

Congressional Concerns Related to the Energy-Water Nexus

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Congressional Detailee

Main Points

- Energy-Water natural and engineered systems are inextricably linked
- The Relationship Is highlighted as both energy and water resource scarcity rises
- Hydropower is the best understood example
- The full array of E-W relationships is NOT well understood
- There are many potential positive outcomes embedded in the relationship of E-W
- Current Federal legislative activities are attempting to bring cohesion to programs that overlap E-W

Themes

- How are Energy and Water Related?
- Current Policy Initiatives
- Federal Agency Actions
- Legislative Actions

Energy and Water Relationship

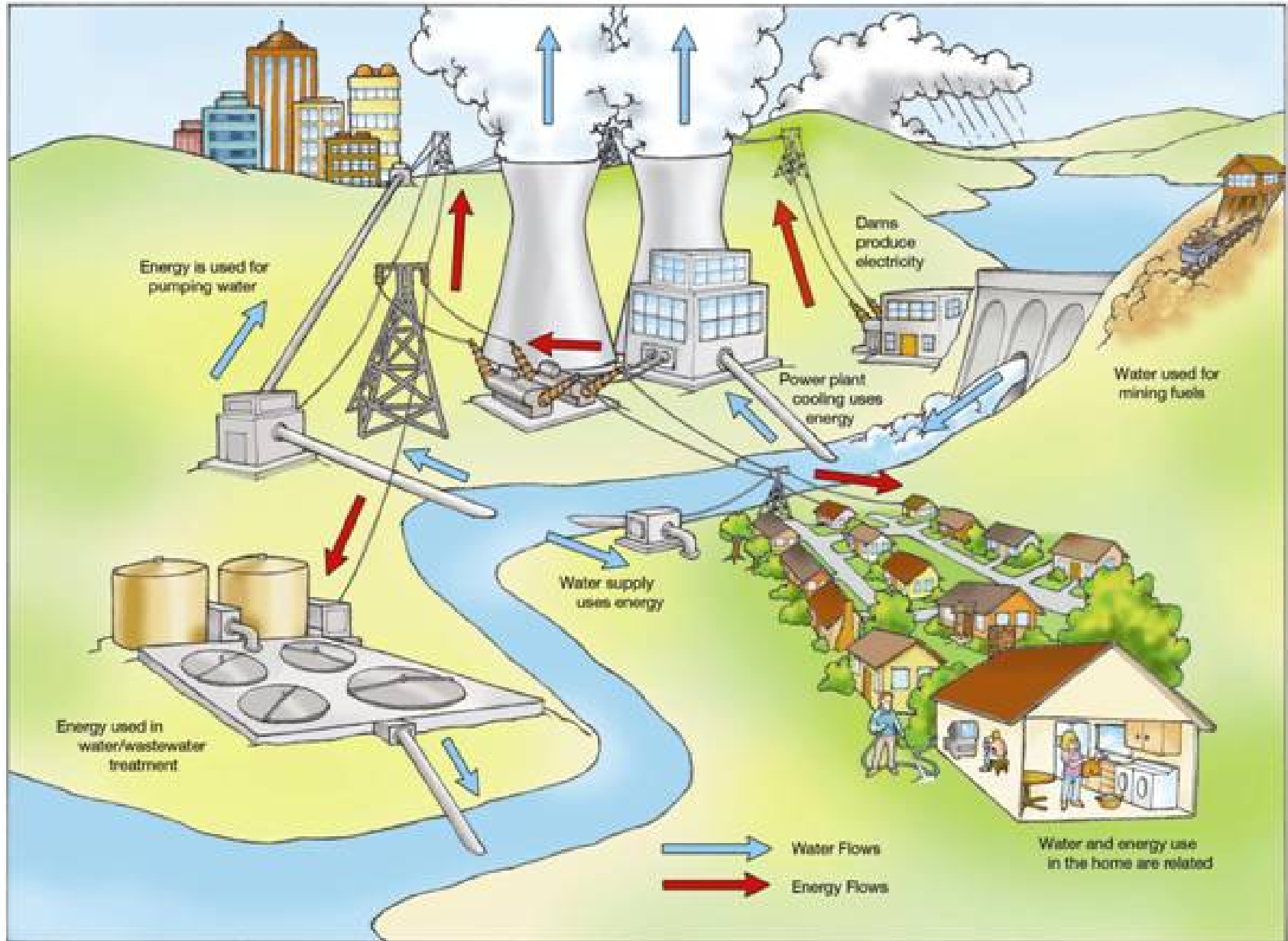
Energy production requires water

- Thermoelectric cooling
- Hydropower
- Extraction and mining
- Fuel Production (H₂, ethanol)
- Emission controls



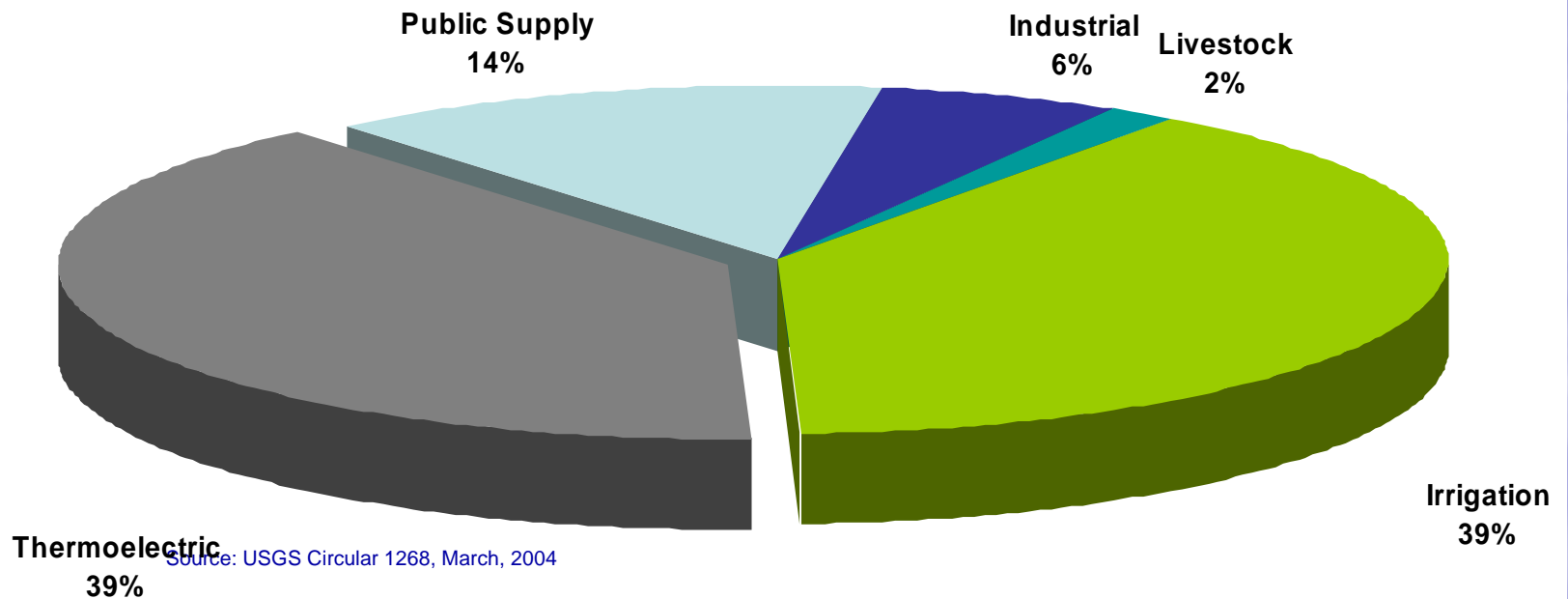
Water production and distribution require energy

- Pumping
- Treatment
- Transport

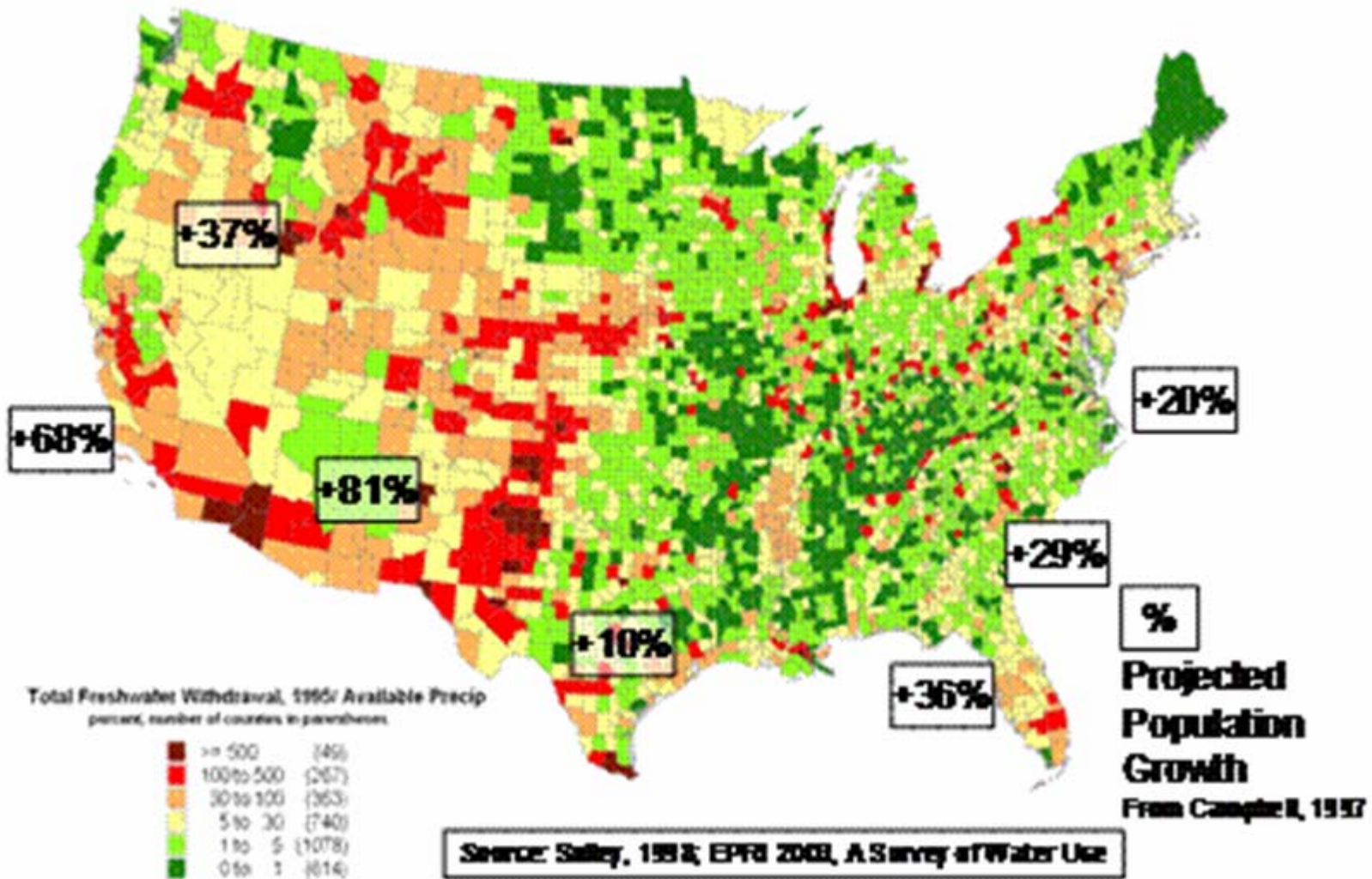


As Much Freshwater Is Used For Producing Electricity As For Irrigation

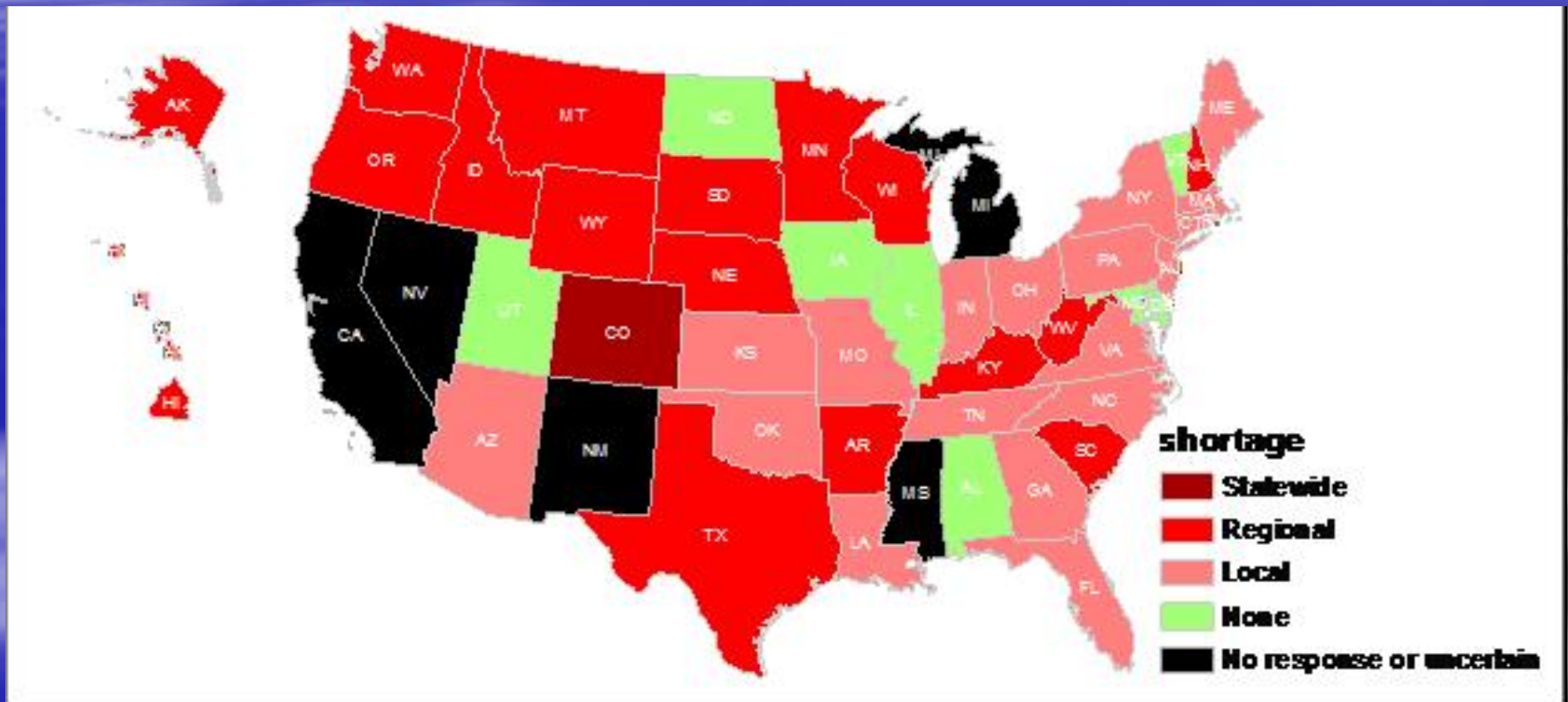
Estimated Freshwater Withdrawals by Sector, 2000



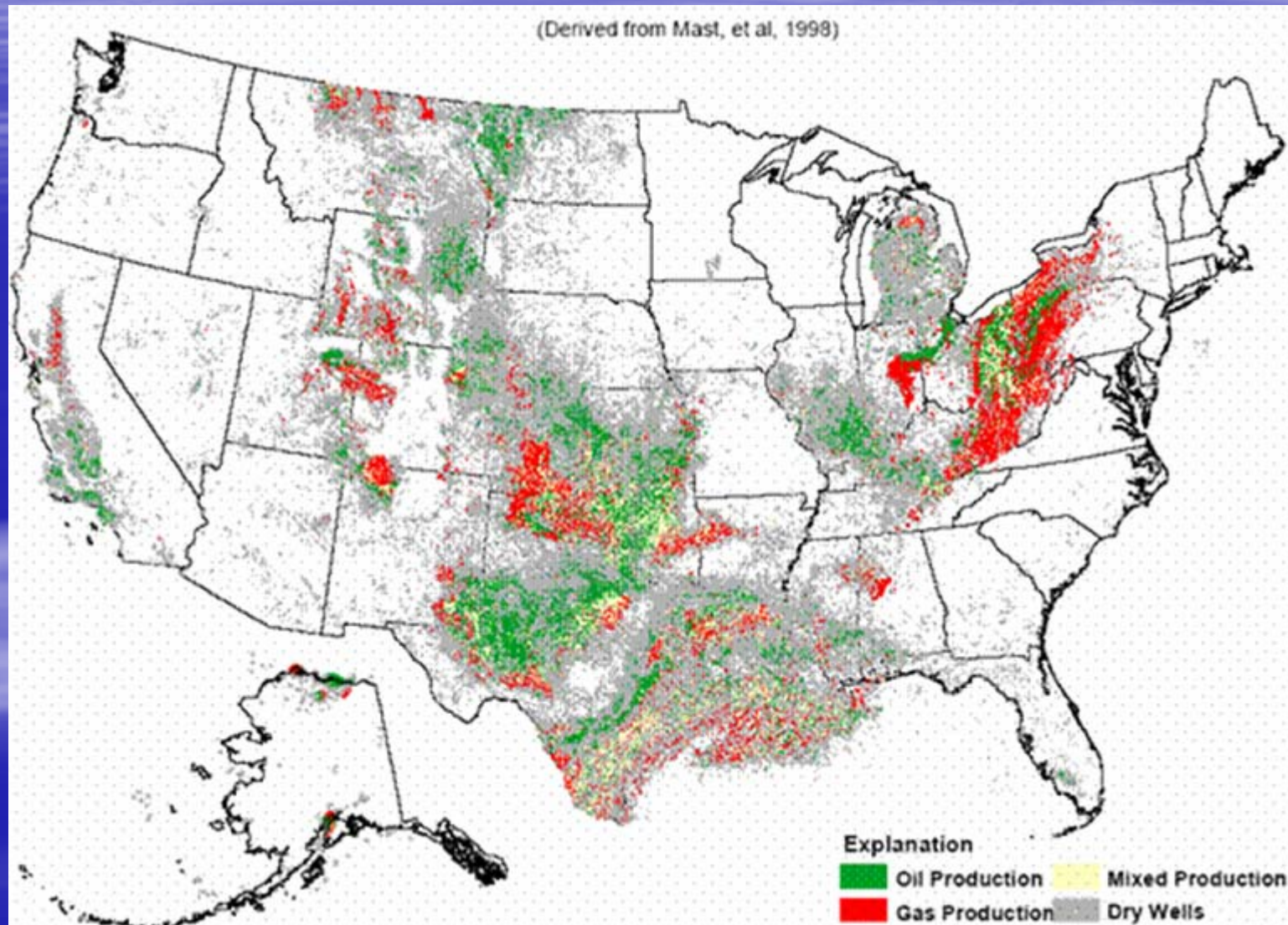
Freshwater Stress Areas vs. Population Growth



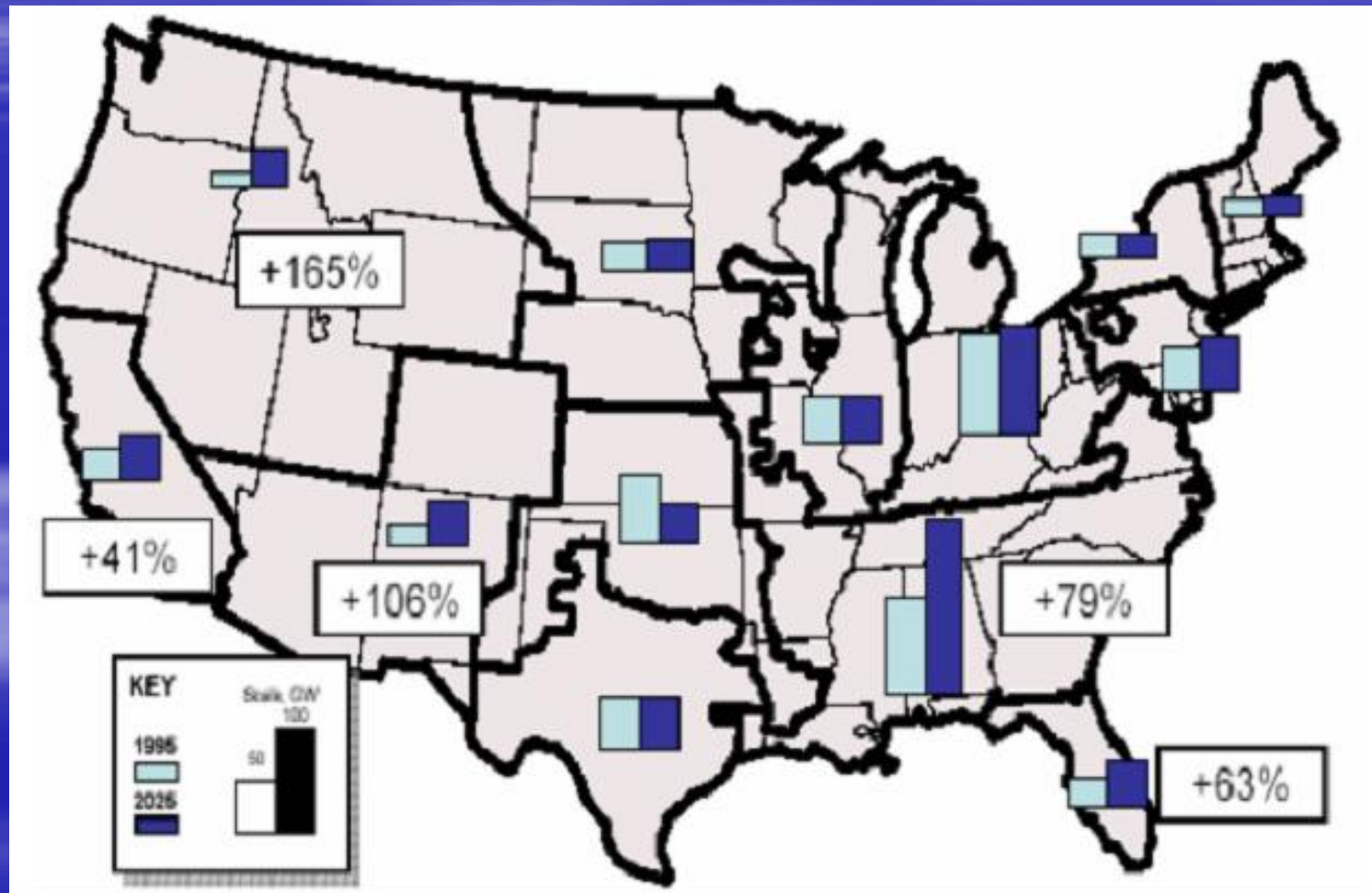
Survey of Likely Water Shortages over the Next Decade under Average Conditions (GAO, 2003)



U.S. Oil and Gas Resources (Energy Information Administration).

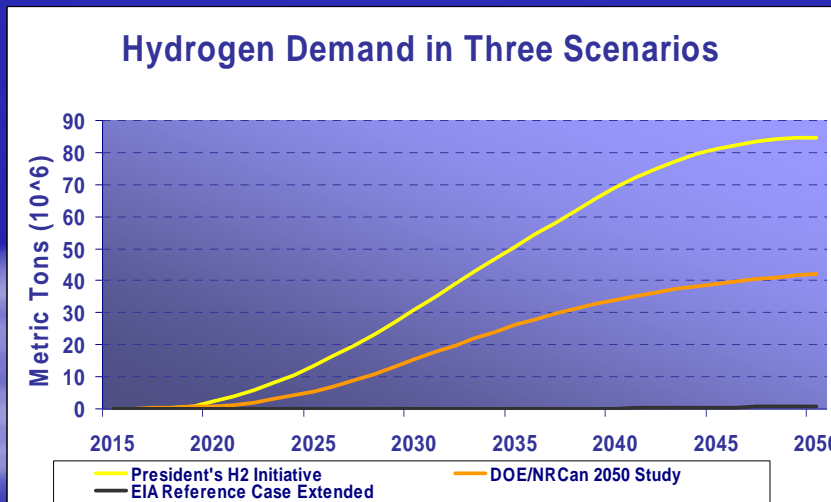


Comparison of Regional Thermoelectric Generation Capacity by North American Electric Reliability Council Region, 1995—2025 (Hoffmann, J., 2004)

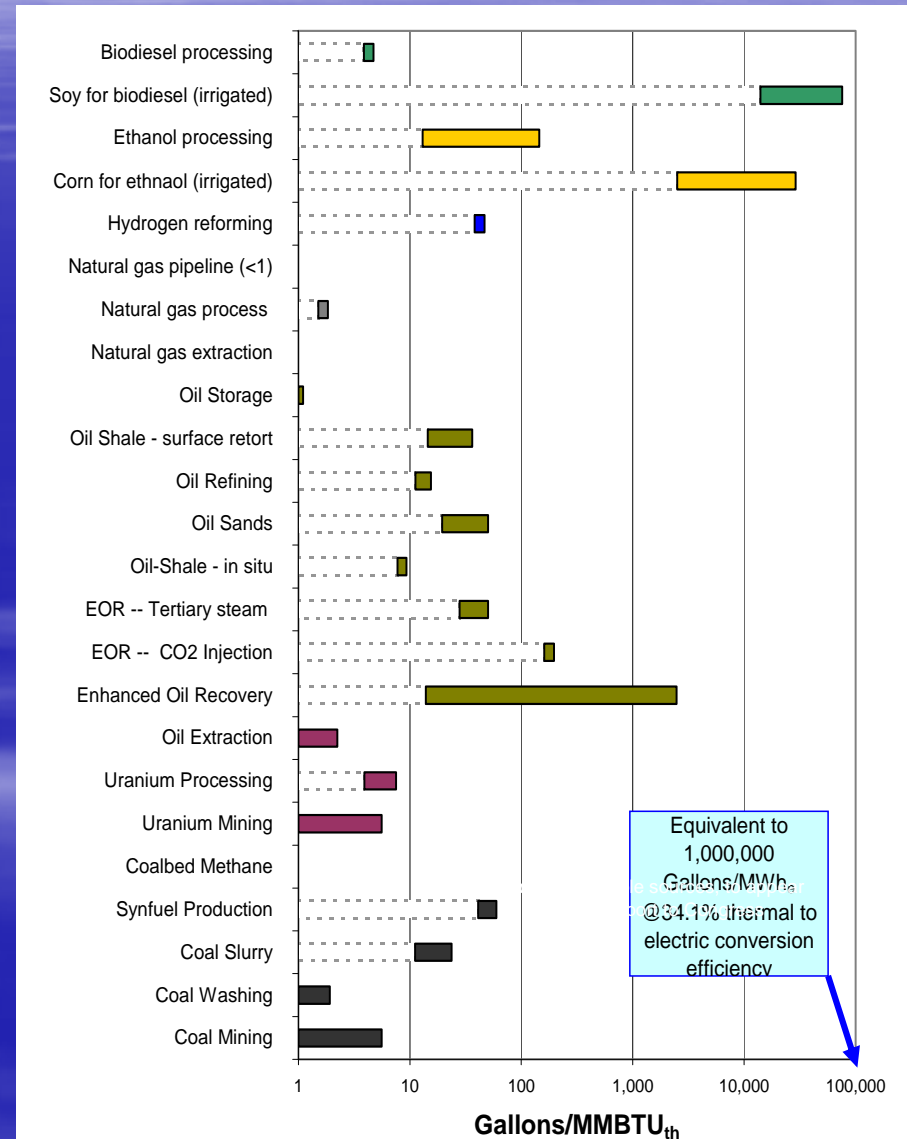


Future energy development will put new demands on water resources

- Many new technologies will be more water intensive
- Hydrogen economy would require even more water:



- Constraints will grow for energy development and power plant siting

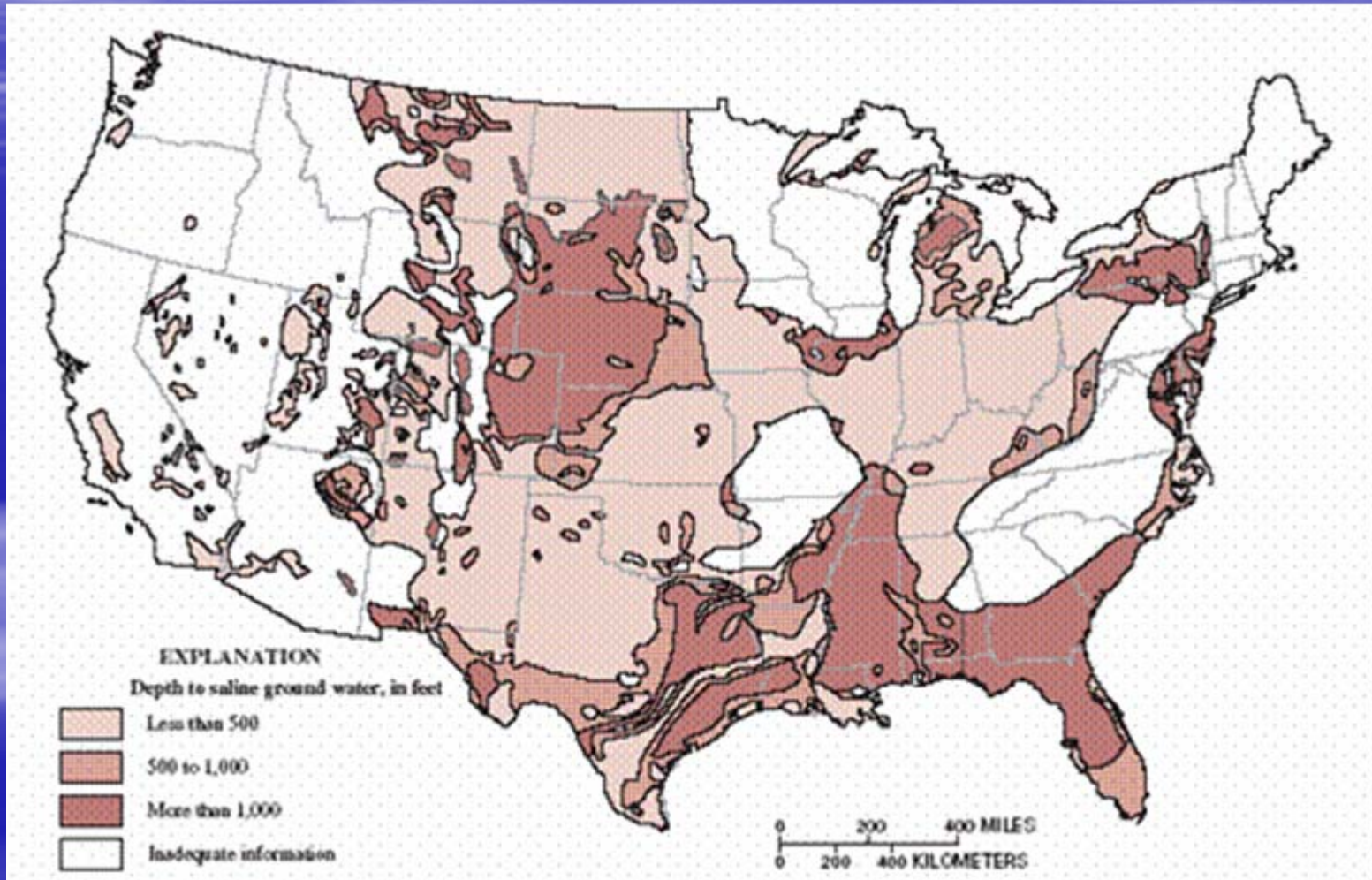


Energy development is already being affected by water constraints

- Water rates in the Las Vegas Valley will go up . . . because of increased electricity costs -- *Las Vegas SUN, 2002*
- Utility regulators put ecology ahead of electricity in rejecting a major power plant . . . that would use 2,500 gallons per minute to cool its steam turbines -- *Arizona Daily Sun 2002*
- Georgia Power Loses Bid to Draw Water from Chattahoochee -- *Miami Herald, February 2002*
- EPA Orders Mass. Power Plant to Reduce Water Withdrawals -- *Providence Journal, RI, July 2002*
- Idaho Denies Water Rights Request for Power Plants -- *U.S. Water News Online, August 2002*
- Pennsylvania Nuclear Power Plant to Use Wastewater from Coal Mines -- *The Philadelphia Inquirer, July 2003*
- Utilities Warn of Power Crunch if Flows Are Cut -- *Greenwire, July 2003*
- Governor of South Dakota called summit to discuss drought on the Missouri River and the impacts on irrigation, drinking-water systems, and power plants -- *News Release, February 2005*



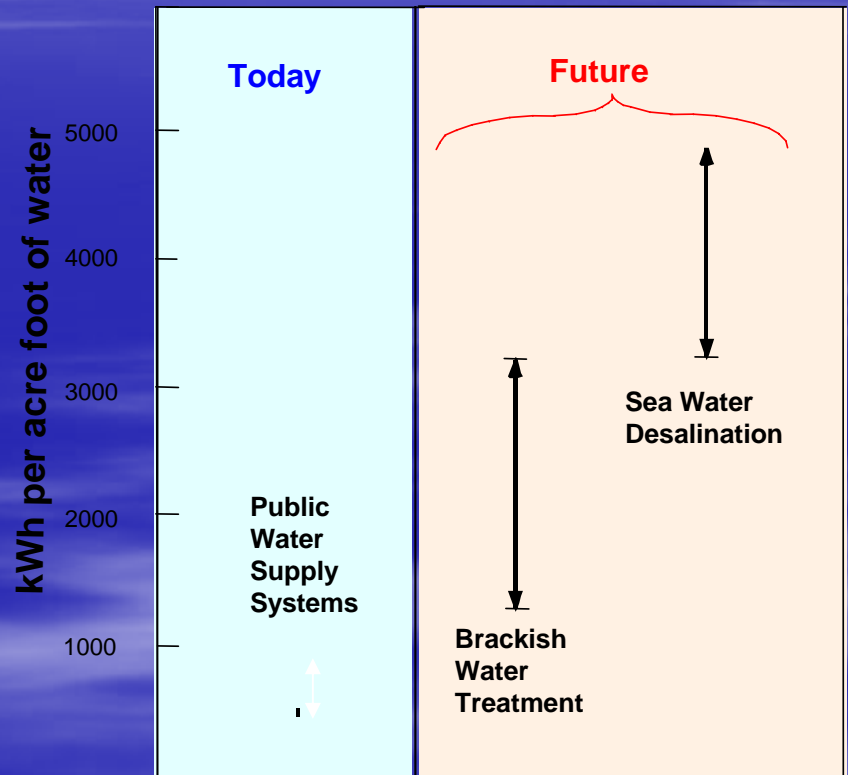
Degraded Water Resources of the U.S. (USGS, 2003, Desalination of Ground Water)



Future water supplies and treatment will be more energy intensive

- Readily accessible fresh water supplies are limited and have been fully allocated in some areas
 - Pumping at deeper depths and longer conveyance distance require more energy
- New technologies to access and/or treat non-traditional water resources will require more energy per gallon of water
 - Impaired water, produced water, brackish water, and sea water

Power requirements for current and future water supply



Source: EPRI, 2000; Water Desalination Task Force, 2003

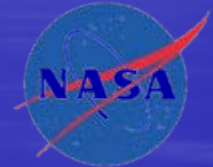
Policy Initiatives

- Office of Science and Technology Policy (Report November 2004)
- Energy-Water Nexus Advocacy Group
- Electric Power Research Institute Reports
- DOE Office of Fossil Energy Reports
- California Energy Commission

Many Federal Agencies Address Water, But Gaps Exist at the Energy~Water Nexus

No agency has overall programmatic responsibility for:

- Water-related impacts on energy policy
- Water used by energy production
- Energy used by water systems



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DOE Mission

- “To protect our national and economic security by promoting a diverse supply and delivery of reliable, affordable, and environmentally sound energy.”

Energy-Water Nexus

US Energy Sustainability

A critical piece is missing



Federal Actions

- Roadmaps
- Report to Congress
- DOE Programs
- BOR Report on Hydropower
- EPA

Energy-Water Roadmap for DOE

- Assess emerging energy and water resource issues based on user and stakeholder needs
- Develop energy and water science and technology priorities
- 3 “Needs Assessment Workshops Nov 2005-Feb 2006
- Technology Outline Workshop May 2006
- Due to DOE by September 2006

Common Needs

- Improved data on water availability and sustainability
- Coordinated natural resources and systems planning
- Improved materials, processes, and technologies to enhance water use efficiency and energy use efficiency
- Science-based and natural resource-based regulations and policy
- Improved economic evaluations of costs and benefits

Energy-Water Report to Congress

- Consider energy and water interdependencies, trends in energy and water supplies, threats and concerns to energy production
- Delivered to DOE February 2006
- In Review at Office of Management and Budget
- Delayed (policy conflicts?)

Legislative Actions

- **Energy Policy Act of 2005 Sec 979 (DOE's First Explicit Energy-Water Authority)**
 - Energy-Water Supply Technologies Program – DOE Office of Science. – develop desalination; develop long-term planning tools; report to Congress on Energy-Water
- **108th Congress (Senate and House Bills)**
 - July 2004 Joint introduction in House Resources and Senate Energy and Natural Resources - no other action

Legislative Actions (2)

- **109th Congress**

- H.R. 3182 – Reauthorizes 1996 Simon Act for BOR and allows partnerships with National Laboratories – no action

- And

S.1860

- Energy-Water Efficiency Technology, Research, Development and Transfer Program Act of 2005
- Bi-Partisan legislation / led by Senators Domenici and Bingaman
- Focus – Technology Development for all aspects of Energy-Water relationships – Get the technology into operation via commercial relationships.

How

- Assessment of current technology and needs (with other agencies) – resulting in a Roadmap and a detailed report to Congress
- Develop an Advisory Panel with strong industry relationships
- Lead laboratories – as selected by DOE
- Grants – to Universities / Industry / Labs (nearly anyone with good ideas)
- WHERE DOES THIS GET US – Technology Development
- WHAT IS MISSING – Policy Analysis, basic science, systems analysis

Issues

- Should the Federal Government invest at all in water supply issues?
- If so, should the investment include research/technology? Should it include subsidies for implementation?
- Should the Federal Government sponsor assessment of State or Local policy and statutes governing implementation of water treatment technology?
- Which Agency should lead this effort? (Coordinate or control)
- Where are the skills to address E-W Technology within Federal Agencies?
- What is the appropriate Public – Private relationship for technology development?

Final

- Current Federal legislative activities are attempting to bring cohesion to programs that overlap E-W – answer the questions.
- We don't fully understand this relationship of Energy-Water and thus face both potential disasters and may miss potential benefits
- As an emerging area – great opportunities / great uncertainties.