

ENERGY DEMANDS ON WATER RESOURCES: The Federal Perspective

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In response to a 2004 congressional directive, the U.S. Department of Energy (DOE) prepared a report to Congress on the interdependency of energy and water in the United States. As illustrated in the table at right, water is an integral element of energy resource and development.

The report, released earlier this year, has a national to regional focus and notes that much of the growth in electricity demand over the next 25 years is projected to occur in areas such as the Southwest where water supplies are already limited. Technologies are available that can reduce water use, such as wind and solar power, but economics, among other factors, have limited their deployment so far.

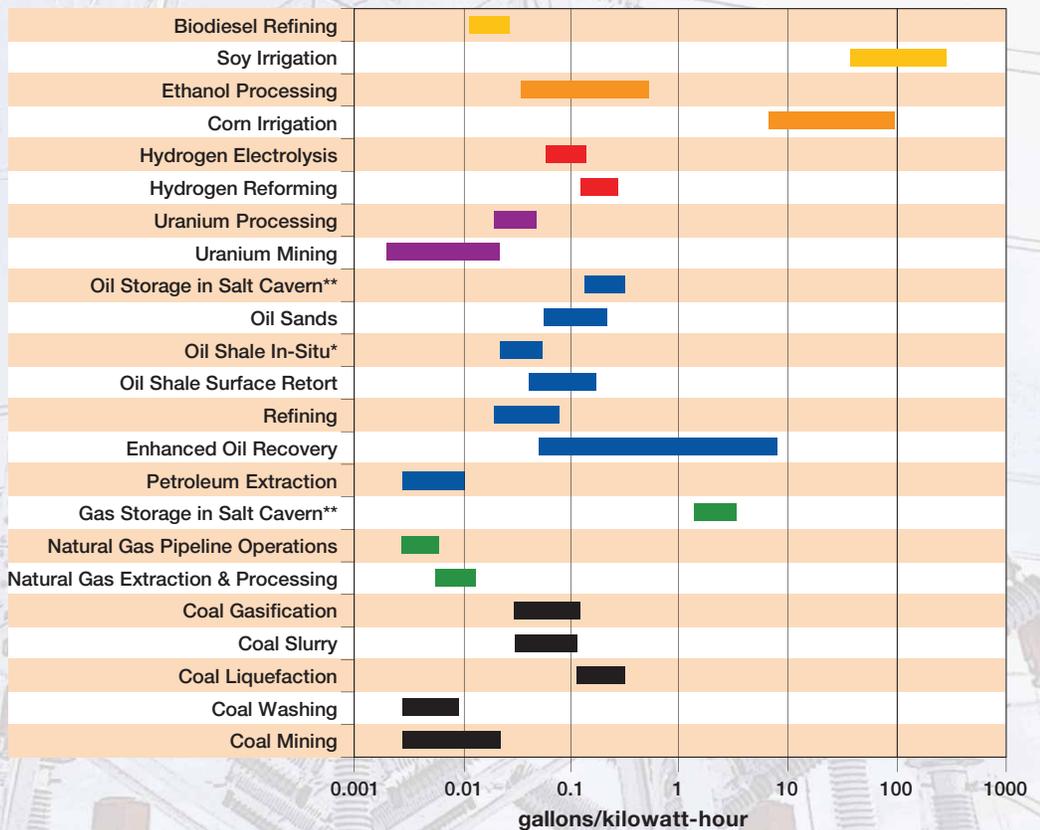
Managers and policy makers must now consider energy and water development so that each resource is used according to its full value. The chart at right shows water consumption for various stages of energy production, a consideration that will become increasingly important as new energy sources are developed.

What is the federal role in this issue? According to the report, federal agencies need to foster greater collaboration among federal, regional, and state agencies and with industry and other stakeholders. Science- and system-based policies are needed to ensure that regulations developed to support one area, such as greater domestic energy supplies, do not have unintended negative impacts on water resources or water quality. Finally, infrastructure synergies should be maximized to promote conservation of both energy and water.

The 80-page report, "Energy Demands on Water Resources: Report to Congress on the Interdependency of Energy and Water," prepared by Sandia National Laboratory with support from the National Energy Technology Laboratory and Los Alamos National Laboratory, is available at www.sandia.gov/energy-water/docs/I21-RptToCongress-EWwEIAComments-FINAL.pdf.

	Energy Element	Water Quantity Connection	Water Quality Connection
Energy Extraction & Production	Oil and gas exploration	Water used for drilling, completion, and fracturing	Shallow groundwater quality impacted
	Oil and gas production	Large volume of impaired water produced	Produced water can impact surface and groundwater quality
	Coal and uranium mining	Large quantities of water may be produced	Tailings and drainage can impact surface water and groundwater
Electric Power Generation	Thermoelectric (fossil, biomass, nuclear)	Surface water and groundwater used for cooling and scrubbing	Thermal and air emissions impact surface waters and ecology
	Hydroelectric	Reservoirs lose large quantities of water to evaporation	Water temperatures, quality, ecology can be impacted
	Solar photovoltaic and wind	Only minimal water used for panel and blade washing	None
Refining & Processing	Traditional oil and gas refining	Water used to refine oil and gas	End use can impact water quality
	Biofuels and ethanol	Water used in growing and refining	Wastewater requires treatment
	Synfuels and hydrogen	Water for synthesis or steam reforming	Wastewater requires treatment
Energy Transportation & Storage	Energy pipelines	Water used in hydrostatic testing	Wastewater requires treatment
	Coal slurry pipelines	Water used for slurry transport and not returned	Final water is of poor quality and requires treatment
	Barge transport of energy	Fuel delivery is impacted by river flows and stages	Spills or accidents can impact water quality
	Oil and gas storage caverns	Large quantities of water required for slurry mining of caverns	Slurry disposal impacts water quality and ecology

Connections between the energy sector and water availability and quantity (from the Report to Congress on the Interdependency of Energy and Water).



*Water Consumption for Electric Power from Evaporatively-Cooled Combined Cycle Gas Turbine
**One-Time Use for Solution Mining of Salt Cavern

Water consumption for various types of energy extraction, processing, storage, and transport (modified from the Report to Congress on the Interdependency of Energy and Water).