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Strengthening Reliability through the Energy Transformation: NERC ITCS Industry Webinar

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RELIABILITY | RESILIENCE | SECURITY

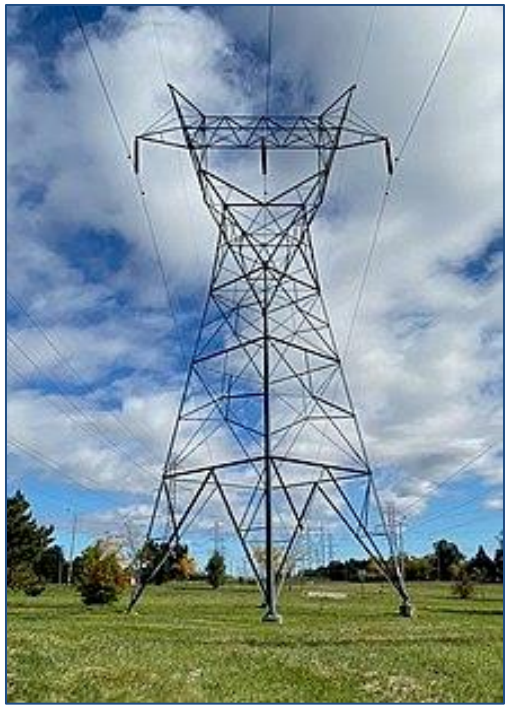



Long-Term Challenges Emerge

How are we going to address…

- Changing Resource Mix
- Resource Retirements
- Extreme Weather
- Demand Growth

without more of this….



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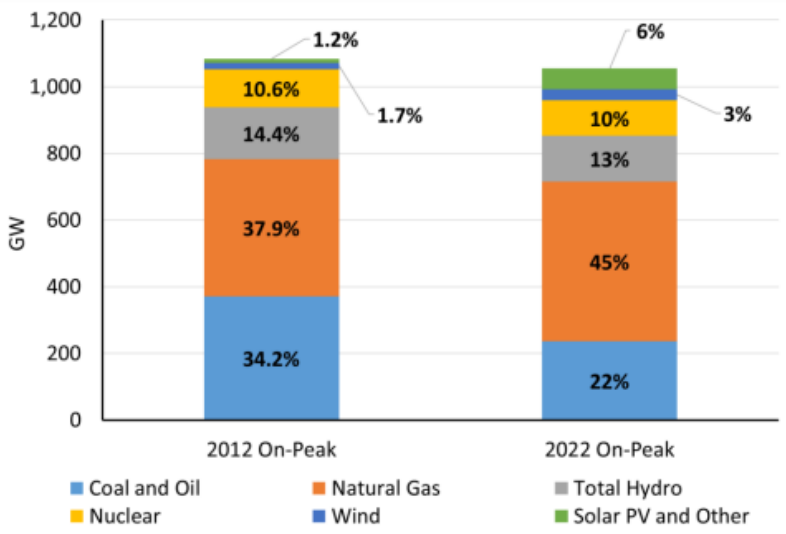
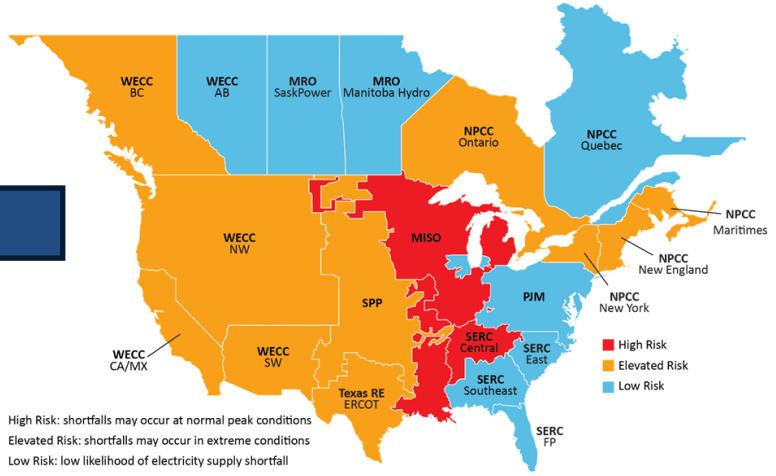
Across an Interconnected System:
Fewer Resources Means More Reliance on Neighbors

2012 and 2022 Peak Capacity Resource Mix NERC-Wide

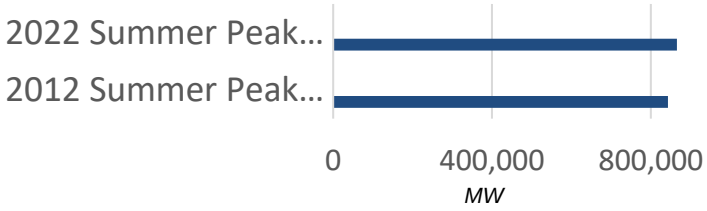


4% Decrease

2024-2033 Risk Areas



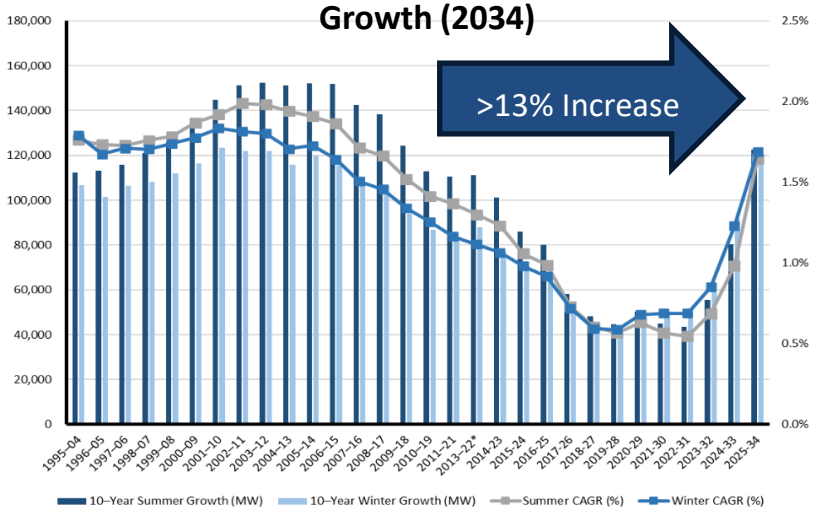
NERC-Wide Summer Peak Demand Changes 2012 and 2022



3% Increase

NERC-Wide Projected Summer Peak Demand Growth (2034)

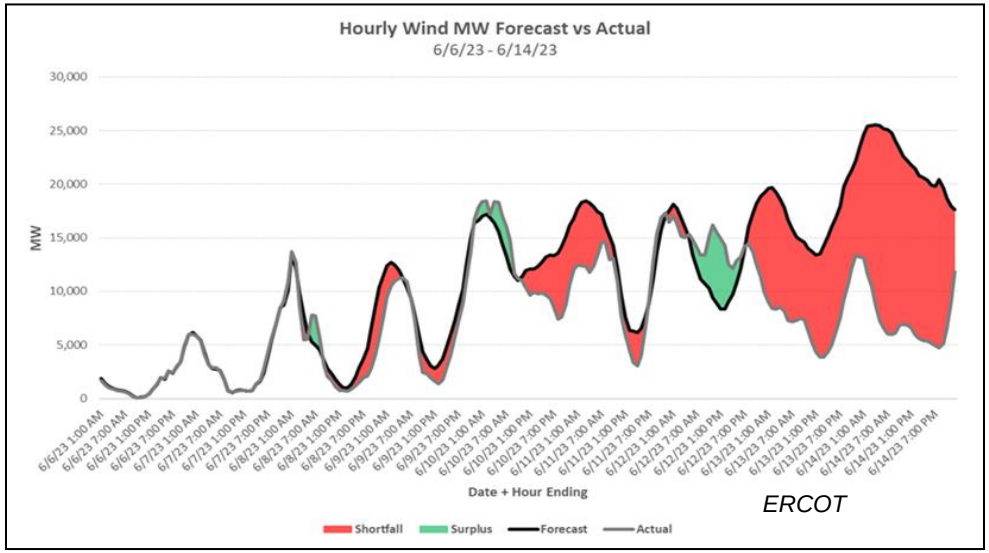
>13% Increase

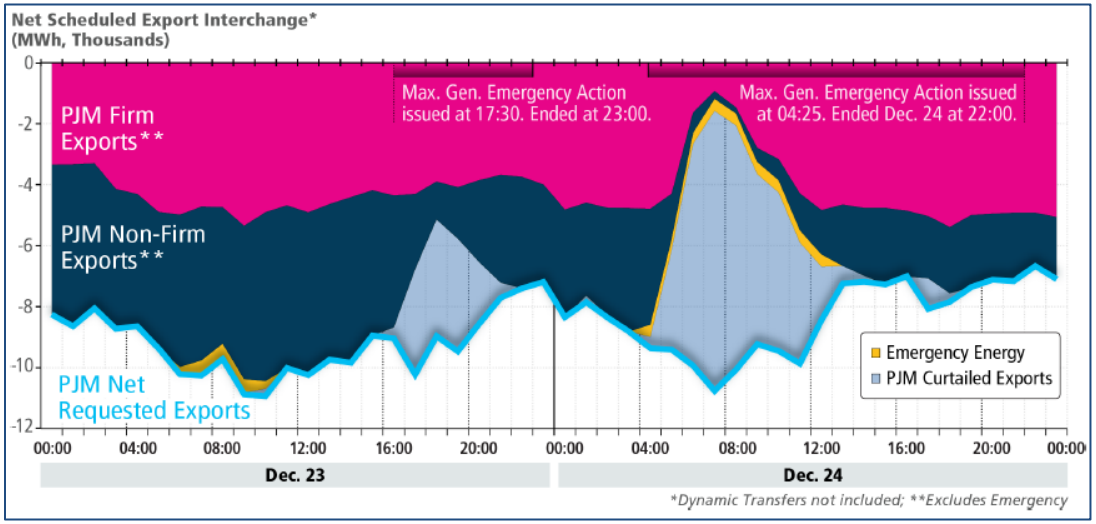


Recent Examples Highlight Need for Wide-Area Energy Assessments

June 6, 2023: ERCOT, SPP, MISO

A "wind drought" caused 60 GW of installed wind capacity to generate 300 MW





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.

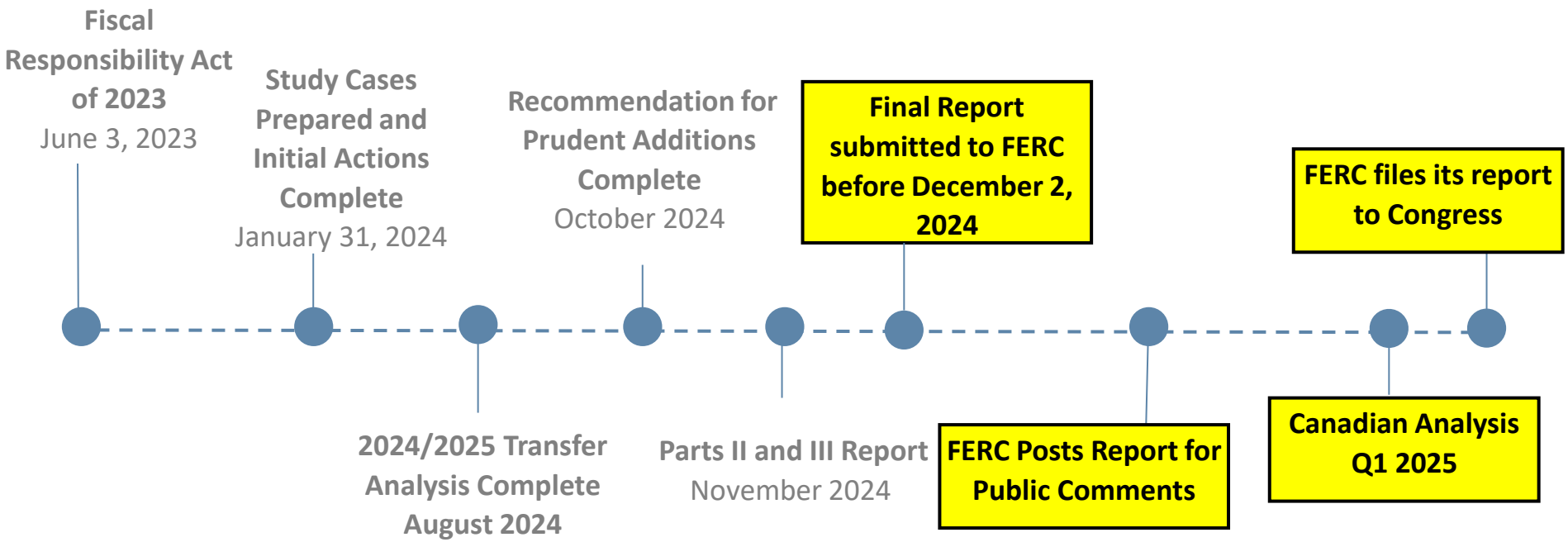
ITCS Objectives

ITCS aligns with ERO Enterprise obligations to perform reliability assessments

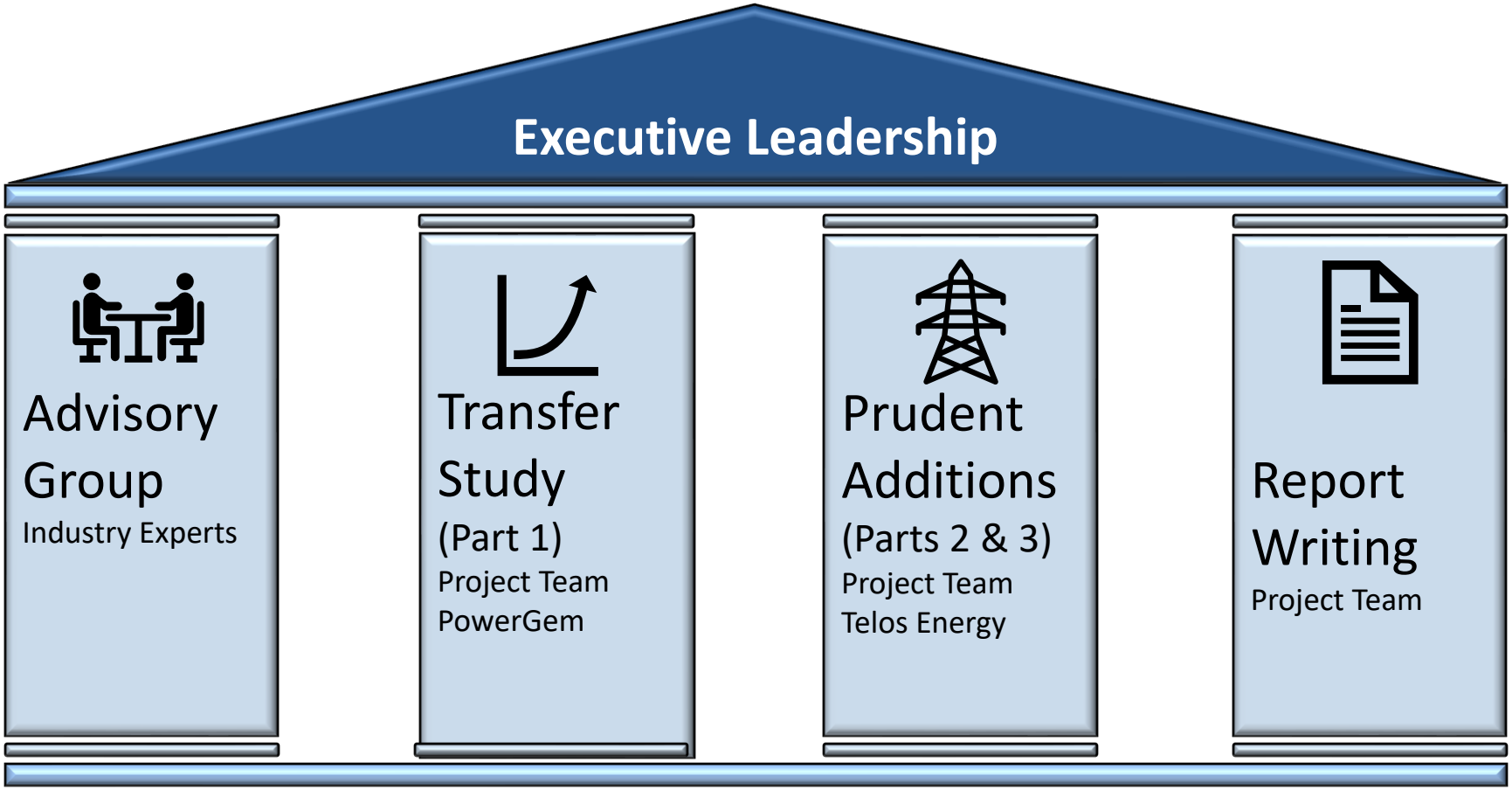
- Independent and objective
- System-wide perspective
- Reliability focus
- Collaboration and coordination
- Strategic planning
- Repeatable process

ITCS Timeline Overview

The following is a timeline of key activities:



Project Execution Strategy



ITCS Study Overview

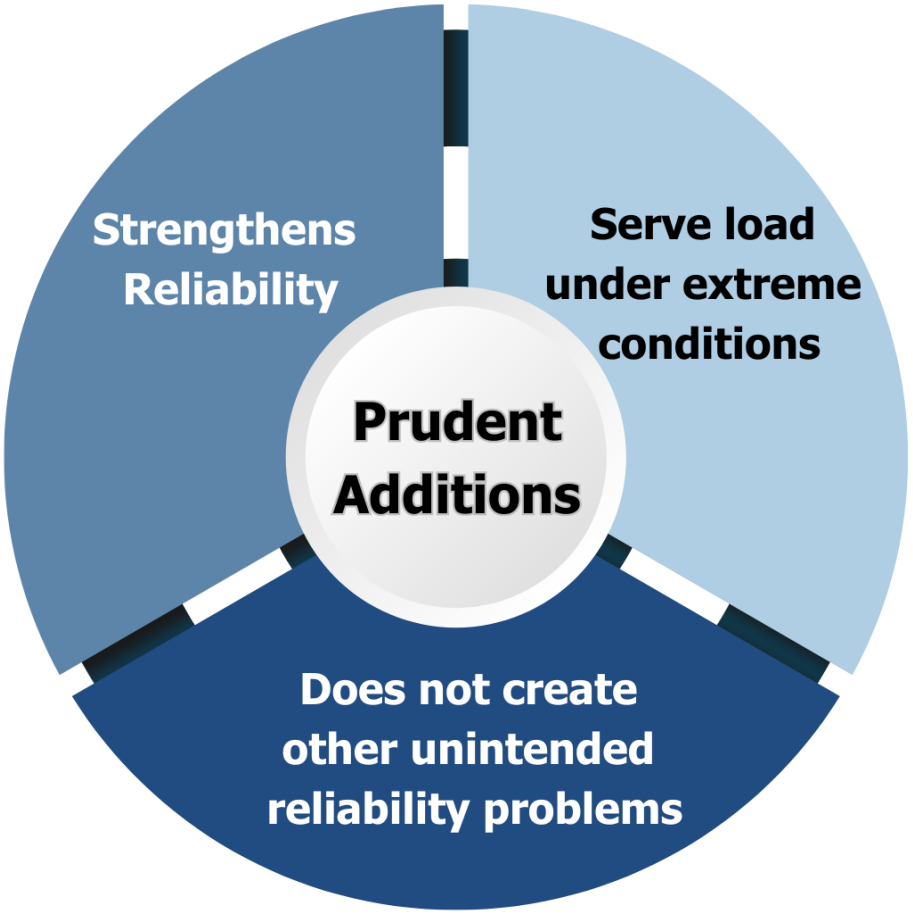
Inside Scope

- Common modeling approach and coordinated results with industry
- Assessed adequacy of North American interregional transmission system under extreme weather
- Identifies areas that may suffer energy deficiencies under extreme weather and will benefit from additional transfer capability
- Reliability focus
- Sets the stage for more in-depth studies in future

Outside Scope

- Alternative modeling approaches used by planning areas – ITCS results may differ from other analyses
- Does not prescribe specific projects
- Does not evaluate market-based dispatch, operational mitigations, economics or policy
- Is not the final step in the process (FERC will request public comments)
- Quantified impacts of planned projects
- Capacity expansion planning

What are Technically Prudent Additions to Transfer Capability?



FERC precedent provides that "prudence" means a determination of whether a reasonable entity would have made the same decision in good faith under the same circumstances, and at the relevant point in time.

Parts 1 and 2 Objectives and Assumptions

	Part 1 Transfer Analysis	Part 2 Prudent Additions
Objective	Current Transfer Capability	Recommend Prudent Additions
Topology	Subdivided FERC Order 1000 Regions	Subdivided FERC Order 1000 Regions
Future Cases	1 Year Out	1 and 10 Years Out
Scenarios	Summer and Winter Peak	12 Weather Years Including Extreme Weather
Chronology	Single Snapshot	Hourly Assessment
Key Outputs	Interregional Transfer Capability	Hourly Energy Margins Prudent Additions

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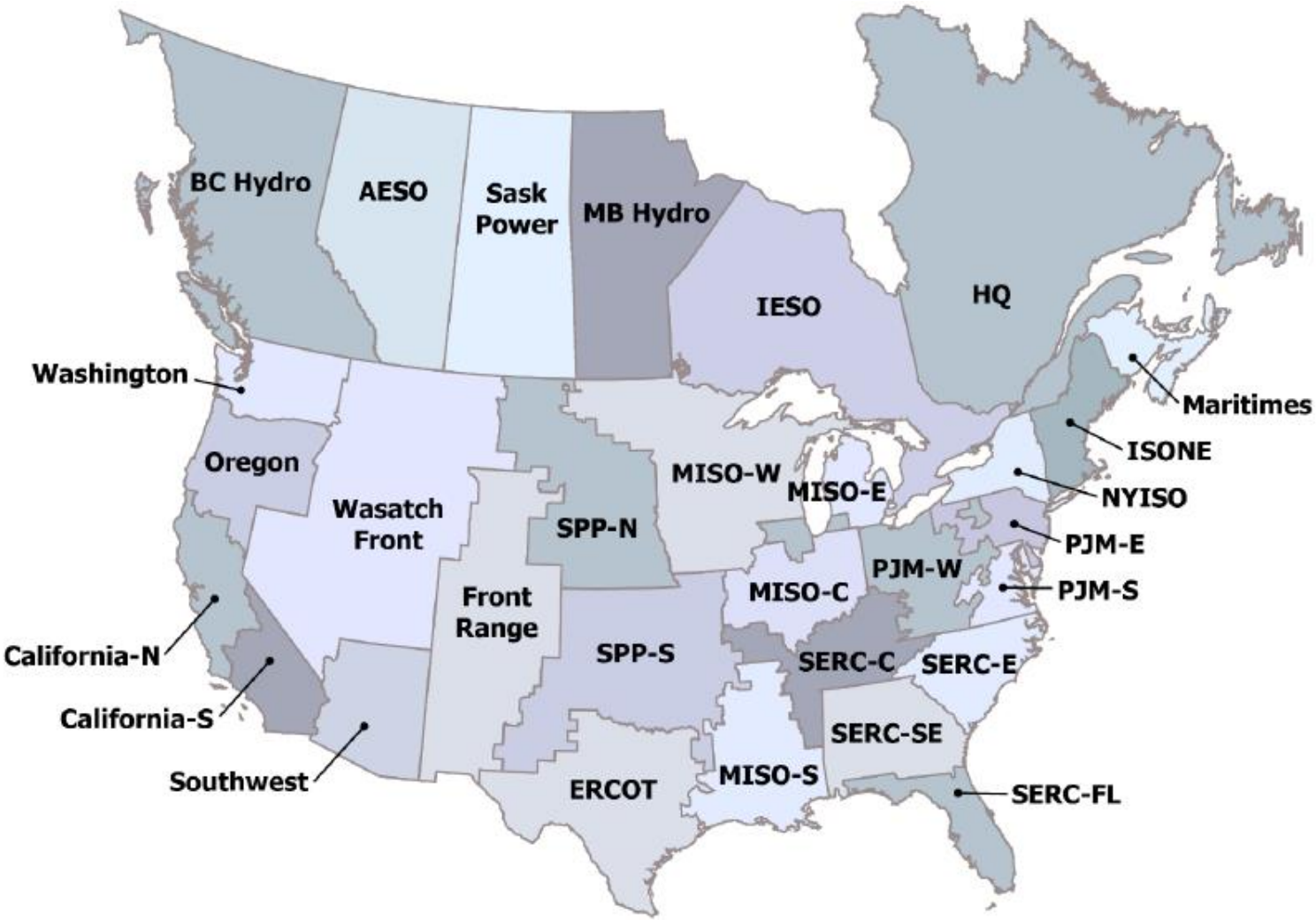
Transmission Planning Regions



Transfer Capability Observations and Findings

Varies Widely

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

Transmission May Not Always be a Solution

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

Resource Evaluation Cannot be Overlooked

- Many planning 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 may not be completed by 2034 without regulatory/legislative changes

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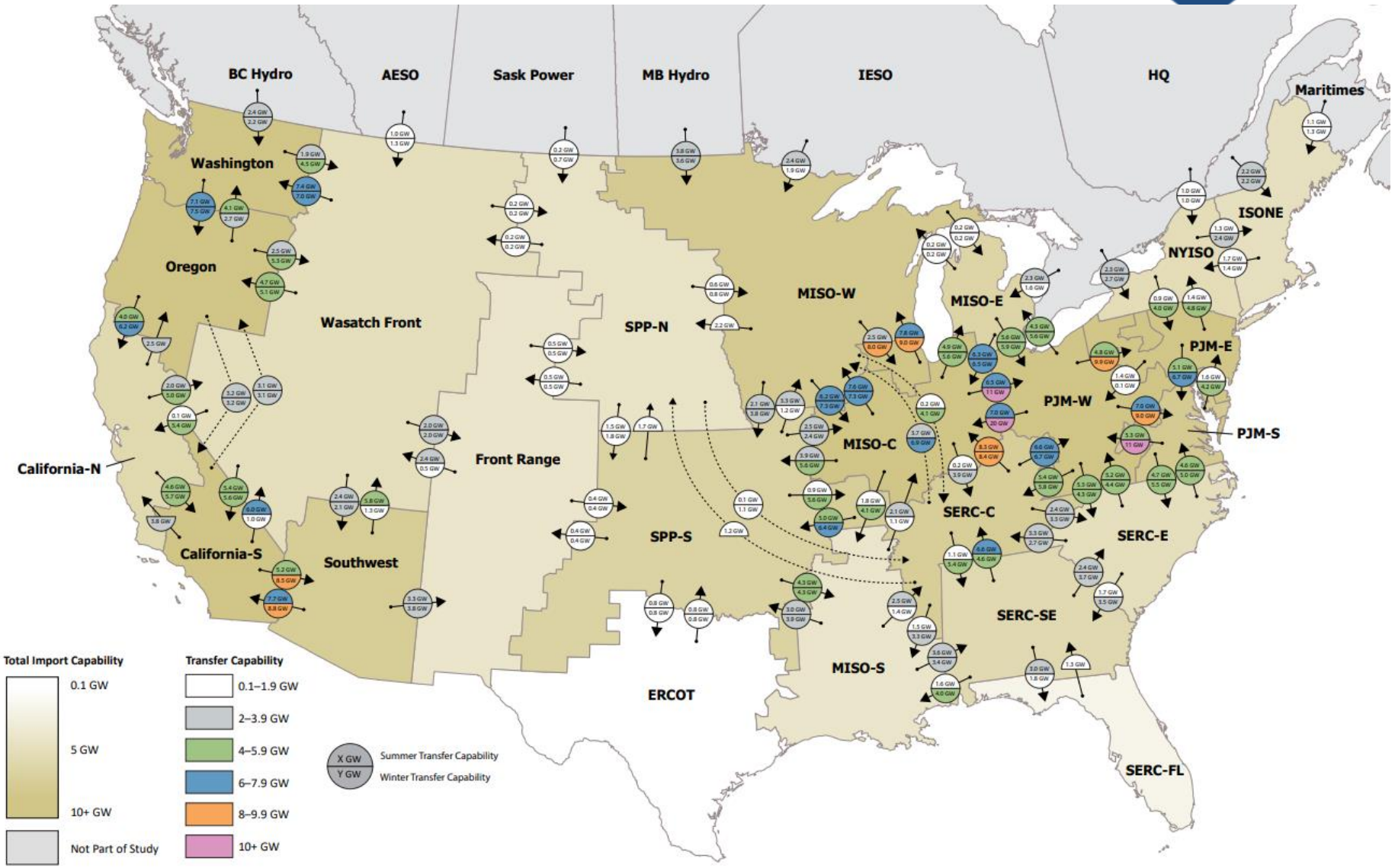
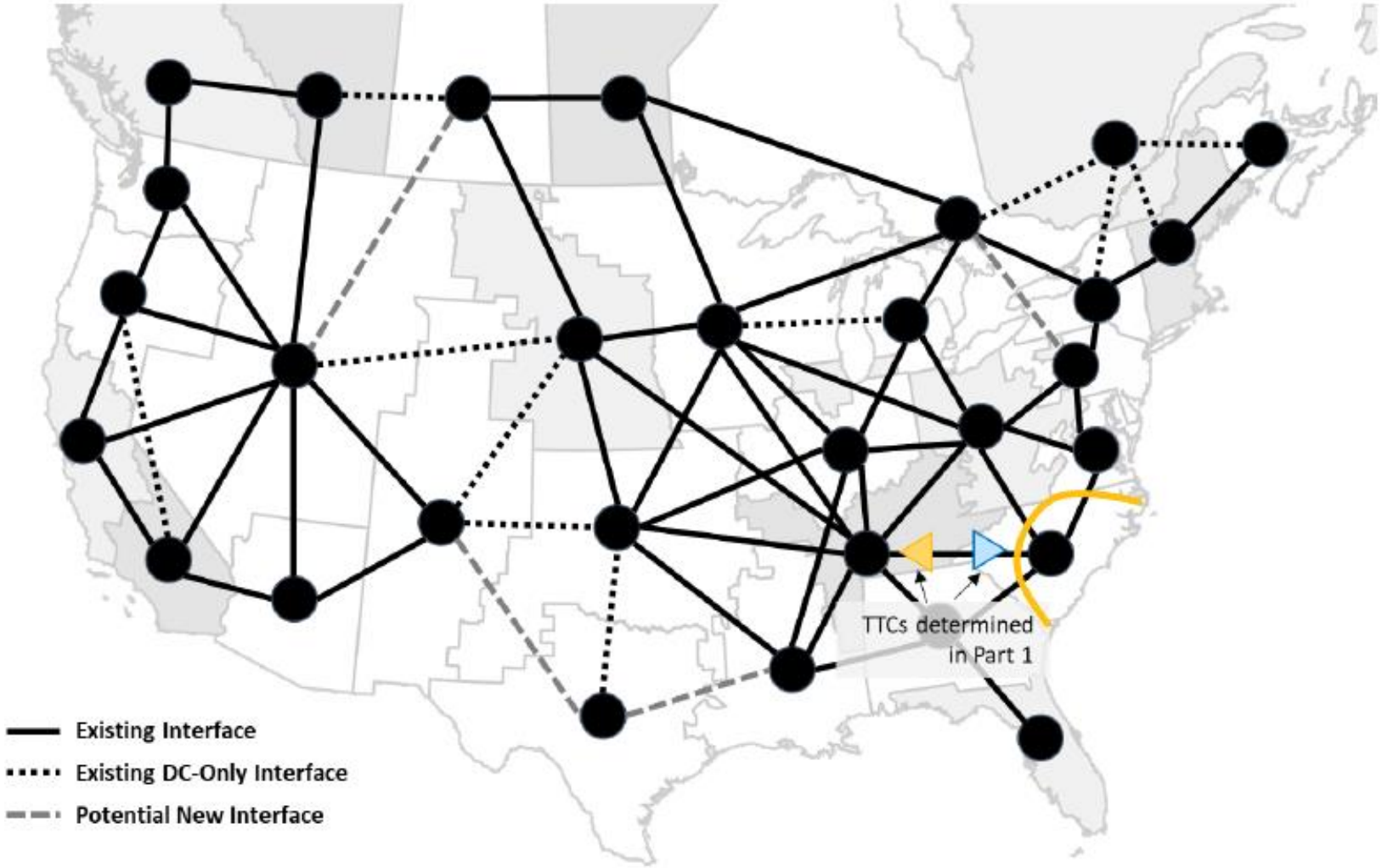
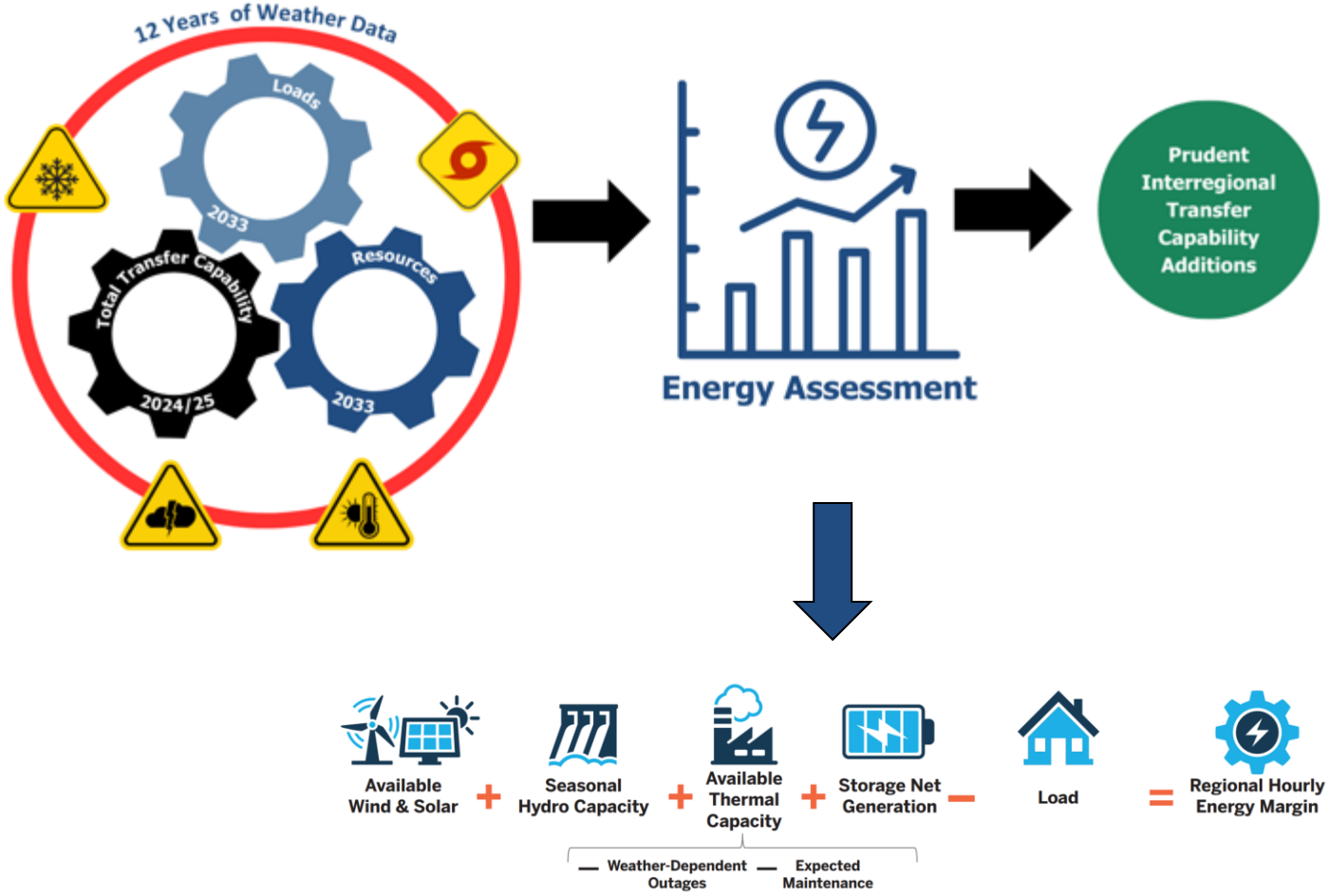
Calculated Transfer Capabilities – 2024/2025 Base Case



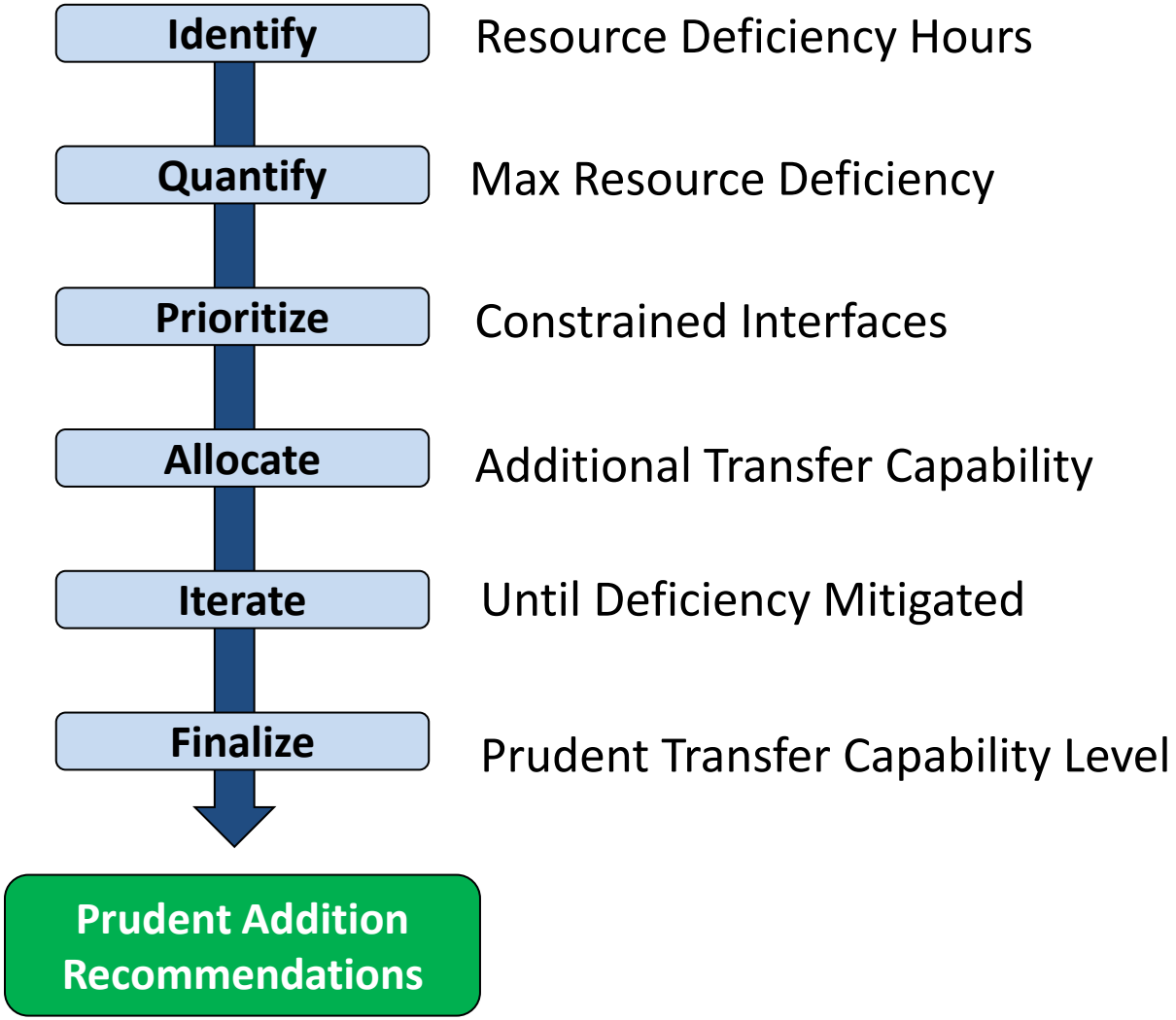
Part 2: Pipe and Bubble Model



Part 2: Energy Assessment and Prudent Additions Recommendations



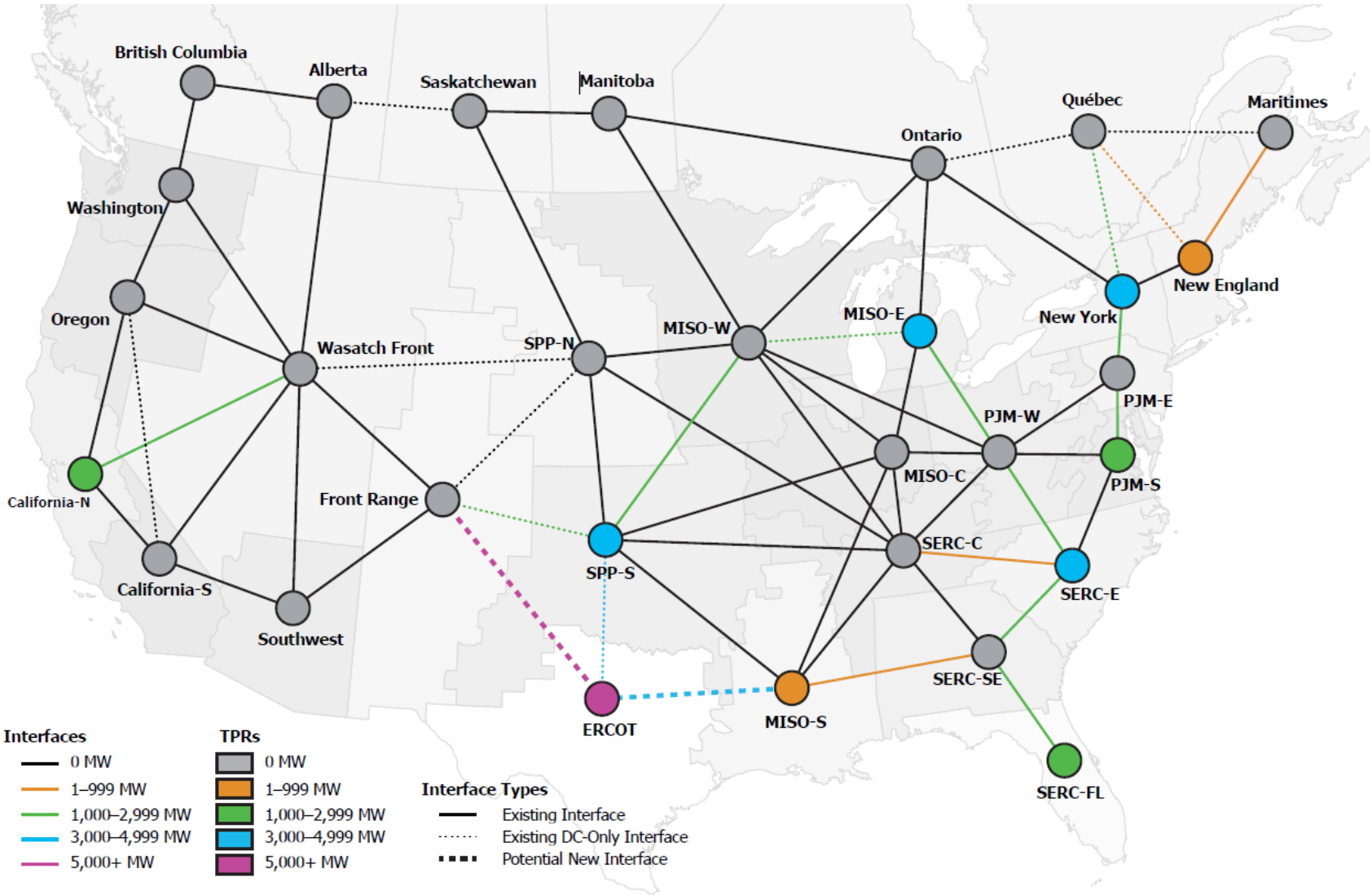
Six-Step Prudent Addition Process



Part 2 Key Findings

- North American system is vulnerable to extreme weather
- One-size fit all transfer capability requirement may be ineffective
- Increased interregional transmission could mitigate energy deficiencies
- Resource assumptions are critical
- Transmission upgrades alone will not address all risks

Prudent Addition Recommendations



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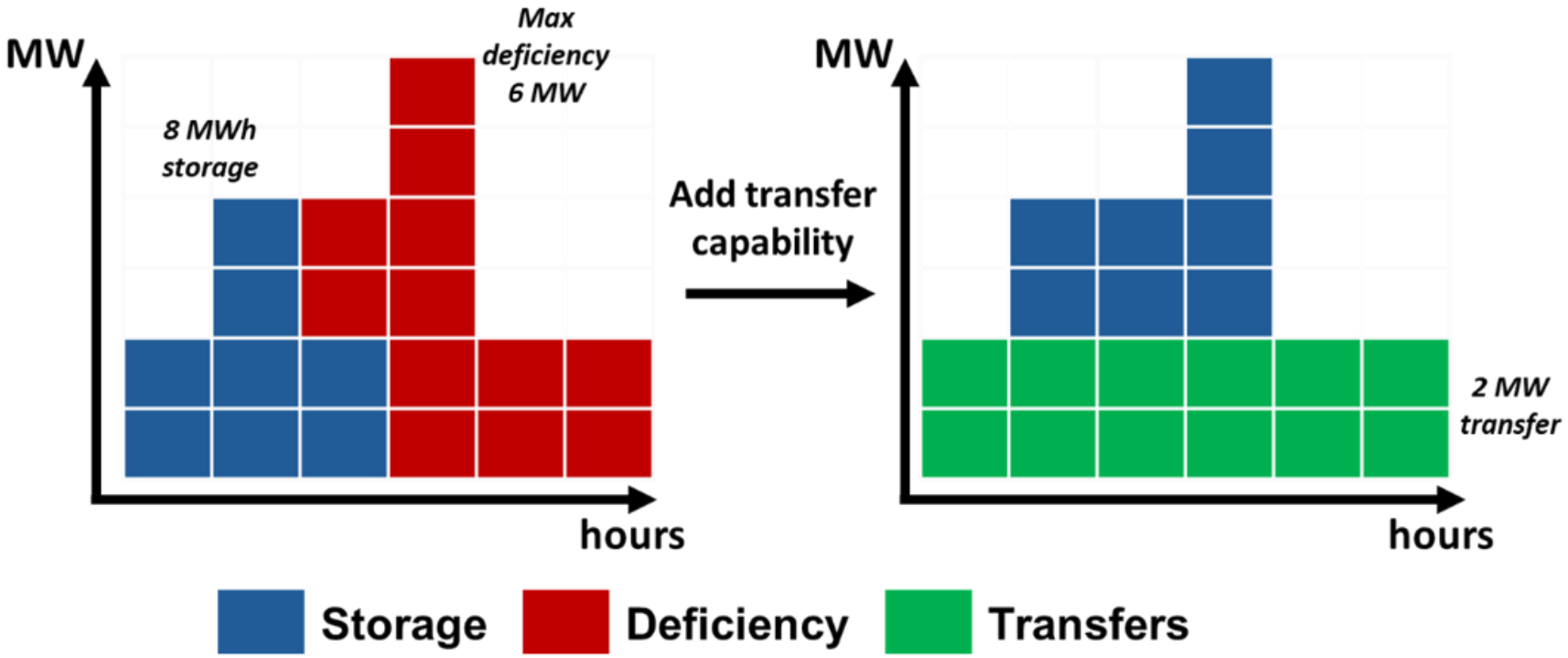
Prudent Addition Recommendations

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**	

Interaction of Transfer Capability and Energy-limited Resources



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 Reliability 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

Key Lessons

- Wide-area energy assessment and scenario development using consistent approach is important
- Study of extreme weather impacts is important
- Coordinated resource and transmission planning is vital
- Adaptive planning processes
- Data and metrics
  - Common datasets
  - Long-term weather forecasts
  - Resource projections uncertainty
  - U.S./Canada impacts

Next steps and Future Studies

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

Stakeholder Input and Feedback Channels

MONTHLY ADVISORY GROUP MEETINGS

NERC AND REGIONAL TECHNICAL COMMITTEES

PRESENTATIONS TO STATE AND PROVINCIAL REGULATORS

PRESENTATIONS TO INTERESTED INDUSTRY GROUPS

LETTERS TO TRANSMITTING UTILITIES

For more information:

- *https://www.nerc.com/pa/RAPA/Pages/ITCS.aspx*
- *itcs@nerc.net*

Questions and Answers