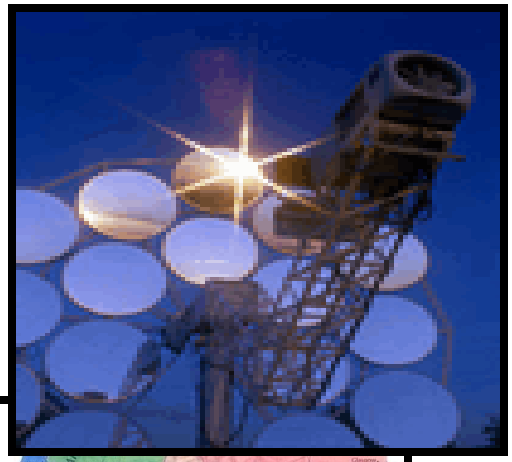
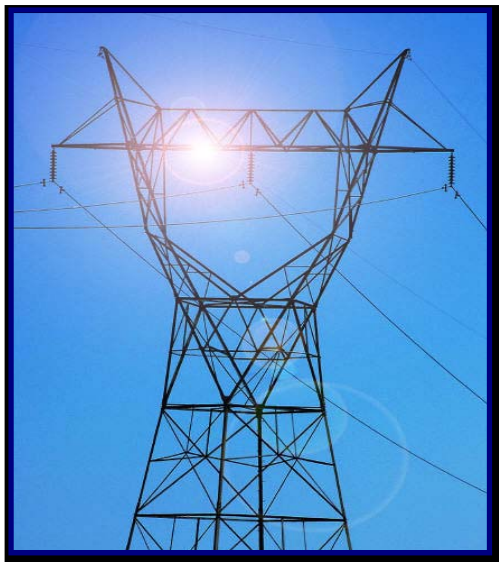
February 24-25, 2009

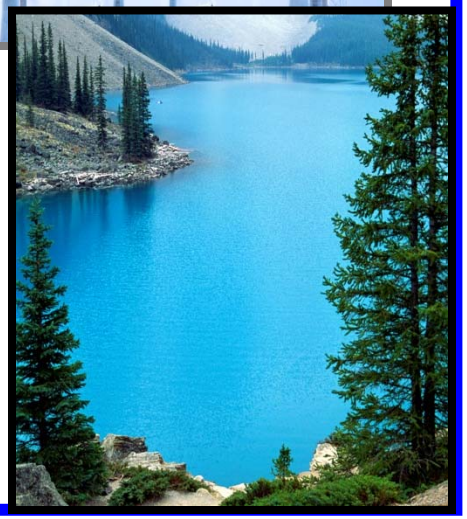
Meeting of
Load Serving Entities,
Public Utility Commissioners, and
Resource Planners

“Towards 2020”

Western Governors’ Association







Michael R. Niggli,
Chief Operating Officer
San Diego Gas & Electric Co.

February 24, 2009

Capital Corporation

"Towards 2020"

Load-Resource Balance (Western Interconnection)

Participants

of Pinnacle West Capital Corporation

"Towards 2020"

Load-Resource Balance (Western Interconnection)

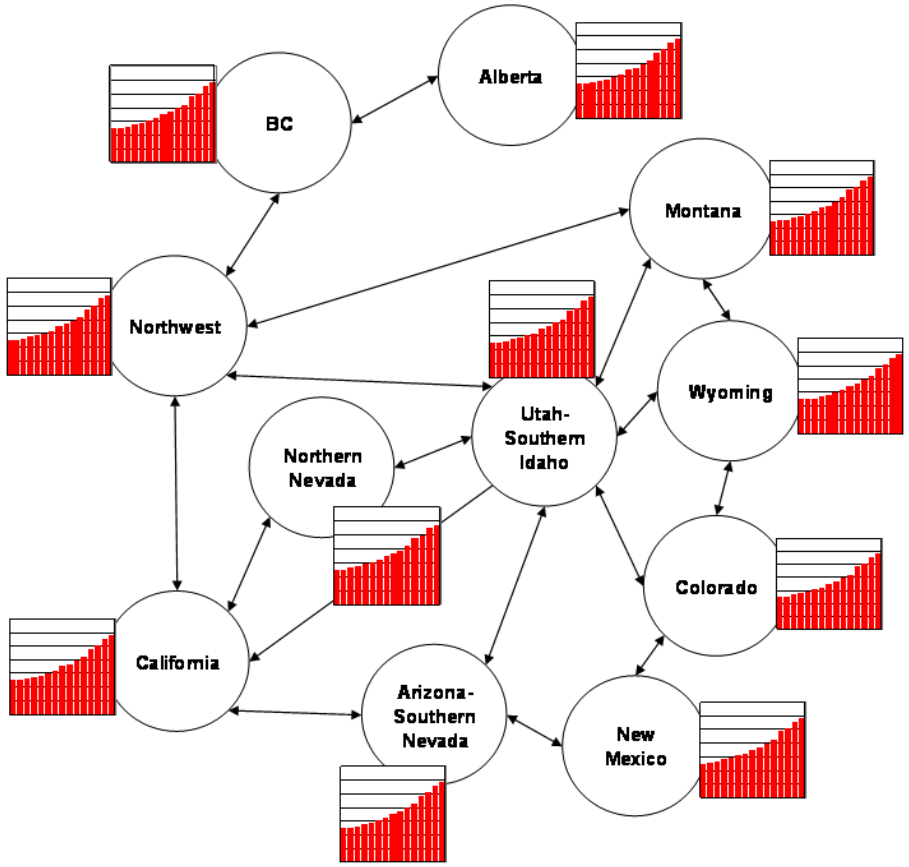
MAJOR PARAMETERS EXAMINED

- Regional Production Costs
- Resource "Firming" Costs
- Transmission "Integration" Costs
- Supply/Demand Curves
- Multi-Regional Evaluation
- Renewable Energy Credits

Publicly Available Data

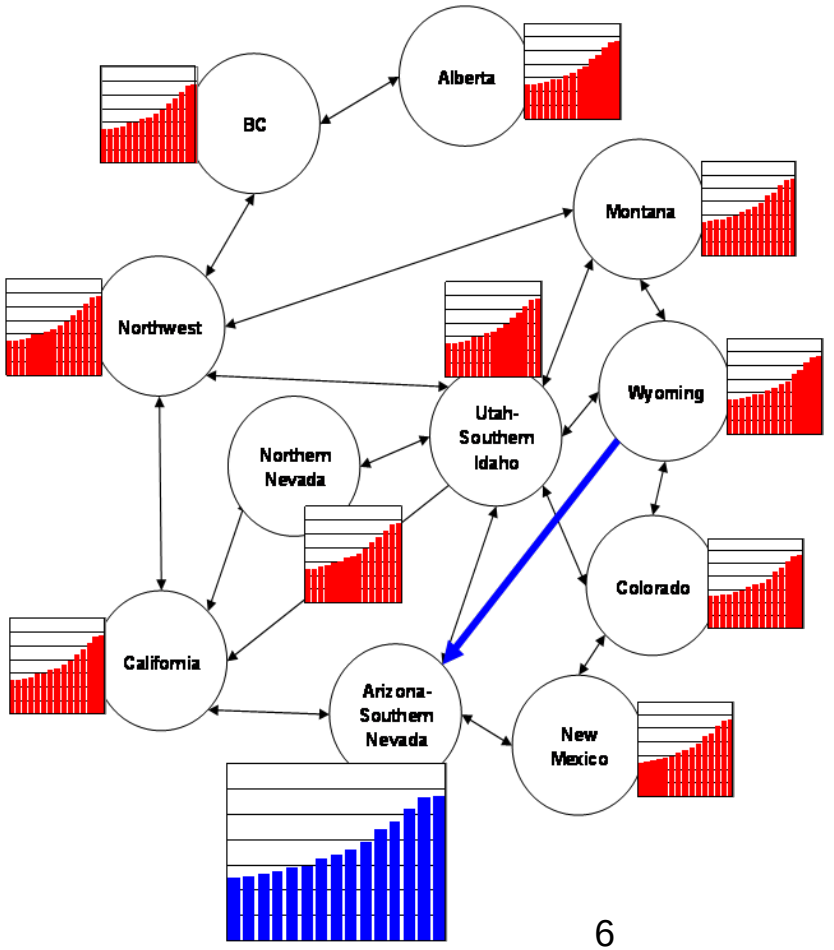
Step 1: Cost of Procuring Energy from Local Resources

- Divide the WECC into 11 regions
- Start with 2008 loads and resources by region
- Grow loads to 2020
- Add least-cost ***local*** resources on a MWh-for-MWh basis to meet load growth, RPS and GHG requirements



Step 2: Change in Energy Cost from Adding Transmission

- Assume fixed-capacity DC transmission line from one region to another
- Allow resources not selected in "source" region to meet needs in "sink" region
- Calculate change in sink region energy costs
- Forward-looking only; no change in use of existing resources



What Drives the Value of New Transmission?

- Differences in supply curves by region
  - Lower land and labor costs in interior West
  - Superior resource endowments in supply regions
- Differences in demand by region
  - Consuming regions like California and the Northwest use up larger shares of their resource endowments to meet RPS targets
  - Producing regions like Wyoming and Montana do not require much energy to meet local load growth or RPS targets

Benefit-Cost Ratios for 1500 MW Line Under Base Case RPS

- Add up state-by-state RPS requirements:
  - 15% of energy in the WECC renewable by 2020
  - 14,000 aMW of new resources WECC-wide
- WY-CO most cost-effective path
- Several other interesting possibilities

Benefit-Cost Ratio for 1500 MW Line, Base Case RPS

		Consuming Region			
		AZ	CA	CO	NW
Producing Region	MT	0.7	0.9	0.7	1.2
	NM	1.1	0.9	0.7	0.4
	NV	0.3	0.6	0.2	0.3
	WY	1.3	1.3	3.2	1.1

Key:	>1.0	0.7-1.0	<0.7

Benefit-Cost Ratios for 1500 MW Line Under High RPS

- High RPS Case, 30% RPS in CA, 25% elsewhere
  - 27% of energy in the WECC renewable by 2020
  - 28,000 aMW of new resources WECC-wide
- Lines into CA and NW gain value
- Lines into CO lose value due to wind integration

Benefit-Cost Ratio for 1500 MW Line, High RPS

		Consuming Region			
		AZ	CA	CO	NW
Producing Region	MT	0.6	1.0	0.6	1.6
	NM	0.9	1.0	0.5	0.6
	NV	0.3	1.3	0.2	1.0
	WY	1.3	1.3	2.9	1.3

Key:	>1.0	0.7-1.0	<0.7

Benefit-Cost Ratios for 1500 MW Line Under CO2 Reduction Case

- Reduce CO2 by 30% from 2008 levels
  - 43,000 aMW of new low-carbon resources in WECC by 2020
  - Allow nuclear and IGCC with carbon capture as low-carbon resources
- WY still big supplier if IGCC pans out
- NW and CA still big buyers

Benefit-Cost Ratio for 3000 MW Line, CO2 Reduction Case

		Consuming Region			
		AZ	CA	CO	NW
Producing Region	MT	0.3	0.9	(0.1)	1.5
	NM	0.5	1.2	0.0	0.8
	NV	0.0	0.9	-	0.8
	WY	1.3	1.7	2.5	1.7

Key:	>1.0	0.7-1.0	<0.7

Benefit-Cost Ratios for 1500 MW Line Under Low Solar Cost Case

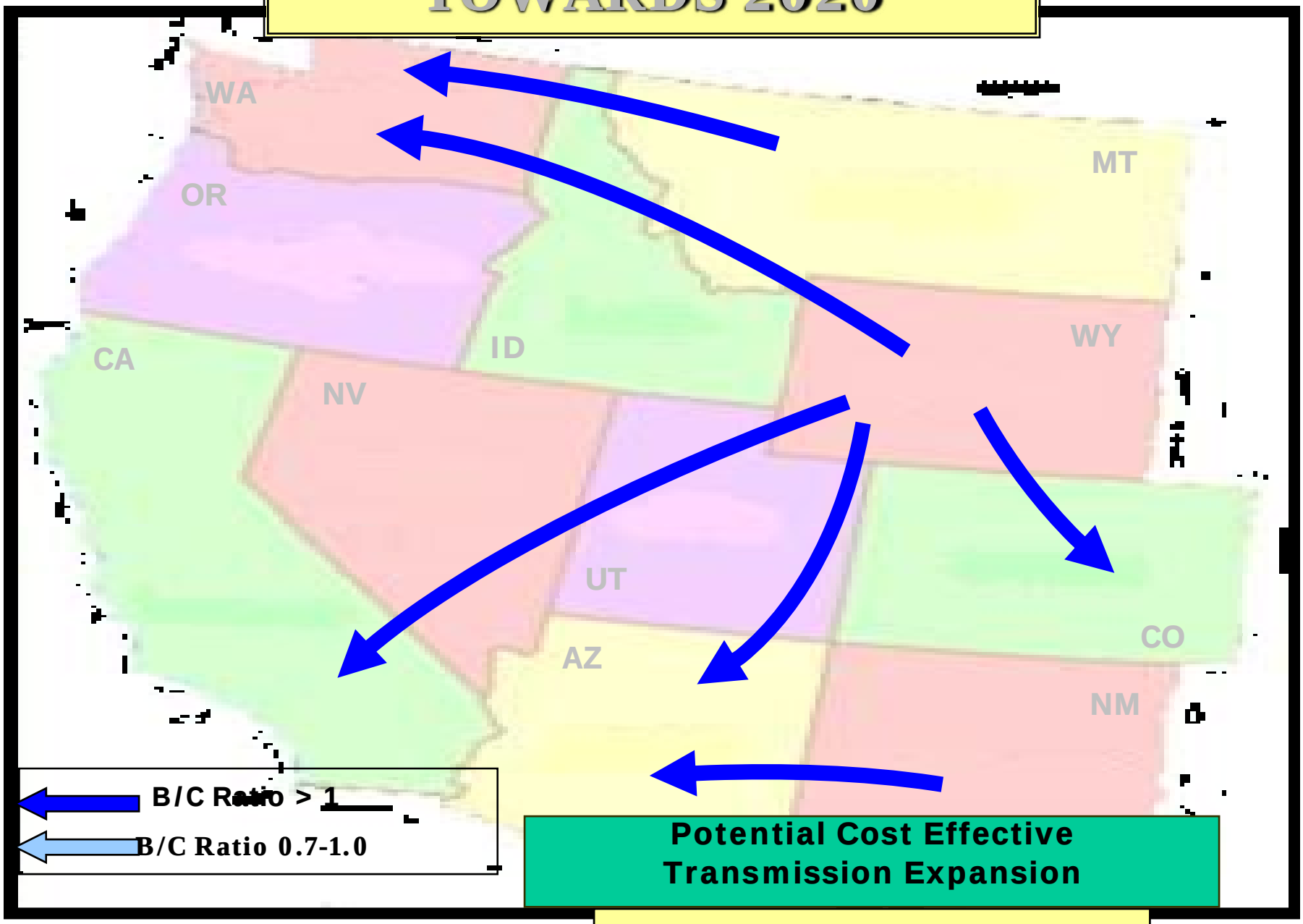
- Reduce cost of solar thermal by 20%
- Base case RPS
- Model selects 10,500 MW of solar thermal in AZ, CA and CO
- Lines into CA, CO and AZ lose value
- NW values unaffected

Benefit-Cost Ratio for 3000 MW Line, Low Solar Cost Case

		Consuming Region			
		AZ	CA	CO	NW
Producing Region	MT	0.3	0.7	0.1	1.2
	NM	0.4	0.8	0.3	0.5
	NV	-	0.4	(0.1)	0.4
	WY	0.9	1.1	1.7	1.1

Key:	>1.0	0.7-1.0	<0.7

TOWARDS 2020



Base Case RPS

What Can We Do?

- Recognize the interdependency of our networks.
- Recognize the benefits of this interdependency.
- “Electric transmission is a key element in unlocking substantial environmental value.”
  - Renewable energy enablement
  - Electrifying transportation
- Establish a common vision among disparate groups.

What Can We Do?

- Finalize Renewable Energy Zones
- Establish Transport Corridors that are
  - reliable
  - effective
  - economic
- Develop Common Siting Principles, such as
  - Garamendi Principles
    - Follow existing corridors
    - Focus on previously disturbed areas
    - Provide objective approach
- Minimize Subsequent Project-Specific Environmental Reviews
  - Focus on impacts not previously analyzed in corridor designation process
- Establish a REC Trading Market

Challenges Facing Utilities and Resource Planners

Session 1

What is Needed to Advance a Resource Agenda?

--Brad Albert, Arizona Public Service

- **Regulatory Support of Resource Direction:**
  - Typically obtained thru resource plan proceedings
- **Clear Support for Future Cost Recovery:**
  - Future capital requirements (PPA or ownership) greatly exceed current capitalization
  - Most resource options are above current customer rates
  - "Preferred" resource choices are above conventional market, will not be built speculatively, and require long-term commitments
- **Joint Procurement Opportunities Will Evolve Naturally:**
  - Southwest utilities have a long history of joint project development
  - Utilities will develop partnerships where needed to:
    - Achieve economies of scale
    - Reduce the risk to acceptable levels
    - Overcome development/procurement barriers
- **Transmission to Fulfill Native Load Renewable Needs:**
  - Current system (plus planned additions) can facilitate much renewable resource development:
    - Proximity of excellent solar resources to load centers
    - Some ability to incorporate wind onto existing transmission system
  - New lines (and upgrades) will be needed over time
  - ACC has supported infrastructure additions:
    - Siting approvals, BTA process
  - Long-line transmission for intermittent resources does not provide compelling benefits versus in-state solar resources

Resource Planning Challenges

--Lisa Schwartz, Oregon PUC

1) Government mandates and restrictions on resource choices make utility resource planning less relevant.
2) Timing for resource planning, resource acquisition and transmission is out of whack.
3) Evaluation of transmission in utility resource plans is inherently limited to near shovel-ready projects. Some promising resources – distributed generation and demand response – also aren't well-suited for analysis in resource plans.
4) What kind of planning do we need to meet carbon reduction goals? Under Oregon PUC guidelines, each utility develops and evaluates a resource portfolio that, if executed, would meet state goals based on caps (not prices). Taking that a step further, the utilities propose carbon reduction plans for PUC approval (in lieu of a regional cap and trade program).
5) We also need regional transmission planning, foundational policies (codes, RPS, acquisition of all cost-effective efficiency, etc.), explicit policies that accelerate the transition to low-carbon resources, removal of barriers to DSM and customer-side resources, and rates designed with energy efficiency and demand response in mind.

Major Challenges in Resource Acquisition Decisions -- David Clement, Seattle City Light

- Timing of Acquisitions
  - Buy Now or Buy Later?
- Renewable Energy Credits (RECs) in Fragmented and Illiquid Markets
  - Future Supply and Cost?
- Transmission Availability
  - What Projects and When?
- Acquiring Resources During Recession, With High Levels of Market Uncertainty
  - Could RPS Goals and Reliability Suffer?

Resource Planning Challenges

--Rob Anderson, San Diego Gas & Electric

- Centralized Planning verses Competitive Markets
- Resource planning based on adopted goals verses expected outcomes
- Currently projects bids in Request for offers are not well developed resulting delays, failures and price increases
- Impacts and solutions to grid reliability impacts of intermittent resources
- Development of a standard Renewable Energy Credit definition
- Planning Paralysis