

# North Plains Connector

## NorthernGrid Study Proposal

April 17, 2024



To develop America's next generation energy infrastructure to power our future



Our projects:

- Connect key areas of the electric grid
- Create a more resilient and efficient electric system
- Utilize the nation's abundant and geographically disperse natural resources
- Benefit all consumers

# North Plains Connector Project – Development Milestones Reached

## • Land

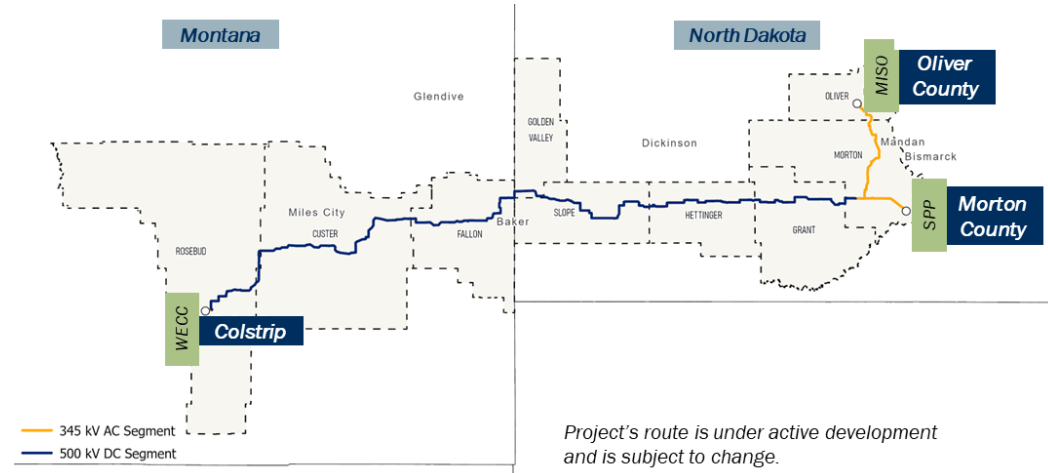
- Total Length: 412 miles
- ROW Pending: 11% private landowners

## • Survey:

- Currently approximately 75% complete
- Finish remainder in 2024 survey season

## • Configuration

- HVDC (VSC) | 525 kV | 3,000 MW | bi-directional
- Interconnections
  - WECC: 3,000 MW into Colstrip, MT 500kV system
  - MISO: 1,500 MW (AC) to new substation in Oliver County, ND; connects to MN Power (an ALLETE company) upgrades
  - SPP: 1,500 MW (AC) to new substation in Morton County, ND



*Project's route is under active development and is subject to change.*



# NPC Project Update – Interconnection



## NorthWestern Energy *on behalf of Colstrip Transmission owners*

- Feasibility & System Impact Study (SIS) completed
- SIS estimated ~\$66M needed for Colstrip 500kV Sub expansion
- Facility Study expected end of Q1 2024
- Interconnection Agreement negotiations expected Q2 2024

## MISO

- Attachment GGG (Queue #H108) SIS (steady state) for 2000 MW withdrawal at Center 345 kV showed only \$44.5M in Network Upgrades needed
- New interconnection request submitted (Queue #H110) in June 2023 for 1500 MW at Nelson Lake 345kV

## SPP

- Transmission Working Group (TWG) accepted feasibility study results in August 2023
- Feasibility Study showed minor constraints that can be mitigated by HVDC dispatch or system upgrades. To be further refined in the Planning Study phase
- Received approval of Planning Phase Scope from SPP Transmission Working Group (TWG) at end of February 2024
- Planning studies in progress, results expected Q4 2025

# Load diversity drives significant capacity sharing opportunity

Analysis across 43 weather years demonstrates consistent load diversity across the East-West Interconnection seam and the capacity sharing opportunity

Table shows, on average, how far each region was below its own peak load during another region's peak load hour

Summer	MISO	SPP	PNW
MISO is Peaking	0%	8%	14%
SPP is Peaking	8%	0%	15%
PNW is Peaking	16%	17%	0%

During SPP's peak summer load hour, PNW load is 15% below its summer peak

During PNW's peak summer load hour, SPP load is 17% below its winter peak

Winter	MISO	SPP	PNW
MISO is Peaking	0%	8%	14%
SPP is Peaking	4%	0%	8%
PNW is Peaking	9%	4%	0%

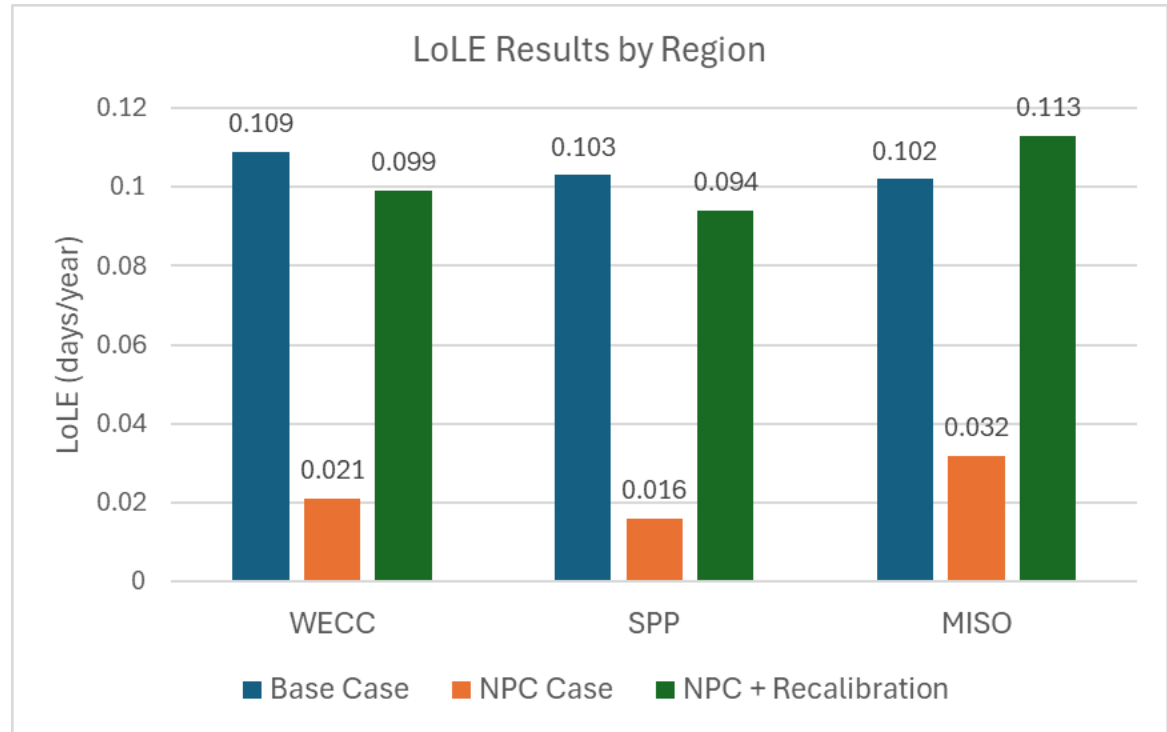
During SPP's peak winter load hour, PNW load is 8% below its winter peak

# The addition of North Plains Connector substantially reduces LoLE in all regions

## Simulation steps:

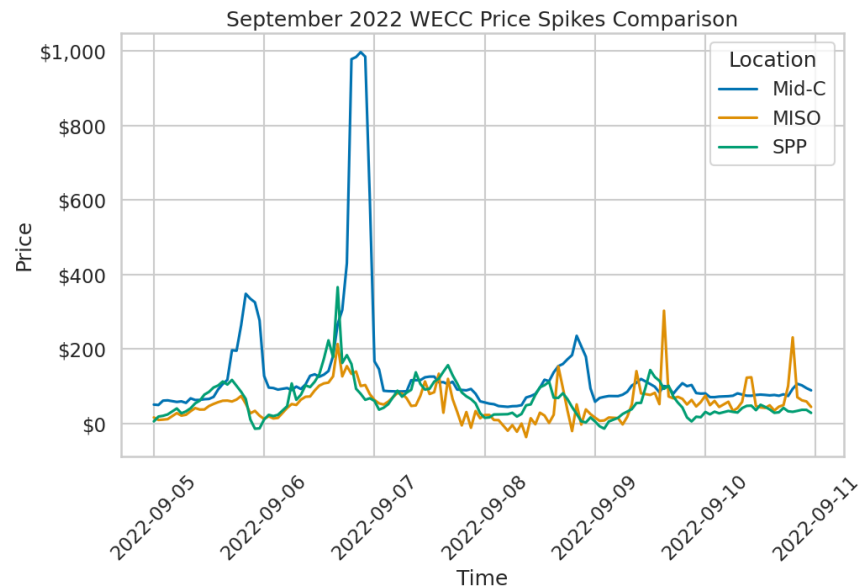
1. Calibrate regions to 0.1 LOLE by adding/removing generation
2. Add NPC
3. Add around the clock load to each region until LOLE returns to 0.1. Amount of load added = NPC capacity value

*Base and Recalibrated LOLEs do not always equal 0.1 because of breakpoints where additional changes to the supply/demand balance overshoot the 0.1 target*

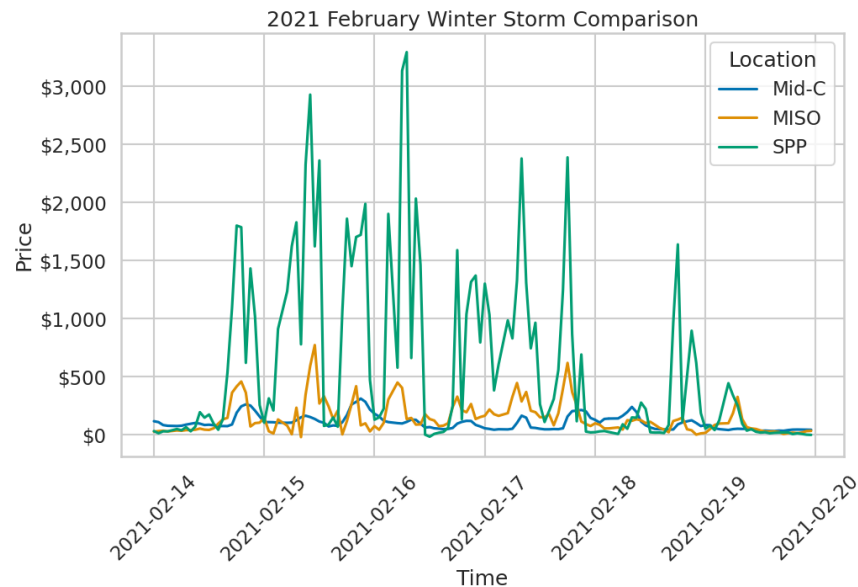


# Interregional diversity is clear during historic scarcity events but doesn't show its full value in models

Extreme weather can occur over a large area, but is typically still regional, leading to distinct impacts on prices in SPP, MISO, and WECC.



While West prices spiked during the September 2022 heat wave, SPP and MISO prices were unaffected.



When MISO and SPP prices spiked due to gas prices and high demand during Winter Storm Uri, the West was largely unaffected.



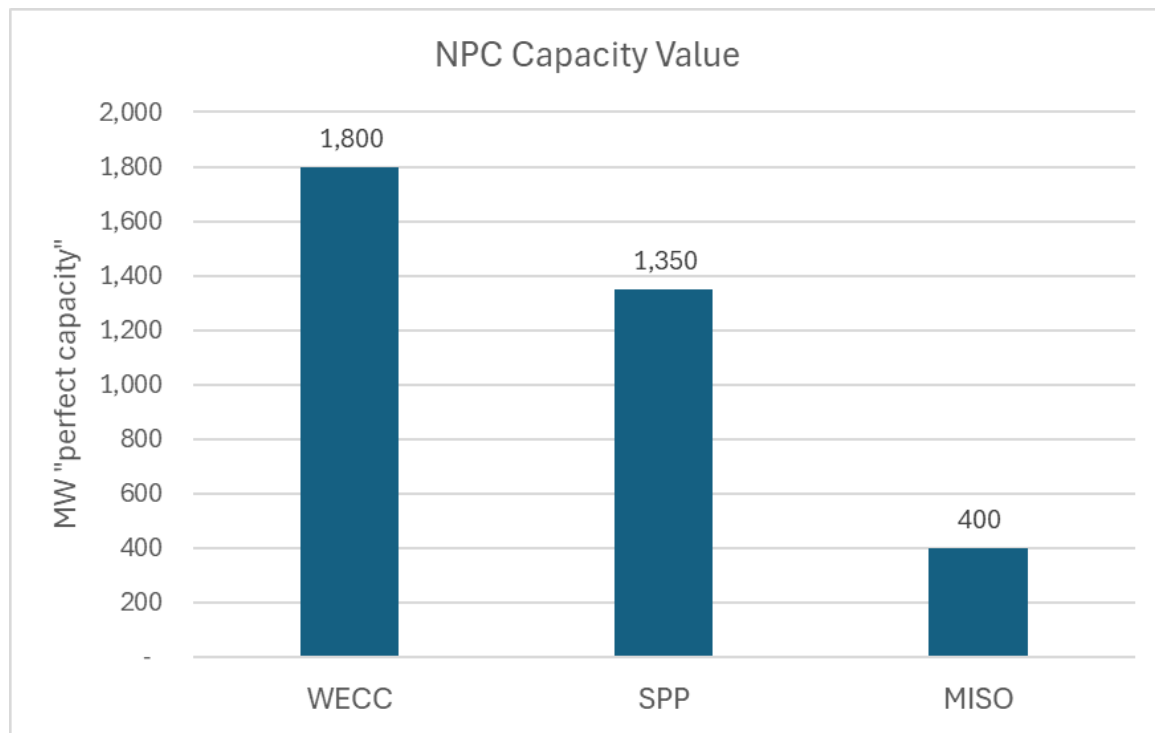
# These LoLE reductions translate to ~3,550MW of load carrying capacity

NPC adds capacity to each region:

- PNW ~1800MW
- SPP ~1350MW
- MISO ~400MW

Capacity is calculated as additional around the clock load that can be served in each region without affecting reliability

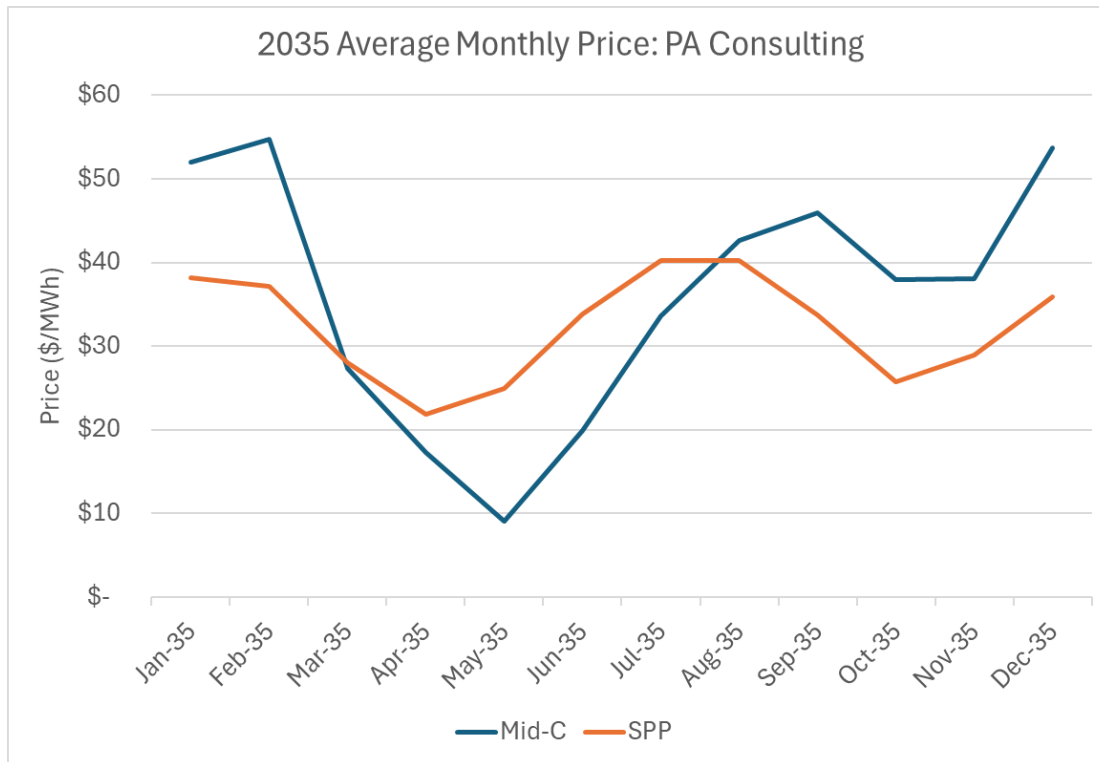
- Approximately 35-80% "ELCC"

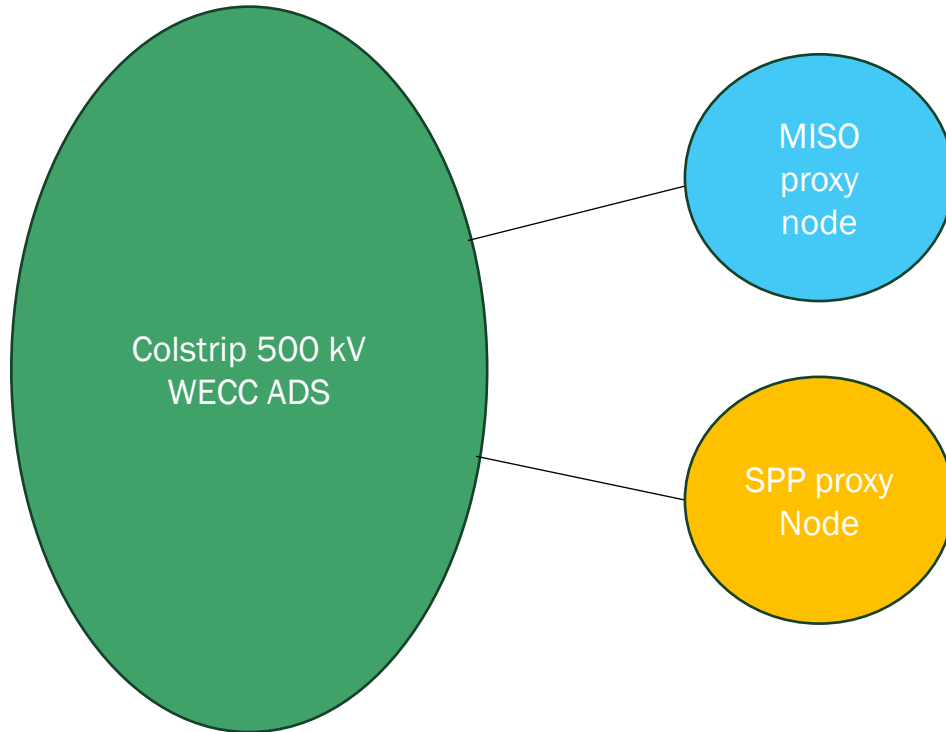




The PA Consulting forward looking model does not capture volatility seen historically, but has a consistent price trend across years

- WECC is higher from late summer through winter
- SPP/MISO are higher in the spring and early summer





## Modeling additions:

GU or Hitachi to provide 8760 pricing data for the eastern side of the line, for Northern Grid to model as new zone?

## Study Objectives:

- Assess Northern grid Transmission System Utilization with particular focus on the CTS system
- Report any new economic congestion created or relieved on the northern grid transmission system

- Can NorthernGrid's Economic Study Vendor create a representation of the Eastern Interconnect?
- Is Northerngrid planning to study an extreme weather event power flow analysis similar to SPP's ITP analysis? Do the studies extend beyond running a production cost model?
- How are current DC ties such as PCDI represented in the WECC Anchor Dataset?
  - Scheduled or market based?
- How are external areas like Alberta and BC modeled in studies?



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