

Residential Conservation: How Much and at What Cost?

Summarized from Evaluation and Cost Benefit Analysis of Municipal Water Conservation Programs, a report by the Water Conservation Alliance of Southern Arizona

What actual water savings can be achieved from municipal conservation programs? How do the costs of conservation programs compare to the volume of water saved? The Water Conservation Alliance of Southern Arizona developed the ECoBA (evaluation and cost benefit analysis) project to gather the hard data to answer these questions.

ECoBA's goal was to provide data to decision makers to help them decide which water conservation program to implement first or next, or which to eliminate. The project analyzed utility records of 88 cases (one year of a particular water conservation program) in 42 programs from 11 states, primarily in the Southwest.

Programs included water audits, landscape retrofits, washing-machine rebates, toilet rebates and replacements, and conservation-device giveaways (such as low-flow shower heads and faucet aerators) applied primarily in single-family residences. In addition, a limited number of rate-change, ordinance, and conservation-class programs were reviewed but insufficient data were available for direct comparison.

The methodology examined participants' water use two years prior to the program and two years afterwards. Their water use was then compared with that of a control group (average use for the entire utility or a subset population) to assess the amount of water savings that could be attributed to the program. The programs that were analyzed occurred between 1994 and 2003.

Besides determining actual water savings achieved, the program was designed to establish costs to the utility, other funders, and customers to attain those water savings. However, only direct costs and benefits that could be quantified for all programs were included; savings to the participants on sewer or other unquantified benefits may in fact be significant.

Researchers looked in-depth at the water-use patterns of the customers who took advantage of the conservation programs and the persistence of their water savings through time, and compared the actual water savings with standard predicted savings. The economic analysis focused on the cost to save an acre-foot of water and the cost to the utility per participant. Results are shown in the charts below. Several key or unexpected findings from the ECoBA project are notable.

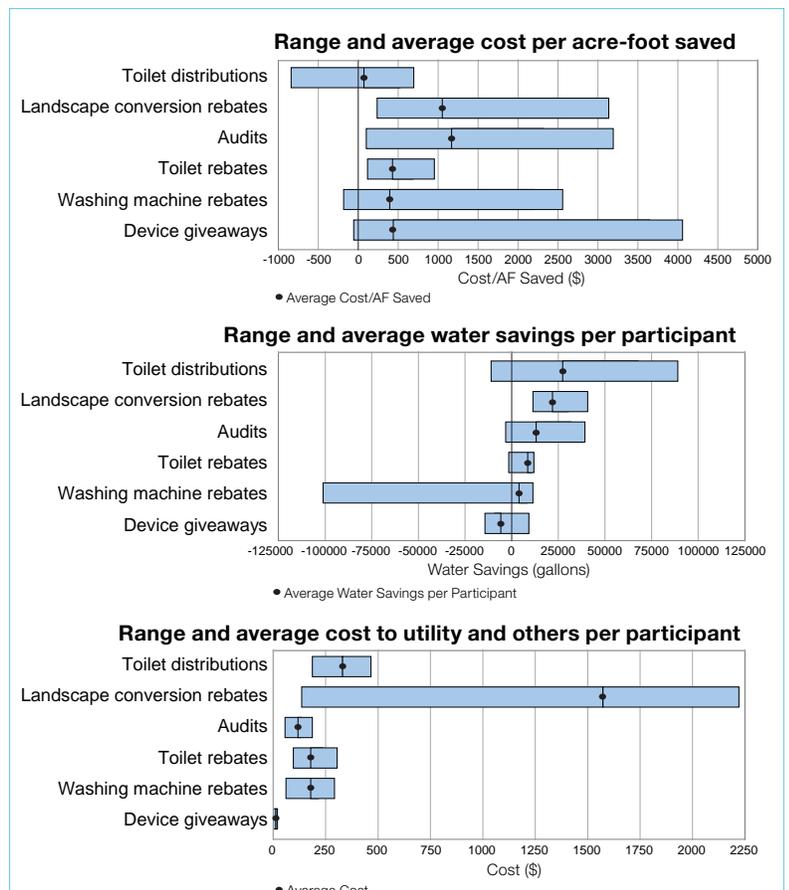
Toilet distributions (giveaways) was the clear winner in terms of cost and water savings; the difference in water savings achieved by toilet distributions (228 percent of predicted water savings) and toilet rebate programs (63 percent of predicted savings) was surprising. The result may be because distribution programs allow a utility to assert total quality control by offering only highly efficient models, ensuring that toilets are installed properly, and also checking for leaks or other conservation opportunities in the household during installation.

Audit and washing-machine rebate programs seemed to attract significantly higher-volume water users than average, whereas landscape-conversion

programs attracted low-water users. Landscape conversion and audit programs were so variable in their costs and savings achieved that program managers are advised to be especially cautious in structuring or targeting these types of programs. On average these programs cost the most to save one acre-foot of water.

Negative water savings per participant (see especially washing-machine rebates, below) indicate that control-group water use decreased more (or increased less) than participant water use. Negative cost per acre-foot saved indicates the utility incurred costs relative to the program and no water savings were attributable to those costs; in fact, an increase in participant water use occurred.

Email watercasa@cals.arizona.edu for the full report.



A comparison of water savings and costs of different conservation programs reveals that toilet distributions offer the greatest across-the-board advantages.