TEXAS RE

Interregional Transfer Capability Study (ITCS) Summary

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Upcoming Texas RE Events

February 11, 2025

GridEx Planning

February 27, 2025

Small Modular Nuclear Reactors

March 11, 2025

Protection Systems and IBRs

Upcoming Texas RE Events

February 19, 2025

Q1 MRC, AGR&F, and Board Meetings

April 23, 2025

Spring Standards, Security, & Reliability Workshop

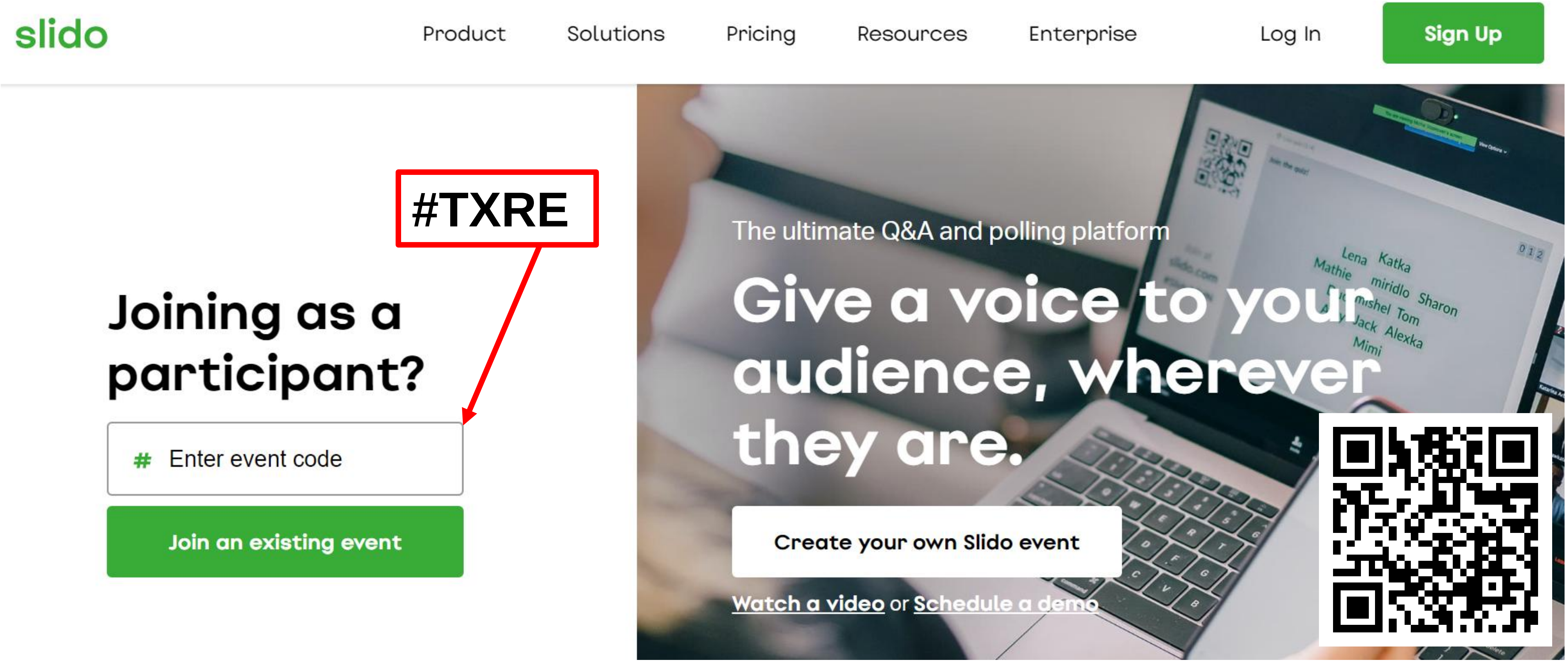
July 16, 2025

Evolving Grid Workshop

Upcoming ERO Enterprise Events

Date	Event
February 4	Penetration-Testing Webinar (MRO)
February 10	Technical Talk with RF (RF)
February 25-26	Spring Reliability & Security Seminar (SERC)
March 4	2025 Women's Leadership Conference (MRO)

Slido.com

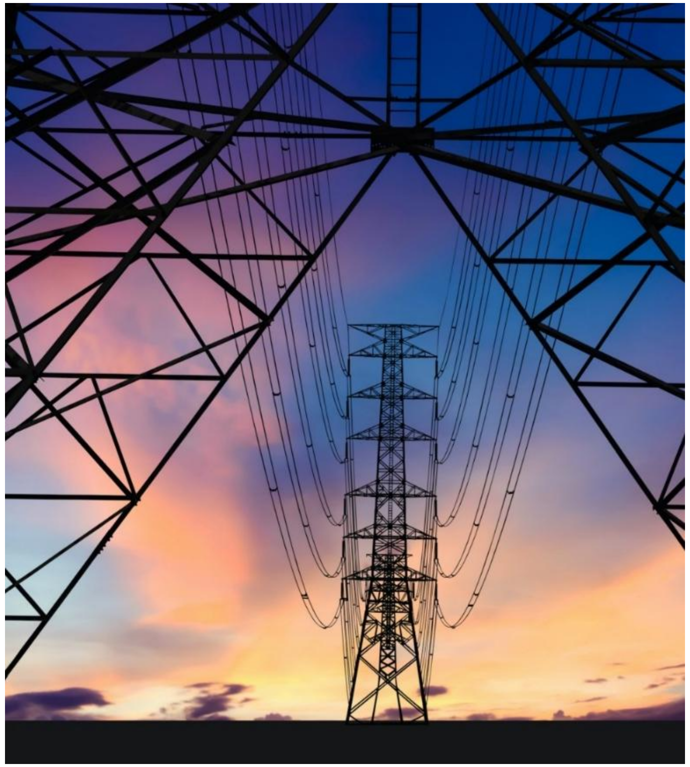


talk with TEXAS RE

Interregional Transfer Capability Study (ITCS) Objectives

Congress directed NERC to perform an Interregional Transfer Capability Study (ITCS) in the Fiscal Responsibility Act of 2023. ITCS aligns with the Electric Reliability Organization's (ERO) obligations to perform reliability assessments

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



ITCS Scope: Fiscal Responsibility Act of 2023

Part I: Calculate current total transfer capability

Part II: Recommend prudent additions to transfer capability

Part III: Recommend how to meet and maintain transfer capability

ITCS Timeline Overview

Fiscal Responsibility Act of 2023
June 3, 2023

Study Cases Prepared and Initial Actions Complete
January 31, 2024

2024/2025 Transfer Analysis Complete
August 2024

Recommendation for Prudent Additions Complete
October 2024

Parts II and III Report
October 2024

Final Report submitted to FERC
November 19, 2024

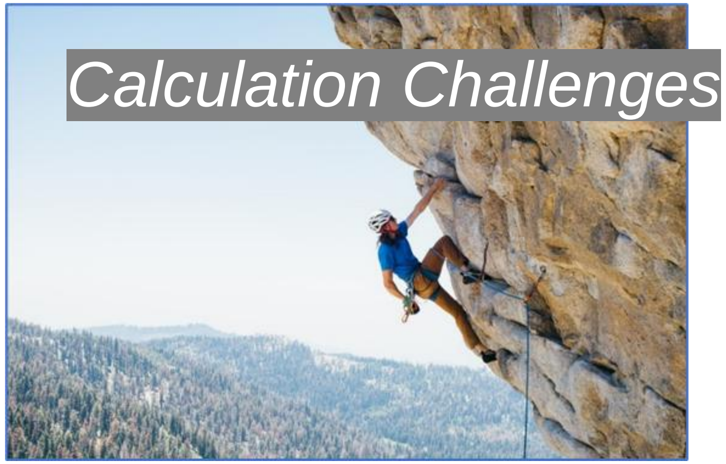
FERC Posts Report for Public Comments Until February 25, 2025

Canadian Analysis Q1 2025

FERC files its report to Congress

Part I Transfer Analysis - Scope

- **Total Transfer Capability = Base Transfers + FCITC (First Contingency Incremental Transfer)**
- **Transfer Directions**
  - Non-simultaneous and simultaneous transfer analysis performed between the neighboring regions
  - Transfers into or between Canadian provinces will be included as part of the Canadian Analysis to be published in early 2025
- **Modeling of Transfer Participation**
  - Each transfer simulated until a valid thermal limit is reached
  - A voltage screening performed for each transfer direction at the FCITC limit



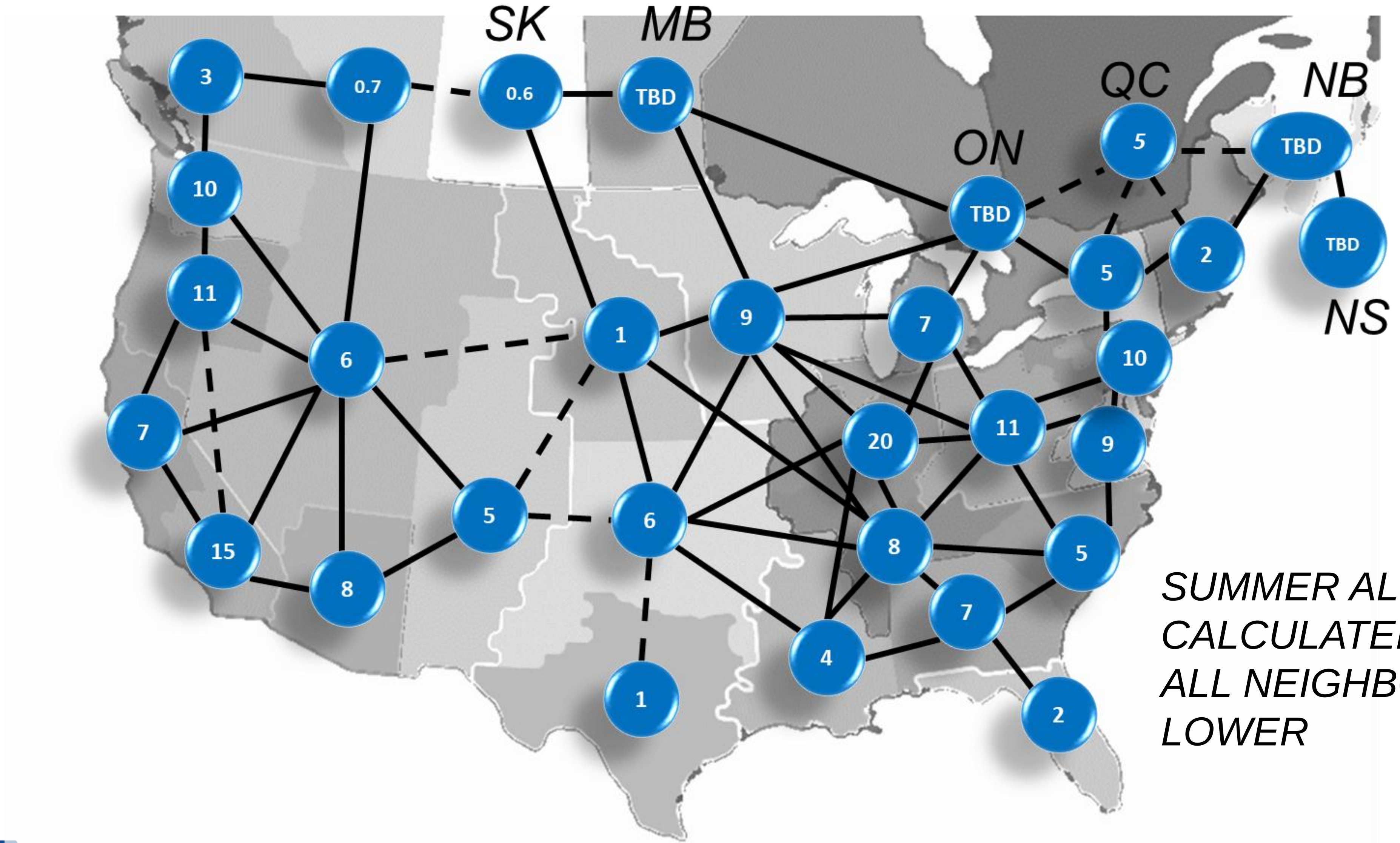
Congress required region-to-region transfer capability

Simultaneous import capability analysis required

Transfer capability is not always a single constant number

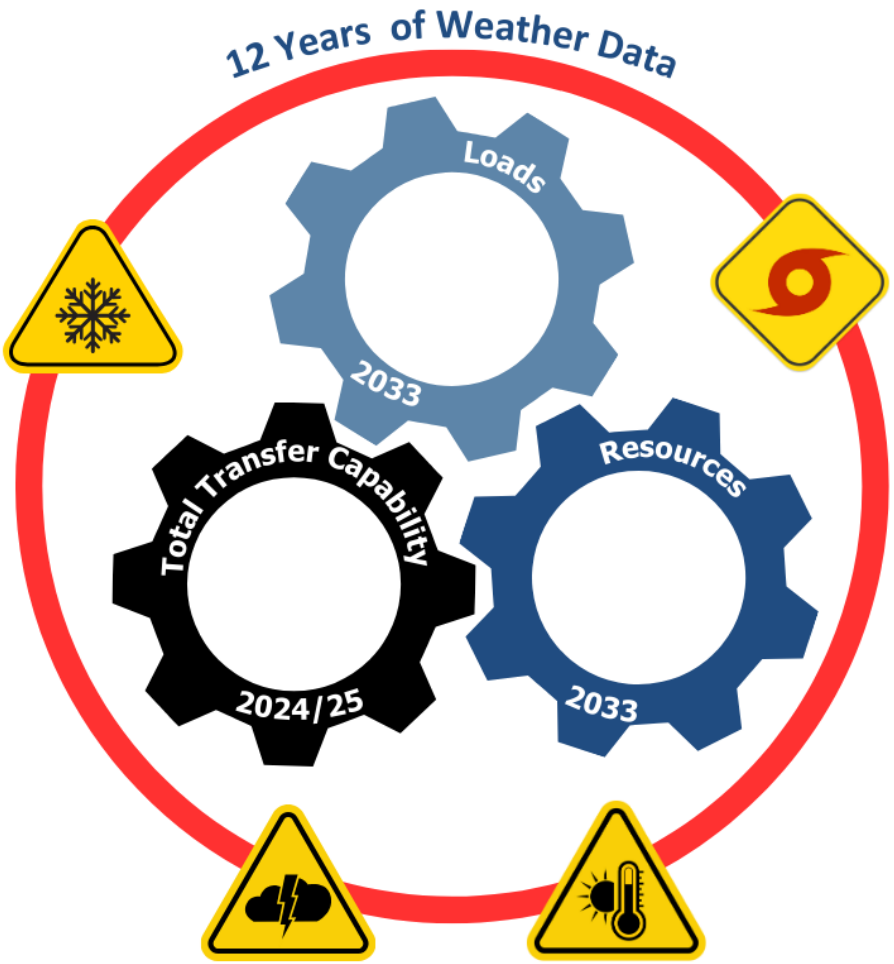
Enhancements needed to cases for future studies

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



SUMMER ALSO CALCULATED – ALL NEIGHBORS LOWER

Part II Prudent Additions Study Approach

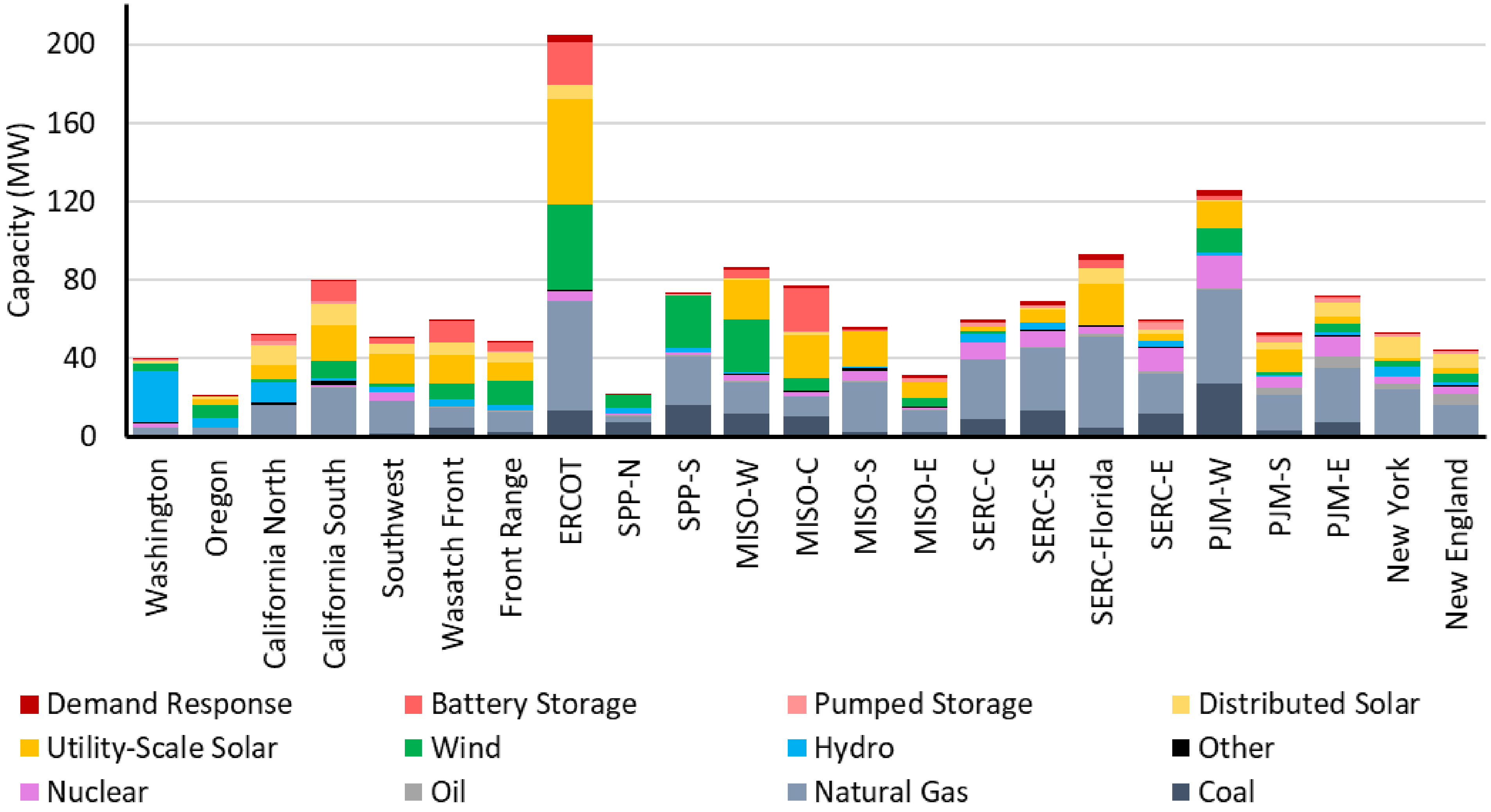


What are technically prudent additions to interregional transfer capability?

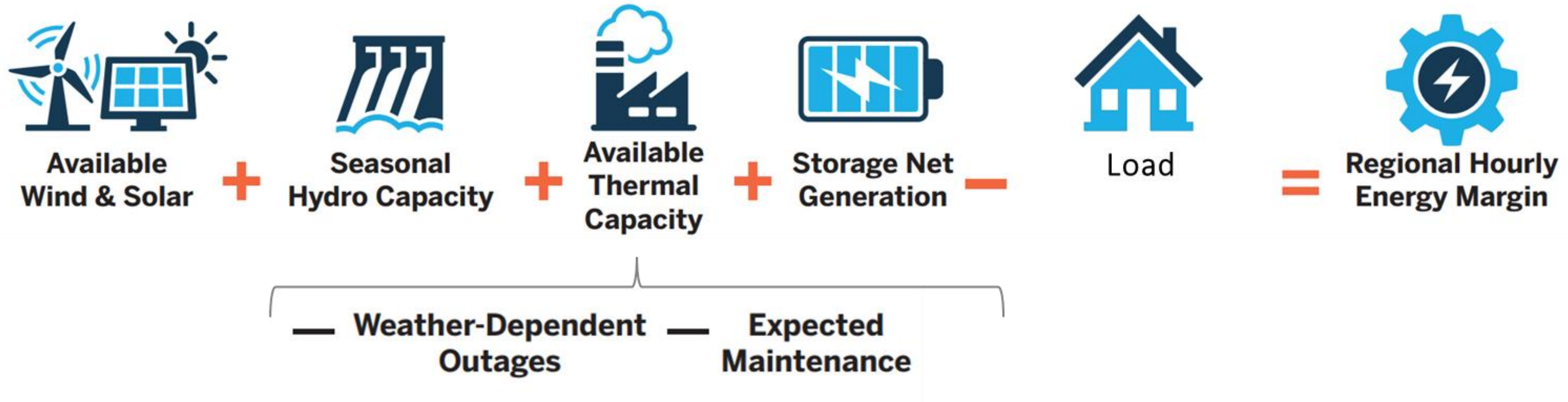
- *Strengthen reliability*
- *Serve load under extreme conditions*
- *Do not create other reliability problems*

Prudent Interregional Transfer Capability Additions

2033 Projected Resource Mix used in ITCS



Hourly Energy Margins

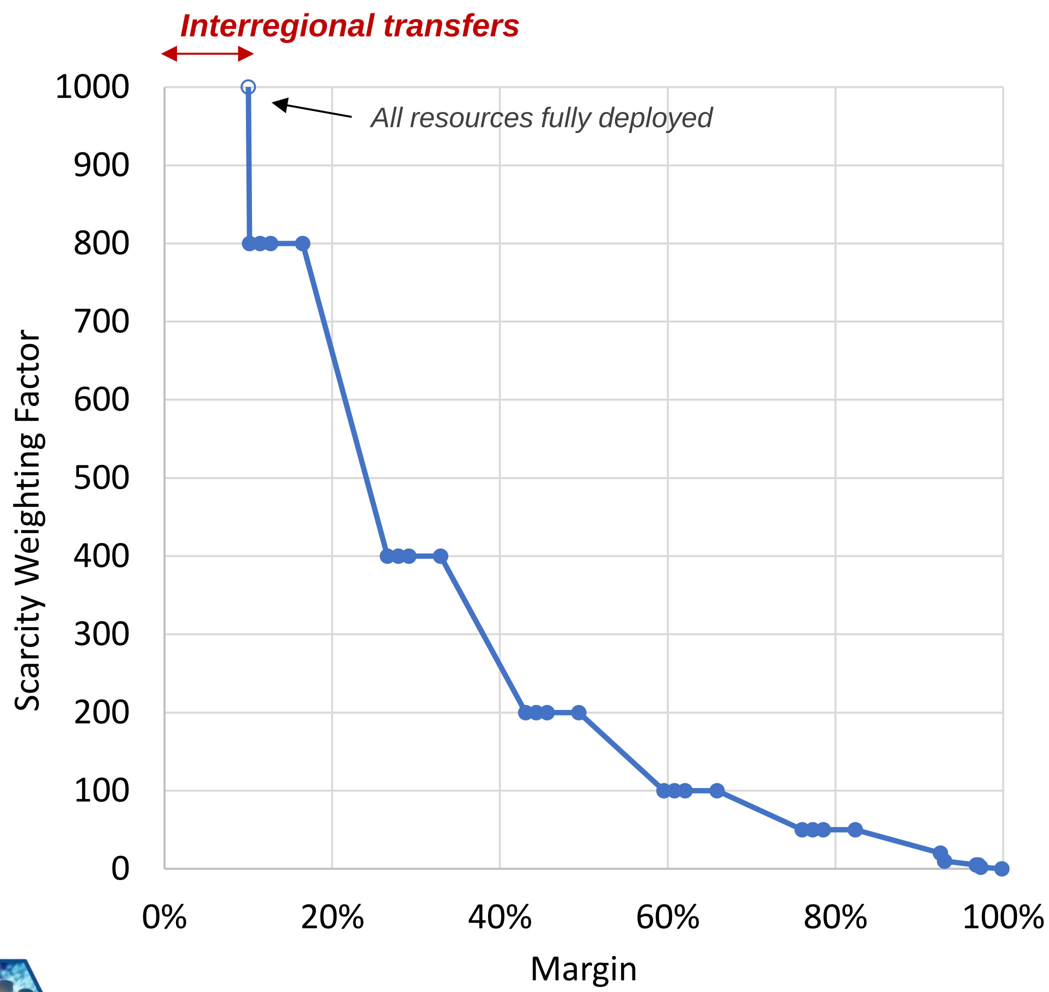


Energy Margin Methodology for Part II: Scope and Limitations

What this method DOES	What this method DOES NOT
✓ Prioritize regions for interregional transfer capability	× Represent actual physical power flows across the network…not a planning study
✓ Tracks daily and hourly availability of all resource types	× Track individual resource performance or replace a full energy assessment/LOLE study
✓ Calculates relative surplus and deficit in each region, at the same time	× Calculate relative costs or prices between regions
✓ Performs a reliability-only dispatch of resources	× Perform an economic, least-cost (production cost) dispatch
✓ Allows regions to import from one region while exporting to another	× Only evaluate "neighbor" flows
✓ Assumes full import capability from neighbors	× Evaluate potential import from non-adjacent planning areas (neighbor's neighbor)
✓ Obtain results driven by extreme weather	× Consider probability of extreme conditions

Reliability Dispatch Curve

Objective: Perform a reliability "dispatch" for each region



- *Each region will serve its own load prior to importing or exporting, which helps isolate **reliability interchange** rather than economic interchange.*
  (this is done by setting a high hurdle rate on ties between regions)
- *Operating costs are NOT assumed for resources*
- *An operating constraint will increase "Scarcity Weighting Factor" in the region as margin gets tighter (model dispatch will be based on relative surplus/scarcity, not resource costs)*
- *If a region cannot serve its own load, it will import from a neighbor that has relatively more surplus (lower scarcity weighting factor), subject to resource availability and tie-line capacity*

Six Step Process to Increase Interregional Transfer Capability

Identify

Identify hours of resource deficiency *based on energy margin analysis across 12 weather years, 8,760hrs/year = 105,120 hours per year, per region*

Quantify

Quantify maximum resource deficiency across all weather years and all hours. Use this to guide size transfer capability additions (33%)

Prioritize

Prioritize Constrained Interfaces to add transfer capability only to interfaces that 1) import to a resource deficient region, 2) hit their limit during tight margin hours, and 3) have surplus available

Allocate

Allocate Additional Transfer Capability to increase transfer capability with neighbors, initially equal to 33% of max deficiency

Iterate

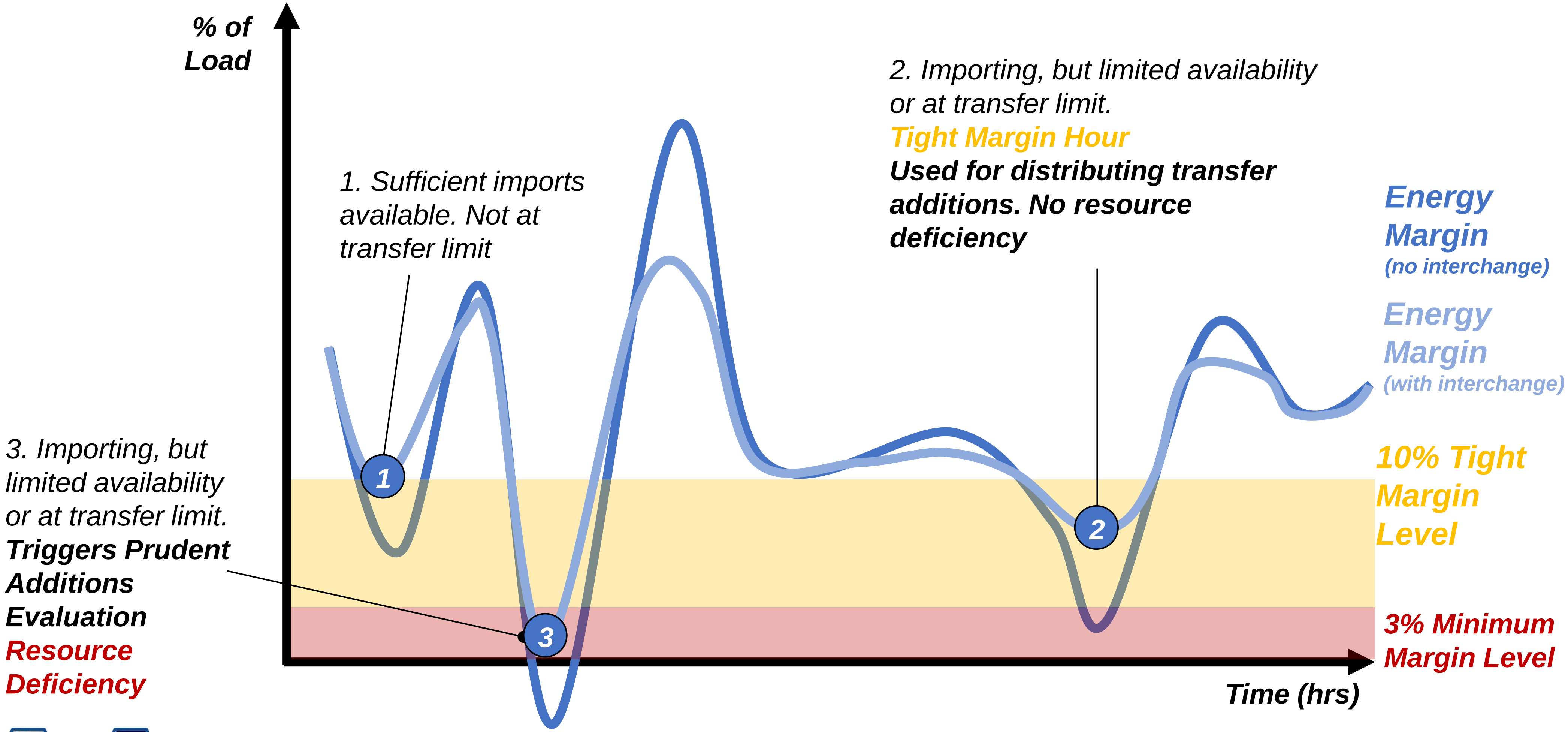
Iterate Until Resource Deficiencies are Resolved by running in increments of 33% of the original max deficiency until deficiencies are resolved or saturation occurs

Finalize

Finalize Levels of Transfer Capability using criteria to determine when additions are considered to strengthen reliability

ITCS Report Chapter 2

Step 1: Identify Hours and Regions with Resource Deficiencies



Step 2: Quantify Maximum Deficiency

Max Resource Deficiencies by Weather Year, by Region (2033)

Transmission Planning Region	WY2007	WY2008	WY2009	WY2010	WY2011	WY2012	WY2013	WY2019	WY2020	WY2021	WY2022	WY2023	Max Resource Deficiency
Washington	0	0	0	0	0	0	0	0	0	0	0	0	0
Oregon	0	0	0	0	0	0	0	0	0	0	0	0	0
California North	0	0	0	0	0	0	0	0	0	0	3,211	0	3,211
California South	0	0	0	0	0	0	0	0	0	0	0	0	0
Southwest	0	0	0	0	0	0	0	0	0	0	0	0	0
Wasatch Front	0	0	0	0	0	0	0	0	0	0	0	0	0
Front Range	0	0	0	0	0	0	0	0	0	0	0	0	0
ERCOT	1,361	0	0	9,400	0	0	0	8,977	14,853	18,926	14,321	12,108	18,926
SPP-N	0	0	0	0	0	0	0	0	0	155	0	0	155
SPP-S	0	0	0	0	0	0	0	0	0	4,137	0	0	4,137
MISO-W	0	0	0	0	0	0	0	0	0	0	0	0	0
MISO-C	0	0	0	0	0	0	0	0	0	0	0	0	0
MISO-S	0	0	560	0	629	0	0	0	0	0	0	0	629
MISO-E	0	0	0	0	1,676	0	0	0	5,715	979	0	0	5,715
SERC-C	0	0	0	0	0	0	0	0	0	0	0	0	0
SERC-SE	0	0	0	0	0	0	0	0	0	0	0	0	0
SERC-Florida	0	0	1,030	1,152	0	0	0	0	0	0	0	0	1,152
SERC-E	0	0	0	0	0	0	0	0	0	0	5,849	0	5,849
PJM-W	0	0	0	0	0	0	0	0	0	0	0	0	0
PJM-S	0	0	0	0	0	0	0	0	0	0	4,147	0	4,147
PJM-E	0	0	0	0	0	0	0	0	0	0	0	0	0
New York	0	81	0	3,244	1,748	2,631	1,229	0	0	0	0	3,729	3,729
New England	0	0	0	85	0	984	68	0	0	0	0	0	984

Summer *Winter* *Dual Season*

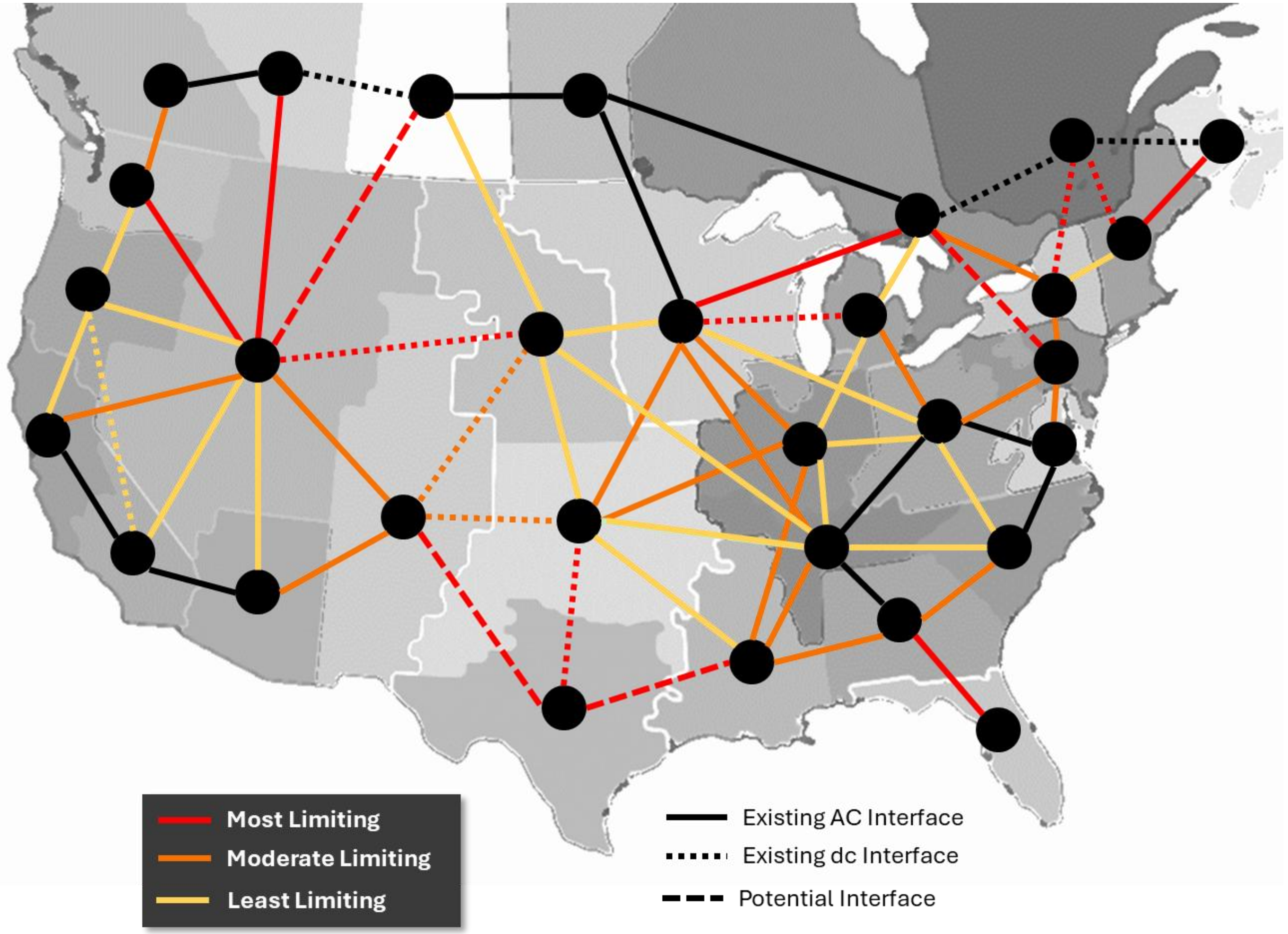
Step 3: Prioritize Constrained Interfaces for Additions

1. *Identify lines importing into deficient regions*

2. *Consider interfaces that hit their limit during tight margin hours*

3. *Prioritize interfaces that have relatively more surplus on the sending end.*

**Add to both the AC total import interface and dc-only interfaces*



Step 4 & 5: Allocate and Iterate Until Resource Deficiencies are Resolved

Initial addition to transfer capability set to 33% of maximum resource deficiency

Allocate across priority interfaces and re-run the energy margin analysis

Recalculate remaining resource deficiency

Calculate the reduction in deficiency relative to the addition in transfer capability as a measure of efficacy

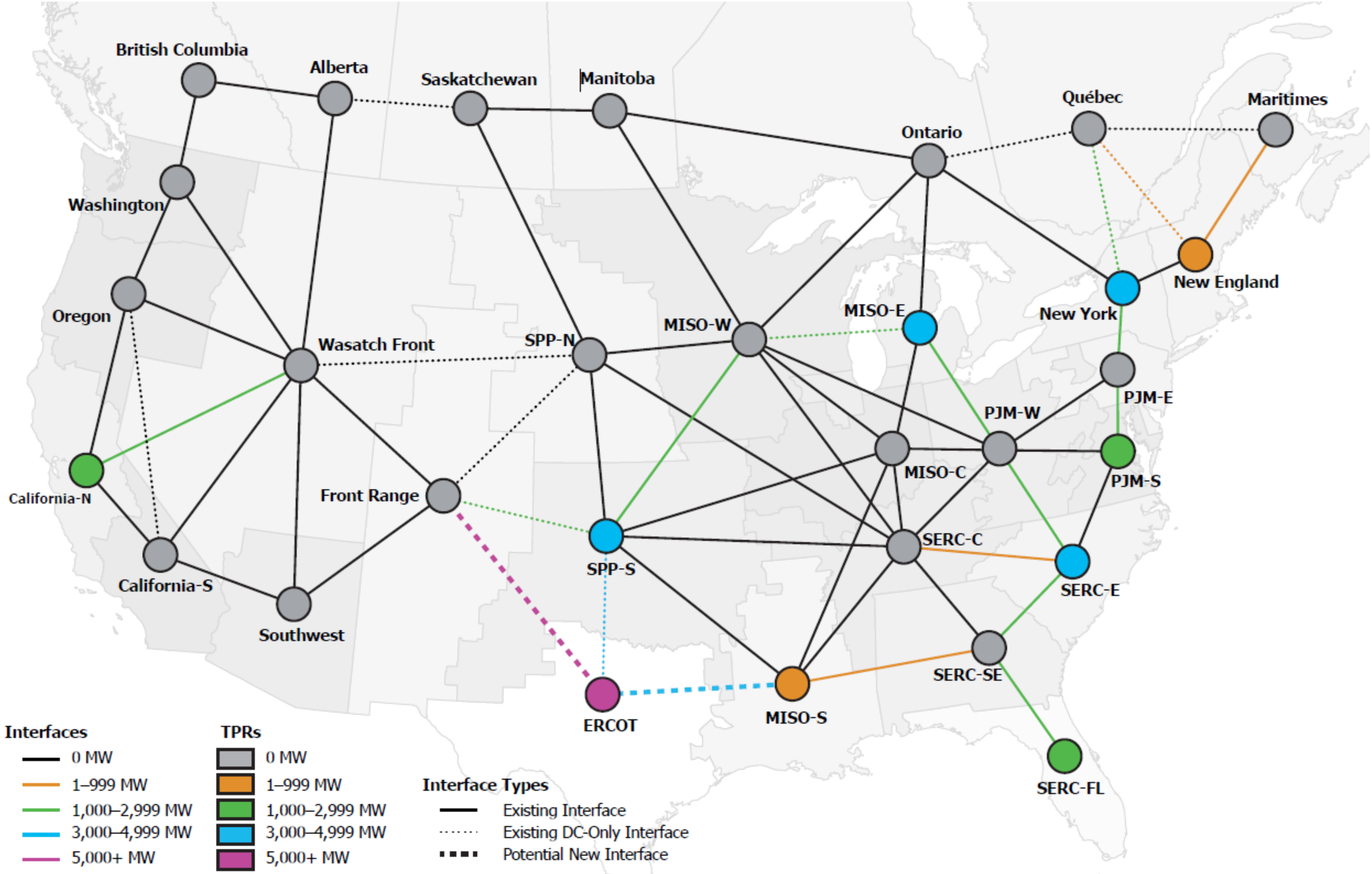
- Reduce maximum resource deficiency by at least 75% of additional transfer capability, or
- Reduce resource deficiency by at least 100% of additional transfer capability in at least 4 hours

Iterate until all deficiencies are resolved or transfer capability stops helping

Why Iterate?

- ***Saturation Effects:*** *As regions start to export more, their energy margins will go down and there will be less to export in the following iteration*
- ***Multiplier Effects:*** *Transmission and energy limited resources (Storage and DR) work together*
- ***Interactive Effects:*** *Flows between regions will change relative surplus and scarcity*

Step 6: Finalize Prudent Addition Recommendations



Part II Deficiencies and Recommended Prudent Additions (Final)

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

**Not all deficiency hours were resolved in these events*

Part III Scope: Meet and Maintain

Mandate calls for:

- "Recommendations to meet and maintain total transfer capability together with such recommended prudent additions to total transfer capability..."

Report will describe general measures and actions needed to achieve and sustain the identified transfer capability and any recommended enhancements

- Additional Analysis
- Capital & Infrastructure
- Grid Enhancing Technologies
- Markets & Regulatory
- Resource Additions

Considerations When Reviewing the Report

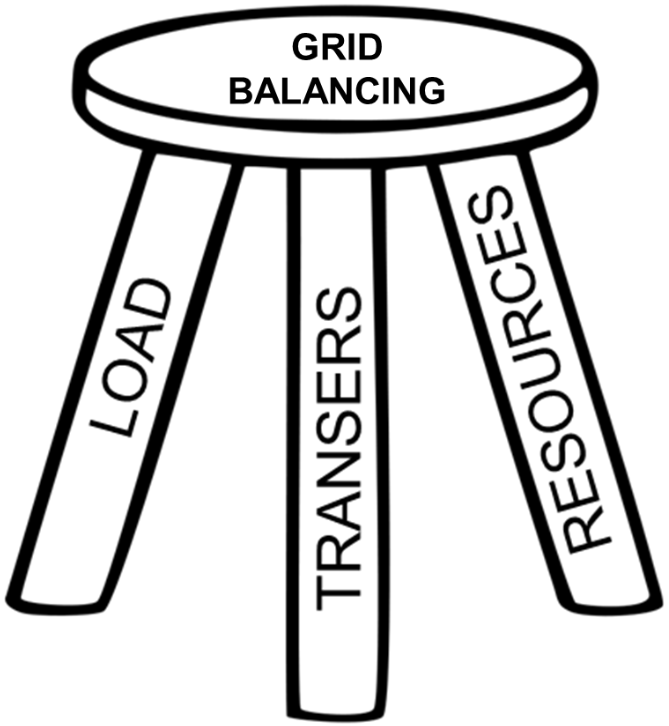
Wide-area energy margin assessment and scenario development called for consistency in assumptions and approach, rather than individual entity practices

Extreme weather (especially Uri-like scenario) drives results; results do not consider probability of occurrence

Study uses transfers to resolve deficiencies below a three percent margin, rather than additional internal demand response or generation (beyond LTRA 2033 projections)

Study does not consider costs or economic factors

No specific transmission projects are identified, nor are implementation barriers addressed, technical, financial or regulatory



[***Current Report: Interregional Transfer Capability Study***]

Questions?

TEXAS RE
Ensuring electric reliability for Texans