

TransWest Express and Gateway South

Co-developed by four leading entities:

Arizona Public Service

PacifiCorp

National Grid

Wyoming Infrastructure Authority

Wyoming Infrastructure Authority Board Meeting

January 29, 2008

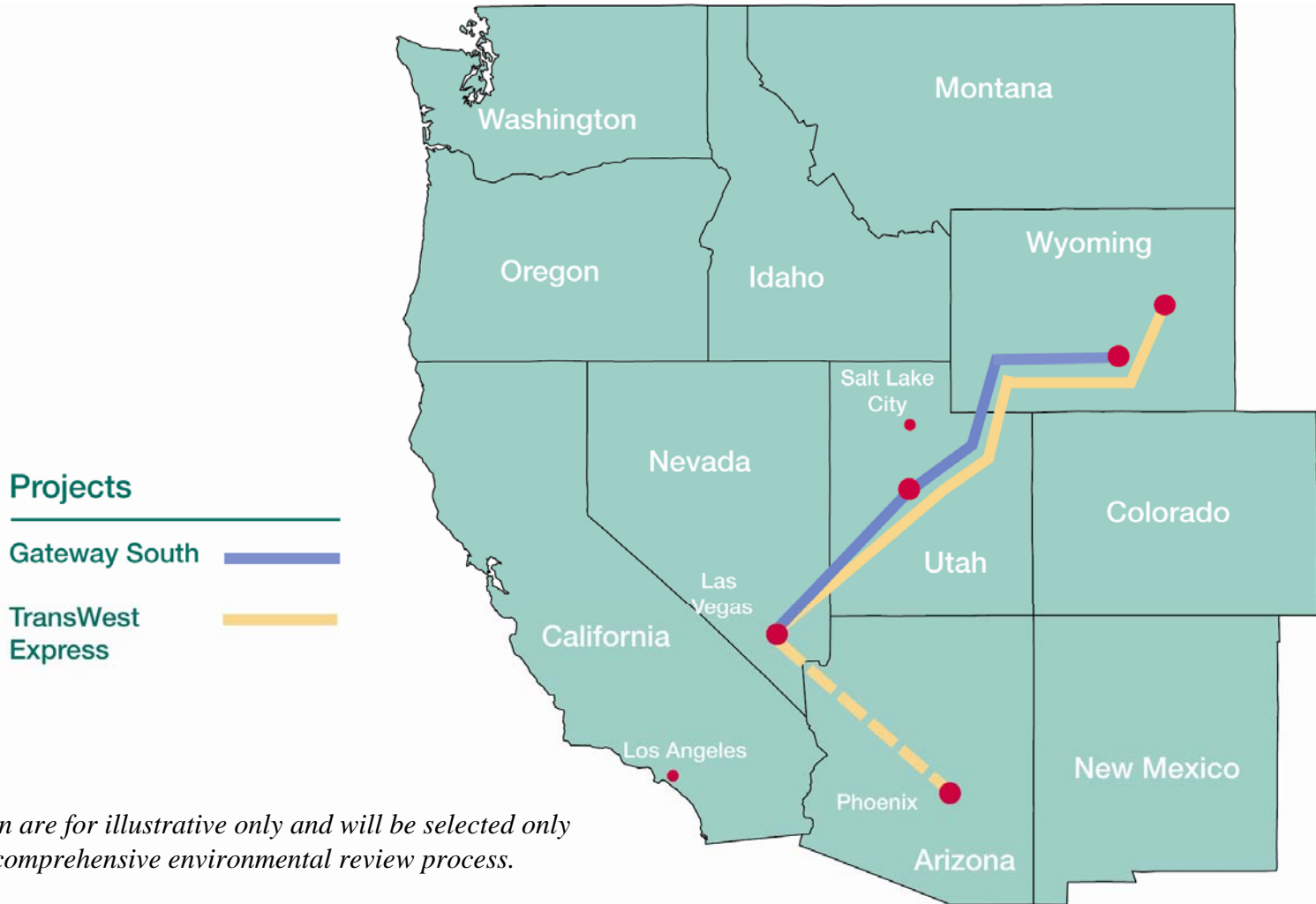
Jackson, Wyoming



Our agenda for today...

- I. **Overview**
- II. **Co-Development Agreement**
- III. **Need for Projects**
- IV. **Conceptual Design Analysis**
- V. **Environmental Permitting**
- VI. **Summary**

I. TransWest Express and Gateway South Overview



Routes shown are for illustrative only and will be selected only following a comprehensive environmental review process.

II. TransWest Express and Gateway South Co-Development Agreement Overview

Interim Agreement

- ◆ Executed August 2007 – valid through March 2008
- ◆ Longer term business agreement targeted for 2008 if parties agree this makes sense

Purpose

- ◆ Established governance arrangements, with a common steering committee
- ◆ National Grid as lead developer of TWE and Gateway South, responsible for deploying the project team
- ◆ Allows initial development steps to be taken while more complex technical and regulatory issues considered

Activities undertaken jointly

- ◆ Common project team implementation strategy and deployment
- ◆ Coordinate Regional Planning and Rating Review processes
- ◆ Coordinate Environmental Permitting
- ◆ Stakeholder and public outreach

Activities undertaken separately

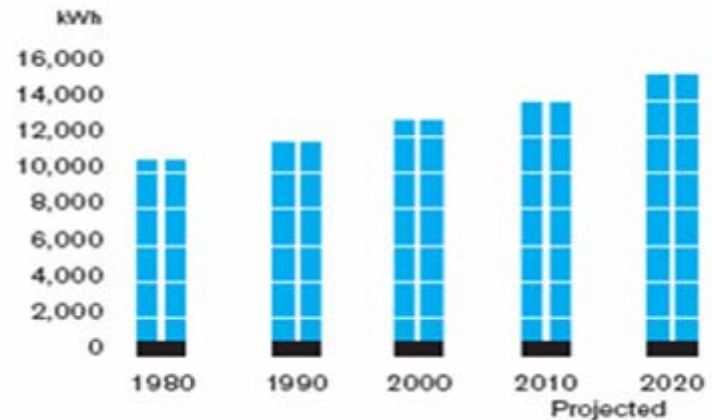
- ◆ ROW filings - purpose and need case, approvals
- ◆ WECC Rating Process
- ◆ Regulatory Filings

III. Overview of Projects

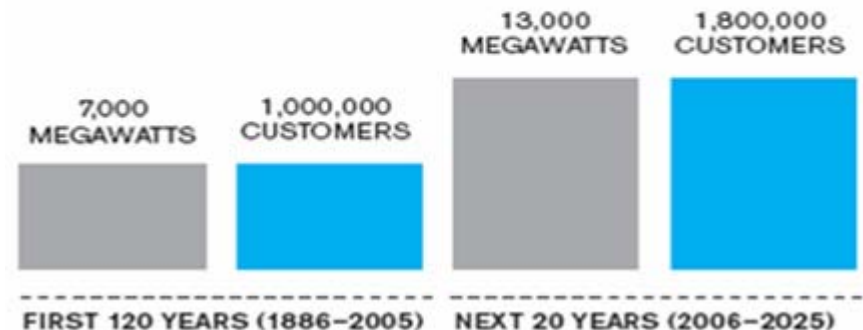
TransWest Express – Need for the Project

- ◆ APS' summer resource capacity requirement expected to increase 8,000MW by 2025
- ◆ APS' annual energy sales expected to increase by 70% by 2025
- ◆ Other Arizona utilities are growing at comparable rates
- ◆ Arizona RPS requires 15% of retail energy sales from renewable resources by 2025
- ◆ TransWest Express is viewed as a viable alternative to local resource development

APS CUSTOMERS ARE USING MORE ELECTRICITY EACH YEAR.



BY 2025, APS WILL BE NEARLY TWICE THE ELECTRIC COMPANY IT IS TODAY.



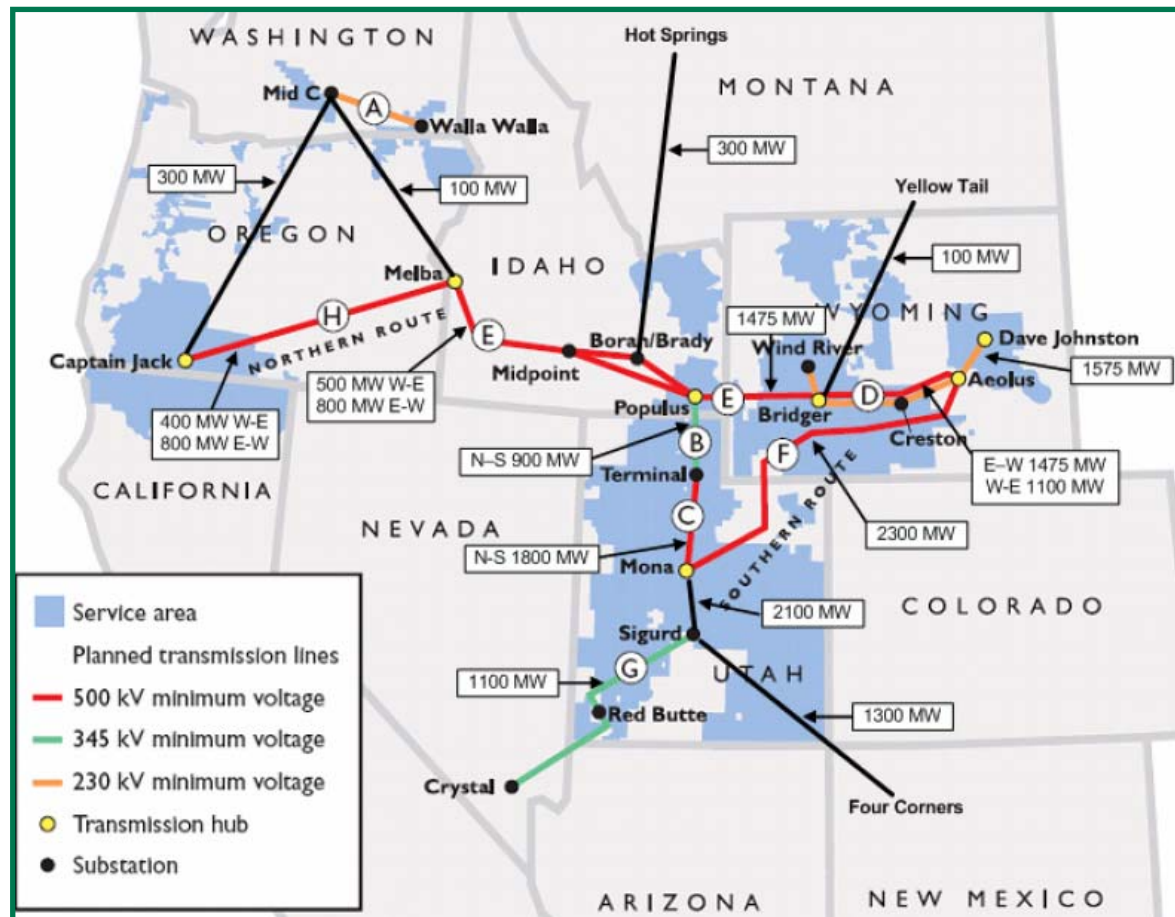
III. Overview of Projects

Gateway South – Need for the Project

- Wasatch Front annual peak load to increase 2,500MW by 2022
- Southern Utah annual peak load to increase by 500MW by 2022*
- PacifiCorp IRP targets 8.5% renewables by 2016
- Over 5,000MW in point to point Transmission Service Requests

*including Transmission Network Service customers

Third Party Point to Point Requests on PacifiCorp System



IV. TransWest Express and Gateway South Conceptual Design Analysis

Scope of Conceptual Design Analysis

- ◆ Key findings from previous analysis
- ◆ Technical and economic considerations of alternatives
- ◆ Common framework for evaluation of alternatives
- ◆ Analysis of evaluations and
- ◆ Recommended Alternatives and Next Steps

Design Variables Reviewed

- ◆ Combined export transfer capacity: 4500, 6000, or 7500 MW
- ◆ Line voltage: 500 kV AC, 765 kV AC, and 500 kV HVDC
- ◆ Tower configuration: Single circuit, double circuit
- ◆ Right-of-Way usage: Independent rights-of-way, common corridors
- ◆ Generation location: NE Wyoming, SE Wyoming, SW Wyoming
- ◆ Transmission interconnection/end points: Mona, Red Butte, southern Nevada (e.g. Crystal or Marketplace areas), Phoenix (Pinnacle Peak area)

IV. TransWest Express - DC Project Configuration Building Blocks

- ◆ 500 kV Bi-pole HVDC in all DC Cases
- ◆ Southern Terminal Locations:
 - ◆ Las Vegas (Cases 4, 5, 8, 10-12)
 - ◆ Phoenix (Cases 3, 7,9)
 - ◆ Las Vegas and Phoenix (Case 11)
- ◆ Single Circuit 500 kV AC NV-AZ (Cases 8,10,12)



IV. Gateway South – AC Project Configuration Building Blocks

- ◆ Double Circuit 500 kV WY-UT in all AC Cases
- ◆ UT-NV:
 - ◆ 345 kV (Case 1) or
 - ◆ 500 kV (Cases 2, 5-7, 9-12)
- ◆ 4,500 MW and 7,500 MW Cases (6, 7, 12) options utilize:
 - ◆ Additional 500 kV WY-UT
 - ◆ Double Circuit 500 kV UY-NV



IV. Alternative Configurations

Cost Estimates and Capacity Levels

- ◆ Capacity on Gateway South to Mona is 3,000 MW for all cases
- ◆ Load at Mona assumed to be 1,500 MW

Cost Summary				Capacity (MW) WY to:			
Case No.	Case Description	Circuit Miles	Project Cost (\$M)	Wyoming Export	Las Vegas Crystal	Las Vegas Marketplace	Phoenix
1	GS - 345 kV	1,050	\$2,510	3,000	800		
2	GS - 500 kV	1,125	\$2,890	3,000	1,500		
3	TWE – HVDC to PHX	1,375	\$4,160	3,000			3,000
4	TWE – HVDC to LV	1,000	\$3,080	3,000		3,000	
5	Reference Case: GS 500kV + HVDC to LV	2,100	\$5,970	6,000	1,500	3,000	
6	GS – 4500 MW	1,900	\$4,670	4,500	3,000		
7	GS 4500 MW + HVDC to PHX	3,300	\$8,820	7,500	3,000		3,000
8	TWE – HVDC to LV + LV-PHX AC	1,275	\$4,040	3,000		3,000	1,500
9	GS 500kV + HVDC to PHX	2,500	\$7,050	6,000	1,500		3,000
10	GS 500kV + HVDC to LV + LV-PHX AC	2,500	\$6,930	6,000	1,500	3,000	1,500
11	GS 500kV + HVDC to LV + 3 rd Terminal at LV	2,500	\$7,470	6,000	1,500	3,000	3,000
12	GS 4500 MW + HVDC to LV + LV-PHX AC	3,300	\$8,710	7,500	3,000	3,000	1,500

IV. Wyoming to Desert Southwest Capacity & Delivery Cost Comparisons

Case No.	Case Description	Capacity Cost (\$M/MW) WY to:			Delivery Charge (\$/MWhr)* WY to:		
		Las Vegas Crystal	Las Vegas Marketplace	Phoenix	Las Vegas Crystal	Las Vegas Marketplace	Phoenix
1	GS - 345 kV	\$1.41			\$28.04		
2	GS - 500 kV	\$1.34			\$26.62		
3	TWE – HVDC to PHX			\$1.38			\$28.29
4	TWE – HVDC to LV		\$1.03			\$20.99	
5	Reference Case: GS 500kV + HVDC to LV	\$1.34	\$1.03		\$26.62	\$20.99	
6	GS – 4500 MW	\$1.24			\$24.66		
7	GS 4500 MW + HVDC to PHX	\$1.24		\$1.38	\$24.66		\$28.29
8	TWE – HVDC to LV + LV-PHX AC		\$0.99	\$1.70		\$20.31	\$34.73
9	GS 500kV + HVDC to PHX	\$1.34		\$1.38	\$26.62		\$28.29
10	GS 500kV + HVDC to LV + LV-PHX AC	\$1.34	\$0.99	\$1.70	\$26.62	\$20.31	\$34.73
11	GS 500kV + HVDC to LV + 3 rd Terminal at LV	\$1.34	\$0.99	\$1.53	\$26.62	\$20.22	\$31.20
12	GS 4500 MW + HVDC to LV + LV-PHX AC	\$1.24	\$0.99	\$1.70	\$24.66	\$20.31	\$34.73

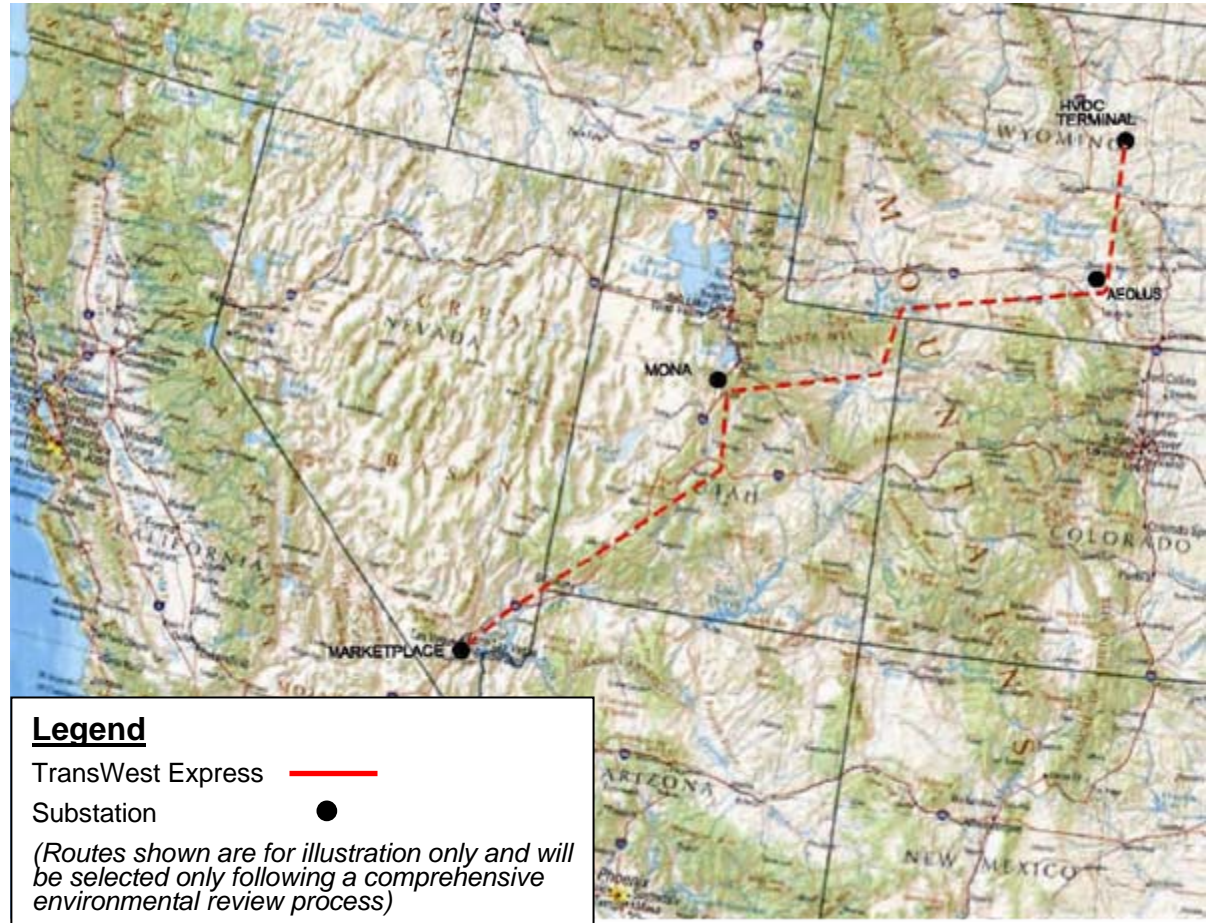
This comparison does not take into account the benefits of south to north flow nor other network impacts.

**Assumes 12.55% Capital Carrying Charge, 75% Load Factor, 4.0% losses for Gateway South and 6.5% losses for TransWest Express*

IV. TransWest Express Reference Case

Wyoming - Nevada

- ◆ 3,000 MW
- ◆ 875 - 900 miles
- ◆ 500kV bi-pole HVDC
- ◆ 2015 in-service date



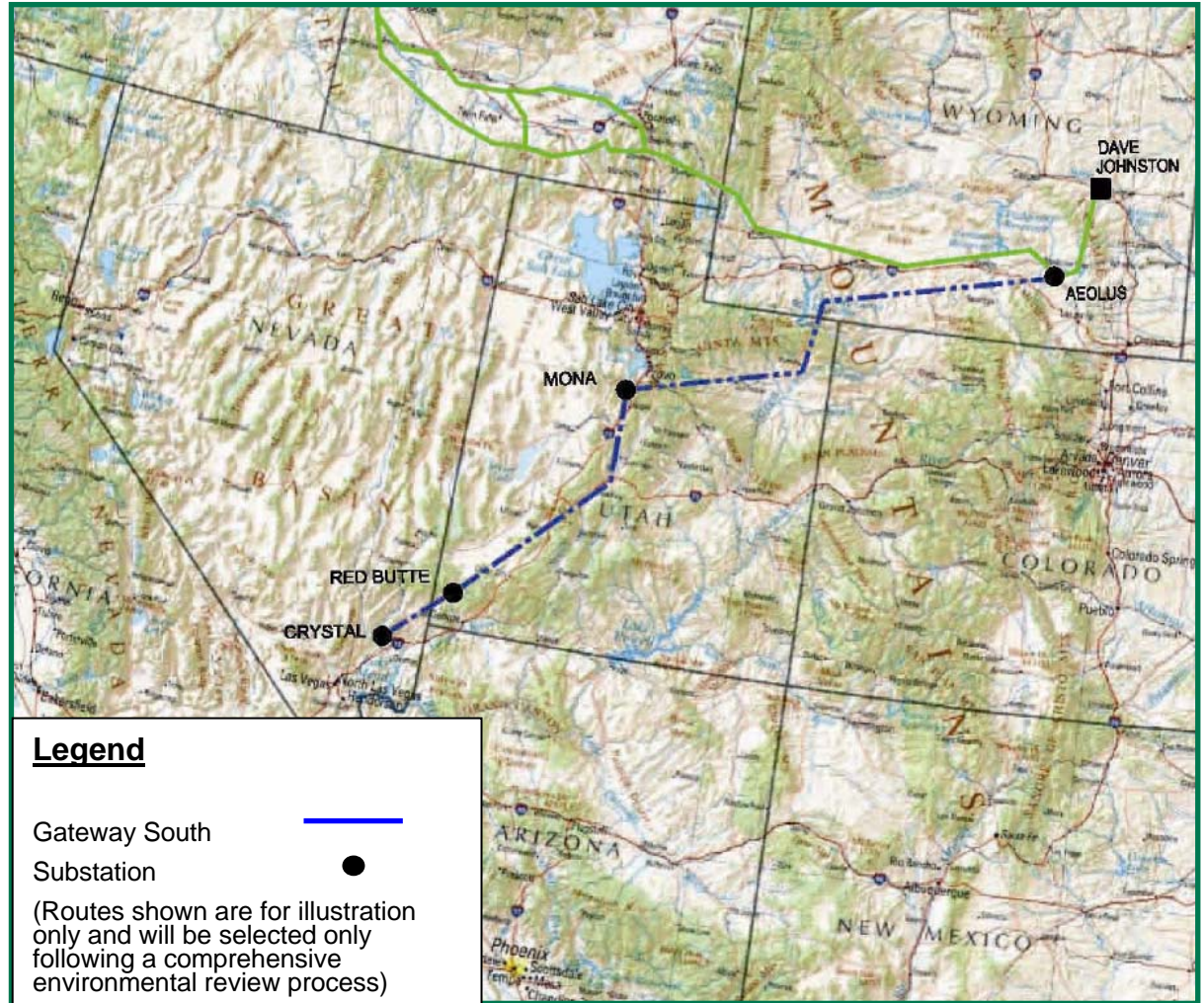
IV. Gateway South Reference Case

Wyoming - Utah

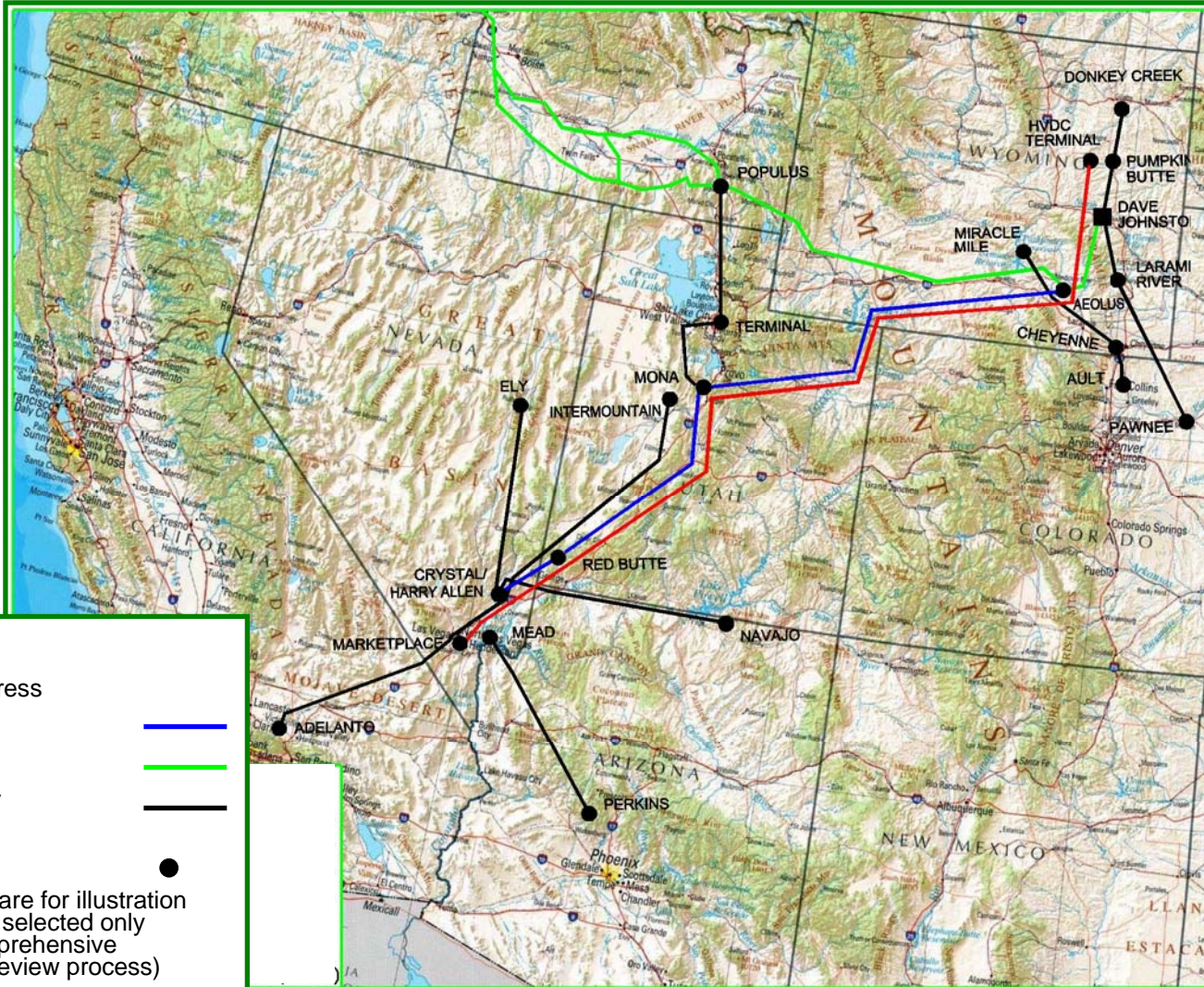
- ◆ 3,000 MW
- ◆ 400 miles
- ◆ 2 - 500kV AC
- ◆ 2013 in-service date

Utah - Nevada

- ◆ 1,500 MW
- ◆ 330 miles
- ◆ 1 - 500 kV AC
- ◆ 2012 in-service Date



IV. Complementary Projects



IV. Transmission Study Loads & Resources

◆ Transmission Study Loads

- ◆ WECC 2015 High Summer Case
- ◆ Reduce Las Vegas and western Arizona generation to stress paths

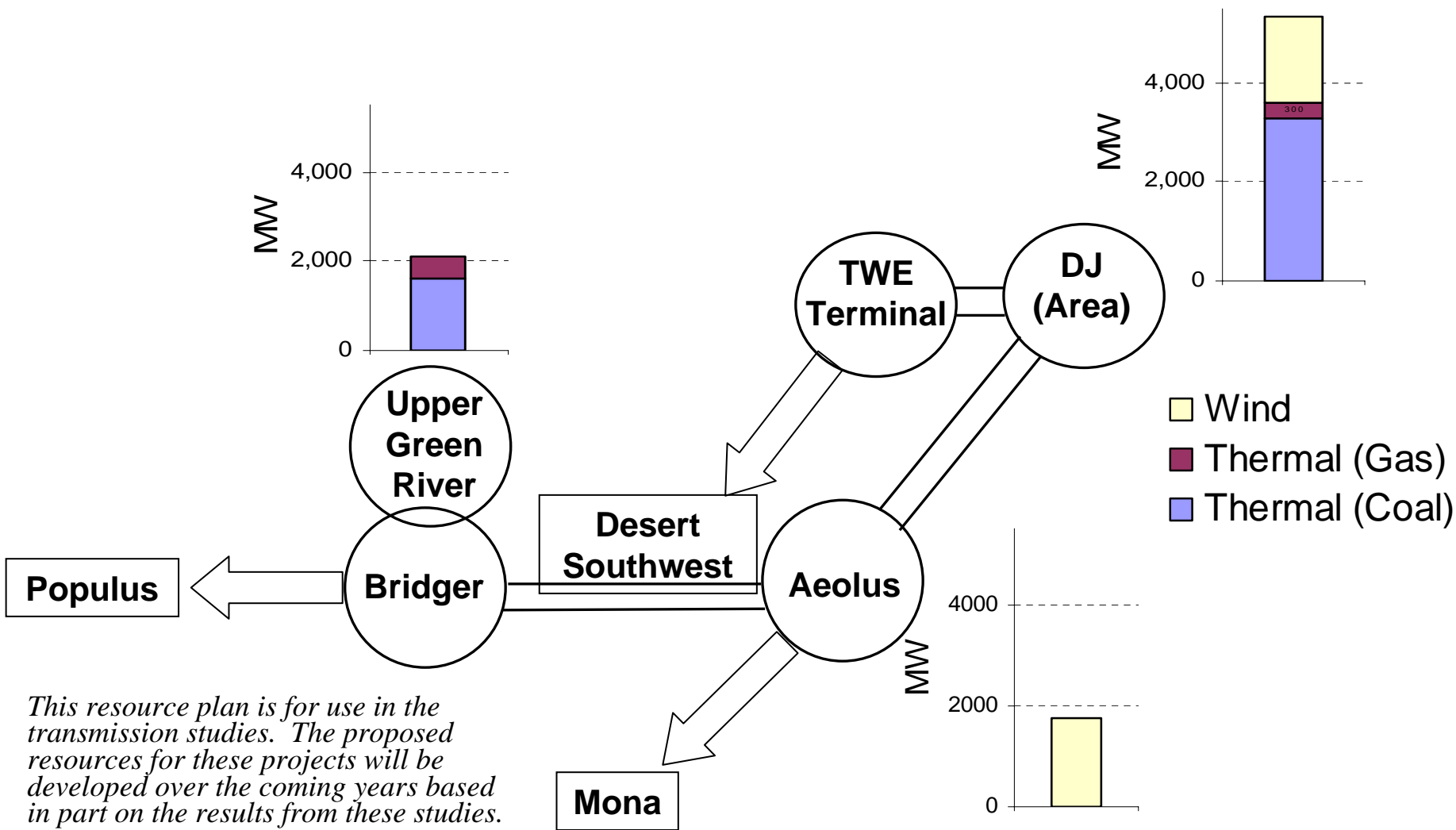
◆ Transmission Study Resources

- ◆ These are not the proposed resources for the projects
- ◆ Developed (partially) from Integrated Resource Plans
 - ◆ Quantities include Gateway West Resources
- ◆ Includes renewable resources above existing RPS levels
- ◆ Wind resource level sufficient to test impacts of non-synchronous generation

◆ Actual Resource Development for Projects

- ◆ Will be responsive to energy policies currently under review by utilities, regulators and other stakeholders
- ◆ Specific economic and technology evaluations and siting/permitting processes also need to run their course

IV. Gateway and TransWest Express Transmission Study Resource Bubble Diagram



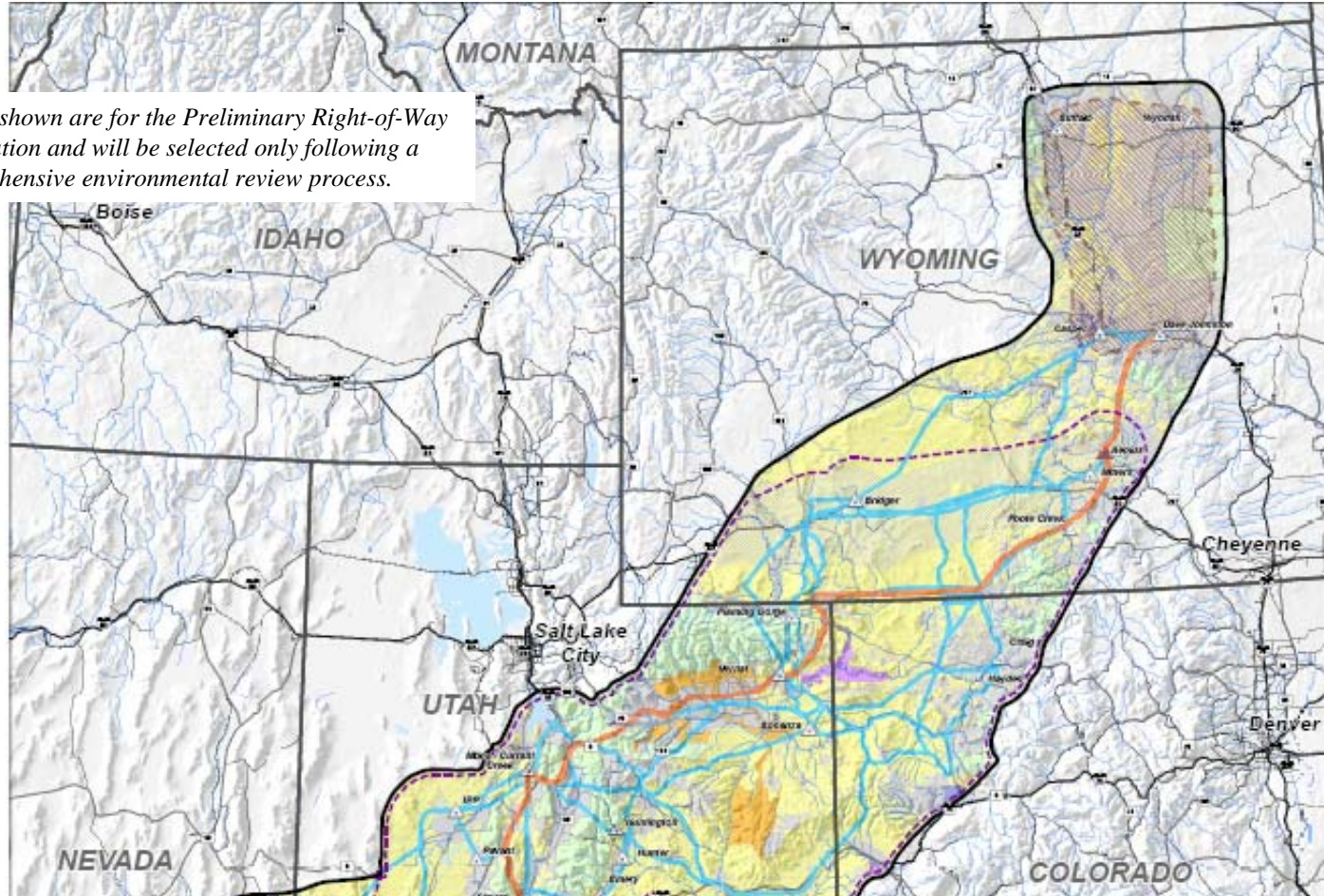
This resource plan is for use in the transmission studies. The proposed resources for these projects will be developed over the coming years based in part on the results from these studies.

V. Environmental Permitting Update

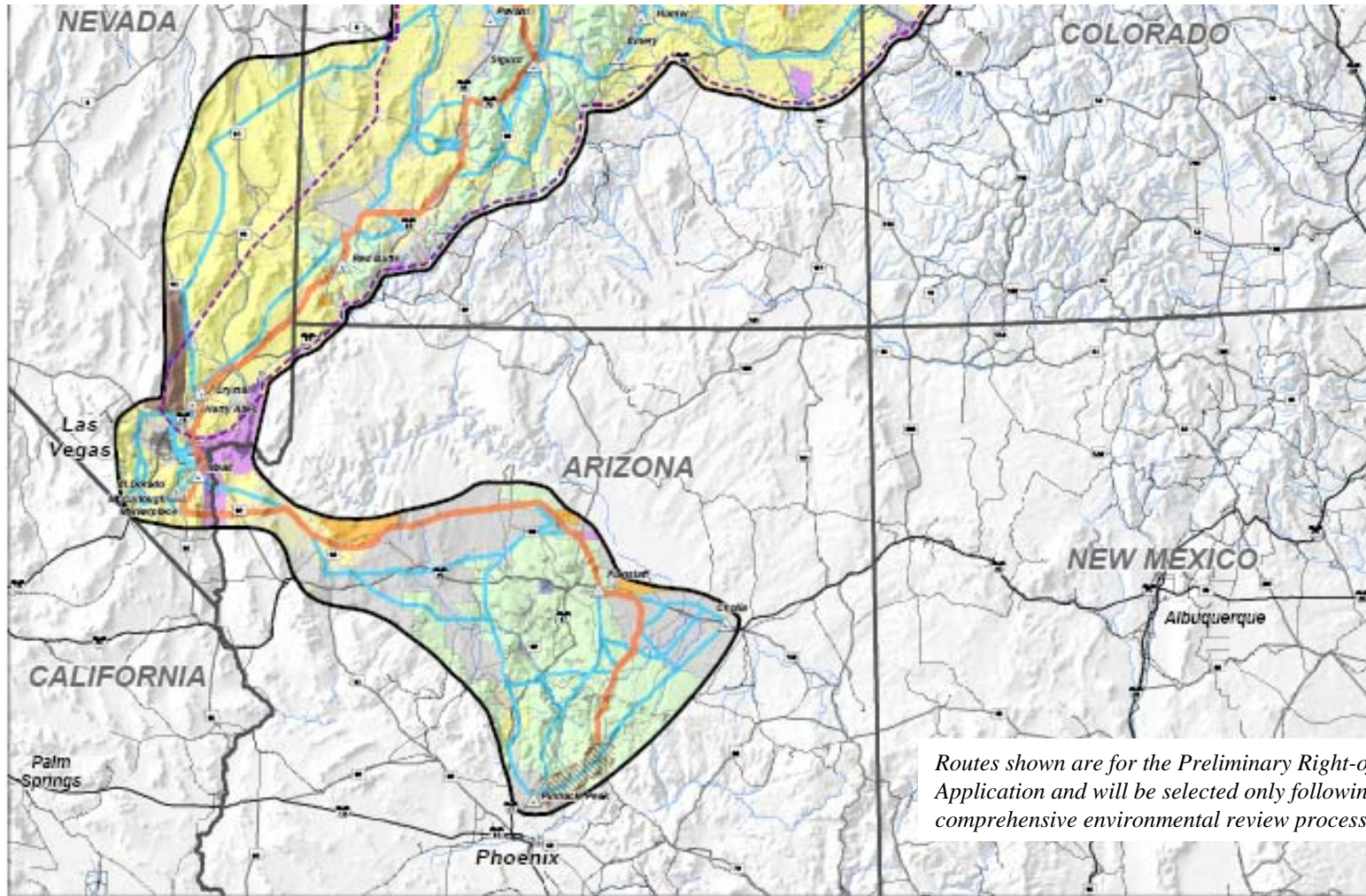
- ◆ **ROW Application Submittals – November 2007**
- ◆ **BLM to be Lead Agency – Cheyenne office**
- ◆ **Common Environmental Impact Statement agreed in principle amongst parties and BLM**
- ◆ **Next steps**
 - ◆ Appointment of 3rd Party EIS Environmental Consultant
 - ◆ Executing Cost sharing agreement with BLM
 - ◆ Consider adoption of federal & state coordination protocols
 - ◆ Response to Department of Energy west wide energy corridors

V. Gateway South and TransWest Express Proposed Northern Study Area and Route

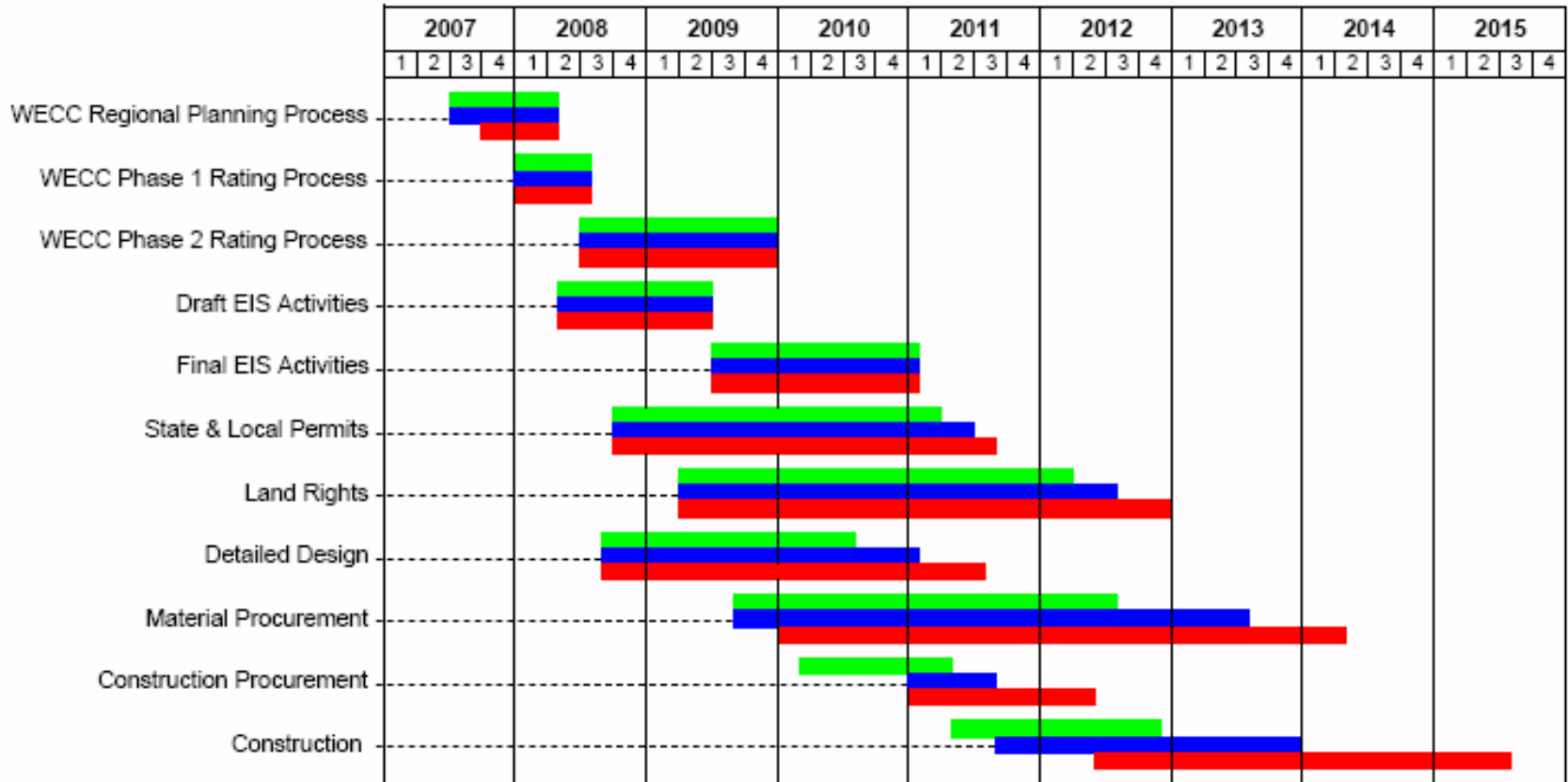
Routes shown are for the Preliminary Right-of-Way Application and will be selected only following a comprehensive environmental review process.



V. Gateway South and TransWest Express Proposed Southern Study Area and Route



VI. Conceptual Project Schedule



Legend:

- █ Gateway South: Mona - Crystal
- █ Gateway South: Aeolus - Mona
- █ TransWest Express

VI. TransWest Express and Gateway South Summary

- ◆ **Aggressive Project Delivery Schedule Established**
- ◆ **Significant Progress made on Critical Path Activities**
- ◆ **‘Hub and Spoke’ Transmission Expansion Approach**
- ◆ **Climate and Energy Policy changes has and will continue to shape projects**
- ◆ **2008 Highlights**
 - ◆ Entry into WECC Phase 2 Rating Process
 - ◆ NEPA Scoping Process completed and commencement of Draft EIS
 - ◆ Expansion of Co-Development Sponsors – Desert Southwest Utilities
 - ◆ Offering to potential Transmission Customers