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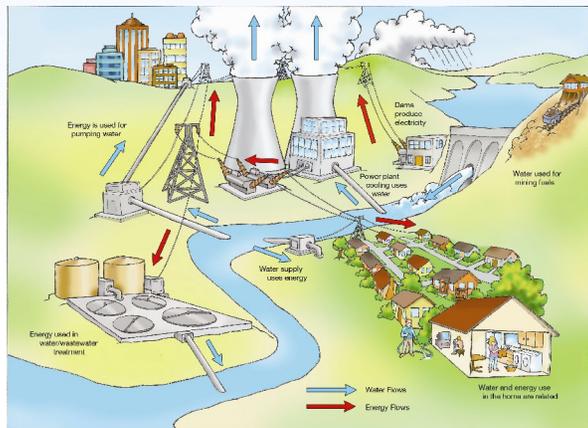
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Problem Statement

Energy and water are critical resources that are inextricably and reciprocally linked. These interdependencies, coupled with increasing demands for energy and diminishing availability of freshwater supplies, pose significant challenges to ensure the sustainability of these two critical resources.



Approach

The roadmap process consisted of several stages:

- Three regional needs-identification workshops were held in 2005-2006
- Issues and needs were then grouped into six research areas during a Gaps Analysis workshop
- A Technology Innovations Workshop was held to allow researchers to suggest specific research topics and approaches that would address each of these primary needs areas



Over 500 participants representing water and energy managers, water and energy utilities, regulatory agencies, environmental groups, industry associations, technology developers, and academia from over 40 states joined in the Roadmap process.

- Results of the workshops were posted to the web to allow for participant feedback and follow-on discussion: www.sandia.gov/energy-water

completing the energy sustainability puzzle



- Based on the results of the workshops, an Energy-Water Research and Development Roadmap Report was written



Research Directions

Thermoelectric Power Generation

- Reduce water use through advanced cooling technologies, scrubbing, innovative source-water intake designs, use of non-traditional waters, and increased power-plant efficiencies



Renewable & Emerging Energy Resources

- Develop environmentally friendly hydropower facilities, improved intermittency and cost-performance of solar and wind technologies, and water-efficient extraction and processing of oil shale



Biofuels & Biomass Production

- Better understand and manage water impacts due to increasing bioenergy production; reduce freshwater use in biofuels processing; reduce freshwater demand in bioenergy production



Non-Traditional Water Utilization & Treatment

- Identify applications and treatment methods for produced and saline aquifer water; improve reverse-osmosis treatment methods to reduce concentrate waste volume and utilize waste heat

Water Resources Characterization

- Improve sensors, data collection, and data management to characterize availability of fresh and nontraditional water; understand impact of climate and use on future water supplies and ecology

Integrated Resource Planning & Decision Support

- Develop system-level models to describe interrelationships between energy, water, infrastructure, and policy; develop joint government/industry working groups to collect appropriate cost and performance data, reduce implementation risks, and accelerate the use of new technologies

ACKNOWLEDGMENTS

We thank Goldie Piatt, Sandhya Rajan, Terry Wilson, Mona Aragon, Susan Kelly, David French, Sherri Thomas, Mirka De La Cava, Larry Dale, Kevin DeGroat, Scott Haase, Jack Whittier, Phil Brittenham, Mike Vittitow, the Executive Committee, the National Laboratory Energy Water Nexus Committee, and all the workshop participants for their contributions and assistance during the Roadmap process.

