

WREZ & High Plains Express

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Trans-Elect Development Co.
- Contractor to LS Power -**

*Colorado PUC Transmission Workshop
June 22, 2009*



Western Governors' Association WREZ Initiative

Preliminary WREZs

LEGEND

- Qualified resource area
- Canadian hydropower resources
- Conventional discovered geothermal

Solar thermal resource

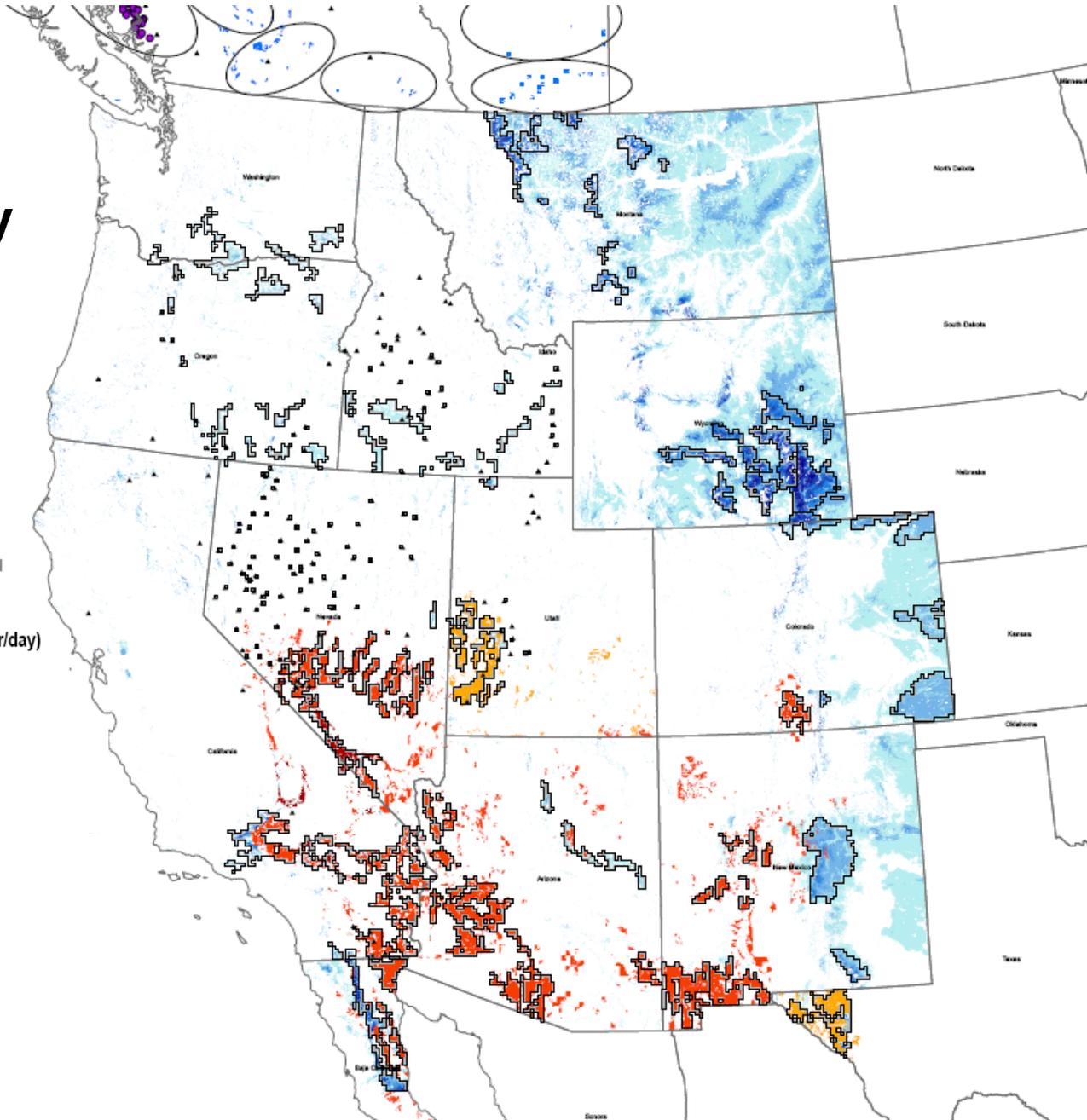
Direct normal insolation (kWh/sqmr/day)

- 6.5 - 7.0
- 7.0 - 7.5
- 7.5 +

Wind resource

Wind power class

- 3
- 4
- 5
- 6
- 7
- Canadian wind



U.S. WREZ Hub Map

Legend

Hydro projects (MW)

- 1 - 10
- 10 - 100
- 100 - 500
- 500+

Geothermal projects (MW)

- 8 - 10
- ▲ 10 - 100
- ▲ 100 - 500
- ▲ 500+

Canadian wind projects



Wind resource

NREL wind power class (50m)

- 3
- 4
- 5
- 6
- 7

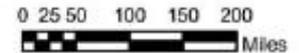
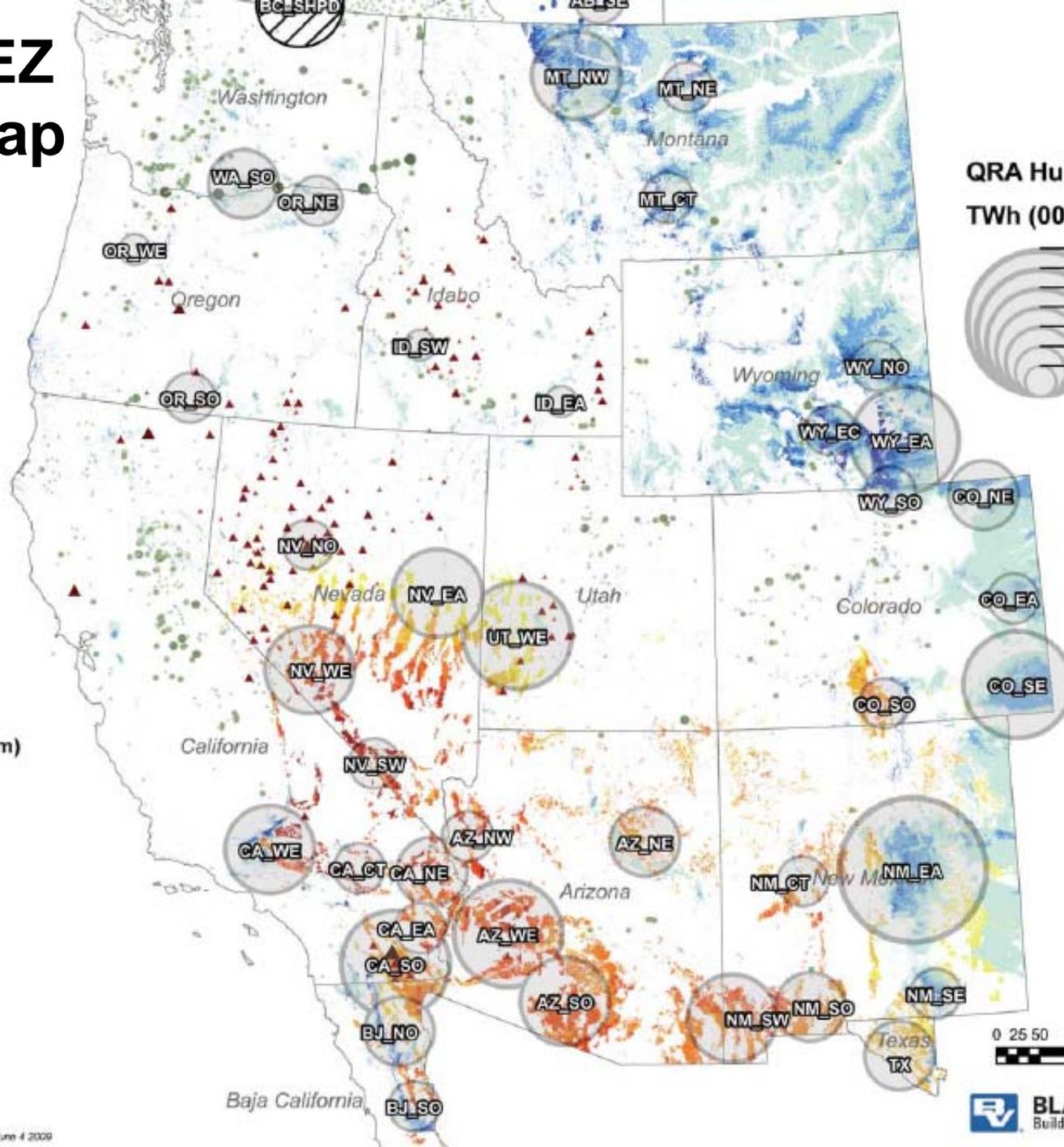
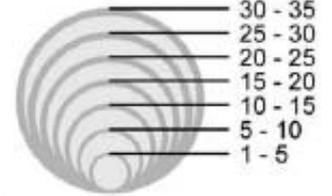
Solar thermal resource

DNI (kWh/sqmt/day)

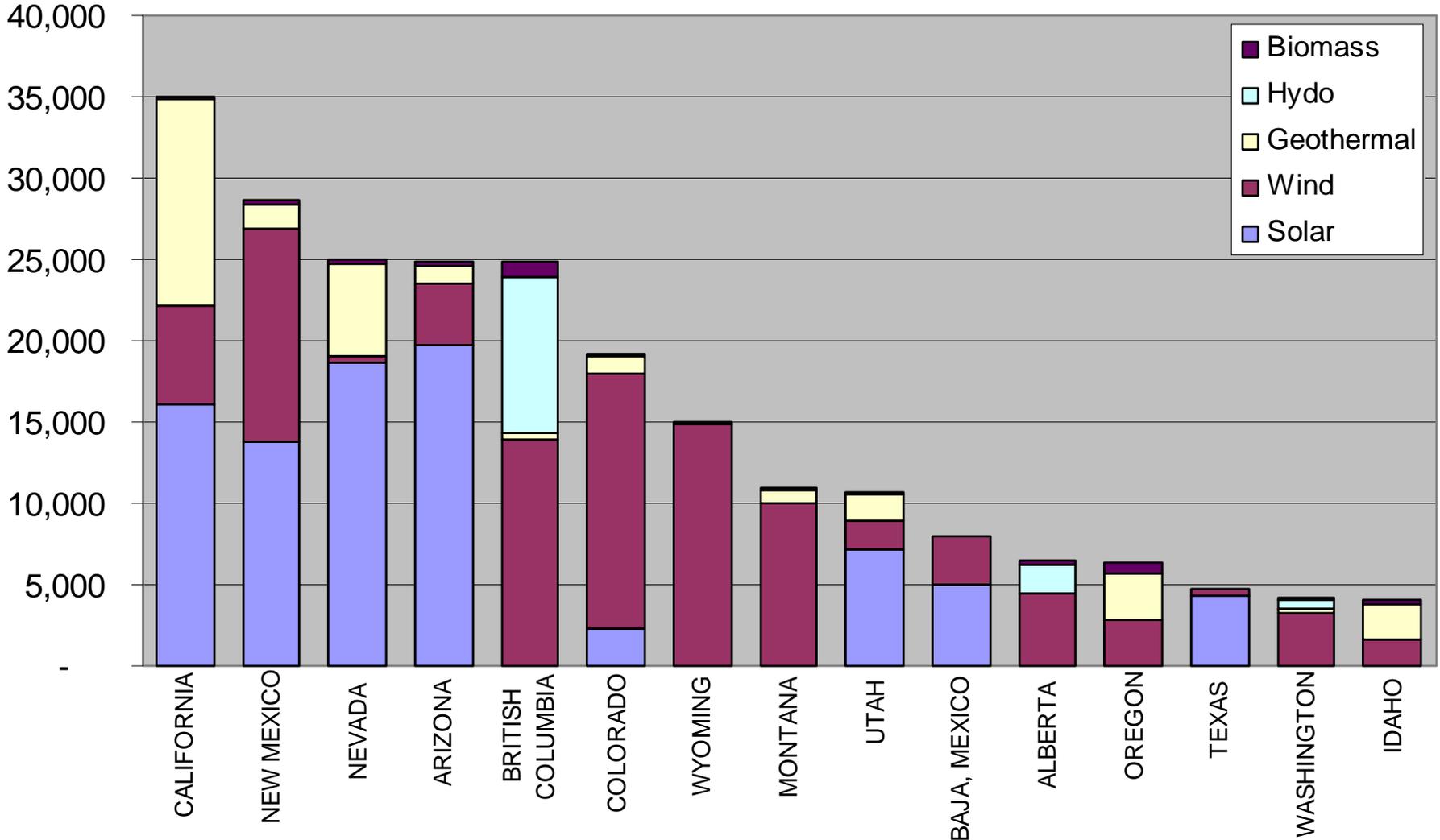
- 6.5 - 6.75
- 6.75 - 7
- 7 - 7.25
- 7.25 - 7.5
- 7.5+

QRA Hub Size Guide

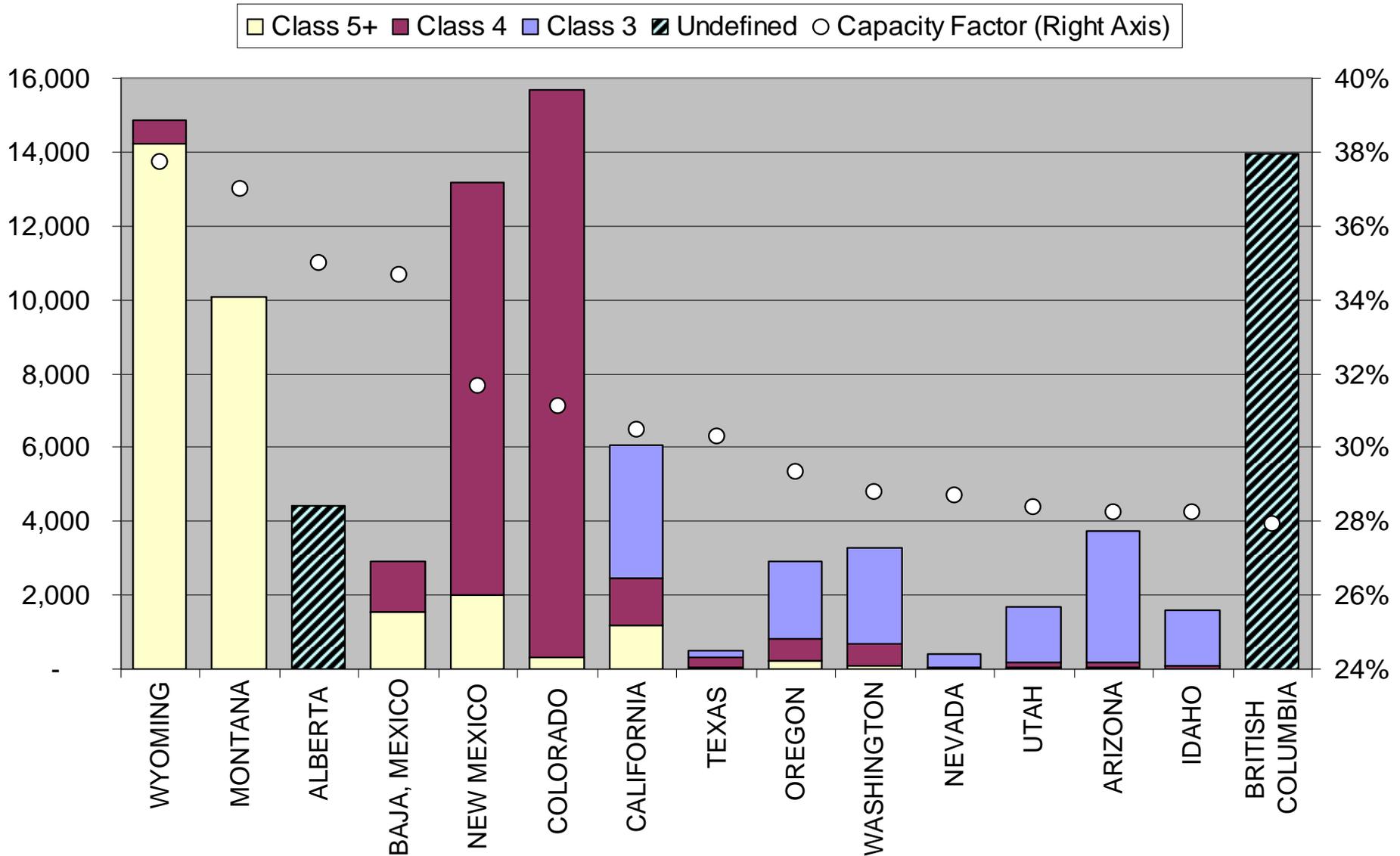
TWh (000s of GWh)/yr



WREZ Renewable Resources (MW)



WREZ Wind Resources (MW)



WREZ Transmission Input Assumptions

VOLTAGE	CIRCUITS	CAPACITY (1) (MW)	CAPITAL (2) (\$000/mi)	RIGHT-OF-	LOSSES (4) (Per 100 mi)	O&M+TAXES (% Capital/YR)	SUBSTATIONS	
				WAY (3) (width in feet)			\$MM/sub (5)	Spacing
230 kV - AC	Single	400	\$900	150	6.90%	3.00%	\$50	100 Miles
230 kV - AC	Double	800	\$1,440	150	6.90%	3.00%	\$50	100 Miles
345 kV - AC	Single	750	\$1,260	160	4.50%	3.00%	\$75	150 Miles
345 kV - AC	Double	1,500	\$2,016	160	4.50%	3.00%	\$75	150 Miles
500 kV - AC	Single	1,500	\$1,800	175	1.50%	3.00%	\$100	200 Miles
500 kV - AC	Double	3,000	\$2,880	175	1.50%	3.00%	\$100	200 Miles
765 kV - AC	Single	3,000	\$2,250	200	1.00%	3.00%	\$125	300 Miles
500 kV - DC	Bipole	3,000	\$1,440	200	1.20%	3.00%	\$250	Terminus

(1) Capacity limited by voltage of interconnecting lines

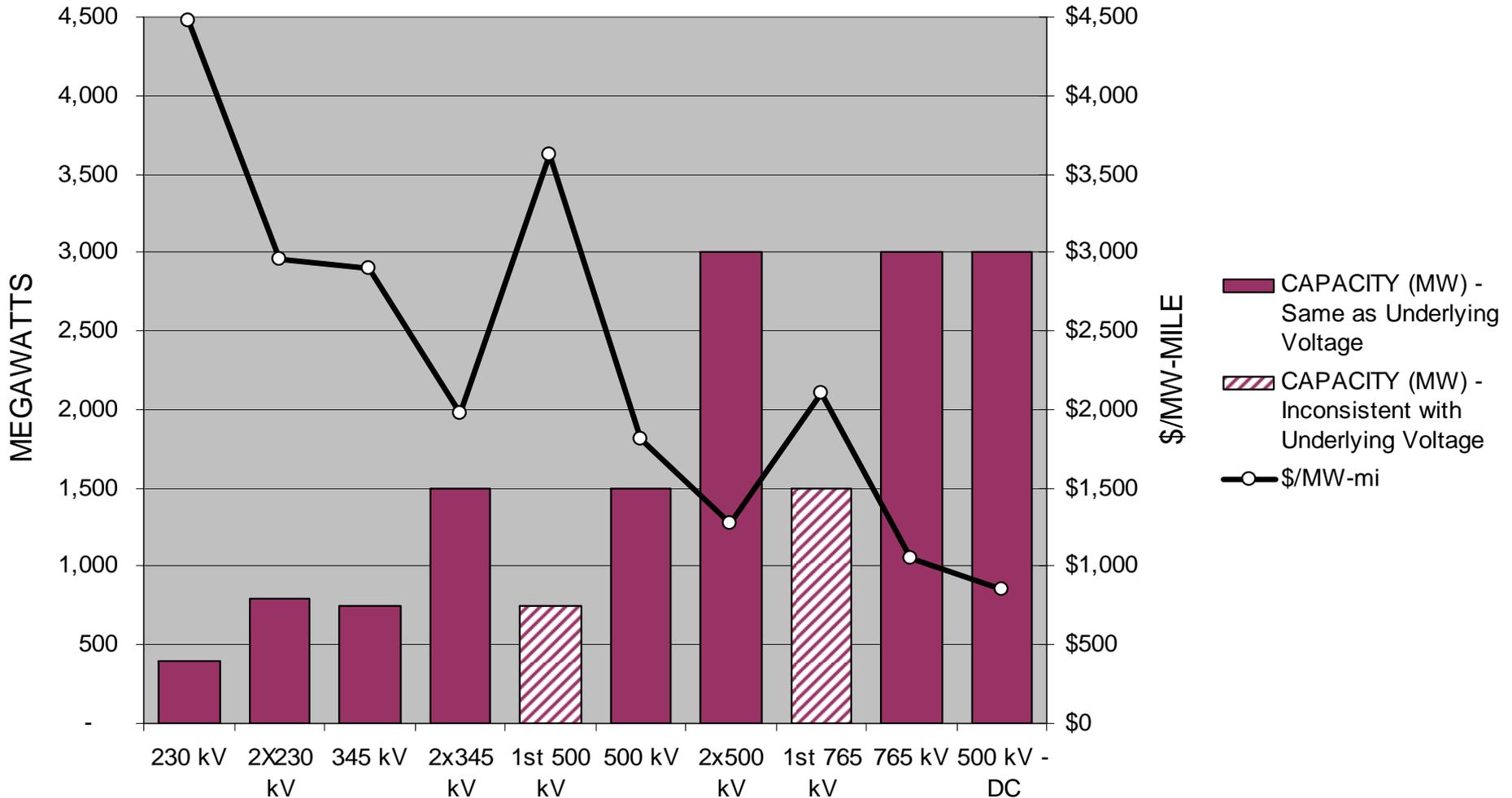
(2) Capital costs do not include right-of-way (ROW)

(3) Values include both land and acquisition costs that vary by region and use which may range from \$50K/mile to \$650K/mile

(4) Losses calculated at full capacity

(5) Inclusive of transformation

WREZ Transmission Cost Comparison



Assumptions: 600 miles and \$10,000/acre for ROW



About the Project

[OVERVIEW](#) [PROJECT MAP](#)

The High Plains Express (HPX) initiative is a roadmap for transmission development in the Desert Southwest and Rocky Mountain region to significantly strengthen the eastern portion of the Western grid. It would potentially incorporate the transmission projects already under development within the HPX footprint.

With added North-South and East-West transmission capability, markets for renewable energy would be broadened, system reliability would be enhanced, and the ability to make economic transfers of energy would provide cost-savings opportunities for consumers in the states of Wyoming, Colorado, New Mexico, and Arizona.

What's New

August 2009
[Feasibility Study Report Released >](#)

June 2009
[HPX Transmission Study Published >](#)

April 2009
[Stakeholder Meetings Notes >](#)

January 2009
[Joined by the Wyoming and New Mexico Transmission Authorities >](#)

Next Meeting

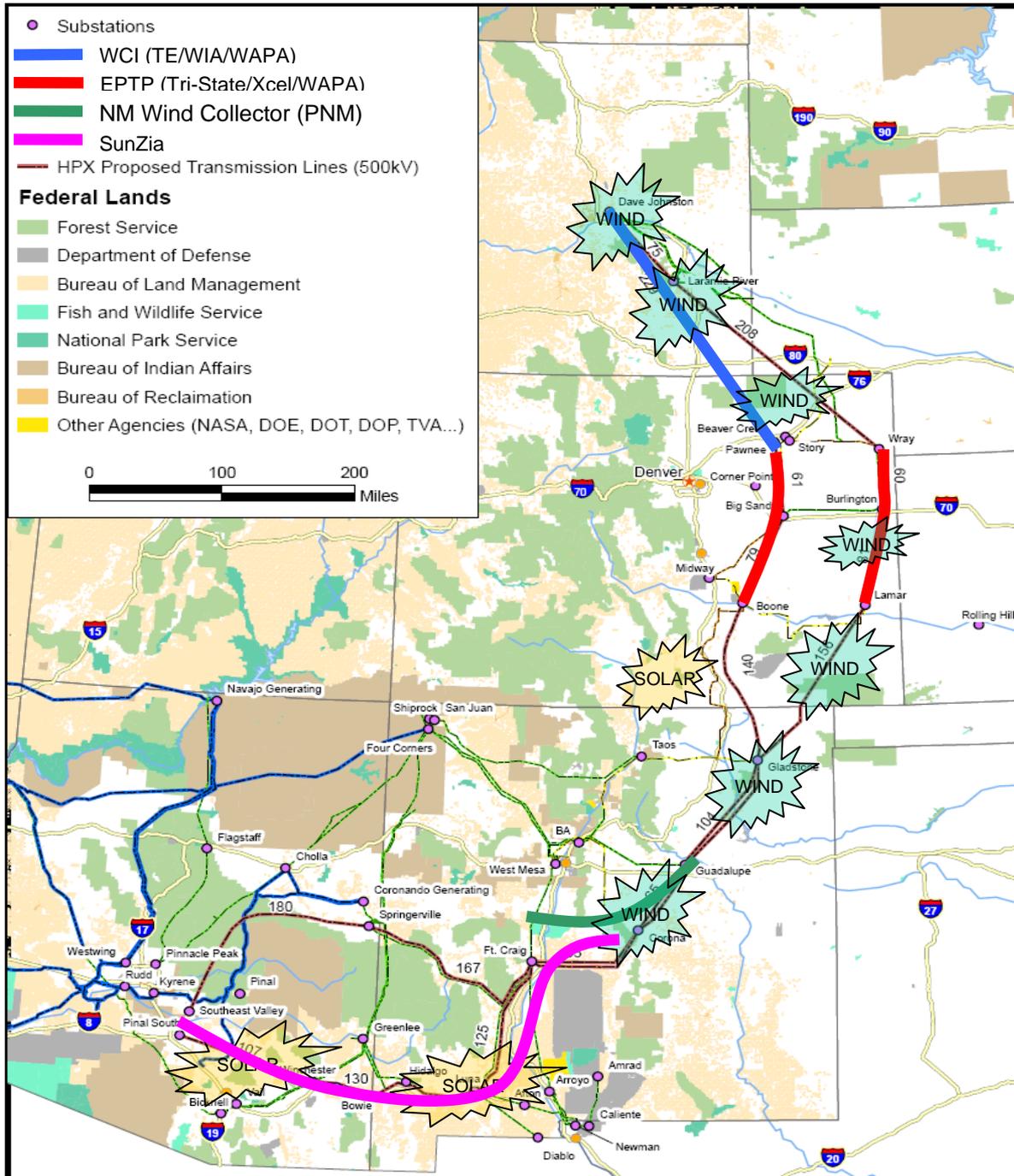
April 17th – 8pm
Louisville Rec. Center
Louisville, Colo.
[Open to the public](#)
[Download Agenda >](#)

Presentations

February 2009
[Feasibility Study Overview](#)
[Download Now >](#)

HPX Initiative

A Roadmap for Regional Transmission Expansion

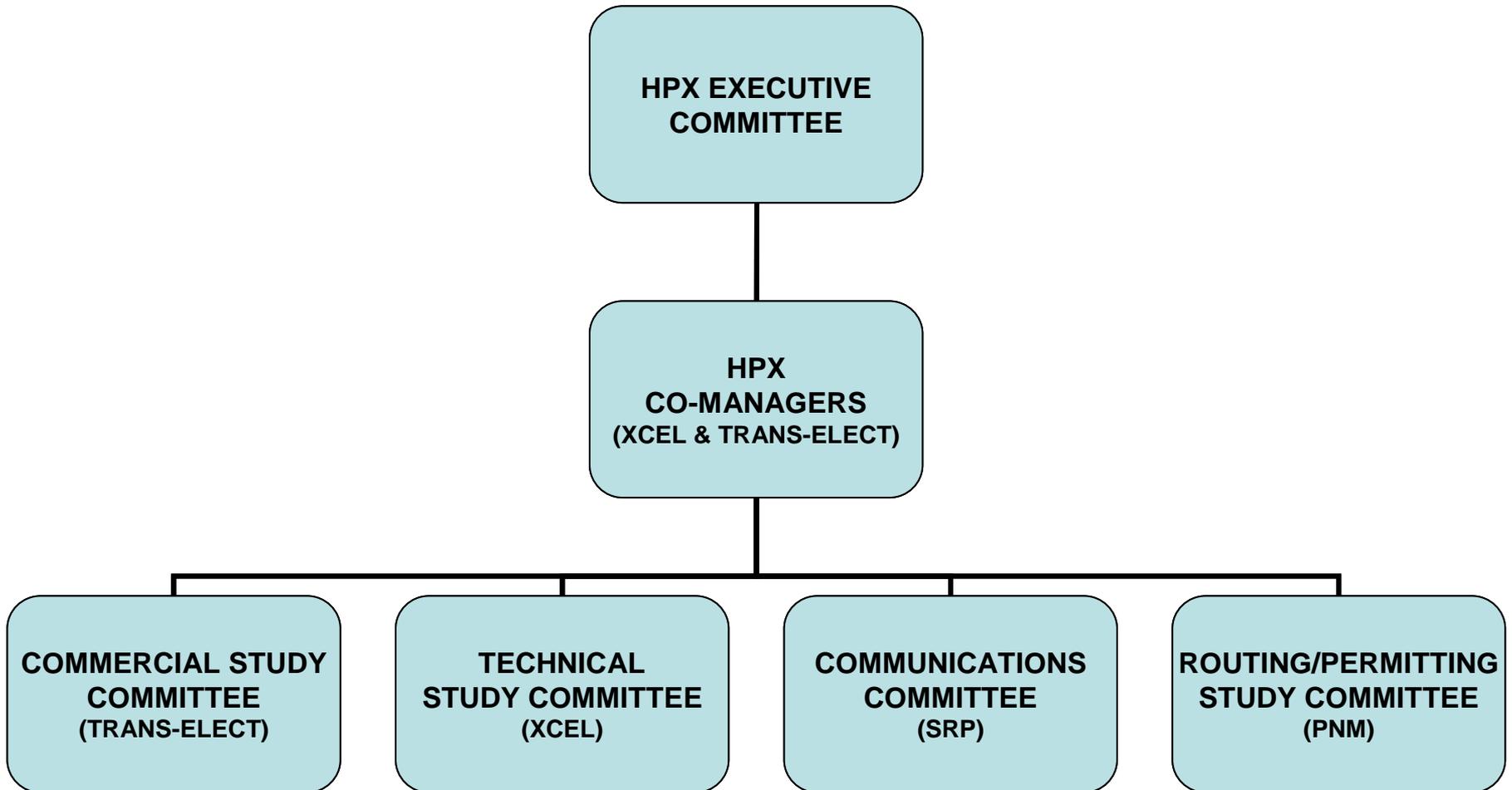


- **Description**
 - Two Corridors
 - ~3,500 MW Capacity
 - ~\$5 Billion
 - Four Component Projects
- **Benefits**
 - Renewable development
 - Enhanced reliability
 - Consumer savings
 - Economic development
- **Participants**
 - 7 Utilities
 - 3 State Authorities
 - 1 Transmission Developer
- **Stage 2 Feasibility (2009-2010)**
 - Detailed Independent Studies
 - Different configurations/paths
 - Stakeholder Process
 - Mindful of ongoing Transmission Reform

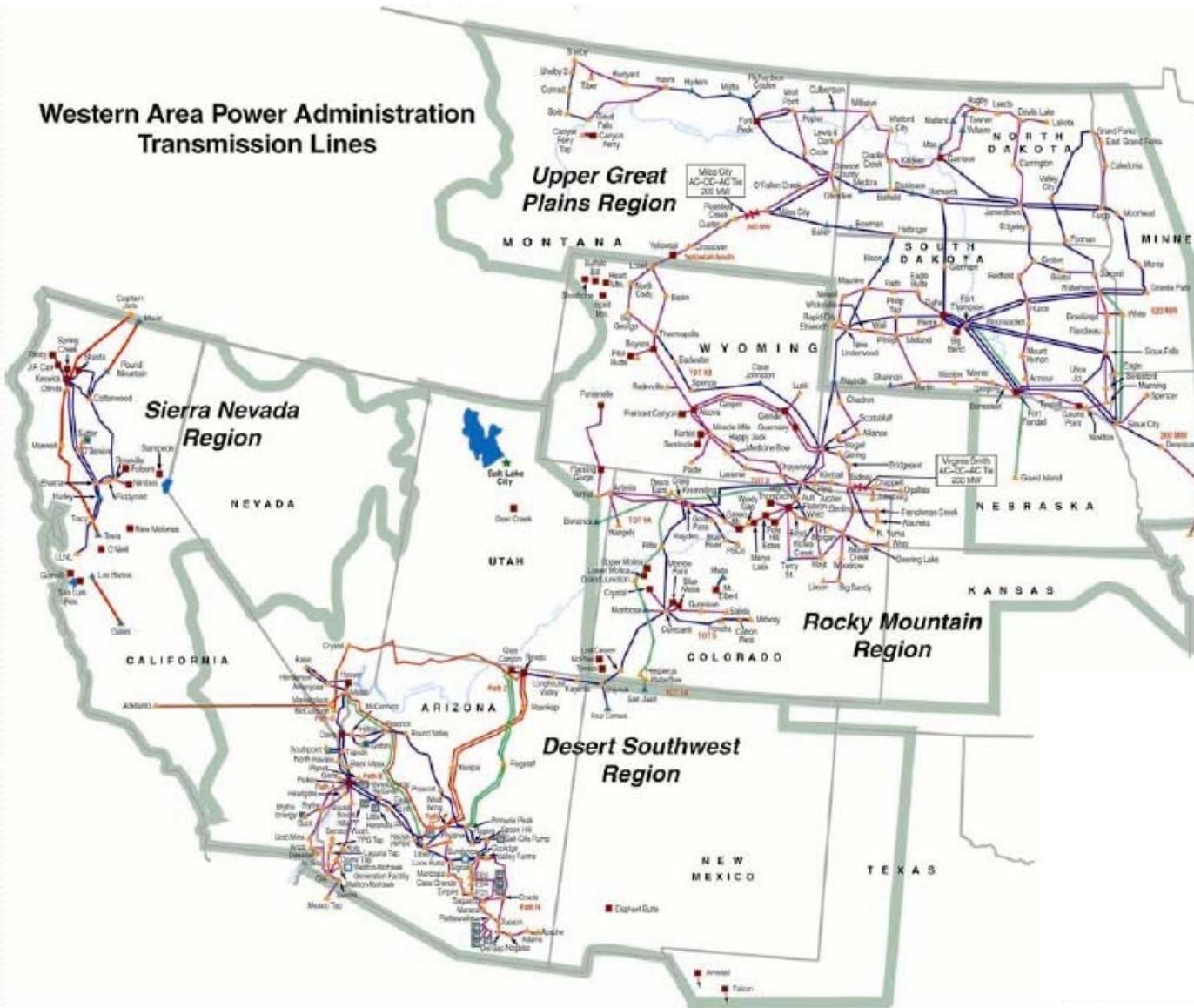
HPX Initiative Participants



HPX Organization



WAPA \$3.25 BB Borrowing Authority



- Over-sizing/right-sizing transmission lines
- Enabling projects that might not otherwise be built
- Selection Criteria
 - One terminus within WAPA footprint
 - Enabling renewables
 - Preserve system reliability & operations
 - In the public interest
 - Expectation of ultimate loan repayment