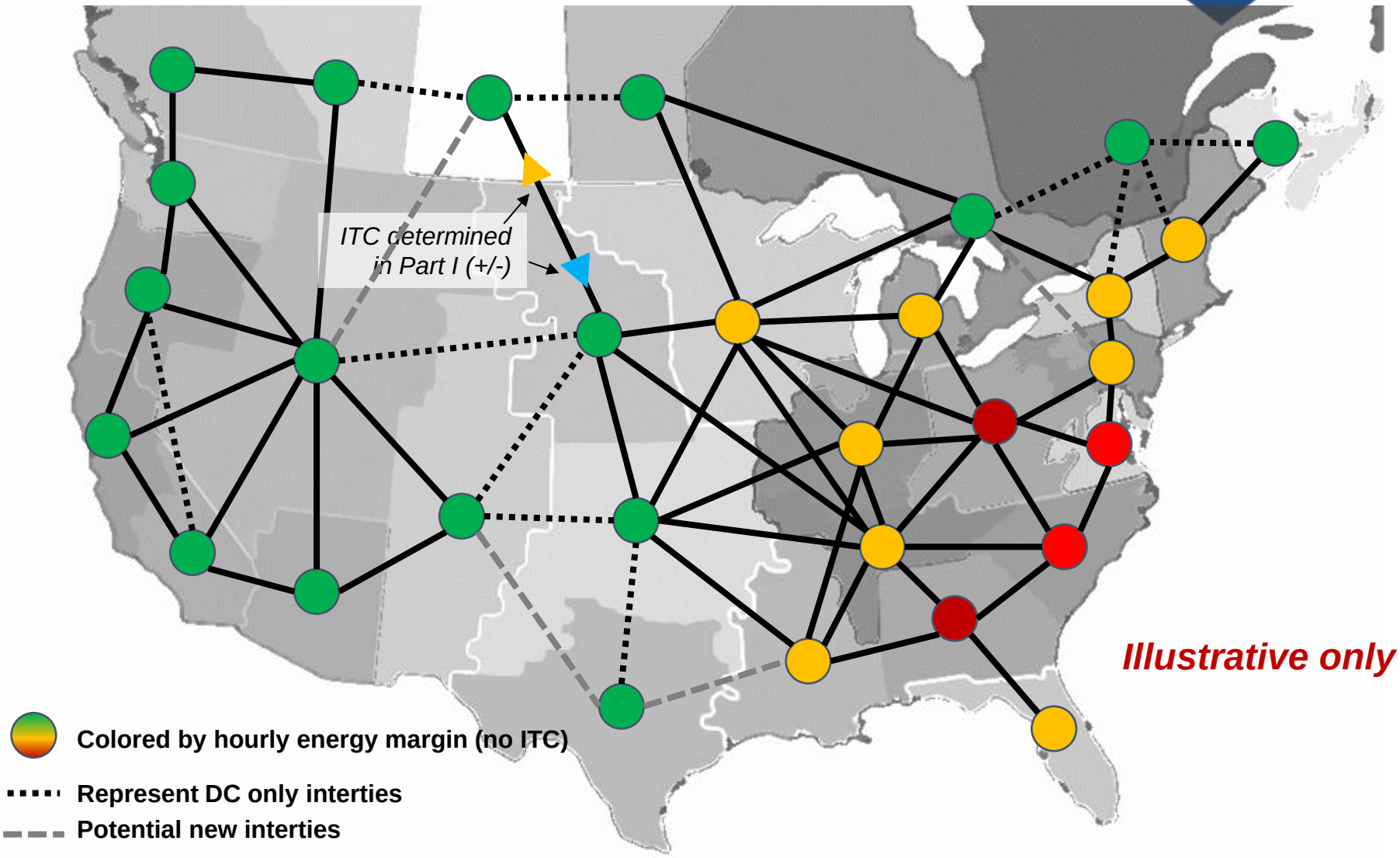
Resource Evaluation Cannot be Overlooked

- Many areas do not have sufficient committed generation to meet demand under extreme conditions (2034)
- Canadian system critical to this evaluation

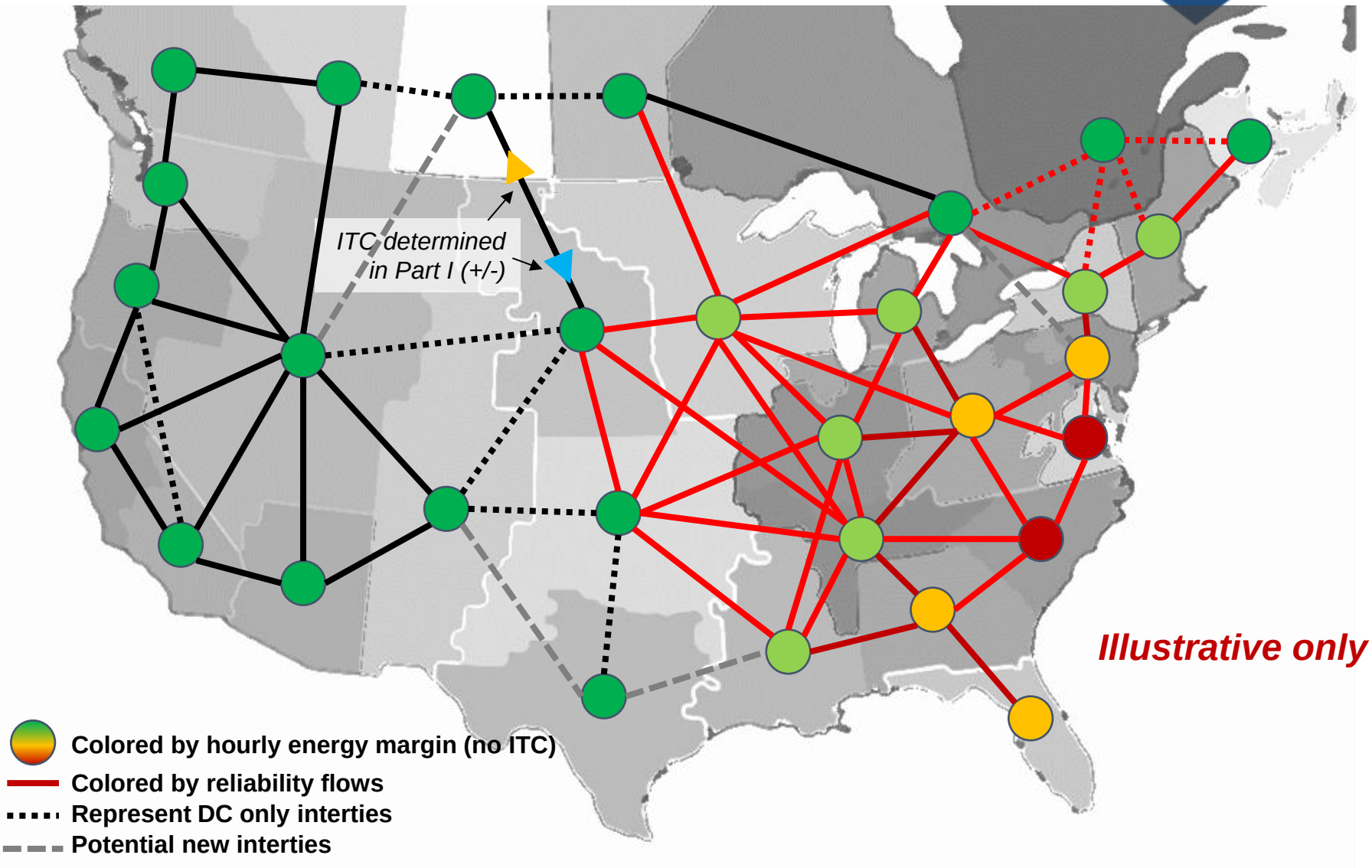
Higher TTCs Will Require Significant Planning and System-Wide Reinforcements

- TTC additions will require more granular stability studies once specific projects are evaluated
- Meaningful TTC additions will not be completed by 2034 without regulatory/legislative changes

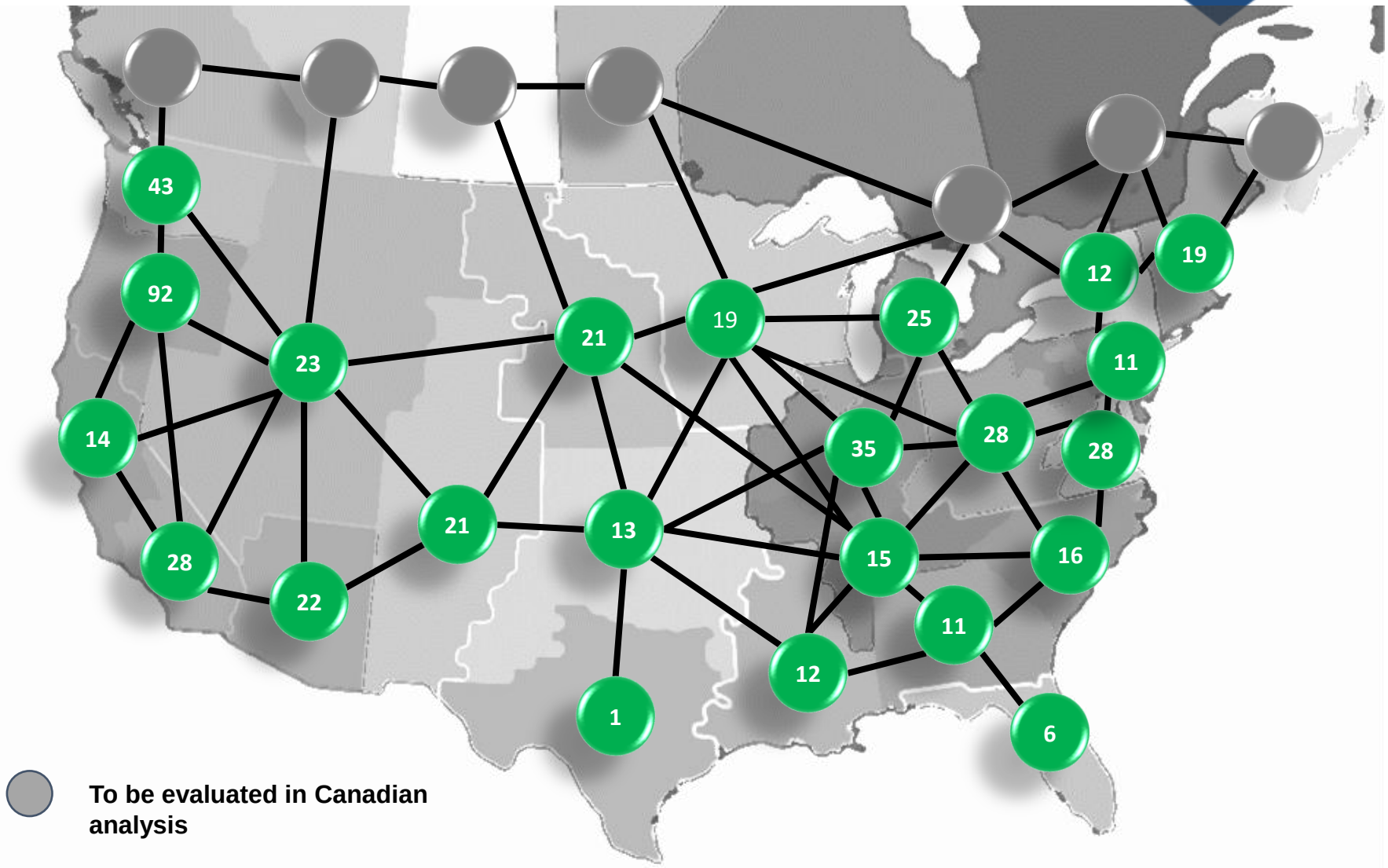
Pipe and Bubble Model



Pipe and Bubble Model

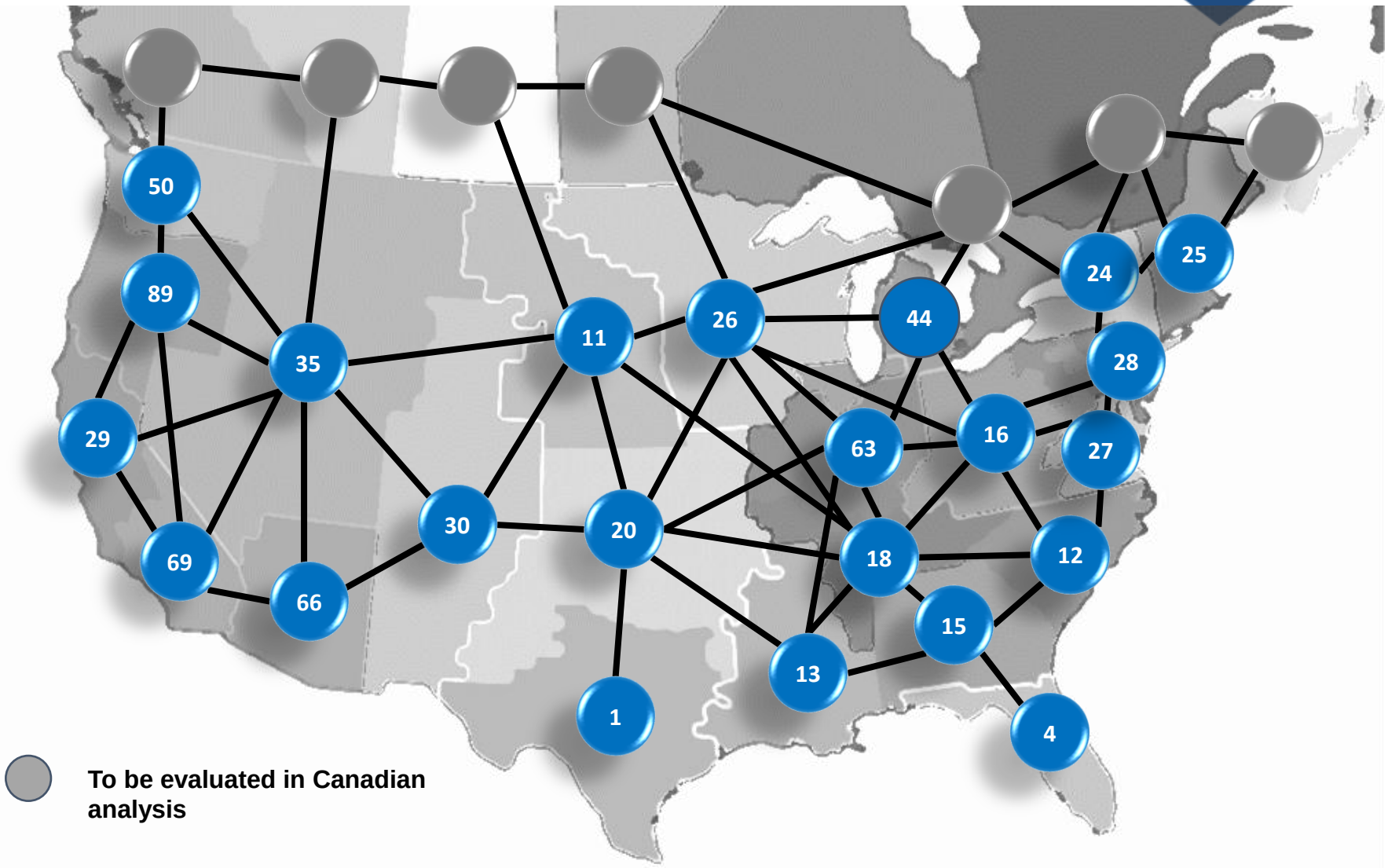


Part I Total Import Capabilities as Percentage of 2024 Peak Load (Summer)



To be evaluated in Canadian analysis

Part I Total Import Capabilities as Percentage of 2024 Peak Load (Winter)



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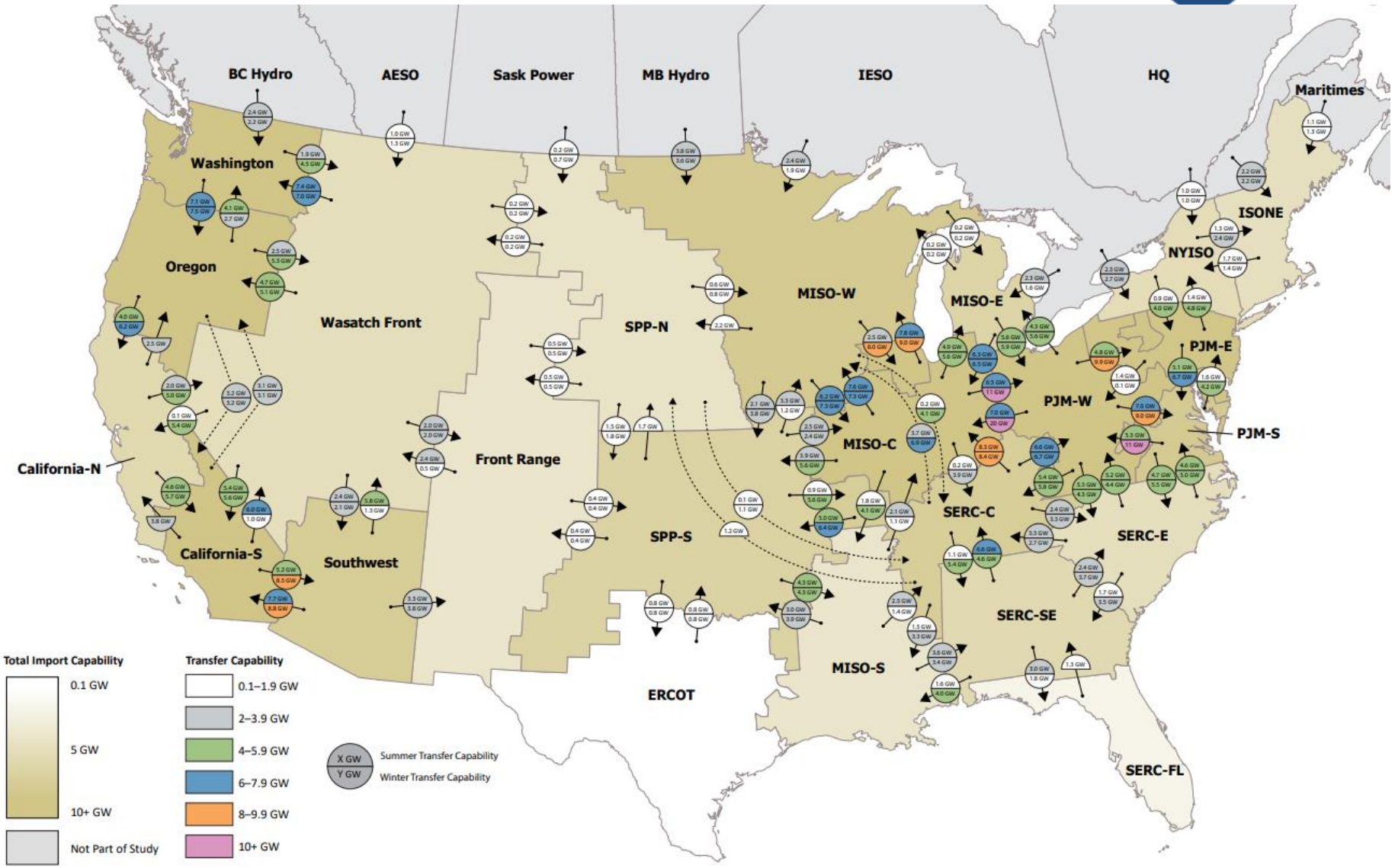
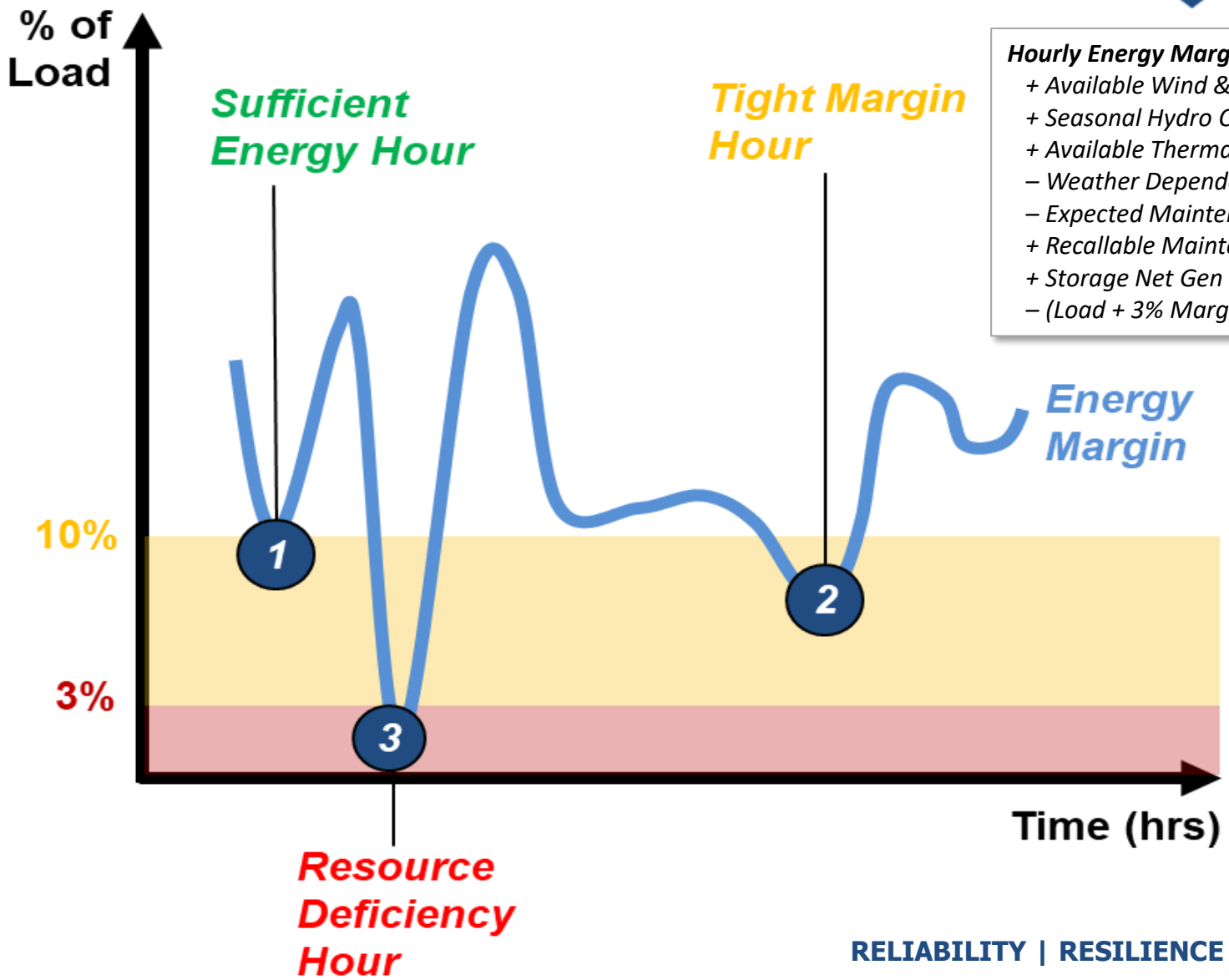
Calculated Transfer Capabilities – 2024/2025 Base Case



Energy Assessment to Identify Prudent Additions

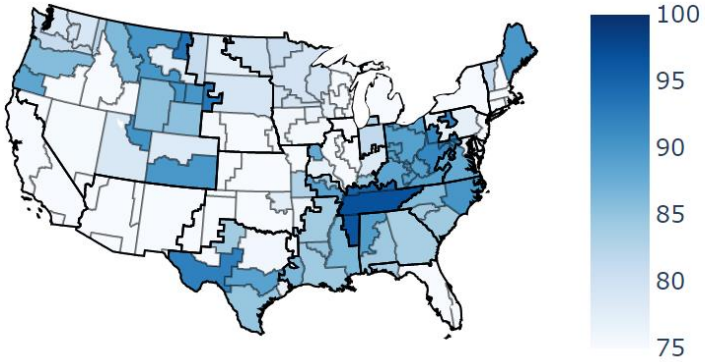


Hourly Energy Margin =

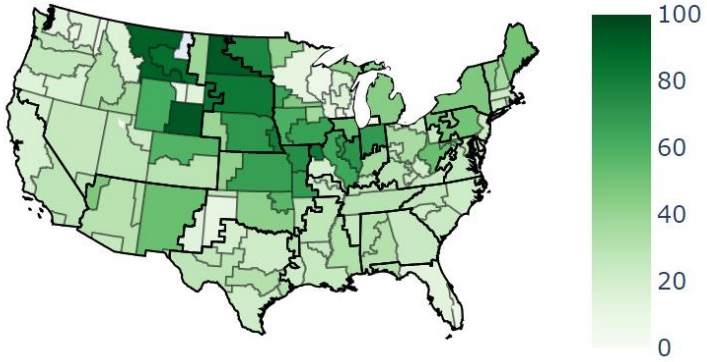
+ Available Wind & Solar
+ Seasonal Hydro Capacity
+ Available Thermal
– Weather Dependent Outages
– Expected Maintenance
+ Recallable Maintenance
+ Storage Net Gen
– (Load + 3% Margin)

Energy Assessment: Cold Snap Example

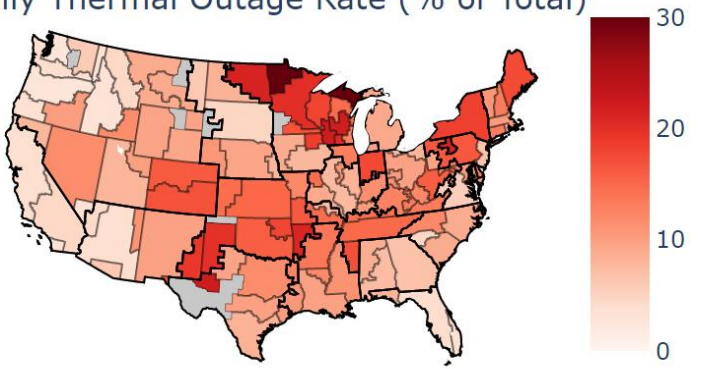
Maximum Daily Load (% of Annual Peak)



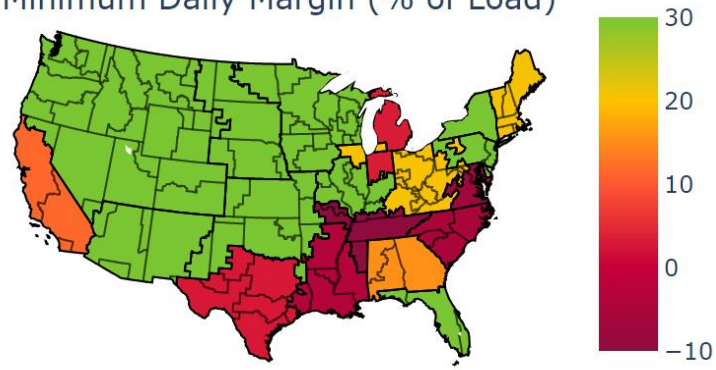
Average Daily Wind & Solar Capacity Factor (%)



Daily Thermal Outage Rate (% of Total)

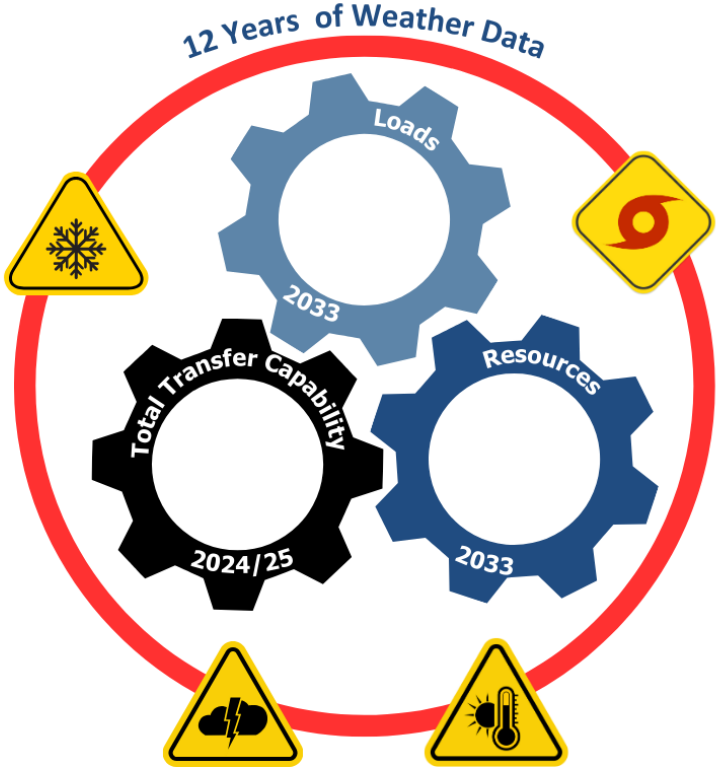


Minimum Daily Margin (% of Load)

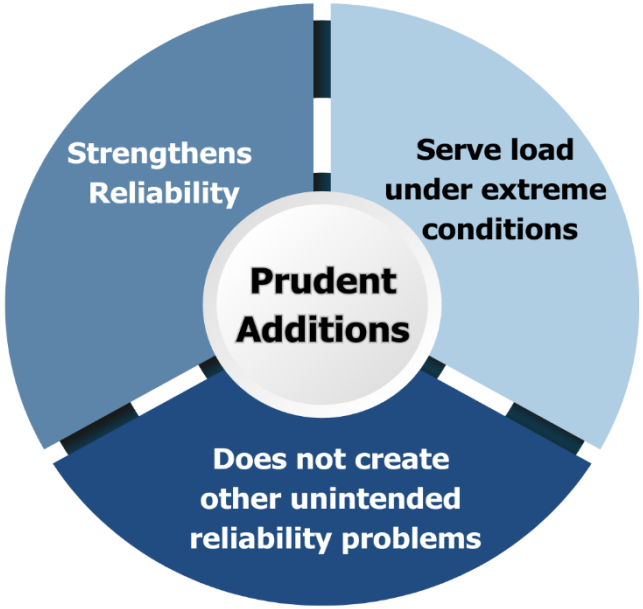


Source: ESIG Transmission Resilience Task Force (Telos Energy)
https://www.esig.energy/transmission-resilience/

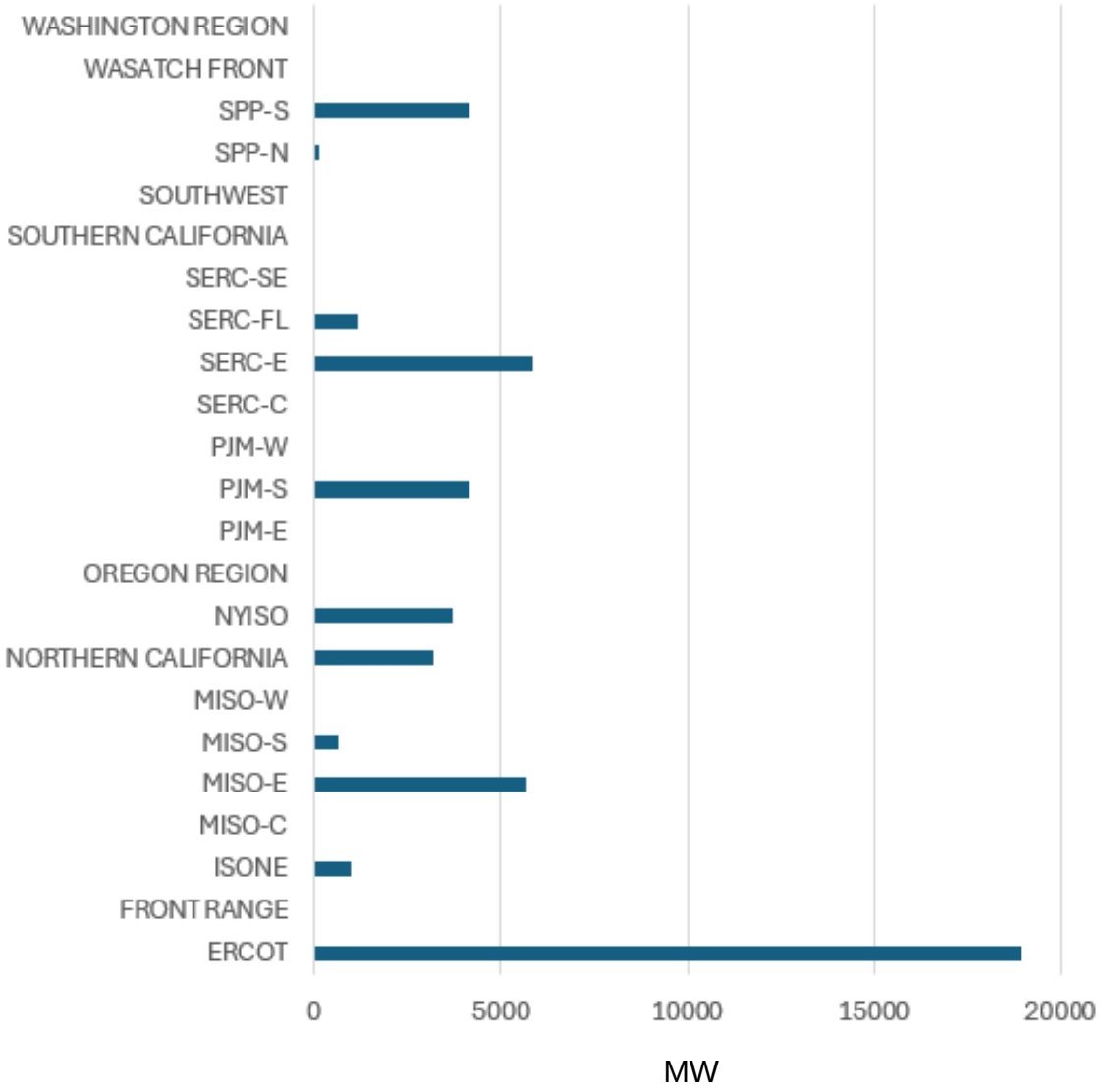
Part II: Prudent Additions Recommendations



Prudent Interregional Transfer Capability Additions

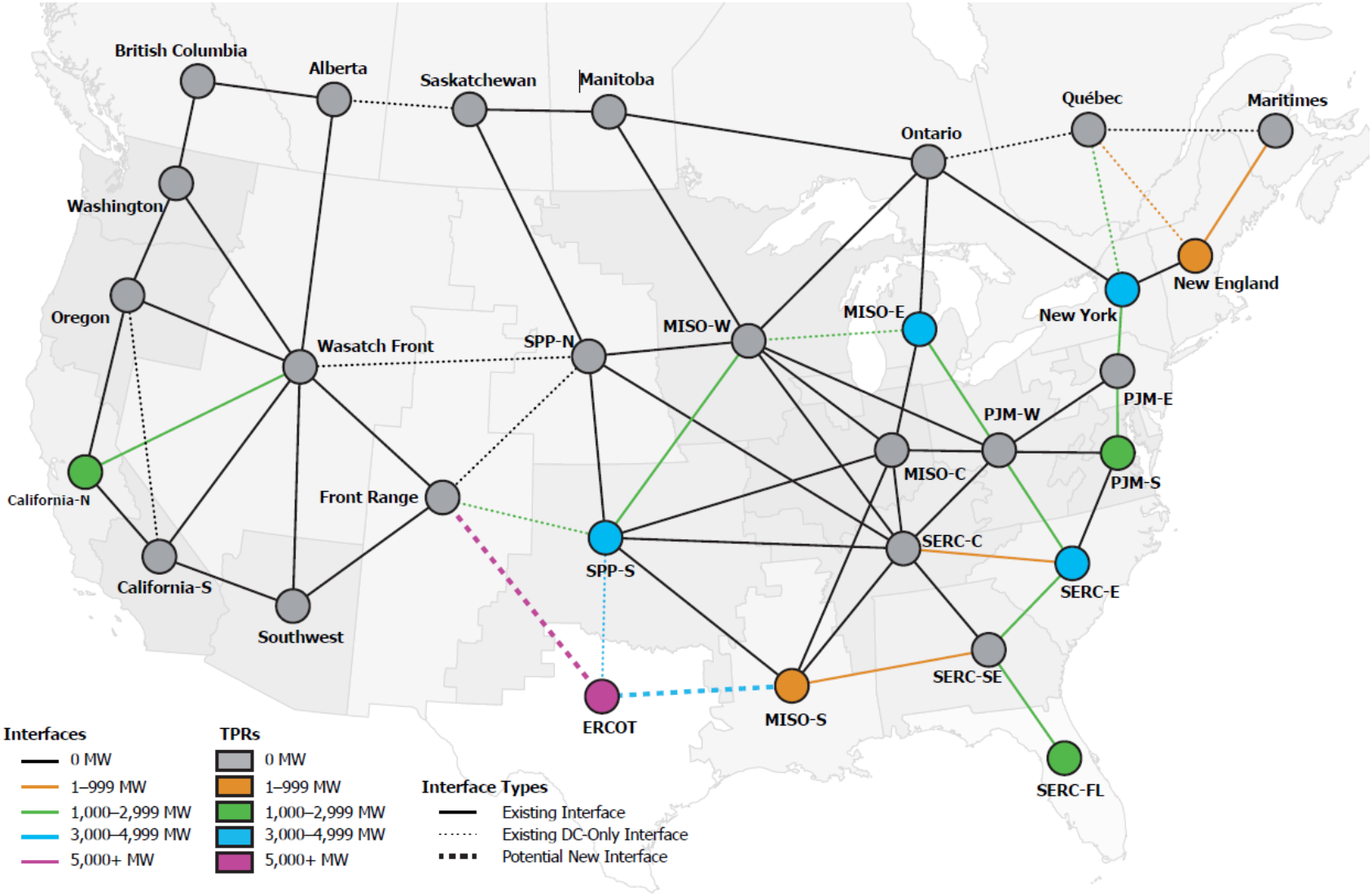


Energy Assessment Maximum Deficiency Identified (Preliminary)



- Capacity expansion determined by projections in Long-Term Reliability Assessment
- Tightening energy margins driven:
  - assumed extreme weather conditions
  - increased load growth
  - on-going retirement of conventional generation
  - shift toward a higher proportion of variable (wind and solar)
  - energy-limited resources (e.g., battery storage).
- Number of hours in these conditions range from 1-20

Prudent Addition Recommendations (Preliminary)



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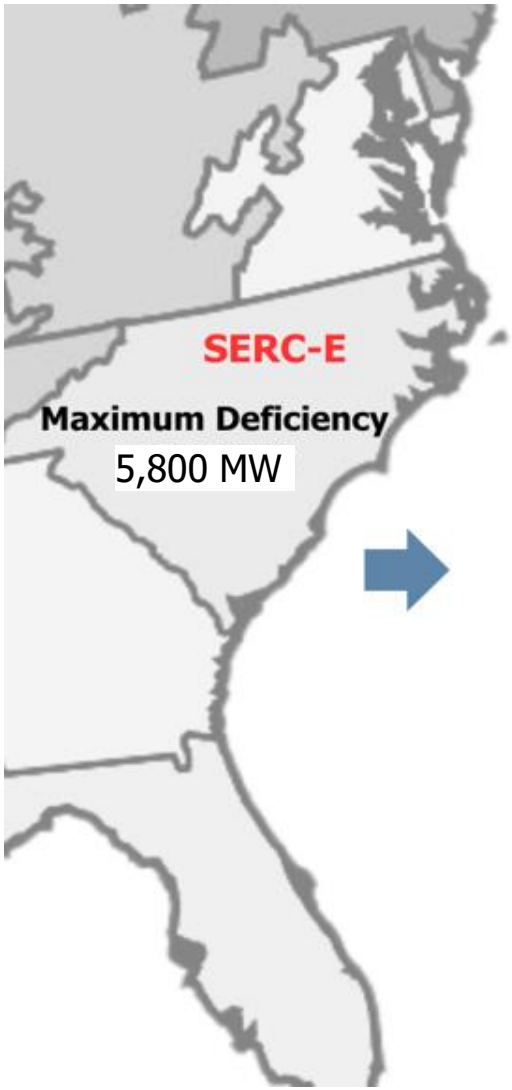
Recommended Prudent Additions (Preliminary)

Increasing Energy Deficiency Hours

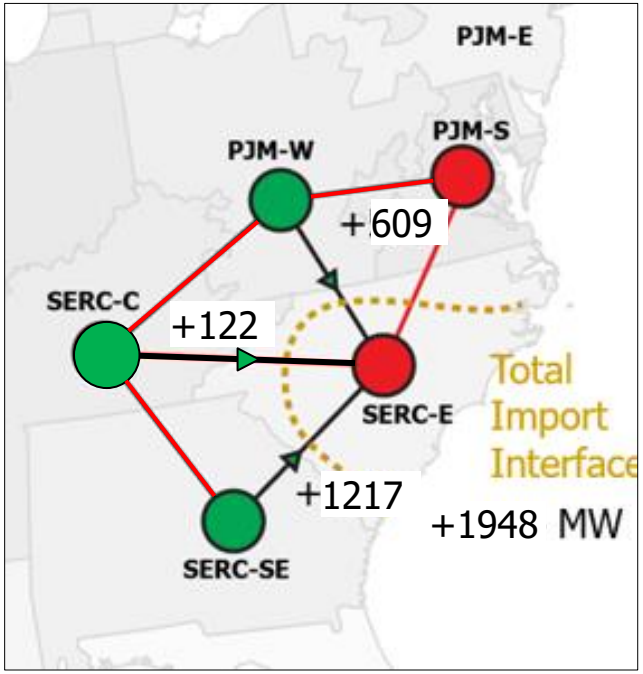
Table ES.1: Recommended Prudent Additions Detail

Transmission Planning Region	Weather Years (WY) / Events	Resource Deficiency Hours	Maximum Deficiency (MW)	Additional Transfer Capability (MW)	Interface Additions (MW)
ERCOT	Winter Storm Uri (WY2021) and nine other events	135	18,926	14,100	Front Range (5,700) MISO-S (4,300) SPP-S (4,100)
MISO-E	WY2020 Heat Wave and two other events	58	5,715	3,000	MISO-W (2,000) PJM-W (1,000)
New York	WY2023 Heat Wave and seven other events	52	3,729	3,700	PJM-E (1,800) Québec (1,900)
SPP-S	Winter Storm Uri (WY2021)	34	4,137	3,700	Front Range (1,200) ERCOT (800) MISO-W (1,700)
PJM-S	Winter Storm Elliott (WY2022)	20	4,147	2,800	PJM-E (2,800)
California North	WY2022 Heat Wave	17	3,211	1,100	Wasatch Front (1,100)
SERC-E	Winter Storm Elliott (WY2022)	9	5,849	4,100	SERC-C (300) SERC-SE (2,200) PJM-W (1,600)
SERC-Florida	Summer WY2009 and Winter WY2010	6	1,152	1,200	SERC-SE (1,200)
New England	WY2012 Heat Wave and two other events	5	984	700	Québec (400) Maritimes (300)
MISO-S	WY2009 and WY2011 summer events	4	629	600	ERCOT (300) SERC-SE (300)
TOTAL				**35,000**	

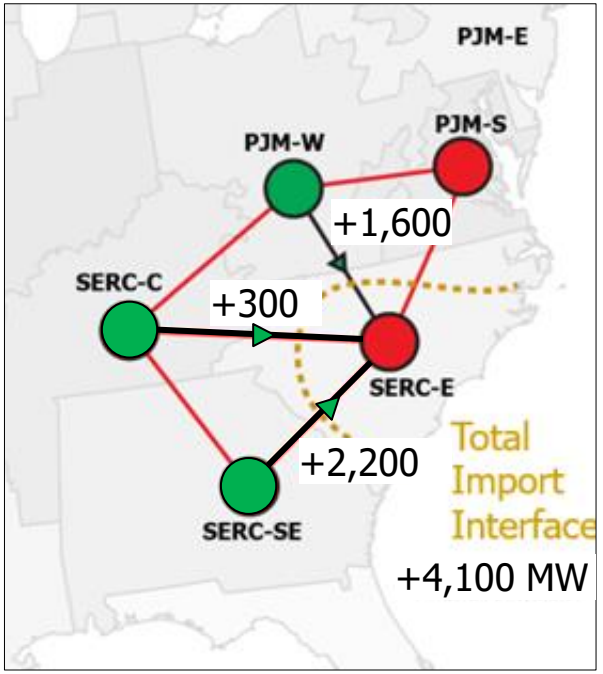
Example of Prudent Addition Analysis: SERC-E (2033)



First Iteration: Utilize Existing Import Capability and Excess Available Generation from Neighbors



Third Iteration: Maximum Support from Neighbors, Prioritized by Excess Available Generation



5,463 MW of Existing Import Capability + 4,100 MW of Prudent Additions = **9,563 MW of Needed Import Capability**

Recommendations to Meet and Maintain Transfer Capability

Meet Transfer Capability

- Upgrade transmission
- Resources
- Remedial Action Schemes (RAS)
- Dynamic Line Ratings (DLR)
- Advanced conductors
- Power flow control devices

Grid Enhancing Technologies

Maintain Transfer Capability

- Planning studies
- Coordination with neighbors
- Regulatory/policy mechanisms or NERC standards

Multiple Options to Address Prudent Addition Recommendations

- Internal resources
- Transmission enhancements to neighbors
  - Resource evaluations
  - Siting and permitting
  - Cost-allocation
- Demand-side management
  - Demand shifting
  - Energy efficiency
  - Demand response
  - Storage

How to Use the Report?

- Understand analysis limitations
- Identify existing projects
- Recommendations are directional
- Prioritize high-risk areas
- Consider implementation barriers
  - Lack of a process and forum to consider large multiregional transmission opportunities
  - Cost allocation and recovery
  - Seams issues
  - Siting and permitting
- Consider each Region's unique circumstances
- Consider a combination of multiple strategies

What's Next?

FERC

- Will post ITCS report for public comment
- Will submit report to Congress with recommendations on statutory changes if any (12 months after comment period ends)

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- Integrate transmission assessment into Long-term Reliability Assessments
- Enhancements to study data and models
- Canadian Analysis

Questions and Answers