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Energy-Water Nexus:
DOE Resources to Collaborate with States

Samuel Bockenhauer, Ph.D.
U.S. Department of Energy
Office of Policy

Sustainable Water Resources Roundtable
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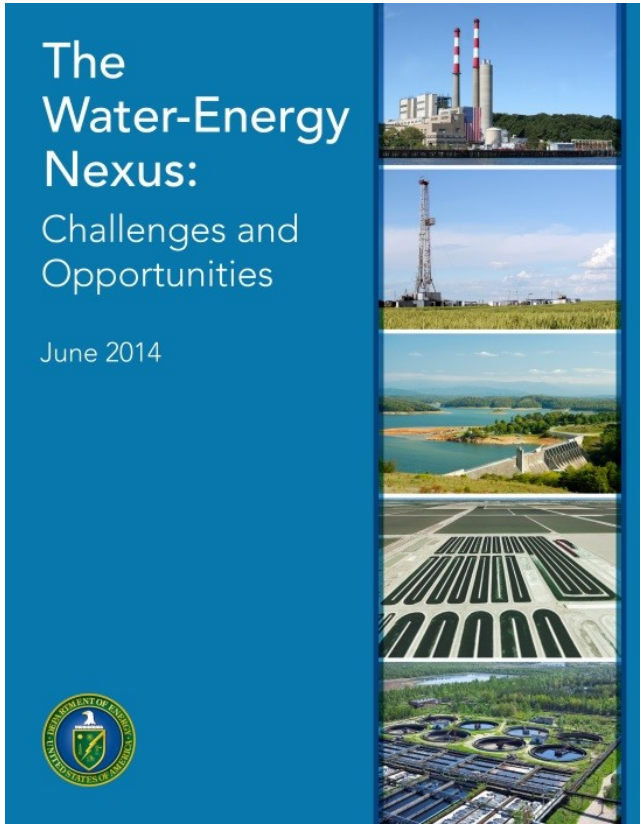
Energy-Water Nexus: DOE Resources to Collaborate with States

Outline:

- DOE's Role in the Energy-Water Nexus
- Why Focus on States?
- Expressions of Interest
- The DOE Office of Policy's Efforts to Collaborate with States:
    1. Energy-Water Nexus Policy Integration
    2. Energy and Water Flow Diagrams ("Sankeys")
    3. Energy-Water Nexus State Policy Database
    4. US-China Clean Energy Research Center
    5. Energy-Water Finance Report
- Summary and Opportunities for Collaboration

Intro to the Energy-Water Nexus: Why Now? Why DOE?

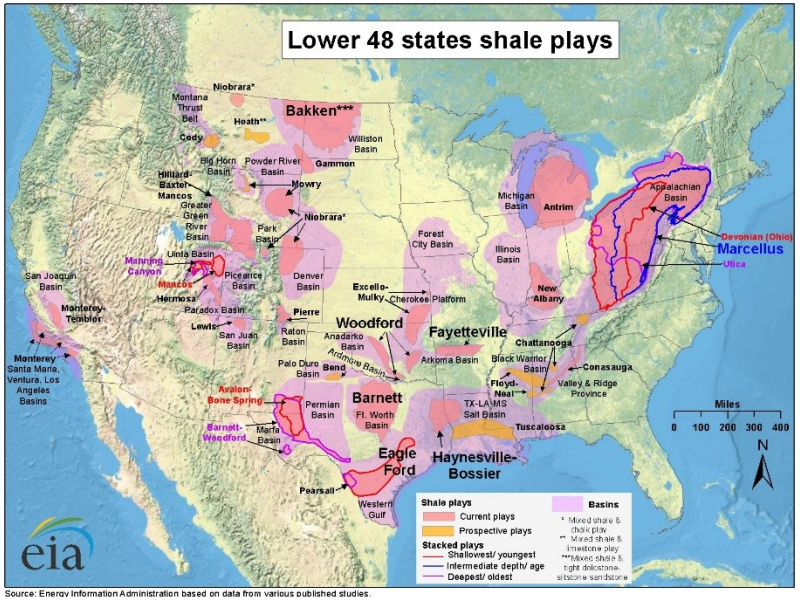
- Energy and water are in many cases interdependent.
- Water scarcity, variability, and uncertainty are becoming more prominent.
- This is leading to vulnerabilities in the U.S. energy system.
- We cannot assume the future is like the past in terms of climate, technology, and decisionmaking.
- Aging infrastructure can bring fresh opportunities.
- DOE has strong expertise in technology, modeling, analysis, and data, and can contribute to understanding the issues and pursuing solutions.



Download the full report at energy.gov

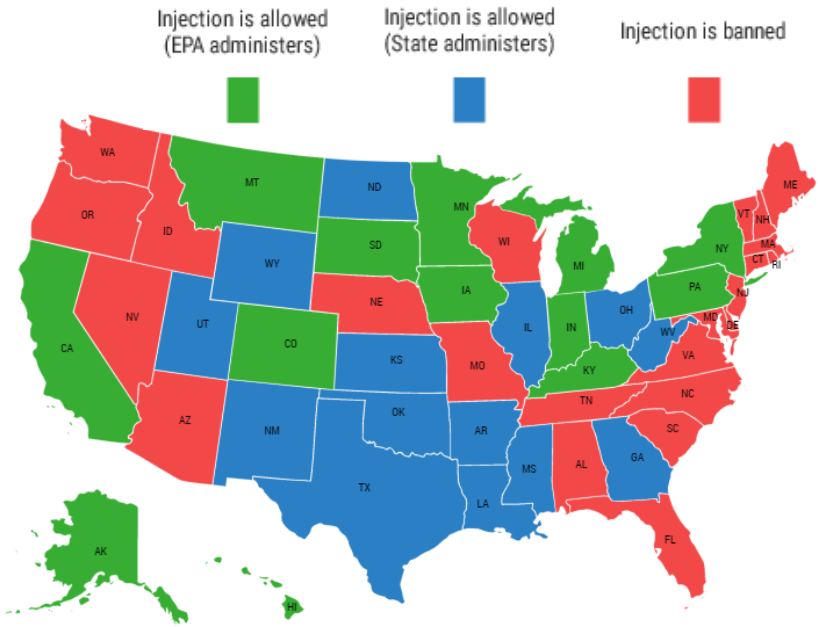
Why Focus on States?

- States are often on the front lines of addressing emerging issues in the energy-water nexus (e.g. drought) that can have national implications.
- There is significant variation in energy and water policy across states and regions.
- Policy lessons from one state could be applicable in other states or the federal government. States can be "laboratories" for policy.
- A sometimes fragmented policy landscape presents opportunities for greater policy integration across:
  - Energy and water policy
  - State and federal policy



Source: Energy Information Administration based on data from various published studies.

Class I Hazardous Waste Underground Injection Control Program



Expressions of Interest

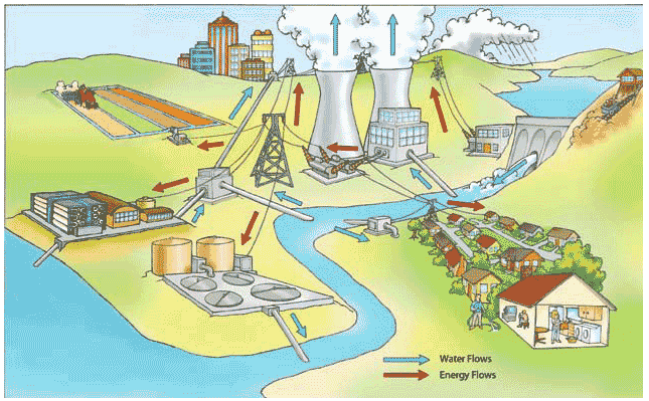
- **National Association of Regulatory Utility Commissioners (NARUC):** President Betkoski unveiled NARUC's theme for 2018: *Powered Together: Tapping the Water Energy Nexus.*
- **Congress:** The 2018 Energy and Water Development Appropriations Bill report language stated "*The Committee recognizes water and energy are critical resources that are reciprocally linked. The Energy-Water Nexus crosscut consists of a collaboration of agencies, national laboratories, State and local governments, utilities, industry, and the science community working collectively to address energy and water resource challenges, specifically as they relate to energy security and energy sector water needs…*"
- **National Security Strategy, 2017:** "Priority Actions … FURTHER AMERICA'S TECHNOLOGICAL EDGE: We will improve America's technological edge in energy, including nuclear technology, next-generation nuclear reactors, better batteries, advanced computing, carbon-capture technologies, and *opportunities at the energy-water nexus.*

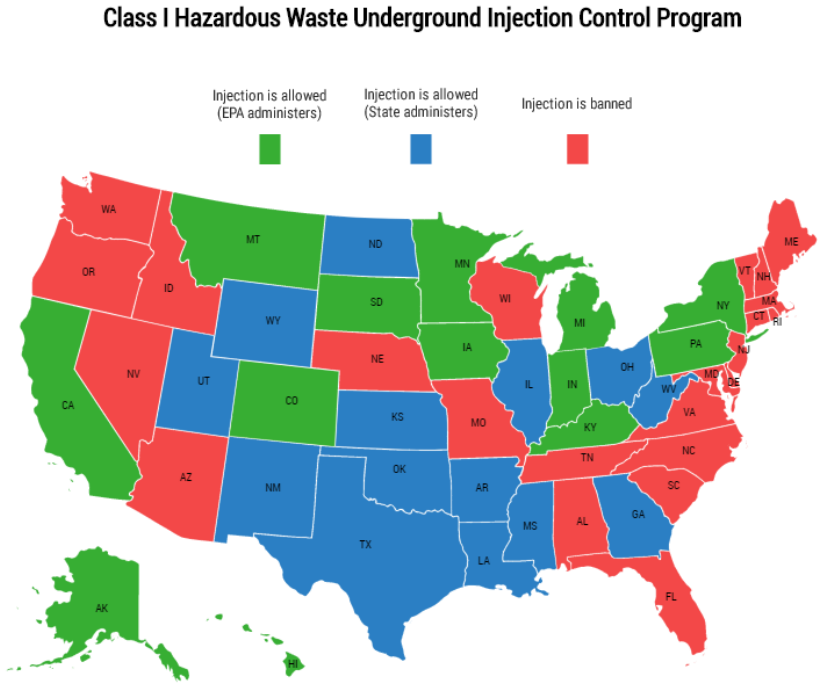
Energy-Water Nexus Policy Integration: White Paper Series

- DOE's Office of Policy supports the National Conference of State Legislatures (NCSL) and National Association of State Energy Officials (NASEO) to draft three policy white papers addressing energy-water nexus federal and state policy connections:
  1. Water use in electricity generation (NCSL)
  2. Energy performance of water infrastructure (NASEO)
  3. Lifecycle water responsibility in oil and gas production (NCSL)
- Overall questions each of the white papers seeks to answer are:
  - What are the key issues, and where do they occur?
  - Who are the key decisionmakers who are grappling with these issues?
  - How do state and/or federal policies affect the decisions made by the decisionmakers?
  - How and where do state and federal policies interact?
- White papers are currently being circulated to internal and external experts for review.

Energy-Water Nexus Policy Integration: NCSE Workshop

- Using the three policy white papers as a starting point, this workshop seeks to engage participants with diverse backgrounds to generate a set of strategies and next steps for more integrated, effective policy at the energy-water nexus.
  - Are there new policy strategies that could address critical challenges faced by states?
  - Are there policy lessons from one state that could be beneficially applied in other states or the federal government?
  - Are there new collaborations between key decisionmakers that could be convened?
- The workshop is Wednesday, January 24, 2:00-4:45pm in the Potomac I meeting room.





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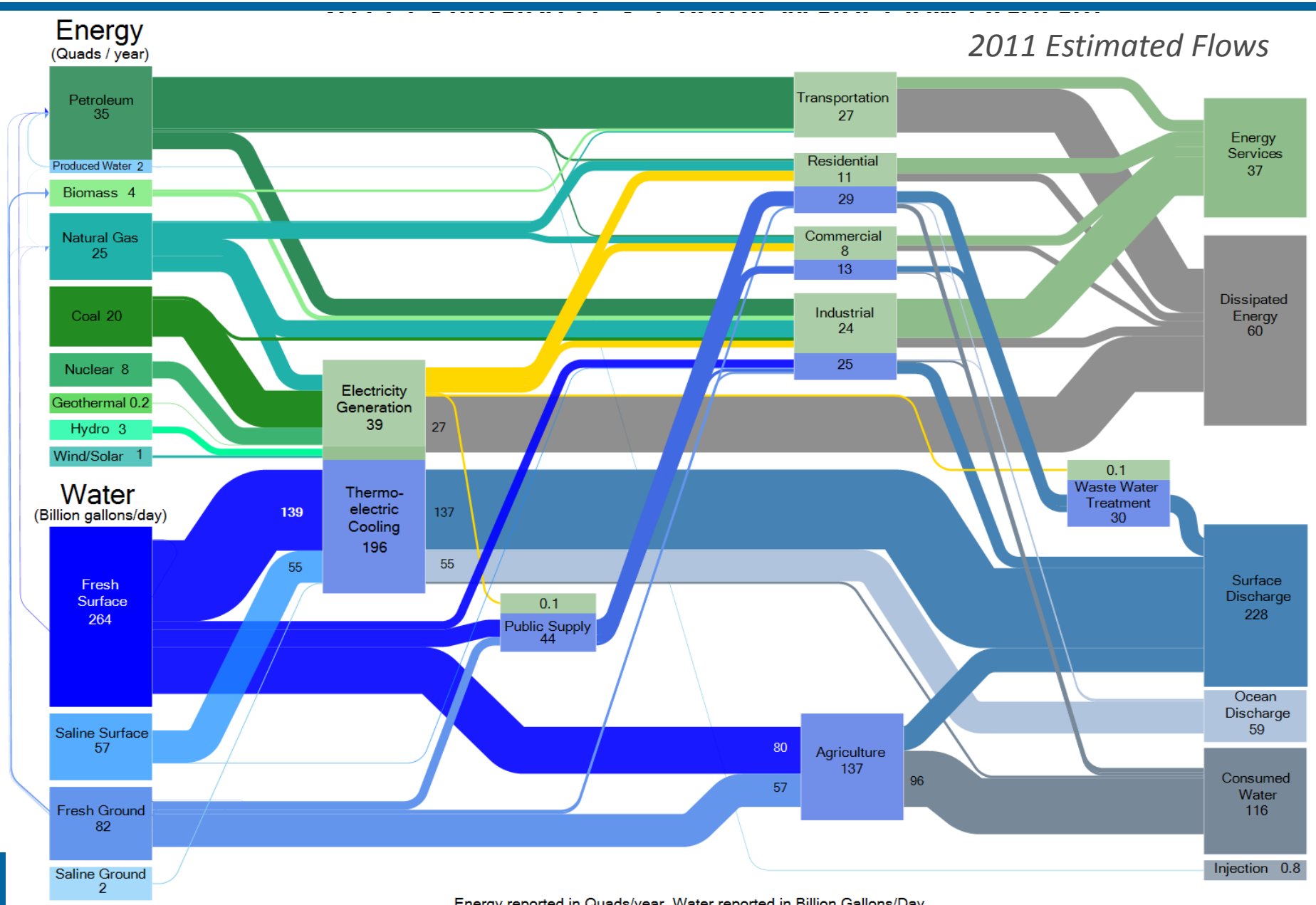
U.S. Energy and Water Flow Diagram ("Sankey")



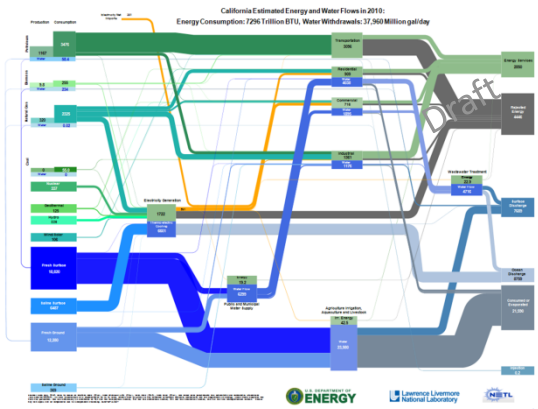
Energy reported in Quads/year. Water reported in Billion Gallons/Day.

New State-Level Energy and Water Sankey Diagrams (by LLNL)

- Exploring regional nature of energy-water nexus issues
- Informing cross-sector conversations on challenges and opportunities
- Identifying data gaps

- California –energy for moving and treating water
- Texas – produced water
- Virginia – fresh water and seawater cooling

Figure 3-5 - Hybrid Energy-Water Sankey Diagram for California



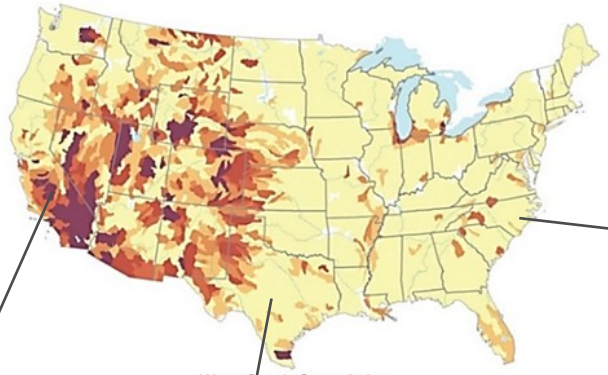


Figure 3-43 - Hybrid Energy-Water Sankey Diagram for Texas

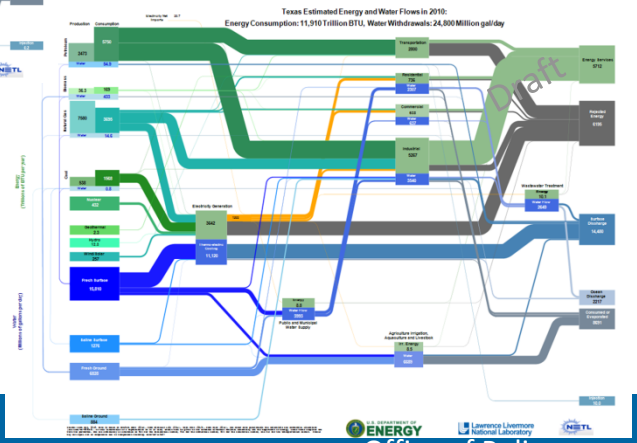
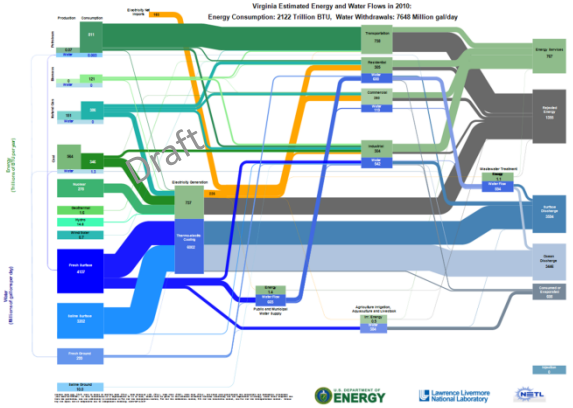


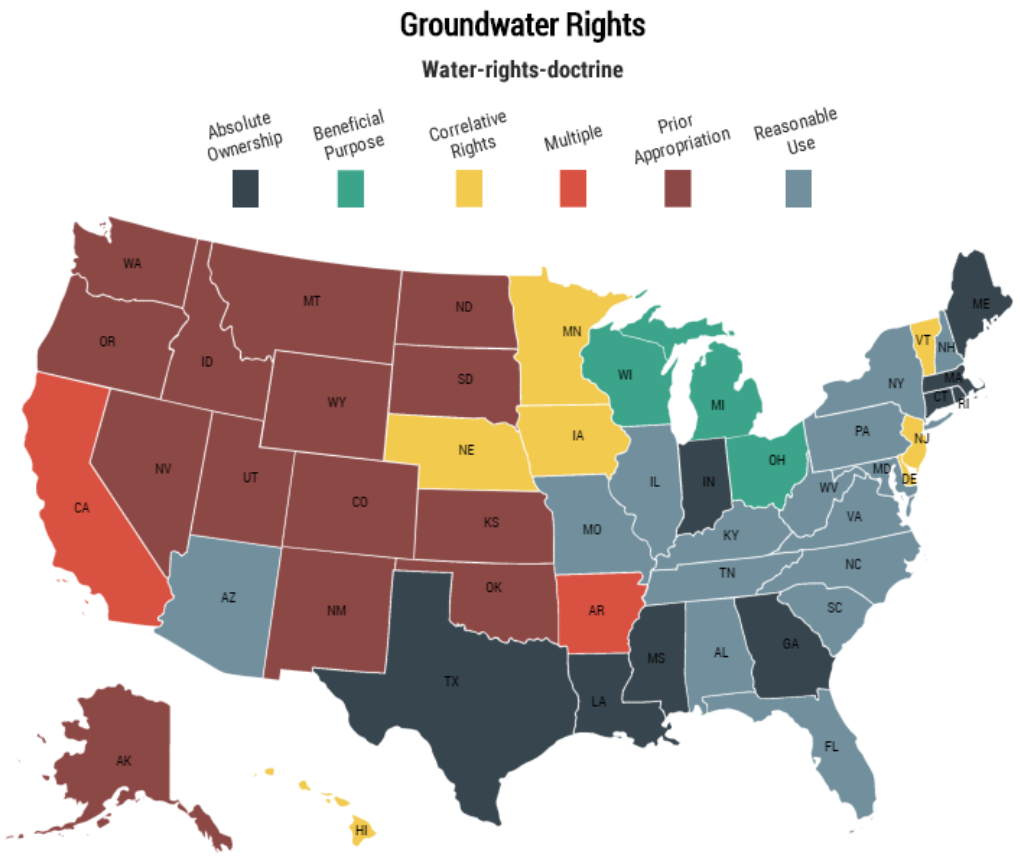
Figure 3-46 - Hybrid Energy-Water Sankey Diagram for Virginia



https://flowcharts.llnl.gov/report

Energy-Water Nexus State Policy Database (beta version)

- DOE-OP's database includes more than 1,700 entries with searchable fields such as jurisdiction, dates enacted, energy subsector affected, relevant statute, contact information of implementing authority, and a concise summary of the policy
  - State and national PDES and NPDES permitting programs
  - Underground injection control permitting
  - Policies affecting surface water rights and groundwater rights
  - Water quality standards
  - Hydraulic fracturing water regulations
  - River and/or dam operations



www.energywaterpolicy.org

Send comments to Samuel.Bockenhauer@hq.doe.gov

U.S.-China Clean Energy Research Center: Energy and Water Track

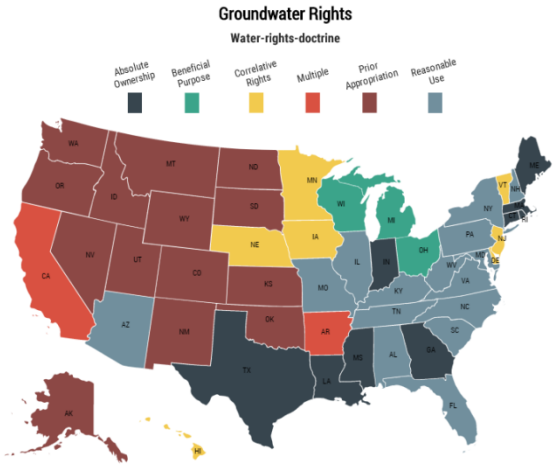
- Four different DOE offices invest a total of $2.5 million annually in the U.S. side of CERC-WET.
- UC Berkeley leads the U.S. side of the CERC-WET consortium.
- The DOE Office of Policy supports Topic 5: Data and Analysis to Inform Planning, Policy, and Decisionmaking.
  - Lifecycle Systems Analyses of Water-Energy Processes and Technologies
  - Integrated National and Regional Scale Modeling of Energy and Water Systems
  - Modeling Complex Water-Energy Systems
  - Water Scenarios for Electricity Generation
  - Market Characterization of Nontraditional Waters in California
- Topic 5 includes modeling and analysis of California and comparative analysis with regions in China.

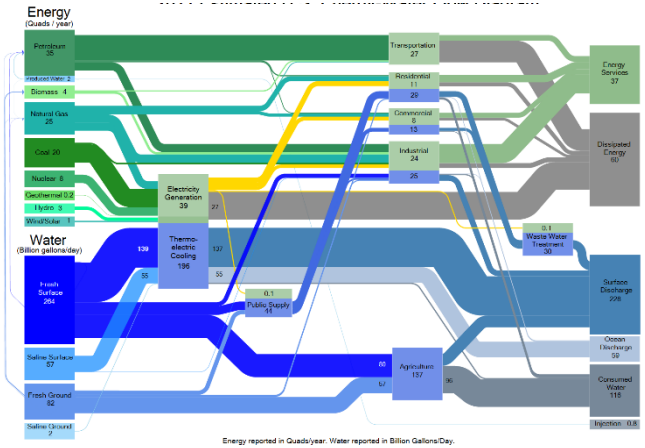
Energy-Water Finance Report

- A report to identify opportunities that capitalize on co-benefits from energy and water finance mechanisms in areas such as:
  - Energy infrastructure that significantly reduces freshwater use
  - Advanced cooling systems for thermoelectric generation
  - Alternative water for thermoelectric generation
  - Waste energy for water treatment
  - More efficient hydropower generation
  - Water infrastructure systems with reduced energy use
- Also identifies financing issues or other barriers to achieving efficient, resilient, and flexible infrastructure and systems.
- Case study: Silverhawk Electric Power Generating Station, $400 million cost
  - Dry cooling system in a water-challenged state (Nevada)
  - Public-private partnership: Southern Nevada Water Authority 25% / NV Energy 75% ownership
- State finance agency programs:
  - Virginia Pooled Financing Program
  - Texas Water Development Fund
  - NY State Water Infrastructure Grants

Summary and Opportunities for Collaboration

- DOE can collaborate with states to address emerging issues, improve policy understanding, and better integrate energy and water policy and decisionmaking.
- Interest in the energy-water nexus from states, Congress, water organizations, and the Administration suggests that the time may be ripe to prioritize these efforts.
- DOE's Office of Policy has a set of state-oriented policy and data resources that it is working to align and position for maximum impact.





➢ We would welcome discussion about possible connections and collaborations with other agencies.

For More Information…

Samuel Bockenhauer, Ph.D.

Physical Scientist

Office of Policy

Samuel.Bockenhauer@hq.doe.gov

DOE Office of Policy's Energy-Water Initiative:

https://energy.gov/policy/initiatives/energy-water-nexus

DOE Energy-Water Nexus Team:

https://energy.gov/under-secretary-science-and-energy/energy-water-nexus-crosscut

Thanks also to: Diana Bauer, Fletcher Fields, Zach Clement, Bob Schmitt, Bonita Singal