

Cross-Tie Transmission Line

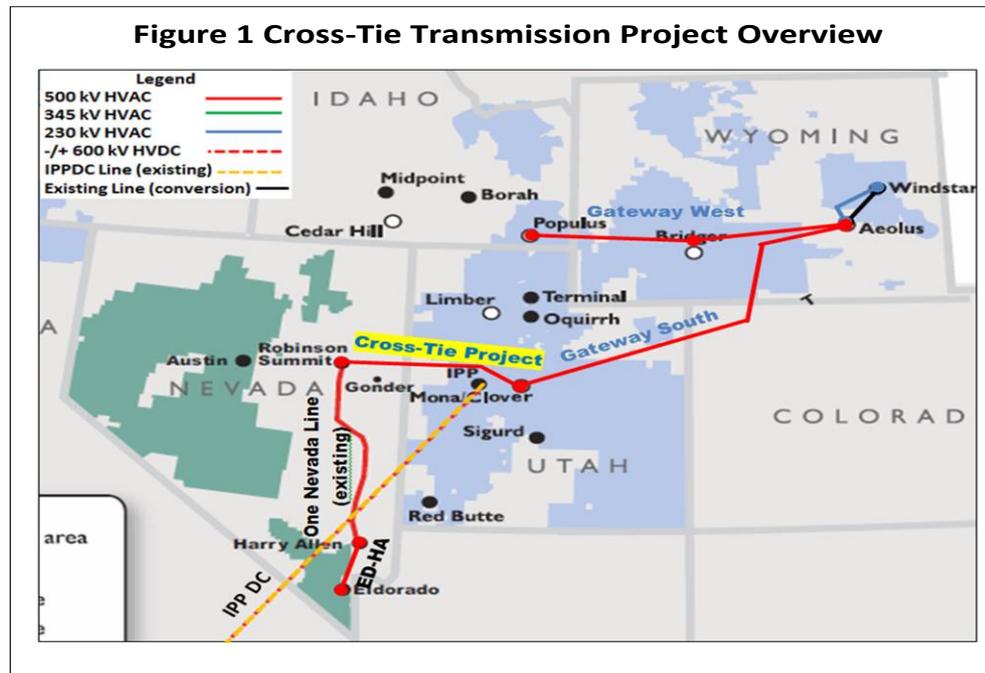
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Principal Transmission Planner



TRANSCANYON

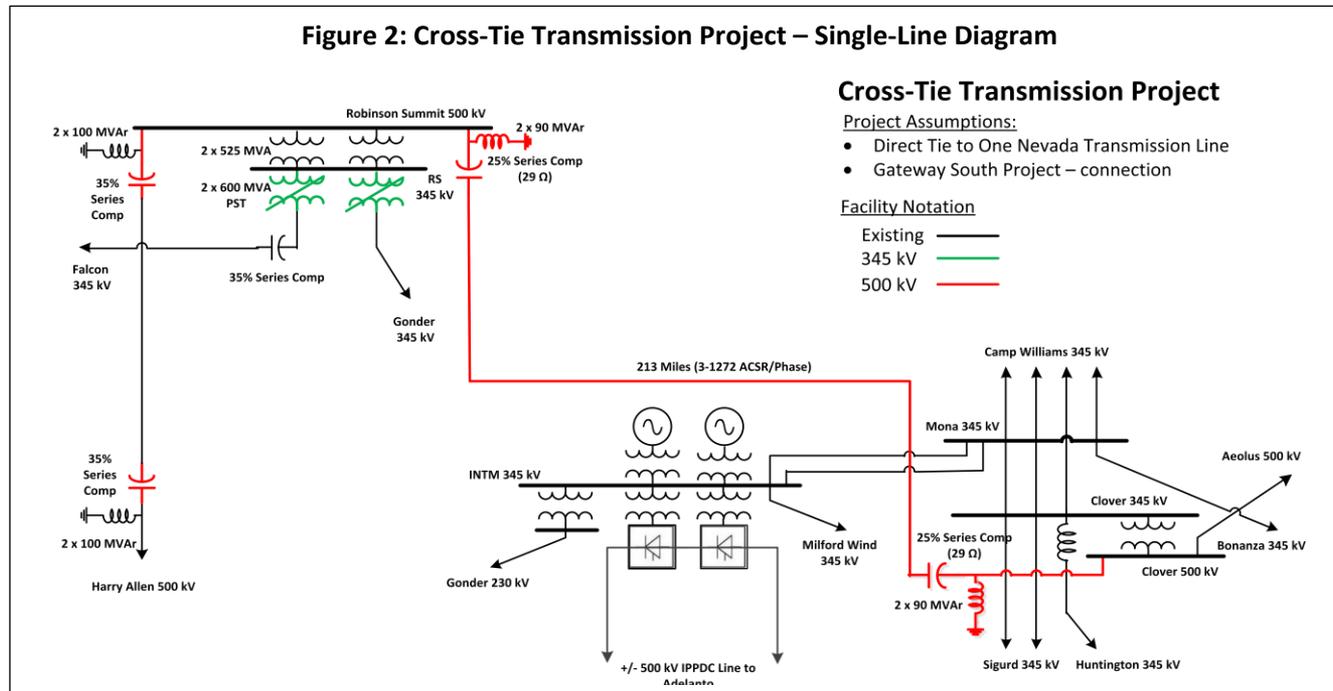
Overview

- ~213 mile 500-kV transmission line between PacifiCorp's proposed Clover 500 kV substation with NV Energy's Robinson Summit 500 kV substation.



- Anticipated Project rating: 1500 MW
- In Service Date: Q4 2024

System Elements and One-line



- 50% Series Compensated; 25% at each end
- Shunt Reactors at each end
- Existing System Upgrades
 - 2 X 600 MVA Phase Shifting Transformers at Robinson Summit.
 - Series Capacitors at either end of One Nevada Line.



Objectives

- Cross-Tie, when coupled with the existing Gateway Central along with planned Gateway South Project (Aeolus – Clover), the existing One Nevada Line (Robinson Summit – Harry Allen) and the currently under construction Harry Allen – Eldorado 500 kV transmission project, will provide needed transmission capacity between the regions of NTTG, WestConnect and CAISO.
- This new capacity will facilitate transfer of low cost renewable resources to diverse load profiles in the three planning regions.
- This increased capacity will reduce the cost of RPS compliance in the planning regions while enhancing opportunities to balance the renewable energy resource mix.
- Gateway West and South if placed in-service by PacifiCorp at the end of 2024, along with the Cross-Tie energized in the same time frame, project could achieve 1500 MW capacity.
- Cross-Tie can also achieve a rating of above 650 MW without any of the Gateway South and West facilities constructed.

Needs

- Cross-Tie will help meet Regional Needs within NTTG, CAISO and WestConnect
- Public Policy needs that this project will address include RPS and GHG goals
 - RPS
 - California 50% RPS by 2030
 - Nevada 25% RPS by 2025
 - Utah 20% RPS by 2025
 - Arizona 15% RPS by 2025
 - New Mexico 20% RPS by 2020
 - GHG
 - California 40% below 1990 levels by 2030
80% below 1990 levels by 2050
 - Oregon 75% below 1990 levels by 2050
- The Cross-Tie Project can help deliver Wyoming wind resources to load centers throughout the West by linking PacifiCorp’s eastern system to the Desert Southwest and California.

- Economic Regional Needs that Cross-Tie will address include
 - The need to facilitate more efficient, lower cost dispatch across the west
 - The Cross-Tie Project would be ideally positioned to increase cost-saving transactions between EIM entities in the 5 minute market to lower energy costs to customers across the West.
 - In an expanded regional RTO from California into Utah and Wyoming, the Cross-Tie project will provide significantly expanded transmission capability between sub-regions of the expanded ISO.
 - Irrespective of the outcomes from future expansion; additional transfer capability will facilitate bilateral contracts for lower cost capacity or energy between entities in the PacifiCorp system and the Desert Southwest or California.
- Cross-Tie will enhance the overall reliability of the Western Interconnection, though this is being considered a secondary benefit for the overall project.

Planning Cost Estimate



- Black & Veatch Transmission and Substation Cost Totals

Project Cost Results	Per Mile	Total
Clover - Robinson Summit Line	\$ 2,319,250.45	\$ 461,530,838.79
ROW Cost	\$ 19,964.14	\$ 3,972,864.00
Clover Substation	N/A	\$ 10,959,685.80
Robinson Summit*	N/A	\$ 28,930,423.20
Substation Adjustments**	N/A	\$ 62,000,000.00
	N/A	\$ -
AFUDC/Overhead Cost	\$ 501,215.01	\$ 99,741,787.84
All Costs	\$ 2,840,429.60	\$ 667,135,599.63

Adjustments to TEPPC model data

	QTY	Rate	Total
Provide 345kV 600MVA PST @ Robinson Summit	2	\$ 20,000,000.00	\$ 40,000,000.00
Allowance for construction modifications at Robinson Summit	1	\$ 10,000,000.00	\$ 10,000,000.00
Allowance for works to support SC at Harry Allen	1	\$ 12,000,000.00	\$ 12,000,000.00
Total			\$ 62,000,000.00
AFUDC/Overhead @ 17.5%			\$ 10,850,000.00

- Line Cost

Project Cost Results	Per Mile	Total
Line Cost	\$ 2,319,250.45	\$ 461,530,838.79
ROW Cost	\$ 19,964.14	\$ 3,972,864.00
AFUDC/Overhead Cost	\$ 409,362.55	\$ 81,463,147.99
All Costs	\$ 2,748,577.14	\$ 546,966,850.78

- Clover Substation

Cost Component	Cost
Base Cost	N/A
Circuit Breakers	\$ 4,478,708
HVDC Converter	\$ -
Transformer(s)	\$ -
SVC(s)	\$ -
Shunt Reactor(s)	\$ 3,727,080
Series Capacitor(s)	\$ 2,753,898
AFUDC/Overhead Cost	\$ 1,917,945.015
Total Substation Cost	\$ 12,877,631

- Robinson Summit

Cost Component	Cost
Base Cost	\$ 2,559,262
Circuit Breakers	\$ 2,985,805
HVDC Converter	\$ -
Transformer(s)	\$ -
SVC(s)	\$ -
Shunt Reactor(s)	\$ 12,009,480
Series Capacitor(s)	\$ 13,935,138
AFUDC/Overhead Cost	\$ 5,510,694.840
Total Substation Cost	\$ 37,000,380

Transmission Cost Calculations

Resource Cost, Performance, & Financing

System Cost	
Total System Cost	\$667,135,600

Economic Lifetime	
System Economic Life	50

Ongoing Costs	
Fixed O&M Costs (%)	1.00%
Fixed O&M Costs Escalator (%/yr)	2.00%
Property Tax	1.00%
Insurance	0.50%

Income Tax Assumptions	
Income Tax - Federal	35.0%
Income Tax - State	7.0%
Income Tax - Effective Tax Rate	39.55%
MACRS Term	15
Levelization Escalation Rate	0.00%

Financing	
Financing Choice	IPP
% Financed w/ equity	50.0%
% Financed w/ debt	50.0%
Debt Interest rate	6.0%
Cost of Equity	10.5%
Debt period in years	50
WACC	7.06%
Equity Amount	\$333,567,800
Debt Amount	\$333,567,800

Outputs	\$/yr	% CapEx/yr
Capital	\$60,428,330	9.1%
Property Tax & Insurance	\$9,184,067	1.4%
Fixed O&M	\$8,402,585	1.3%
Total	\$78,014,982	11.7%

- At an estimated cost of \$667 million (including AFUDC), the project is estimated to cost customers \$78.0 million annually (nominal, levelized) over the 50-year assumed life of the facilities.

Preliminary Technical Analysis

- Transmission model in planning cases
 - 500 kV, 213 miles, 3-1272 ACSR conductor line between the Clover and Robinson Summit substations
 - 50% series compensation on the 500 kV line (29 ohms at each end)
 - 2 x 80 MVar shunt reactors at each end of the line
 - Two - 345 kV phase shifters at Robinson Summit 345 kV on the Falcon – Robinson Summit 345 kV line and the Gonder – Robinson Summit 345 kV line.
 - 70% series compensation on the 500-kV line from Robinson Summit to Harry Allen (45 Ohms at each end of the line)
 - Analysis was conducted on 2 cases:
 - **2025 Heavy Summer case with Gateway Included**
 - **Scenario 1: Clover – Robinson Summit 500 kV line flow = 1500 MW.**
 - **Scenario 2: Clover – Robinson Summit 500 kV line flow = 1500 MW and Mona – IPP 345 kV flow = 600 MW (Import into IPP); IPPDC flow = 2400 MW.**
 - **2025 Heavy Summer case without Gateway**
 - **Scenario 1: Clover – Robinson Summit 500 kV line flow = 650 MW.**
 - **Scenario 2: Clover – Robinson Summit 500 kV line flow = 680 MW; Mona – IPP 345 kV flow = 600 MW (Import into IPP); IPP DC flow = 2400 MW.**

Preliminary Technical Analysis

- 2025 Summer Peak Case with Gateway Segment D (Aeolus – Populus) and Segment F (Aeolus – Clover) included.
- Resources:
 - 2800 MW Wind in Wyoming
 - 1200 MW Solar in Southern Utah
 - Dispatched against generation in Southern California
- ~1500-1700 MW possible on Cross-Tie
- Preliminary analysis indicated no system violations.
- Major Path flows recorded:

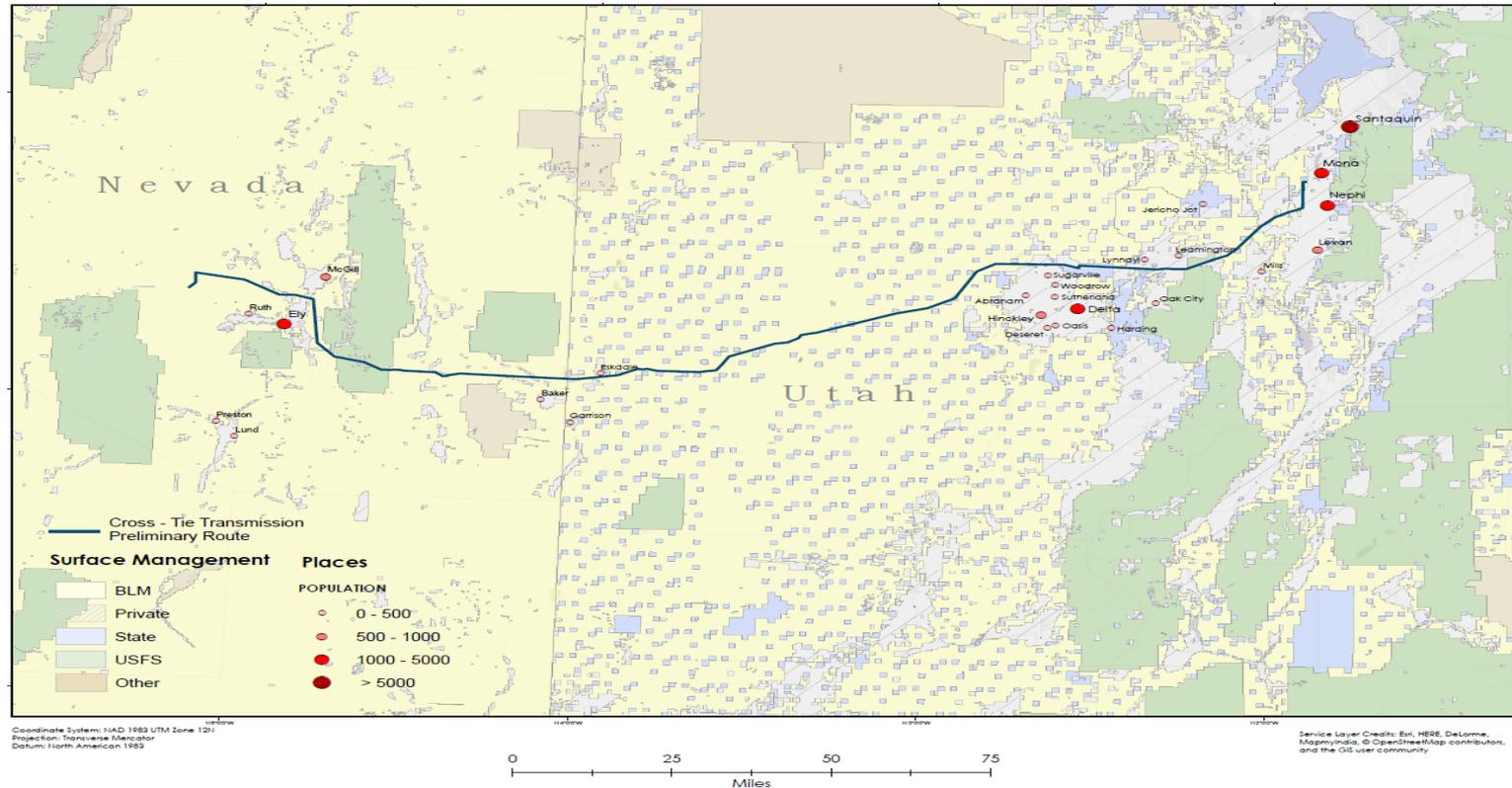
System Element	Pre-project Case	With Cross-Tie
	Flow (MW)	
Gateway Segment D (WB)	978	870
Gateway Segment F (WB)	1293	1542
Path C (SB)	354	788
IPPDC	2400	2400
Mona – IPP	788	610
Cross-Tie (Clover – Robinson Summit)	-	1680
One Nevada Line	916	2104
Harry Allen – Eldorado	2086	2500

Preliminary Technical Analysis

- 2025 Summer Peak Case with no Gateway segments included
- Resources
 - ~ 990 MW of solar generation in Southern Utah were added to the system
 - No wind in Wyoming was added as Gateway is not Modeled
 - Dispatched against generation in Southern California
- ~650-680 MW possible on Cross-Tie
- Preliminary analysis indicated no system violations.
- Major Path flows recorded:

System Element	Pre-project Case	With Cross-Tie
	Flow (MW)	
Path C (SB)	1000	1218
IPPDC	2400	2400
Mona – IPP	662	590
Cross-Tie (Clover – Robinson Summit)	-	680
One Nevada Line	126	575
Harry Allen – Eldorado	1584	1781

Preliminary Route Map



- Development is anticipated within existing BLM utility corridors.
- WECC Data Viewer - minimal to moderate environmental sensitivities or constraints expected.

Scenarios for Evaluation

- Scenario 1
 - 10 years out Renewable Energy Requirement
 - Existing RPS targets (10 years out) for each state in Western Interconnection. Add at least 3,000 MW of wind resources in Wyoming. Proposed Transmission to facilitate delivery of new RPS Generation.
 - No Wyoming wind without Gateway Segments D and F. Additional Solar in Southern Utah that can support 650 MW on Cross-Tie.
- Scenario 2
 - 20 years out Renewable Energy Requirement
 - 50% RPS across Western Interconnection. Add at least 6,000 MW of wind resources in high potential WREZ zones in Wyoming.

Who We Are

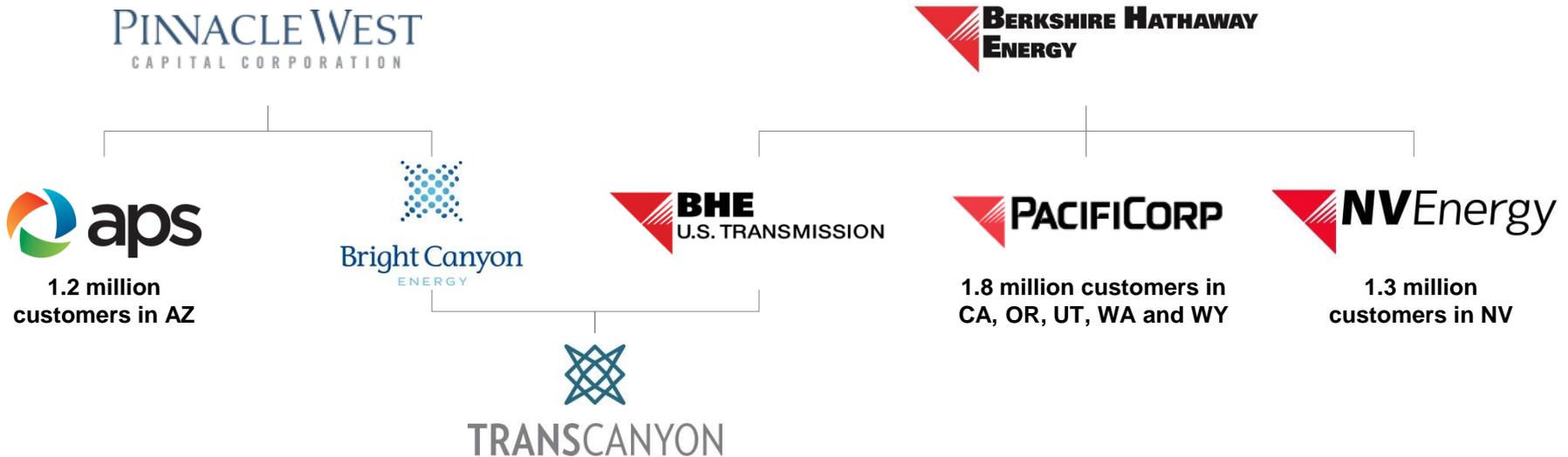
TransCanyon is an independent developer of electric transmission infrastructure for the western United States

- Independent well-positioned to drive creative solutions
- Leverage the combined energy expertise and financial strength of Berkshire Hathaway Energy and Pinnacle West
- Focused on all phases – development through ongoing operation
- Long-term stewards of the environment
- Value collaboration to achieve success



Deep Experience in the West

Our team builds on the skills, resources and experience of its parent companies and utility affiliates across the western United States



28 Professionals Led by 4 Board Members and 3 Key Officers

Board Members	Key Officers		
<p>Mark Schiavoni Bright Canyon Energy</p> <p>Jason Smith Bright Canyon Energy</p> <p>John Cupparo BHE U.S. Transmission</p> <p>Doug Kusyk BHE U.S. Transmission</p>	 JASON SMITH President	 BOB SMITH Vice President, Transmission Planning & Development	 TODD JENSEN Vice President, Project Delivery

Full Range of Expertise & Capabilities



Experienced team has completed 1,050 miles and \$3.7B of transmission investment in the western United States



- WECC TEPPC participation
- WestConnect Order 1000 Implementation Committee and Planning Management Committee
- 2,400 miles of permitting experience in western U.S.
- Twelve WECC path ratings

- Constructed and energized 10 major transmission projects since 2009
- Extensive engineering, design and construction experience
- All components of transmission (i.e., lines and substations)

- APS operates and maintains 2,651 miles of high-voltage lines
- PacifiCorp operates and maintains 2,005 miles of high-voltage lines
- Financial strength of Berkshire Hathaway Energy (A3/A) and Pinnacle West (A3/A-)