Beyond the Energy/Water Nexus

Developing Sustainable Solutions for the Electric Power Industry

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World’s Slowest Train Wreck?

Water Supply

Energy Water Demand
Imminent Danger of Running Out of Water
Still Waiting …. Energy – Water Nexus +20 Years

- Desalinization
- Private water supply
- Inter-basin transfer
- Toilet to Tap
Why No Disaster?

- Process moves slowly
- Strong legal framework
- Market value of resource
- Deal making
Relevant Water Issues

- Supply
- Distribution
- Salinity
- Redistribution
Concentrated Solar Water Use in Perspective

- Western Governors’ Association goal of 8 GW of Solar in Southwest by 2015
- 8 GW at Capacity Factor of 25% and 800 gal/MW hr – 40,150 Ac-Ft/year CSP water
- Equivalent to 8,600 acres of Cotton
- 4.7% of 185,000 acres cotton to be planted in AZ in 2010
Total Cost and Sustainable Supply

**Total Water Cost**
- Water Rights
- Pumping Costs
- Power load
- Treatment Costs
- Disposal Costs
- Capital versus Operational Costs

**Sustainable**
- Volume of Water
- Time Water Needed
- Water Quality over Time
- Potential for Undesirable Impacts
Which is Energy Project is Greener?
Is Dry Cooling the Answer?

Capital Cost – 500 MW Steam Plant

- Once-Through: $300,000,000
- Wet Cooling System: $300,430,000
- Dry Cooling System: $342,600,000 (+12.6% compared to Base)

Diagrams showing Air-Cooled Condenser systems with (top) and without (bottom) liquid cooling.
Past Experience in Air Cooing
Great in Germany, Not So Great in the Southwest
Keys to Water Supply Development for Power

- Avoid hype and make sound water decisions for your site
- Understand the long-term impact of water decisions
- Use good business principles
- Include potential for water supply contamination as a factor in water decisions
Factors to Optimize Energy Water Costs

- Spend the time to find the best water right option
- Include the total cost of water in the site selection process
- Do the math for poor quality water
- Disposal wells versus evaporation basins
- Evaluate hybrid dry-wet cool options
- Evaluate water banking options
- Be wary of Farmers offering water
Make Use of Uncounted Water

Base Flow

Flooding

[Images of a calm river and a flooded river]
Water Banking Alternative
Water Quality Fit for Purpose

- Match water quality for use (i.e., low quality for dust control)
- Reclaimed Use
- Slightly saline for cooling
Questions?