

Tempe Water Utilities Dept.

Landscape Rebate Program

The City of Tempe Water Utilities Department serves the communities of Tempe and Guadalupe, located in central Arizona. Combined, these communities have a population of approximately 170,000 people. The area's economy is heavily supported by a state university and hundreds of manufacturing and technology firms¹. As of the 2000 census, Tempe's median family income was \$55,237.²

UTILITY DEMOGRAPHICS

The City of Tempe Water Utilities Department currently maintains approximately 42,000 connections 84.6% of which were residential. Of their total connections, 31,350 were single family residential, 4,200 were single family residential, 3,230 were commercial, 88 were industrial, 3,300 were irrigation and flood irrigation, and 200 government and miscellaneous customers. The City of Tempe Water Utilities Department's total service area encompasses 41.5 square miles. Approximately 99% of the utility's customers are within the City of Tempe, with the remaining connections in Guadalupe. The total amount of treated water use in 2004 was 52,711 AF. The average per capita residential water use was 148 gallons per day, as of 2004.

Landscape Rebate Program	
Rebate Amount:	\$100
Eligible Customers:	SF
Customers Analyzed:	SF
Program Years:	1992-present
Analysis Years:	March 2001 – February 2002

UTILITY RATE STRUCTURE AND PRICES

The City of Tempe Water Utilities Department has an increasing block rate structure. The monthly base rates for service to single family residences are \$8.39 within Tempe city limits, and \$10.82 outside Tempe city limits. The monthly service charge includes zero gallons of water. The fee structure for water consumption inside Tempe and Guadalupe, as of November 1, 2002, is as follows:

0 – 8,000 gallons	\$0.83 per 1,000 gallons
8,001 – 15,000 gallons	\$0.88 per 1,000 gallons
15,001 – 25,000 gallons	\$0.97 per 1,000 gallons
25,001 – 50,000 gallons	\$1.03 per 1,000 gallons
50,001 – 100,000 gallons	\$1.13 per 1,000 gallons
≥ 100,000 gallons	\$1.17 per 1,000 gallons

CURRENT CAPACITY AND WATER SOURCES

The City of Tempe Water Utilities Department has a current storage capacity of 38.8 million gallons, over 95% of which is drawn from surface water sources which include the Salt River Project, the Central Arizona Project (CAP), and the Modified Roosevelt Dam New Conservation Storage.

¹ Arizona Department of Commerce: Tempe Community Profile.

² U.S. Census Bureau, American Fact Finder.

FUTURE PLANS TO MEET DEMAND

The population within the City of Tempe grew 0.35% annually, on average, between 2000 and 2004. The utility intends to meet future water demand within the service area by first utilizing its current capacity and water sources. The utility has plans to expand and

OTHER CITY OF TEMPE CONSERVATION PROGRAMS

Toilet Rebate Program, October 1992- present
Plumbing Retrofit Kit Giveaway, October 1992- present
Free plumbing retrofit kits provided to water customers whose homes were built before 1980.

School Gardening Grants, awarded every September since 2000

Public Education, 1990- present

Conservation Based Rate Structure, 1999- present

Water Waste Ordinance, 1999- present

Industrial Grant Program, 1999- present

The grants cover 25-50% of costs up to \$20,000.

change water sources and infrastructure to allow the utilization of increased amounts of reclaimed water. Additionally, the City of Tempe Water Utilities Department is seeking additional CAP water supplies. Lastly, the utility will meet

further demand by increasing groundwater and recovery well production capacity and continuing its programs to encourage customer conservation.

REBATE PROGRAM - DESCRIPTION

Since 1992, the City of Tempe Water Utilities Dept. has offered \$100 rebates to single family customers for converting turf landscapes to xeriscape. Since the program's beginning, 855 customers, all from within Tempe city limits, have participated in the landscape rebate program and over 2,000,000 square feet of turf has been removed. Of the 855 rebates processed, over 90% have been for landscape conversions, with the remainder for new landscapes. The utility does not require a minimum amount of turf to be removed, only that an entire front or back yard is converted to xeriscape. The utility increased the rebate amount to \$250 for a front or back yard, for a maximum rebate of \$500, in September, 2004.

The utility issues rebate checks to single family residential customers participating in the landscape rebate program. Customers are informed of the program via bill inserts, mailings from the utility, newsletter articles, public service announcements, newspaper articles, as well as information on the utility website.

METHODOLOGY

Please see the General Methodology for the specific procedures and techniques used for all ECoBA analyses.

The analysis includes only single-family households that received landscape conversion rebates between March 2001 and February 2002. The water savings were calculated and a cost benefit analysis was performed for the time period of March 2001 to February 2002. The findings refer to this yearlong period only, not to the ongoing program. The lifespan of the landscape conversion was assumed to be ten years³.

³ Pekelney, D.M. et al. *Guidelines to Conduct Cost-Effectiveness Analysis of Best Management Practices for Urban Water Conservation*. California, 1996.

All quantified costs and benefits have been discounted to the first year of the analysis (2001) and inflated to 2004 dollars. The discount rate used for this analysis was 5.4%. The Consumer Price Index values used in this analysis were the 2004 value of 188.9 and the 2001 value of 177.1.

The population studied in this analysis includes participants who received rebates for converting their turf landscapes (as opposed to new landscapes). Fifty-one customers participated from March 2001 to February 2002. There were 28 usable participants out of 51 total participants. Forty-five percent, or 23, of the participants were unusable because they moved during the period of analysis, or sufficient raw data was not available.

All City of Tempe single-family residential households that did not participate in the landscape conversion rebate program were used as the control group. However, the average pre-measure water use of the participants (169,629 gallons) was lower than that of the control group (208,676 gallons). There were 29,972 customers in the control group.

ASSUMPTIONS

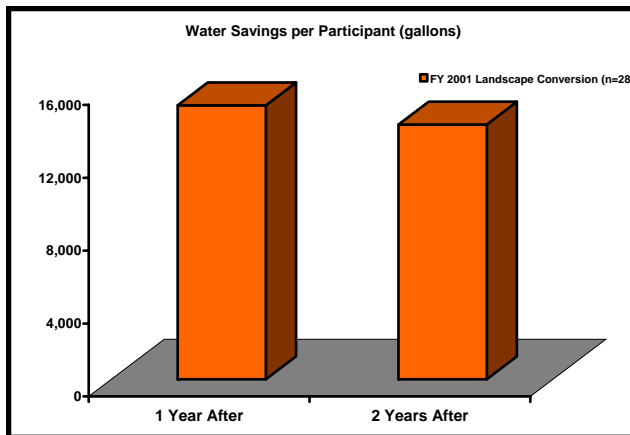
Please see the General Assumptions for the specific conditions and rules underlying all ECoBA analyses.

We assumed 30,000 single-family residential connections for each recognizing that this is not entirely accurate. The utility was unable to provide an actual count. After removing participants from this figure, the control group totaled 29,972 users.

We assumed that 65% of the converted square footage cost \$1,000 on average, and the remaining 35% cost \$2,000 on average.

There was no minimum square footage requirement for the yard conversions.

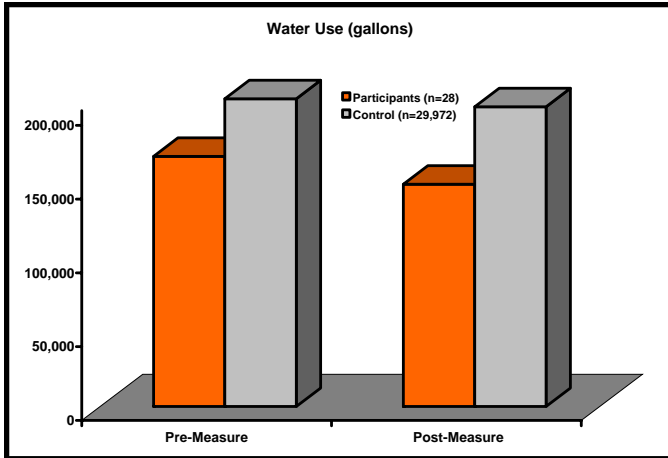
The price of water used in determining the benefits to customers from reduced water bills is the price from the range where the participants' pre-measure average monthly use fell. Ex.: Pre-measure average monthly use = 14,825 gallons, which is within the range of 8,001 to 15,000 gallons, and so the price per 1,000 gallons was \$0.86 per 1,000 gallons in 2002, \$0.88 per 1,000 gallons in 2003, and assumed to be \$0.88 for the remainder of the lifespan.



Participants who had two or more consecutive months of no water use were included in the study.

RESULTS - WATER SAVINGS

The first year after the landscape conversion rebates, water savings amounted to 421,013 gallons, or 15,036 gallons per participant per year (gppy) (8.8% of pre-measure water use). The second year after the



conversion rebates, water savings amounted to 391,492 gallons, or 13,982 gpy (8.2% of pre-measure water use). The average water savings per year was 406,252 (1.2 AF), or 14,509 gpy (8.6% of pre-measure water use). **The total water savings over the ten year assumed lifespan of the landscape conversions was 4,062,521 gallons (12.5 AF), or 145,090 gallons per participant.**

During the two years before replacing high water use landscape with Xeriscape, participants' water use

was 81.3% of the control group's use, on average. During the two years after replacing the high water use landscape, participants' water use was 74.2% of the control group's use, on average. The participants' water use decreased by 11.1% whereas the control group's use decreased by 2.6%. **The resulting overall water savings attributed to this program was 8.5%.**

RESULTS - COST BENEFIT ANALYSIS

Costs and benefits listed below represent the entire lifespan of the program (ten years).

- ◆ The quantified cost to the utility was \$3,593. This includes the cost of materials, \$80, advertising, \$53, labor, \$473, and incentive payments, \$2,987. This is a cost of \$129 per participant, which includes materials, \$3, advertising, \$2, labor, \$17, and incentive payments, \$107.
- ◆ The quantified benefit to the utility was \$0.
- ◆ The approximate quantified cost to the participants was \$40,319. This includes the estimated cost of landscape conversion and relevant materials. The cost per participant is \$1,440.
- ◆ The quantified benefit to the participants was \$5,867. This includes financial incentives, \$2,987 and water bill savings, \$2,880. This is a benefit of \$210 per participant, including \$107 in financial incentives and \$103 in water bill savings.

Quantified Costs and Benefits							
Utility				Participants			
Costs		Benefits		Costs		Benefits	
Materials	\$80	Not Quantified		Landscape Conversion	\$40,319	Financial Incentives	\$2,987
Advertising	\$53					Value of Water Saved	\$2,880
Labor	\$473						
Incentive Payments	\$2,987						
Total	\$3,593					Total	\$5,867

UTILITY PERSPECTIVE

Results of cost benefit analysis show a net benefit (net present value) of -\$3,593 from the utility perspective. This is a net benefit of -\$128 per participant. The quantified costs to the utility were greater than the quantified benefits to the utility. **The cost per acre-foot of water saved from the utility perspective was \$288.**

PARTICIPANT PERSPECTIVE

Results of cost benefit analysis show a net benefit (net present value) of -\$34,452 from the participant perspective. This is a net benefit of -\$1,230 per participant. The quantified costs to the participant were greater than the quantified benefits to the participant. **The cost per acre-foot of water saved from the participant perspective was \$3,234.**

OVERALL PERSPECTIVE

Results of cost benefit analysis show a net benefit (net present value) of -\$38,045 from an overall perspective. This is a net benefit of -\$1,359 per participant. The quantified costs to the participants and utility were greater than the quantified benefits to the participants and utility. **The cost per acre-foot of water saved from the overall perspective was \$3,522.**

UNQUANTIFIED COSTS AND BENEFITS

Costs

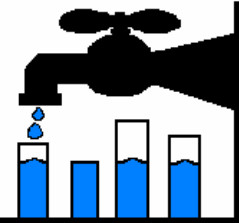
- Landfill disposal of turf.
- Aesthetics.
- Loss of function.

Benefits

- Financial savings on sewer bills for participants.
- Avoided cost of acquisition and distribution of water saved.
- Environmental benefits of reduced water use.
- Increased public awareness about water conservation.
- Water saved for future municipal use.
- Reduced surface water use.
- Program participants received newly xeriscaped yards.
- Reinforces need to conserve water and the desirability of conservation.
- Increased customer satisfaction with the utility.
- Aesthetics.

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Landscape Rebate Program



Results of Cost Benefit Analysis-Lifespan (10 Years)

	UTILITY	PARTICIPANT	OVERALL
<i><u>Present Value Costs</u></i>			
Costs to Utility	3,593	NA	3,593
Costs to Participants	NA	40,319	40,319
Costs to Others	NA	NA	0
Total Costs	\$3,593	\$40,319	\$43,912
<i><u>Present Value Benefits</u></i>			
Total Water Savings	12.47 AF	12.47 AF	12.47 AF
Benefits to Utility	0	NA	0
Benefits to Participants	NA	5,589	5,589
Benefits to Others	NA	NA	0
Total Benefits	\$0	\$5,589	\$5,589
<i><u>Cost Benefit Calculations</u></i>			
Net Present Value (NPV) (Total Benefits - Total Costs)	-\$3,593	-\$34,730	-\$38,323
Cost Effectiveness Analysis(CEA) (Total Costs ÷ Total Water Savings)	\$288 /AF	\$3,234 /AF	\$3,522 /AF