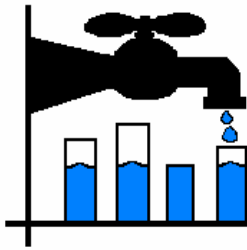


# LANDSCAPE CONVERSION REBATE CASE NARRATIVES

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# Albuquerque Water Res. Div.

## Landscape Rebate Program

The City of Albuquerque Water Resources Division is a municipal water provider serving the City of Albuquerque, a large city located in north central New Mexico. The Division provides water to approximately 449,000 people. The 1999 median household income in Albuquerque was \$38,272, which is higher than the statewide median of \$34,133.<sup>1</sup>

### UTILITY DEMOGRAPHICS

As of 2003, the City of Albuquerque Water Resources Division had 162,608 connections, 90.1% of which were residential. Of their total connections, 146,484 were single family residential, 13,177 were commercial (multifamily residential connections are included with commercial), 114 were industrial, approximately 1,000 were irrigation, and 1,833 were institutional (schools, government agencies, hospitals) water customers. The city's total service area is approximately 180 square miles. As of 2004, Albuquerque customers' water use, in gallons per capita per day (gpcd), was 177.<sup>2</sup>

### LANDSCAPE REBATE PROGRAM

<b>Rebate Amount:</b>	<b>\$ .40 sq./ft., max \$800</b>
<b>Eligible Customers:</b>	<b>SF, ICI</b>
<b>Customers Analyzed:</b>	<b>SF</b>
<b>Program Years:</b>	<b>1996 - present</b>
<b>Analysis Years:</b>	<b>1997 - 2001</b>

### UTILITY RATE STRUCTURE AND PRICES

The City of Albuquerque has a uniform rate structure. The 2004 monthly water charges are \$6.04 for 5/8" and 3/4" meters, which includes zero gallons of water. The charge per hundred cubic feet (ccf) of water is \$1.23 per ccf (\$1.64 per 1,000 gallons). The commodity rate includes the cost per unit, state of New Mexico conservation fee, contributions to the Sustainable Water Supply program, and contributions to the Water Resources Management Program.<sup>3</sup>

### CURRENT CAPACITY AND WATER SOURCES

As of 2003, the Water Resources Division had storage capacity of 211 million gallons per day of treated water.<sup>4</sup> The utility's 94 wells are supplied by the Santa Fe Group Aquifer.<sup>5</sup>

### FUTURE PLANS TO MEET DEMAND

The population of Albuquerque increased substantially between 1990 and 2000; during that decade, the population increased by 15.9%.<sup>6</sup> The City of Albuquerque continues to grow at a rate of 1.5% per year.<sup>7</sup> The utility plans to meet future demand by reducing groundwater use, expanding and changing water sources, implementing and continuing conservation programs, reusing water, purchase, and constructing a purification facility.

<sup>1</sup> US Census Bureau.

<sup>2</sup> City of Albuquerque Water Conservation Home.

<sup>3</sup> City of Albuquerque Water Utility Department.

<sup>4</sup> City of Albuquerque. Citizen Services—Frequently Asked Questions.

<sup>5</sup> City of Albuquerque. Water Quality Report 2003.

<sup>6</sup> US Census Bureau.

<sup>7</sup> US Census Bureau.

## REBATE PROGRAM - DESCRIPTION

The City of Albuquerque Landscape Rebate Program is an incentive program for residential and commercial customers who convert their high water use turf to Xeriscape. Eligible customers receive \$0.40 per square foot converted, and must convert at least 500 square feet of high water use landscape. The maximum rebate for residential and

### OTHER CITY OF ALBUQUERQUE CONSERVATION PROGRAMS

**Toilet Rebates, 1996-present**  
**Showerhead/Aerator Rebates and Replacements, 2000-present**  
**Washing Machine Rebates, 2000-present**  
**Water Harvesting System Rebates, 2002-present**  
**Graywater System Rebates, 2003-present**  
**Irrigation System Rebates, 2003-present**  
**Conservation Rates, 2001-present**  
**Indoor/Outdoor Audits, 1998-present**  
**Leak Detection for Customers, 1998-present**  
**Public education, 1999-present**  
**Conservation Ordinances, 1996-present**  
**Dishwasher/Hot Water Recirculator Rebate Program, 2003-present**

commercial customers is \$800 and \$5,000, respectively. Customers wishing to participate in the rebate program must first submit an application to the city detailing their landscaping plans. City inspectors visit the property to

ensure that existing landscape is in fact high water use (customers with existing water efficient landscapes are ineligible). If the application is approved, customers have six months in which to complete the conversion. Upon project completion, customers must arrange a final inspection, thereafter, the appropriate rebate amounts are credited to customers' accounts.<sup>8</sup>

The program has significantly increased in popularity since its initiation in 1996. Changes to the financial incentive amount have contributed to the programs rising popularity. From 1996 to 1999, the rebate amount was \$0.25 per square foot converted. In 2000, the rebate amount increased to \$0.40 per square foot converted. In 2003, the city increased the maximum rebate amount for commercial users to \$5,000, which resulted in increased commercial participation.

The landscape rebate program is part of the city of Albuquerque's larger water conservation campaign (financial incentives, public education, water use audits, etc.). The city specifically targets high water users for all conservation programs.

## 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 during the years 1997 through 2001. The water savings were calculated and a cost benefit analysis was performed for the years 1997, 1998, 1999, 2000, and 2001. The findings refer to these five years only, not to the ongoing program. The

<sup>8</sup> Xeriscape Rebate and Designs.

lifespan of the landscape conversion, which is used as the period of analysis, was assumed to be 10 years.

All quantified costs and benefits have been discounted to the first year of the analysis (1997) and inflated to 2004 dollars. The discount rate used for this analysis was 6.1%. The CPI values that were used in this analysis were the 2004 value of 188.9 and the 1997 value of 160.5.

The population studied for this analysis was comprised of all participants who received a landscape conversion rebate during 1997, 1998, 1999, 2000, and 2001. There were 104 usable participants out of 104 total participants in 1997, 155 out of 159 in 1998, 192 out of 195 in 1999, 197 out of 201 in 2000, and 287 out of 294 in 2001, for a total of 935 usable participants out of 953. Approximately 2%, or 18, of the possible participants were unusable because there was insufficient raw data, they were not single family residential customers, or they have moved during the period of analysis.

All City of Albuquerque single family residential households that did not participate in the landscape conversion rebate program were used as the control group. However, the weighted average annual pre-measure water use of the participants (190,236 gallons) was lower than that of the control group (264,155 gallons).

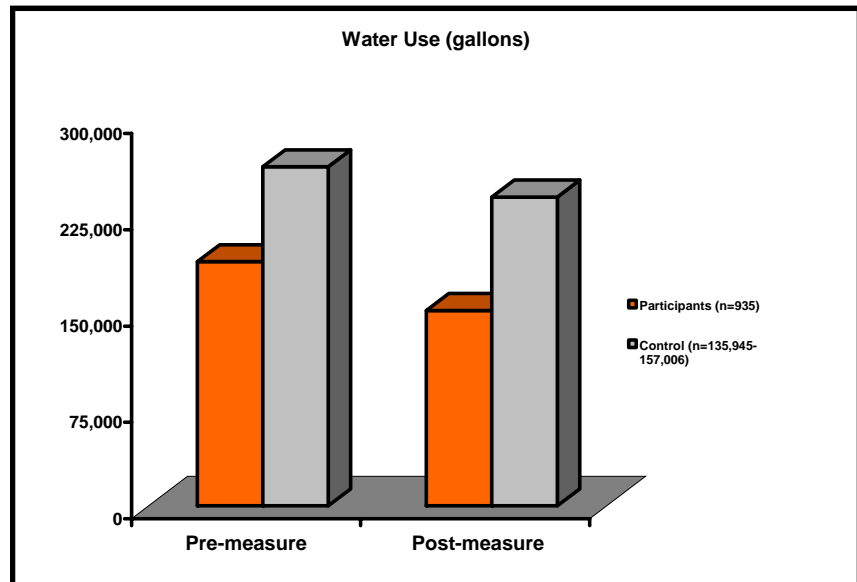
For 1997 landscape conversion rebates, the control group consisted of 135,841 households in 1995, 138,467 in 1996, 140,708 in 1997, 143,241 in 1998, and 146,430 in 1999.

For 1998 landscape conversion rebates, the control group consisted of 138,416 households in 1996, 140,657 in 1997, 143,190 in 1998, 146,379 in 1999, and 148,985 in 2000.

For 1999 landscape conversion rebates, the control group consisted of 140,620 households in 1997, 143,153 in 1998, 146,342 in 1999, 148,948 in 2000, and 151,813 in 2001.

For 2000 landscape conversion rebates, the control group consisted of 143,148 households in 1998, 146,337 in 1999, 148,943 in 2000, 151,808 in 2001, and 154,735 in 2002.

For 2001 landscape conversion rebates, the control group consisted of 146,247 households in 1999, 148,853 in 2000, 151,718 in 2001, 154,645 in 2002, and 156,719 in 2003.



## ASSUMPTIONS

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

There was a no minimum square footage requirement for the landscape conversions.

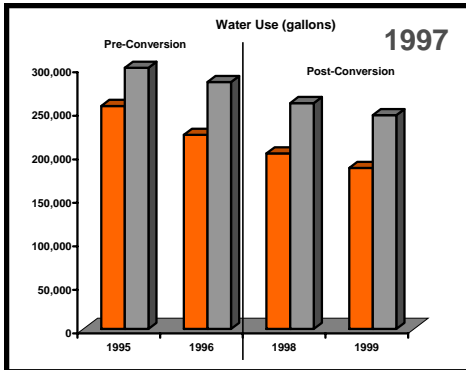
The number of connections is an average of connections from throughout the year.

We estimated \$50,000 per year in advertising costs for this program.

We estimated \$70,000 per year in labor for this program, including Xeriscape inspector (\$50,000/yr) and clerical staff (\$20,000/yr).

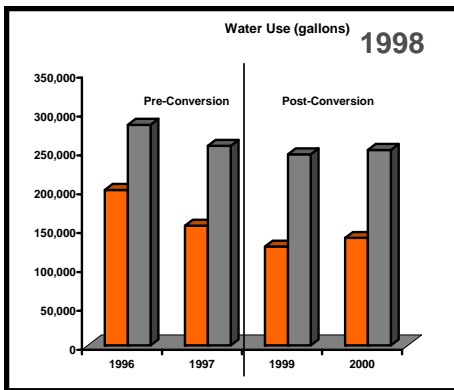
We assumed a cost of \$3.50 per square foot to the participant for labor and materials for the landscape conversion.

We assumed the variable water rate of \$1.23 per ccf since 1997.

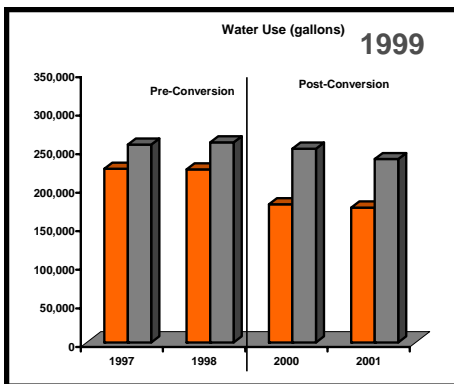


## RESULTS - WATER SAVINGS

In the first year after the 1997 landscape conversion rebates, water savings amounted to 1,184,258 gallons, or 11,387 gallons per participant per year (gppy) (4.8% of pre-measure water use). The second year after the landscape conversion rebates, water savings amounted to 1,744,853 gallons, or 16,777 gppy (7.0% of pre-measure water use). The average water savings per year was 1,464,556 gallons (4.5 AF), or 14,082 gppy (5.9% of pre-measure water savings). **The total water savings over the ten year assumed lifespan of the landscape conversions was 14,645,557 gallons (44.9 AF), or 140,823 gallons per participant.**



The first year after the 1998 landscape conversion rebates, water savings amounted to 5,241,184 gallons, or 33,814 gppy (19.1% of pre-measure water use). The second year after the rebates, water savings amounted to 4,118,516, or 26,571 gppy (15.0% of pre-measure water use). The average water savings per year was 4,679,850 gallons (14.4 AF) or 30,193 gppy (17.1% of pre-measure water use). **The total savings over the ten year assumed lifespan of the landscape conversions was 46,798,504 gallons (143.6 AF), or 301,926 gallons per participant.**



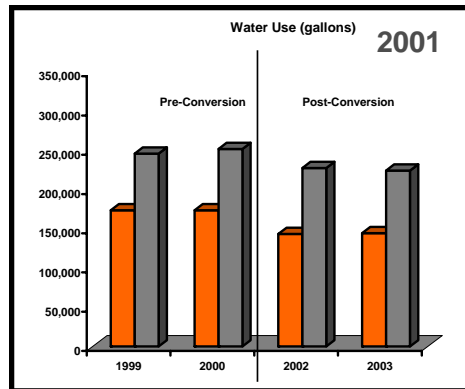
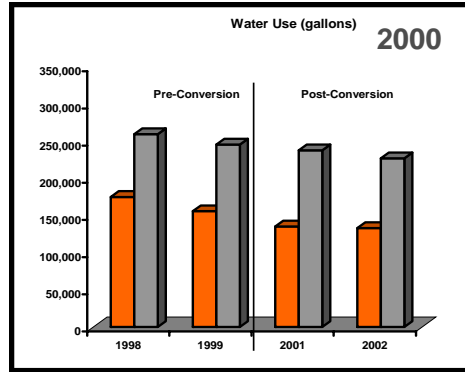
PARTICIPANTS ■  
CONTROL GROUP ■

The first year after the 1999 landscape conversion rebates, water savings amounted to 7,615,701 gallons, or 39,665 gppy (17.7% of pre-measure water use). The second year after the rebates, water savings amounted

to 6,206,817 gallons, or 32,327 gppy (14.4% of pre-measure water use). The average water savings per year was 6,911,259 gallons (21.2 AF) or 35,996 gppy (16.0% of pre-measure water use). **The total water savings over the ten year assumed lifespan of the landscape conversions was 69,112,591 gallons (212.1 AF), or 359,961 gallons per participant.**

The first year after the 2000 landscape conversion rebates, water savings amounted to 4,065,211 gallons, or 20,636 gppy (12.5% of pre-measure water use). The second year after the rebates, water savings amounted to 3,098,622 gallons, or 15,729 gppy (9.5% of pre-measure water use). The average water savings per year was 3,581,917 gallons (11.0 AF) or 18,182 gppy (11.0% of pre-measure water use). **The total water savings over the ten year assumed lifespan of the landscape conversions was 35,819,166 gallons (109.9 AF), or 181,823 gallons per participant.**

The first year after the 2001 landscape conversion rebates, water savings amounted to 4,390,978 gallons, or 15,300 gppy (8.8% of pre-measure water use). The second year after the rebates water savings amounted to 3,418,305 gallons, or 11,910 gppy (6.9% of pre-measure water use). The average water savings per year was 3,904,642 gallons (12.0 AF) or 13,605 gppy (7.9% of pre-measure water use). **The total water savings over the ten year assumed lifespan of the landscape conversions was 39,046,418 gallons (119.8 AF), or 136,050 gallons per participant.**



PARTICIPANTS   
 CONTROL GROUP 

In the first year after the landscape conversions, the total water savings for the five years studied amounted to 22,497,333 gallons, or 24,061 gppy (12.7% of weighted pre-measure water use). In the second year after the landscape conversions, the total water savings amounted to 18,587,114 gallons, or 19,879 gppy (10.5% of weighted pre-measure use). **The total water savings over the ten year assumed lifespan of the landscape conversions was 205,422,235 gallons (630.4 AF), or 219,703 gallons per participant.**

During the two years before participating in the program, participants' water use was 72.0% of the control group's use, on average. During the two years after participating in the program, their water use was 63.3% of the control group's use, on average. The participants' water use decreased by 20.0% from pre-measure to post-measure, whereas the control group's use decreased by 8.9%. **The resulting overall water savings attributed to this program was 11.1%.**

## RESULTS - COST BENEFIT ANALYSIS

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

### 1997 LANDSCAPE CONVERSION REBATES

- ◆ The quantified cost to the utility was \$150,005. This includes the

cost of advertising, \$58,847, the cost of financial incentives, \$8,772, and the cost of labor, \$82,386. This is a cost of \$1,442 per participant, including \$566 for advertising, \$84 in financial incentives, and \$792 in labor.

- ◆ The quantified benefit to the utility was \$0.
- ◆ The quantified cost to the participants was \$122,805. This includes the cost of the landscape conversion and relevant materials, \$122,805. This is a cost of \$1,181 per participant.
- ◆ The quantified benefit to the participants was \$29,451. This includes financial incentives, \$8,772, and water bill savings \$20,679. This is a benefit of \$283 per participant, including \$84 in financial incentives and \$199 in water bill savings.

**UTILITY PERSPECTIVE - 1997**

Results of the cost-benefit analysis show a net benefit (net present value) of -\$150,005 from the utility perspective. This is a net benefit of -\$1,442 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 \$3,338.**

1997 Quantified Costs and Benefits							
Utility				Participants			
Costs		Benefits		Costs		Benefits	
Advertising	\$58,847	Not Quantified		Conversion Materials	\$122,805	Financial Incentives	\$8,772
Financial Incentives	\$8,772					Water Bill Savings	\$20,679
Labor	\$82,386						
<b>Total</b>	<b>\$150,005</b>			<b>Total</b>	<b>\$122,805</b>	<b>Total</b>	<b>\$29,451</b>

**PARTICIPANT PERSPECTIVE - 1997**

Results of the cost benefit analysis show a net benefit (net present value) of -\$93,355 from the participant perspective. This is a net benefit of -\$898 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 \$2,732.**

**OVERALL PERSPECTIVE - 1997**

Results of cost benefit analysis show a net benefit (net present value) of -\$243,360 from an overall perspective. This is a net benefit of -\$2,340 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 \$6,070.**

**1998 LANDSCAPE CONVERSION REBATES**

- ◆ The quantified cost to the utility was \$161,872. This includes the cost of advertising, \$55,464, the cost of financial incentives \$28,758, and the cost of labor, \$77,650. This is a cost of \$1,045 per participant, including \$358 for advertising, \$186 in financial incentives, and \$501 in labor.
- ◆ The quantified benefit to the utility was \$0.

- ◆ The quantified cost to the participants was \$402,614. This includes the cost of the landscape conversion and relevant materials, \$402,614. This is a cost of \$2,598 per participant.
- ◆ The quantified benefit to the participants was \$91,179. This includes financial incentives, \$28,758, and water bill savings, \$62,421. This is a benefit of \$589 per participant, including \$186 in financial incentives, and \$403 in water bill savings.

1998 Quantified Costs and Benefits							
Utility				Participants			
Costs		Benefits		Costs		Benefits	
Advertising	\$55,464	Not Quantified		Conversion Materials	\$402,614	Financial Incentives	\$28,758
Financial Incentives	\$28,758					Water Bill Savings	\$62,421
Labor	\$77,650						
<b>Total</b>	<b>\$161,872</b>					<b>Total</b>	<b>\$91,179</b>

**UTILITY PERSPECTIVE - 1998**

Results of the cost-benefit analysis show a net benefit (net present value) of -\$161,872 from the utility perspective. This is a net benefit of -\$1,045 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 \$1,127.**

**PARTICIPANT PERSPECTIVE - 1998**

Results of the cost-benefit analysis show a net benefit (net present value) of -\$311,434 from the participant perspective. This is a net benefit of -\$2,009 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 \$2,803.**

**OVERALL PERSPECTIVE - 1998**

Results of cost benefit analysis show a net benefit (net present value) -\$473,306 from an overall perspective. This is a net benefit of -\$3,054 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 \$3,930.**

**1999 LANDSCAPE CONVERSION REBATES**

- ◆ The quantified cost to the utility was \$160,545. This includes the cost of advertising, \$52,275, the cost of financial incentives \$35,085, and the cost of labor, \$73,185. This is a cost of \$836 per participant, including \$272 for advertising, \$183 in financial incentives, and \$381 in labor.
- ◆ The quantified benefit to the utility was \$0.
- ◆ The quantified cost to the participants was \$491,191. This includes the cost of the landscape conversion and relevant materials, \$491,191. This is a cost of \$2,558 per participant.
- ◆ The quantified benefit to the participants was \$121,958. This includes financial incentives, \$35,085, and water bill savings,

\$86,873. This is a benefit of \$635 per participant, including \$183 in financial incentives, and \$452 in water bill savings.

1999 Quantified Costs and Benefits						
Utility			Participants			
Costs		Benefits	Costs		Benefits	
Advertising	\$52,275	Not Quantified	Conversion Materials	\$491,191	Financial Incentives	\$35,085
Financial Incentives	\$35,085				Water Bill Savings	\$86,873
Labor	\$73,185					
<b>Total</b>	<b>\$160,545</b>				<b>Total</b>	<b>\$121,958</b>

**UTILITY PERSPECTIVE - 1999**

Results of the cost-benefit analysis show a net benefit (net present value) of -\$160,545 from the utility perspective. This is a net benefit of -\$836 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 \$757.**

**PARTICIPANT PERSPECTIVE - 1999**

Results of the cost-benefit analysis show a net benefit (net present value) of -\$369,233 from the participant perspective. This is a net benefit of -\$1,923 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 \$2,316.**

**OVERALL PERSPECTIVE - 1999**

Results of cost-benefit analysis show a net benefit (net present value) of -\$529,779 from an overall perspective. This is a net benefit of -\$2,759 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 \$3,073.**

**2000 LANDSCAPE CONVERSION REBATES**

- ◆ The quantified cost to the utility was \$151,426. This includes the cost of advertising, \$49,270, the cost of financial incentives \$33,178, and the cost of labor, \$68,978. This is a cost of \$769 per participant, including \$250 for advertising, \$169 in financial incentives, and \$350 in labor.
- ◆ The quantified benefit to the utility was \$0.
- ◆ The quantified cost to the participants was \$290,310. This includes the cost of the landscape conversion and relevant materials, \$290,310. This is a cost of \$1,474 per participant.
- ◆ The quantified benefit to the participants was \$75,624. This includes financial incentives, \$33,178, and water bill savings, \$42,446. This is a benefit of \$384 per participant, including \$169 in financial incentives, and \$215 in water bill savings.

**UTILITY PERSPECTIVE - 2000**

Results of the cost-benefit analysis show a net benefit (net present value) of -\$151,426 from the utility perspective. This is a net benefit of -

\$769 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 \$1,378.**

2000 Quantified Costs and Benefits							
Utility				Participants			
Costs		Benefits		Costs		Benefits	
Advertising	\$49,270	Not Quantified		Conversion Materials	\$290,310	Financial Incentives	\$33,178
Financial Incentives	\$33,178					Water Bill Savings	\$42,446
Labor	\$68,978					Total	\$75,624
<b>Total</b>	<b>\$151,426</b>			<b>Total</b>	<b>\$290,310</b>		

**PARTICIPANT PERSPECTIVE - 2000**

Results of the cost-benefit analysis show a net benefit (net present value) of -\$214,686 from the participant perspective. This is a net benefit of -\$1,090 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 \$2,641.**

**OVERALL PERSPECTIVE - 2000**

Results of cost benefit analysis show a net benefit (net present value) of -\$366,112 from an overall perspective. This is a net benefit of -\$1,858 per participant. The quantified costs to the participants and the utility were greater than the quantified benefits to the participants and the utility. **The cost per acre-foot of water saved from an overall perspective was \$4,019.**

**2001 LANDSCAPE CONVERSION REBATES**

- ◆ The quantified cost to the utility was \$162,046. This includes the cost of advertising, \$46,437, financial incentives, \$50,597, and labor, \$65,012. This is a cost of \$565 per participant, including \$162 for advertising, \$176 in incentives, and \$227 in labor.
- ◆ The quantified benefit to the utility was \$0.
- ◆ The quantified cost to the participants was \$442,723. This includes the cost of the landscape conversion and relevant materials, \$442,723. This is a cost of \$1,543 per participant.
- ◆ The quantified benefit to the participants was \$94,203. This includes financial incentives, \$50,597, and water bill savings, \$43,606. This is a benefit of \$328 per participant, including, \$176 in financial incentives and \$152 in water bill savings.

**UTILITY PERSPECTIVE - 2001**

Results of the cost-benefit analysis show a net benefit (net present value) of -\$162,046 from the utility perspective. This is a net benefit of -\$565 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 \$1,352.**

**PARTICIPANT PERSPECTIVE - 2001**

Results of the cost-benefit analysis show a net benefit (net present value) of -\$348,520 from the participant perspective. This is a benefit of -\$1,214 per participant. The quantified costs to the participant were



greater than the quantified benefits to the participants. **The cost per acre-foot of water saved from the participant perspective was \$3,695.**

2001 Quantified Costs and Benefits							
Utility				Participants			
Costs		Benefits		Costs		Benefits	
Advertising	\$46,437	Not Quantified		Conversion Materials	\$442,723	Financial Incentives	\$50,597
Financial Incentives	\$50,597					Water Bill Savings	\$43,606
Labor	\$65,012						
<b>Total</b>	<b>\$162,046</b>			<b>Total</b>	<b>\$442,723</b>	<b>Total</b>	<b>\$94,203</b>

**OVERALL PERSPECTIVE - 2001**

Results of the cost benefit analysis show a net benefit (net present value) of -\$510,567 from an overall perspective. This is a net benefit of -\$1,779 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 \$5,047.**

**LANDSCAPE CONVERSION REBATES - ALL YEARS**

- ◆ The quantified cost to the utility was \$785,895. This includes the cost of advertising, \$262,294, the cost of financial incentives, \$156,390, and the cost of labor \$367,211. This is a cost of \$841 per participant, including \$281 for advertising, \$167 in financial incentives, and \$393 in labor.
- ◆ The quantified benefit to the utility was \$0
- ◆ The quantified cost to the participants was \$1,749,643. This includes the cost of the landscape conversion and relevant materials \$1,749,643. This is a cost of \$1,871 per participant.
- ◆ The quantified benefit to the participants was \$412,414. This includes financial incentives, \$156,390, and water bill savings, \$256,024. This is a benefit of \$441 per participant, including \$167 in financial incentives, and \$274 in water bill savings

**UTILITY PERSPECTIVE - ALL YEARS**

Results of the cost benefit analysis show a net benefit (net present value) of -\$785,895 from the utility perspective. This is a net benefit of -\$841 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 \$1,247.**

**PARTICIPANT PERSPECTIVE - ALL YEARS**

Results of the cost benefit analysis show a net benefit (net present value) of -\$1,337,229 from the participant perspective. This is a net benefit of -\$1,430 per participant. The quantified costs to the participants were greater than the quantified benefit to the participants. **The cost per acre-foot of water saved from the participant perspective was \$2,775.**

**OVERALL PERSPECTIVE - ALL YEARS**

Results of cost-benefit analysis from an overall perspective show a net benefit (net present value) of -\$2,123,124 from an overall perspective. This is a net benefit of -\$2,271 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 \$4,022.**

<b>ALL YEARS Quantified Costs and Benefits</b>							
<b>Utility</b>				<b>Participants</b>			
<b>Costs</b>		<b>Benefits</b>	<b>Costs</b>		<b>Benefits</b>		
Advertising	\$262,294	Not Quantified	Conversion Materials	\$1,749,643	Financial Incentives	\$156,390	
Financial Incentives	\$156,390				Water Bill Savings	\$256,024	
Labor	\$367,211						
<b>Total</b>	<b>\$785,895</b>				<b>Total</b>	<b>\$412,414</b>	

**UNQUANTIFIED COSTS AND BENEFITS**

**Costs**

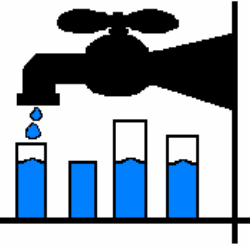
- Landfill disposal of high water use landscaping.
- Time spent converting the landscape.
- Time spent arranging and awaiting pre- and post-conversion inspections by the city.
- Aesthetics.
- Loss of function.

**Benefits**

- Financial savings on sewer bills for participants.
- Avoided costs of acquisition and distribution of water saved.
- Environmental benefits of reduced water use.
- Increased public awareness about water conservation.
- Water savings for future municipal water use.
- Reduced surface water use.
- Newly xeriscaped landscapes.

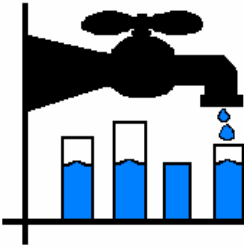
# Albuquerque Water Res. Div.

## Landscape Rebate Program



<b>1997</b>		<b>Results of Cost Benefit Analysis-Lifespan (10 Years)</b>		
	UTILITY	PARTICIPANT	OVERALL	
<b><u>Present Value Costs</u></b>				
Costs to Utility	150,005	NA	150,005	
Costs to Participants	NA	122,805	122,805	
Costs to Others	NA	NA	0	
<b>Total Costs</b>	<b>\$150,005</b>	<b>\$122,805</b>	<b>\$272,810</b>	
<b><u>Present Value Benefits</u></b>				
Total Water Savings	44.95 AF	44.95 AF	44.95 AF	
Benefits to Utility	0	NA	0	
Benefits to Participants	NA	29,450	29,450	
Benefits to Others	NA	NA	0	
<b>Total Benefits</b>	<b>\$0</b>	<b>\$29,450</b>	<b>\$29,450</b>	
<b><u>Cost Benefit Calculations</u></b>				
Net Present Value (NPV) (Total Benefits - Total Costs)	-\$150,005	-\$93,355	-\$243,360	
Cost Effectiveness Analysis (CEA) (Total Costs ÷ Total Water Savings)	\$3,338 /AF	\$2,732 /AF	\$6,070 /AF	

<b>1998</b>		<b>Results of Cost Benefit Analysis-Lifespan (10 Years)</b>		
	UTILITY	PARTICIPANT	OVERALL	
<b><u>Present Value Costs</u></b>				
Costs to Utility	161,872	NA	161,872	
Costs to Participants	NA	402,614	402,614	
Costs to Others	NA	NA	0	
<b>Total Costs</b>	<b>\$161,872</b>	<b>\$402,614</b>	<b>\$564,485</b>	
<b><u>Present Value Benefits</u></b>				
Total Water Savings	144 AF	144 AF	144 AF	
Benefits to Utility	0	NA	0	
Benefits to Participants	NA	91,179	91,179	
Benefits to Others	NA	NA	0	
<b>Total Benefits</b>	<b>\$0</b>	<b>\$91,179</b>	<b>\$91,179</b>	
<b><u>Cost Benefit Calculations</u></b>				
Net Present Value (NPV) (Total Benefits - Total Costs)	-\$161,872	-\$311,434	-\$473,306	
Cost Effectiveness Analysis (CEA) (Total Costs ÷ Total Water Savings)	\$1,127/AF	\$2,803 /AF	\$3,930 /AF	



# Albuquerque Water Res. Div.

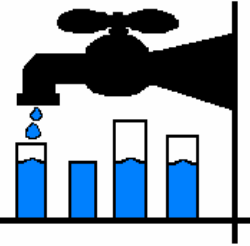
## Landscape Rebate Program

Results of Cost Benefit Analysis-Lifespan (10 Years)			1999
	UTILITY	PARTICIPANT	OVERALL
<u>Present Value Costs</u>			
Costs to Utility	160,545	NA	160,545
Costs to Participants	NA	491,190	491,190
Costs to Others	NA	NA	0
<b>Total Costs</b>	<b>\$160,545</b>	<b>\$491,190</b>	<b>\$651,736</b>
<u>Present Value Benefits</u>			
Total Water Savings	212.10 AF	212.10 AF	212.10 AF
Benefits to Utility	0	NA	0
Benefits to Participants	NA	121,957	121,957
Benefits to Others	NA	NA	0
<b>Total Benefits</b>	<b>\$0</b>	<b>\$121,957</b>	<b>\$121,957</b>
<u>Cost Benefit Calculations</u>			
Net Present Value (NPV) (Total Benefits - Total Costs)	-\$160,545	-\$369,233	-\$529,778
Cost Effectiveness Analysis(CEA) (Total Costs ÷ Total Water Savings)	\$757 /AF	\$2,316 /AF	\$3,073 /AF

Results of Cost Benefit Analysis-Lifespan (10 Years)			2000
	UTILITY	PARTICIPANT	OVERALL
<u>Present Value Costs</u>			
Costs to Utility	151,425	NA	151,425
Costs to Participants	NA	290,309	290,309
Costs to Others	NA	NA	0
<b>Total Costs</b>	<b>\$151,425</b>	<b>\$290,309</b>	<b>\$441,735</b>
<u>Present Value Benefits</u>			
Total Water Savings	109.92 AF	109.92 AF	109.92 AF
Benefits to Utility	0	NA	0
Benefits to Participants	NA	75,623	75,623
Benefits to Others	NA	NA	0
<b>Total Benefits</b>	<b>\$0</b>	<b>\$75,623</b>	<b>\$75,623</b>
<u>Cost Benefit Calculations</u>			
Net Present Value (NPV) (Total Benefits - Total Costs)	-\$151,425	-\$214,686	-\$366,112
Cost Effectiveness Analysis (CEA) (Total Costs ÷ Total Water Savings)	\$1,378 /AF	\$2,641 /AF	\$4,019 /AF

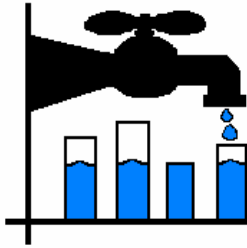
# Albuquerque Water Res. Div.

## Landscape Rebate Program



<b>2001</b>			
<b>Results of Cost Benefit Analysis-Lifespan (10 Years)</b>			
	UTILITY	PARTICIPANT	OVERALL
<u>Present Value Costs</u>			
Costs to Utility	162,046	NA	162,046
Costs to Participants	NA	442,723	442,723
Costs to Others	NA	NA	0
<b>Total Costs</b>	<b>\$162,046</b>	<b>\$442,723</b>	<b>\$604,769</b>
<u>Present Value Benefits</u>			
Total Water Savings	119.83 AF	119.83 AF	119.83 AF
Benefits to Utility	0	NA	0
Benefits to Participants	NA	94,203	94,203
Benefits to Others	NA	NA	0
<b>Total Benefits</b>	<b>\$0</b>	<b>\$94,203</b>	<b>\$94,203</b>
<u>Cost Benefit Calculations</u>			
Net Present Value (NPV) (Total Benefits - Total Costs)	-\$162,046	-\$348,520	-\$510,566
Cost Effectiveness Analysis (CEA) (Total Costs ÷ Total Water Savings)	\$1,352 /AF	\$3,695 /AF	\$5,047 /AF

<b>ALL YEARS</b>			
<b>Results of Cost Benefit Analysis-Lifespan (10 Years)</b>			
	UTILITY	PARTICIPANT	OVERALL
<u>Present Value Costs</u>			
Costs to Utility	785,894	NA	785,894
Costs to Customers	NA	1,749,642	1,749,642
Costs to Others	NA	NA	0
<b>Total Costs</b>	<b>\$785,894</b>	<b>\$1,749,642</b>	<b>\$2,535,537</b>
<u>Present Value Benefits</u>			
Total Water Savings	630.42 AF	630.42 AF	630.42 AF
Benefits to Utility	0	NA	0
Benefits to Customers	NA	412,413	412,413
Benefits to Others	NA	NA	0
<b>Total Benefits</b>	<b>\$0</b>	<b>\$412,413</b>	<b>\$412,413</b>
<u>Cost Benefit Calculations</u>			
Net Present Value (NPV) (Total Benefits - Total Costs)	-\$785,894	-\$1,337,228	-\$2,123,123
Cost Effectiveness Analysis (CEA) (Total Costs ÷ Total Water Savings)	\$1,247 /AF	\$2,775 /AF	\$4,022 /AF



# 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.<sup>1</sup>

### 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.<sup>2</sup> 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.

<sup>1</sup> US Census Bureau, QuickFacts.

<sup>2</sup> 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.<sup>3</sup>

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

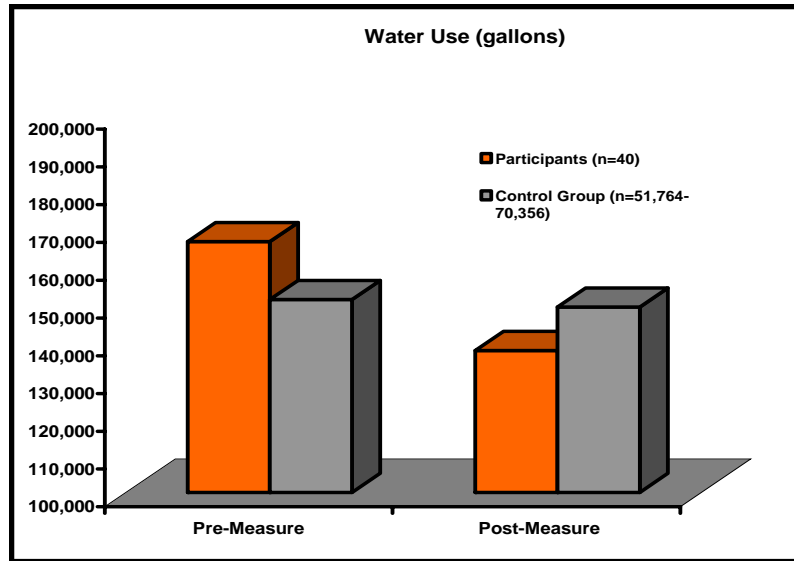
<sup>3</sup> Pekelney, D.M. et al. *Guidelines to Conduct Cost-Effectiveness Analysis of Best Management Practices for Urban Water Conservation*. California, 1996.

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.

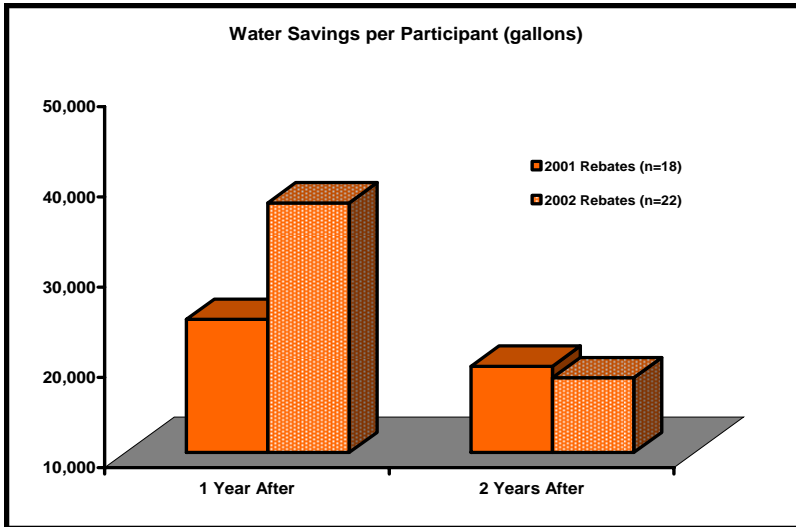
The price of water used in determining the benefits to customers from reduced water bills is the price from the range where the participants' pre-measure average monthly use fell. Ex.: Pre-measure average monthly use = 13,870 gallons, which is within the range of 10,000 to 20,000 gallons, and so the 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
<b>Total</b>	<b>\$8,293</b>			<b>Total</b>	<b>\$164,082</b>	<b>Total</b>	<b>\$15,895</b>	

**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.

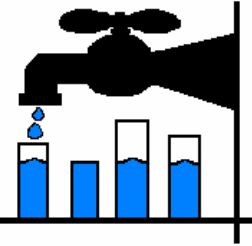
##### **Benefits**

- 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.

**L-2**

# Chandler Utilities Dept.

## Landscape Rebate Program



### 2001

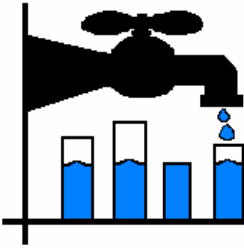
#### Results of Cost Benefit Analysis-Lifespan (10 Years)

	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
<b>Total Costs</b>	<b>\$3,840</b>	<b>\$94,646</b>	<b>\$98,486</b>
<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
<b>Total Benefits</b>	<b>\$0</b>	<b>\$7,677</b>	<b>\$7,677</b>
<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
<b>Total Costs</b>	<b>\$4,453</b>	<b>\$69,436</b>	<b>\$73,889</b>
<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
<b>Total Benefits</b>	<b>\$0</b>	<b>\$9,398</b>	<b>\$9,398</b>
<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

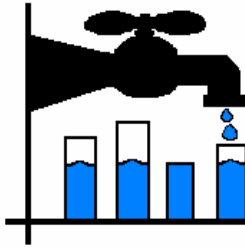


# Chandler Utilities Dept.

## Landscape Rebate Program

Results of Cost Benefit Analysis-Lifespan (10 Years)		<b>ALL YEARS</b>		
	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	
<b>Total Costs</b>	<b>\$8,293</b>	<b>\$164,082</b>	<b>\$172,375</b>	
<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	
<b>Total Benefits</b>	<b>\$0</b>	<b>\$17,715</b>	<b>\$17,715</b>	
<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	





# 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 firms<sup>1</sup>. As of the 2000 census, Tempe's median family income was \$55,237.<sup>2</sup>

### 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	
<b>Rebate Amount:</b>	<b>\$100</b>
<b>Eligible Customers:</b>	<b>SF</b>
<b>Customers Analyzed:</b>	<b>SF</b>
<b>Program Years:</b>	<b>1992-present</b>
<b>Analysis Years:</b>	<b>March 2001 – February 2002</b>

### 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.

<sup>1</sup> Arizona Department of Commerce: Tempe Community Profile.

<sup>2</sup> 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 years<sup>3</sup>.

<sup>3</sup> 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

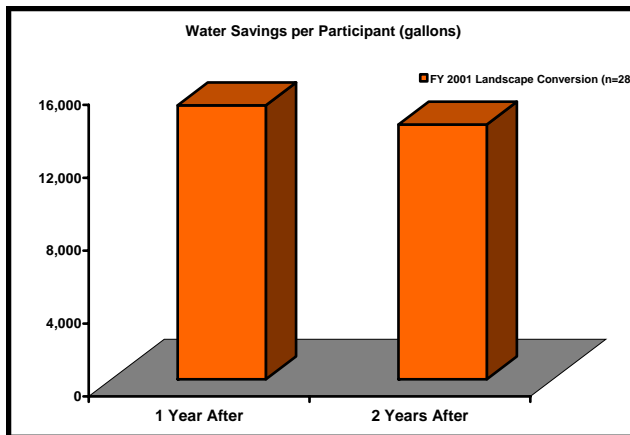
*Please see the General Assumptions for the specific conditions and rules underlying all ECoBA analyses.*

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.

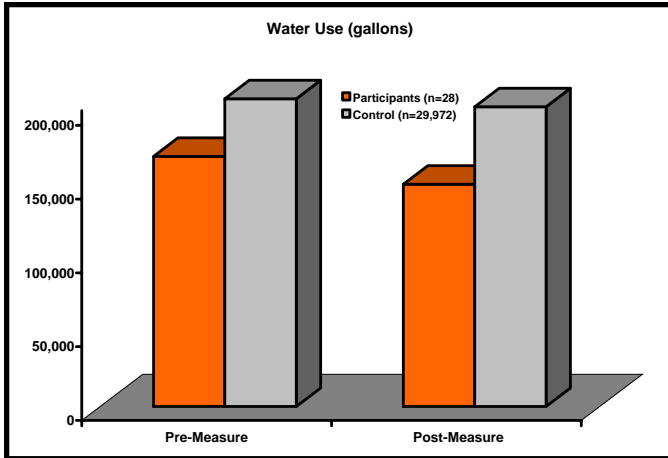
The price of water used in determining the benefits to customers from reduced water bills is the price from the range where the participants' pre-measure average monthly use fell. Ex.: Pre-measure average monthly use = 14,825 gallons, which is within the range of 8,001 to 15,000 gallons, and so the price 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 gppy (8.2% of pre-measure water use). The average water savings per year was 406,252 (1.2 AF), or 14,509 gppy (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						
<b>Total</b>	<b>\$3,593</b>					<b>Total</b>	<b>\$5,867</b>

### 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

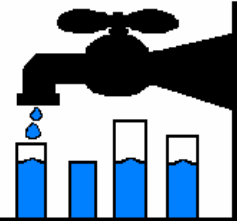
- Landfill disposal of turf.
- Aesthetics.
- Loss of function.

##### 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.

# Tempe Water Utilities Dept.

## Landscape Rebate Program



<b>Results of Cost Benefit Analysis-Lifespan (10 Years)</b>			
	UTILITY	PARTICIPANT	OVERALL
<b><u>Present Value Costs</u></b>			
Costs to Utility	3,593	NA	3,593
Costs to Participants	NA	40,319	40,319
Costs to Others	NA	NA	0
<b>Total Costs</b>	<b>\$3,593</b>	<b>\$40,319</b>	<b>\$43,912</b>
<b><u>Present Value Benefits</u></b>			
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
<b>Total Benefits</b>	<b>\$0</b>	<b>\$5,589</b>	<b>\$5,589</b>
<b><u>Cost Benefit Calculations</u></b>			
<b>Net Present Value (NPV)</b> (Total Benefits - Total Costs)	<b>-\$3,593</b>	<b>-\$34,730</b>	<b>-\$38,323</b>
<b>Cost Effectiveness Analysis(CEA)</b> (Total Costs ÷ Total Water Savings)	<b>\$288 /AF</b>	<b>\$3,234 /AF</b>	<b>\$3,522 /AF</b>