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Overview of the Regional and Interregional Electric Transmission Development Landscape

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U.S. DEPARTMENT OF ENERGY BATTELLE

Agenda

- Varied transmission development landscape across the country
- Current efforts to improve regional and interregional transmission planning and development
- FERC background and context
- Layers of transmission planning
- Role of states
- Cost allocation and cost recovery
- Siting and permitting
- Public engagement

There's a varied transmission planning landscape across the country

- In the U.S., there are **different utility ownership and regulatory structures** that impact interregional transmission development.
- **FERC sets the planning requirements** that regional transmission planning organizations use to conduct regional and interregional planning.
- The Electric Reliability Council of Texas **(ERCOT) is a notable exception** as a regional transmission organization (RTO) that is not subject to FERC jurisdiction due to the absence of interstate commerce in wholesale electricity in their service territory.
- **States also play an important role** in transmission planning and development, but that **role varies** based on project type and the broader transmission planning context.

Current efforts to improve interregional transmissions planning and development

- FERC Rulemakings and other actions
  - Order 2023 streamlined interconnection studies
  - NOPR on regional transmission planning, cost allocation, and generator interconnection
  - Joint Federal-State Task Force with NARUC on transmission
  - Staff workshop on interregional transfer capability requirements
- DOE studies and offerings
  - Transmission siting and financing programs
  - National Transmission Planning (NTP) Study
  - National Transmission Needs Study
  - Regional offshore wind studies (Eastern and Western US)
- Northeast states collaborative on interregional transmission
- NERC Interregional Transfer Capability Determination Study
- Western Transmission Expansion Coalition
- Federal Power Act Section 216 Federal Siting Authority

RTOs and ISOs serve many functions

- RTO = Regional Transmission Organization
- ISO = Independent System Operator

- An RTO/ISO manages the electric grid in its territory, as well as the flow of electricity between neighboring regions. It also designs and administers energy and other markets.
- RTOs and ISOs operate transmission systems and regional markets independent of the utilities and generators that use the grid and serve as regional transmission planning organizations with responsibility under **FERC Order 1000**.
- RTOs/ISOs perform regional and interregional planning, cost allocation, and cost recovery under the oversight of FERC.

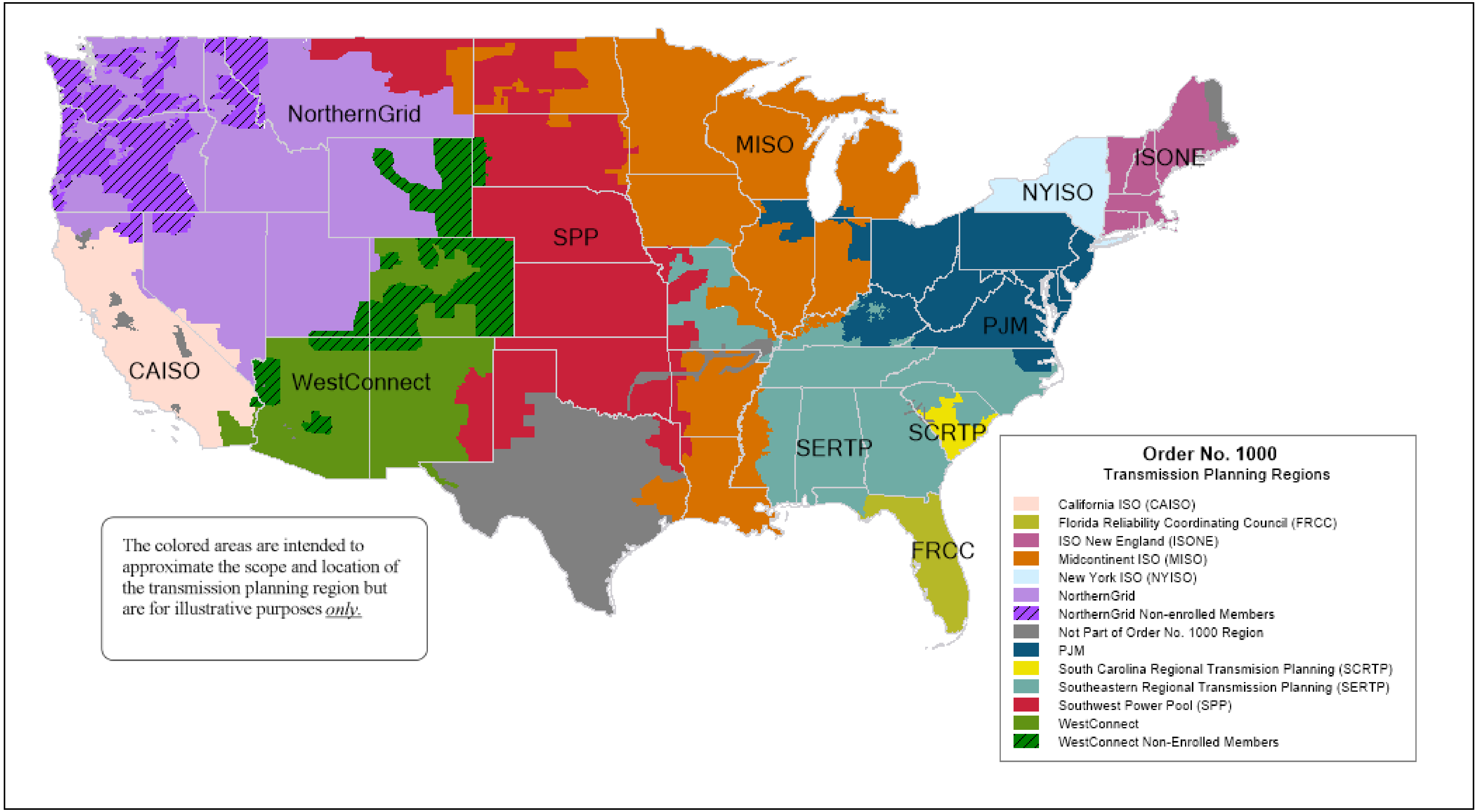
FERC has a series of transmission planning requirements

- **Federal Power Act** (16 U.S.C. §§ 791 et seq.) FERC is responsible for regulating interstate transmission and wholesale electricity rates in interstate commerce, including rates, terms, and conditions of transmission facility services.
- **FERC Order 888** (1996) implemented open access to transmission facilities and established minimum transmission planning requirements
- **FERC Order 890** (2007) required coordinated regional transmission planning around nine key planning principles.

FERC Order 1000 set the stage for today's planning landscape

- **FERC Order 1000** (2011) required the development of regional transmission plans and promoted interregional transmission by requiring "interregional coordination."
  - Regions must coordinate and determine if interregional transmission projects could more efficiently or cost-effectively meet regional transmission needs
  - Regions must develop common cost allocation methods that meet FERC's interregional cost allocation principles.

FERC has established regional transmission planning organizations



Transmission planning occurs in layers

1. **Local transmission projects** involve lower voltage projects solely within a public utility's service territory.
   - Each utility conducts its local system reliability studies, often to meet NERC reliability standards and other criteria.
2. **Regional transmission projects** are typically identified in regional planning processes or by merchant project developers and span more than one utility service territory or state.
   - In non-RTO/ISO regions, the regional transmission planning organization incorporates local plans and conducts regional planning reliability studies.
   - In RTO/ISO regions, the RTO/ISO integrates local plans developed by transmission owners into regional planning, with varying levels of oversight.
3. **Interregional transmission projects** are typically identified first in regional transmission plans and then interregional coordination forums, or by merchant project developers who are not tied jurisdictionally to a local area.

Transmission projects can be developed to fill different needs

Proposed regional or interregional transmission projects can serve different needs, including the following:

1. **Reliability**: address system reliability issues.
2. **Economics**: increase the efficiency of the existing transmission system by addressing issues such as congestion or resource integration.
3. **Public Policy**: meet legal or regulatory requirements at the federal, state, or local level.
4. **Multi-Driver or Multi-Value**: transmission projects that address more than one need.

Depending on the regulatory structure, PUCs can play a significant role in planning and cost recovery of transmission investments

- Where a utility is not part of an RTO/ISO, a state-level **Public Utility Commission (PUC) oversees planning and resource development activities** for generation, distribution, and transmission of electricity service.
- PUCs do not regulate regional or interregional transmission tariffs.
- **States regulate retail rates** charged to end-use customers, which includes determinations of cost recovery and return on equity for their state’s regulated, investor-owned utilities, but not the transmission part of the tariffs.
- Most state commissions require the utility to engage in some form of long-term planning and can require an **Integrated Resource Plan (IRP):** a decadal needs assessment that identifies both generation and associated transmission needs and serves as a near-term capital investment plan of action.

State PUC authority over cost allocation and recovery in RTO/ISO regions is not uniform

- State-level rules determine whether a state has more or less shared authority with FERC and the RTO/ISO in transmission planning and development.
- Some states may have rules that deem FERC-approved rates prudent, whereas other states may require a separate state-level prudence review.
- In RTO/ISO areas, the incumbent transmission owner develops a local transmission plan that the RTO/ISO then incorporates as input into its regional reliability study and regional transmission plan.
- Projects may span multiple utility service territories or states, and so cost allocation and recovery processes are more complex.
- There are a number of open questions about state versus federal authority for transmission development.

Cost allocation and cost recovery are critical issues in transmission development

- Transmission planning organizations favor solutions with a clear and well-established precedent for cost recovery.
- Current institutional practices are built around local and regional projects.
- Interregional solutions come with more perceived regulatory risk.
- The type of transmission project influences who pays the upfront costs for building transmission:
  - **Generation project developers** generally pay for upfront investments required to interconnect a generator to the transmission network, along with associated upgrades.
  - **Incumbent transmission owners** generally finance upgrades to the existing transmission system.
  - **Incumbent or non-incumbent transmission developers** bear the upfront costs of competitive transmission projects, whether regional or interregional.
- While various entities initially pay these costs, **cost recovery** will eventually be sought from electricity customers through a charge on their electricity bills.

In Order 1000, FERC created six principles of interregional cost allocation

- FERC's **six principles of cost allocation**:
  1. **Costs** of interregional transmission facilities should be allocated to each transmission planning region in a way that is **roughly commensurate with benefits**.
  2. A transmission planning region that receives no benefit from an interregional transmission facility **cannot be involuntarily allocated associated costs**.
  3. Benefit-cost threshold ratios can be used to determine if an interregional transmission facility has sufficient benefits to qualify for cost allocation; Ratio cannot exceed 1.25.
  4. Allocation of costs must **solely be within the transmission regions** where the interregional project is located.
  5. The cost allocation method and data requirements **must be transparent**, with adequate documentation to allow interested parties to determine how they were applied.
  6. Transmission providers located in neighboring transmission planning regions **can use different cost allocation methods for different types of interregional transmission facilities** (e.g., those addressing reliability, congestion, or public policy). Each cost allocation method must be set out clearly and explained in detail in FERC filings.

Common cost allocation methods

- Common cost allocation methods include the following:
  - **“License plate”** where each utility recovers its own transmission costs in its territory. Often used for reliability and public utility local projects.
  - **“Postage stamp” or Load-ratio share**, which uniformly assigns costs based on the load served
  - **Direct assignment** of costs to interconnecting generators
  - **Merchant cost recovery**, where developers recover investment costs through negotiated rates with customers, outside regulated tariffs; more common in HVDC lines

In RTO/ISOs, formula rates are often applied for projects approved through FERC

- **Formula rates** are applied by FERC for most regional projects identified in regional transmission expansion planning.

- Formula rates are designed to determine a utility's cost of providing transmission service, which is then used to set a rate.
- The formula rate process begins with a rate case, where FERC determines a cost-of-service formula for the utility to determine its rates.
- Subsequently, the utility re-calculates its rates annually using the approved formula and updated input data and documentation that it submits to FERC.

$$Cost\ of\ Service = Return + O\&M + Dep. + Oth + Inc.Taxes + Other\ Taxes - Op.Revenues$$

Different cost recovery models exist for different project types

- **Local projects** - The RTO/ISO regional plan filed with FERC includes local plan projects. FERC presumes the associated rates to recover costs for local projects to be prudent unless contested. Formula rates are commonly applied.
- **Regional projects** - Once FERC accepts a regional plan, cost recovery for projects generally occurs through FERC formula rates.
  - Outside of RTO/ISO transmission planning regions, there may not be an established formula rate in place between utilities, and these projects may be subject to a lengthier rate setting process.
- **Interregional projects** – Projects identified in regional transmission plans and interregional coordination forums may qualify for interregional cost allocation.
  - Each region must accept its interregional cost allocation according to a mutually agreed upon methodology.
  - Between RTO/ISOs, there may not be an accepted formula rate, subjecting the project to a more detailed rate proceeding.

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Brattle has summarized different approaches for quantifying transmission benefits

Over 10 Years of Industry Experience with Identifying and Quantifying a Broad Range of Transmission Benefits

SPP 2016 RCAR, 2013 MTF

Quantified

1. **production cost savings***
   - value of reduced emissions
   - reduced ancillary service costs
2. avoided transmission project costs
3. reduced transmission losses*
   - capacity benefit
   - energy cost benefit
4. lower transmission outage costs
5. value of reliability projects
6. value of mtg public policy goals
7. Increased wheeling revenues

Not quantified

8. reduced cost of extreme events
9. reduced reserve margin
10. reduced loss of load probability
11. increased competition/liquidity
12. improved congestion hedging
13. mitigation of uncertainty
14. reduced plant cycling costs
15. societal economic benefits

(SPP Regional Cost Allocation Review Report for RCAR II, July 11, 2016. SPP Metrics Task Force, *Benefits for the 2013 Regional Cost Allocation Review*, July, 5 2012.)

MISO MVP Analysis

Quantified

1. **production cost savings** *
2. reduced operating reserves
3. reduced planning reserves
4. reduced transmission losses*
5. reduced renewable generation investment costs
6. reduced future transmission investment costs

Not quantified

7. enhanced generation policy flexibility
8. increased system robustness
9. decreased natural gas price risk
10. decreased CO_2 emissions output
11. decreased wind generation volatility
12. increased local investment and job creation

(Proposed Multi Value Project Portfolio, Technical Study Task Force and Business Case Workshop August 22, 2011)

CAISO TEAM Analysis
(DPV2 example)

Quantified

1. **production cost savings*** and reduced energy prices from both a societal and customer perspective
2. mitigation of market power
3. insurance value for high-impact low-probability events
4. capacity benefits due to reduced generation investment costs
5. operational benefits (RMR)
6. reduced transmission losses*
7. emissions benefit

Not quantified

8. facilitation of the retirement of aging power plants
9. encouraging fuel diversity
10. improved reserve sharing
11. increased voltage support

(CPUC Decision 07-01-040, January 25, 2007, Opinion Granting a Certificate of Public Convenience and Necessity)

NYISO PPTN Analysis
(AC Upgrades)

Quantified

1. **production cost savings*** (includes savings not captured by normalized simulations)
2. capacity resource cost savings
3. reduced refurbishment costs for aging transmission
4. reduced costs of achieving renewable and climate policy goals

Not quantified

5. protection against extreme market conditions
6. increased competition and liquidity
7. storm hardening and resilience
8. expandability benefits

(Newell, et al., Benefit-Cost Analysis of Proposed New York AC Transmission Upgrades, September 15, 2015)

* Fairly consistent across RTOs

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Source: Brattle. MISO South Tranche 3 Transmission Planning and Cost Allocation. September 2023

States significantly influence siting and permitting

- States have significant influence over the permitting approvals required to build and maintain transmission facilities
- Siting standards and processes vary greatly across states, regions, and even across local areas, where there may be county-by-county standards.
- The federal government typically has limited influence in this arena, but existing authorities of the Federal Power Act may be able to be utilized to approximate national or multi-regional planning.
  - The Federal Power Act authorizes FERC to exercise backstop siting authority for any national interest electricity transmission corridors (NIETC) that the Department of Energy designates (16 USC §824p). To date, FERC has not exercised this authority.
- Eminent domain—the ability of the government to seize property for a public use, with appropriate compensation—may be used to grant access to private lands if the developer and landowner do not reach an agreement.

Opportunities exist to increase meaningful engagement in the planning process

- Most direct public input into transmission planning happens during the siting phase of a specific transmission project well after local, regional, or interregional planning processes have been completed
- In vertically integrated states outside of an RTO/ISO, transmission projects are often included in Integrated Resource Planning dockets.
  - State PUCs and parties can review and vet proposed projects at some level, and transmission projects are within the line of sight of the state decision-makers.
- As projects move into the FERC Order 1000 regional processes, state officials and others do not have the same level of visibility or ability to participate.

FERC recognizes the need to improve engagement in transmission planning

- FERC Order 1000 directs that: “Stakeholders and any interested party must have a meaningful opportunity to participate in identifying and evaluating potential solutions to regional transmission needs.” (FERC Order 1000, p.203).
- In FERC’s April 2022 Notice of Proposed Rulemaking, FERC raised concerns about the lack of public transparency and public engagement in the local transmission planning processes, stating,
  - “We are concerned that local transmission planning processes may lack adequate provisions for transparency and meaningful input from stakeholders, and that regional transmission planning processes may not adequately coordinate with local transmission planning processes.” (179 FERC ¶ 61,028)
- In the same order, FERC proposed specific reforms that, if finalized, would require regional transmission planning processes to include at least three stakeholder meetings on local transmission planning processes for each public utility transmission provider before local transmission plans can be incorporated into the regional planning models.

Interregional coordination forums exist but there are barriers to participation

- **Interregional coordination forums** are one venue for parties and members of the regional transmission planning organization to get involved in the interregional coordination process.
  - Interregional coordination forums have developed participant engagement processes through which stakeholder organizations, almost always defined as registered RTO/ISO members, can provide input into the development of coordinated system plans. Stakeholders have an opportunity to provide comments and feedback.
  - Examples of these forums include the Interregional Planning Stakeholder Advisory Committees (IPSAC) hosted by PJM, MISO, New York/New England ISOs as part of their interregional coordination processes. There is also an IPSAC for MISO/PJM/SPP.

Interregional coordination forums exist but there are barriers to participation

- **Barriers** to members of the public engaging in regional transmission planning entity participant proceedings include: membership costs and requirements, lack of technical knowledge, lack of public materials available in non-expert language, lack of awareness about public processes activities and timelines, and resource constraints that limit participation in often highly time-consuming and complex processes.
  - In 2021, FERC's Office of Public Participation (OPP) was formed "under congressional directives in the Federal Power Act to assist the public with understanding of and participation in Commission proceedings." PNNL worked with FERC OPP to host a workshop focused on "improving public participation" and technical assistance.

Identified Barriers to Interregional Transmission

A. Leadership, Alignment and Understanding	1. Insufficient leadership from RTOs and federal & state policy makers to prioritize interregional planning 2. Limited trust amongst states, RTOs, utilities, & customers 3. Limited understanding of transmission issues, benefits & proposed solutions 4. Misaligned interests of RTOs, TOs, generators & policymakers 5. States prioritize local interests, such as development of in-state renewables
B. Planning Process and Analytics	6. Benefit analyses are too narrow, and often not consistent between regions 7. Lack of proactive planning for a full range of future scenarios 8. Sequencing of local, regional, and interregional planning 9. Cost allocation (too contentious or overly formulaic)
C. Regulatory Constraints	10. Overly-prescriptive tariffs and joint operating agreements 11. State need certification, permitting, and siting

Source: Appendix A of A Roadmap to Improved Interregional Transmission Planning, November 30, 2021

Summary

- Regional and interregional transmission planning approaches vary across the country, mainly based on whether a state is part of an RTO/ISO or not.
- FERC Order 1000 requires interregional coordination, but to date, coordination has not resulted in interregional projects.
- Transmission planning is layered, consisting of local, regional, and interregional processes.
- Regional and interregional projects require coordination and must demonstrate that they are better options than local projects and parties must agree on cost allocation.
- There are opportunities for engagement in regional and interregional forums, but barriers exist to broad participation.

Thank you

FERC requires interregional coordination

- Each FERC Order 1000 regional transmission planning organization has a specific interregional transmission planning process to comply with FERC requirements. Coordination process plans are submitted for FERC approval.
- FERC Order 1000 requires two or more regional transmission planning organizations to determine that an **interregional transmission project is more efficient or cost-effective** than any single-region alternatives before an interregional transmission project can be developed.
- This generally requires each region to conduct its own separate review before coordinating across regions.
- Interregional coordination forums provide a venue for regional transmission planning organizations to share relevant information and review potential interregional transmission opportunities.

Examples of innovative approaches

MISO Multi-Value Projects (MVP) approach is an innovative approach that started with states

- The MISO long-range transmission planning (LRTP) process and cost-allocation methodology grew from a collaboration of Midwest governors interested in meeting their individual state's Renewable Portfolio Standards and addressing delays in connecting new renewable energy to the grid.
- MISO developed a new project type, the Multi-Value Project (MVP), and associated criteria through a process that began in 2007 and culminated in an MVP transmission plan consisting of 17 projects that the MISO Board of Directors approved in 2011.
  - $10.3 billion Tranche 1 plan approved by MISO board in July 2022 – 18 projects spanning nine states
  - $1.7 billion Joint Targeted Interconnection Queue (JTIQ) projects along MISO's seam with the Southwest Power Pool
  - $17 - $23B initial MVP Tranche 2 plan is designed to handle what grid is expected to look like in 2042 based on utility resource plans and state energy goals.

DIVE BRIEF

MISO proposes up to $23B transmission expansion with 765-kV ‘highway’

The Midcontinent Independent System Operator expects to refine its initial Tranche 2 proposal before it heads to a board vote, possibly by September.

Published March 7, 2024

- “The draft Tranche 2 map … shows good progress towards identifying a portfolio of lines that can support MISO states and utilities in meeting their clean energy goals, while also improving reliability and accommodating load growth,” Natalie McIntire, a senior advocate at Sustainable FERC Project, said in an email. “MISO’s inclusion of a number of 765-kV lines is key to a robust buildout of the grid of the future.”

A recent example of an innovative state and RTO collaboration is the New Jersey and PJM State Agreement Approach (SAA)

- FERC Order 1000 directs FERC-jurisdictional regional grid operators to "describe procedures that provide for the consideration of **transmission needs driven by Public Policy Requirements** in the regional transmission planning processes."
- New Jersey increased its state offshore wind goal from 7.6 GW by 2035 to 11 GW by 2040. New Jersey asked PJM to incorporate New Jersey's offshore wind goals into PJM's regional planning process through a novel regulatory pathway called a **State Agreement Approach (SAA).**
- The PJM SAA provides a **mechanism for states to identify public policy projects** to PJM for inclusion in PJM's Regional Transmission Expansion Plan.
- In an SAA, the **costs** of the proposed public policy projects are recovered from the customers in the states proposing the projects
- The **stated goals** of the New Jersey/PJM SAA included reducing community disruption, environmental impacts, and customer costs, while minimizing risk.

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The Northeast States Collaborative on Interregional Transmission is another emerging innovative approach

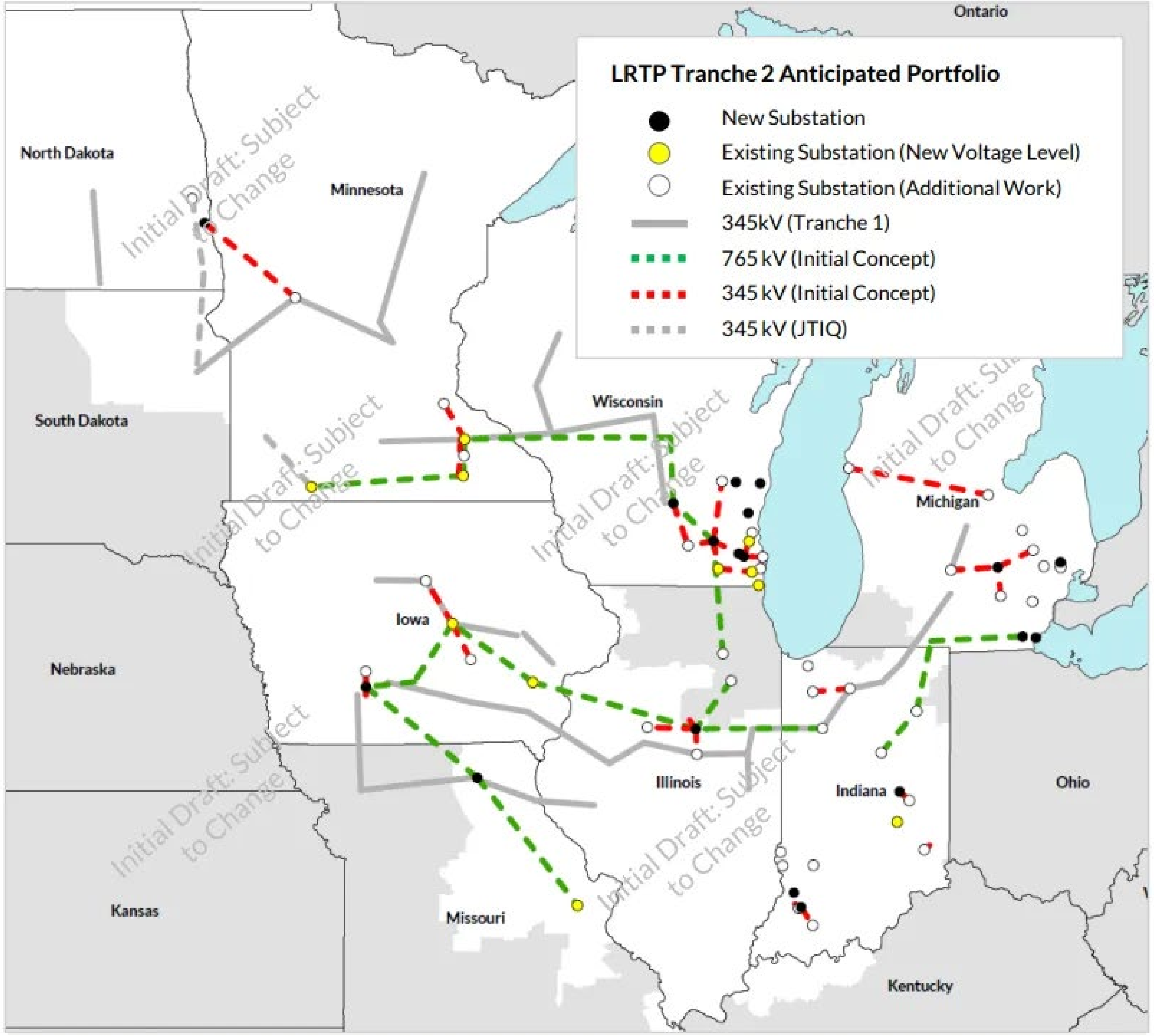
- Officials from Massachusetts, Connecticut, Maine, Vermont, New York, New Jersey, Rhode Island, New Hampshire, Maryland, and Delaware request federal support for developing an interregional transmission planning collaborative.
- The states submitted a letter to the director of the DOE Grid Deployment Office on June 16, 2023, requesting support in forming a “Northeast States Collaborative on Interregional Transmission.”

> UTILITY DIVE   Deep Dive   Opinion   Library   Events   Press Releases
>
> Generation   T&D   Grid Reliability   Electrification   Load Management   Renewables
>
> **Northeastern states seek DOE support for transmission collaborative across three regions**
>
> “Rather than wait for new regulatory mandates to spur action, we can collectively take steps now to consider expanding ties between our regions,” the states told DOE.
>
> Published June 20, 2023

- The collaborative would explore opportunities to increase interconnectivity between northeast regions, particularly to plan for offshore wind development in the Atlantic.

MISO's proposed Tranche 2 projects include a 765-kV transmission "highway"

LRTP Tranche 2
Projects as of 03/04/2024

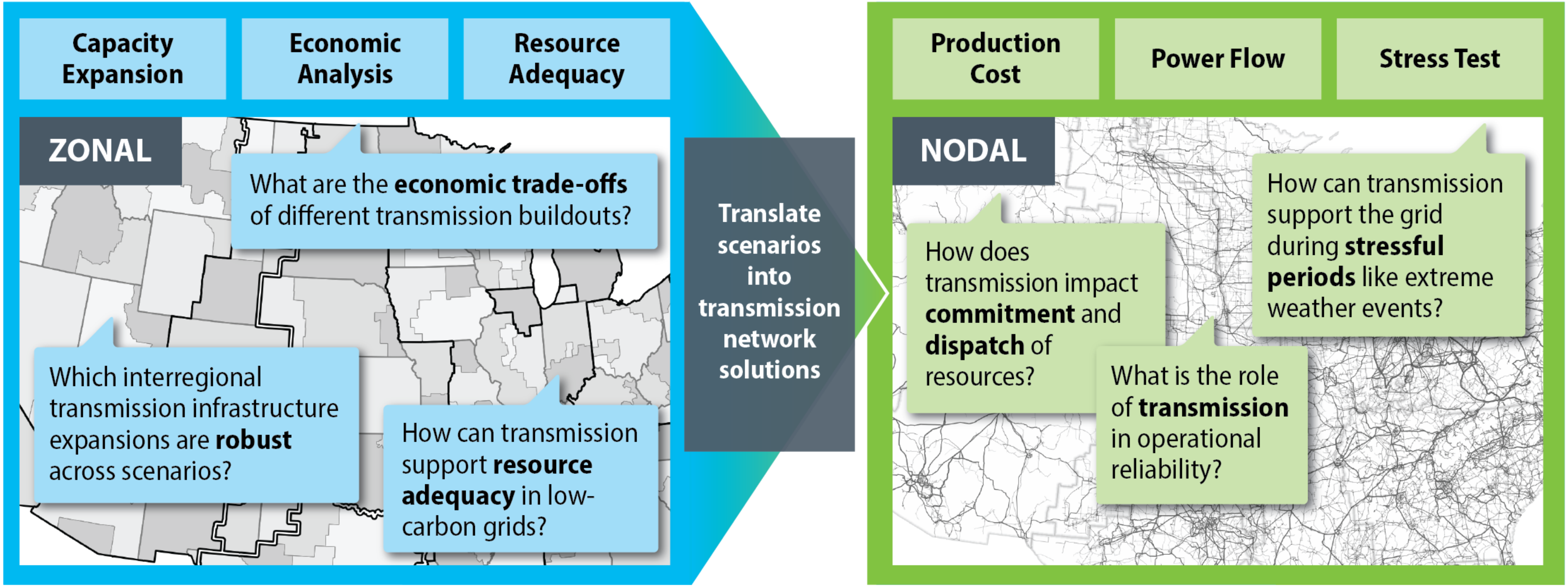


https://www.utilitydive.com/news/miso-midcontinent-tranche-2-lrtp-transmission-expansion/709576/

Many aspects of interregional coordination are extensions of the regional planning process

- To qualify for regional cost allocation, a regional project proposal must be more efficient or cost-effective than existing regional or local alternatives.
- Interregional projects must be more efficient or cost-effective in both regions compared to alternatives in each region. An interregional project that more efficiently or cost-effectively addresses a transmission need in one region but not the other is unlikely to move forward.
- Once developed or proposed, transmission planning organizations compare interregional solutions, if any, to proposed regional transmission project proposals included in the individual transmission planning regions' regional plans. If the interregional project is shown to meet one or more transmission needs in a more efficient or cost-effective manner for both regions, it may then qualify for interregional cost allocation.

Multimodel framework for better understanding the role, value and opportunities for transmission in the U.S.



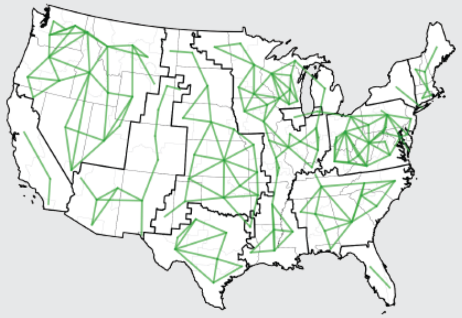
~100 scenarios out to 2050

3 scenarios for a single year (2035)

Scenario Framework: Transmission Expansion Paradigms

Reference Transmission Framework

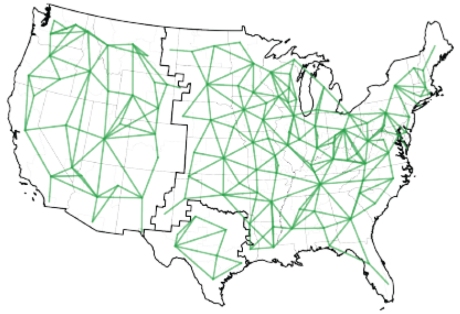
Limited (Lim)



- No new interregional transmission
- Total annual transmission expansion limited to recent observed maximum

Accelerated Transmission Framework

Alternating Current (AC)



- Expansion allowed within interconnections
- No new DC connections

Point-to-Point (P2P)

- Expansion allowed across the country
- Includes long-distance point-to-point HVDC options

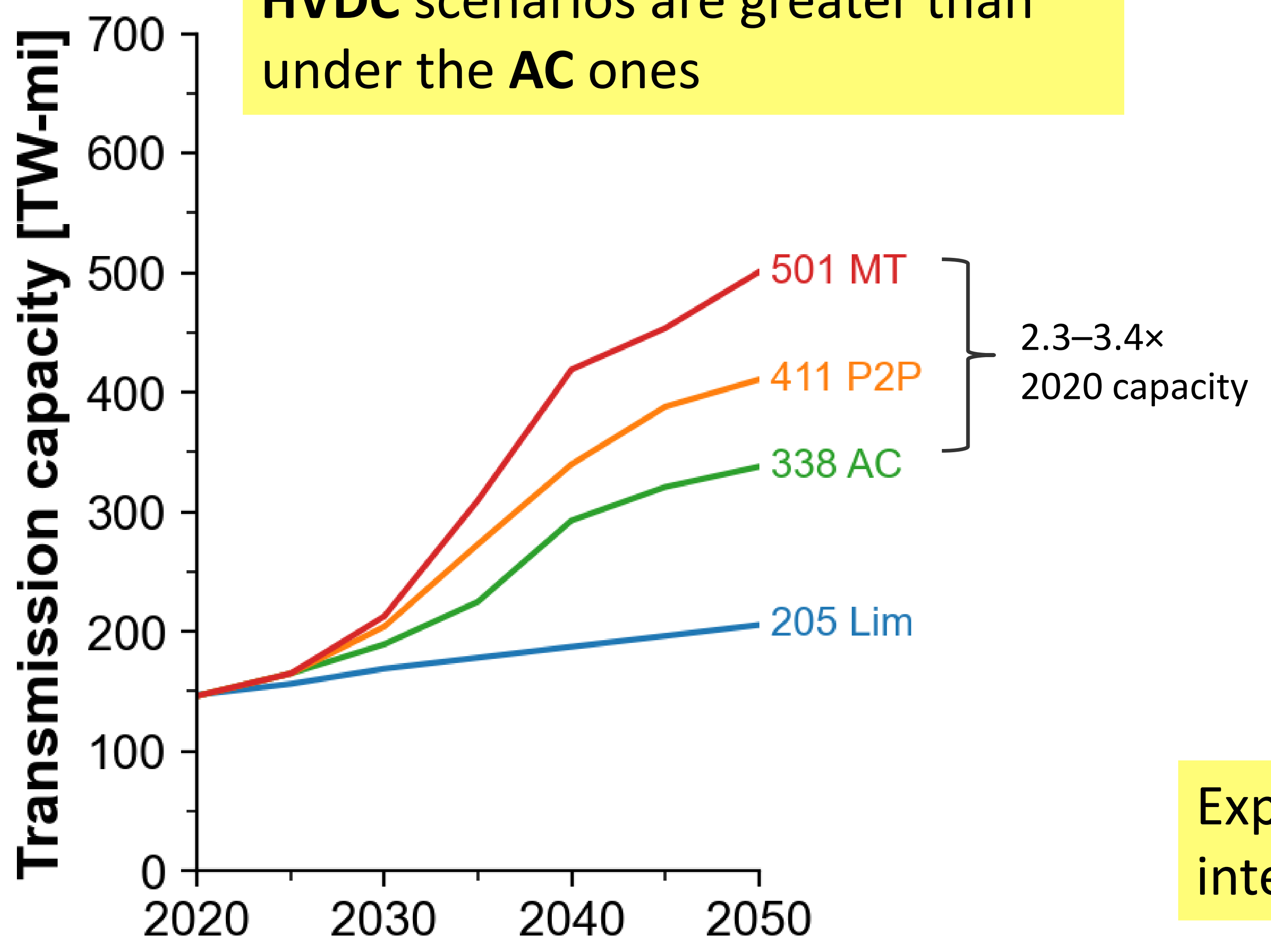
Multi-Terminal (MT)

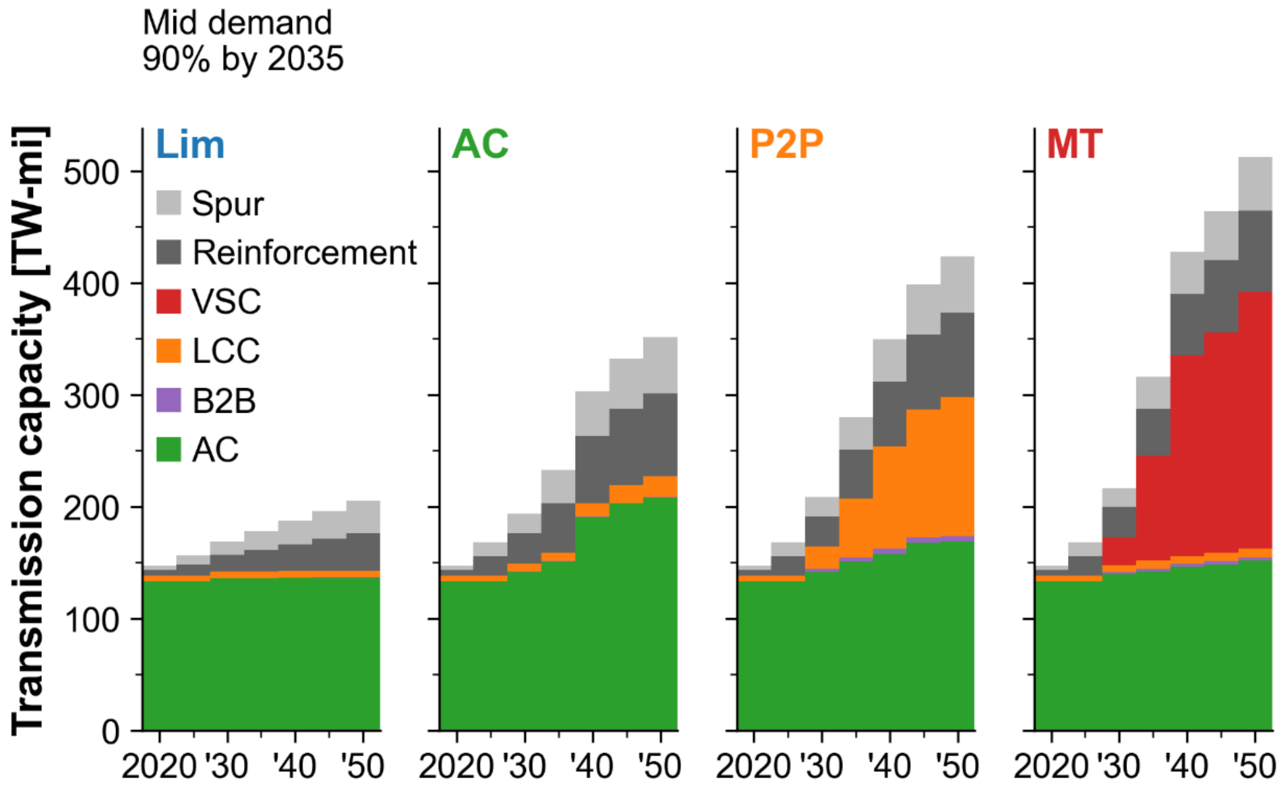
- Expansion allowed across the country
- Includes multi-terminal HVDC options between neighboring zones

Rapid and significant growth in new transmission capacity occurs under the decarbonization scenarios

90% by 2035, mid demand

Transmission additions under the **HVDC** scenarios are greater than under the **AC** ones





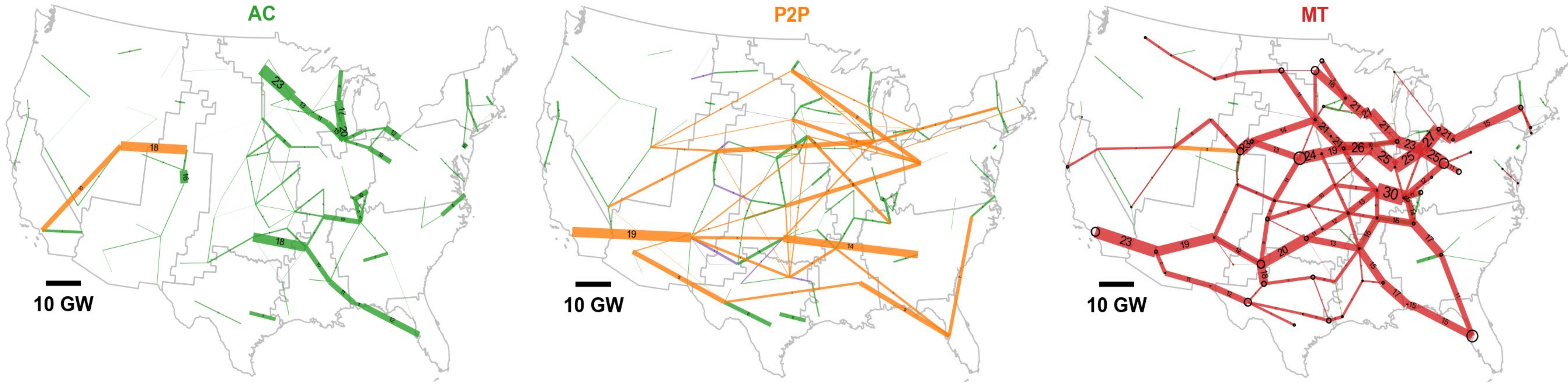
Expansion of **all types** of transmission—local, regional, and interregional—is observed under low-carbon futures

Preliminary results

What have we learned from the capacity expansion modeling?

90% by 2035, mid demand

Transmission is added in **all regions**, but expansion is particularly pronounced around the **central wind belt**



Including significant expansion across the interconnection seams (when allowed)

Preliminary results

Organization of MISO States Cost Allocation

- Organization of MISO States (OMS) has been instrumental in the recent progress made on the MISO LRTP and MVP transmission projects.
- OMS supports regional coordination and long-range transmission planning. OMS has developed a set of cost allocation principles for projects developed through LRTP

https://www.brattle.com/wp-content/uploads/2023/09/MISO-South-Tranche-3-Transmission-Planning-and-Cost-Allocation.pdf

MISO MVP Benefits quantified:

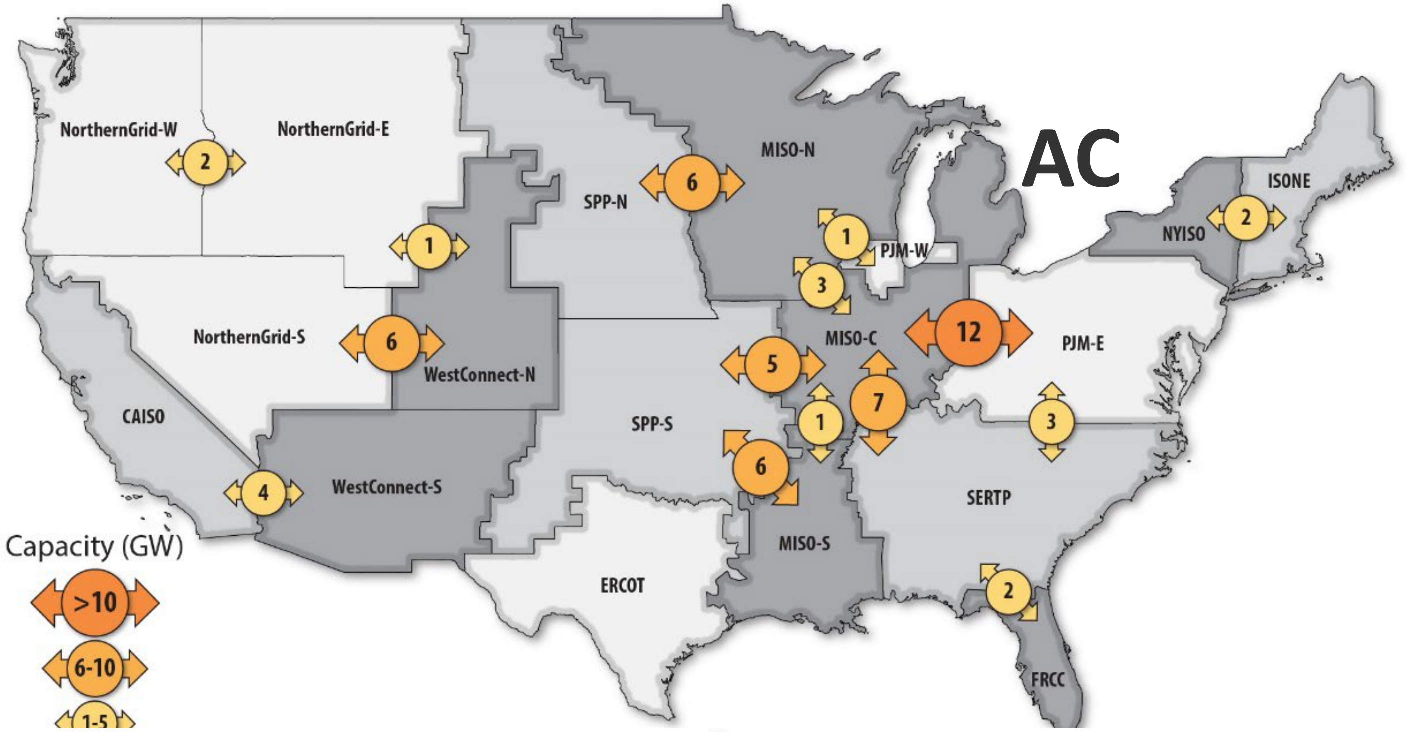
1. production cost savings
2. reduced operating reserves
3. reduced planning reserves
4. reduced transmission losses*
5. reduced renewable generation investment costs
6. reduced future transmission investment costs

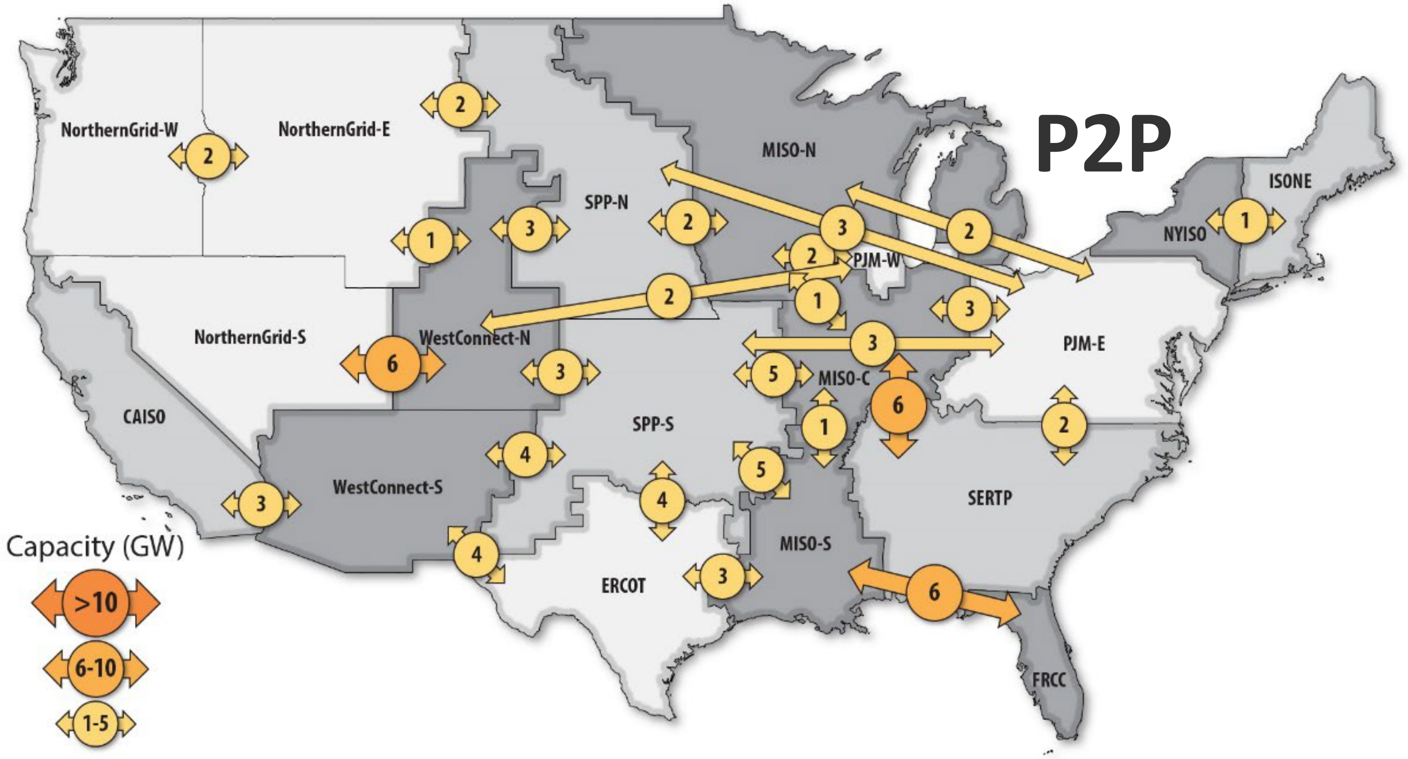
Benefits Not quantified

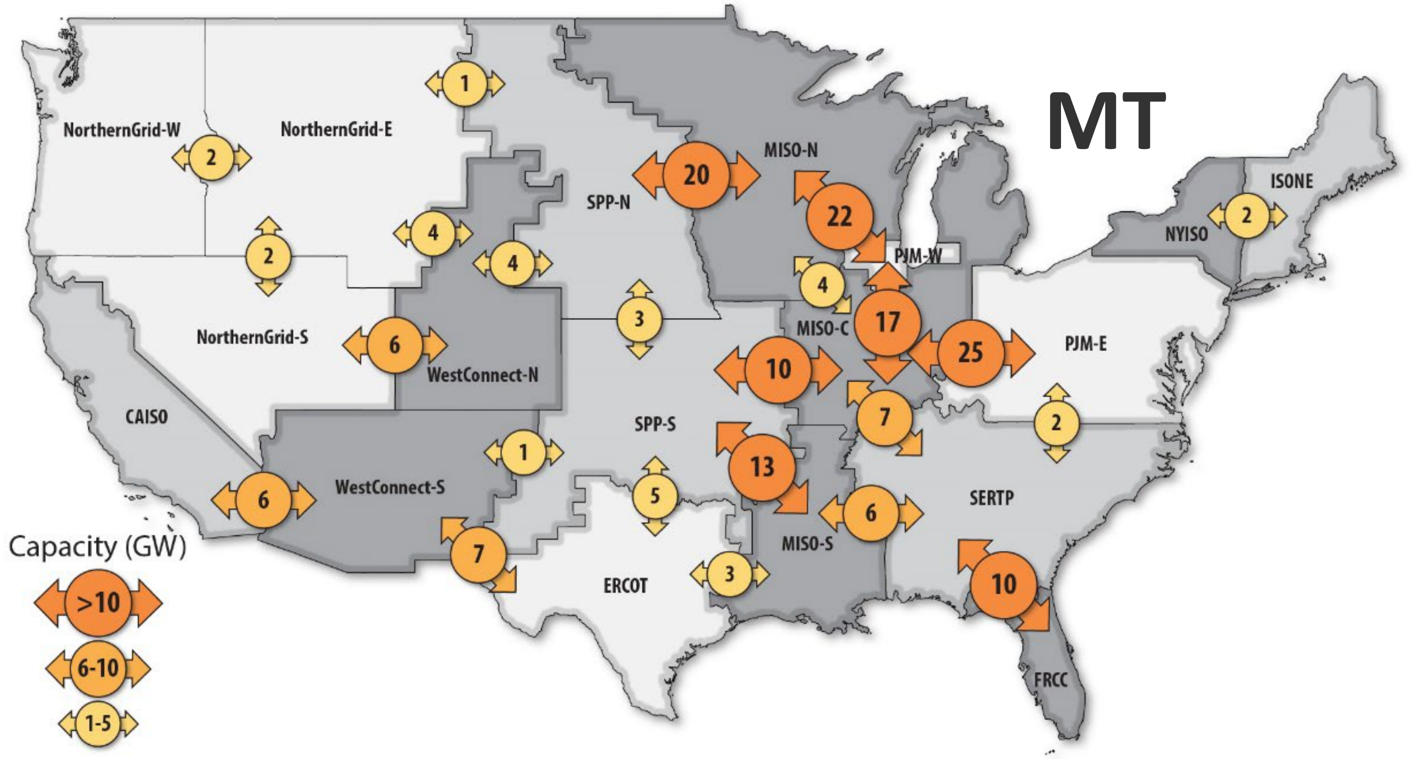
7. enhanced generation policy flexibility
8. increased system robustness
9. decreased natural gas price risk
10. decreased CO_2 emissions output
11. decreased wind generation volatility
12. increased local investment and job creation

(Proposed Multi Value Project Portfolio, Technical Study Task Force and Business Case Workshop August 22, 2011)

HOT options are starting points for further study







High Opportunity Transmission (HOT) options: interregional interfaces with robustly expanded capacity by 2035 across several decarbonization scenarios

- HOT options exist for all planning regions, but are concentrated in the central Midwest
- Expansion *beyond* these capacities are found in several sensitivities, and when looking at longer timescales or higher load growth

Preliminary results

90% by 2035, mid demand