NERC

NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Interregional Transfer Capability Study

Study Framework and Plan

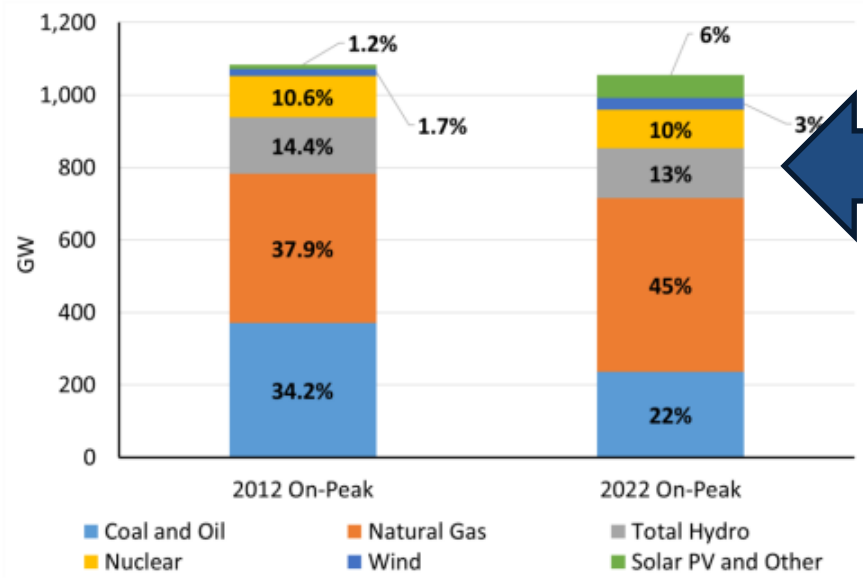
August 2023

RELIABILITY | RESILIENCE | SECURITY



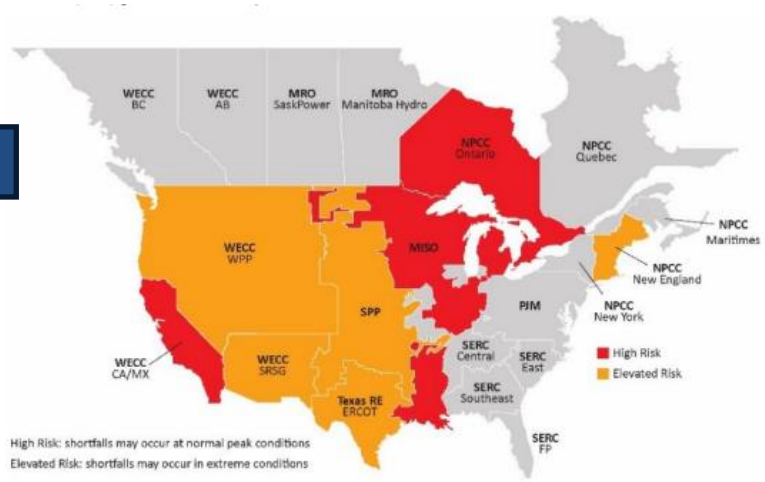

Across an Interconnected System: Less Resources, More Reliance on Neighbors

2012 and 2022 Peak Capacity Resource Mix NERC-Wide

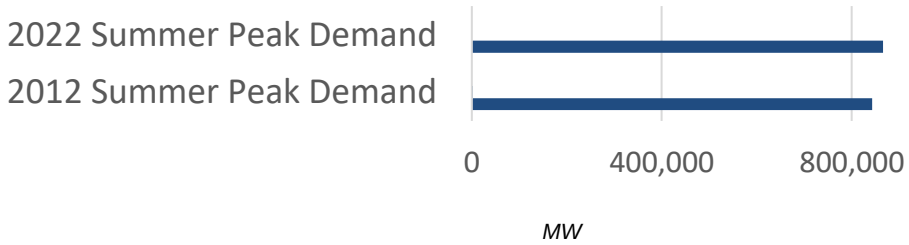


4% Decrease

2025 Risk Areas



NERC-Wide Summer Peak Demand Changes 2012 and 2022



3% Increase

Background

Who: NERC, in consultation with each Regional Entity and each transmitting utility in a neighboring transmission planning region [Registered Entities]

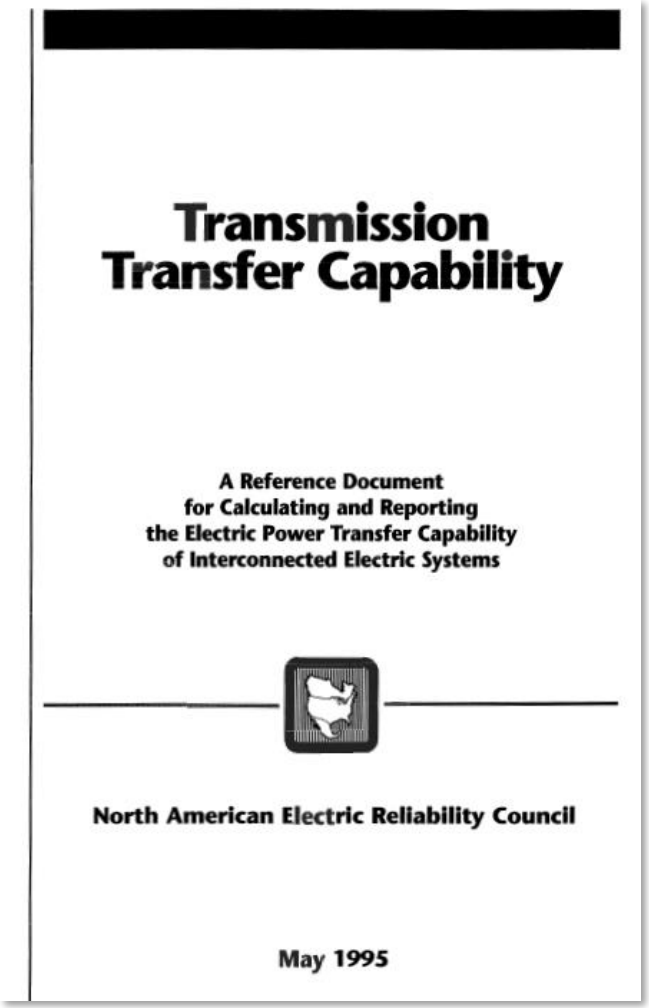
What: A study on the amount of electric power that can be moved or transferred reliably from one area to another area

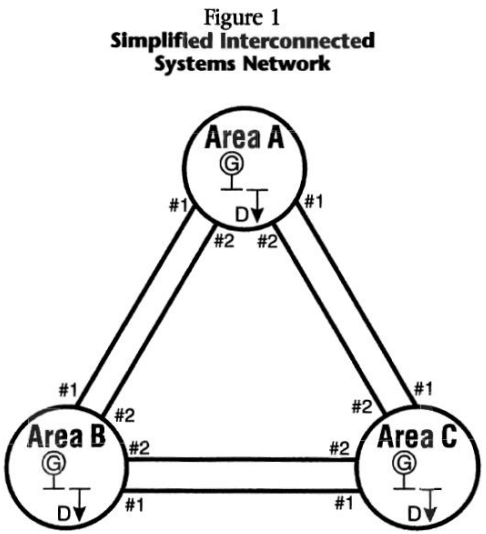
1. Current total transfer capability, between each pair of neighboring transmission planning regions.
2. A recommendation of prudent additions to total transfer capability between each pair of neighboring transmission planning regions that would demonstrably strengthen reliability within and among such neighboring transmission planning regions.
3. Recommendation on how to meet and maintain the identified total transfer capability (from #1) and the recommended additional transfer capability (from #2)

When: NERC files with FERC within 18 months of enactment of the bill. Public comment period will occur when FERC publishes the study in the Federal Register.

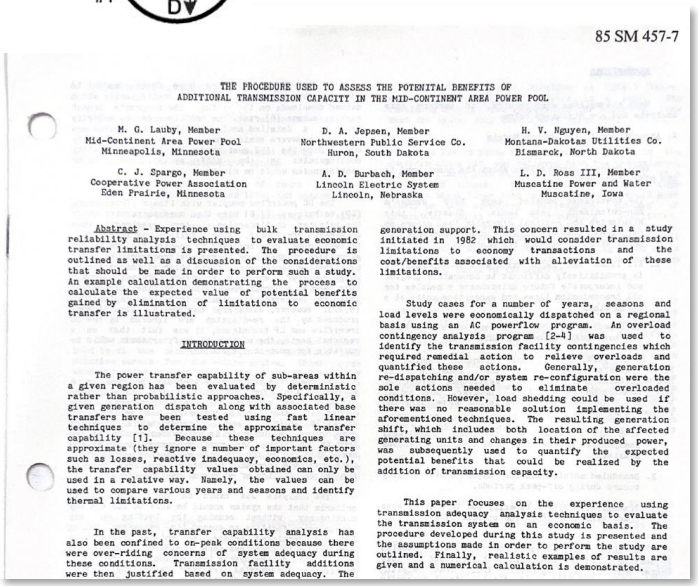
 Study filing deadline: On or before December 2, 2024

Transfer Capability





Definition: *the amount of electric power that can be moved or transferred reliably from one area to another area of the interconnected transmission systems by way of all transmission lines (or paths) between those areas under specified system conditions, or such definition as contained in Commission-approved Reliability Standards.*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THE PROCEDURE USED TO ASSESS THE POTENITAL BENEFITS OF ADDITIONAL TRANSMISSION CAPACITY IN THE MID-CONTINENT AREA POWER POOL

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Abstract - Experience using bulk transmission reliability analysis techniques to evaluate economic transfer limitations is presented. The procedure is outlined as well as a discussion of the considerations that should be made in order to perform such a study. An example calculation demonstrating the process to calculate the expected value of potential benefits gained by elimination of limitations to economic transfer is illustrated.

INTRODUCTION

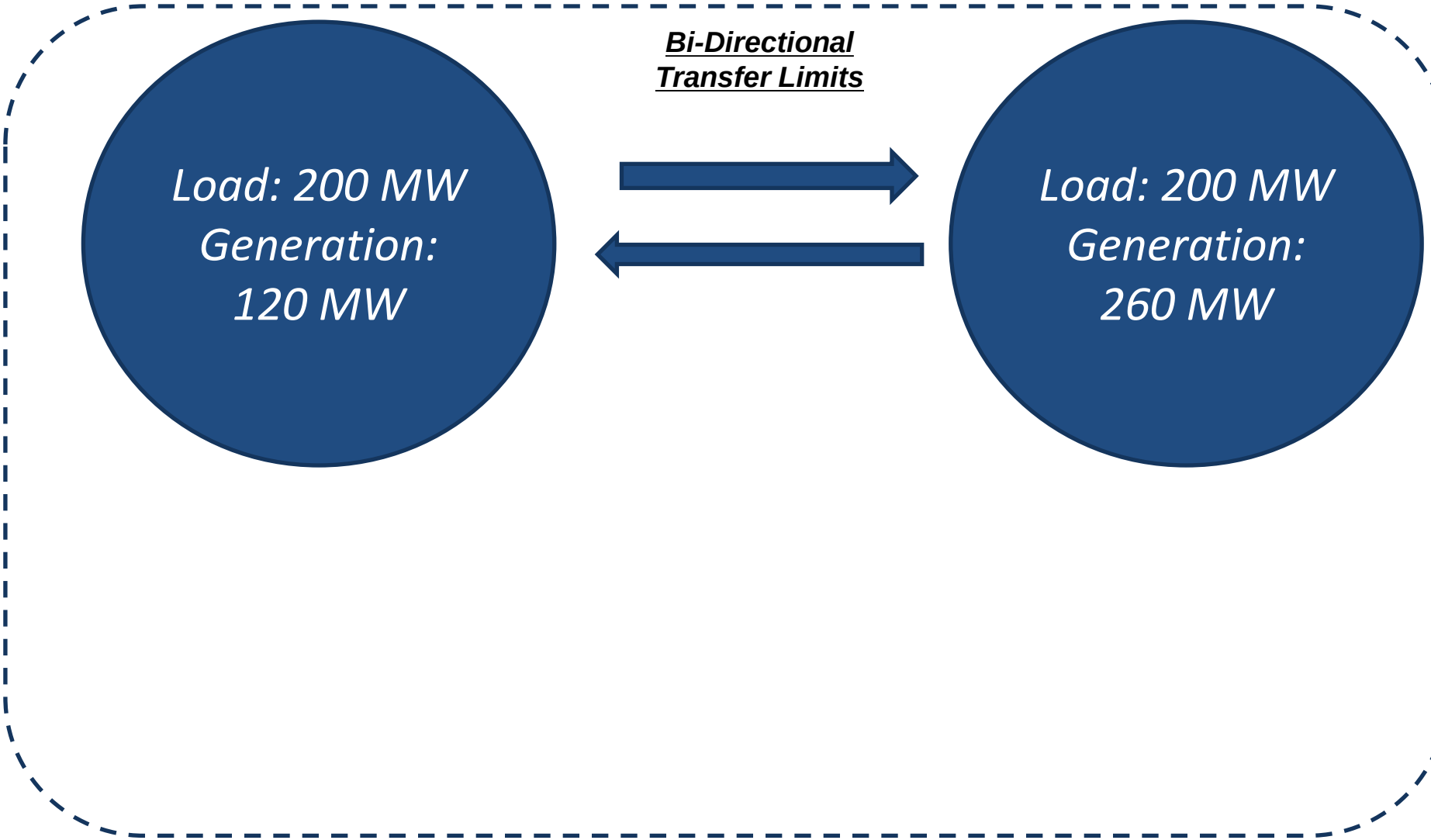
The power transfer capability of sub-areas within a given region has been evaluated by deterministic rather than probabilistic approaches. Specifically, a given generation dispatch along with associated base transfers have been tested using fast linear techniques to determine the approximate transfer capability [1]. Because these techniques are approximate (they ignore a number of important factors such as losses, reactive inadequacy, economics, etc.), the transfer capability values obtained can only be used in a relative way. Namely, the values can be used to compare various years and seasons and identify thermal limitations.

In the past, transfer capability analysis has also been confined to on-peak conditions because there were over-riding concerns of system adequacy during these conditions. Transmission facility additions were then justified based on system adequacy. The generation support. This concern resulted in a study initiated in 1982 which would consider transmission limitations to economy transactions and the cost/benefits associated with alleviation of these limitations.

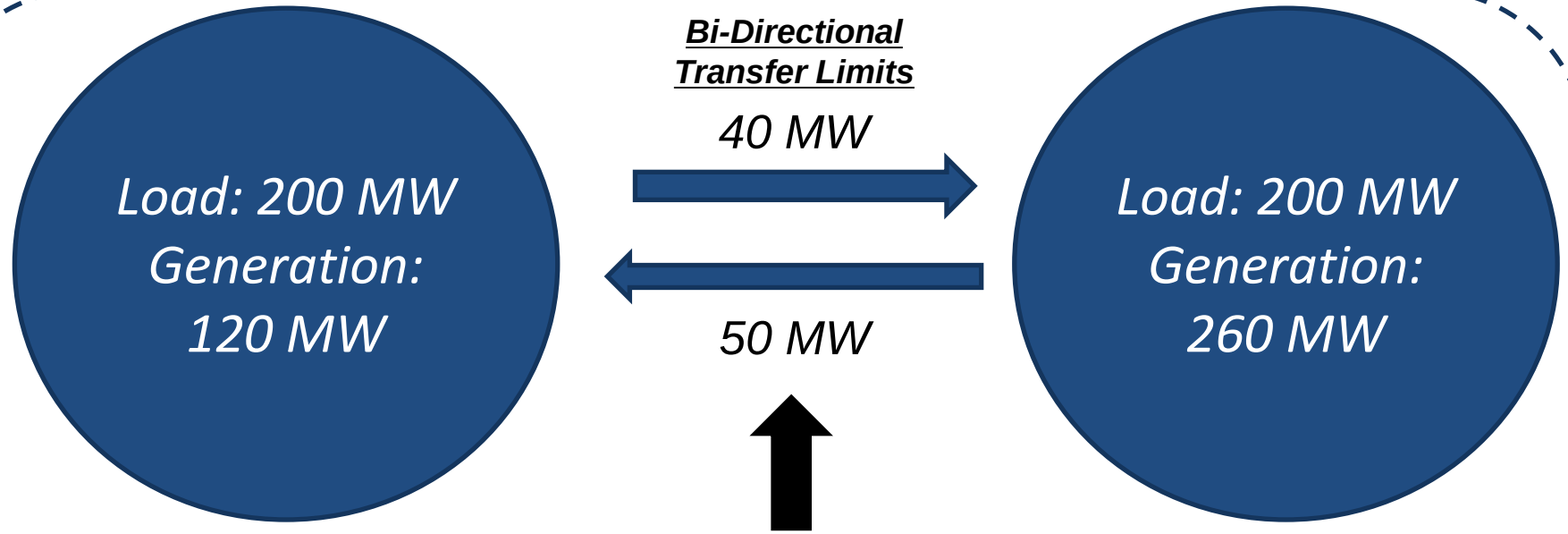
Study cases for a number of years, seasons and load levels were economically dispatched on a regional basis using an AC powerflow program. An overload contingency analysis program [2-4] was used to identify the transmission facility contingencies which required remedial action to relieve overloads and quantified these actions. Generally, generation re-dispatching and/or system re-configuration were the sole actions needed to eliminate overloaded conditions. However, load shedding could be used if there was no reasonable solution implementing the aforementioned techniques. The resulting generation shift, which includes both location of the affected generating units and changes in their produced power, was subsequently used to quantify the expected potential benefits that could be realized by the addition of transmission capacity.

This paper focuses on the experience using transmission adequacy analysis techniques to evaluate the transmission system on an economic basis. The procedure developed during this study is presented and the assumptions made in order to perform the study are outlined. Finally, realistic examples of results are given and a numerical calculation is demonstrated.

ITCS Summary



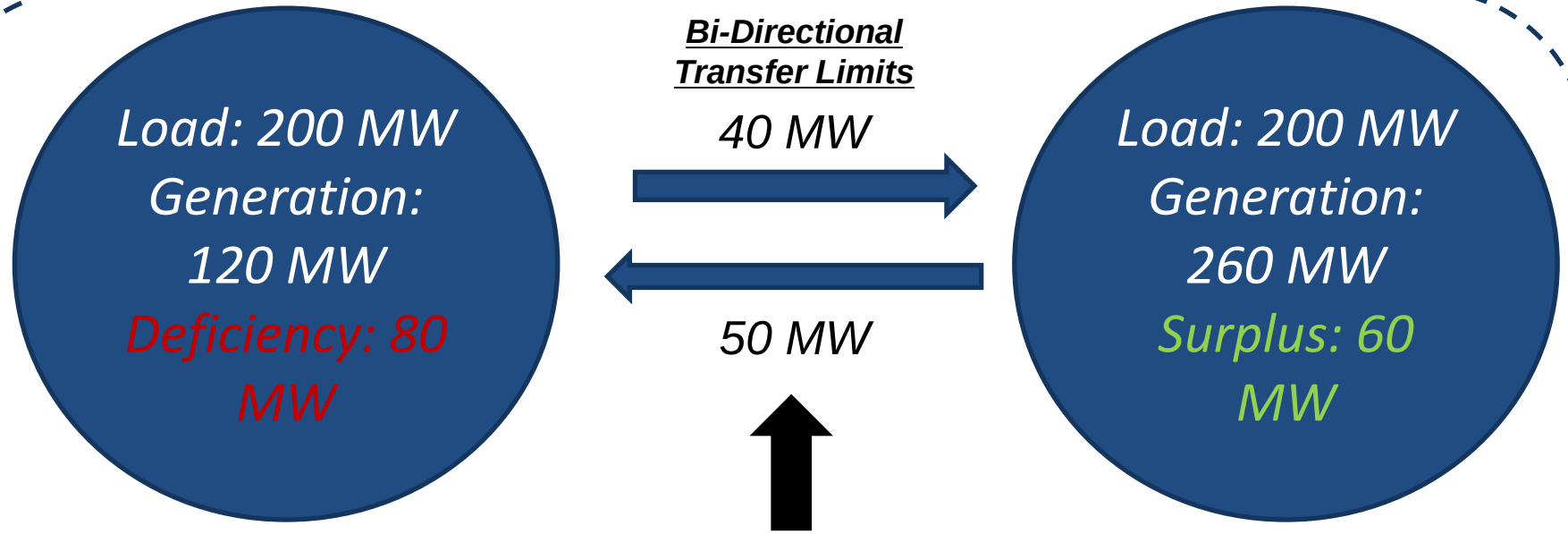
ITCS Summary



TASK 1:

- *What is the transfer capability?*

ITCS Summary



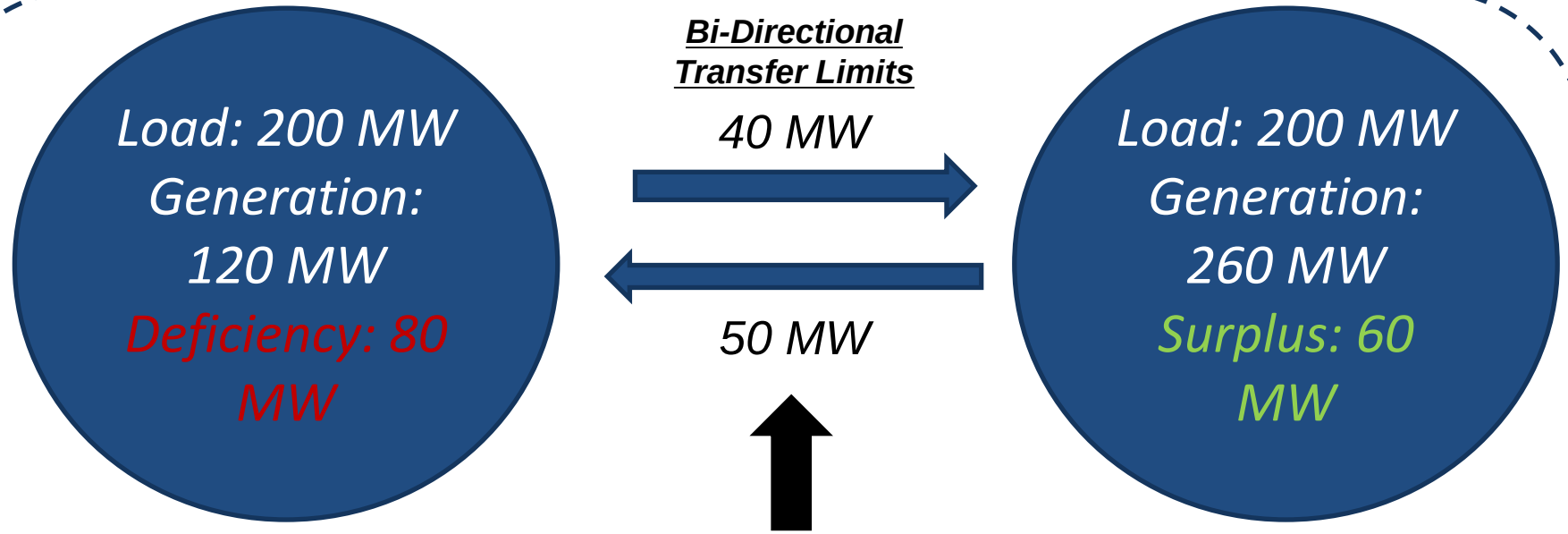
TASK 1:

- *What is the transfer capability?*

TASK 2:

- *What is the deficiency?*
- *Is there sufficient capability?*
- *If not, how much is needed to maintain reliability?*

ITCS Summary



TASK 1:

- What is the transfer capability?

TASK 2:

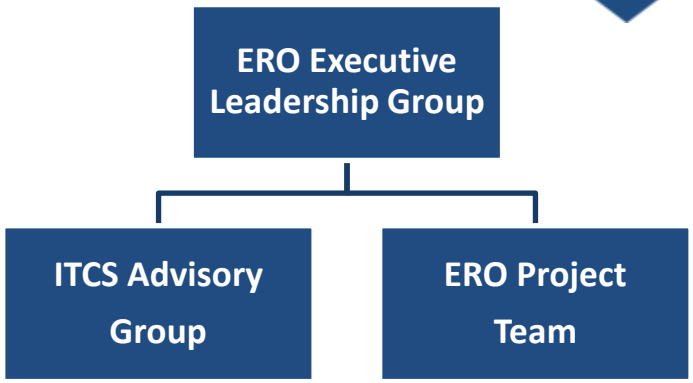
- What is the deficiency?
- Is there sufficient capability?
- If not, how much is needed to maintain reliability?

TASK 3:

- What is needed to meet and maintain these transfer limits
- Does the increase require other reliability reinforcements or considerations?

Study Group and Project Management

- ERO Executive Leadership Group: Serves as the executive project sponsor
- ERO Project Team: ERO Staff Team (NERC and Regional Entity Staff) will oversee, coordinate, and conduct the required studies
- ITCS Advisory Group: Stakeholder advisory group provides advice and input on the study scope, approach, results, and recommendations.



NERC Staff	Regional Entity Staff	Industry
• Study design and oversight • Identify common assumptions, scenarios, and case creation parameters • Compile study results for cross-interconnection wide study	• Leverage technical study groups and data collection processes • Run power flow simulations	• Support scenario development • Support capacity and transmission expansion assumptions • Coordinate with study groups and Regional Entity staff

Phased Approach

Phase 0: Study Prep

- Define study scope, assumptions, scenarios
- Stakeholder engagement
- Data requests
- Build study cases & scenarios for transfer capability analysis

Phase 1 : Analysis

- Leverage LTRA to identify generation deficient and surplus areas
- Perform transfer capability analysis
- Identify thermal, voltage & stability limits (Total Transfer Capability)

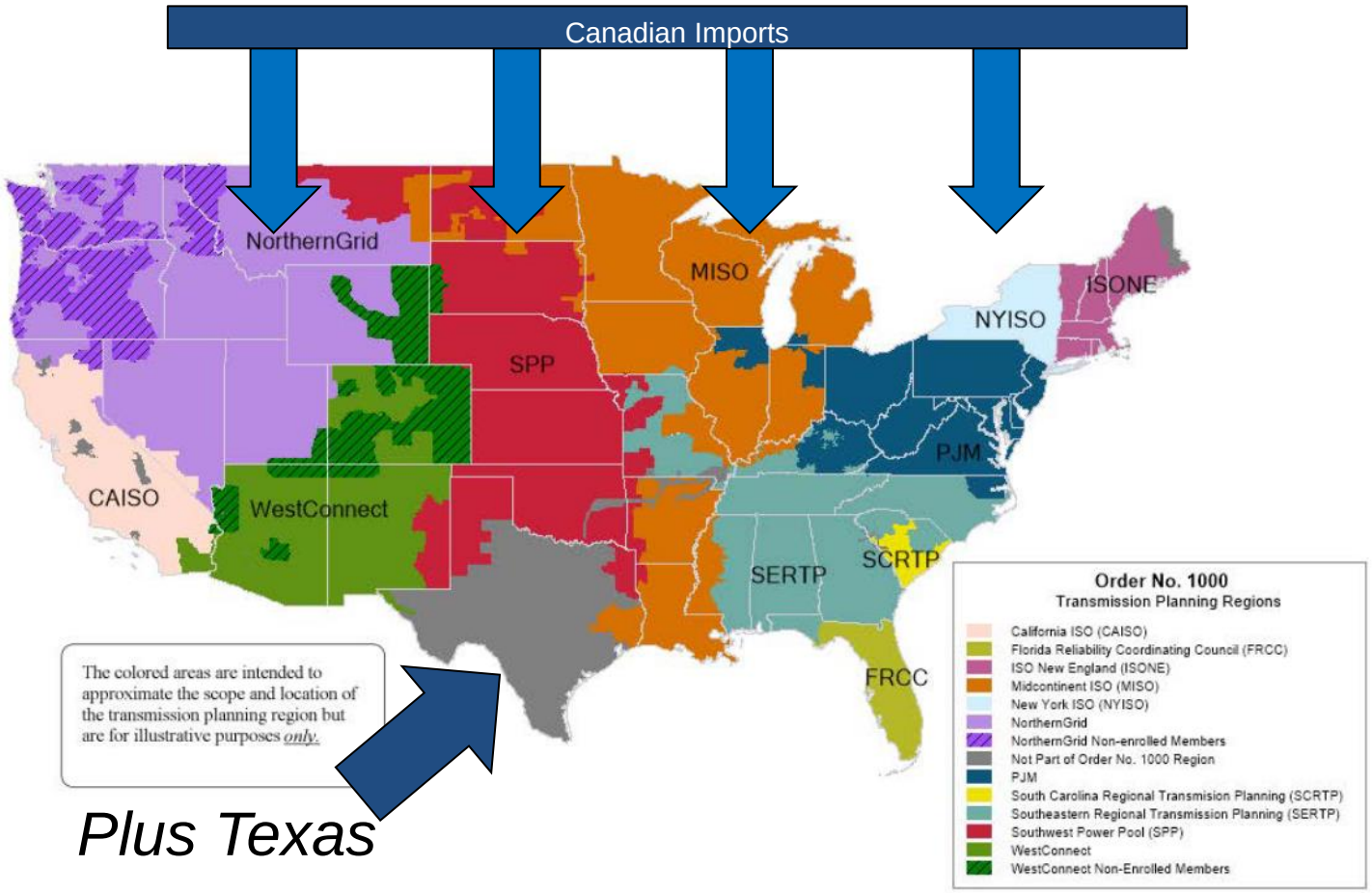
Phase 2 : Recommendations

- Define metrics for identification of “prudent transmission additions” based on reliability
- Draft final recommendations

July 2023 – August 2024

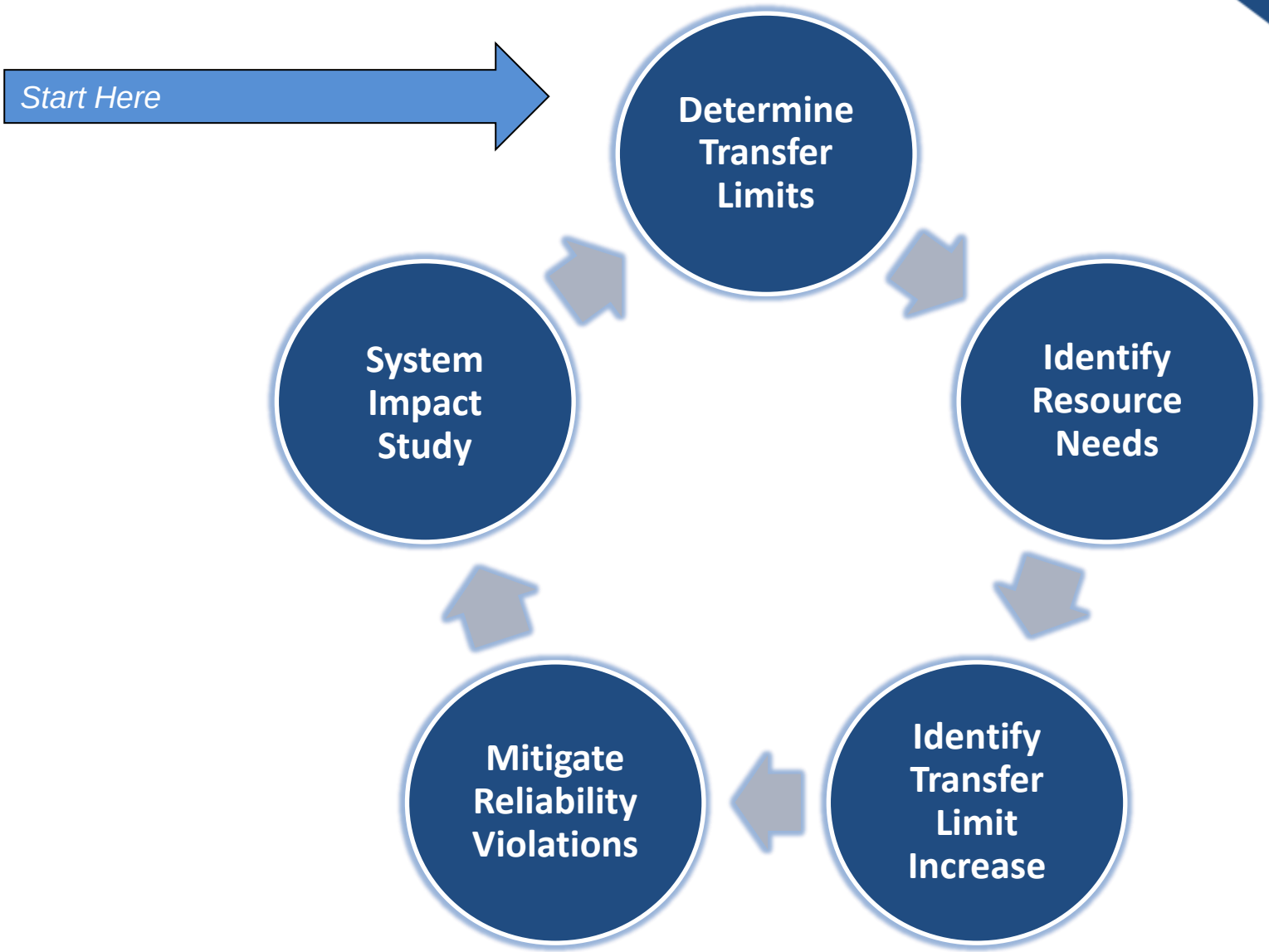
Stakeholder Engagement | Data Collection | Technical Coordination | Stakeholder Comment

ITCS - Areas of Study



- Legislation identified "Transmission Planning Regions" as identified in FERC Order 1000
- Texas Interconnection DC Ties included
- Canadian import capability and possible increases also assessed

General Approach



Study Approach: Part 1

- Study Case and Scenario Development
- Extreme Case Assumptions / Development
- Energy and Capacity Expansion Analysis
- Finalize Cases: Steady State and Stability
- Transfer Capability Analysis; AC Load Flow, Contingency Analysis

Objective: *Determine the total transfer capability between neighboring transmission planning regions*

Difficulty Rating: 

Study Approach: Part 2

- Metric Development
- Determine Needs Based on Resource Deficiencies
- System Expansion “Prudency” Analysis and Options for Prudent Additions
- Inter-Interconnection Analysis
- Transfer Capability Analysis
- Interconnection Stability

Objective: *Identify “prudent” additional transfer capability between neighboring areas to resolve reliability issues in the future*

Difficulty Rating: 

Study Approach: Part 3

- Review of existing studies and policy recommendations
- Identify generation and transmission needs and risks
- Identify actions needed to meet and maintain transfer capability (e.g., policy, market, NERC Reliability Standards)

Objective: *Identify mechanisms to achieve and sustain the identified transfer capability and any recommended enhancements.*

Difficulty Rating:

Final Report, Recommendations, and Outreach

- **Final Report Preparation Phase (Months 13-14):** Compile study results, develop a comprehensive final report, review and validate the report with stakeholders, and address any feedback received.
- **Stakeholder Comment Phase (Months 14-17)**
- **Submit to FERC (Month 18): December 2, 2024**
- **FERC Review (Beyond 18 Months):** Provide support to FERC, as needed.

Benefits Beyond ITCS

Significantly improves reliability risk assessments going forward by incorporating more transmission considerations

- Enables assessment of the uncertainty risks from energy-constrained resources
- Better representation of the transfer capability and resilience of the BPS under extreme conditions
- Supports the assessment of impacts from generating unit retirements and the need for addition of essential reliability services
- Requires ongoing independent assessment as retiring generation is replaced by energy-constrained resources resulting in the need for prudent amounts of transfer capability to address energy uncertainty

ITCS Resources

ITCS Resources (2023 and 2024)

- Five FTEs to be hired in 2023
  - Project manager
  - Engineering manager
  - Engineers (2)
  - Communications support
- Consultants
  - Executive leadership support
  - Technical study support
  - Public affairs support
- Regional Entity
  - Varies. Regional Entities will need to collect data, validate models, run and supply study results, etc. Any financial impacts run through their own budget processes.

Future Resources

- We have not included any additional resources to further enhance transmission transfer capacity analytics in the 2025 and 2026 projections in the 2024 BP&B. The value proposition and resource needs beyond 2024 will be evaluated with the Board at our next strategic planning session.

Reprioritizing Work

Eliminate a 2023 WPP

- Will not conduct the special assessment on new and evolving electricity market practices
  - Will partially address in this year's Long-Term Reliability Assessment as well as in the ITCS

Defer 2023 Personnel

- Defer hiring of four (4) open positions in the technical areas until 2024 to offset the four new hires in 2023
  - Changes are neutral for personnel expense in 2023

Repurpose Contractor and Consultant funds in 2023 and 2024

- GMD/EMP research
- Emerging technology/cyber risk studies
- Environmental policy analysis

Onward!

- NERC's role as the independent voice for reliability
- Critical assignment supporting the ERO's Reliability Assessment mandate
- Strong transmission system is crucial to a reliable supply and the delivery of electricity
- Rapidly changing resource mix requires greater access and deliverability of resources
- On-going assessment critical to maintaining BPS reliability

Questions