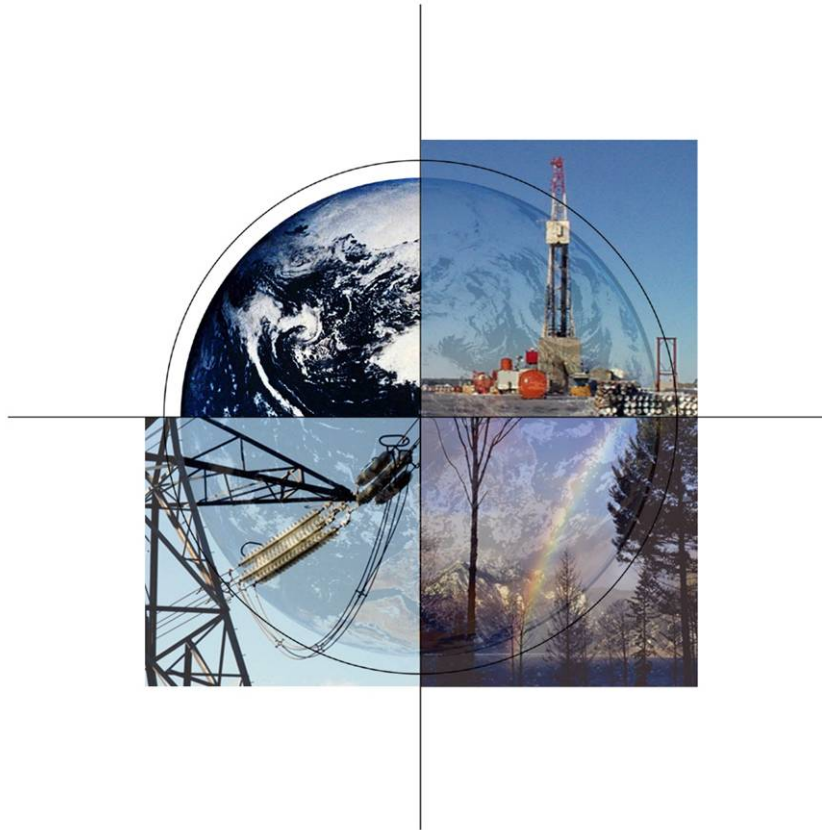


DOE/NETL Power Plant Water Management R&D Program



*11th Meeting of the
Sustainable Water
Resources Roundtable*

*January 25-26, 2007
Washington, DC*

Thomas J. Feeley, III
National Energy Technology Laboratory

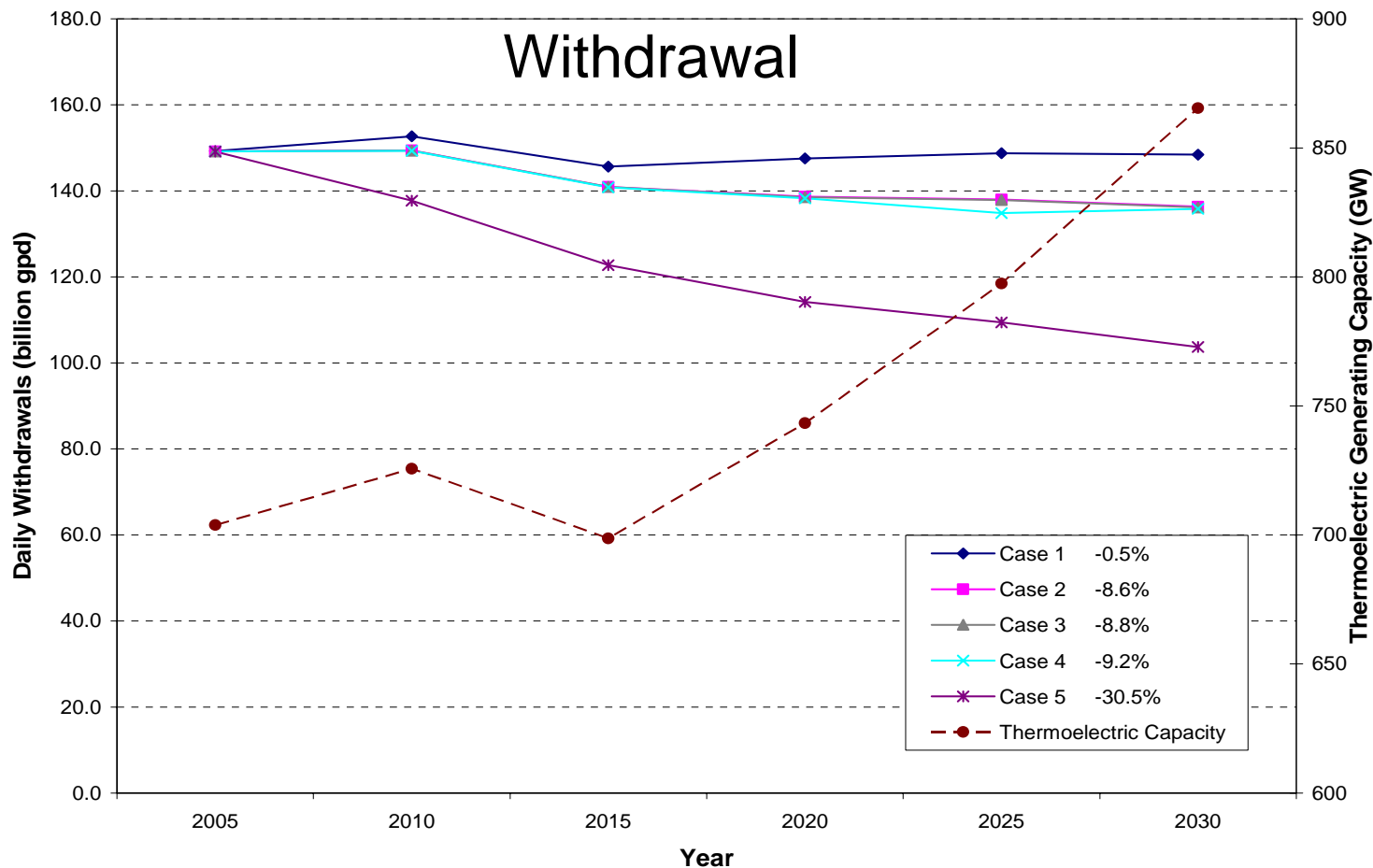


Water Use Projection Cases

- **Case 1 (Status Quo) – Additions and retirements are proportional to current water source and type of cooling system**
- **Case 2 (Regulatory Driven) – All additions use freshwater and wet recirculating cooling (WRC), while retirements are proportional to current water source and cooling system**
- **Case 3 (Regulatory Light) – 90% of additions use freshwater and WRC, and 10% of additions use saline water and once-through cooling, while retirements are proportional to current water source and cooling system**
- **Case 4 (Dry Cooling) – 25% of additions use dry recirculating cooling and 75% of additions use freshwater and WRC, while retirements are proportional to current water source and cooling system**
- **Case 5 (Conversion) – Additions use freshwater and WRC, while retirements are proportional to current water source and cooling system. 5% of existing freshwater once-through cooling capacity is retrofitted with WRC every five years starting in 2010**



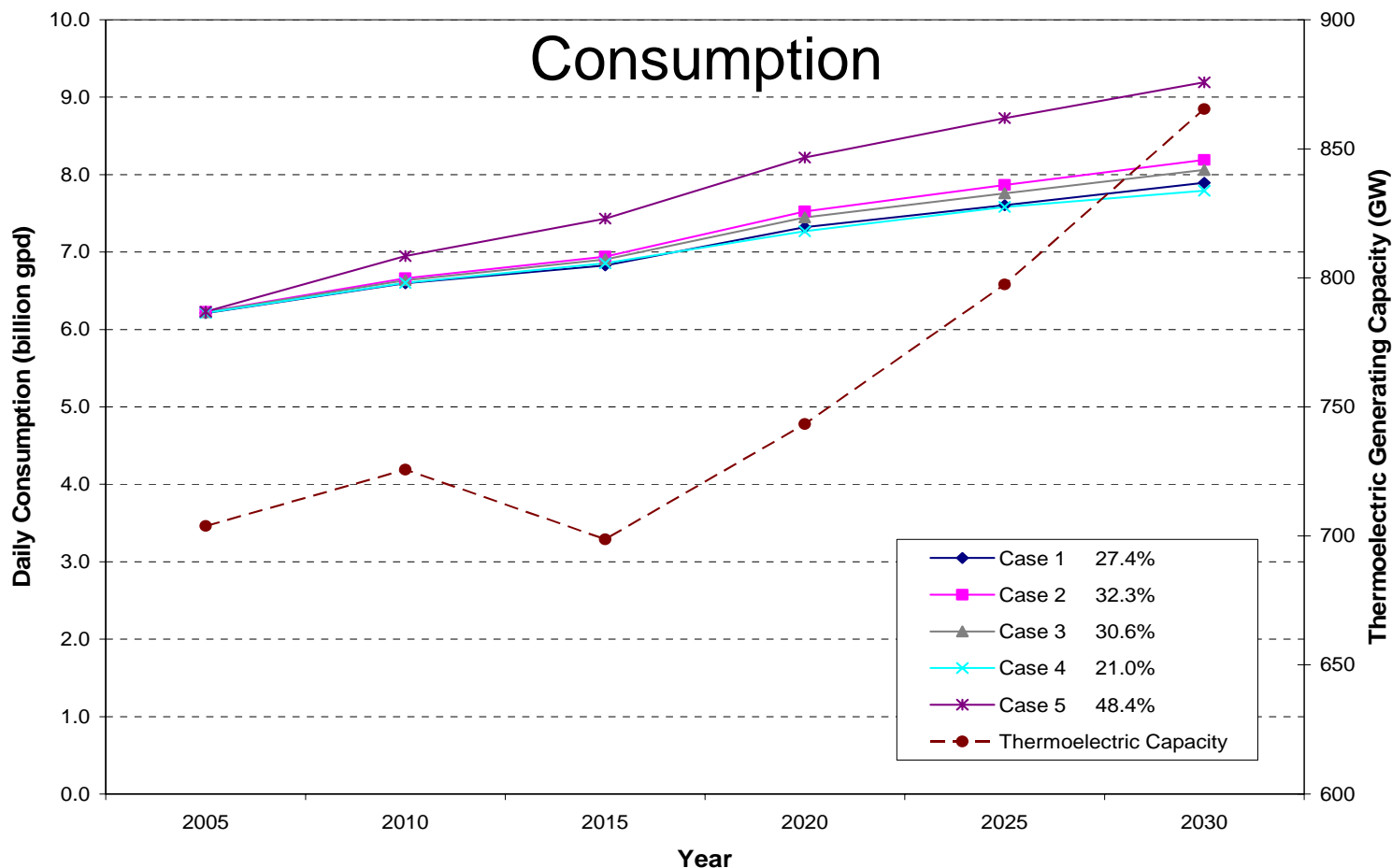
Projected Changes in U.S. Thermoelectric Sector Freshwater Withdrawal and Consumption



DOE/NETL, "Estimating Freshwater Needs to Meet Future Thermoelectric Generation Requirements,"
August, 2006 <http://www.netl.doe.gov/technologies/coalpower/ewr/pubs/WaterNeedsAnalysisPhaseI1006.pdf>



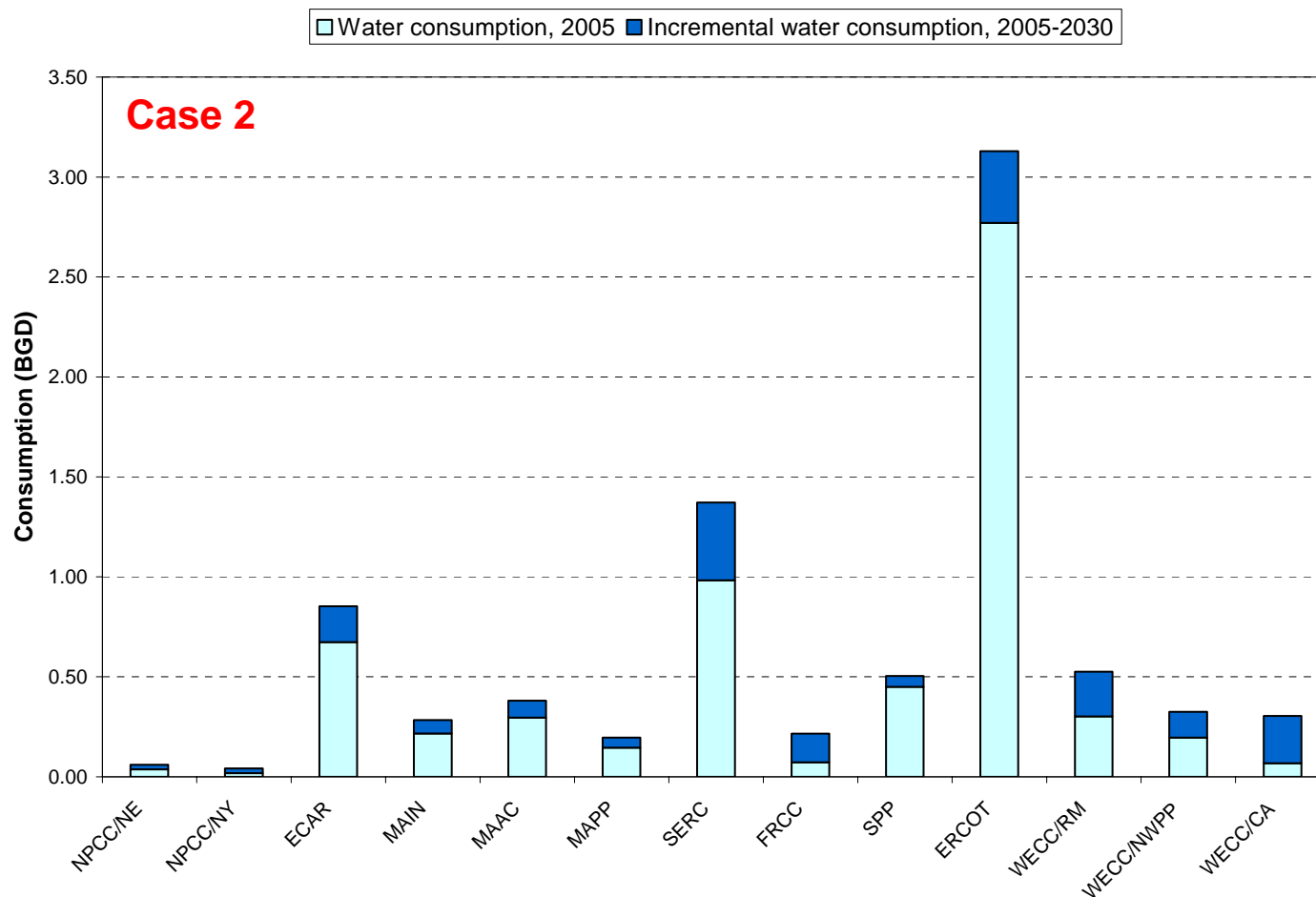
Projected Changes in U.S. Thermoelectric Sector Freshwater Withdrawal and Consumption



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August, 2006 <http://www.netl.doe.gov/technologies/coalpower/ewr/pubs/WaterNeedsAnalysisPhaseI1006.pdf>



Regional Thermoelectric Consumption Results



Case 2: All additions use freshwater and wet re-circulating cooling, while retirements are proportional to current water source and cooling system.

DOE/NETL, *“Estimating Freshwater Needs to Meet Future Thermoelectric Generation Requirements,”* August, 2006 <http://www.netl.doe.gov/technologies/coalpower/ewr/pubs/WaterNeedsAnalysisPhase11006.pdf>



Regional Results Overview

- **EIA thermoelectric capacity increase projections:**
 - 24% nationally
 - 66% western US
 - 61% southeast US
- **Case 2 withdrawal projections:**
 - 8.6% decrease nationally
 - 30% decline in Texas
 - 25% increase in Florida
- **Case 2 consumption projections:**
 - 32.3% increase nationally
 - 12.0 % increase in Southwest Power Pool (SPP)
 - 352% increase in Western Electricity Coordinating Council/California (WECC/CA)



Recent Articles on Water-Related Impacts on Power Plant Siting and Operation

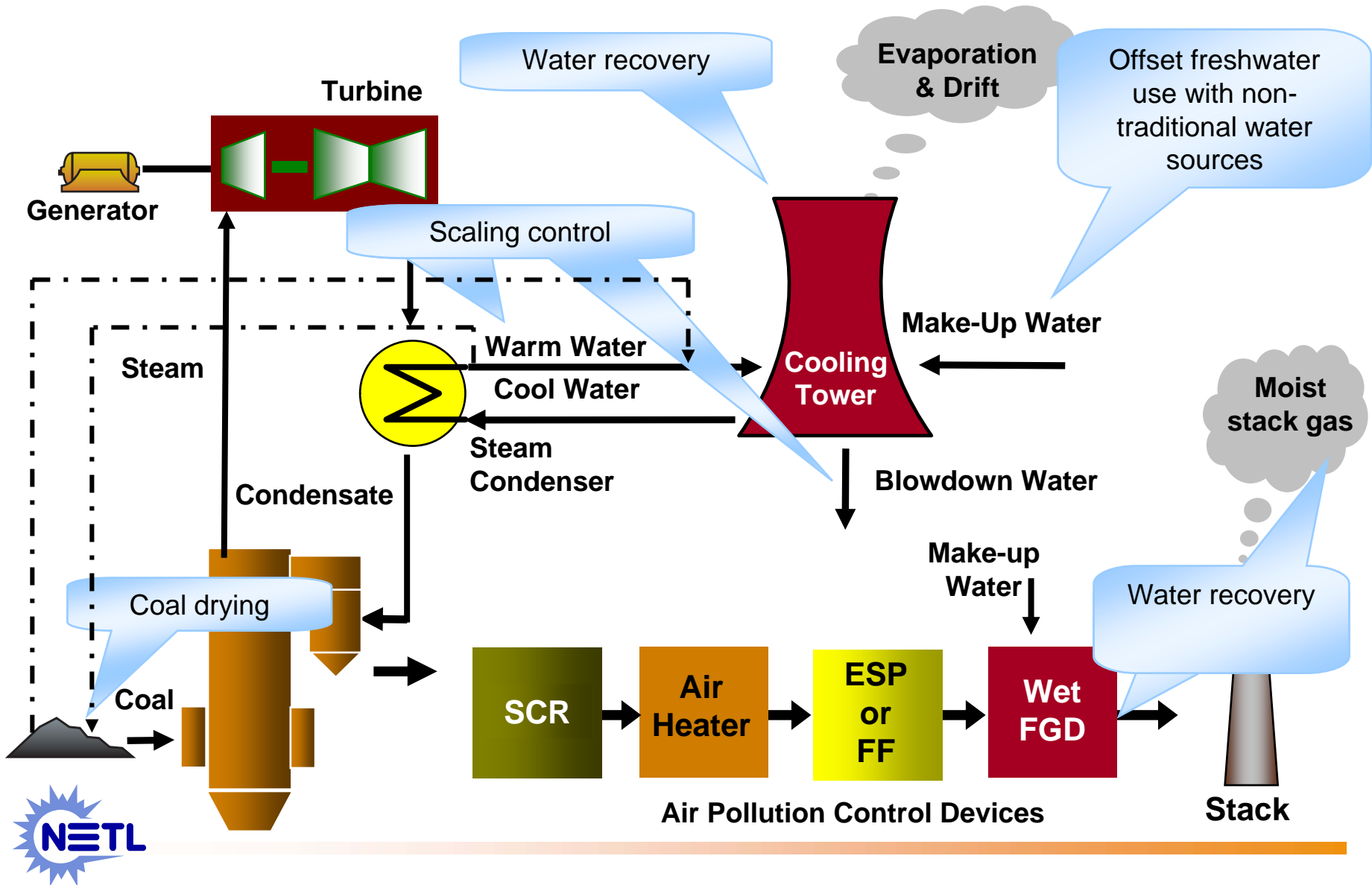
- **Energy Project Could Threaten Water Supply in Salina, Kansas**
 - *McClatchy-Tribune Business News, November 2006*
- **Southern Drought Leads to Shutdown of Hydro, Forcing Utilities to Buy from Market**
 - *POWERnews, October 2006*
- **Idaho May Adopt Moratorium on Coal Power Due to Water Issues**
 - *Reuters, March 2006*
- **Desert Rock Water Agreement Passes Navajo National Committee**
 - *The Daily Times, February 2006*
- **California's Efforts to End Use of Sea Water to Cool Plants Could Jeopardize 24 GW**
 - *POWERnews, March 2006*



*May 2006 Issue of
Power Magazine*



FE/NETL Power Plant Water Management R&D



Technical & Cost Goals

- **Short Term – Have technologies ready for commercial demonstration by 2015 that, when used alone or in combination, can reduce freshwater w/drawal and consumption by 50% or greater for thermoelectric power plants equipped with wet recirculating cooling technology at levelized cost of less than \$2.40 per 1000 gallons freshwater conserved.**
- **Long Term – Have technologies ready for commercial demonstration by 2020 that when used in combination can reduce freshwater w/drawal and consumption by 70% or greater at levelized cost of less than \$1.60 per 1000 gallons freshwater conserved.**



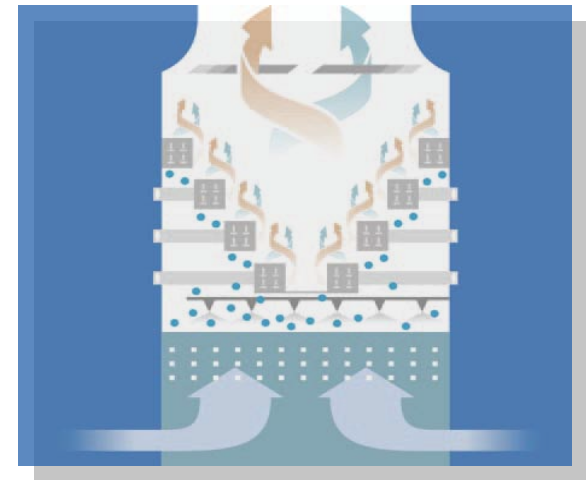
Use of Air2Air™ Technology to Recover Fresh-Water at Thermoelectric Power Plants -- SPX Cooling Systems

Objective

Evaluate benefits of deploying the Air2Air™ condensing technology to recover water from PNM's San Juan Generating Station cooling towers

Tasks

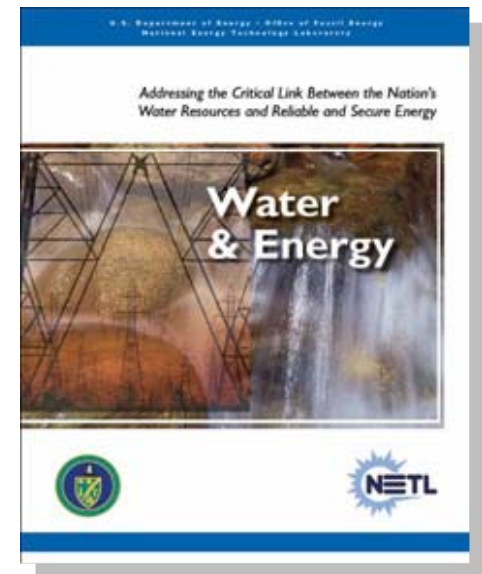
- Quantify water conservation segmented by season and time of day
- Analyze quality of condensed water
- Identify onsite processes capable of utilizing recovered water
- Examine operation during freezing conditions
- Investigate plume abatement methods



SPX Air2Air™ Technology

FE/NETL Energy-Water Activities

- **Fossil Fuel Based Thermoelectric Power**
 - Non-Traditional Sources of Process and Cooling Water
 - Innovative Water Reuse and Recovery
 - Advanced Cooling Technologies
 - Advanced Water Treatment and Detection Technology
 - Advanced Power Systems, i.e., Gasification, FutureGen
- **Coal Mining**
 - Airborne Geophysical Mapping
 - Mine Pool Treatment and Beneficial Use
- **Natural Gas and Oil Production**
 - Airborne Geophysical Mapping
 - Water Management Approaches and Analyses
 - Produced Water Management Technologies and Beneficial Use
- **Carbon Sequestration**
 - Produced Water from Geological Sequestration
- **System Analysis and Engineering**
 - Power Plant Water Use Modeling
 - Regulatory Analyses
 - Thermoelectric Water Needs Projections



**FE/NETL Energy-Water
Program Plan**

Future Plans

- **Continue to update analyses of water needs related to coal, oil and natural gas production and utilization**
- **Issue FY07 solicitation directed at:**
 - Advanced cooling technology
 - TBD



DOE/FE Innovations for Existing Plants Program



To find out more about DOE/FE's energy-water R&D activities visit us at:

<http://www.netl.doe.gov/technologies/coalpower/ewr/water/index.html>

