

Chandler Utilities Dept.

Landscape Rebate Program

The City of Chandler is located in the southeast region of the Greater Phoenix area, and is home to a population of approximately 228,000 residents. The 1999 median household income in Chandler was \$58,416, which is higher than the statewide median of \$40,558.¹

UTILITY DEMOGRAPHICS

As of 2004, the City of Chandler had approximately 66,239 connections. Of their total connections 62,170 were single family residential, 857 were multifamily residential, 1,418 were commercial, 45 were industrial, 1,674 were irrigation, 32 were educational/medical, and 43 were reclaimed water. Chandler's total service area is 72 square miles. Their residential water use, in gallons per capita per day (gpcd), is about 133.

LANDSCAPE REBATE PROGRAM

Rebate Amount: \$200, minimum 1,000 sq. ft.
Eligible Customers: SF
Customers Analyzed: SF
Program Years: 1990-present
Years Analyzed: 2001, 2002

UTILITY RATE STRUCTURE AND PRICES

Since 1997, the City of Chandler has employed a seasonal rate structure. Most residences have 3/4" or 1" meters. The residential monthly base charge for both 3/4" and 1" meters, which includes zero gallons of water, is \$16.28 for residents inside the city and \$29.30 for residents outside the city. In addition to the monthly base charge, all water is charged at the following rate per thousand gallons:

	Winter Rate		Summer Rate	
	In City	Outside City	In City	Outside City
First 10,000	\$0.96	\$1.73	\$0.96	\$1.73
Next 10,000	\$1.19	\$2.14	\$1.27	\$2.29
Next 80,000	\$1.37	\$2.47	\$1.86	\$3.35
Over 100,000	\$1.19	\$2.14	\$1.86	\$3.35

CURRENT CAPACITY AND WATER SOURCES

The City of Chandler has a storage capacity of 117 million gallons and delivers an average of 52 million gallons each day. The City of Chandler receives its water from Chandler's water treatment plant, 22 groundwater wells, Central Arizona Project (CAP) water, the Salt River Project (SRP), and reclaimed water. The water treatment plant treats and disinfects water from the Salt River, Verde River, CAP water (from the Colorado River), and SRP wells.

FUTURE PLANS TO MEET DEMAND

The City of Chandler is one of the fastest growing cities in Arizona and the United States, having grown 9.7% per year, on average, between 1990 and 2000.² Chandler plans to meet future water demand by continuing with current capacity and sources, adding to their CAP supply, expanding their existing water treatment plant, possibly adding another plant, through water conservation, and through reuse.

¹ US Census Bureau, QuickFacts.

² Arizona Department of Commerce: Chandler Community Profile.

REBATE PROGRAM - DESCRIPTION

The City of Chandler's Low Water Use Landscape Rebate Program, initiated in 1990, offers a \$200 rebate to residents who convert their landscape from turf to low water use landscaping (xeriscape) or who install xeriscape at a new home. The rebate amount changed from \$150 to the current amount of \$200 in 2000. To qualify for a rebate, the entire front and back yards must be landscaped and the total landscapable area must exceed 1000 square feet. In addition, a minimum of 50% of the total landscapable area must be non-turf inorganic ground cover after conversion and primary accent plants for the landscapable area must be drought resistant shrub and trees. A

Water Conservation Specialist will then visit a qualifying resident to discuss irrigation scheduling, timer operation and system maintenance. The City has issued over 9,000 rebates since 1990.

OTHER CITY OF CHANDLER CONSERVATION PROGRAMS

Toilet Rebate, 1990-1996
Water Saver Kits, 1991-present
Water Audits/Self-Audits, 1991-present
Low Water Use Landscape Packets, 2000-present
Automatic Irrigation Controller Rebate, 1991-present
Public Education, various start dates

METHODOLOGY

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

This analysis includes only single family households that received rebates for landscape conversions during the years 2001 and 2002. The water savings were calculated and a cost benefit analysis was performed for the years 2001 and 2002. The findings refer to these two years only, not to the ongoing program. The lifespan of the landscape conversions, which is used as the period of analysis, was assumed to be ten years.³

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 in this analysis was 5.4%. The CPI values that were 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 installing new landscapes) during 2001 and 2002. There were 18 usable participants out of 24 total in 2001 and 22 out of 40 in 2002, for a total of 40 usable participants out of 64. The participants that were unusable either did not complete the landscape conversion during the same year that the rebate was received, or they were not residents for the full period of analysis.

For 2001 rebates, the period of analysis consisted of one calendar year

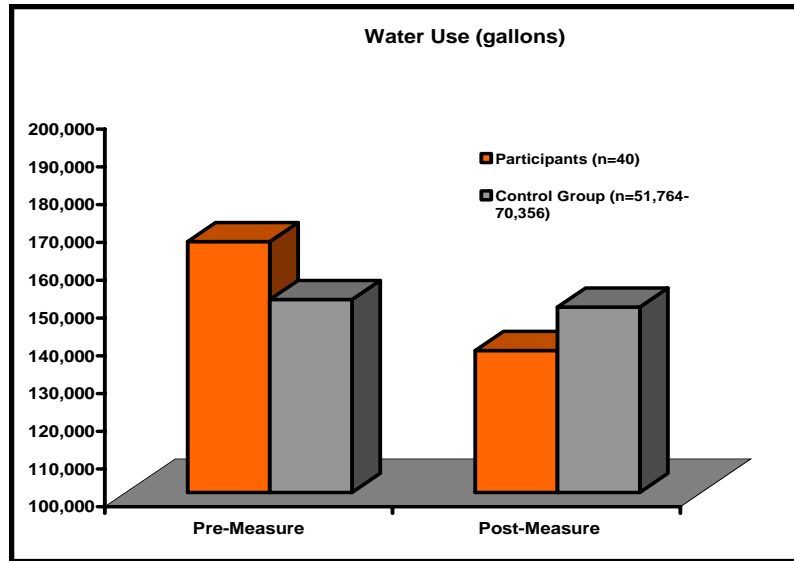
³ Pekelney, D.M. et al. *Guidelines to Conduct Cost-Effectiveness Analysis of Best Management Practices for Urban Water Conservation*. California, 1996.

prior to the landscape conversion and two calendar years after. For the 2002 rebates, a full two calendar years prior to the landscape conversion and two calendar years after were analyzed.

All Chandler single family residential households that were not participants in this analysis were used as the control group. The average pre-measure water use of the participants (166,438 gallons) was higher than that of the control group (151,078 gallons).

For 2001 rebates, the control group consisted of 51,768 households in 2000, 56,436 in 2002, and 59,597 in 2003.

For 2002 rebates, the control group consisted of 51,764 households in 2000, 54,119 in 2001, 56,432 in 2002, 59,593 in 2003, and 70,356 in 2004.



ASSUMPTIONS

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

Single family residential accounts that did not participate in the landscape rebate program were used as the control group.

We assumed that customers paid an average of \$2 per square foot to convert their landscape, per conversation with the utility.

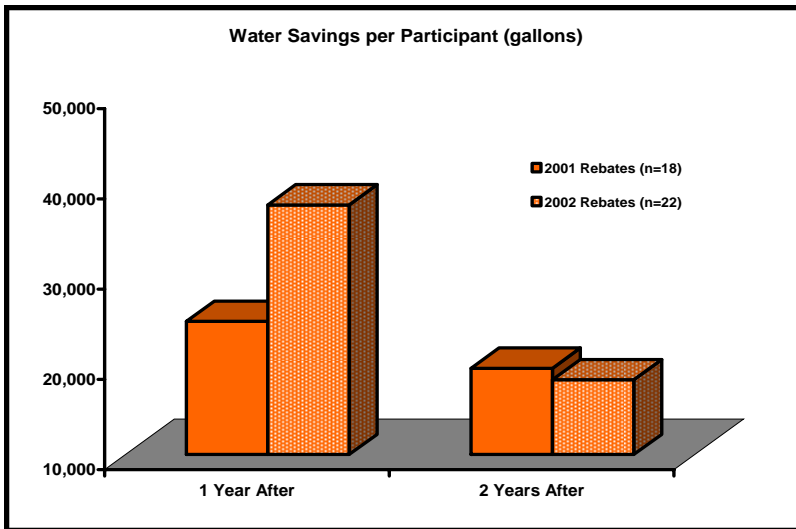
The price of water used in determining the benefits to customers from reduced water bills is the price from the range where the participants' pre-measure average monthly use fell. Ex.: Pre-measure average monthly use = 13,870 gallons, which is within the range of 10,000 to 20,000 gallons, and so the price per 1,000 gallons was \$1.19.

Participants who had two or more consecutive months of no water use were not included in the study.

RESULTS - WATER SAVINGS

In the first year after the 2001 rebates, the water savings amounted to 445,670 gallons, or 24,759 gallons per participant per year (gppy) (17.4% of pre-measure water use). The second year after the rebates, the water savings amounted to 352,105 gallons, or 19,561 gppy (13.8% of pre-measure water use). The average savings per year was 398,888 gallons, or 22,160 gppy (15.6% of pre-measure water use). The total savings over the ten year assumed lifespan for the 2001 rebates was 3,988,877 gallons, or 221,604 gallons per participant.

The first year after the 2002 rebates, the water savings amounted to 828,743 gallons, or 37,670 gppy (20.2% of pre-measure water use). The second year after the rebates, the water savings amounted to 402,249 gallons, or 18,284 gppy (9.8% of pre-measure water use). The average savings per year was 614,496 gallons, or 27,977 gppy (15.0% of pre-measure water use). The total savings over the ten year assumed lifespan was 6,154,961 gallons, or 279,771 gallons per participant.



In the first year after the rebates the total water savings for the two years studied was 1,274,414 gallons, or 31,860 gppy (19.1% of weighted pre-measure water use). In the second year after the rebates the total water savings were 754,354 gallons, or 18,859 gppy (11.3% of weighted pre-measure water use). **The total savings over the ten year assumed lifespan of the landscape conversions was 10,143,848 gallons, or 253,596 gallons per participant.**

During the two years before replacing high water use landscape with xeriscape, participants' water use was 108.6% of the control group's use, on average. During the two years after replacing the high water use landscape, participants' water use was 92.0% of the control group's use, on average. The participants' water use decreased by 17.3% whereas the control group's use decreased by 1.3%. **The resulting overall water savings attributed to this program was 16.0%.**

2001 Quantified Costs and Benefits								
Utility				Participants				
Costs		Benefits		Costs		Benefits		
Incentive Payments	\$3,840	Not Quantified		Landscape Conversion	\$94,646	Water Bill Savings	\$3,096	
							Financial Incentives	\$3,840
Total	\$3,840			Total	\$94,646	Total	\$6,936	

RESULTS - COST BENEFIT ANALYSIS

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

2001 REBATES

- ◆ The quantified cost to the utility was \$3,840 (\$213 per participant). This includes the cost of financial incentive payments.
- ◆ The quantified benefit to the utility was \$0.
- ◆ The quantified cost to the participants was \$94,646 (\$5,258 per participant). This includes the estimated cost of landscape conversion and relevant materials.
- ◆ The quantified benefit to the participants was \$6,936 (\$385 per participant). This includes water bill savings, \$3,096 (\$172 per participant), and financial incentives, \$3,840 (\$213 per participant).

UTILITY PERSPECTIVE - 2001

Results of the cost benefit analysis show a net benefit (net present value) of -\$3,840 from the utility perspective. This is a net benefit of -\$213 per participant. The quantifiable 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 \$314.**

PARTICIPANT PERSPECTIVE- 2001

Results of the cost benefit analysis show a net benefit (net present value) of -\$86,970 from the participant perspective. This is a net benefit of -\$4,832 per participant. The quantifiable costs to the participants were greater than the quantified benefits to the participants. **The cost per acre-foot of water saved from the participant perspective was \$7,732.**

OVERALL PERSPECTIVE- 2001

Results of cost benefit analysis show a net benefit (net present value) of -\$90,809 from an overall perspective. This is a net benefit of -\$5,045 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 an overall perspective was \$8,045.**

2002 REBATES

- ◆ The quantified cost to the utility was \$4,452 (\$202 per participant). This includes the cost of financial incentive payments.
- ◆ The quantified benefit to the utility was \$0.
- ◆ The quantified cost to the participants was \$69,436 (\$3,156 per participant). This includes the estimated cost of landscape conversion and relevant materials.
- ◆ The quantified benefit to the participants was \$8,442 (\$383 per participant). This includes water bill savings, \$3,990 (\$181 per participant), and financial incentives, \$4,452 (\$202 per participant).

2002		Quantified Costs and Benefits			
Utility		Participants			
Costs	Benefits	Costs		Benefits	
Incentive Payments	\$4,452	Landscape Conversion	\$69,436	Water Bill Savings	\$3,990
	Not Quantified			Financial Incentives	\$4,452
Total		\$4,452	Total	\$0	Total

UTILITY PERSPECTIVE - 2002

Results of the cost benefit analysis show a net benefit (net present value) of -\$4,452 from the utility perspective. This is a net benefit of -\$202 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 \$236.**

PARTICIPANT PERSPECTIVE - 2002

Results of the cost benefit analysis show a net benefit (net present value) of -\$60,038 from the participant perspective. This is a net benefit of -\$2,729 per participant. The quantified costs to the participants were greater than the quantified benefits to the participants. **The cost per acre-foot of water saved from the participant perspective was \$3,676.**

OVERALL PERSPECTIVE - 2002

Results of cost benefit analysis show a net benefit (net present value) of -\$64,491 from an overall perspective. This is a net benefit of -\$2,931 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 an overall perspective was \$3,912.**

ALL YEARS

- ◆ The quantified cost to the utility was \$8,293 (\$207 per participant). This includes the cost of financial incentive payments.
- ◆ The quantified benefit to the utility was \$0.
- ◆ The quantified cost to the participants was \$164,082 (\$4,102 per participant). This includes the estimated cost of landscape conversion and relevant materials.
- ◆ The quantified benefit to the participants was \$15,894 (\$397 per participant). This includes water bill savings, \$7,602, (\$190 per participant), and financial incentives, \$8,293, (\$207 per participant).

ALL YEARS Quantified Costs and Benefits							
Utility				Participants			
Costs		Benefits		Costs		Benefits	
Incentive Payments	\$8,293	Not Quantified		Landscape Conversion	\$164,082	Water Bill Savings	\$7,602
						Financial incentives	\$8,293
Total	\$8,293			Total	\$164,082	Total	\$15,895

UTILITY PERSPECTIVE - ALL YEARS

Results of the cost benefit analysis show a net benefit (net present value) of -\$8,293 from the utility perspective. This is a net benefit of -\$207 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 \$266.**

PARTICIPANT PERSPECTIVE - ALL YEARS

Results of the cost benefit analysis show a net benefit (net present value) of -\$146,367 from the participant perspective. This is a net

benefit of -\$3,659 per participant. The quantified costs to the participants were greater than the quantified benefits to the participants. **The cost per acre-foot of water saved from the participant perspective was \$5,271.**

OVERALL PERSPECTIVE - ALL YEARS

Results of cost benefit analysis show a net benefit (net present value) of -\$154,660 from an overall perspective. This is a net benefit of -\$3,866 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 an overall perspective was \$5,537.**

UNQUANTIFIED COSTS AND BENEFITS

Costs

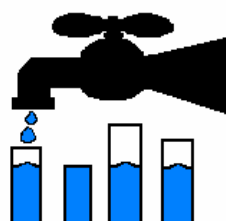
- The customers' time spent converting their landscape.
- The cost to the utility for site visits and processing of rebates.

Benefits

- Financial savings to water savings for participants
- Avoided cost of acquisition and distribution of water saved.
- Environmental benefits of reduced use of water.
- Increased public awareness about water conservation.
- Increased customer satisfaction with the utility.
- Reinforces need to conserve water and desirability of conserving.

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Landscape Rebate Program



2001

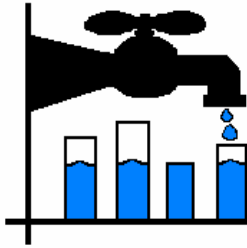
Results of Cost Benefit Analysis-Lifespan (10 Years)

	UTILITY	PARTICIPANT	OVERALL
<u>Present Value Costs</u>			
Costs to Utility	3,840	NA	3,840
Costs to Participants	NA	94,646	94,646
Costs to Others	NA	NA	0
Total Costs	\$3,840	\$94,646	\$98,486
<u>Present Value Benefits</u>			
Total Water Savings	12.24 AF	12.24 AF	12.24 AF
Benefits to Utility	0	NA	0
Benefits to Participants	NA	7,677	7,677
Benefits to Others	NA	NA	0
Total Benefits	\$0	\$7,677	\$7,677
<u>Cost Benefit Calculations</u>			
Net Present Value (NPV) (Total Benefits - Total Costs)	-\$3,840	-\$86,969	-\$90,809
Cost Effectiveness Analysis (CEA) (Total Costs ÷ Total Water Savings)	\$314 /AF	\$7,732 /AF	\$8,045 /AF

2002

Results of Cost Benefit Analysis-Lifespan (10 Years)

	UTILITY	PARTICIPANT	OVERALL
<u>Present Value Costs</u>			
Costs to Utility	4,453	NA	4,453
Costs to Participants	NA	69,436	69,436
Costs to Others	NA	NA	0
Total Costs	\$4,453	\$69,436	\$73,889
<u>Present Value Benefits</u>			
Total Water Savings	18.89 AF	18.89 AF	18.89 AF
Benefits to Utility	0	NA	0
Benefits to Participants	NA	9,398	9,398
Benefits to Others	NA	NA	0
Total Benefits	\$0	\$9,398	\$9,398
<u>Cost Benefit Calculations</u>			
Net Present Value (NPV) (Total Benefits - Total Costs)	-\$4,453	-\$60,038	-\$64,491
Cost Effectiveness Analysis (CEA) (Total Costs ÷ Total Water Savings)	\$236 /AF	\$3,676 AF	\$3,912 /AF



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Landscape Rebate Program

Results of Cost Benefit Analysis-Lifespan (10 Years)		ALL YEARS		
	UTILITY	PARTICIPANT	OVERALL	
<u>Present Value Costs</u>				
Costs to Utility	8,293	NA	8,293	
Costs to Participants	NA	164,082	164,082	
Costs to Others	NA	NA	0	
Total Costs	\$8,293	\$164,082	\$172,375	
<u>Present Value Benefits</u>				
Total Water Savings	31.13 AF	31.13 AF	31.13 AF	
Benefits to Utility	0	NA	0	
Benefits to Participants	NA	17,715	17,715	
Benefits to Others	NA	NA	0	
Total Benefits	\$0	\$17,715	\$17,715	
<u>Cost Benefit Calculations</u>				
Net Present Value (NPV) (Total Benefits - Total Costs)	-\$8,293	-\$146,367	-\$154,660	
Cost Effectiveness Analysis (CEA) (Total Costs ÷ Total Water Savings)	\$266 /AF	\$5,271 /AF	\$5,537 /AF	

