Targeting rebates in the water-energy nexus

Alvar Escriva-Bou
Water Policy Center, Public Policy Institute of California, escriva@ppic.org

Manuel Pulido-Velazquez
Research Institute of Water and Environmental Engineering, IIAMA, Universitat Politècnica de València, mapuve@hma.upv.es

Jay R. Lund
Center for Watershed Sciences, University of California, jrlund@ucdavis.edu

Follow this and additional works at: https://scholarsarchive.byu.edu/iemssconference

Part of the Civil Engineering Commons, Data Storage Systems Commons, Environmental Engineering Commons, Hydraulic Engineering Commons, and the Other Civil and Environmental Engineering Commons

https://scholarsarchive.byu.edu/iemssconference/2016/Stream-C/42

This Event is brought to you for free and open access by the Civil and Environmental Engineering at BYU ScholarsArchive. It has been accepted for inclusion in International Congress on Environmental Modelling and Software by an authorized administrator of BYU ScholarsArchive. For more information, please contact scholarsarchive@byu.edu, ellen_amatangelo@byu.edu.
Targeting rebates in the water-energy nexus

Alvar Escriva-Bou\textsuperscript{1}, Manuel Pulido-Velazquez\textsuperscript{2} and Jay R. Lund\textsuperscript{3}

1. Water Policy Center, Public Policy Institute of California, San Francisco, USA (escriva@ppic.org)
2. Research Institute of Water and Environmental Engineering, IIAMA, Universitat Politècnica de València, Spain (mapuve@hma.upv.es)
3. Center for Watershed Sciences, University of California, Davis (jrlund@ucdavis.edu)

Abstract: Water conservation is often the most cost effective source of additional water supply for water stressed regions to maintain supply reliability with increasing population and/or demands, or shorter-term droughts. In previous research we demonstrated how including energy savings of conserved water can increase willingness to adopt conservation measures, at the same time that increases energy and GHG emissions savings. But the capacity to save water, energy and GHG emissions depends fundamentally in the economic benefits for customers and utilities. Utilities have traditionally used rebates, subsidies or incentives to enhance water conservation. But the economic benefits originated by these rebates depend on the actual savings of the water, energy and GHG emissions. A crucial issue that is not considered in the financial analysis of these rebates is the heterogeneity in water consumption, resulting in rebating households that actually do not need improvements in certain appliances. Smart meters with end-use disaggregation allow to consider this heterogeneity and to target rebates. By using an optimization approach that minimizes water and energy residential costs—accounting for retrofit costs and individual benefits according to previous levels of consumption—we are able to assess economically optimal rebate programs both for customers and utilities. Three programs are considered: first, same economic incentives are provided to all households and then they do their optimal decisions; second, traditional appliance-focused rebates are assessed; and third, utilities provide only rebates to those households that maximize water, energy or GHG emissions savings. Results show that the most economically efficient options for households are not the best options for utilities, and that traditional appliance-focused rebates are much less optimal than targeted rebates.

Keywords: water conservation; water-energy nexus; urban water use; water policy; water utilities.