

# Water-energy dependence around Pacific Rim mapped

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Glen Canyon Dam in northern Arizona uses hydroelectric power from the Colorado River to provide energy to the Western U.S. A new publication from Sandia National Laboratories maps the use of fresh water for energy production in 21 Pacific Rim economies. Credit: Randy Montoya

A wide-ranging analysis of water vulnerability across the

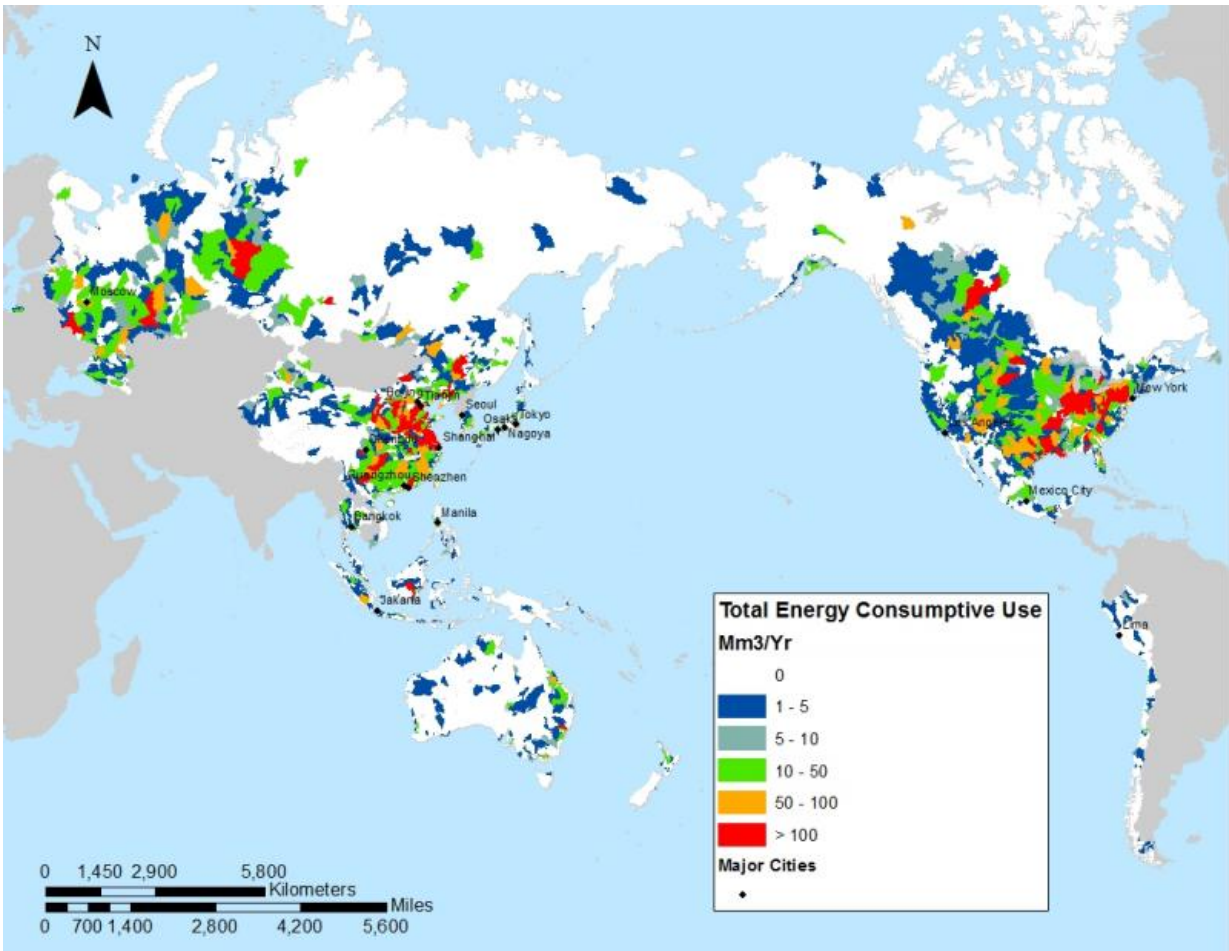
Pacific—including the U.S., China, Russia and Japan—has identified hundreds of locations where energy production depends upon scarce water supplies.

The Sandia National Laboratories study, "Mapping Water Consumption for Energy Production Around the Pacific Rim," was published in *Environmental Research Letters*.

Prepared for the [Asia-Pacific Economic Cooperation](#) (APEC), the first-of-its-kind report maps out every power plant, refinery and mine in 21 Asia-Pacific economies that rely on fresh [water](#) for [energy](#). Simultaneously, it shows the data in context to regions at high to extreme risk of drought and dwindling natural water supplies.

"This is the first time we have worked on a project of this scale to illustrate how much fresh water is used for energy development," said Sandia hydrologist Vince Tidwell, who co-authored the report with technologist Barbie Moreland. "The purpose was to lay out a foundation to raise awareness in these economies about energy-water issues and vulnerabilities they are facing."

The report compares demand in 10 energy sectors where fresh water is consumed to produce energy—including thermoelectric and hydroelectric power production; coal, uranium, natural gas and oil extraction; refining of biofuels, oil and natural gas; and production of biofuel feedstocks.



A new report from Sandia National Laboratories maps fresh water for energy consumption in context with economies facing extreme water risk. Credit: Sandia National Laboratories

Among the 21 APEC economies are some of the world's biggest energy users, where economics, population growth and other factors contribute to mounting water demands. The U.S. alone has more than 1,200 thermoelectric power plants, more than 500 refineries, and about 800 mines.

Tidwell said he was surprised by the number of energy facilities across

Asia-Pacific economies in locations facing water risk. The study identified 32 percent of the 2,511 watersheds consuming fresh water for energy are also characterized as being at high to extreme risk of running out of [fresh water](#). For six of the economies, watersheds at risk represented half or more of all basins consuming water for energy.

"Where we have energy growth and demand in regions with high or extreme water risk, we start to worry. Our hope is the hard data in this publication will get people to pay attention," Tidwell said.

APEC's Energy Working Group recently established an Energy Resilience Task Force co-chaired by the Departments of Energy for the U.S. and the Philippines. One major work stream under this new task force is to address energy-water nexus challenges. This Sandia report helps develop a baseline understanding of challenges across the APEC region so additional activities may be developed.

The study also supports the Department of Energy's (DOE) Water-Energy Nexus program, generated from the 2014 report, [The Water-Energy Nexus: Challenges and Opportunities](#), outlining the interdependence between energy and water. It was funded for APEC by the DOE's Office of International Affairs.

Sandia based the Asia-Pacific study on its decades of experience analyzing water data and developing water models, along with expert research in water technology and development. Sandia's core mission to solve complex national security problems includes safeguarding resilient and sustainable energy-water systems.

**More information:** Vincent Tidwell et al. Mapping water consumption for energy production around the Pacific Rim, *Environmental Research Letters* (2016). [DOI: 10.1088/1748-9326/11/9/094008](https://doi.org/10.1088/1748-9326/11/9/094008)

Provided by Sandia National Laboratories

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