USGS Report on Water-Energy Nexus

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Water availability and use are closely connected with energy development and use. Water cannot be delivered to homes, businesses, and industries without energy, and most forms of energy development require large amounts of water. The United States faces two significant and sometimes competing challenges: to provide sustainable supplies of freshwater for humans and ecosystems and to ensure adequate sources of energy for future generations. This report reviews the complex ways in which water and energy are interconnected and describes the earth science data collection and research that can help the Nation address these important challenges.

The earth sciences have been a cornerstone in developing our current understanding of the water-energy nexus. A full understanding of the nexus, however, is limited by uncertainty in our knowledge of fundamental issues, such as the quantity of freshwater that is available, the amount of water that is used in energy development, the effects that emerging energy development technologies have on water quality and quantity, and the amount of energy required to treat and deliver freshwater. Enhanced data collection and research can improve our understanding of these important issues and thereby lay the groundwork for informed resource management.

Relevant earth science issues analyzed and discussed herein include freshwater availability; water use; ecosystems health; assessment of saline water resources; assessment of fossil-fuel, uranium, and geothermal resources; subsurface injection of wastewater and carbon dioxide and related induced seismicity; climate change and its effect on water availability and energy production; byproducts and waste streams of energy development; emerging energy-development technologies; and energy for water treatment and delivery.