SAMUELI SCHOOL OF ENGINEERING
UNIVERSITY of CALIFORNIA · IRVINE
Department of Civil and Environmental Engineering

ENVIRONMENTAL ENGINEERING SEMINAR SERIES

FRIDAY, FEBRUARY 21ST FROM 1:30PM-2:20PM

MCDONNELL DOUGLAS AUDITORIUM (MDEA)

Evaluating the Efficacy of Water Conservation Strategies Through Changes in the Power Sector

Presented By: Kelly T. Sanders, Ph.D.

Assistant Professor, Civil & Environmental Engineering
University of Southern California

Dr. Sanders is an Assistant Professor at the University of Southern California, in the Viterbi School of Engineering.

Dr. Sanders received her Ph. D at the University of Texas and is interested in conducting system level analyses that seek to resolve issues with technical, political, and societal significance to inform better decision making in regards to energy and water resource MGMT.

Abstract:

Much of the Western US has experienced severe to exceptional drought in the past decade, increasing competition among urban, rural, and industrial users of water. While conventional water efficiency strategies target municipal and agricultural water use, very little attention has been given to the thermoelectric power sector, which represents nearly 50% of US water withdrawals annually. This presentation explores the effect of increasing the valuation of water through market levers as a mechanism to induce water savings from thermoelectric power plants in the Electric Reliability Council of Texas' (ERCOT) electric grid. To do so, a unit commitment and dispatch model was utilized to simulate power generation, wholesale generation costs, water withdrawals, and water consumption across a set of increased cooling water costs ranging from 10 to 1,000 USD per acre-foot. Results suggest that water withdrawals for cooling thermoelectric power plants in ERCOT can be reduced by as much as 75%, while water consumption can be reduced by 23% by imposing a fee for water. However, to achieve these water savings, wholesale electricity generation costs might increase as much as120% based on 2011 fuel costs and generation characteristics. Although conventional long-term water supply projects tend to be more cost-effective than water management through shifts in power generation, the electric grid demonstrates short-term flexibility that conventional water supply projects do not. Thus, there might be conditions under which the grid could be effective at “supplying" water, particularly during emergency drought conditions.

Next Week’s Seminar (Friday, February 28th)

Michael MacKinnon
University of California, Irvine

Questions? Email: CEE@UCI.EDU Phone: (949) 824-5333