



WESTERN STATES  
TRANSMISSION  
INITIATIVE PRIMER:  
**Transmission Planning and  
Cost Allocation in the West**



GRIDWORKS

## Transmission Benefits

### Enhanced grid reliability and resilience

- Transmission helps alleviate impacts of extreme weather on demand and grid operations
- Imports reduce loss of load probability
- Better prepared to address ongoing load and supply changes

### Capture advantages of regional diversity

- Different seasonal peaks
- Weather/fuel availability at different times
- Time zones impact both demand and supply

### Reduced congestion/power costs

### Economic development for power exporters and importers

### Replaces older, less efficient lines



## Barriers to Transmission Development

### Transmission planning

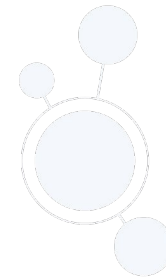
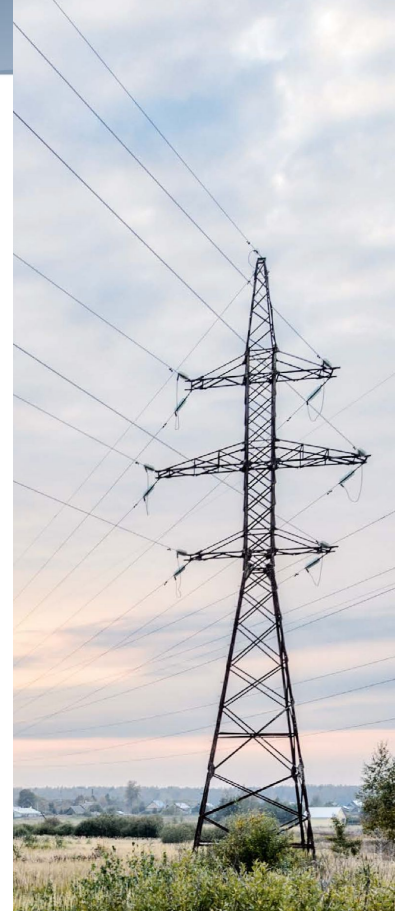
- Current approaches to planning not sufficiently anticipatory
- Difficult to engage in West-wide planning in absence of an RTO

### Cost allocation

- New transmission requires substantial investments
- Some utilities don't have the resources to finance major projects
- It can be difficult to calculate certain benefits and beneficiaries

### Siting

- The siting process can be extremely lengthy
- Significant amount of federal land in the West
- States may not have incentives to approve transmission that primarily benefits other states

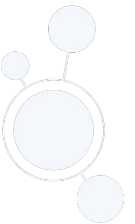


### States

- Regulate distribution service
- Most states have transmission siting authority
- Oversight over cost recovery by vertically integrated utilities
- RETA (New Mexico) and CETA (Colorado) play active roles in promoting transmission development

### FERC

- Seven factor test (including voltage of line, whether power flows out, and proximity to distribution customers) to determine transmission vs. distribution
- Regulates rates for transmission service by jurisdictional utilities
- Cannot allocate transmission costs to non-jurisdictional entities
- Requires jurisdictional utilities to operate transmission lines in non-discriminatory manner (Open Access)
- Order No. 1000 requires regional transmission planning and cost allocation for jurisdictional utilities and non-jurisdictional utilities that voluntarily agree to pay
- Limited “backstop” transmission siting authority



Requires jurisdictional utilities to engage in regional transmission planning

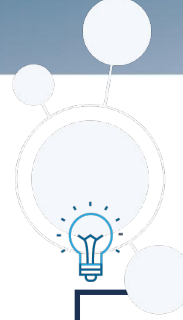
Three “planning regions” in the Western U.S.

- California ISO
- Northern Grid
- WestConnect

If the regional planning process results in a transmission project,

- The costs must be allocated pursuant to the planning region’s FERC-approved cost allocation methodology
- The project must be competitively bid unless there is a State Right of First Refusal for incumbent utility

Neighboring regions must engage in interregional transmission planning, but no interregional project has ever resulted from this process



### **Transmission terminology:**

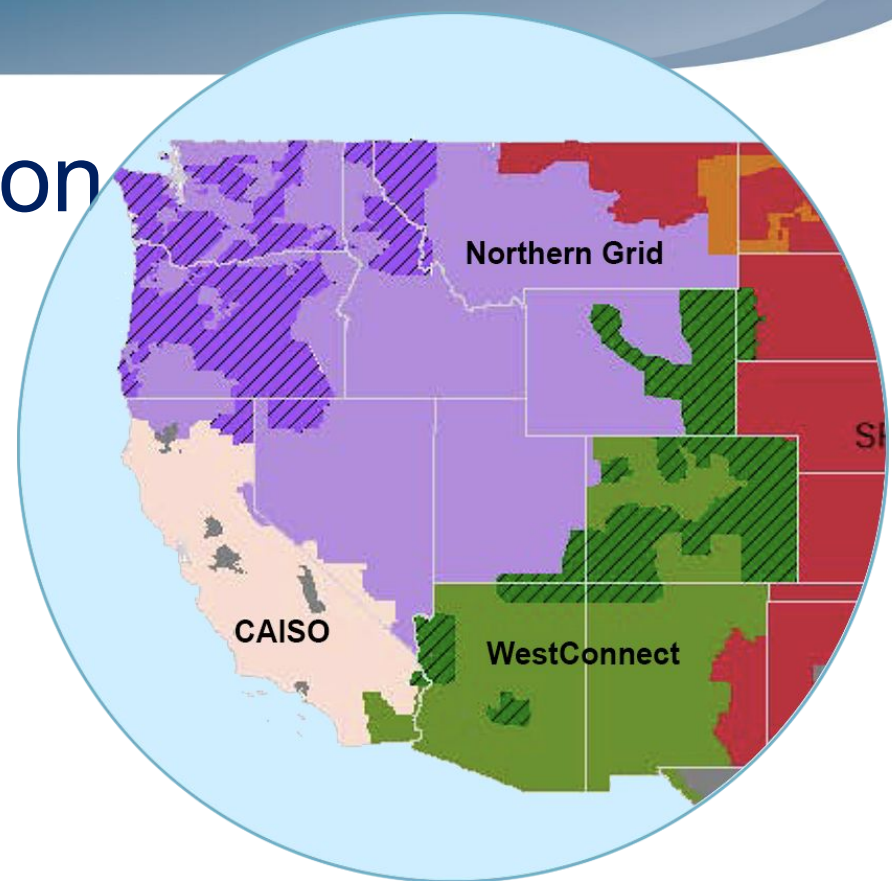
- “Regional” refers to these 3 planning regions and transmission built within the regional footprint
- “Interregional” refers to projects built across more than one planning region or across interconnects

# Western Transmission Planning Regions

**CAISO** – Plans for and manages the flow of electricity for about 80 percent of California and a small part of Nevada

**NorthernGrid** – Facilitates regional transmission planning across the Pacific Northwest and Intermountain West. Members include Bonneville Power Administration, investor-owned utilities, and consumer-owned utilities located in California, Idaho, Montana, Oregon, Utah, Washington and Wyoming

**WestConnect** – Conducts regional transmission planning for Southwestern and Interior West states, including Arizona, California, Colorado, New Mexico, South Dakota, Wyoming, and Utah



**FERC**



# What is Transmission Planning?

Analyze future demand for power and power resources

- Economic growth
- New sources of demand (*e.g.*, data centers)
- Electrification

Identify objectives

- Maintain reliability
- Economic benefits, such as facilitating access to cheaper power
- Achieve public policy goals, such as reduction in GHG emissions

Model options based on various scenarios

Consider options based-on:

- Impact on reliability metrics
- Costs and benefits



## How is Transmission Planned in the West?

Order No. 1000 regional planning (CAISO, WestConnect, NorthernGrid)

- Outside of California, no projects have come from regional planning
- Primarily a bottoms-up approach that does not address West-wide needs

Federal government

- BPA (75% of high voltage transmission in the Northwest)
- WAPA (10% of the transmission grid in the Western Interconnect)

Utility projects

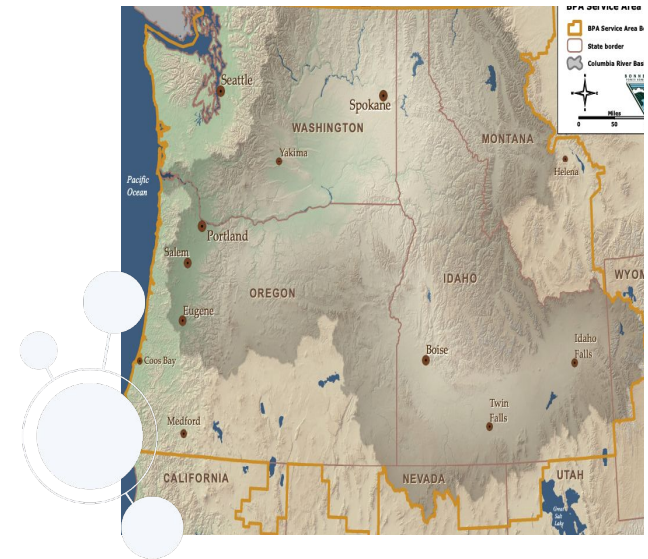
- Planning consistent with integrated resource plans

Two or more utilities jointly planning projects

- Does not occur frequently for large projects

Merchant transmission

- Independent companies take on the risk to develop, build, and sell the transmission capacity for their projects



## WAPA Footprint





## Some Major New Western Transmission Projects are Being Developed...

### Energy Gateway South (Wyoming/Colorado/Utah)

- PacifiCorp
- Under construction

### Ten West Link (Arizona and California)

- Merchant project by infrastructure developer
- Under construction

### Gateway West (Wyoming and Utah)

- PacifiCorp
- Under construction

BPA recent announcement of expedited transmission projects in Northwest

### Sun Zia (New Mexico and Arizona)

- Merchant project developed by Pattern Energy
- Recently received BLM approval

### Boardman to Hemingway (Idaho and Oregon)

- PacifiCorp and Idaho Power
- Approved by Oregon -- awaiting approval from Idaho PUC

### Transwest Express (Wyoming-Nevada)

- Merchant
- Broke ground in June

## ...But Significant Challenges to Multistate Transmission Development Remain

- Limited number of utilities capable of funding major projects alone
- Reluctance to share in costs
- Public power and federal utilities must volunteer to pay
- The Northwest is heavily reliant on BPA to build transmission
- Transmission planning is not sufficiently forward-looking
- Lack of meaningful interregional transmission planning
- Lengthy time period to develop and permit major projects



# Why Does the West Need More Transmission Capacity?

## Reliability threats

- Accelerated generation retirements
- Increased reliance on intermittent resources
- Extreme weather

## Expectations for substantially higher electricity demand

- Electrification
- Data centers

## Accessing renewable resources to satisfy clean energy targets

DOE [National Transmission Needs Study](#) draft suggests substantial new transmission capacity needed in West to meet state public policy goals

## WECC [State of the Interconnection Report](#)

- “WECC studies show a growing risk associated with transmission availability, particularly regarding growing resource adequacy risks.”

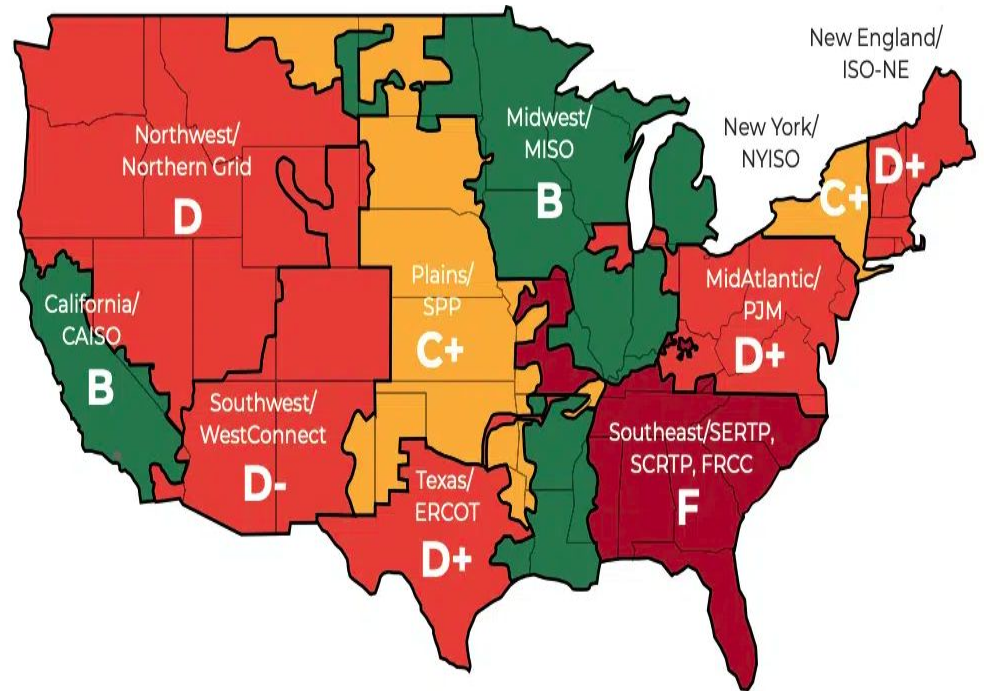
## CAISO [20-Year Transmission Outlook](#)

- Calls for significant new additions of high voltage AC and HVDC lines



## Regional Transmission Planning Efforts, Ranked

Americans For a Clean Energy Grid [recently ranked transmission planning efforts](#) nation wide:



## FERC Proposed Transmission Planning Reforms

FERC's [2022 Transmission NOPR](#) would require

- long-term (20+ years) regional transmission planning
- reassessments every 3 years
- Consideration of a variety of factors, such as:
  - State laws and regulatory requirements
  - Utility integrated resource plans
  - Generator interconnection requests
  - Technological developments
- Development and consideration of at least 4 different long-term planning scenarios

Unclear when the proposal will be finalized

Transmission needs require action before FERC proposal becomes final

FERC continues to work on an interregional transmission proposal



## FERC Consideration of Grid Enhancing Technologies in Planning

FERC's transmission planning NOPR requires planners to consider enhancing existing capacity

Squeezing more out of the existing system reduces the need for new transmission lines

Transmission power transfer capability limited by line ratings to protect equipment, including from outages and fires

Ratings limits can be modified depending on weather

- FERC now requires transmission providers to adjust ratings depending on ambient temperature
- FERC considering requiring the use of dynamic line ratings, which adjust ratings depending on weather conditions at points along the way

Advanced power flow technologies increase transmission capacity and efficiency without building new lines





FERC allocates costs associated with Order No. 1000 regionally planned transmission

FERC cost allocation must be “roughly commensurate” with benefits

Non-jurisdictional utilities can’t be forced to pay anything

Identifying transmission benefits and beneficiaries can be controversial

2 successful regional approaches

- MISO MVP and LRTP programs: Negotiation among states as to what each will pay for a **portfolio** of projects that, as a whole, benefits all states (even if some projects only benefit particular states)
- SPP Highway-Byway:
  - High voltage project costs are socialized across region
  - Medium voltage costs are split such that one-third are allocated across SPP and two-thirds are allocated to utilities where project is located
  - Low voltage costs are paid entirely by local utility

## FERC Proposed Cost Allocation Reforms

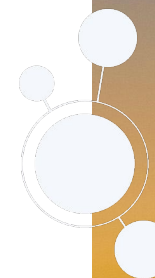
Included in 2022 Transmission NOPR

Transmission planning regions would revise cost allocation approach:

- *Ex Post* State Agreement approach – one or more states may voluntarily agree to a cost allocation method after a project is planned
- *Ex Ante* approach – agreement on a method to allocate costs for all future transmission planned regionally
- Or a combination of the two

States would be given the first chance to agree on the approach taken

If states do not agree, FERC will likely decide







California ISO

# Transmission Planning

*Jeff Billinton*

*Director, Transmission Infrastructure Planning*

*July 20, 2023*

*WSTI Webinar: Transmission Planning*

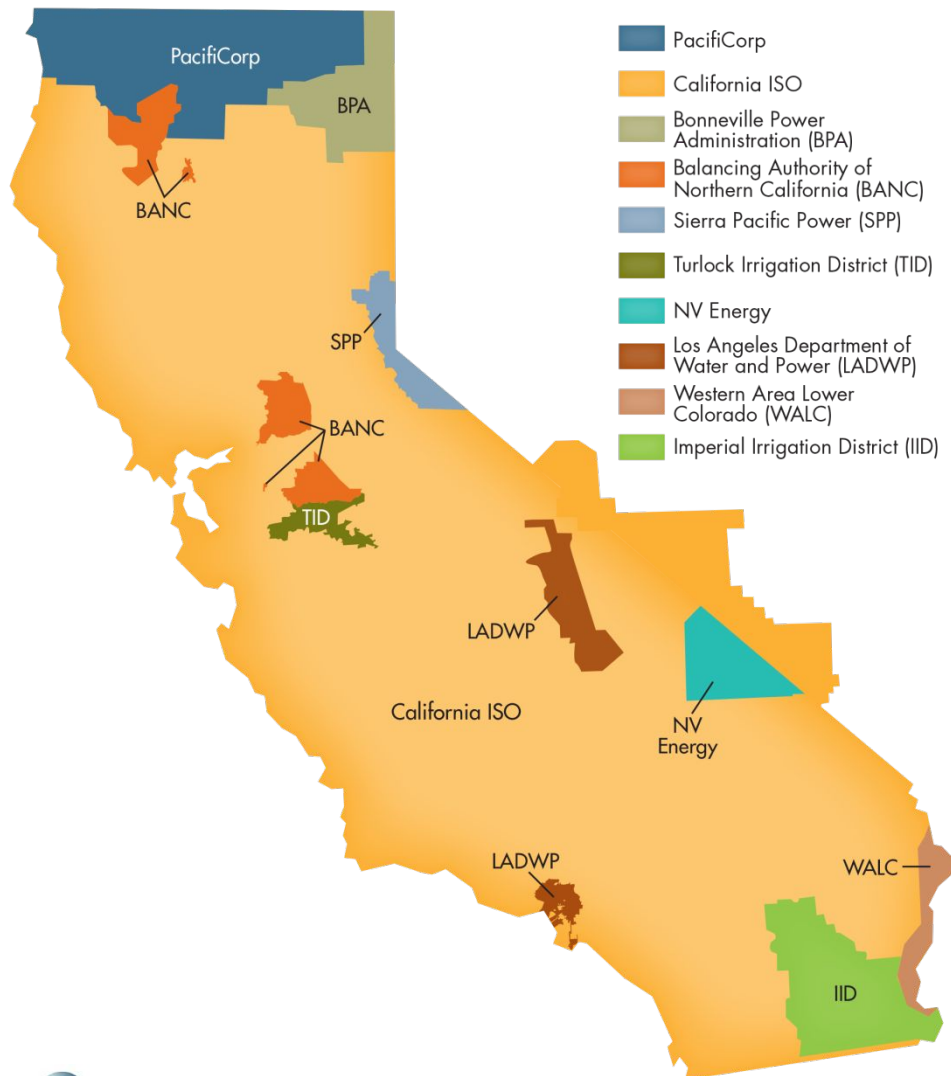


California ISO

**This primer was created by  
Gridworks for the benefit of CREPC  
as part of the Western States  
Transmission Initiative.**

**More information on WSTI can be  
found online:**

# California ISO by the numbers



- Serves **80%** of state
- **32** million consumers
- **26,000** miles of wires
- **76,000** MW plant capacity
- **52,061** MW record peak demand (Sept. 6, 2022)
- **225** million megawatt-hours of electricity delivered annually (2020)
- **\$10.8** billion market (2020)

# 2023-2024 Transmission Planning Process

December 2022

April 2023

May 2024

## Phase 1 – Develop detailed study plan

State and federal policy  
CEC - Demand forecasts  
CPUC - Resource forecasts and common assumptions with procurement processes  
Other issues or concerns

## Phase 2 - Sequential technical studies

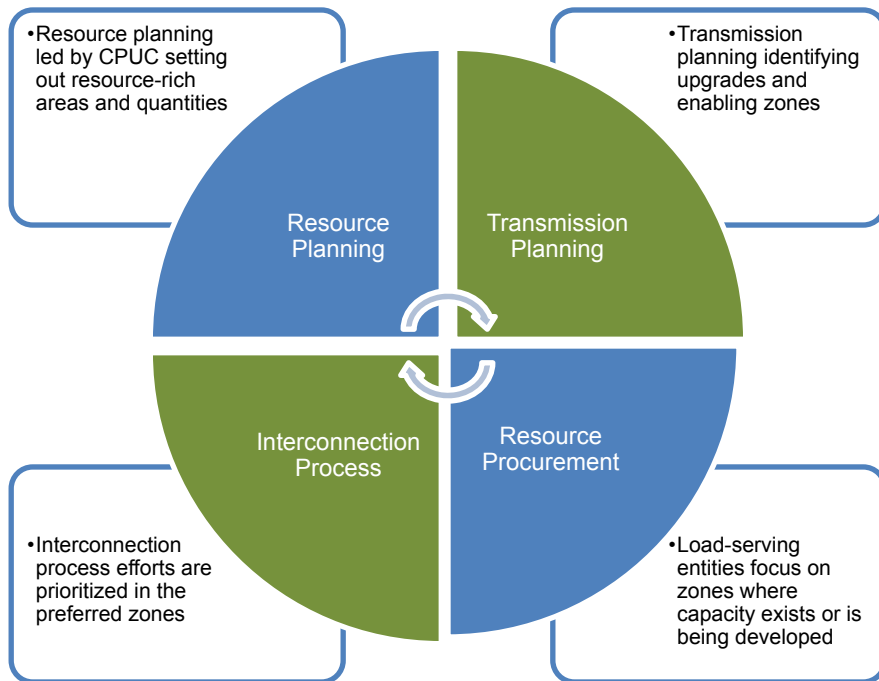
- Reliability analysis
- Renewable (policy-driven) analysis
- Economic analysis

Publish comprehensive transmission plan with recommended projects

## Phase 3 Procurement

CAISO Board for approval of transmission plan

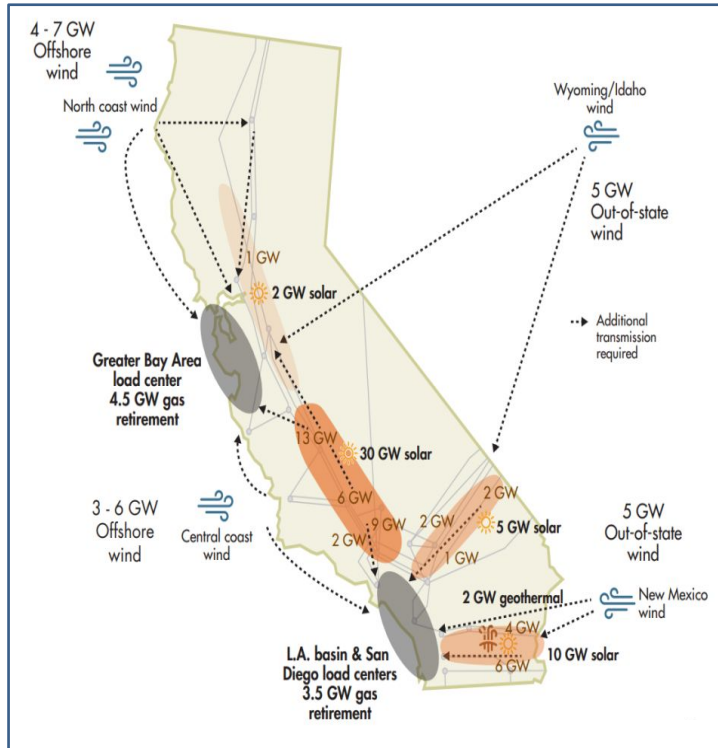
# The 2022-2023 Transmission Plan addresses the rapidly escalating need for new resources and sets the foundation for a focused zonal approach to resource development



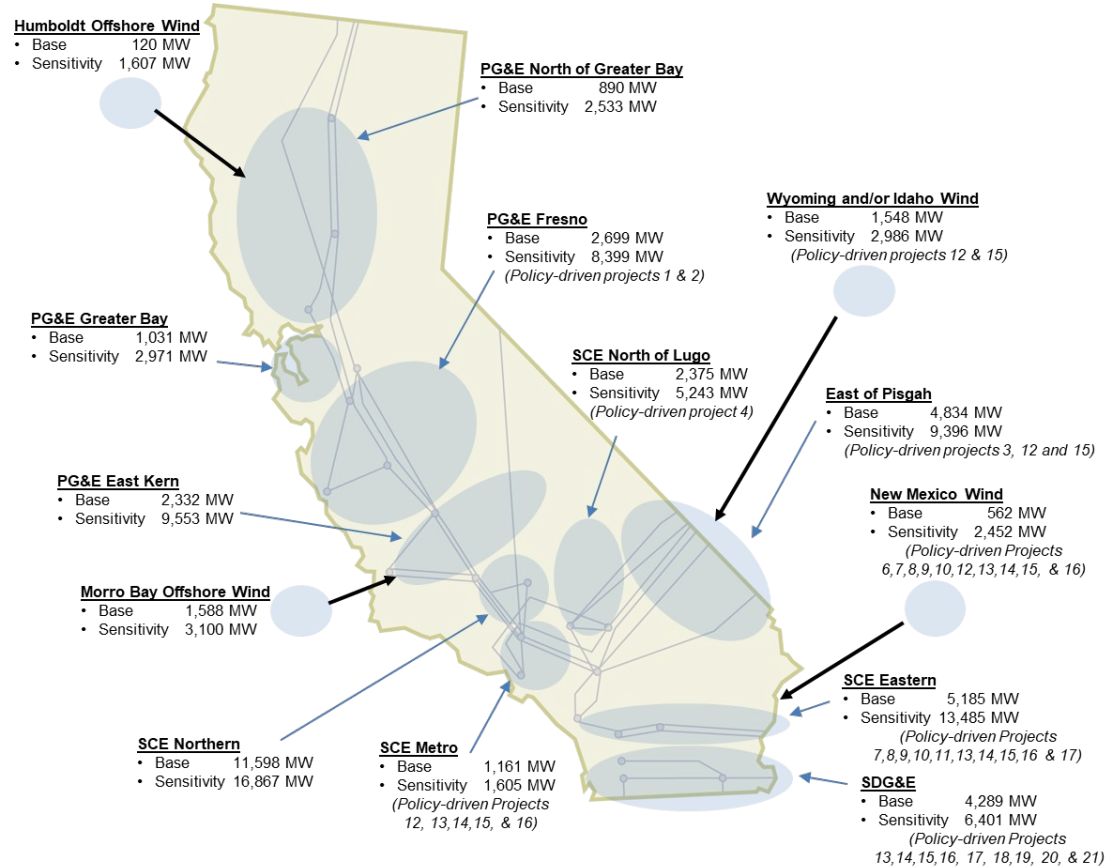
The strategic direction for transformational change in process alignment was established in the CPUC/CEC/ISO Memorandum of Understanding signed in December, 2022 to:

- Tighten the linkage between resource and transmission planning, procurement direction, and the ISO interconnection process to the greatest extent possible.
- Create formal linkage between CEC SB 100/IEPR activities and the ISO and CPUC processes
- Reaffirm the existing state agency and single forecast set coordination

# 2022-2023 draft transmission plan uses a zonal approach which enables clear direction and prioritization



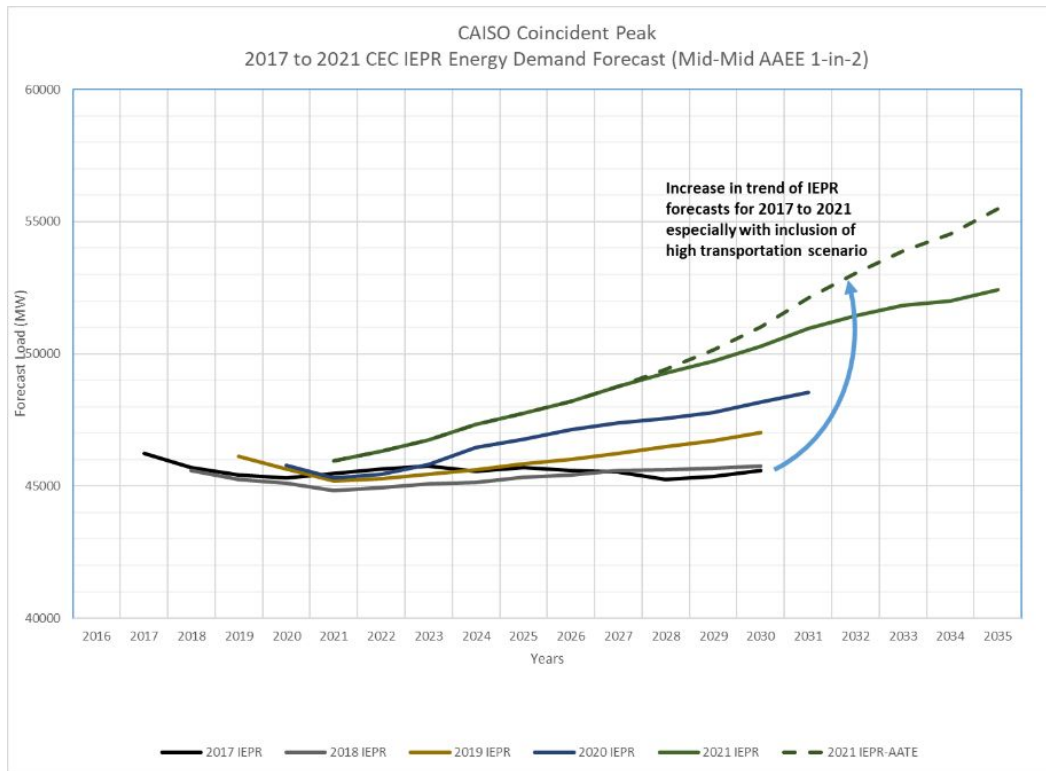
CAISO 20-year Transmission Outlook - 2022



CAISO 2022-2023 draft Transmission Plan

# California's climate change goals are driving escalating load forecasts

The CEC's load forecast is used in both the CPUC's Integrated Resource Planning process and the ISO's transmission planning process.

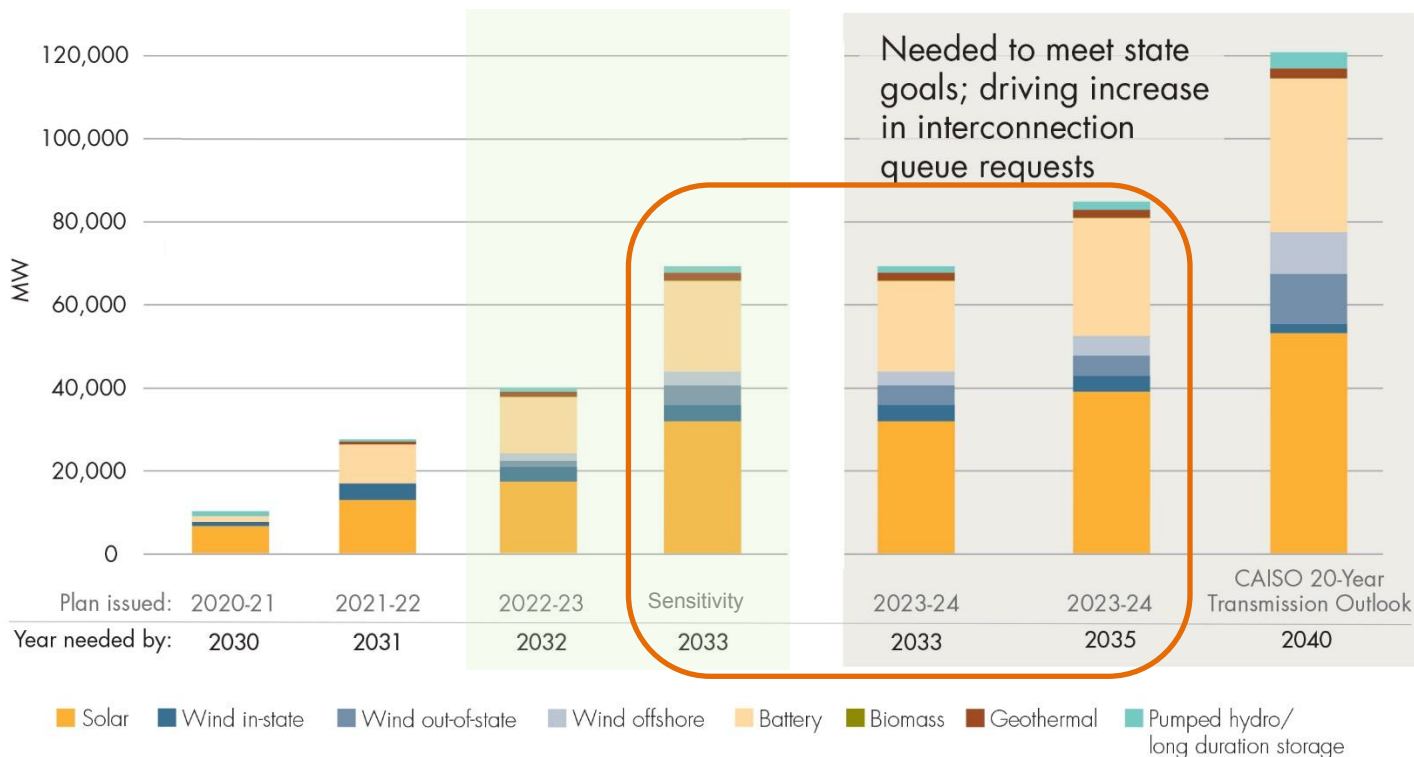


The ISO uses:

- 1-year-in-10 weather event forecast for local reliability studies
- 1-year-in-5 weather event forecast for bulk system reliability-driven and policy-driven studies
- 1-year-in-2 weather event forecast for economic (market efficiency) studies

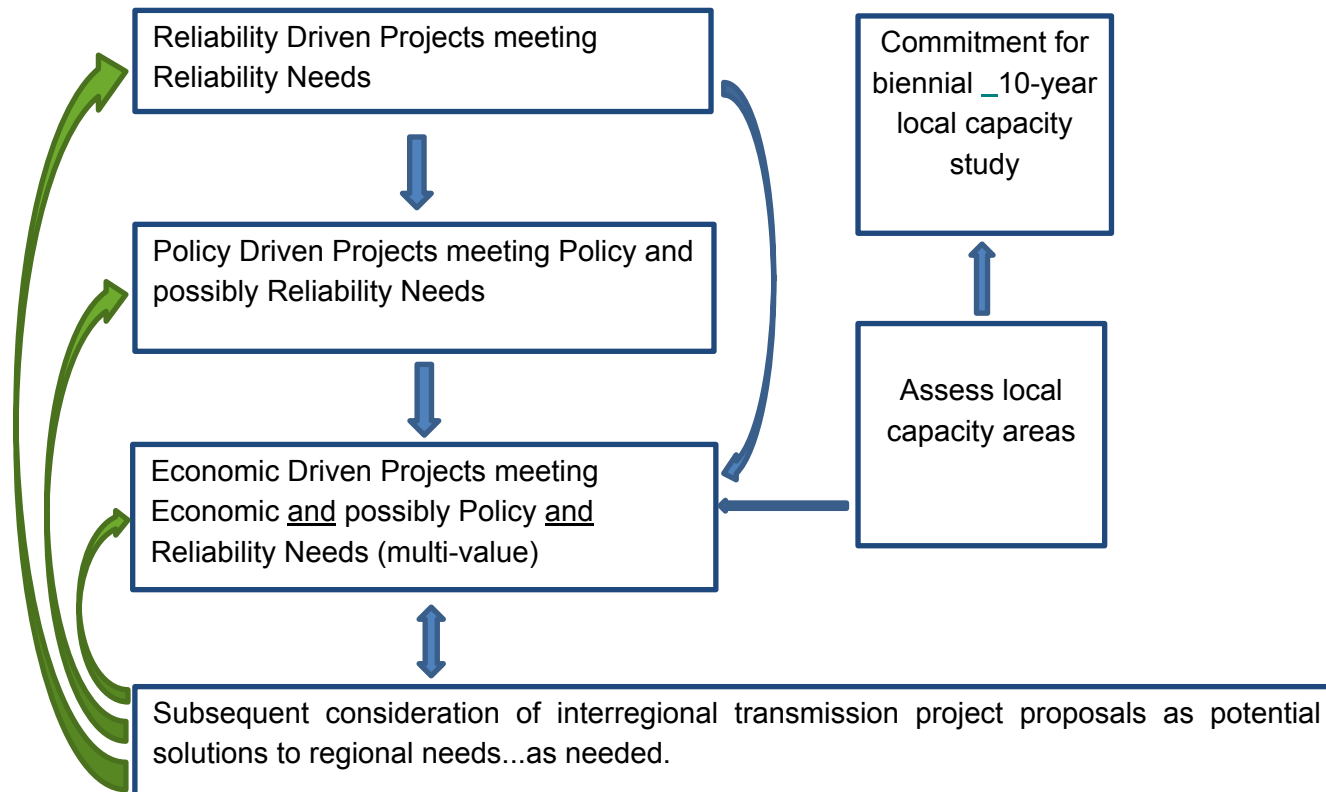
# California's climate change goals and escalating load forecasts then lead to unprecedented resource needs

Additional resources needed  
*based on state agency resource plans provided to ISO for transmission planning*





Studies are coordinated in a particular sequence as a part of the transmission planning process – leading to a “comprehensive” plan that considers all needs:



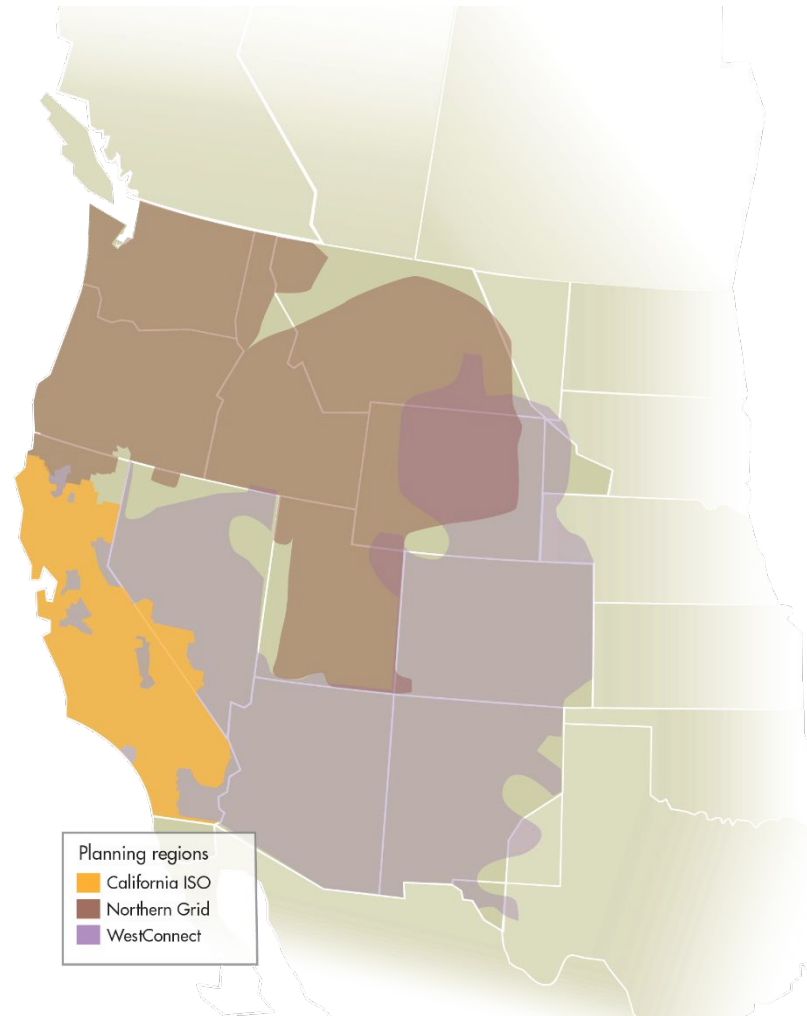
# The CAISO and our neighbors have an interregional coordination framework approved by FERC:

## Interregional coordination

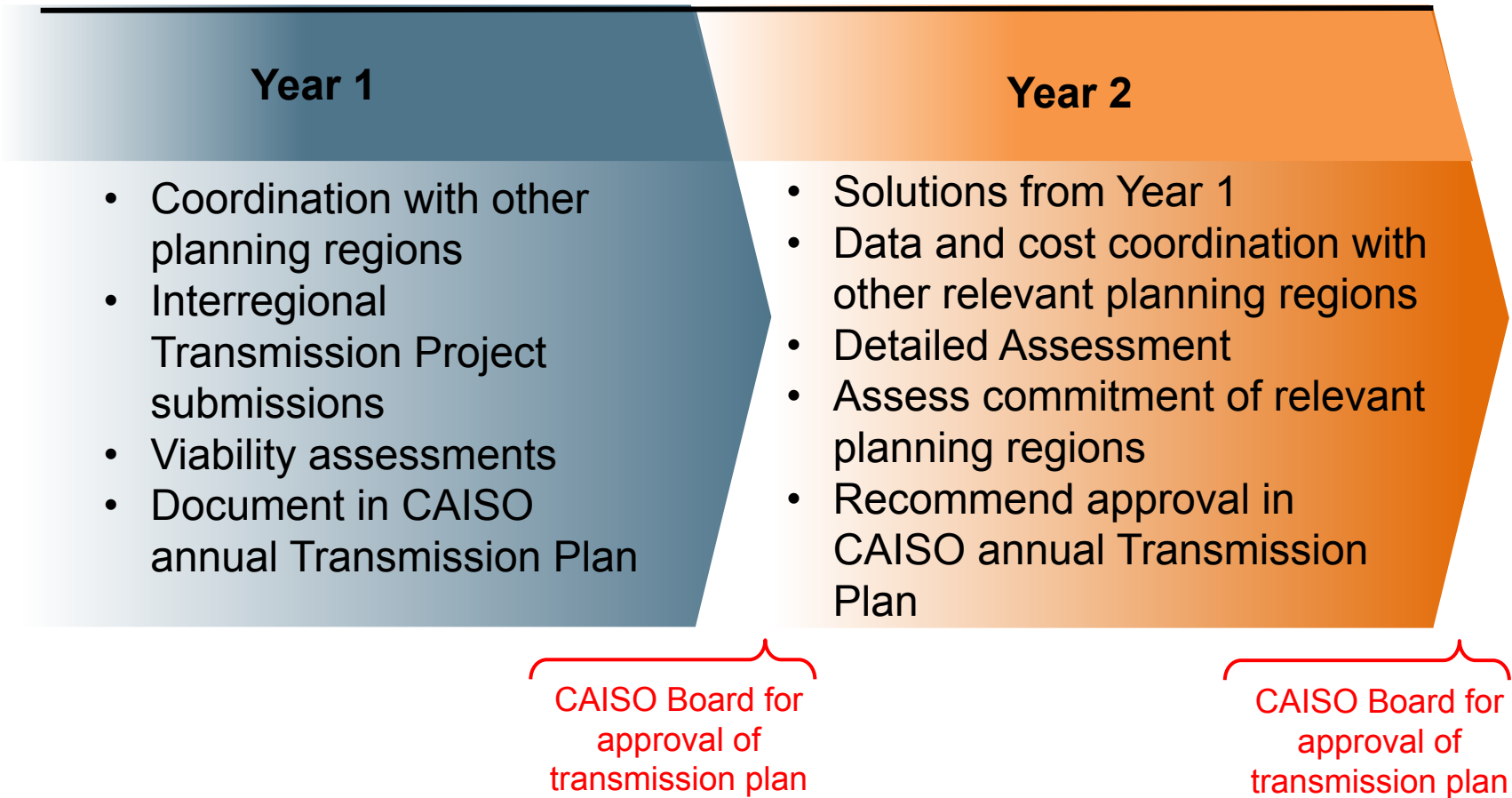
- Annual exchange of information
- Annual public interregional coordination meeting

## Interregional cost allocation

- Each region determines (1) if project meets any regional needs and (2) if project is more cost effective or efficient than regional solution(s)
- Costs shared in proportion to each region's share of total benefits

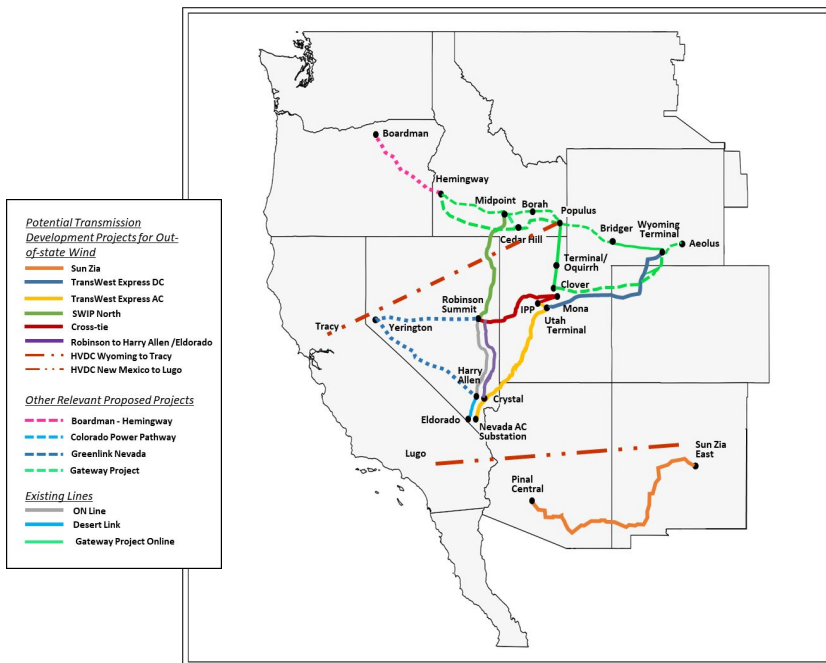


# Interregional coordination biennial process timeline (aligns with other regions' biennial planning cycles)



# Key priorities in the 2023-2024 Transmission Planning Process now underway

- (North Coast) offshore wind transmission needs
- Interregional transmission needs accessing out of state wind resources – and other potential resources



Achieving the targeted volumes of out of state wind requires the aggregate capacity of:

- TransWest Express
- SunZia
- SWIP North
- Cross Tie
- Robinson-Eldorado
- Additional (HVDC) transmission to Northern California
- Additional (HVDC) transmission to Southern California

Several of these projects are currently being developed under a subscriber model – with the transmission costs incorporated into the energy costs – and not rate-base projects receiving cost-of-service cost recovery that would be added to CAISO transmission access charges.

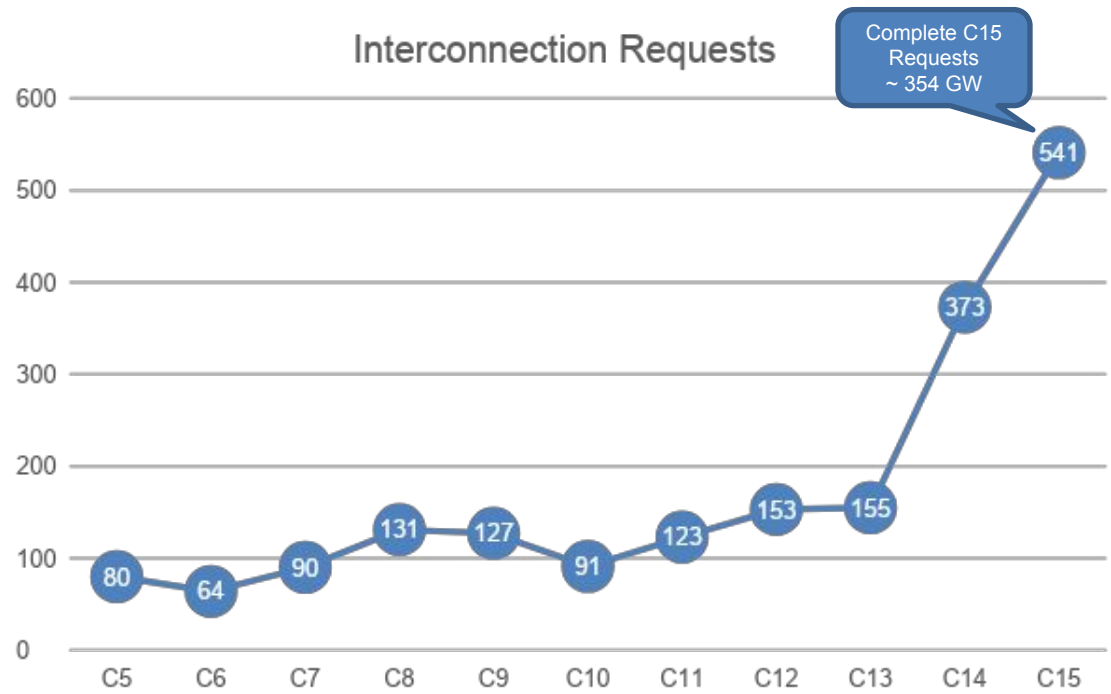
# The ISO is also updating its 20 Year Transmission Outlook – to be released in spring, 2024

- Will reach out to 2045
- Key issues will include
  - overall resource development
  - Gas-fired generation retirement
  - Growing requirements for offshore wind and out of state resources
  - Draft portfolios call for 165 GW new installed capacity

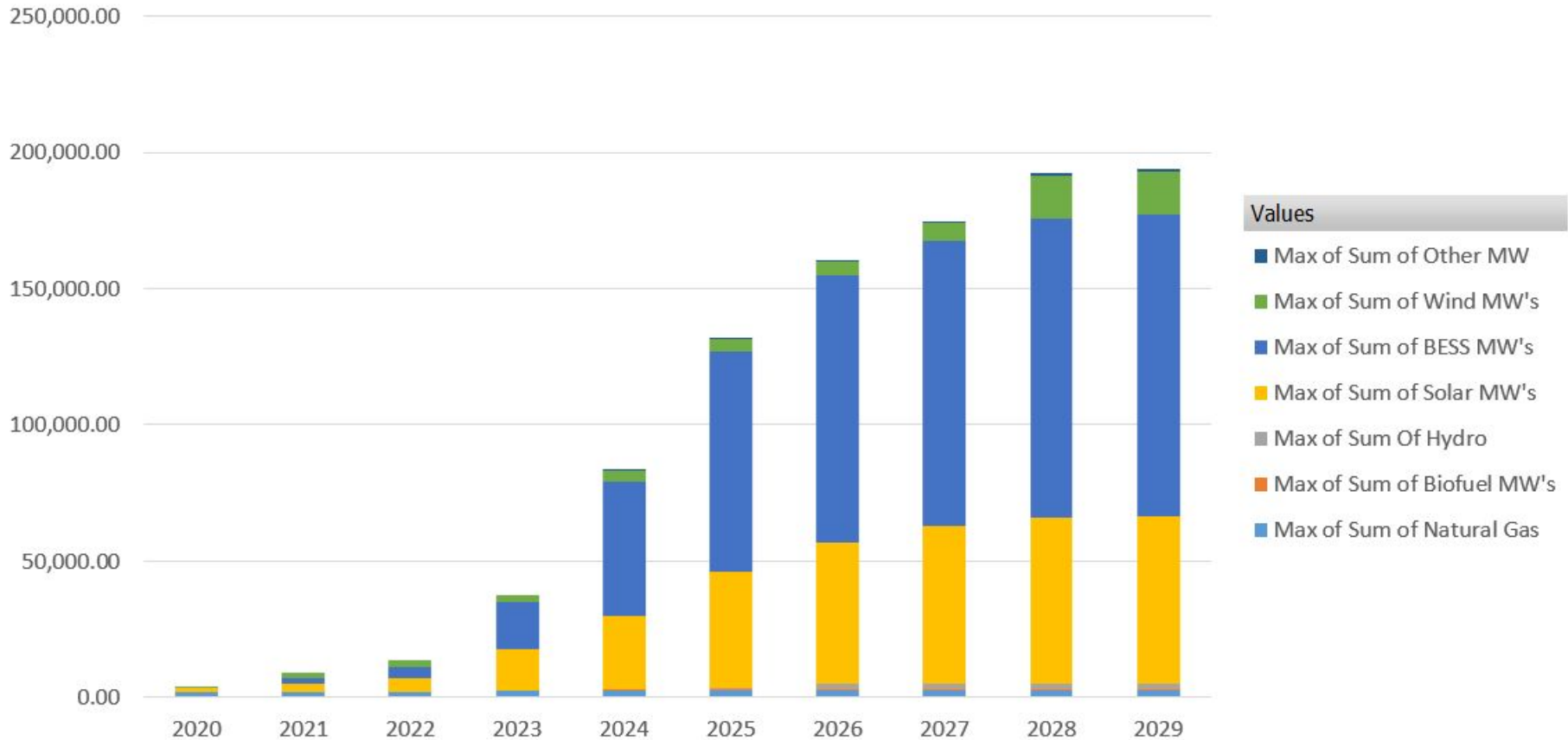
# The ISO is exploring transformative change to its interconnection process through a stakeholder process

- Current circumstances have reinforced the need for these transformative changes - Interconnection requests continue to skyrocket

- This April, Cluster 15 applications greatly exceeded last year's informal survey results of about 300 expected requests
- Many in areas not part of state resource plans, and in excessive volumes even in those areas



# The 354 GW in Cluster 15 new applications are above the already existing ~180 GW in the ISO queue



# Resources

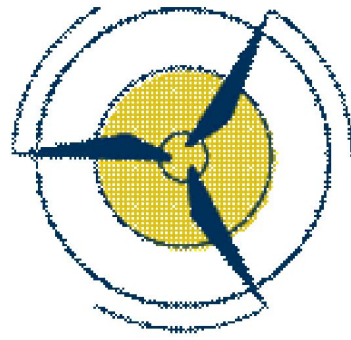
- **Tariff**
  - Section 24 – Comprehensive Transmission Planning Process
  - Appendix DD – Generator Interconnection and Deliverability Allocation Procedures
  - Link: <http://www.caiso.com/rules/Pages/Regulatory/Default.aspx>
- **Business Practice Manuals**
  - Transmission Planning Process
  - Generator Interconnection and Deliverability Allocation Procedures
  - Link: <https://bpmcm.caiso.com/Pages/BPMLibrary.aspx>



# Resources

- Other website links
  - Transmission planning page
    - <http://www.caiso.com/planning/Pages/TransmissionPlanning/Default.aspx>
  - ISO Board Approved 2022-2023 Transmission Plan
    - <http://www.caiso.com/Pages/documentsbygroup.aspx?GroupID=13E8A7DF-2D59-4BAE-9794-C99CC5945FA5>
  - 20-Year Transmission Outlook
    - <https://stakeholdercenter.caiso.com/RecurringStakeholderProcesses/20-Year-transmission-outlook>
  - Generation interconnection page
    - <http://www.caiso.com/planning/Pages/GeneratorInterconnection/Default.aspx>

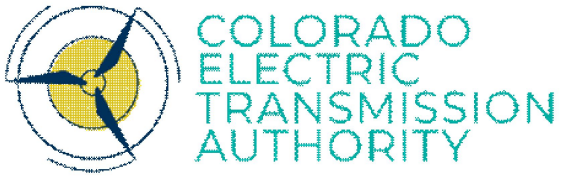
Jeff Billinton  
Director, Transmission Infrastructure Development  
California ISO  
[jbillinton@caiso.com](mailto:jbillinton@caiso.com)  
(916) 608-7126



COLORADO  
ELECTRIC  
TRANSMISSION  
AUTHORITY

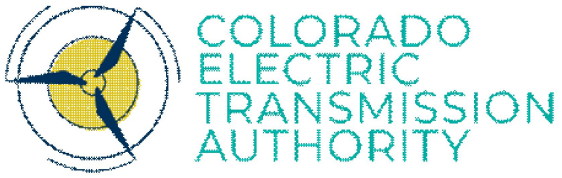
Maury Galbraith, Executive Director

Gridworks Transmission 101 for CREPC  
July 20, 2023



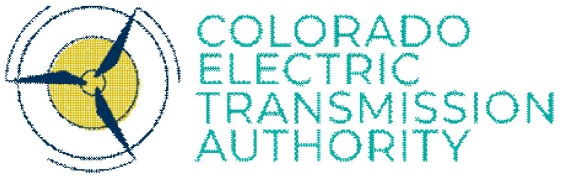
# Organizational Structure

- CETA was created to facilitate the expansion of electric transmission facilities to enable Colorado to meet its clean energy goals (Senate Bill 21-072).
- Colorado Clean Energy Goals:
  - 100% Renewable Electricity by 2040
  - Economy-wide carbon emissions 90% below 2005 levels by 2040; 50% below 2005 levels by 2030; and 26% below 2005 levels by 2025.
- CETA is and independent public body. It is a public instrumentality and political subdivision of the state. CETA performs an essential public function.
- CETA is not an agency of state government and is not subject to administrative direction by any commission, board, or agency of the state.
- Authority is vested in the Board of Directors:
  - Two members appointed by the Governor
  - Director of the Colorado Energy Office
  - Three members appointed by the Speaker of the House
  - Three members appointed by the President of the Senate



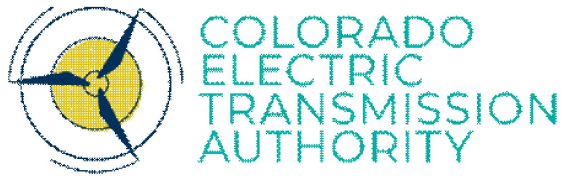
# Specific Powers

- Engage in transmission planning activities that would increase grid reliability, help Colorado meet its clean energy goals, and aid in economic development.
- Identify and establish corridors for the transmission of electricity within the state.
- Coordinate, investigate, plan, prioritize, and negotiate with entities within and outside Colorado for the establishment of interstate transmission corridors.
- Consider options and alternatives, including through studies contracted with independent expert analysts, to increase the efficient use of the transmission system. Options and alternatives may include storage and advanced transmission technologies.
- Make determinations about the efficient use of existing rights-of-way it proposes to develop as a precondition to pioneering new rights-of-way.
- Conduct a transparent and competitive process to select a qualified transmission operator to carry out all required financing, planning, acquisition, maintenance, and operation of eligible facilities.
- Eligible facilities means electric transmission facilities and all related structures, properties, and supporting infrastructure that are financed or acquired by the Authority.



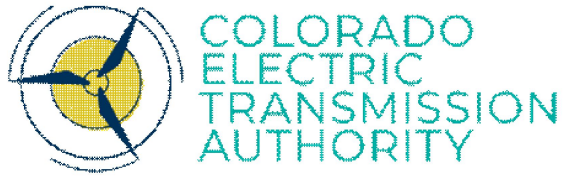
# Transmission Planning

- CETA must complete a study of the need for expanded transmission capacity in Colorado (Senate Bill 23-016):
  - Initial Report: September 1, 2024
  - Final Report: January 31, 2025
- The study must consider the ability to expand capacity through:
  - Construction of new transmission lines;
  - Improvements to existing transmission lines; and
  - Connections to organized wholesale electricity markets.
- The study must determine whether expanded transmission capacity will:
  - Improve system reliability and optimize the flow of electricity;
  - Support the state's emission reduction goals; and
  - Support the state's forecasted electricity needs;
- The study must consider how to reduce land impacts by:
  - Using existing rights-of-way;
  - Co-locating multiple lines;
  - Reconductoring existing lines; and
  - Strategically siting new corridors.



# Other Considerations

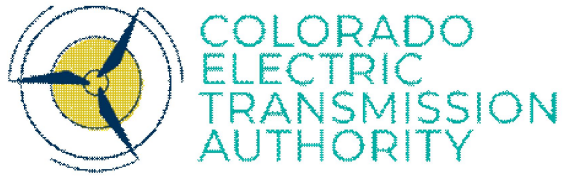
- The study will incorporate state polices including Colorado's Clean Energy Goals:
  - 100% Renewable Electricity by 2040
  - Economy-wide carbon emissions 90% below 2005 levels by 2040
- The study will consider interregional transmission that crosses state lines.
- The study will identify potential electric transmission corridors (both in-state and interregional).
- The study will include a gap analysis that allows CETA to identify transmission projects to pursue in partnership with other developers and projects that to plan, finance, and construct on its own initiative.
- The CETA Board has created three standing committees:
  1. Finance, Audit, and Budget Committee;
  2. Transmission Planning Committee;
  3. Partnership Development Committee.
- CETA's Transmission Planning Committee is developing a statement of work for a request for proposals for transmission planning consultants to study the need for expanded transmission capacity in Colorado.



# Coordination is a Challenge

- Colorado has multiple transmission utilities that develop transmission plans to meet their specific needs.
- WestConnect and the Colorado Coordinated Planning Group (CCPG) develop transmission plans that aggregate the utilities' plans.
- These plans are likely optimal at a local or individual utility perspective.
- CETA needs to review and consider each of these plans to identify partnership opportunities and to avoid duplication of effort.
- There is also a need to consider transmission from a global or holistic perspective.
- CETA needs to conduct its own transmission plans to ensure that all transmission lines needed to achieve Colorado's clean energy goals are being planned and developed.
- CETA needs to conduct a gap analysis that compares the local plans to its global plan to identify missing transmission projects that need to be prioritized in Colorado.
- CETA provides this coordination function to enable the different transmission entities to work together effectively and efficiently.
- Achieving Colorado's clean energy goals will require coordination and the ability to work together.





# Thank You



Maury Galbraith, Executive Director

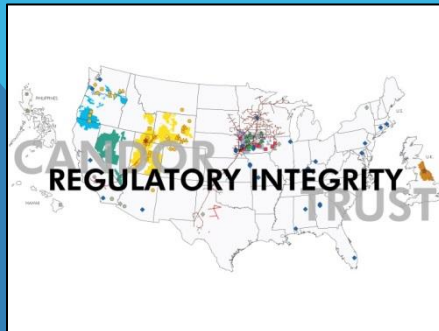
[mgalbraith\\_ceta@outlook.com](mailto:mgalbraith_ceta@outlook.com)

<https://www.cotransmissionauthority.com>



# WSTI Webinar #1 NV Energy Transmission Planning

July 20, 2023



# NV Energy Transmission Study Plan

- **NV Energy Transmission Study Plan is performed in accordance with FERC, NERC, and PUCN requirements**
- **Current Transmission Study Plan includes:**
  - Reliability Studies – NERC
  - Economic Planning Studies
  - Generator Interconnection & Network Studies- FERC/OATT
  - Transmission Service Studies for Load Additions-PUCN
  - Regional Transmission Project Evaluation-PUCN & FERC
  - NorthernGrid Regional Transmission Planning Process

# NERC Reliability Studies

- On July 1, 2023, NERC Compliance Standard TPL-001-5 - becomes effective and replaced existing NERC Compliance TPL standard. TPL-001-5, will be used for all transmission compliance studies starting with the 2023 study cycle.
- NV Energy conducts an annual assessment of the system reliability pursuant to NERC transmission planning, facilities and protection standards
- Studies performed by NV Energy include steady state and transient contingency analysis as well as short circuit analysis.
- Scenarios evaluated include short term, long term, off peak, and on peak cases

# NV Energy

## Economic Planning Studies

- Line losses are calculated into the overall plan of service for load growth, selection of Company-owned generation, IPP development, and renewable energy evaluations in order to develop the most cost-effective facilities. In specific cases, existing facilities are analyzed for possible upgrade.
- NV Energy is participating in the Western Markets Exploratory Group study to evaluate the potential benefits from participating in EDAM, Markets+ and a Fully Functioning Market. These benefits are expected to include a reduction in production cost, enhanced renewable integration and increased ability to comply with environmental goals.

# NV Energy

## Generator Interconnection Processes

- **Large Generator Interconnection Requests - > 20 MW**
  - Biannual Queue Cluster Windows
    - Annual Spring Queue Cluster Window
      - ✓ Application submittals must be received no later than February 15<sup>th</sup> to be considered
      - ✓ Application submittals must include all items specified in Section 3.2.1 of the LGIP
      - ✓ Queue Cluster Window closes March 31<sup>st</sup> (or last business day of month)
    - Annual Fall Queue Cluster Window
      - ✓ Application submittals must be received no later than August 15<sup>th</sup> to be considered
      - ✓ Application submittals must include all items specified in Section 3.2.1 of the LGIP
      - ✓ Queue Cluster Window closes September 30<sup>th</sup> (or last business day of month)
  - Study Processes
    - System Impact Studies
      - ✓ 120 Calendar Days after the receipt of all executed System Impact Study Agreements (reasonable efforts)
    - Facilities Studies
      - ✓ 120 Calendar Days after the receipt of an executed Facilities Study Agreement (reasonable efforts)
- **Small Generator Interconnection Requests - ≤ 20 MW**
  - No Cluster Window
  - Study Processes
    - System Impact Studies
      - ✓ 120 Calendar Days after the receipt of all executed System Impact Study Agreements (reasonable efforts)
    - Facilities Studies
      - ✓ 90 Calendar Days after the receipt of an executed Facilities Study Agreement (reasonable efforts)

# Greenlink Nevada Transmission Project

## Greenlink West

- Fort Churchill to Northwest 525 kV
- Northwest to Harry Allen 525 kV
- Northwest substation expansion
- Amargosa and Esmeralda 525/230 kV collector substations

## Greenlink North

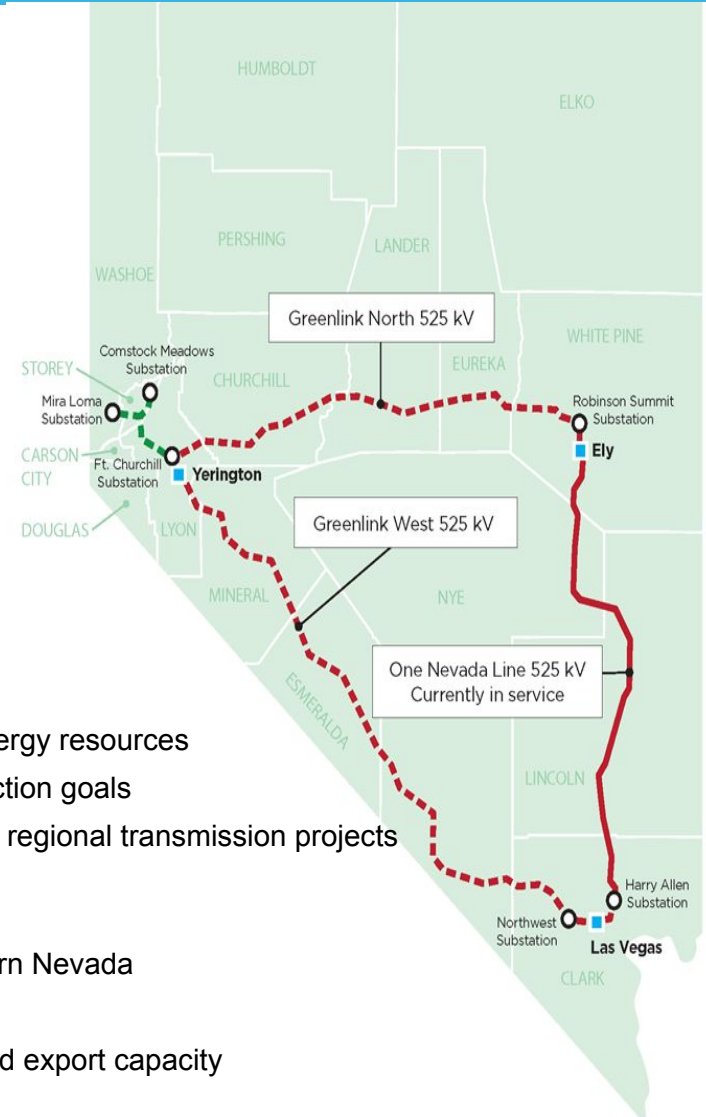
- Fort Churchill to Robinson Summit 525 kV
- Lander 525/230 kV collector substation

## Common Ties

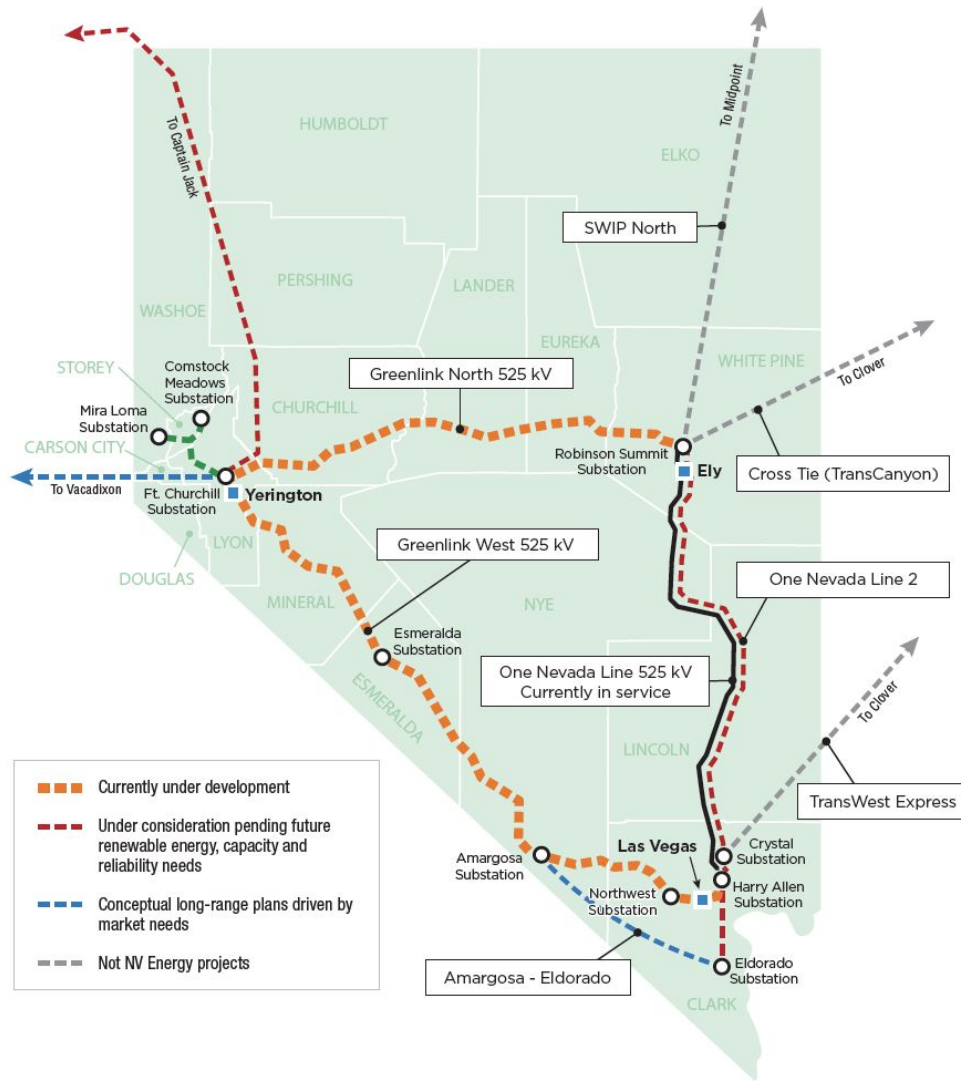
- Fort Churchill 525-345-230-120 kV substation
- Fort Churchill to Mira Loma 345 kV
- Fort Churchill to Comstock Meadows #1 345 kV
- Fort Churchill to Comstock Meadows #2 345 kV

## Benefits for customers and the state of Nevada

- Creates access to new areas of the state to develop affordable renewable energy resources
- Facilitates ability to meet Nevada's renewable development and carbon-reduction goals
- Positions Nevada to benefit from renewable energy resource mix when future regional transmission projects interconnect at Robinson Summit
- Strengthens electric reliability for Nevada
- Aligns with long-term statewide economic growth both in northern and southern Nevada
- Positions Nevada as energy leader in western U.S.
- Increases transfer capacity between north and south and increases import and export capacity



# Regional Transmission Development



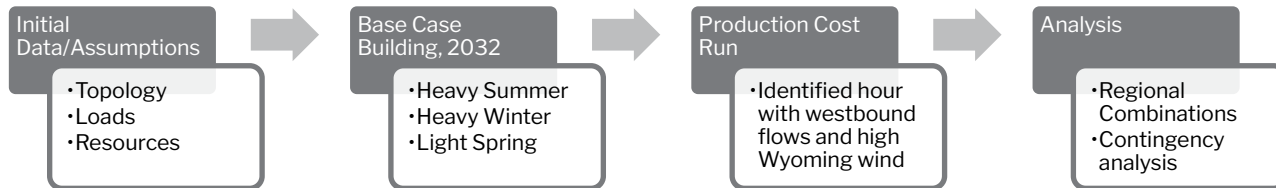


The background of the slide features a blue gradient from light blue on the left to dark blue on the right. Overlaid on this gradient are several thick, white, diagonal lines that intersect to form a grid-like pattern, resembling a stylized power grid or transmission lines.

# NorthernGrid

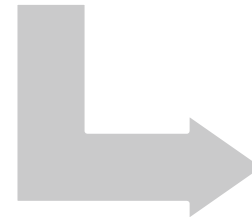
Regional Transmission  
Planning Process

# Regional Combination Discussion



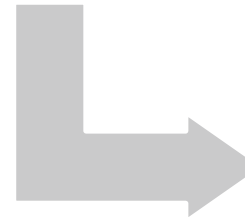
Four  
“Seed”  
Cases

- 26 Regional Combinations

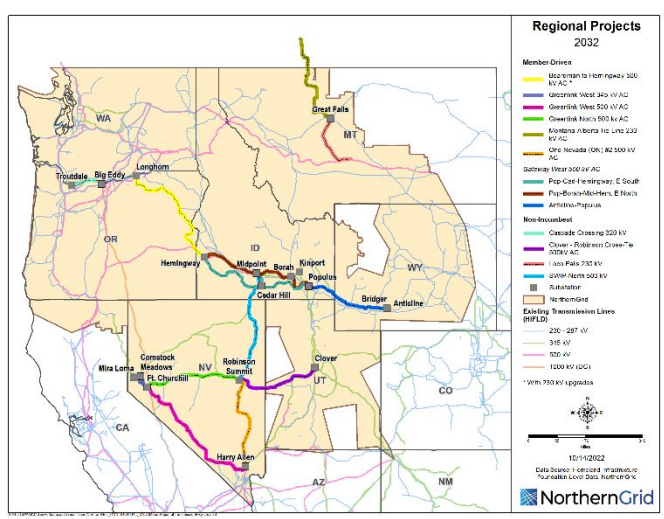


For Each  
Resulting  
Case

- Run contingency analysis for approx. 1,700 contingencies



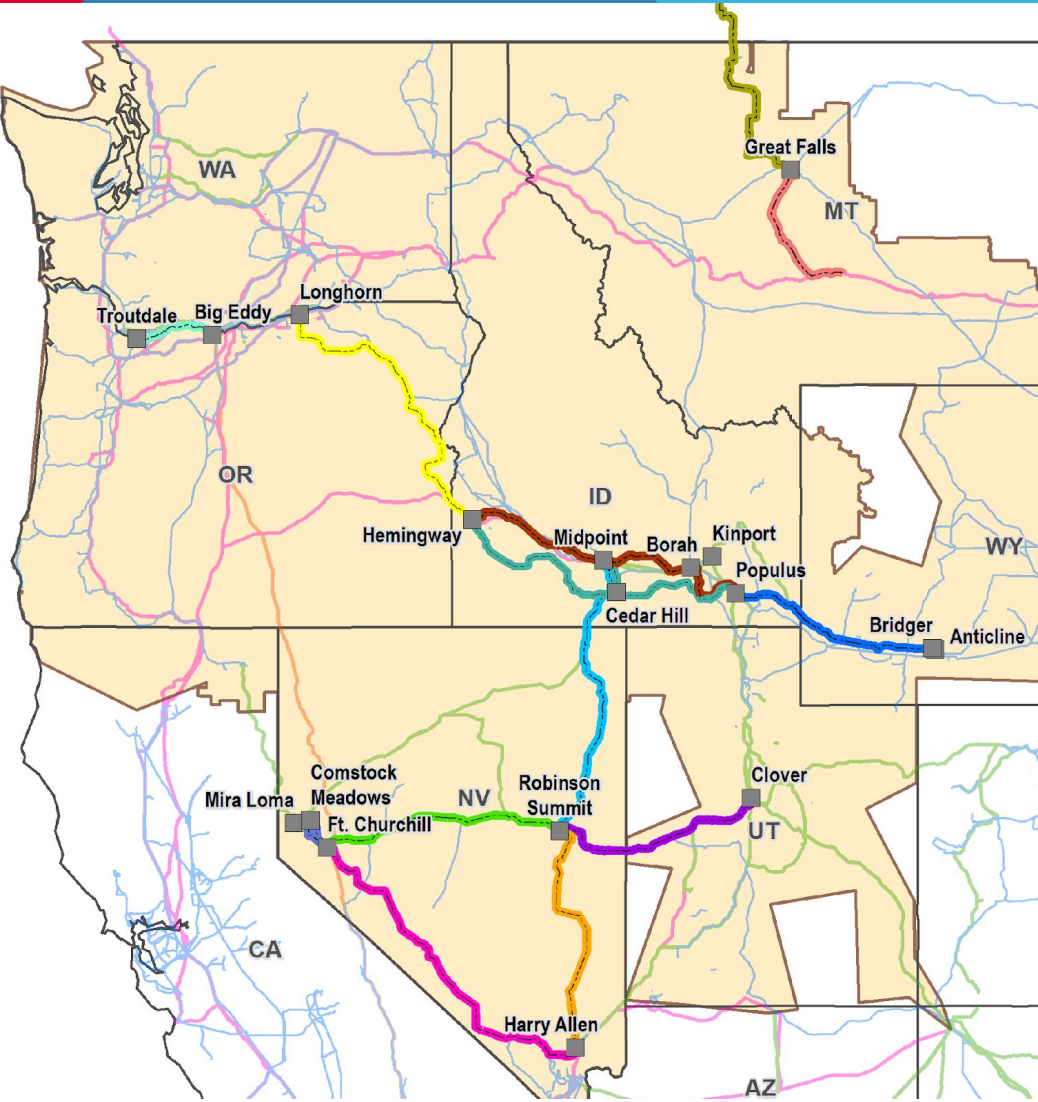
Summarize  
Ranked  
Results



BLMP: Baseline Member Projects  
 BLNP: Baseline, NO Member Projects  
 RC10: "Bugatti" Case  
 \*\*Projects in Construction are in all cases\*\*  
 15 Regional Projects includes in 26 Cases

| RC Name     | BLMP | BLNP | RC01 | RC02 | RC03 | RC04 | RC05 | RC06 | RC07 | RC08 | RC09 | RC10 | RC11 | RC12 | RC13 | RC14 | RC15 | RC16 | RC17 | RC18 | RC19 | RC20 | RC21 | RC22 | RC23 | RC24 | RC25 | RC26 |
|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| CCX         |      |      | X    |      |      |      |      |      |      |      |      | X    |      | X    |      | X    |      |      |      |      |      |      |      |      |      |      |      | X    |
| B2H         | X    |      |      | X    |      |      |      |      |      |      |      | X    | X    | X    | X    | X    | X    | X    |      |      |      |      |      |      |      |      |      | X    |
| GWW D.3     | X    |      |      |      | X    |      |      |      |      |      |      | X    | X    | X    | X    | X    | X    | X    |      |      |      |      |      |      |      |      |      |      |
| GWW Phase 2 | X    |      |      |      |      |      |      |      |      |      |      | X    |      |      |      |      | X    |      |      |      |      |      |      |      |      |      |      |      |
| GWW Phase 1 | X    |      |      |      |      | X    |      |      |      |      |      | X    | X    | X    | X    | X    | X    | X    |      |      |      |      |      |      |      |      |      |      |
| GWW D.1     | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    |
| GWS F       | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    | X    |
| ON2         | X    |      |      |      |      |      | X    |      |      |      |      | X    |      |      |      |      |      |      | X    |      | X    | X    | X    |      |      | X    |      |      |
| GNLK N-W    | X    |      |      |      |      |      |      | X    |      |      |      | X    |      |      |      |      |      |      | X    | X    |      | X    | X    | X    | X    | X    |      |      |
| CrossTie    |      |      |      |      |      |      |      |      | X    |      |      | X    |      |      |      |      |      |      | X    | X    | X    |      | X    | X    |      |      |      |      |
| SWIP-N      |      |      |      |      |      |      |      |      |      | X    |      | X    |      |      | X    | X    |      |      | X    | X    | X    | X    |      |      |      | X    |      |      |
| Loco Falls  |      |      |      |      |      |      |      |      |      |      |      | X    |      |      |      |      |      |      | X    | X    | X    | X    | X    | X    |      |      |      | X    |
| MATL        | X    |      |      |      |      |      |      |      |      |      | X    | X    |      |      |      |      |      | X    |      |      |      |      |      |      |      |      |      | X    |
| RobinsonPS  |      |      |      |      |      |      |      | X    | X    |      | X    |      |      |      | X    | X    |      |      | X    | X    | X    | X    | X    | X    |      |      |      |      |
| ON1SC       |      |      |      |      |      |      |      | X    | X    |      | X    |      |      |      | X    | X    |      |      | X    | X    | X    | X    | X    | X    |      |      |      |      |





Regional Combination 11:

- Boardman - Hemingway
- Hemingway - Midpoint, #2
- Midpoint - Cedar Hill
- Cedar Hill - Populus
- Populus - Anticline

\*\*Gateway South and Gateway West Segment D.1 are not depicted on this diagram as they are under construction\*\*

# Interregional Transmission Planning

- **There are three regional planning organizations in the western interconnection: CAISO, NorthernGrid, and WestConnect.**
- **If a project connects to more than one region, then each region will evaluate the benefits of the project.**
- **Annual Interregional planning meeting to discuss and coordinate each region's transmission plan.**
- **If a project is accepted for Order 1000 cost allocation, then the costs will be allocated to each region in proportion to the benefits that the region will receive.**

# Transmission Planning – An Overview

## WSTI Webinar

Ravi K. Aggarwal  
Bonneville Power Administration  
Jul 20, 2023





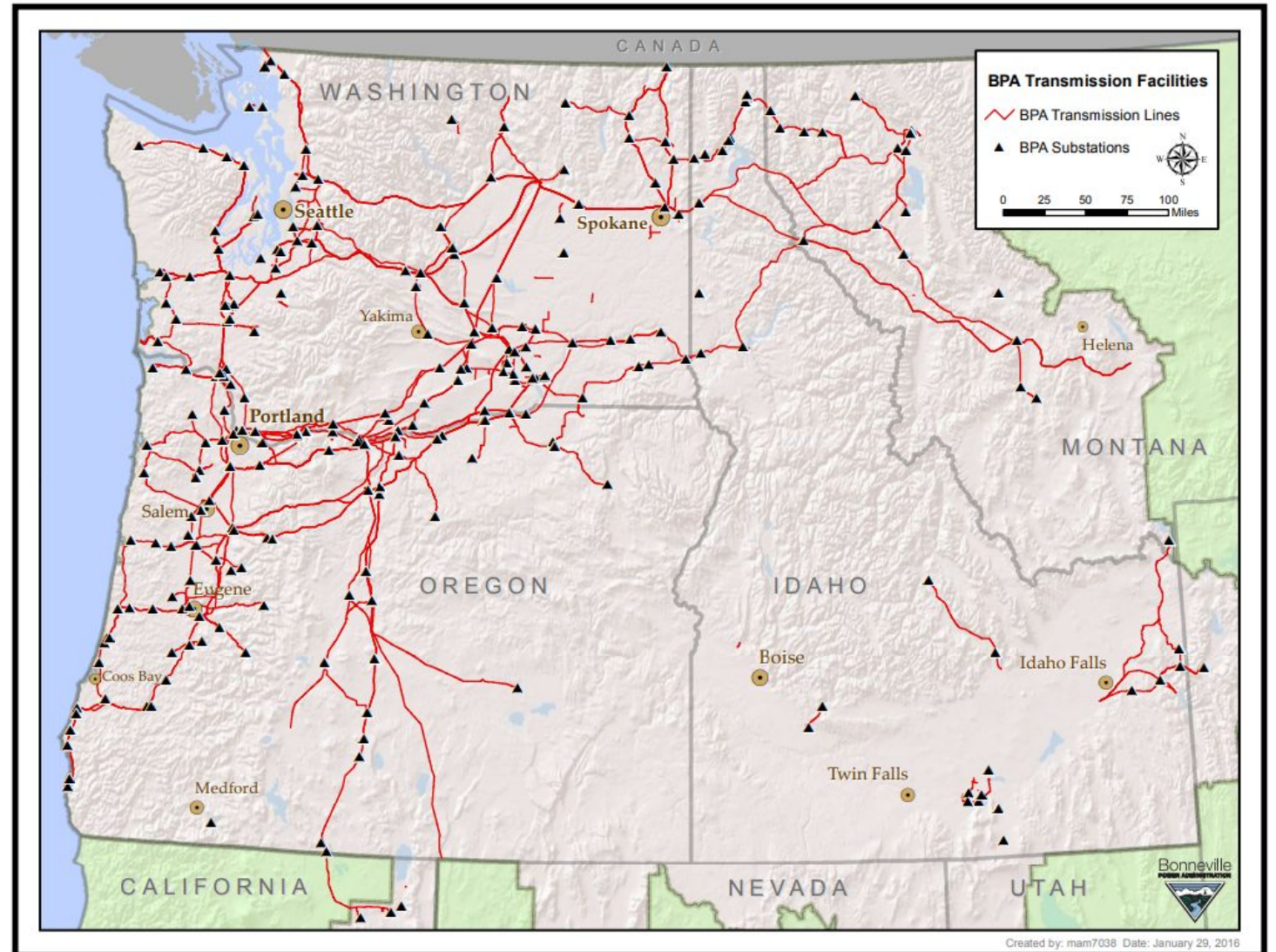
# Introduction to BPA

- BPA was created by an act of Congress in 1937 to market power from the Bonneville dam and to construct facilities necessary to transmit that power
- BPA does not own, but currently markets power from 31 Federal hydro plants, the Columbia Generating Station nuclear plant, and several small non-Federal power plants
- These plants produce an average of 8,000 MW at any point in a normal runoff year
- About 80% of the power BPA sells is hydroelectric
- BPA provides about 28% of the electric power consumed within the PNW and over 50% of power consumed in WA
- BPA receives no congressional appropriations. BPA recovers all costs from selling power and transmission services
- BPA, with USCOE & USBR, invests \$250 - \$300 million per year in Fish & Wildlife programs across the Columbia River basin

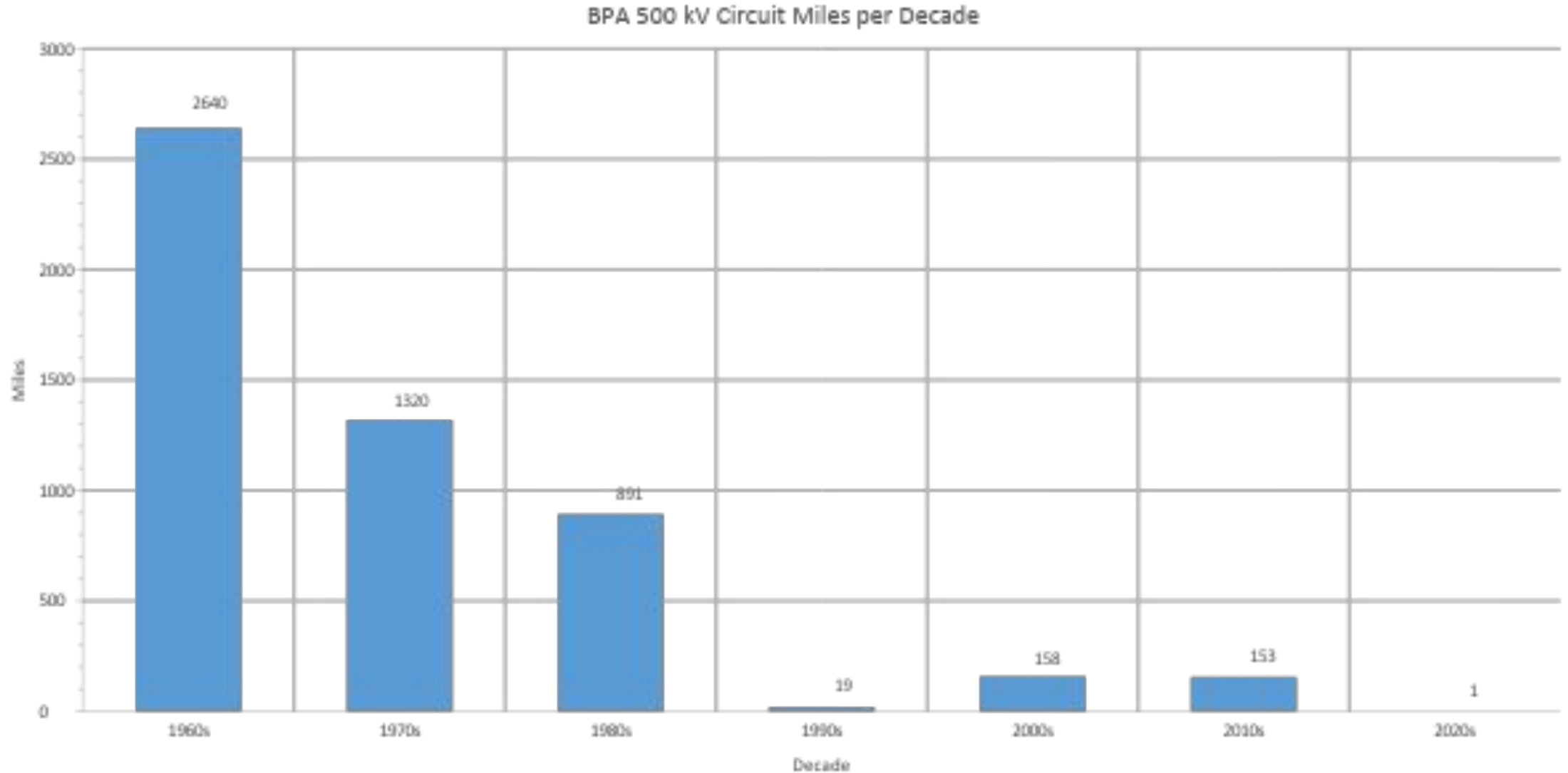


# BPA Infrastructure

- BPA owns and operates 15,000+ circuit miles of transmission lines
- BPA owns and operates 3,500+ miles of fiber optic network
- BPA serves over 300 customers
- BPA operates several large paths in the Western Interconnection:
  - California-Oregon Intertie with California (4,800 MW)
  - Pacific DC Intertie (3,220 MW)
  - Northern Intertie with Canada (3,150 MW)
  - Montana Intertie (2,200 MW)



# PNW Transmission Build Out



# BPA's Transmission Planning

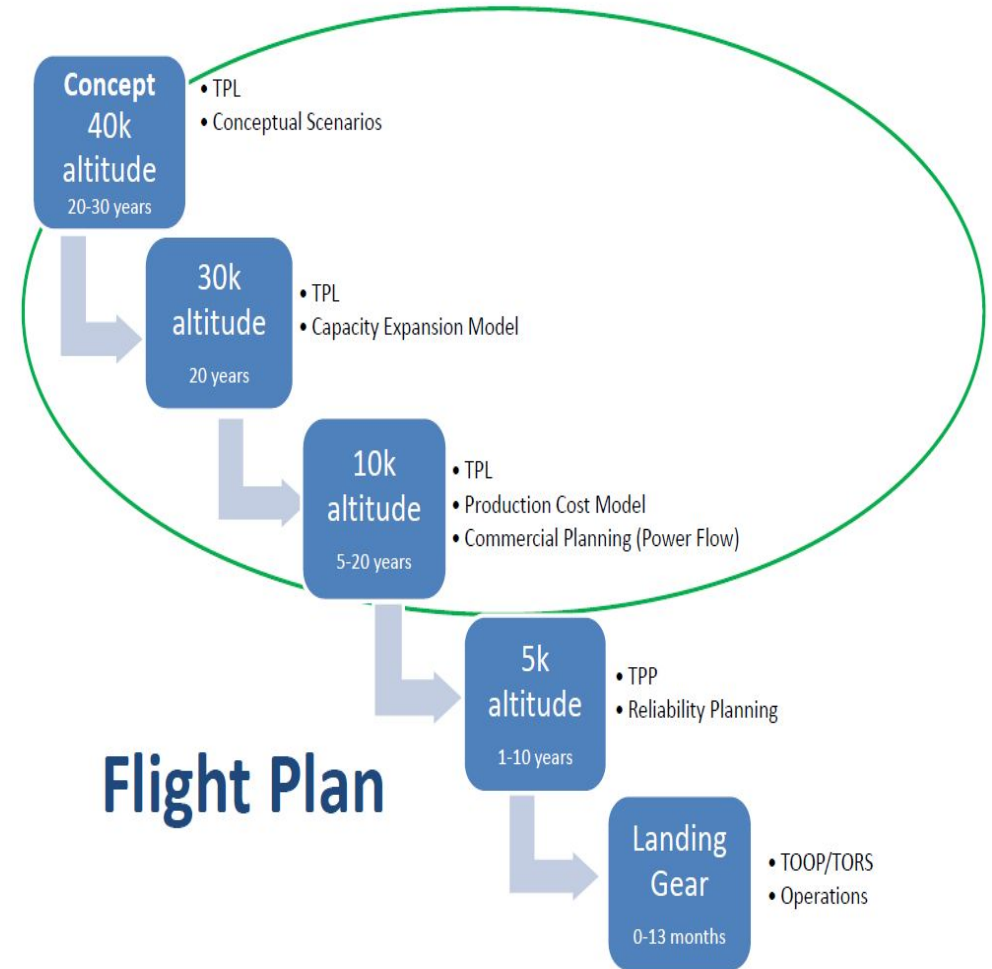
- Annual Assessment of the system reliability (NERC Compliance Studies)
- Generation Interconnection, Line & Load Interconnection
- Network Load Planning Studies (27 Areas)
- Plan of Service Development for BPA grid (Regional and Inter-regional) – Address Transmission Service Requests
- Studies include Power Flow, Voltage and Transient Stability
- Perform scenario analysis as part of plan of service development

# Long-Term Transmission Planning

- Long-Term Transmission Planning
  - Commercial Planning – Transmission Service Requests
  - Economic Planning Studies (Capacity Expansion and PCM)
  - Scenario planning – Short and long-term (up to 20 years), utilizing various load and resource patterns
- Risk-informed, flexible, and scalable commercial planning process to align with Agency strategy

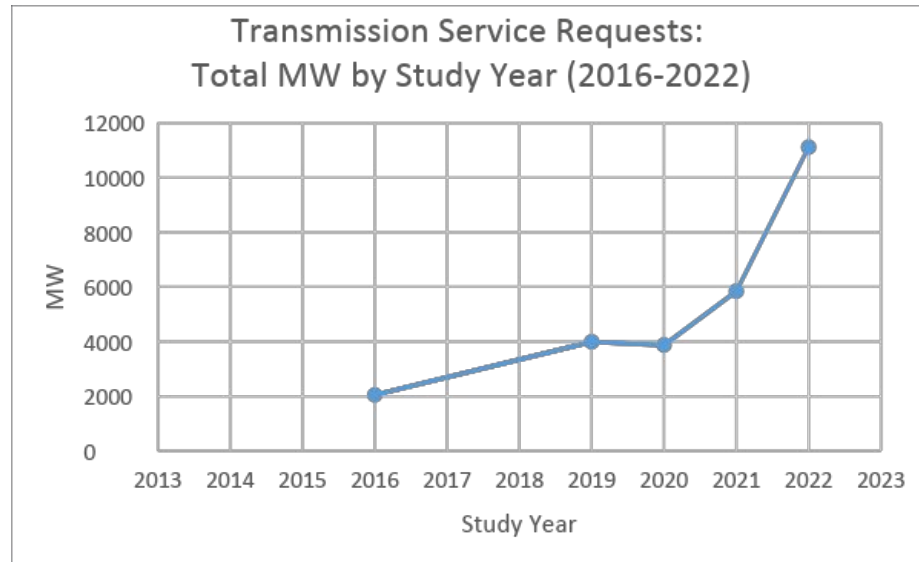
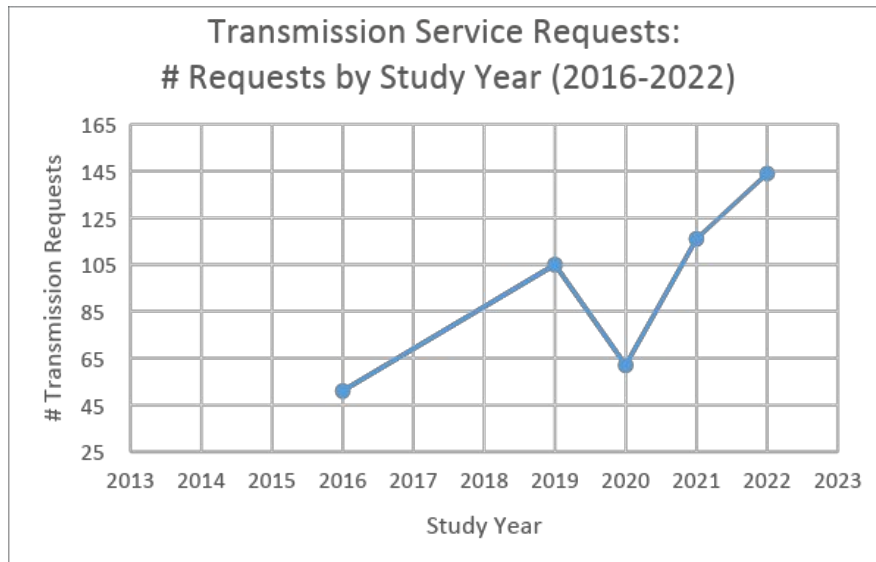
# Long-Term Transmission Planning – A birds eye view

- **Perform scenario analysis for Long Term Commercial Planning**
  - Long Term ATC, Production Cost Model, Commercial Cluster Study, Long Term Capacity Expansion, Conditional Firm, and more
- **Market Based Scenario Analysis**
  - Large transmission projects, Transmission Service Request Evaluation, Cross Agency Teams, Commercial Needs Assessment, Flowgate Congestion Mitigation
- **Analysis and negotiations for strategically significant projects/policies**
- **Support and actively participate regional processes (NorthernGrid, Resource Adequacy)**



# Transmission Service Requests

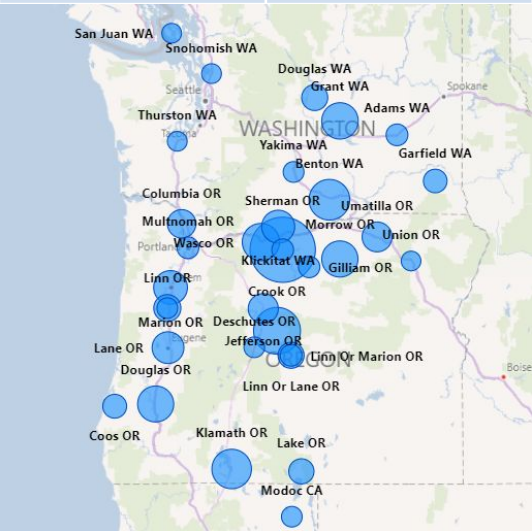
- WA & OR Clean Energy policies are driving an increase in TSR submittals
  - Since 2019, BPA has studied over 17,000 MW of requested transmission service primarily delivering to the Portland metro area or the Seattle/Puget Sound area
  - According to recent IRP data, the clean resource need to serve these regions is expected to be around 6,000 MW in total by 2030
  - The 2022 Cluster Study had more requested demand (~11.1 GW) than the 2020 and 2021 studies combined (~10 GW).
  - The 2023 Cluster Study will include ~17 GW of requests.
  - The requested transmission service is far outpacing the regional demand



# GI Requests *in Progress* by Study Phase

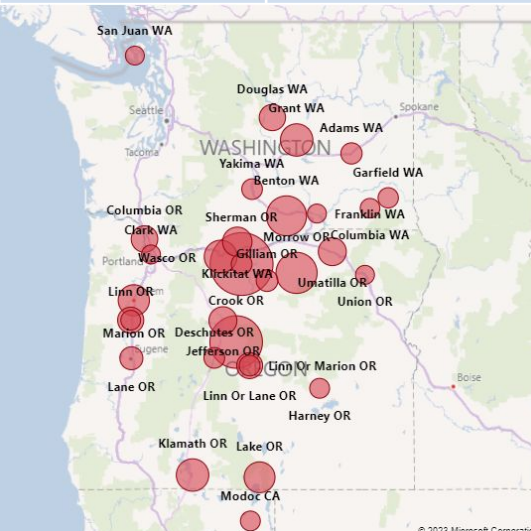
## Battery ~50 gigawatt

| Study Phase                             | MW     |
|---|--------|
| b - Feasibility Study                   | 34,965 |
| c - Interconnection System Impact Study | 6,675  |
| d - Facility Study                      | 8,726  |



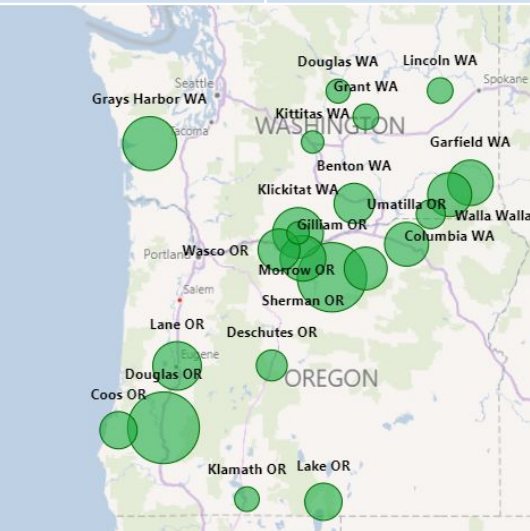
## Solar ~49 gigawatt

| Study Phase                             | MW     |
|---|--------|
| b - Feasibility Study                   | 31,692 |
| c - Interconnection System Impact Study | 8,013  |
| d - Facility Study                      | 9,716  |

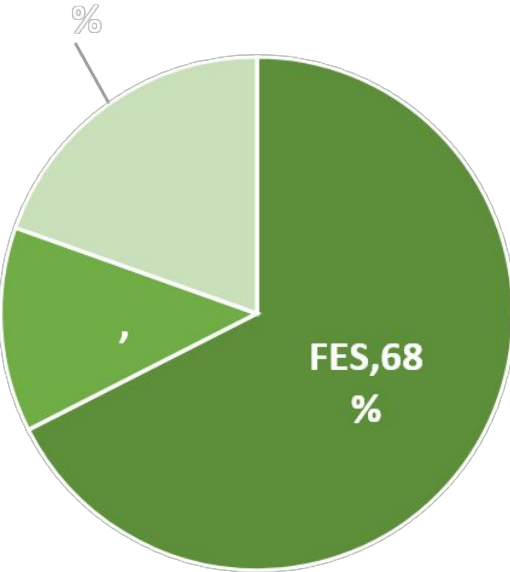


## Wind ~14 gigawatt

| Study Phase                             | MW     |
|---|--------|
| b - Feasibility Study                   | 10,260 |
| c - Interconnection System Impact Study | 0      |
| d - Facility Study                      | 3,849  |

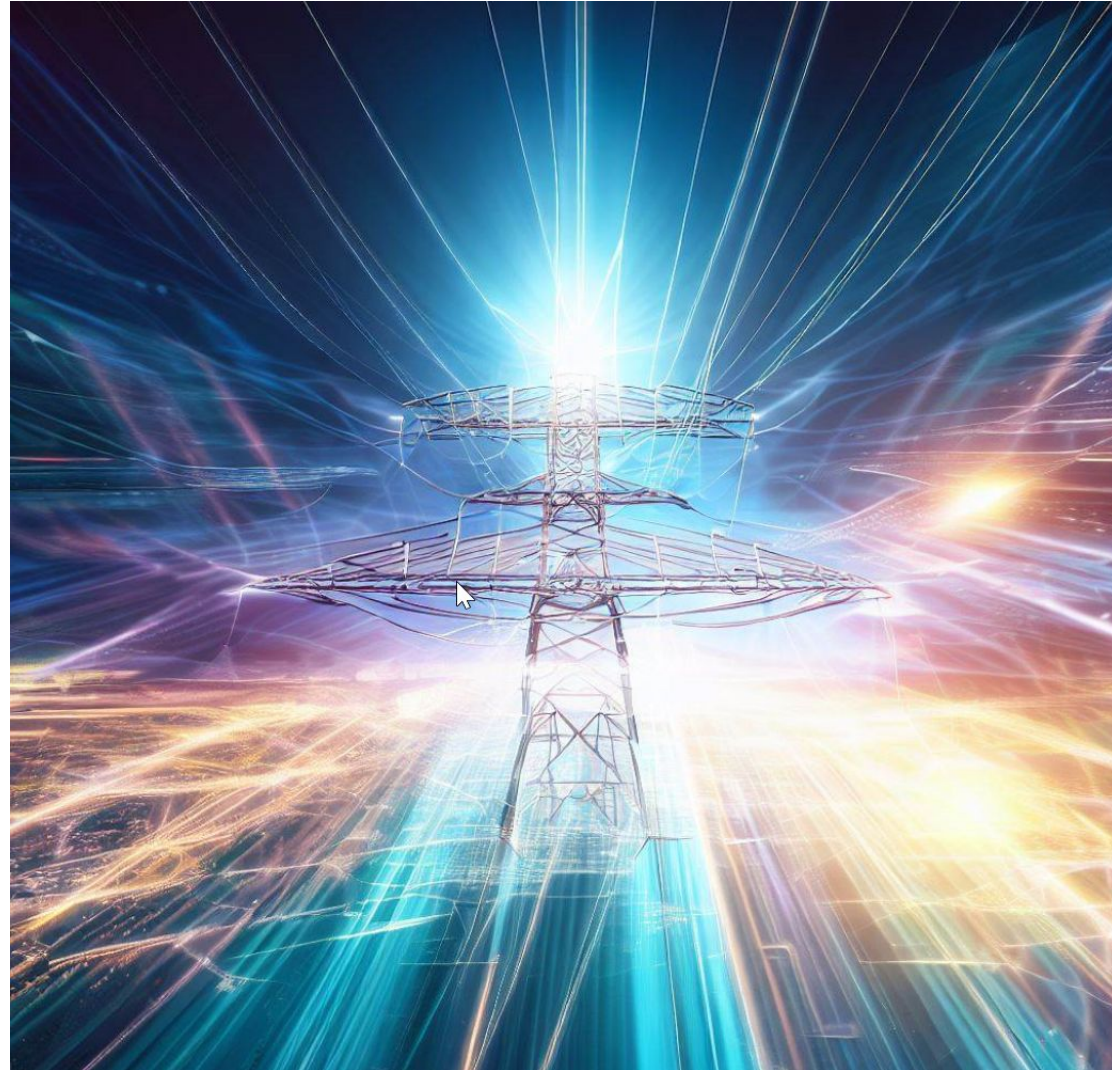


Generation Interconnection Requests Percentage in Progress and in FAS,20 Study Phase





# The Evolving Grid

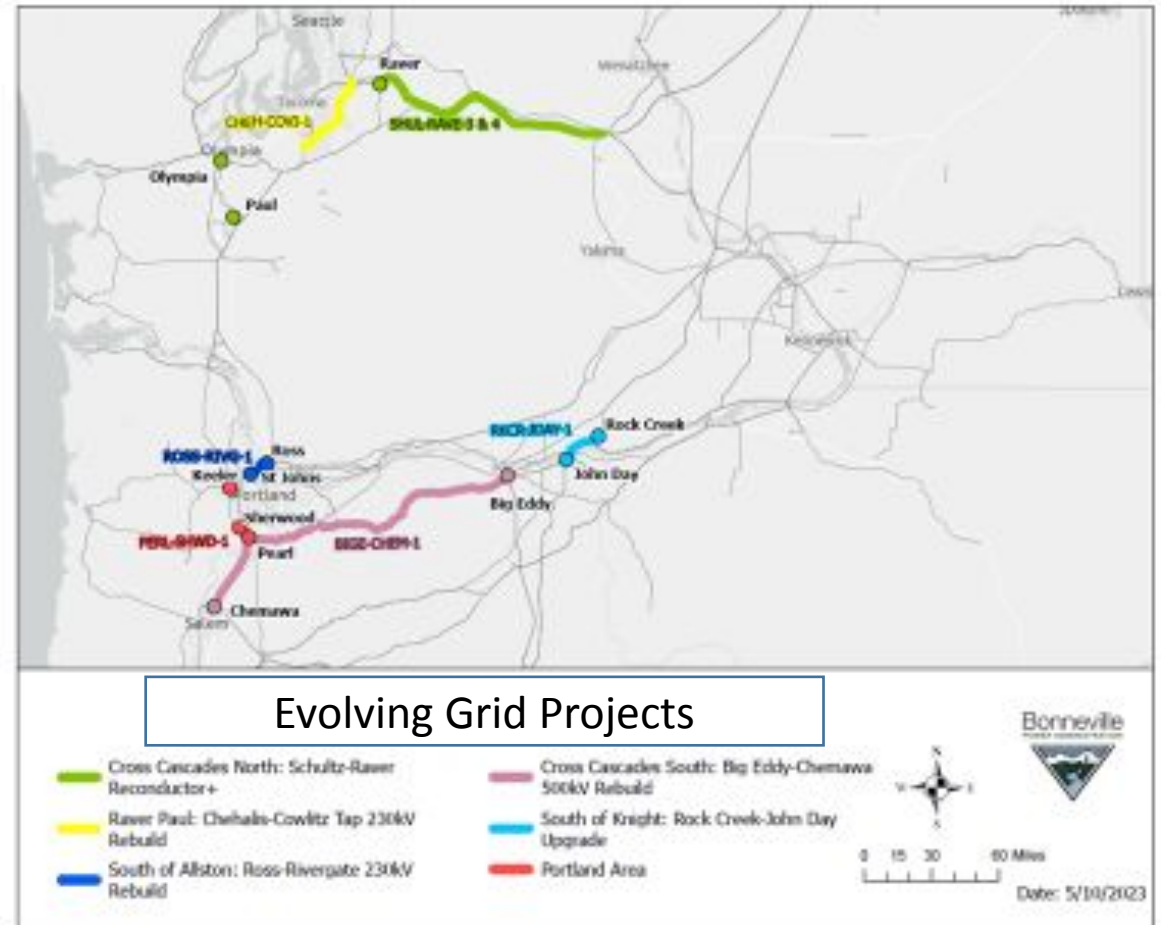


# Evolving Grid – BPA Projects in Flight

The following projects are needed in many future scenarios for reliability, expanded load service, and as renewable resources seek delivery to load:

1. Portland Area Reinforcements
2. Cross-Cascades South (Big Eddy-Chemawa 500 kV Rebuild
3. Raver-Paul path upgrade
4. Cross-Cascades North Reinforcement
5. Ross – Rivergate 230 kV Upgrade
6. Rock Creek-John Day 500 kV Upgrade

B O N N E V I L L E P O W E R A D M I N I S T R A T I O N



# Primary Challenges to Transmission Planning

- Lack of regional integrated resource and transmission planning
  - Load forecasting consistency challenges related to electrification and large industrial facilities
  - Differing state clean energy goals across BPA's system
  - Huge mismatch between supply and demand (Requested Supply exceeds projected demand by a significant amount)
- Lack of transparency resulting in conflicting findings – Need more collaboration

# Helpful Links

**BPA Transmission Plan:**

<https://www.bpa.gov/-/media/Aep/transmission/attachment-k/2022-bpa-transmission-plan.pdf>

**Transmission Availability :** <https://www.bpa.gov/energy-and-services/transmission/transmission-availability>

**Interconnection:** <https://www.bpa.gov/energy-and-services/transmission/interconnection>

**Transmission Service Request Study:**

<https://www.bpa.gov/energy-and-services/transmission/acquiring-transmission/tsep>

**NorthernGrid Regional Planning:** [NorthernGrid](#)



# Questions

# WA & OR Regional Clean Energy Targets & Policies

2030

**National:** Net greenhouse gas emissions to 50-52% below 2005 levels in 2030  
**Washington:** All electric utilities greenhouse gas neutral  
**Oregon:** 80% below baseline

2040

**Oregon:** 100% below baseline

2050

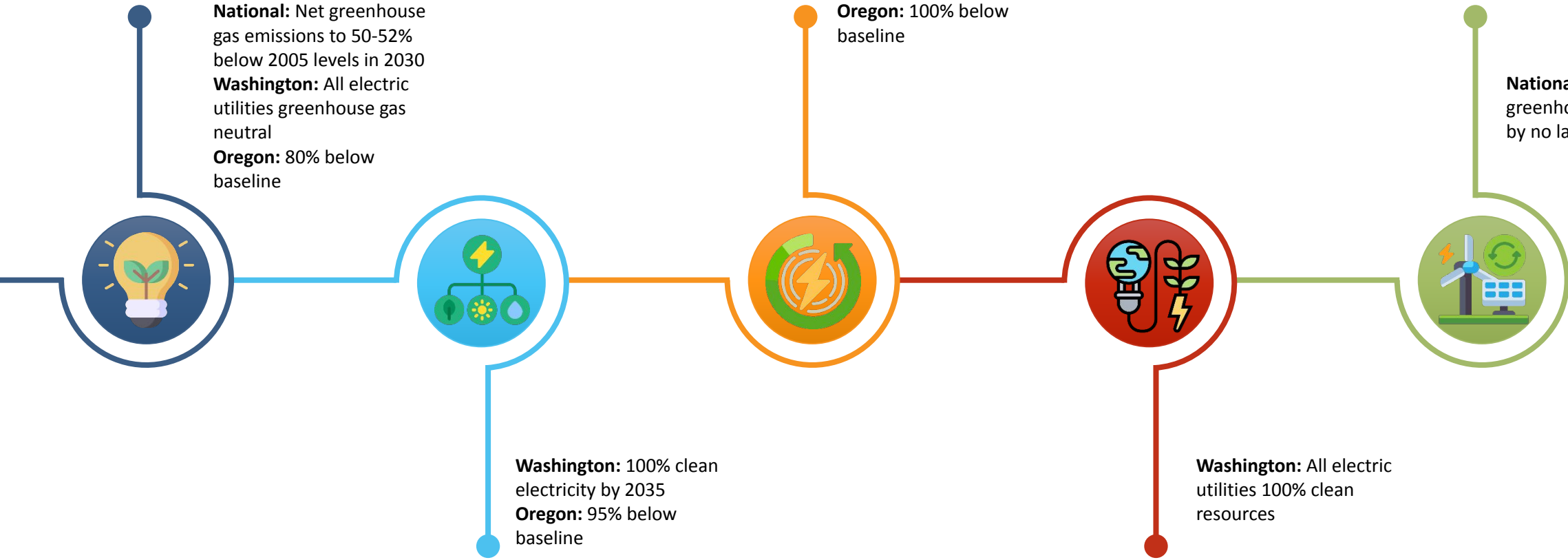
**National:** Net-zero greenhouse gas emissions by no later than 2050

2035

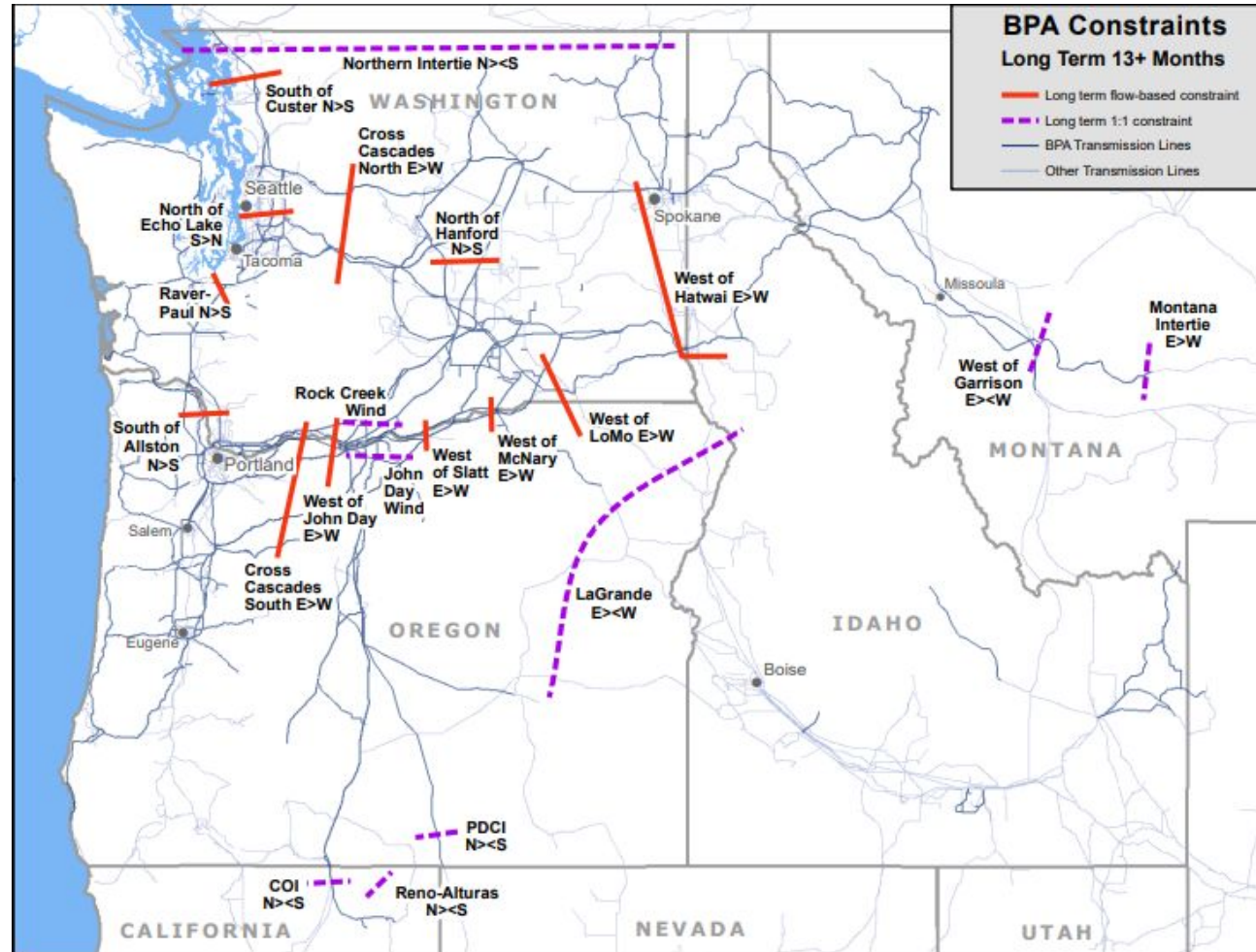
**Washington:** 100% clean electricity by 2035  
**Oregon:** 95% below baseline

2045

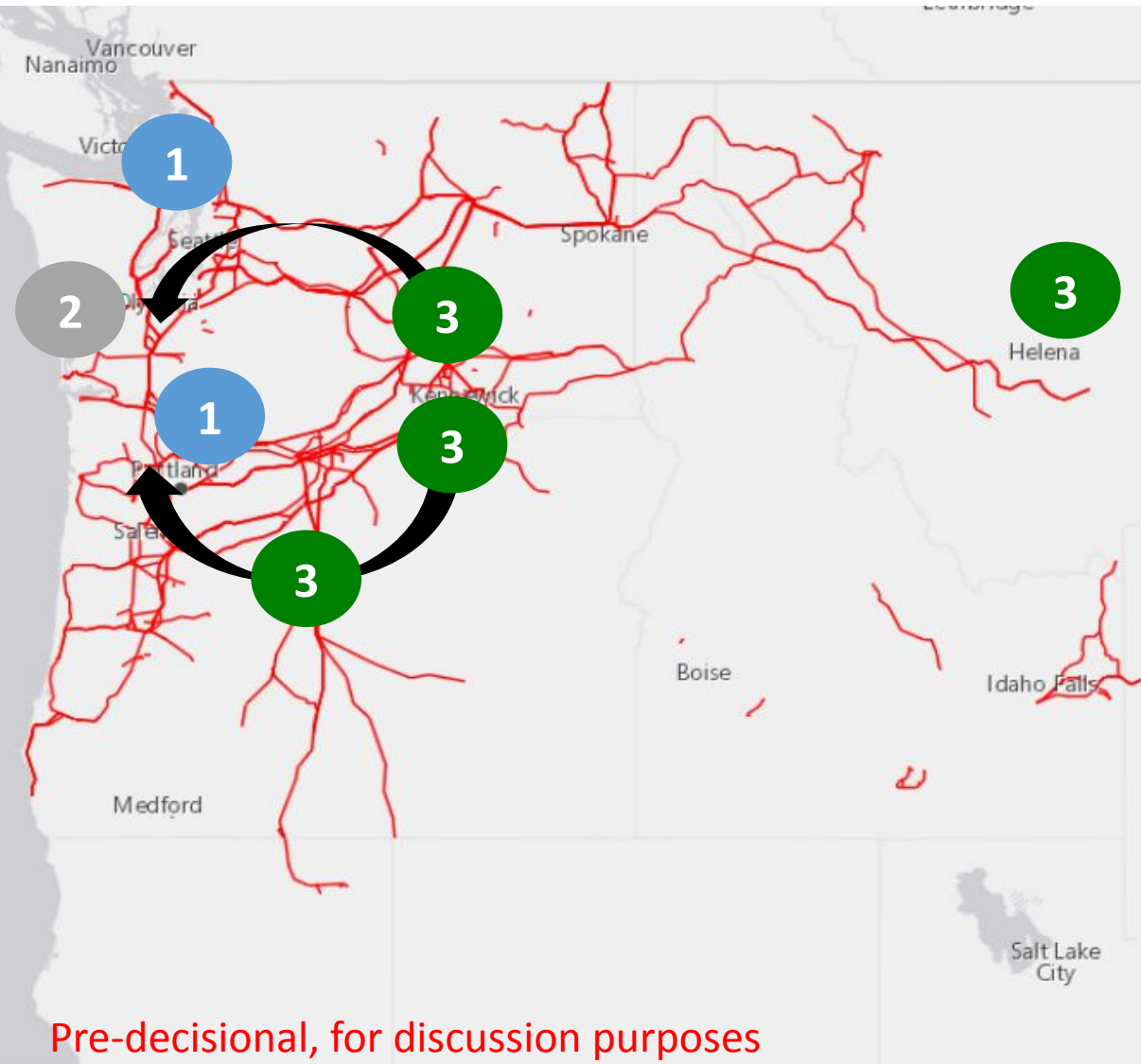
**Washington:** All electric utilities 100% clean resources



# BPA Transmission Long-term Constraints



# Landscape Overview



## The following factors:

1. Load growth in Portland and Seattle – driven by high tech industry, transportation and building electrification
2. Reduced operation of 4.5 GW of carbon emitting generators on the west side along the I5 corridor
3. Replacement wind and solar resources are located east of the Cascades

***Will increase flows on cross-Cascades transmission paths and throughout the load centers***





# **New Mexico Renewable Energy Transmission Authority Transmission Update**

**Presentation to  
WSTI Transmission Planning Webinar**

Fernando Martinez  
Executive Director

July 20, 2023



# NM RETA Background

---

- Established by the NM legislature in 2007 to plan, finance, develop and acquire high voltage transmission lines and storage projects in order to promote economic development in New Mexico.
  - A “public body, separate and apart from the state, constituting a governmental instrumentality for the performance of essential public functions.”
  - Six-member Board, three appointed by the governor, one appointed by the speaker of the house, one appointed by the president pro-tem of the senate and the state treasurer or designee. The secretary of the Energy, Minerals and Natural Resources Department serves as non-voting ex-officio member.
- Project selection process outlined in regulation - 17.8.2 NMAC (12/15/2011)
  - Relationship levels – all beyond NDA require Board approval
    - NDA
    - Letter of Support
    - MOU (this step triggers notice provisions to utilities, Public Regulation Commission and public)
    - Master Lease Agreement
      - Enables tax and eminent domain benefits for project
- RETA sponsored projects must transmit at least 30% of their energy from renewable resources. RETA’s current projects are planned to have 100% of their energy originate from renewable resources.



**RETA**

# RETA's Benefits for Developers are Critical

---

- Private development partners:
  - Provide transmission design and construction expertise
  - Contribute to RETA administrative expenses via lease agreements.
- Tax incentives:
  - Property, gross receipts, and compensating tax.
- Assistance with permitting and siting:
  - Powers of eminent domain
  - Government-level relationships with State Land Office, Dept. of Transportation, Middle Rio Grande Conservancy District, other state and local agencies
  - Streamline permitting, but not skirting environmental requirements.
- Bond financing:
  - if developer needs financing support.

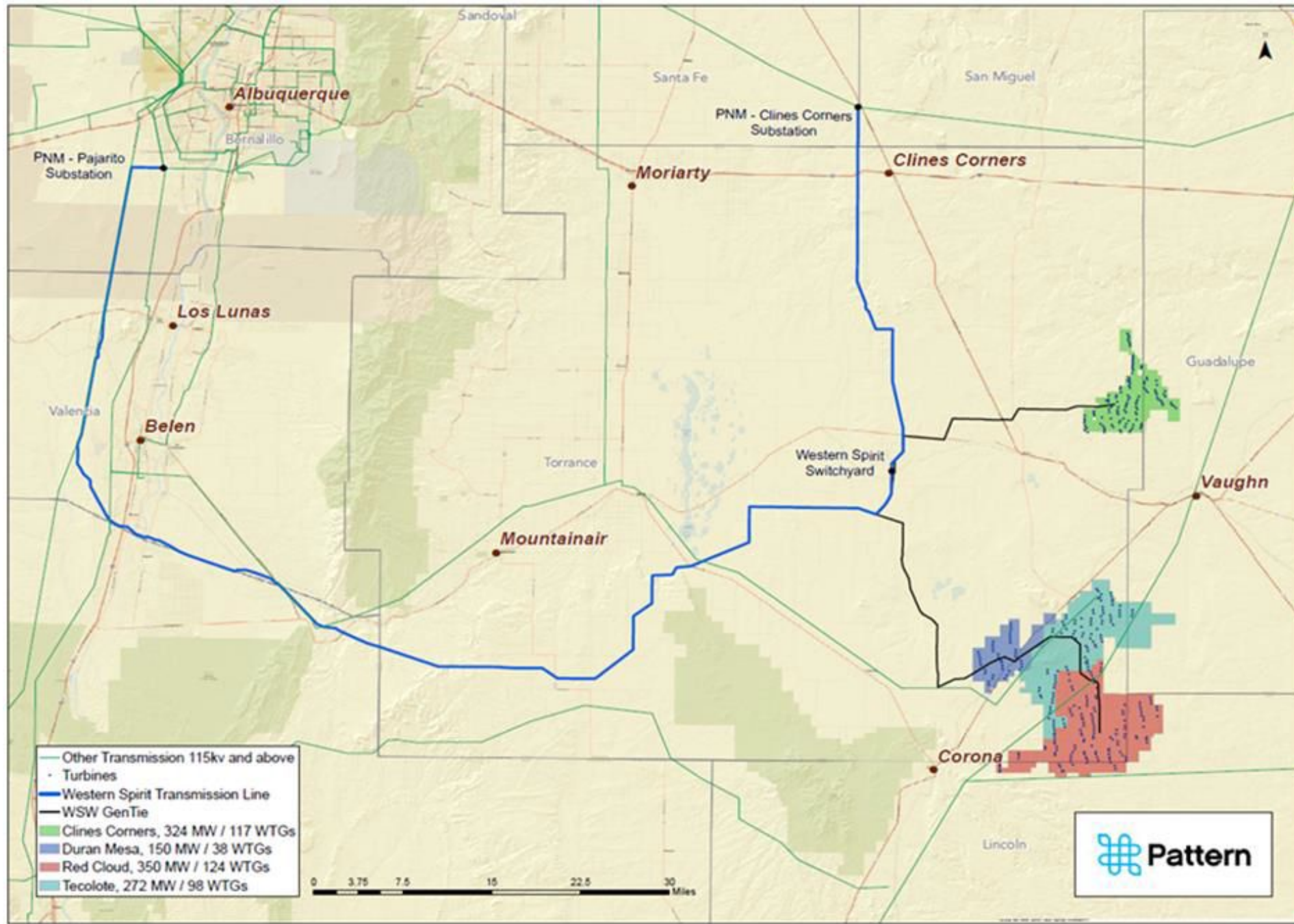


# Western Spirit Transmission Line: Operating

---

- Western Spirit is a 155-mile 345-kV AC transmission line rated at 800 MW
- 100% of the power comes from renewable resources located in Central New Mexico
- A first of its kind public-private partnership
  - Owned by RETA and jointly developed with Pattern Energy
- Initially identified by RETA in a study of the NM Transmission System by Los Alamos National Labs more than a decade ago
  - Western Spirit co-development started in 2010
- Completed in 2021, the Project was acquired by PNM and is now a part of their grid
  - No rate payers' impact
  - 100% of cost is borne by the wind farms delivering clean electricity





# Western Spirit Project Map



**RETA**

# Four Projects Currently in Development Under Master Lease Agreement

---

- SunZia (Pattern Energy) – Central New Mexico to South Central Arizona
  - 550 miles, 525 kV HVDC – 3,000 MW capacity, 2026 completion date
- RioSol (Southwestern Power Group) – co-located with SunZia (NM to AZ)
  - 550 miles, 500kV AC – 1,500MW, 2028 completion date
- NM North Path (Invenergy) – Northeast to Northwest New Mexico
  - 400 miles, 525 kV HVDC – 4,000 MW, 2028 completion date
- Mora Line (Ameren) – Northeast New Mexico
  - 114 miles, 345 and 115 kV, 182 MW, 2025 completion date
- Links to project websites at <https://nmreta.com/transmission-lines/>



# SunZia Transmission Line Project

---

- 350-mile, 525-kV HVDC transmission line
  - New Mexico portion
  - 3,000 MW
  - Operating 2026
- A public-private partnership
  - Owned by RETA and jointly developed with Pattern Energy
- 100% of the power comes from renewable resources located in Central New Mexico
  - Largest wind farm in the U.S.



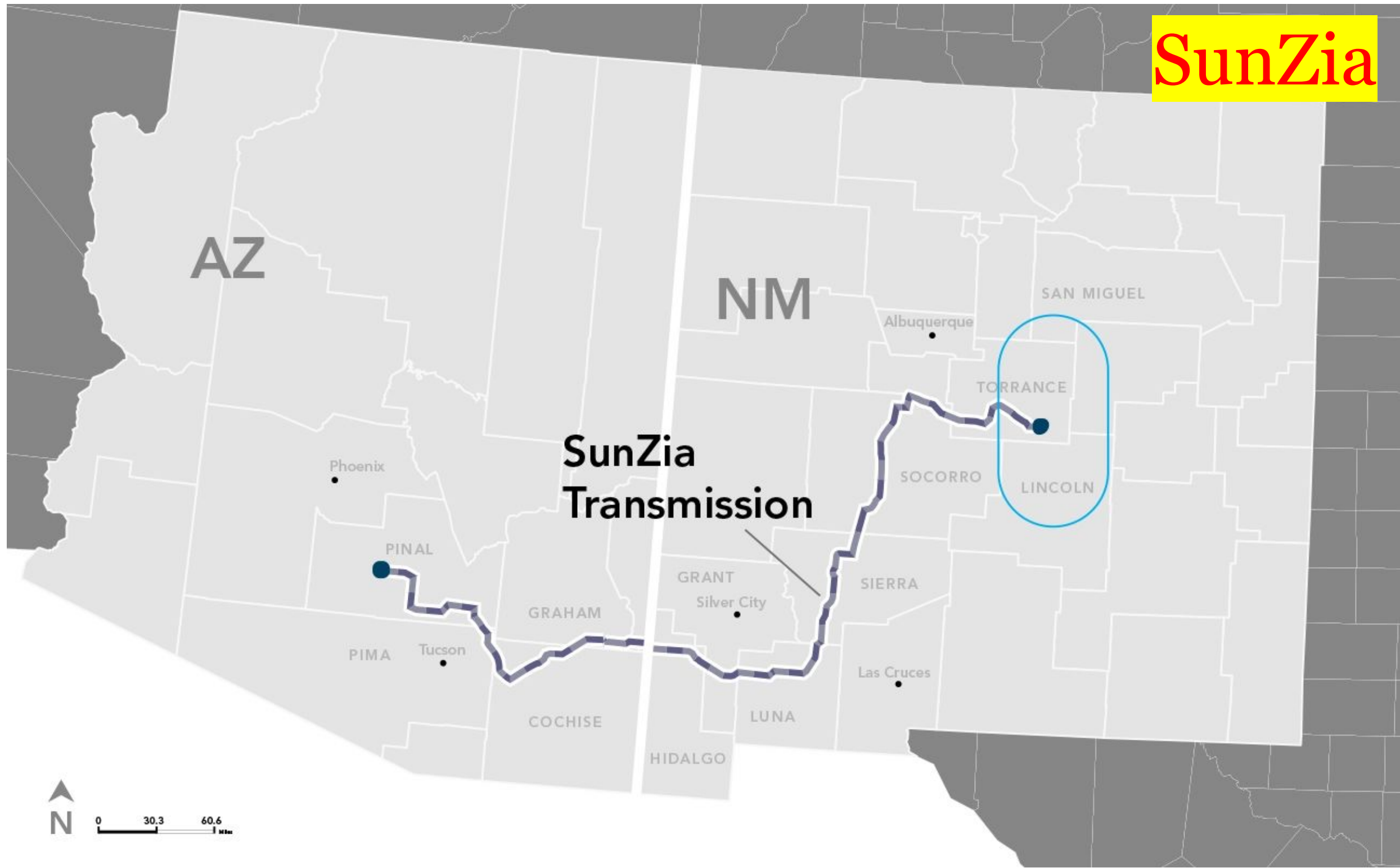
# RioSol Transmission Line Project

---

- 350-mile, 500-kV AC transmission line
  - New Mexico portion, co-located with SunZia
  - 1,500 MW
  - Operating 2028
  
- 100% of the power comes from renewable resources located in Central New Mexico
  - Interconnection of NM wind and solar resources
  
- A public-private partnership
  - Owned by RETA and jointly developed with Southwestern Power Group







# Mora Line Transmission Project

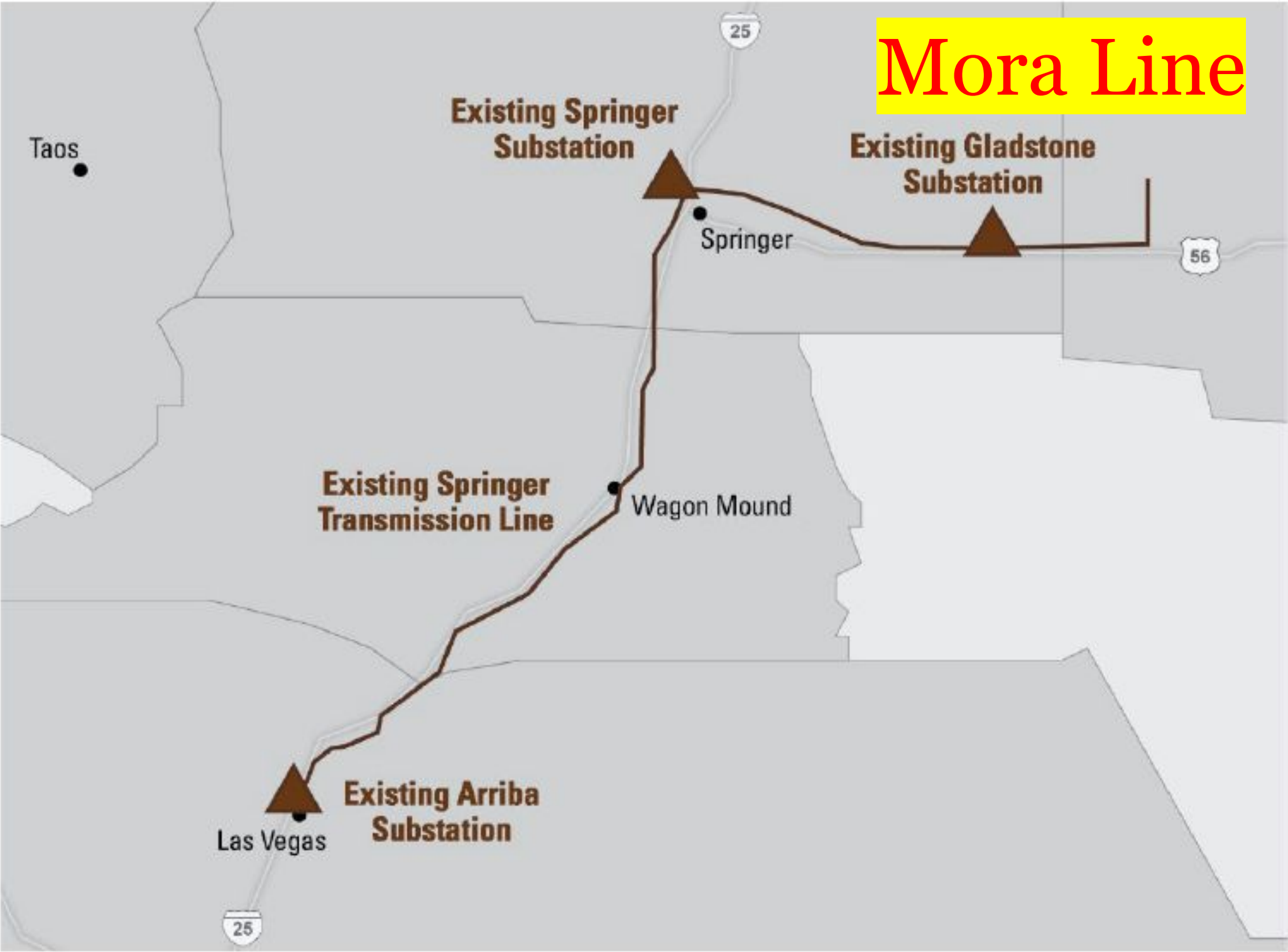
---

- 114-mile transmission line at 115 kV and 345 kV
  - 182 MW
  - Operating 2025
- 100% of the power comes from renewable resources located in Northeast New Mexico
  - Unlocks exceptional wind resources for in-state utilization
  - Strengthens New Mexico grid
- A public-private partnership
  - Owned by RETA and jointly developed with Ameren Transmission



**RETA**

# Mora Line



**RETA**

# North Path Transmission Line Project

---

- 400-mile, 525-kV HVDC transmission line
  - 4,000 MW
  - Operating 2028
- 100% of the power comes from renewable resources located in Northeast New Mexico
  - Unlocks exceptional wind resources
- A public-private partnership
  - Owned by RETA and jointly developed with Invenergy

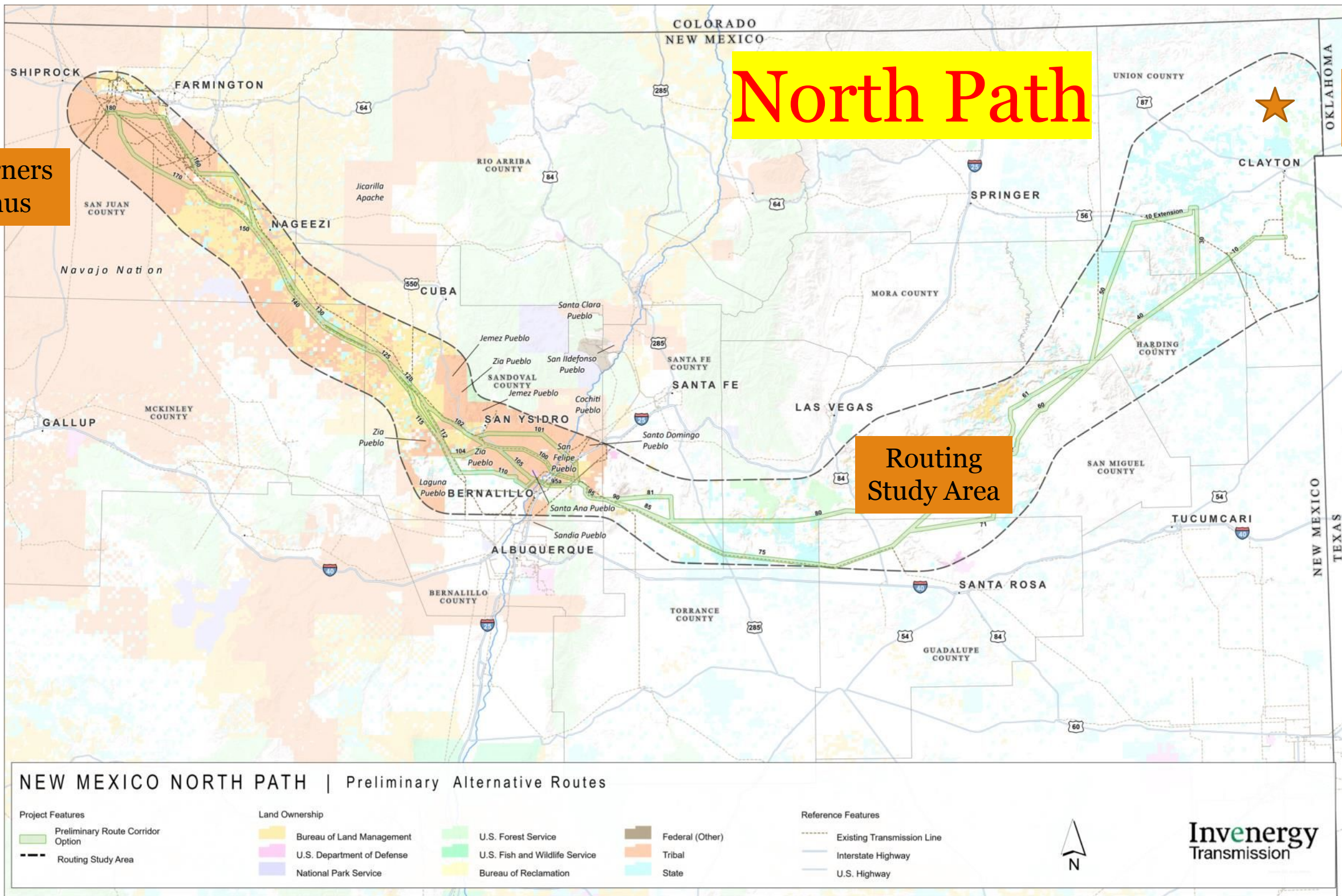


# North Path

Four Corners  
Terminus

Union County  
Terminus

Routing  
Study Area



## NEW MEXICO NORTH PATH | Preliminary Alternative Routes

### Project Features

- Preliminary Route Corridor Option
- Routing Study Area

### Land Ownership

- Bureau of Land Management
- U.S. Department of Defense
- National Park Service
- U.S. Forest Service
- U.S. Fish and Wildlife Service
- Bureau of Reclamation

- Federal (Other)
- Tribal
- State

### Reference Features

- Existing Transmission Line
- Interstate Highway
- U.S. Highway



**Invenergy**  
Transmission



**RETA**

# Transmission Planning in New Mexico

## As directed by NM statute or policies...

- Integrated Resource Plans
  - Three IOUs: PNM, El Paso Electric, Southwestern Public Service
  - 3-year action plan: RFP process requirements
  - 20-year planning period: forecasting and generation
  - Long-range transmission plans not required
- Energy Transition Act
  - Increasing RPS targets, 80% in 2040
  - No transmission planning required

## Neighboring jurisdictions...

- 10-year Transmission Planning
  - States: Arizona and Colorado
  - RTO: Southwest Power Pool, eastern NM
  - Not applicable, western and central NM:
    - PNM
    - El Paso Electric

## Independent, Federal, and Regional actions...

- Independent Transmission Studies
  - 2022 RETA transmission study update
  - 2020 RETA transmission study
  - 2010 LANL transmission study
- FERC Orders
  - Require NM utilities' coordination across Southwest US
  - Southwest US region: WestConnect, includes NM
- WestConnect
  - PNM and El Paso Electric are Members, convene biannual public meetings
  - RETA is a stakeholder, RETA partners are Members
  - Member utilities and developers navigate 2-year process to establish transmission priorities
  - NM utilities' participation level in WestConnect process is discretionary



**RETA**

# NM RETA Contracted with ICF to Study Renewable Energy Potential in New Mexico

---

- New Mexico Renewable Energy Transmission & Storage Study
  - Completed in 2020
  - Updated in 2022
- Study elicited significant interest by developers in bringing renewable energy and transmission projects to NM
- Executive summaries attempt to describe the issues and challenges in an easily understandable form
- Study, Study Update, and Executive Summaries available online  
<https://nmreta.com/nm-reta-transmission-study/>





505-699-0651

[fernando@nmreta.net](mailto:fernando@nmreta.net)



[www.nmreta.com](http://www.nmreta.com)

<https://nmreta.com/nm-reta-transmission-study/>

New Mexico Renewable Energy Transmission Authority

