



# High Plains Express Transmission Project

**Stakeholder Meeting  
Denver, CO  
November 14, 2007**



# Welcome

**John Collins**  
**System Planning Manager**  
**Platte River Power Authority**  
**[collinsj@prpa.org](mailto:collinsj@prpa.org)**

# Agenda

- **Background**
- **Study Results**
- **Siting**
- **Economics**
- **Schedule / Next Steps**
- **Participant Comments**
- **Stakeholder Input**



# Background

**Thomas Green**  
**Transmission Planning Engineer**  
**Public Service Company of Colorado**  
**[thomas.green@xcelenergy.com](mailto:thomas.green@xcelenergy.com)**

# Vision

**Jointly explore opportunities to expand the electric transmission grid in Wyoming, Colorado, New Mexico and Arizona to reliably meet the growing electricity needs by increasing access to renewable and other diverse resources within regional energy resource zones.**

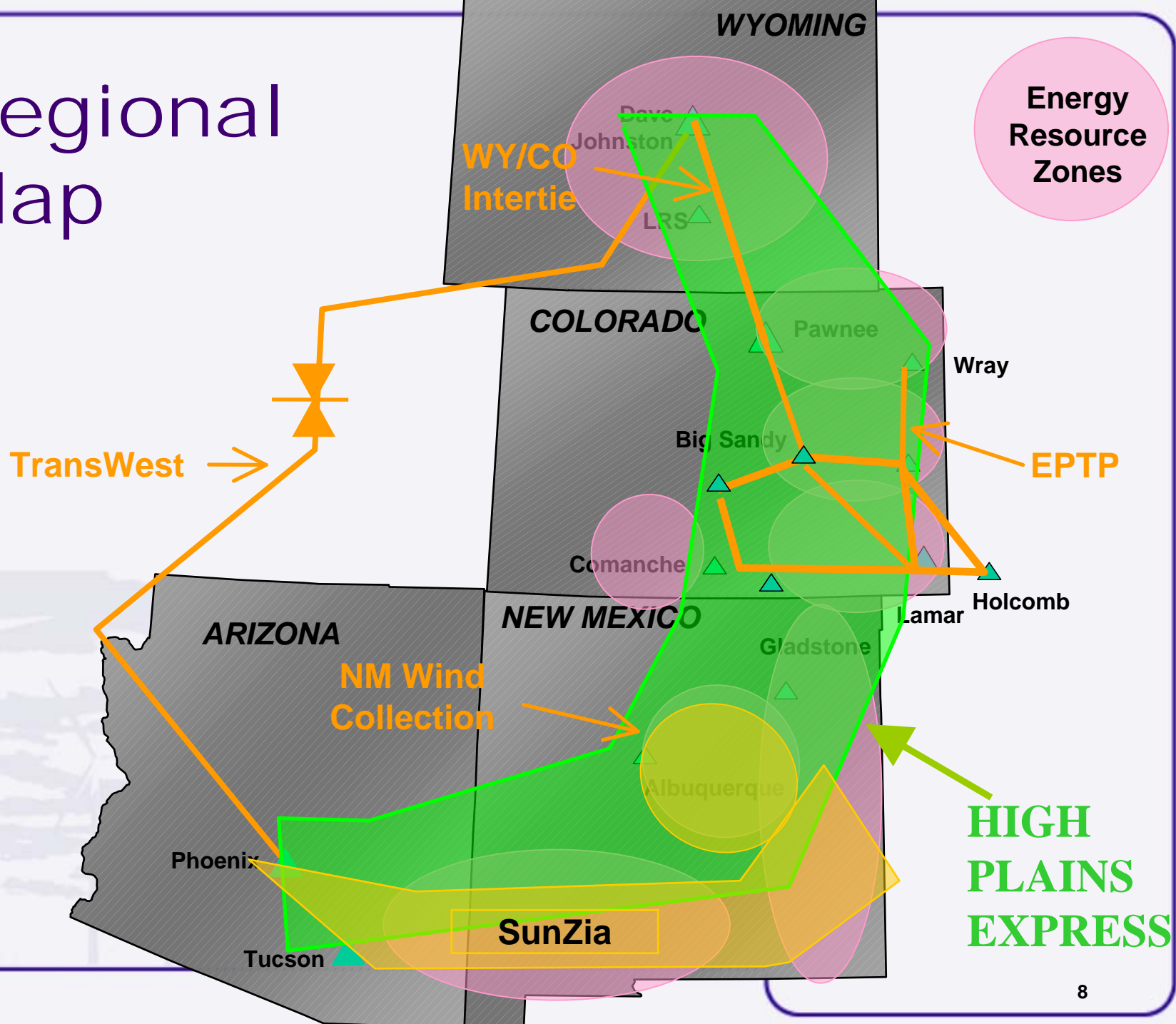
# Project Summary

- **High-Voltage Transmission from WY – CO – NM - AZ**
- **Provide Transmission Access to “Energy Resource Zones”**
- **Allow Access to Economic Resources**
- **Coordinate with Other Projects:**
  - Wyoming/Colorado Intertie
  - Eastern Plains Transmission Project (EPTP)
  - New Mexico Wind Collector System
  - SunZia
- **Benefits:**
  - Improved regional reliability
  - Increased regional import/export capability
  - Minimize environmental impacts by sharing common corridors
  - Help states meet renewable energy standards

# Participants

- Colorado Springs Utilities
- Platte River Power Authority
- Public Service Company of New Mexico
- Public Service Company of Colorado
- Salt River Project
- Trans-Elect Development Company
- Tri-State Generation & Transmission
- Western Area Power Administration
  
- Wyoming Infrastructure Authority
- New Mexico Energy, Minerals and Natural Resources Department

# Regional Map



Energy Resource Zones

WY/CO Intertie

TransWest

EPTP

NM Wind Collection

HIGH PLAINS EXPRESS

SunZia



# Phase 1 Process

- **Open process**
  - **FERC 890**
- **Stakeholder Kickoff Meeting March 23, 2007**
- **Updates at WECC and Subregional Meetings**
  - **CCPG, SWAT, TSS, PCC, Westconnect, etc.**
- **Weekly Studies Meetings**
- **Documents and reports are posted at:**
  - **[http://www.rmao.com/wtpp/HPX\\_Studies.html](http://www.rmao.com/wtpp/HPX_Studies.html)**

# Studies

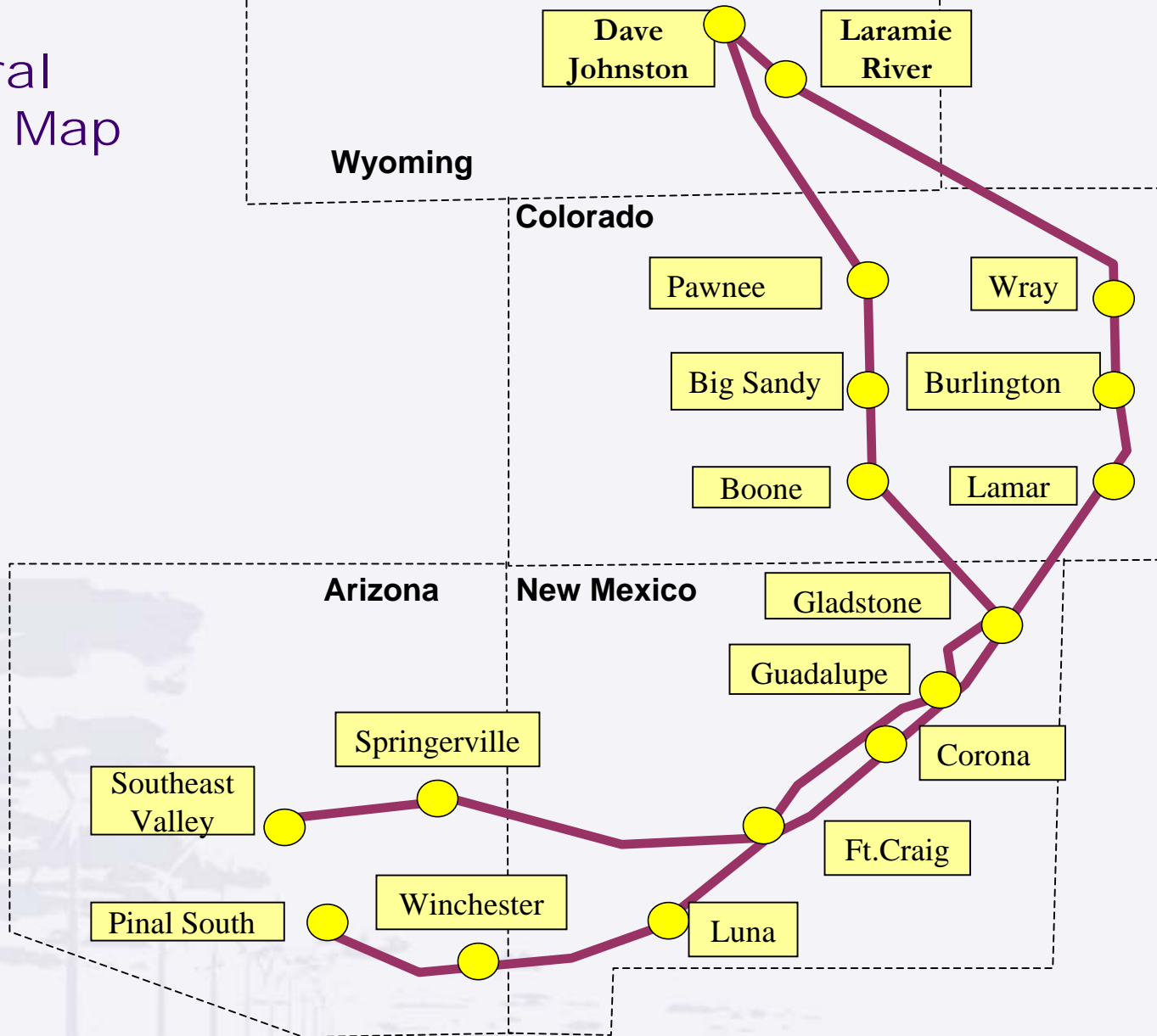
**Robert Easton**  
**Operations Engineering and Planning Manager**  
**Western Area Power Administration**  
**Rocky Mountain Region**

**[aeaston@wapa.gov](mailto:aeaston@wapa.gov)**

# Study Process

- **Finalized scope**
- **Picked Consultant**
- **Formed Studies Team**
- **Developed Models**
  - **2017 Peak Summer Load Conditions**
- **Performed Benchmarking**
- **Agreed on Alternatives**
- **Sensitivity Analyses**

# General Study Map



# Interface Locations

STATE	UPLOAD (MW)	DOWNLOAD (MW)	STATE	UPLOAD (MW)	DOWNLOAD (MW)
<b>Wyoming</b>			<b>New Mexico</b>		
Laramie River	500-2000		Gladstone	300-750	
Dave Johnston	500-2000		Guadalupe	300-750	✓
<b>Total Wyoming</b>	<b>1000-4000</b>		Corona	300-750	
<b>Colorado</b>			Ft. Craig		✓
Pawnee	300-1000	✓	Luna		✓
Wray	300	✓	<b>Total New Mexico</b>	<b>900-2250</b>	<b>900-1000</b>
Big Sandy	300	✓	<b>Arizona</b>		
Burlington	300-500	✓	Pinal South		✓
Boone	300-500	✓	Southeast Valley		✓
Lamar	300-1000	✓	Springerville		✓
			Winchester		✓
<b>Total Colorado</b>	<b>1800-3400</b>	<b>1800-2500</b>	<b>Total Arizona</b>		<b>1000-4000</b>

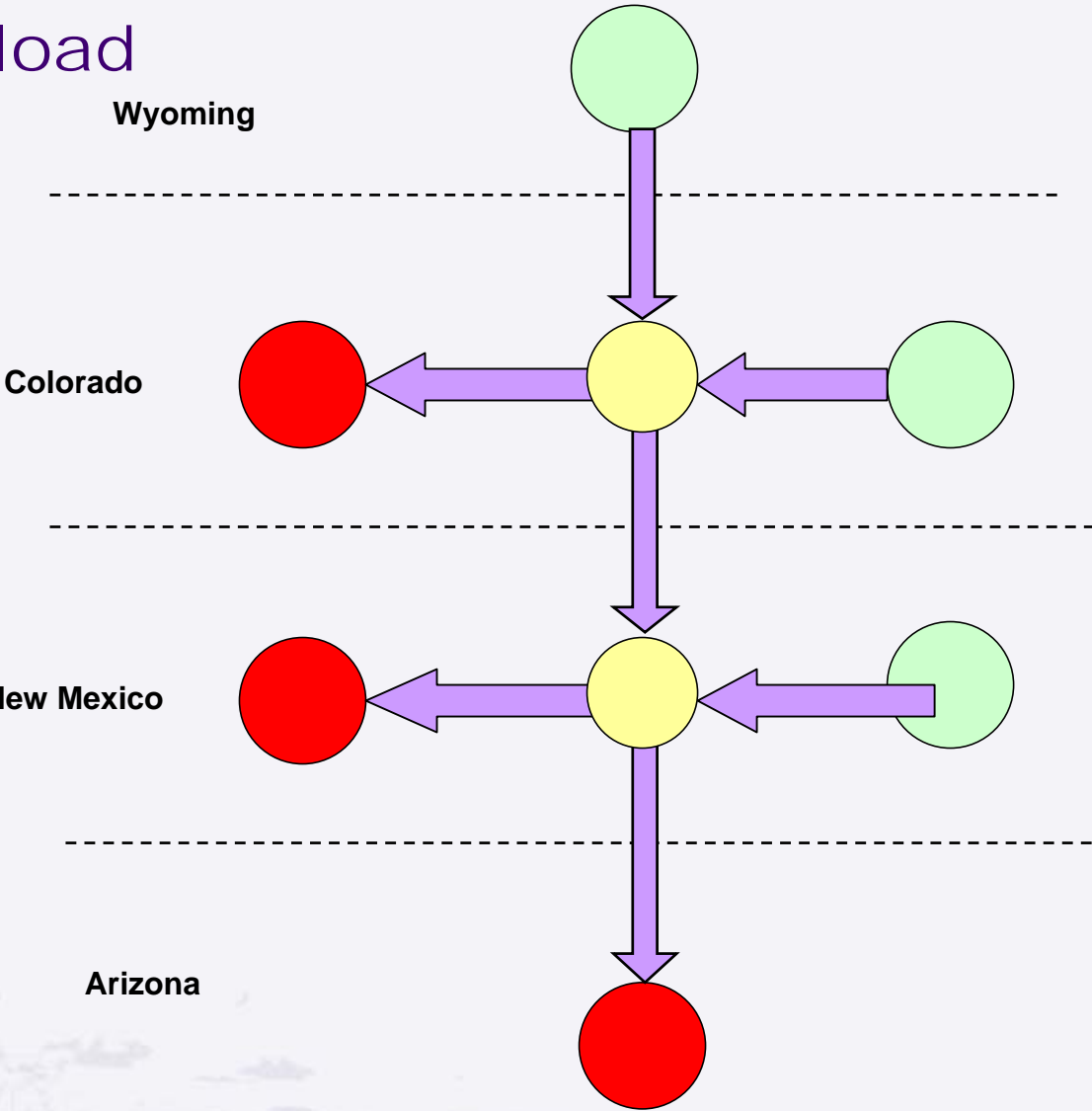
# Studies - Alternatives




- **A/C Transmission Only**
- **Single 500kV**
- **Two Single-circuit 500kV**
- **Two Double-circuit 500kV**
- **Series Compensation:**
  - **0%, 50%, 70%**

# Studies – Scenarios

- **Flowability**
- **Moderate Upload**
  - **(Upload = Download)**
- **High Upload**
  - **(Upload > Download)**

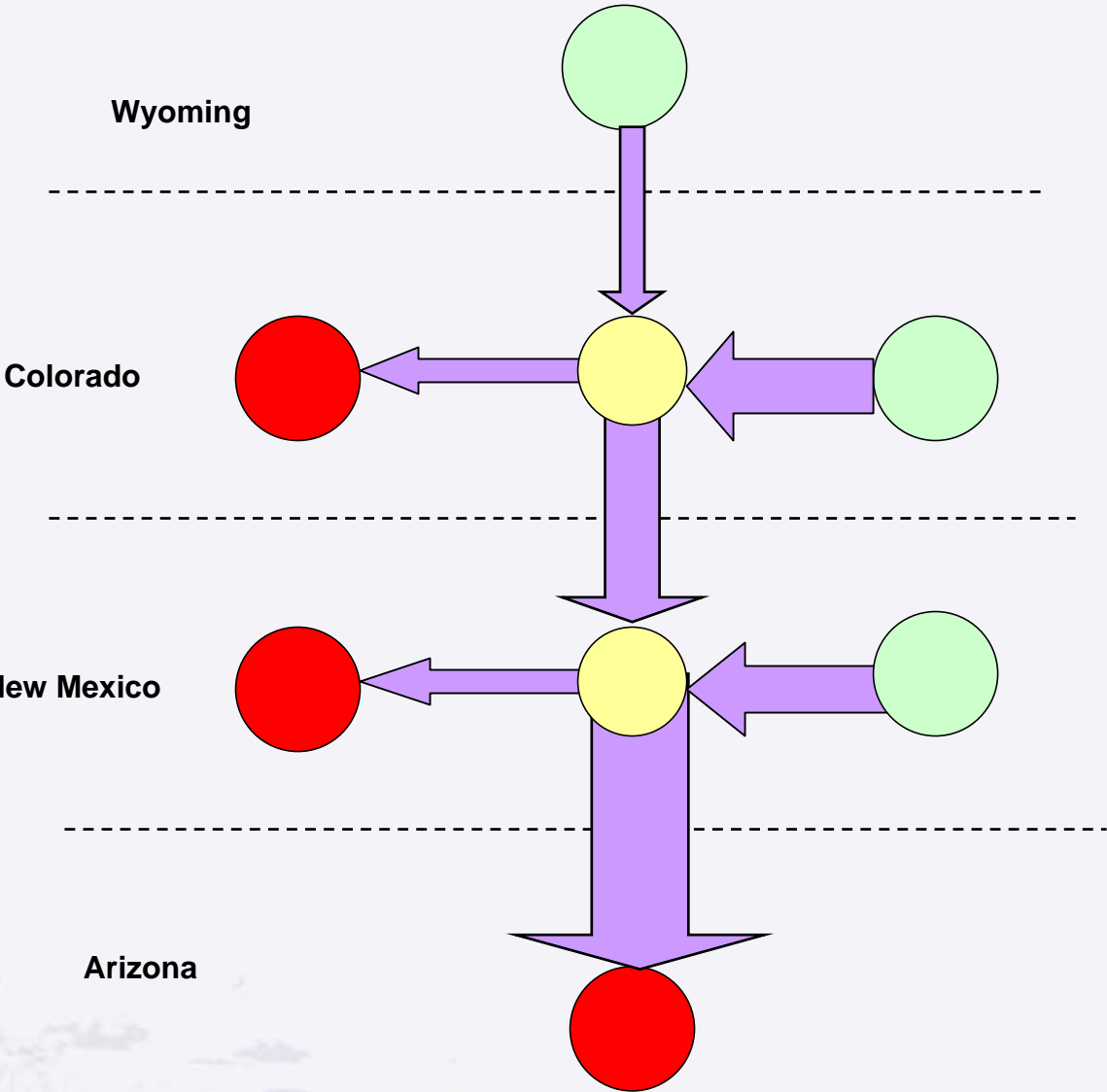
# Moderate Upload






-  UPLOAD
-  DOWNLOAD
-  INTERFACE



# High Upload



-  **UPLOAD**
-  **DOWNLOAD**
-  **INTERFACE**

# Studies - Results

## ➤ **500kV AC**

- **One Single Circuit: 1000 - 1500 MW**
- **Two Single-Circuit lines: 3500 – 4000 MW**
- **Two Double-Circuit lines: 6500 – 7000 MW**

## ➤ **Series Compensation**

- **Sensitivities with 0%, 50%, 70%**
- **S.C. modeled on all lines**
- **Will need to optimize with detailed studies**

# Studies – Cost Estimate

- **Two separate 500 kV AC lines**
- **\$1.5 Mil/mile for 1,280 miles x 2 = \$3.84 billion**
- **Substations (10 new / 5 upgraded): \$640 million**
- **Series Compensation: \$512 million**
- **SVC: \$140 million**
- **Total Costs: \$5.13 billion**

# Studies Team - Synergies

- **Wyoming /Colorado Intertie**
  - Potential Leg of HPX
  - Build for 500kV Capability – Operate 345kV
- **Eastern Plains Transmission Project**
  - Potential Building Block of HPX
  - Planned for 500kV
- **New Mexico Wind Collector System**
  - Potential Leg of HPX
- **SunZia**
  - Potential Building Block of HPX
  - Planned as 500kV



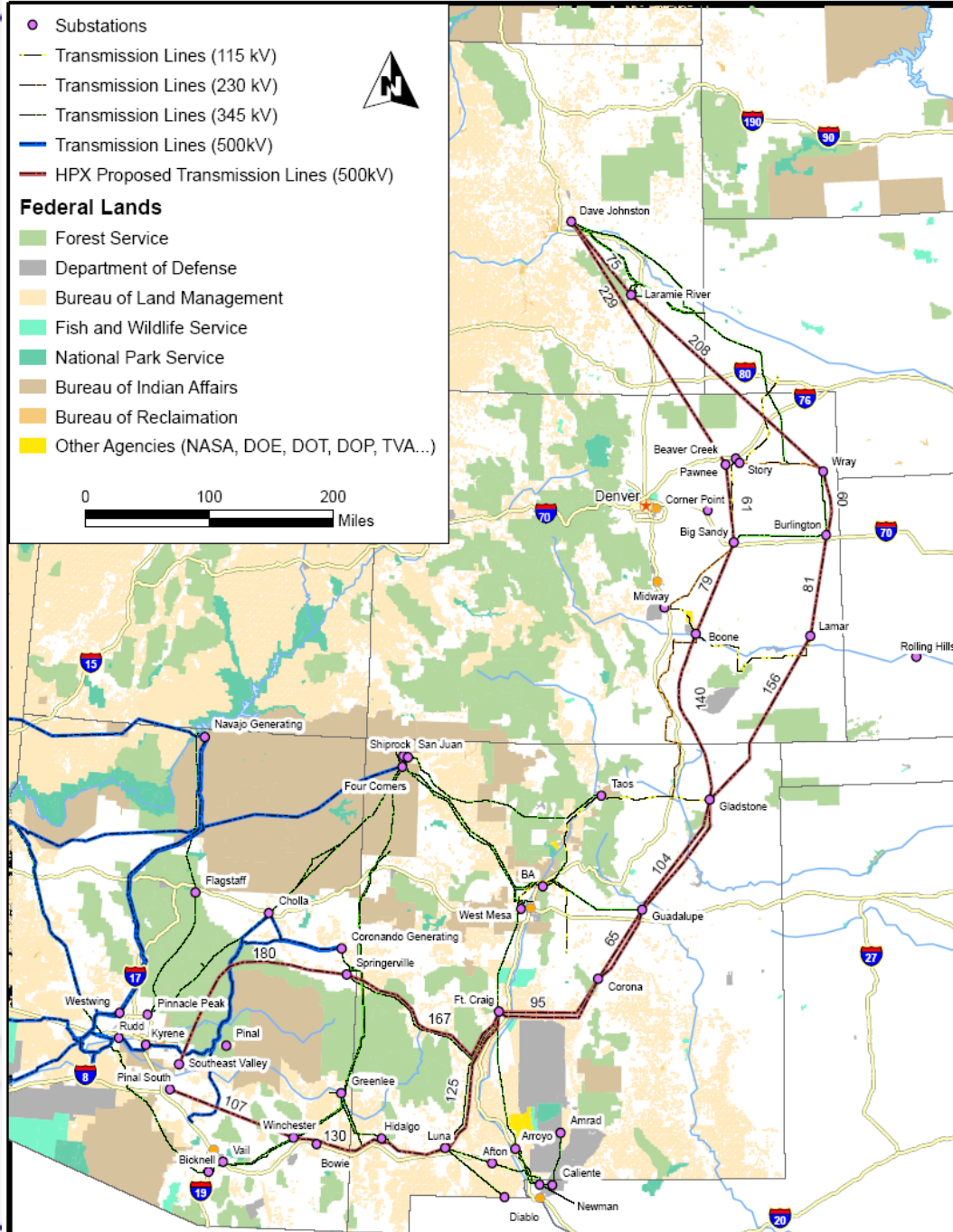
# Questions on Transmission Studies



# Siting

**R. Peter Mackin**  
**Vice President, Reliability Services**  
**Utility System Efficiencies, Inc.**  
**[petermackin@useconsulting.com](mailto:petermackin@useconsulting.com)**

# Preliminary Routing Map



# Siting

- **Non-Confidential Data**
  - **ESRI- Data provided with GIS software**
    - ▶ **Federal Lands**
    - ▶ **Hydrology Features (rivers, streams, lakes)**
    - ▶ **Transportation Features**
    - ▶ **State boundaries**
    - ▶ **County boundaries**
    - ▶ **Cities**



# Siting

- **Confidential Transmission Data from Utilities (CEI)**
  - **SRP - Select Arizona transmission features (Substations, Transmission Lines)**
  - **PNM - New Mexico Substations and Transmission Lines**
  - **Tri-State GT (EPTP) - Select CO Substations**
  - **Digitized from hard-copy Tri-State Maps - Select WY, CO, NM substations and transmission lines**
  - **WAPA hard copy mapping data used for reference purposes**

# Siting

- **Preliminary routing to determine transmission line lengths for feasibility study input**
  - **Connect known renewable resource areas with load centers**
  - **Avoid known sensitive areas**
    - ▶ **DOD Maneuver Area**
    - ▶ **Santa Fe Trail**
    - ▶ **BIA lands**
  - **Parallel existing transmission where feasible**
  - **New ROWs assumed where needed for reliability**



# Questions on Siting

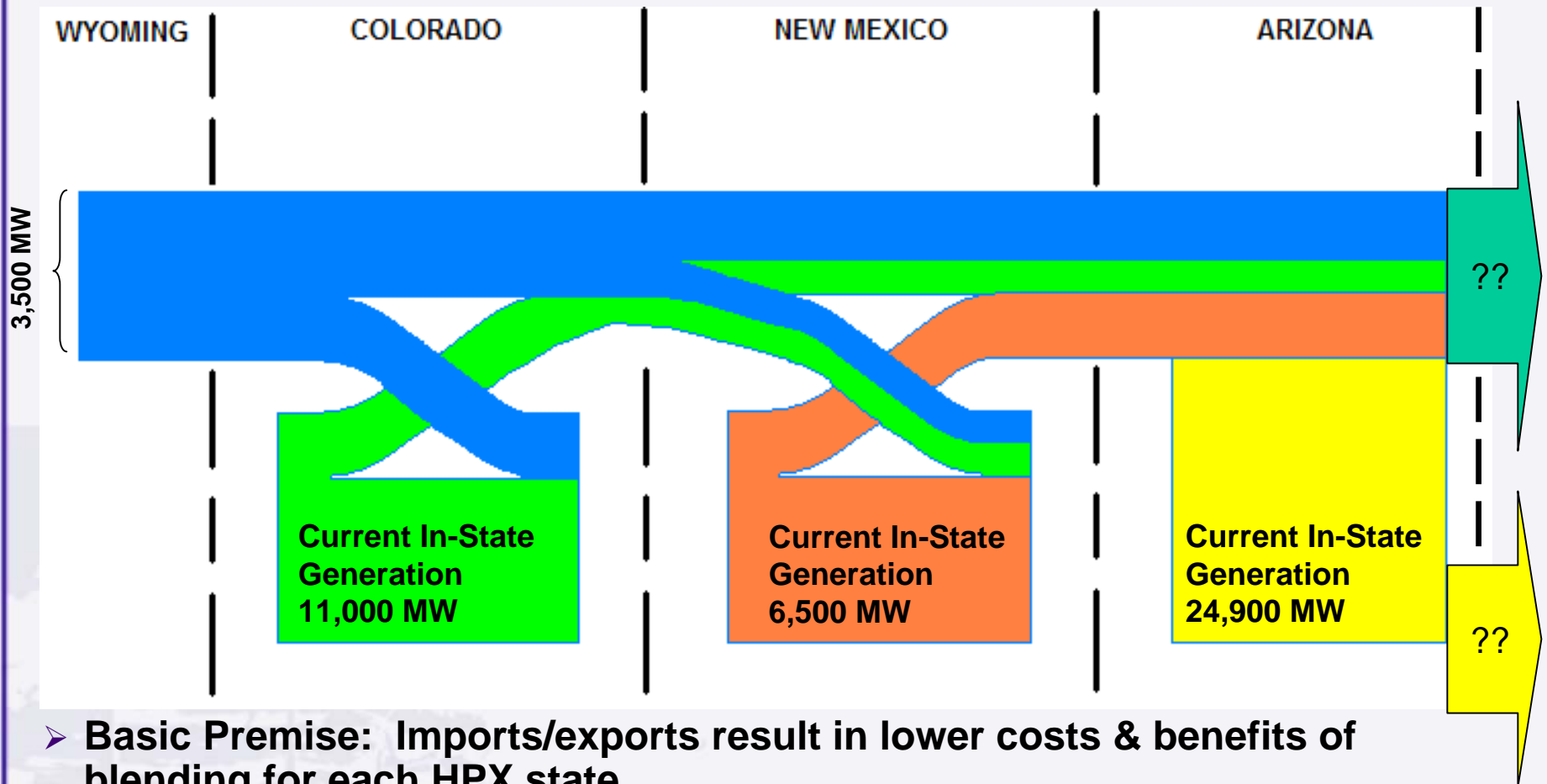
# Economics

**Jerry Vaninetti**  
**Vice President**  
**Trans-Elect Development Company**  
**[jvaninetti@trans-elect.com](mailto:jvaninetti@trans-elect.com)**

# Potential HPX Benefits

- **Economic:** *Subject of this Presentation*
  - **Savings for customers:** benefits must exceed costs
  - **What are the economics for various resource mixes?**
  - **Can emerging public policy goals be achieved via HPX?**
- **Benefits for Participants**
  - **Project Partners:** risk/reward trade-offs
  - **HPX States:** Wyoming, Colorado, New Mexico & Arizona
- **Expansion of Markets for Renewables**
- **Synergies**
  - **Reliability:** Extension of 500 kV to Eastern WECC
  - **Imports/Exports:** regional market development
  - **Geographic Diversity:** firming intermittent wind with wind & solar
  - **Diversity of Supply:** hedge against supply/demand imbalances
  - **Rural economic development**
- **Public Policy Goals**
  - **Renewable Portfolio Standards (RPS) & Emerging Carbon-Constraints**
- **Flexibility to Accommodate Future Scenarios**
  - **Greenhouse Gas (GHG) Taxes & Increased Renewable Demands**
  - **Avoidance of Stranded Resources**

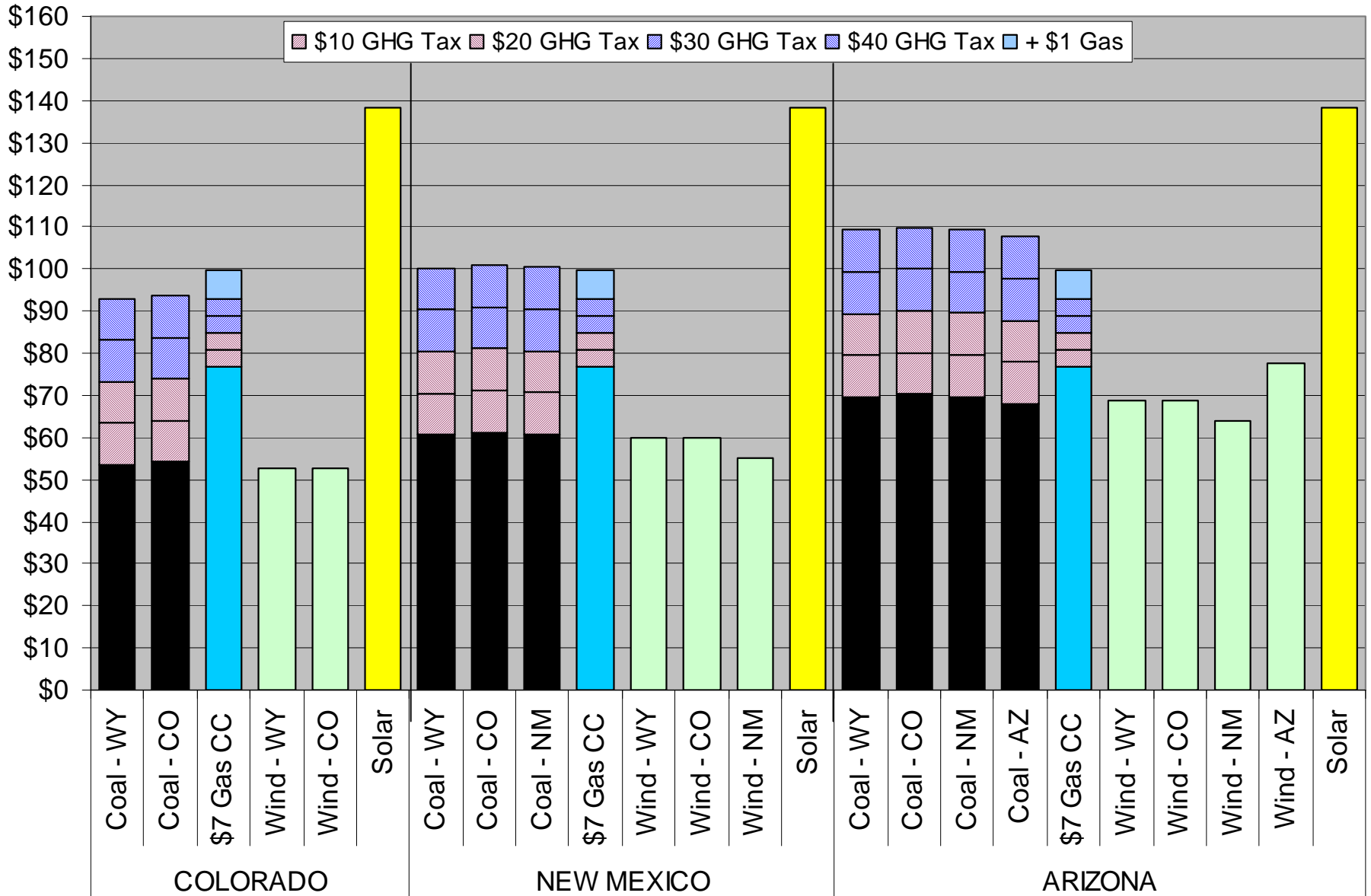
# The HPX Concept



- **Basic Premise:** Imports/exports result in lower costs & benefits of blending for each HPX state
- **Market:** For RPS compliance & competitive power supplies

# Power Delivery Costs (\$/MWh)

*(based on industry accepted current cost assumptions)*



# Loads & Resources (2005 - DOE)

CAPACITY (MW)	WYOMING	COLORADO	NEW MEXICO	ARIZONA	TOTAL	SHARE
Coal	5,847	4,928	3,957	5,430	20,162	41%
Oil & Gas	166	4,706	2,031	12,647	19,550	40%
Nuclear	0	0	0	3,875	3,875	8%
Hydroelectric	303	652	82	2,720	3,757	8%
Renewables	287	238	410	16	951	2%

<b>TOTAL</b>	<b>6,707</b>	<b>11,087</b>	<b>6,480</b>	<b>24,904</b>	<b>49,178</b>	<b>100%</b>
Growth @ 2%/yr to 2020	2,320	3,835	2,241	8,614	17,009	35%
RPS Requirements (UCS)	NA	2,396	1,282	2,004	5,682	

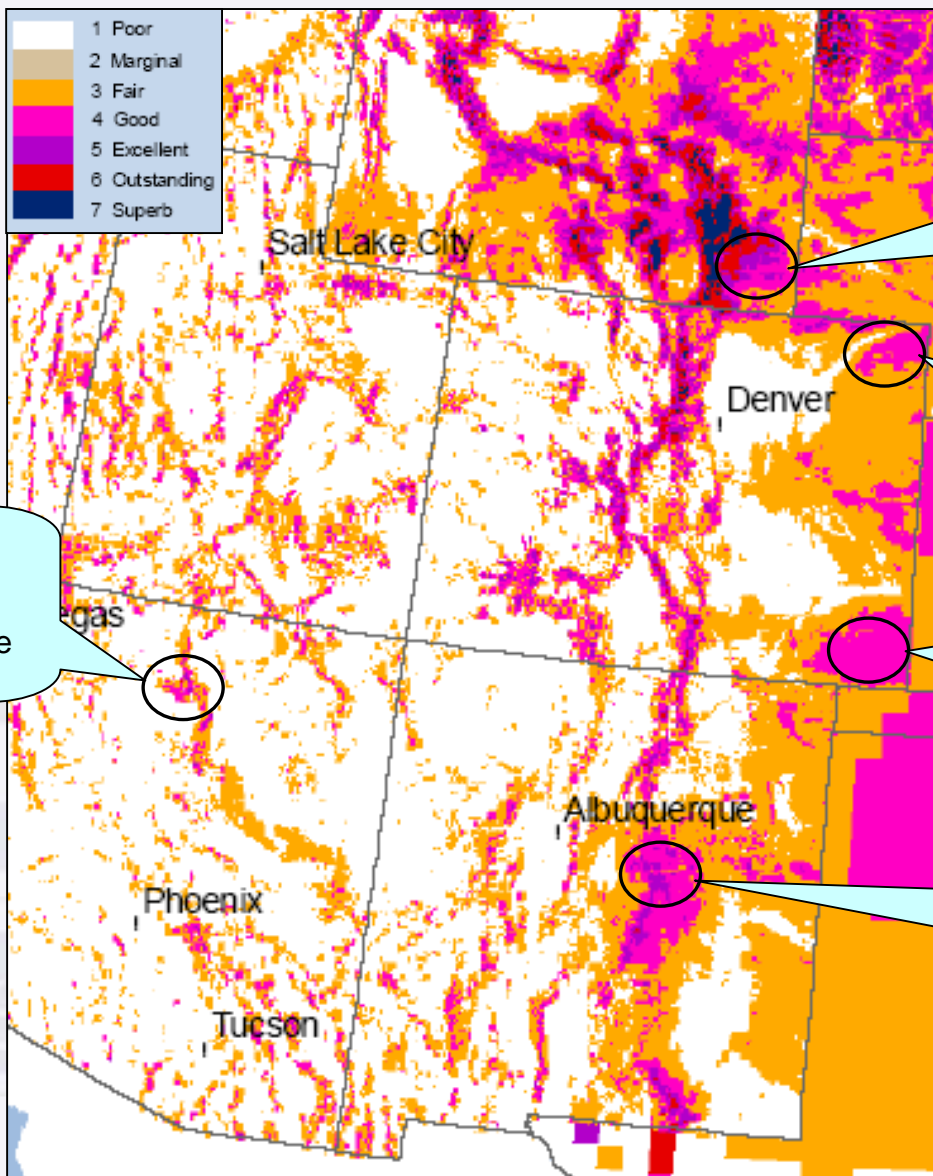
GENERATION (MWH)	WYOMING	COLORADO	NEW MEXICO	ARIZONA	TOTAL	SHARE
Coal	43,345,685	35,570,135	29,947,248	40,143,310	149,006,378	64%
Oil & Gas	367,277	11,940,336	4,224,127	28,936,475	45,468,215	20%
Nuclear	0	0	0	25,807,446	25,807,446	11%
Hydroelectric	808,375	1,415,296	164,993	6,410,064	8,798,728	4%
Renewables	717,264	810,561	799,274	73,995	2,401,094	1%
<b>TOTAL</b>	<b>45,567,307</b>	<b>49,614,265</b>	<b>35,135,642</b>	<b>101,478,655</b>	<b>231,795,869</b>	<b>100%</b>

CAPACITY FACTOR	WYOMING	COLORADO	NEW MEXICO	ARIZONA	TOTAL
Coal	85%	82%	86%	84%	84%
Oil & Gas	25%	29%	24%	26%	27%
Nuclear	NA	NA	NA	76%	76%
Hydroelectric	30%	25%	23%	27%	27%
Renewables	29%	39%	22%	53%	29%
<b>AVERAGE</b>	<b>78%</b>	<b>51%</b>	<b>62%</b>	<b>47%</b>	<b>54%</b>

LOADS	WYOMING	COLORADO	NEW MEXICO	ARIZONA	TOTAL
Megawatt Hours	14,137,727	48,353,236	20,638,951	69,390,686	152,520,600
% of Generation	31%	97%	59%	68%	66%



# The Wind Resource *(NREL Projections)*



1	Poor
2	Marginal
3	Fair
4	Good
5	Excellent
6	Outstanding
7	Superb

**Arizona**  
 30% Capacity Factor  
 30% Hourly St. Dev.  
 Max capacity 2% of time  
 ~1,000 MW potential

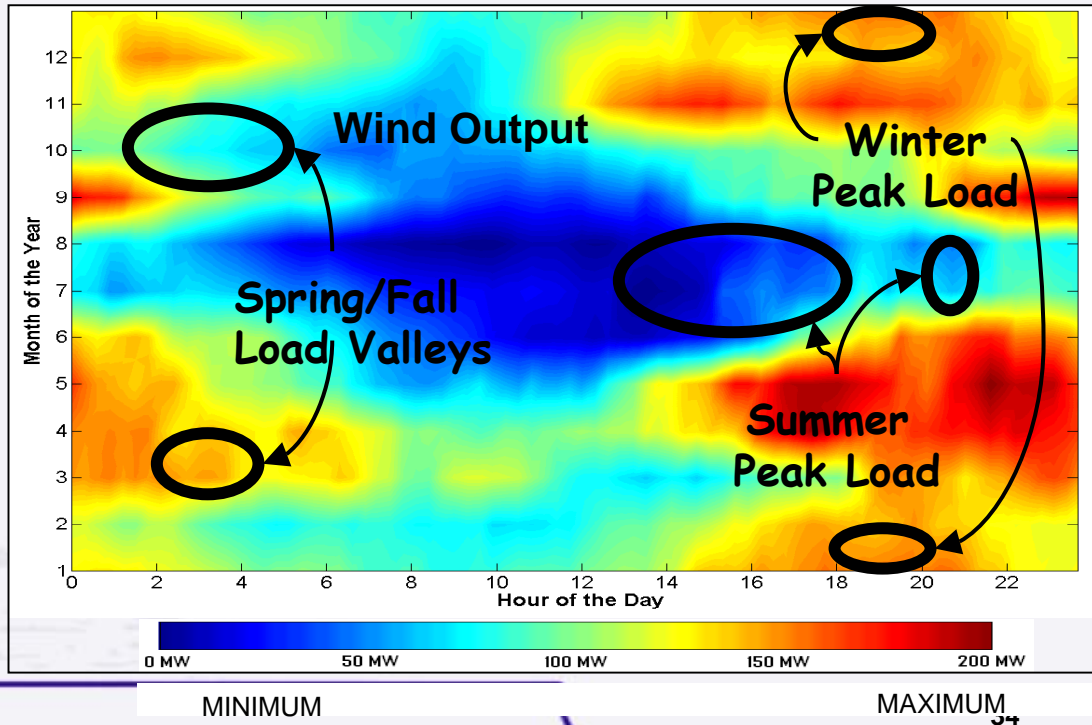
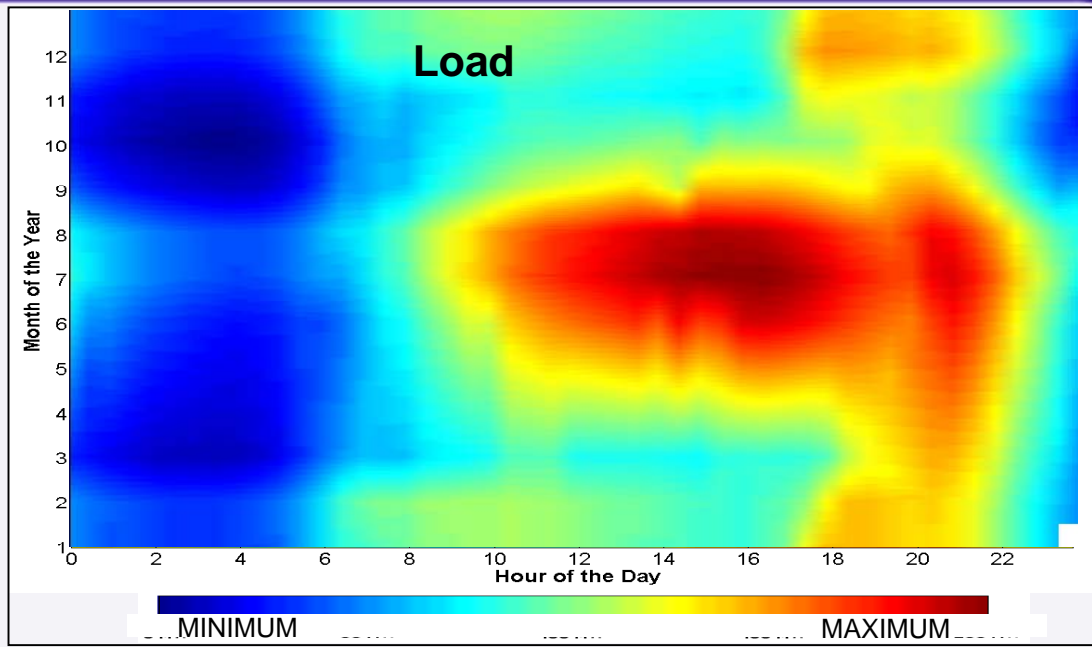
**SE Wyoming**  
 48% Capacity Factor  
 39% Hourly St. Dev.  
 Max capacity 11% of time  
 >10,000 MW potential

**NE Colorado**  
 41% Capacity Factor  
 40% Hourly St. Dev.  
 Max Capacity 15% of time  
 >10,000 MW potential

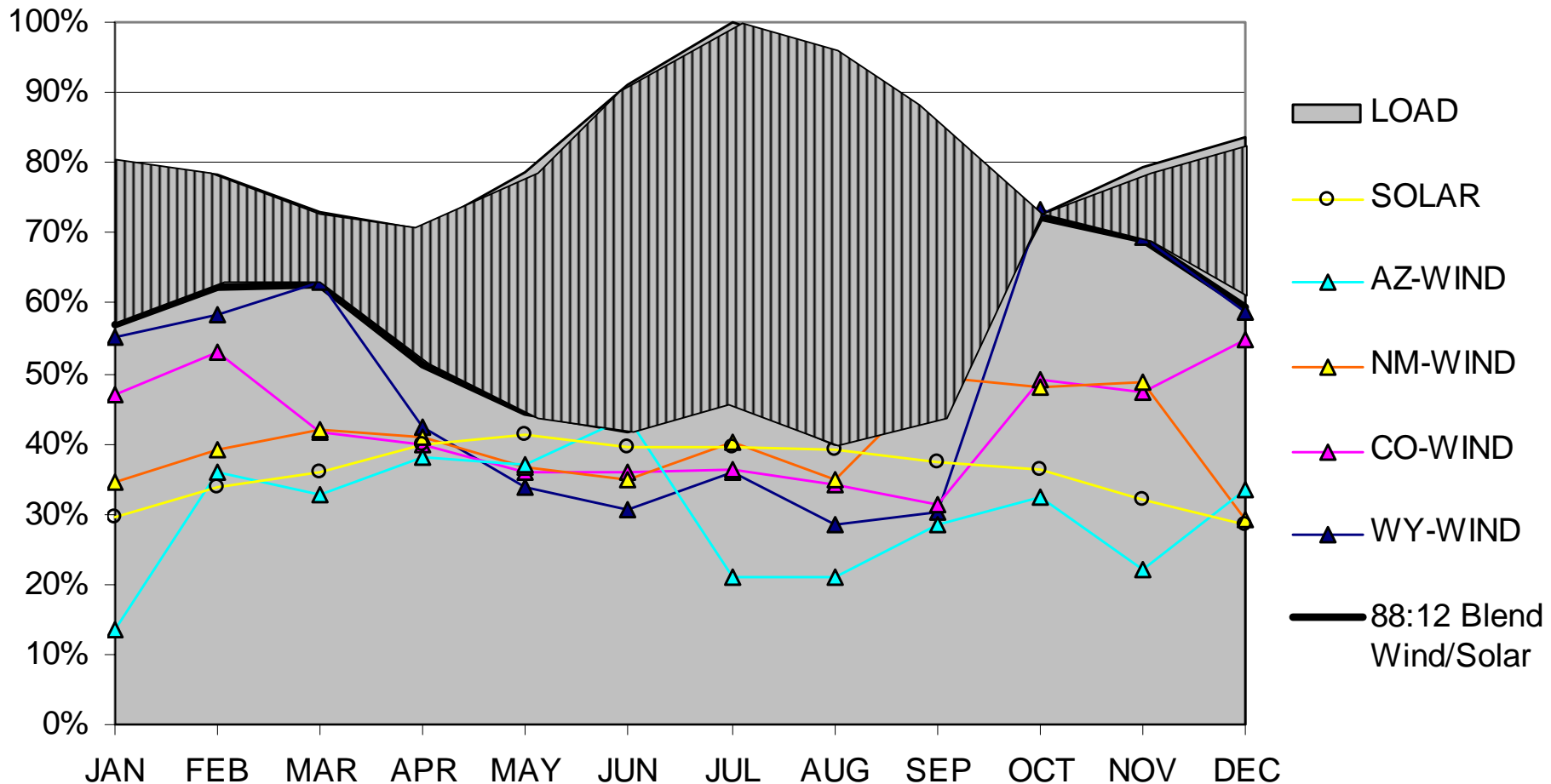
**SE Colorado**  
 43% Capacity Factor  
 28% Hourly St. Dev.  
 Max capacity 2% of time  
 >10,000 MW potential

**New Mexico**  
 40% Capacity Factor  
 33% Hourly St. Dev.  
 Max capacity 15% of time  
 >10,000 MW potential


- Windfarm output vs. control area load.
- Dispatchables will need to be used to firm wind for peak load conditions



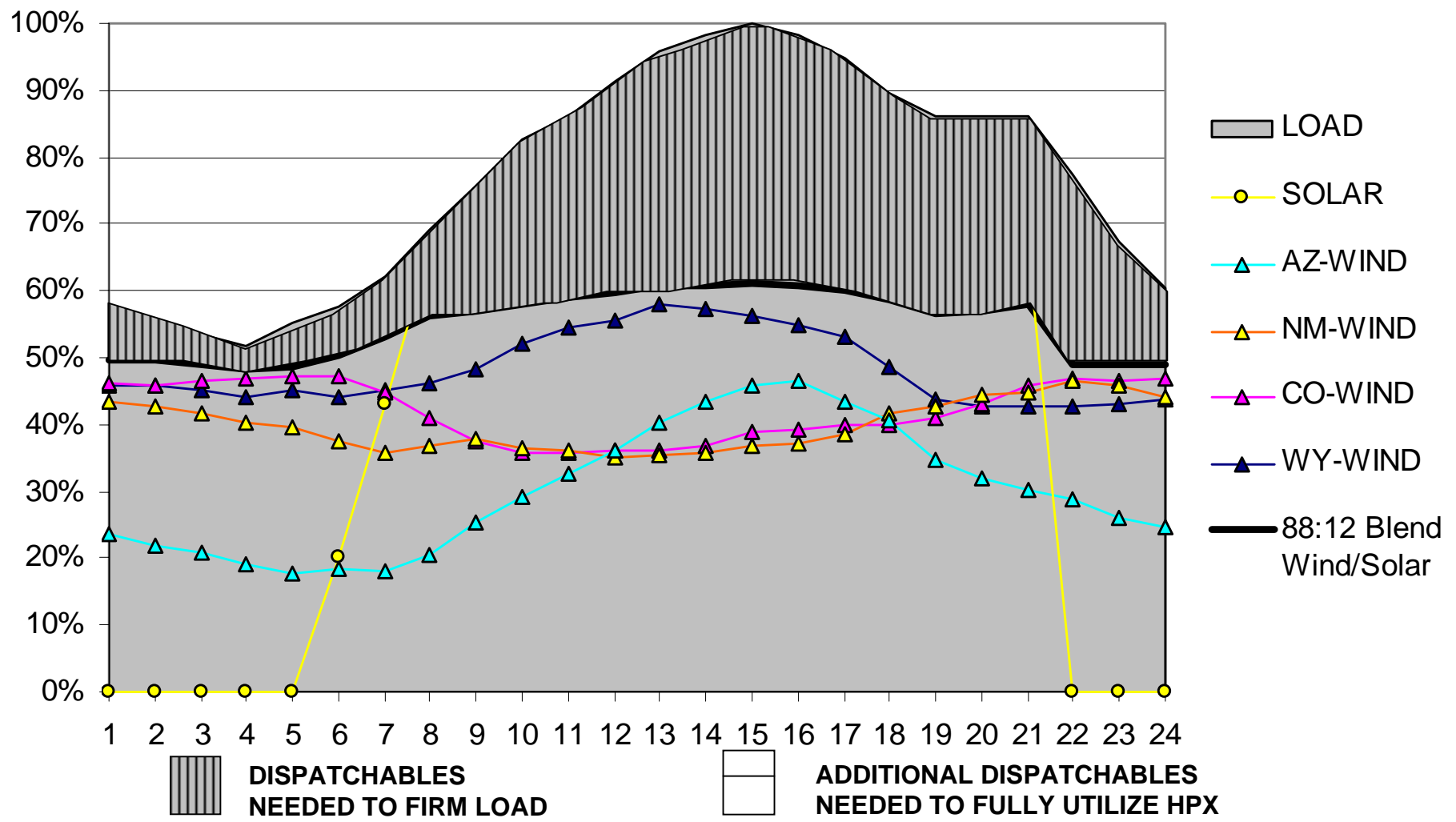
# Load vs. Wind Availability: Monthly



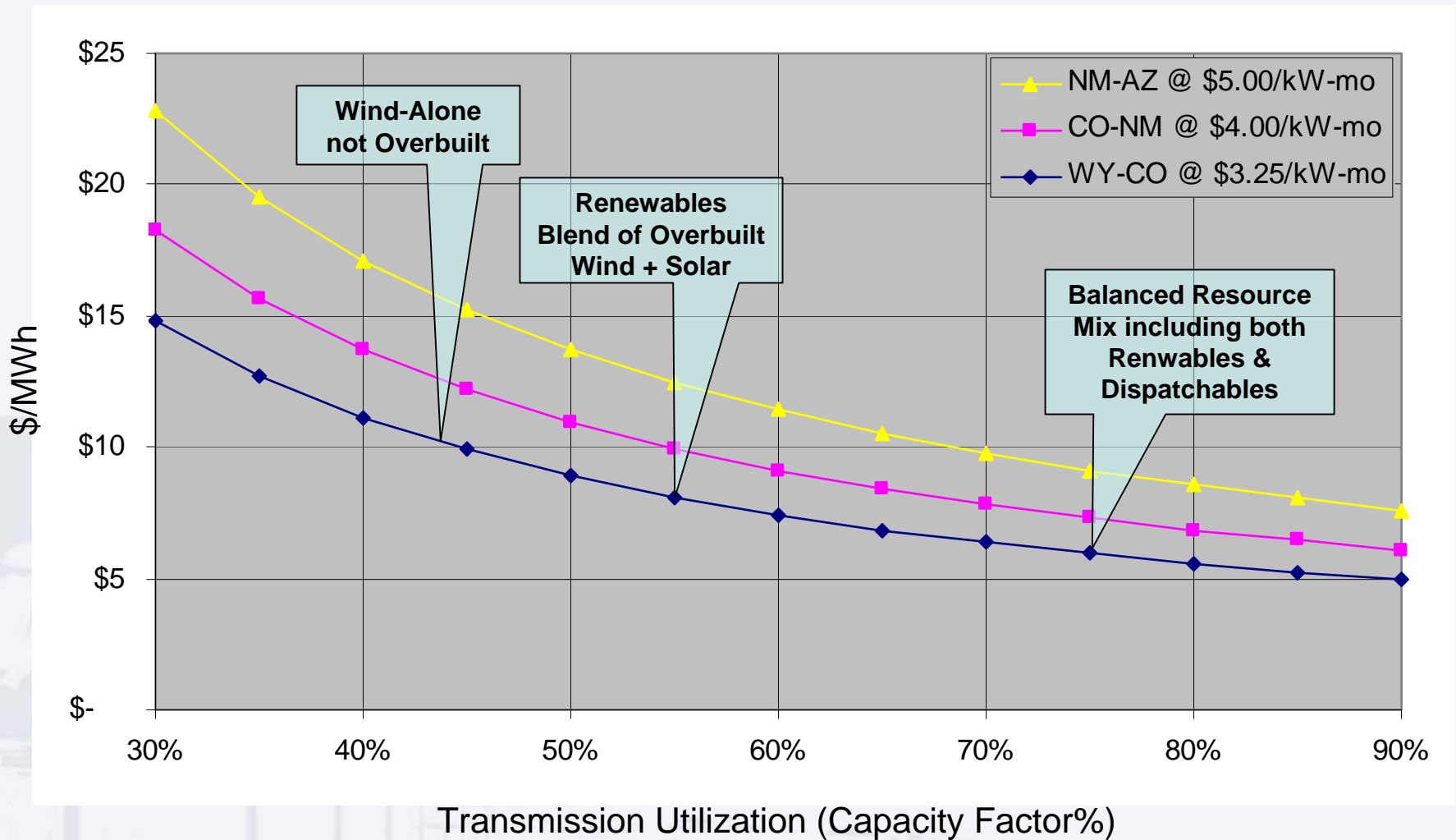
 **DISPATCHABLES NEEDED TO FIRM LOAD**

 **ADDITIONAL DISPATCHABLES NEEDED TO FULLY UTILIZE HPX**

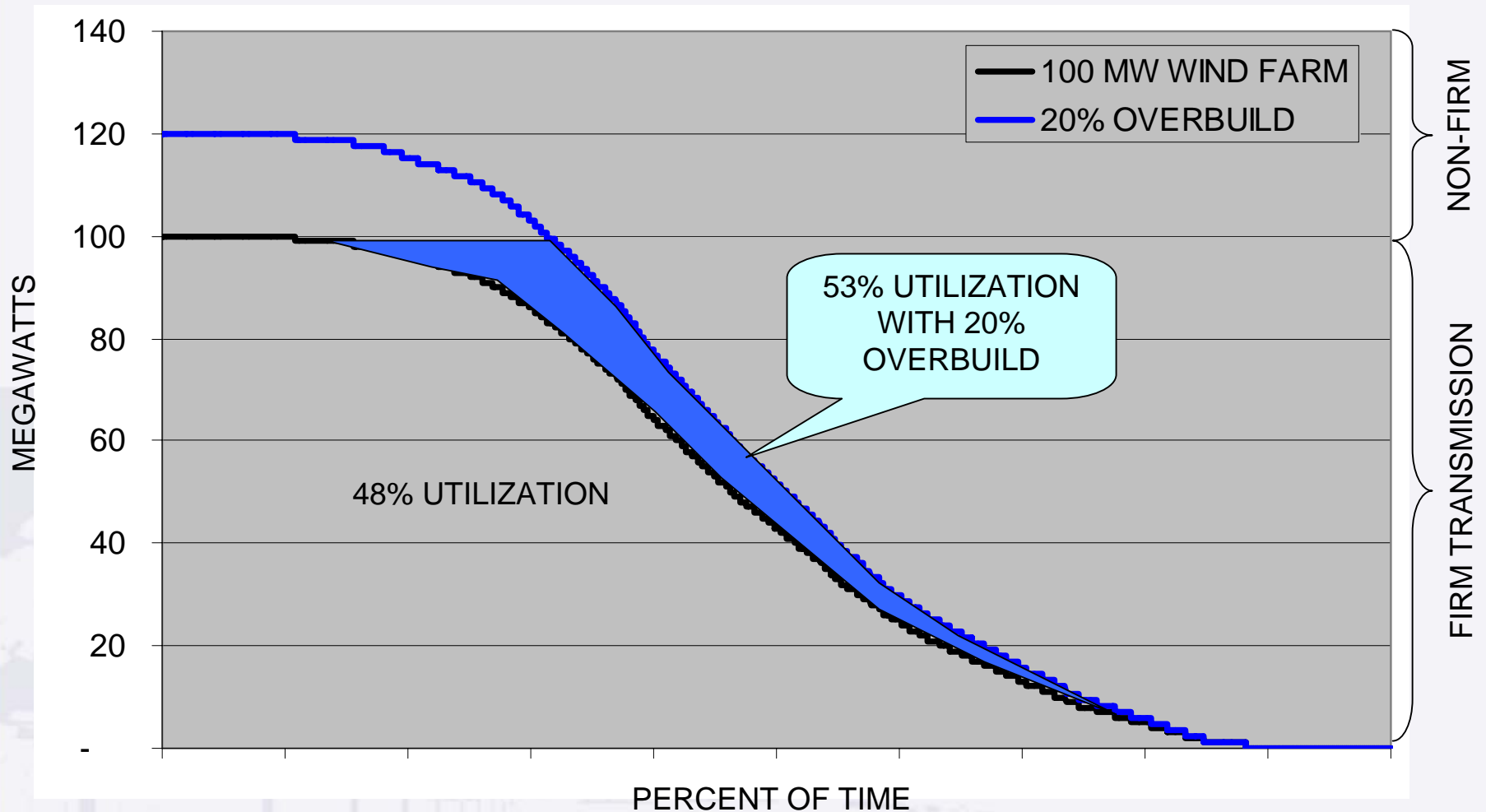
# Load vs. Wind Availability: Hourly



# Higher Transmission Utilization = Lower Delivered Energy Costs



# Wind Overbuild Example for SE Wyoming (NREL Projections)



# Benefit/Cost Analysis

- **Use of FEAST model developed by PG&E for the Frontier Line feasibility studies**
  - Stakeholder-vetted input assumptions, validated by multiple users
  - Adapted for use on HPX project
- **FEAST: A screening tool for the high-level evaluation of transmission feasibility involving new resources**
  - Frontier Economic Assessment Screening Tool (FEAST)
- **B/C ratio > 1.0 = Economic Feasibility**
  - Savings to customers (before the inclusion of transmission costs) must exceed \$500 million/year for B/C >1
  - Also measured in \$/year and \$/MWh
- **Key Assumptions:**
  - 3,500 MW, 9.3% line losses, utility financing & \$5.13 billion cost
  - HPX renewables mix: wind @ 10% overbuild & 500 MW Solar
  - Renewables-first dispatch concept used in some scenarios

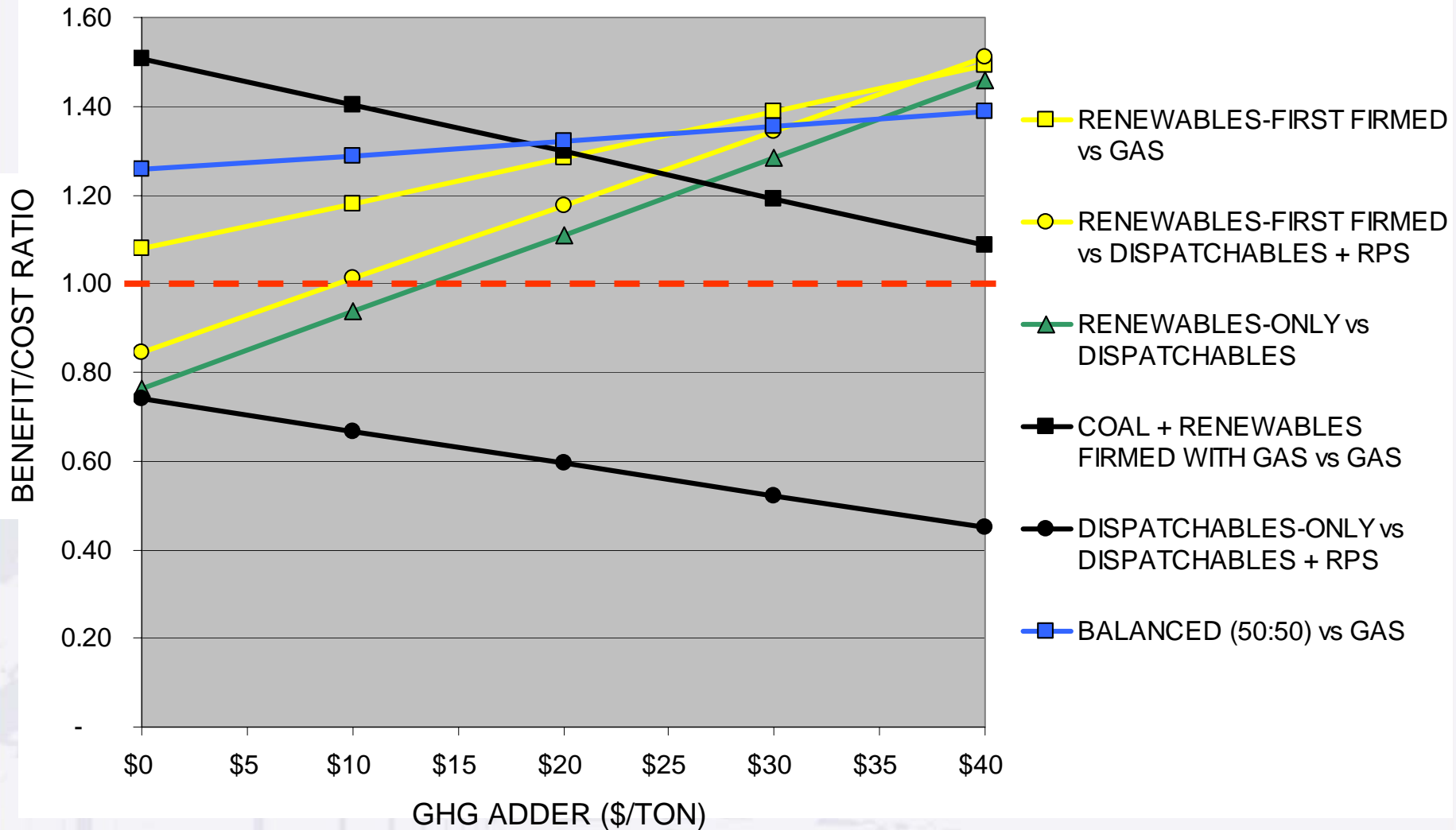
# High-Level HPX Feasibility Results

SOURCE	SINK	GHG	HPX FEASIBILITY				HPX ENERGY MIX			
			B/C	\$MM/YR	\$/MWH	UTLZ	WIND	SOLAR	COAL	GAS
RENEWABLES-ONLY	DISPATCHABLES (COAL/GAS)	\$10	0.94	(\$32)	(\$1.87)	56%	90%	10%	-	-
		\$20	1.11	\$56	\$3.21	56%	90%	10%	-	-
		\$30	1.28	\$144	\$8.30	56%	90%	10%	-	-
		\$40	1.46	\$232	\$13.36	56%	90%	10%	-	-
RENEWABLES-FIRST FIRMED WITH COAL & GAS	GAS	\$10	1.18	\$91	\$3.97	75%	67%	8%	13%	12%
		\$20	1.28	\$144	\$6.25	75%	67%	8%	13%	12%
		\$30	1.39	\$196	\$8.52	75%	67%	8%	13%	12%
		\$40	1.49	\$248	\$10.79	75%	67%	8%	13%	12%
RENEWABLES-FIRST FIRMED WITH COAL & GAS	DISPATCHABLES + 20% RPS	\$10	1.01	\$5	\$0.24	75%	67%	8%	13%	12%
		\$20	1.18	\$90	\$3.89	75%	67%	8%	13%	12%
		\$30	1.34	\$174	\$7.55	75%	67%	8%	13%	12%
		\$40	1.51	\$258	\$11.21	75%	67%	8%	13%	12%
COAL + RENEWABLES FIRMED WITH GAS	GAS	\$10	1.40	\$204	\$8.86	75%	28%	-	61%	11%
		\$20	1.30	\$150	\$6.53	75%	28%	-	61%	11%
		\$30	1.19	\$97	\$4.20	75%	28%	-	61%	11%
		\$40	1.09	\$43	\$1.88	75%	28%	-	61%	11%
50:50 RENEWABLES & DISPATCHABLES	GAS	\$10	1.29	\$146	\$6.38	75%	52%	-	25%	23%
		\$20	1.32	\$163	\$7.12	75%	52%	-	25%	23%
		\$30	1.36	\$180	\$7.85	75%	52%	-	25%	23%
		\$40	1.39	\$197	\$8.59	75%	52%	-	25%	23%
DISPATCHABLES-ONLY (COAL/GAS)	DISPATCHABLES + 20% RPS	\$10	0.67	(\$169)	(\$7.33)	75%	-	-	52%	48%
		\$20	0.59	(\$205)	(\$8.93)	75%	-	-	52%	48%
		\$30	0.52	(\$242)	(\$10.53)	75%	-	-	52%	48%
		\$40	0.45	(\$279)	(\$12.13)	75%	-	-	52%	48%

B/C < 1  1.0 - 1.2  1.2 - 1.4  > 1.4



# HPX Economic Feasibility (FEAST)



# Conclusions (1 of 2)

- **Primary Conclusions from High-Level Economic Screening:**
  - A mix of renewable & dispatchable resources provide the best B/C ratios
  - A balanced resource mix of renewables & dispatchables provides the best B/C ratios over a range of GHG costs
  - HPX is economically feasible in most scenarios considered
    - ▶ The B/C ratio increases for renewable-dominated portfolios at higher GHG \$
    - ▶ The B/C ratio declines for dispatchable-dominated portfolios at higher GHG \$
  - HPX will facilitate a multitude of resource mixes over time to remain cost-effective while remaining consistent with public policy
- **The operational practicality of co-dispatching renewables & dispatchables will ultimately determine HPX's optimal resource mix**

# Conclusions (2 of 2)

- **Blending of renewables (between states & renewable types) improves their performance on HPX**
  - Higher line utilization, especially when “overbuilt”
  - Firming wind with wind/solar minimizes the need for dispatchables
  - Dispatchables needed during Summer months & Daylight hours
- **Dispatchables can be used to firm renewables & to maximize line utilization to improve effective renewable delivery rates**
  - Existing resources can be used to provide some of the dispatchables
- **Non-economic benefits would be additive to the economic benefits estimated by FEAST:**
  - Improved reliability
  - Facilitating public policy
  - Enabling renewable markets & regional power markets
  - Rural economic development

# Possible Next Steps – Phase II

- **Different Import/Export & Source/Sink Scenarios**
  - Varying energy resource mixes
- **Smaller Upstream, Larger Downstream Capacity**
  - Number of lines and/or varying voltages
  - Phased development
- **Sensitivity Analysis**
  - Line Utilization: Traditional (serving load) or “baseload” Pipeline?
  - Overbuild Scenarios
  - Gas price differentials between states
  - Alternate Scenarios requested by Stakeholders
- **Assessment of benefits for each HPX state**
- **Detailed economic modeling: dispatch model**
- **Identify & assess non-economic benefits**
- **More accurate assessments of wind performance**
- **Study the practicalities of co-dispatching renewables & dispatchables for a renewables-first project**



# Questions on Economic Studies

# Next Steps

**Robert Kondziolka**  
**Manager, Transmission Planning**  
**Salt River Project**

**[robert.kondziolka@srpnet.com](mailto:robert.kondziolka@srpnet.com)**

# Phased Approach

## **Phase 1** *Feasibility*

- Complete Studies
- Finalize Study Report

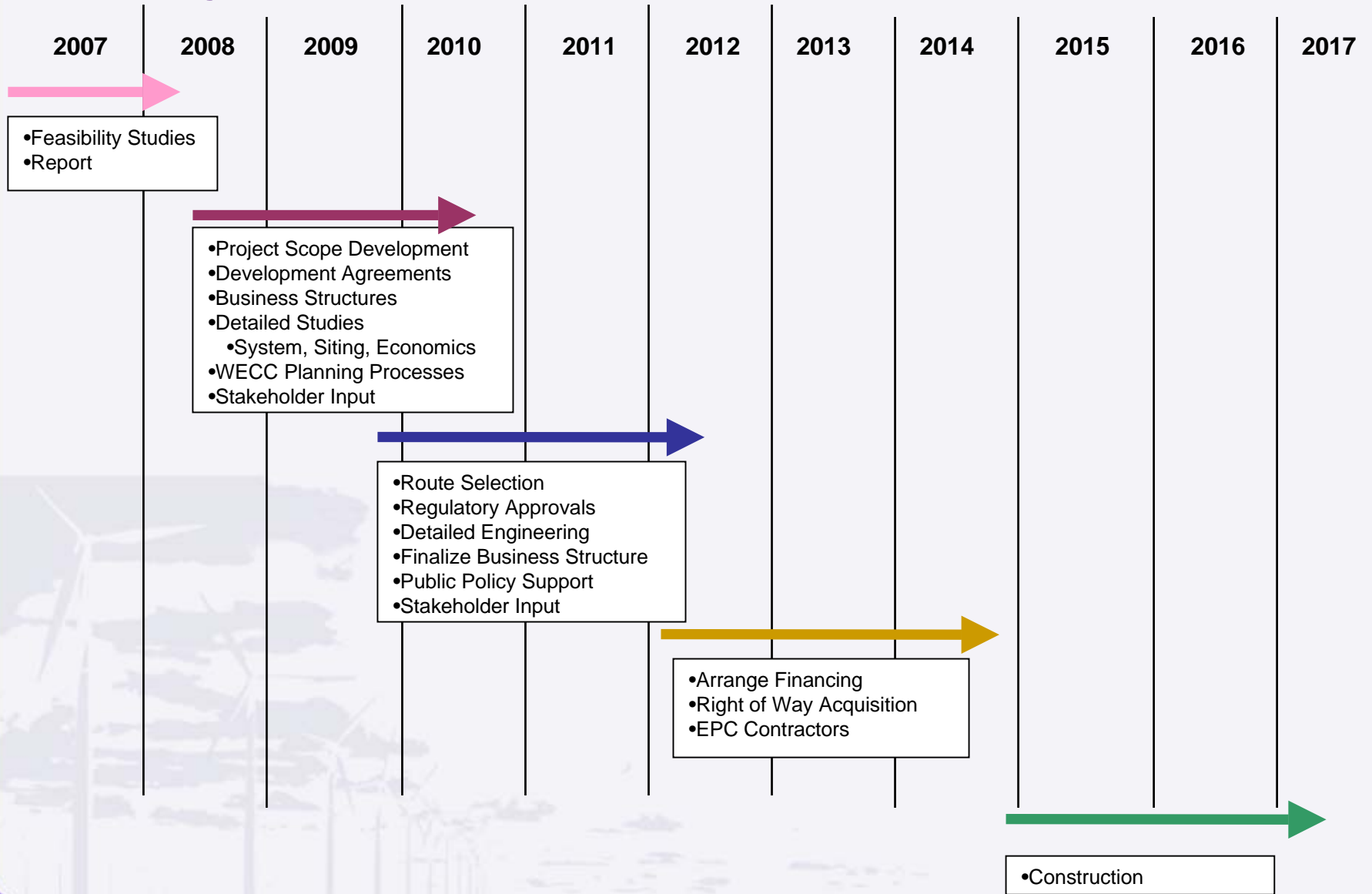
## **Phase 2** *Development*

- Project Definition
- Ownership Negotiations
- Detailed System, Siting & Economic studies
- Commercial Issues
- Regulatory and Policy Issues

## **Phase 3** *Implementation*

- Design, Engineering
- Right of Way Procurement
- Construction
- Operation

# Project Milestone Schedule





# Regional / Sub-regional Coordination

## ➤ **WECC**

➤ [www.wecc.biz](http://www.wecc.biz)

➤ **Procedures for Regional Planning and Project Rating**

## ➤ **WestConnect**

➤ <http://www.westconnect.com/>

## ➤ **Colorado Coordinated Planning Group**

➤ **Next meeting December 11, 2007 in Denver**

## ➤ **Southwest Area Transmission**

➤ **Next meeting January 15-16, 2008 in Las Vegas**

# Project Ownership & Management

- **Who ultimately participates in HPX?**
  - Risk/reward profile for each party
  - Ownership shares
  - Development agreements & governance
- **Segmented or shared ownership?**
  - Shared transmission ownership is the norm in WECC
  - Segmented ownership: separate projects with different partners in each segment (the current situation: WCI, EPTP, SunZia)
    - ▶ How do these projects get linked?
- **If shared ownership, how is HPX development managed?**
  - HPX Board of Directors comprised of project owners
  - HPX project management team
    - ▶ Shared or exclusively dedicated resources
- **Who funds development?**
  - Budget for multi-phase development process
  - Significant development costs to get to go/no-go decision
  - Source of development funding and to what extent is it recoverable

# Siting and Route Selection

- **Optimized land use planning**
  - **Shared infrastructure corridors**
  - **Focus on low-value private land in flat, non-sensitive areas**
- **Avoidance of critical areas**
  - **Communities**
  - **Crossings: rivers & infrastructure (roads, railroads, transmission, etc.)**
  - **Sensitive wildlife & vegetation areas**
  - **Set-Aside Areas: parks, grasslands, forests, scenic corridors, etc.**
  - **Tribal Lands**
  - **Topographic: mountains, ridges, river valleys, etc.**
  - **Crop irrigation systems**
- **Use of Independent Consultants**
  - **GIS and field methods**
  - **Collection of information from public & private agencies**
- **Stakeholder input for route selections prior to permitting**
  - **Community meetings to vet alternatives**

# Commercial Issues

- **Corporate Differences between Current HPX Participants**
  - **Investor-Owned (IOU): Xcel & PNM**
  - **Public Power: SRP, Tri-State, CSU & PRPA**
  - **Federal Power: WAPA**
  - **Trans-Elect: Independent Transmission Developer**
  - **State Transmission Authorities: WIA, RETA & CEDA?**
- **Cost Recovery & Allocation Scenarios**
  - **Assured: for the benefit of HPX participants' customers**
    - ▶ **Demonstration of need for import/export options to benefit local customers**
  - **Merchant: market risk & pre-building for future needs**
    - ▶ **Portion of exports in excess of displacements**
  - **Role of Public Policy: State and Federal Government**
    - ▶ **Financial incentives/support: bonding, tax abatement, returns, depreciation, loans, etc.**
    - ▶ **Cost Recovery**
    - ▶ **WAPA's role and charter**

# Regulatory / Policy Issues

- **Federal Government: FERC, DOE**
- **Western Governors Association**
  - **Regional development of renewables**
    - ▶ Absent a regional plan, renewables market cannot be enabled
  - **Parallel effort to HPX development**
    - ▶ Cost Recovery & Allocation
    - ▶ Optimized land use & transmission planning
    - ▶ Independent assessment of need
- **State**
  - **State Commissions**
  - **Transmission Authorities**
- **WECC**
  - **Detailed Studies**
  - **Regional Planning Process**
  - **Project Rating**

# Participant Comments

- **Joanna Prukop**

- **Cabinet Secretary**
- **New Mexico Energy, Minerals and Natural Resources**

- **Steve Waddington**

- **Executive Director**
- **Wyoming Infrastructure Authority**

- **Jeff Mechenbier**

- **Director of Transmission Analysis**
- **Public Service Company of New Mexico**

- **Mark Graham**

- **Manager, Transmission Planning**
- **Tri-State Generation & Transmission**

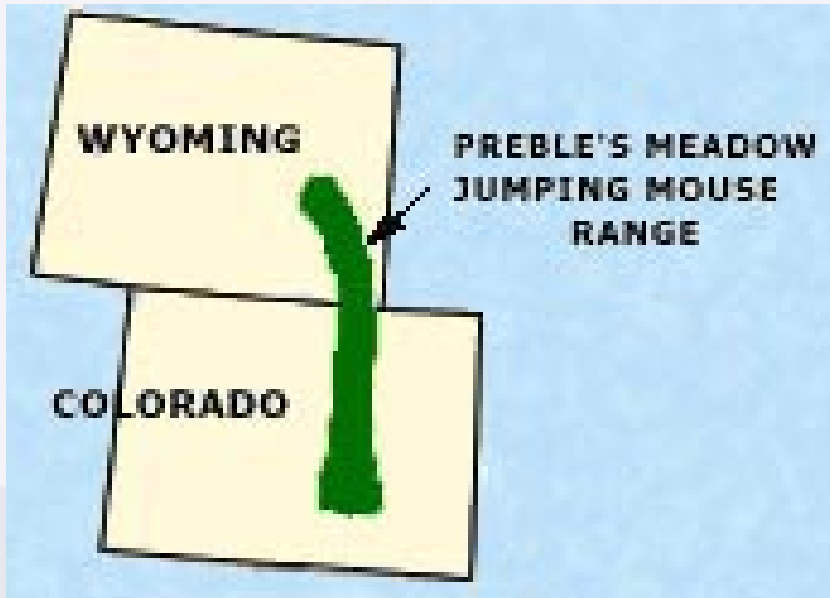
# Lesser Prairie Chicken

<http://www.westgov.org/wga/initiatives/HighPlains/leaflet.htm>



# Preble's Meadow Jumping Mouse

<http://www.fws.gov/mountain%2Dprairie/species/mammals/preble/Index.htm>







# Stakeholder Input

# Responses to Stakeholder Questions Received



# Responses to Stakeholder Questions

- **What is the planned generation resource mix for HPX?**
  - HPX is planned to enable renewable and other economic resource development.
  - Dispatchable resources are needed to maximize transmission utilization to firm renewables.
  - Studies indicate that economics (B/C ratios) are most favorable with renewable/fossil resource mix.
  - Fossil only and Renewable-only scenarios were the least favorable.
- **Will Solar power be a part of the HPX resource mix?**
  - At this time, solar is more expensive than wind resources. However, its availability during the times when wind generally isn't available supported its inclusion into HPX's resource mix for economic evaluation.
  - The general route for HPX does not pass through solar regions in Colorado, but does in New Mexico. Transmission to accommodate Colorado solar will continue to be evaluated through SB07-100 studies.

# Responses to Stakeholder Questions

## ➤ **Why is HPX needed?**

- **To meet a portion of the expanding energy needs in the region.**
- **To provide a cost-effective “pipeline” to access & deliver economic energy throughout the region.**
- **To expand markets for renewable power resources.**
- **To improve the reliability of the transmission grid.**

## ➤ **Will the State Regulatory Authorities be asked to assist with rate recovery for HPX?**

- **To the extent that HPX serves/benefits native load.**
- **There will be merchant components, particularly for exports in excess of resources displaced by imports, which may require public policy support.**

## ➤ **What is the role of State Transmission Authorities?**

- **Integral in planning and in public policy development and support.**
- **Potential role in cost recovery support.**
- **Potential source of low-cost financing backed by bonds.**

# Responses to Stakeholder Questions

- **Have routes been selected?**
  - **Routes have NOT been selected – a process that will involve extensive public input prior to and during permitting activities. To date, only conceptual routing has been considered, which has been focused on intersecting major renewable resource zones within each affected state.**
- **Will you consider avoidance of Military Training Facilities?**
  - **HPX will seek input from the Military, as such activities are prevalent along potential HPX routes**
- **Are you aware of sensitive habitat for species such as the Lesser Prairie Chicken in SE Colorado?**
  - **Wildlife and vegetation habitat will be mapped and HPX routes devised to mitigate and avoid impacts**
  - **Western Resource Advocates & WGA recently sponsored a wildlife/transmission planning workshop to coordinate activities**

# Responses to Stakeholder Questions

- **Is HPX competing with other sub-regional transmission plans?**
  - **No.** Participants in other sub-regional projects have indicated that the individual projects can be considered as “building blocks” of the HPX project. Although each project may be developed independently, coordination would be addressed through existing regional and sub-regional planning processes.
- **How will HPX interact with projects such as the TransWest Project?**
  - Although the Feasibility Study did not include TransWest or other “mega” projects, we expect that HPX will be complimentary.
  - As each of these projects matures, interactions will be studied in more detail. WECC and other processes require such studies.

# Responses to Stakeholder Questions

- **Will HPX compete with and/or preclude the development of in-state resources?**
  - HPX is likely to provide only a portion of each state's energy needs, thereby leaving much to be supplied from in-state sources.
  - HPX could enable the development of import/export markets for renewables which don't currently exist, thereby expanding markets for renewables.
  - To some extent, HPX may facilitate the displacement of in-state fossil fuel development with renewables, although those resources will be needed to "firm" wind.
- **To what extent are there benefits for each HPX state?**
  - Wyoming: Exports of wind and associated economic development
  - Colorado: Reduced power costs, blending with imported wind & downstream exports
  - New Mexico: Reduced power costs, blending with imported wind & downstream exports
  - Arizona: Reduced power costs and blending with imported wind

# Responses to Stakeholder Questions

- **Did you consider DC Alternatives?**
  - **While DC transmission lines may be cheaper, it is very difficult to identify benefits for parties/states along a DC line that wouldn't have access to power carried on the line, unless expensive converters were installed**
  - **DC does little to improve reliability to the region's transmission grid**
- **To what extent has generator tripping been considered in HPX planning?**
  - **The intent has been to design a project that will not require generation tripping for most contingency conditions.**





# Stakeholder Questions / Comments