

# TransWest Express Project

## *Feasibility Study Update*

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**STEP Meeting**

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# Feasibility Study Objective

- Evaluate the electrical performance of different EHV transmission alternatives capable of delivering 3,000 MW of power from Wyoming to Arizona and the Southwest in 2013
- Recommend the most technically desirable plan for further detailed technical evaluation

# Study Status

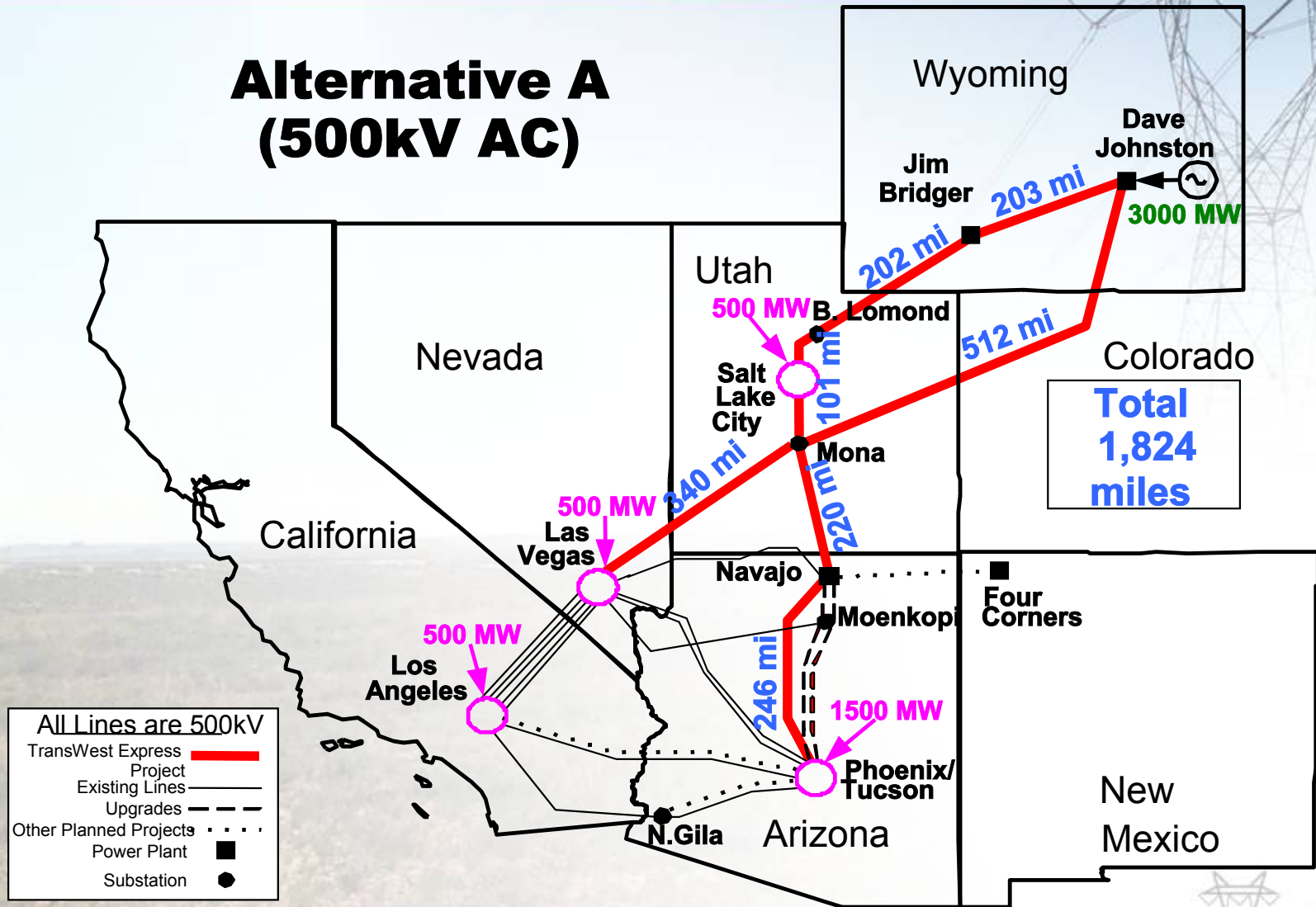
- Evaluated Five 500 kV AC and DC Alternatives and 765 kV Option
- Performed high level power flow, post-transient and transient analyses
- Compared alternatives based on electrical performance, transmission losses and project capital cost
- Completed Interim Report
- Final report is in-progress



# Transmission Alternatives Evaluated and Associated Transmission Schedules



# Alternative A (500kV AC)

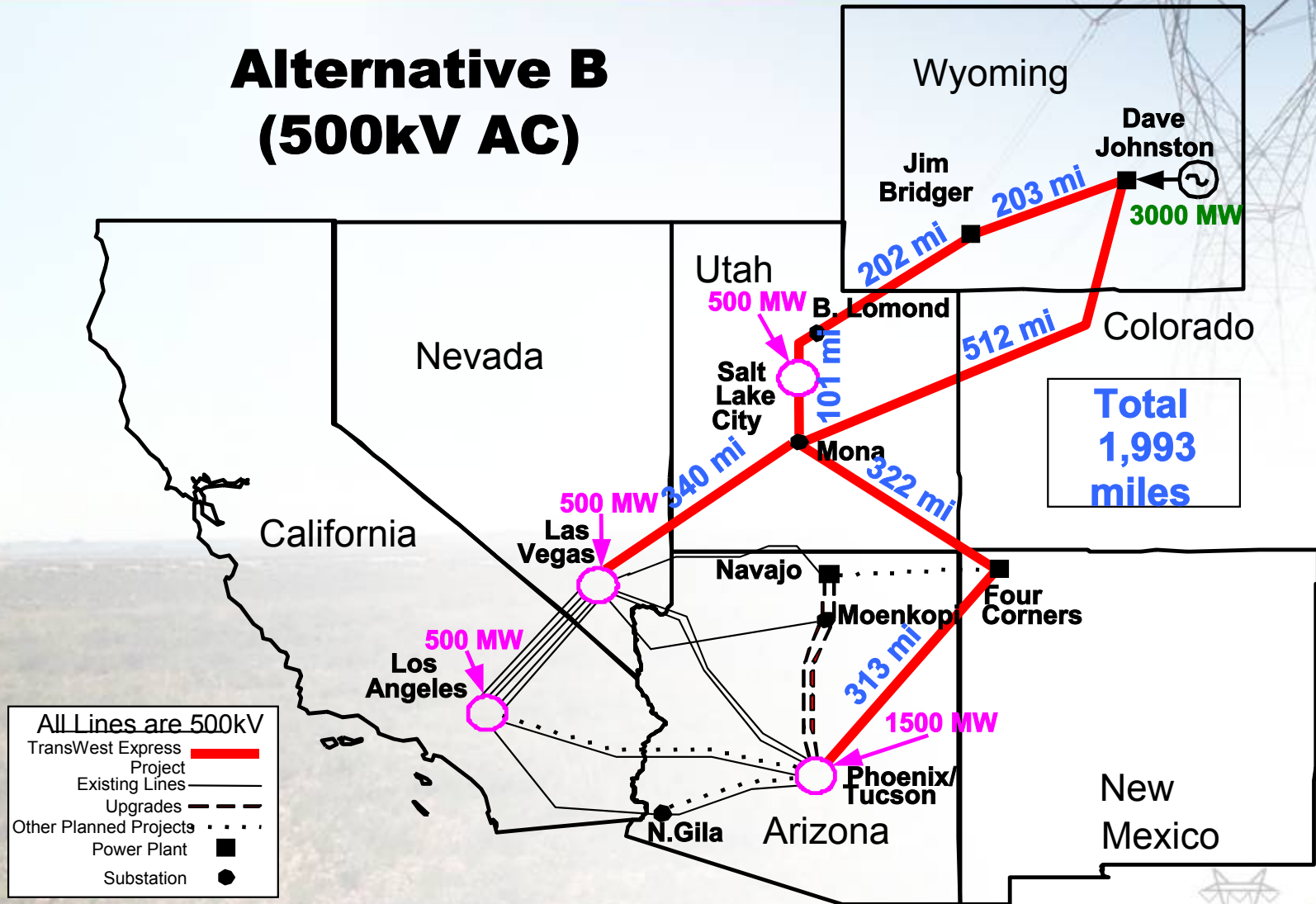


All Lines are 500kV

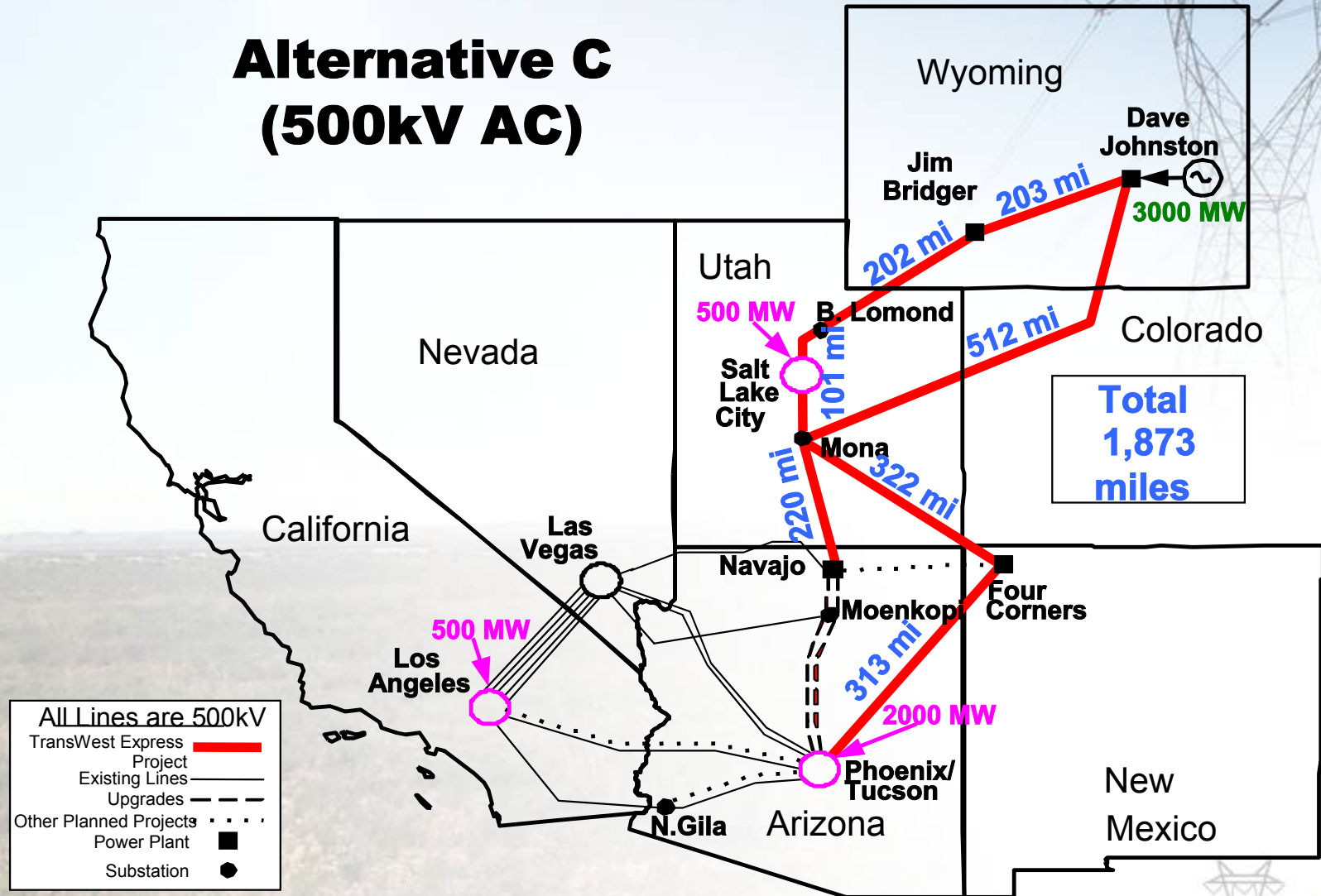
- TransWest Express Project (Red line)
- Existing Lines (Thin black line)
- Upgrades (Dashed black line)
- Other Planned Projects (Dotted black line)
- Power Plant (Black square)
- Substation (Black circle)



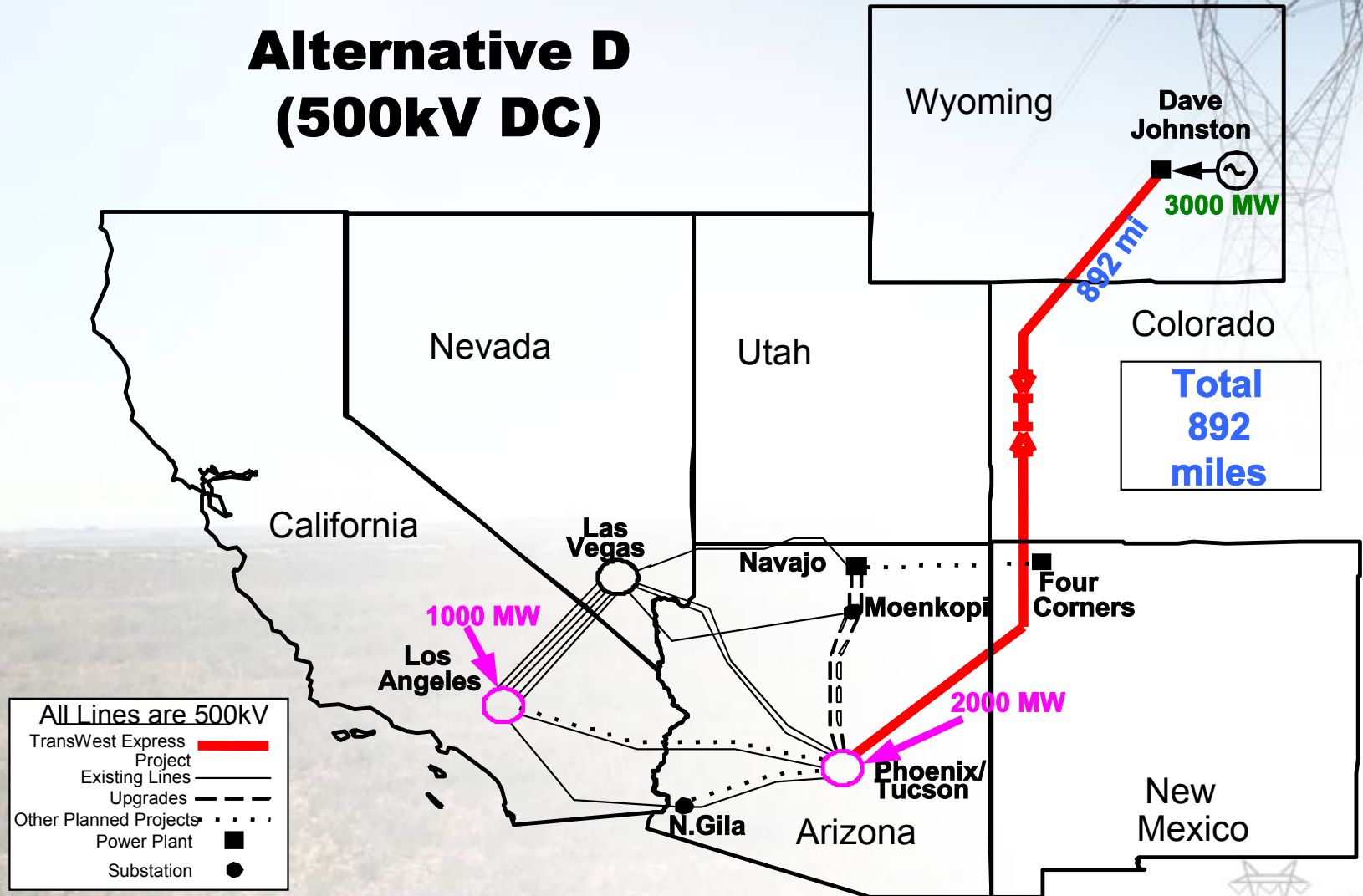
# Alternative B (500kV AC)



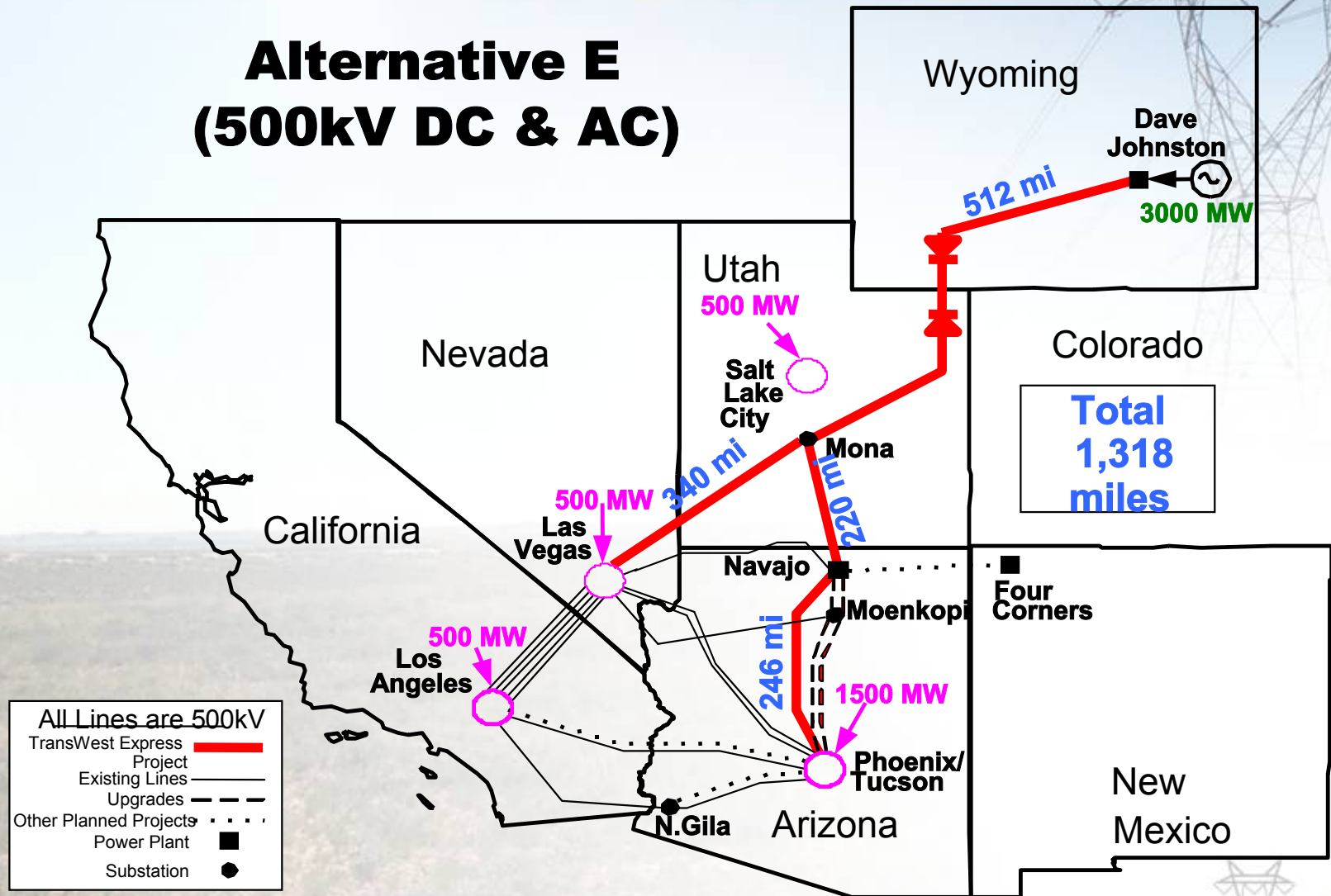
# Alternative C (500kV AC)



# Alternative D (500kV DC)



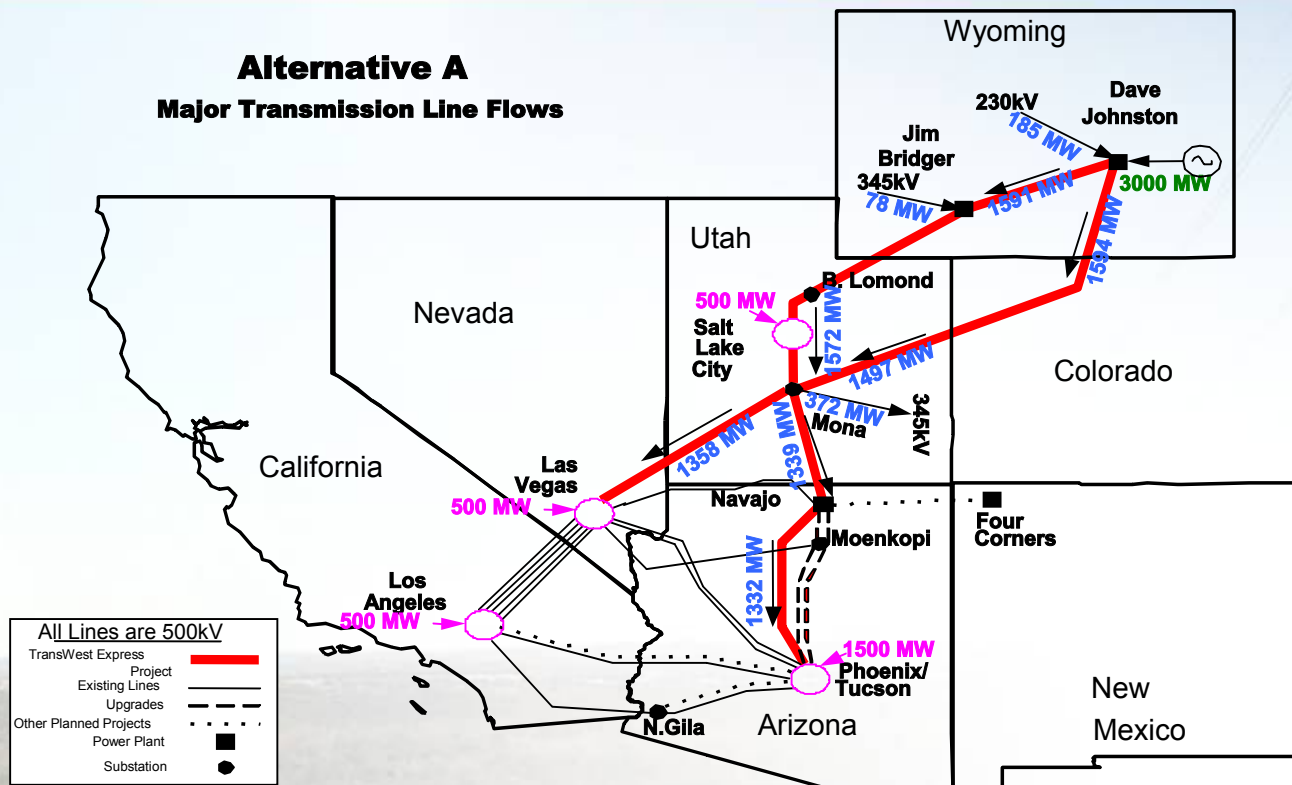
# Alternative E (500kV DC & AC)



# Study Results

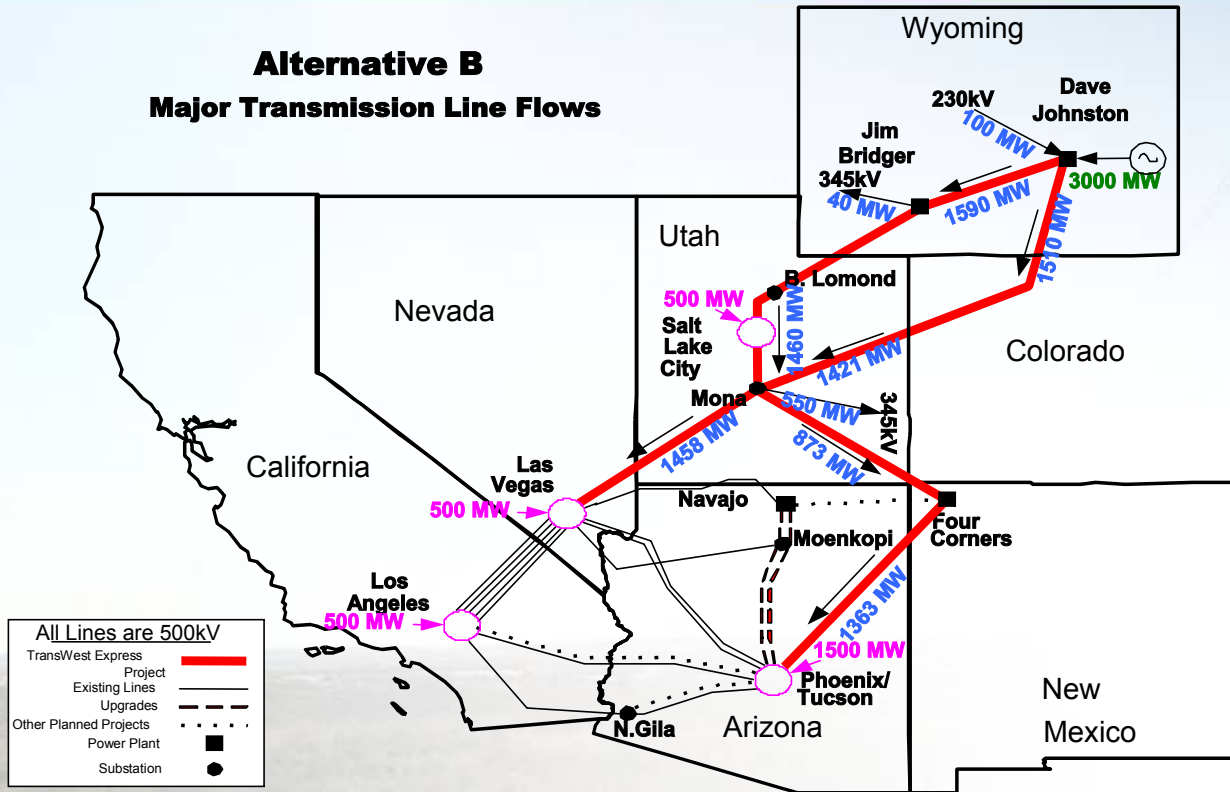


## Alternative A Major Transmission Line Flows



Transmission Alternatives	Path Flows (MW)			
	S. Navajo	FCW	EOR	COI
Benchmark	2,172	1,696	4,835	4,042
Alternative A	2,187	1,658	4,656	3,908

## Alternative B Major Transmission Line Flows

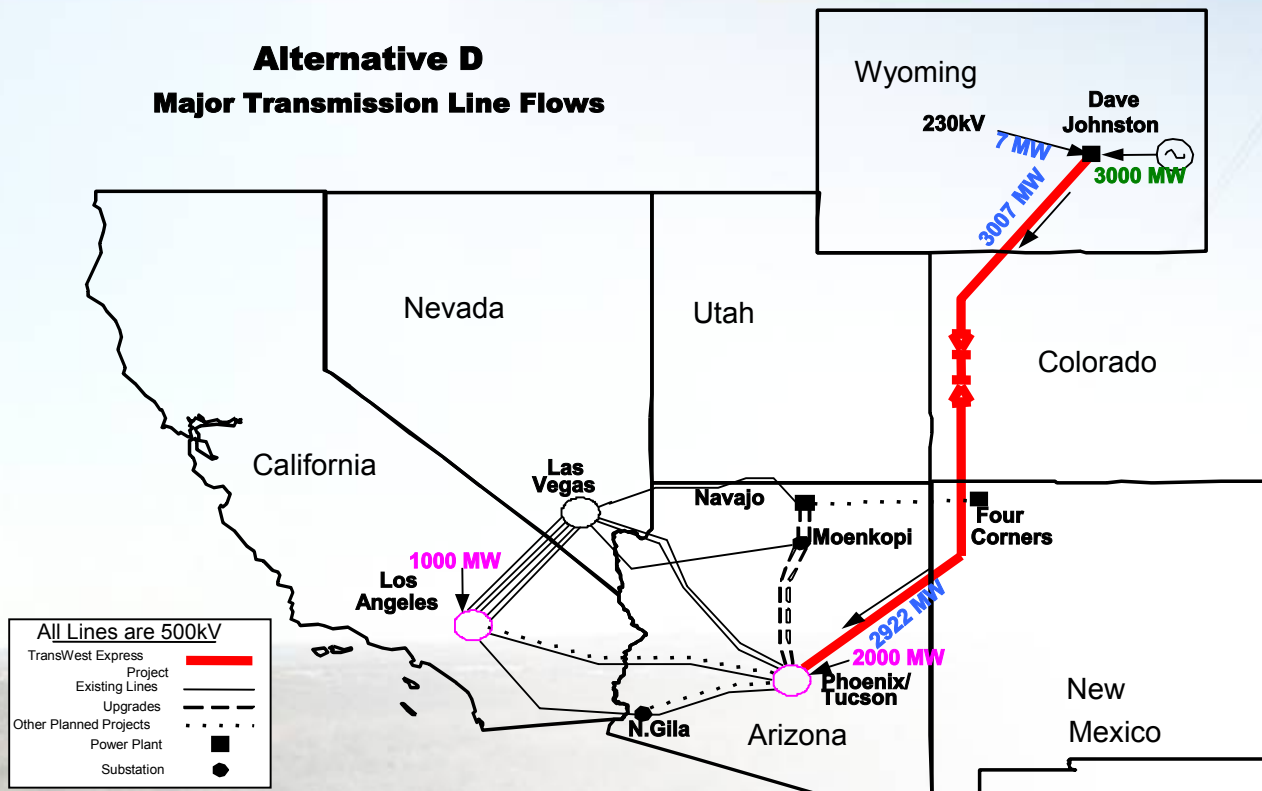


Transmission Alternatives	Path Flows (MW)			
	S. Navajo	FCW	EOR	COI
Benchmark	2,172	1,696	4,835	4,042
Alternative B	2,128	1,487	4,380	4,082





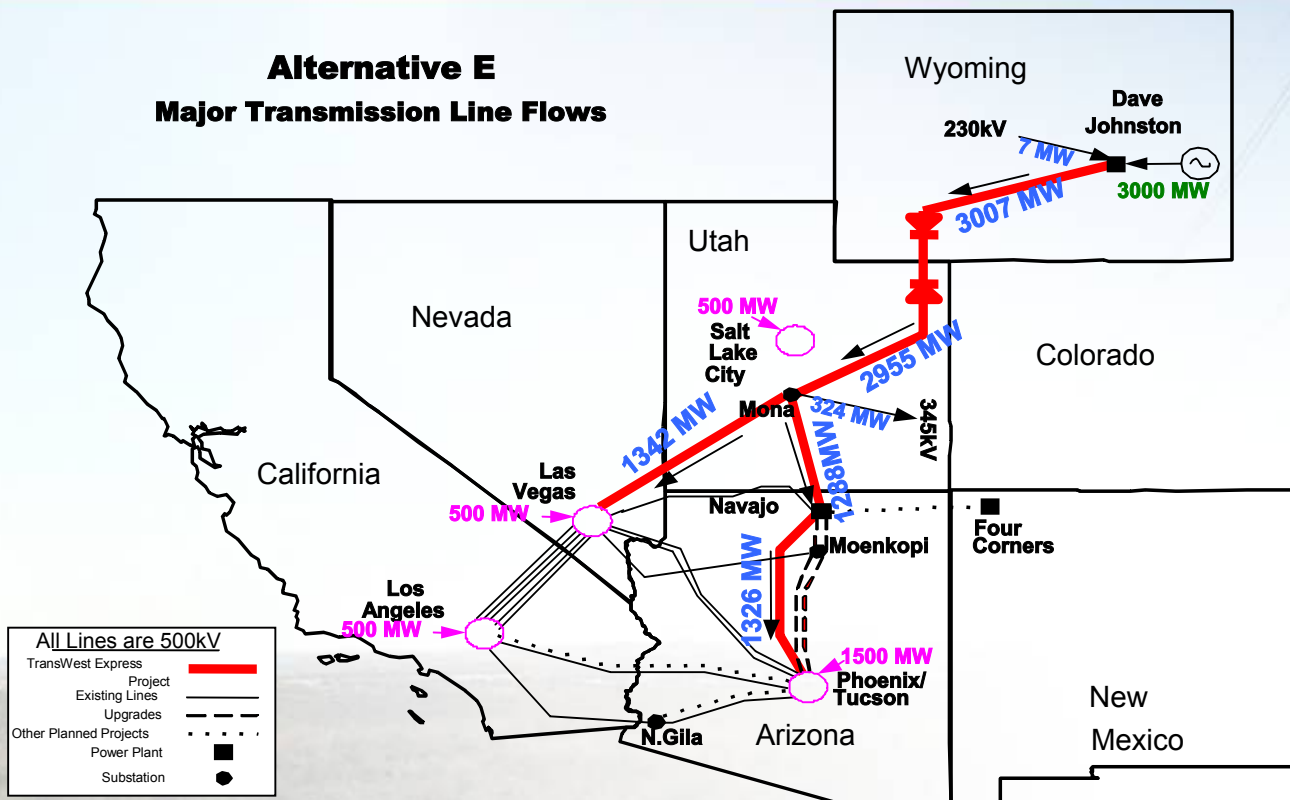
## Alternative D Major Transmission Line Flows



Transmission Alternatives	Path Flows (MW)			
	S. Navajo	FCW	EOR	COI
Benchmark	2,172	1,696	4,835	4,042
Alternative D	1,755	1,668	5,804	4,033



## Alternative E Major Transmission Line Flows



Transmission Alternatives	Path Flows (MW)			
	S. Navajo	FCW	EOR	COI
Benchmark	2,172	1,696	4,835	4,042
Alternative E	2,178	1,676	4,648	3,938

# Transmission Losses and Estimated Project Cost

<b>Transmission Alternatives</b>	<b>Increase in WECC System Losses</b>	<b>Project Cost (\$ Million)</b>
Alternative A	245 MW	4,335
Alternative B	256 MW	4,897
Alternative C	308 MW	4,589
Alternative D	124 MW	2,347
Alternative E	182 MW	3,190

# 500kV vs. 765kV AC Transmission Alternatives

Items	Transmission Alternative A	
	@ 500kV Voltage Level	@ 765kV Voltage Level
Miles of New Transmission lines	<b>1,824</b>	<b>1,824</b> (1,578 miles, 765kV level & 246 miles, 500kV level)
Compensation Level	<b>Up to 70%</b>	<b>0%</b>
Increase in WECC System Losses (MW)	<b>245</b>	<b>90</b>
Total Number of Transformers	<b>4</b>	<b>7</b>
Cost Estimate (\$ Million)	<b>4,335</b>	<b>5,338</b>

# Conclusions

- All transmission alternatives evaluated are feasible and capable of meeting the objective of the study
- Additional facilities or upgrades beyond the basic scope of each alternative are needed to meet reliability standards
- Performances of Alternatives A, B, and C were found to be similar electrically but Alternative A has lower losses and lower capital cost

# Conclusions (continued)

- DC and AC/DC hybrid alternatives have lowest losses, least miles of new transmission lines, and lowest capital cost compared to 500kV AC only alternatives
- For most critical outages, 3,000 MW of generation is tripped for DC and AC/DC hybrid alternatives while 1,500 MW is tripped for AC alternative
- 765kV AC alternative compares favorable electrically to 500kV AC but has higher capital cost though lower losses
- 765kV AC could potentially have capacity for 5,000 MW

***Questions?***

