

Projected California warming promises cycle of more heat waves, energy use for next century

July 10 2008

As the 21st century progresses, major cities in heavily air-conditioned California can expect more frequent extreme-heat events because of climate change.

This could mean increased electricity demand for the densely populated state, raising the risk of power shortages during heat waves, said Norman Miller, an earth scientist at Lawrence Berkeley National Laboratory and geography professor at the University of California, Berkeley, and Katharine Hayhoe, a climate researcher at Texas Tech University. If the electricity were generated using fossil fuels, this could also mean even more emissions of heat-trapping gases that cause climate change.

Their results were published in the online version of the *Journal of Applied Meteorology and Climatology*. Co-authors included Maximilian Auffhammer, of the Agricultural and Resource Economics Department at UC Berkeley, and Jiming Jin, formerly of the Earth Sciences Division at Berkeley Lab and now at Utah State University.

"Electricity demand for industrial and home cooling increases near linearly with temperature," said lead author Miller, a climate scientist and a principal investigator with the Energy Biosciences Institute in Berkeley. "In the future, widespread climate warming across the western U.S. could further strain the electricity grid, making brownouts or even rolling blackouts more frequent."

When projected future changes in extreme heat and observed relationships between high temperature and electricity demand for California are mapped onto current availability, the researchers discovered a potential for electricity deficits as high as 17 percent during peak electricity demand periods.

Climate projections from three atmosphere–ocean general circulation models were used to assess projected increases in temperature extremes and day-to-day variability, said Hayhoe. Increases range from approximately twice the present-day number of extreme heat days for inland California cities such as Sacramento and Fresno, to up to four times the number of extreme heat days for previously temperate coastal cities such as Los Angeles and San Diego before the end of the century.

This year, California experienced an unusually early heat wave in May and is currently in the midst of its second major heat wave of the summer, one that has already broken high temperature records for several more California cities and increased fire and health risks. One hundred and nineteen new daily high temperature records were set during the May heat wave, including the earliest day in the year in which Death Valley temperatures reached 120oF (on May 19, beating the old record of May 25 set in 1913).

In the future, the authors say, the state should brace for summers dominated by heat wave conditions such as those experienced this year. Extreme heat and heat wave events have already triggered major electricity shortages, most notably in the summer of 2006. Given past events, the results of this study suggest that future increases in peak electricity demand may challenge current and future electricity supply and transmission capacities.

Similar increases in extreme-heat days are likely for other U.S. urban centers across the Southwest, including Arizona, New Mexico, and

Texas, as well as for large cities in developing nations with rapidly increasing electricity demands.

Risk of electricity shortages can be reduced through energy conservation, said Hayhoe, as well as through reducing emissions of heat-trapping gases in order to limit the amount of future climate change that can be expected.

Miller and Hayhoe also contributed to the Nobel Prize-winning United Nations Intergovernmental Panel on Climate Change. Miller is currently leading the BP-funded Energy Biosciences Institute (EBI) project on biofuel productivity potentials, including biofuels' impact under changing climate conditions. The EBI is a collaboration between the University of California, Berkeley, the University of Illinois at Urbana-Champaign, and Lawrence Berkeley National Lab dedicated to the development and analysis of the impacts of sustainable biofuels. Miller is also a member of the U.N. Earth Science System Partnership Working Group on Bioenergy.

Source: Lawrence Berkeley National Laboratory

Citation: Projected California warming promises cycle of more heat waves, energy use for next century (2008, July 10) retrieved 19 April 2024 from <https://phys.org/news/2008-07-california-energy-century.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.