

Thornton Water Res. Div.

Toilet Rebate Program

The City of Thornton Water Resources Division (TWRD) is located in Thornton, Colorado, approximately 10 miles north of downtown Denver. As of March 31, 2005, the population served by TWRD was 127,832, where 111,002 reside inside the city and 16,830 reside outside the city. Median household income was \$54,445 as of the 2000 census, which was higher than the statewide average of \$47,203.¹

UTILITY DEMOGRAPHICS

As of May 2005, TWRD maintained 34,259 connections of which 94.3% were residential. Of their total connections, 30,377 were single family residential, 1,937 were multifamily residential, 628 were ICI, and 1,317 were irrigation accounts, including city parks. In addition to providing water to individual retail customers, TWRD provides 2.0 million gallons per day (mgd) of treated water to the City of Westminster. TWRD's total service area is 19 square miles. As of 2004, average customer water use in gallons per capita per day (gpcd) was 142 for all customers and 129 for residential customers.

TOILET REBATE PROGRAM	
Rebate Amount:	\$100
Eligible Customers:	SF
Customers analyzed:	SF
Program Years:	2003 - present
Years Analyzed:	2003

UTILITY RATE STRUCTURE AND PRICES

As of 2004, the domestic inside-city monthly service charge is \$2.46 for a 5/8 x 3/4 inch meter and the outside-city charge is \$3.69 per month. TWRD has an increasing block rate structure. The four-tier structure categorizes rates by determining how much a customer uses relative to their Average Winter Consumption (AWC) and their Monthly Outdoor Allowance (MOA).

Usage	Price	
	INSIDE CITY	OUTSIDE CITY
0 gallons - AWC	\$3.00/1,000g	\$4.50/1,000g
> AWC, up to AWC + MOA	\$3.00/1,000g	\$4.50/1,000g
> AWC + MOA, up to AWC + 2xMOA	\$4.50/1,000g	\$6.75/1,000g
> AWC + 2xMOA	\$9.00/1,000g	\$13.50/1,000g

CURRENT CAPACITY AND WATER SOURCES

Currently, the capacity of existing raw water storage from reservoirs is 26,594 acre-feet. Their treated water storage capacity is 27 mgd. TWRD has two water treatment plants that have a combined capacity of 65 mgd. TWRD's primary water sources are Clear Creek and the South Platte River.

¹ U.S. Census Bureau, American FactFinder.

FUTURE PLANS TO MEET DEMAND

The City of Thornton's growth rate has decreased from 5.0% in 2002 to 3.8% in 2004. The city's plans to meet future demand through a number of different actions. They plan to continue use of current capacity and sources, implement a planned surface water supply project from the Cache la Poudre River basin, expand storage and treatment facilities, continue conservation efforts, purchase and exchange additional water rights, and develop water reuse projects.

REBATE PROGRAM - DESCRIPTION

On May 1, 2003, the Toilet Rebate Program began, which offers single family customers a \$100 credit on their water bill for the replacement of

a high water use toilet with a 1.6 gallon per flush (gpf) or less toilet. Customers are limited to two rebates per household. Participants must break the toilet and take a picture of the old, broken toilet to attach to their rebate application. Participants can also be selected for inspection of their new toilet and their original sales

OTHER THORNTON CONSERVATION PROGRAMS

Washing Machine Rebates, May 1, 2003-present

Toilet Rebates, May 1, 2003 - present

Tiered Conservation Rates, effective May 15, 2003

Public Education, May 2002-present

Water Conservation Ordinances, various start dates

Showerhead & Aerator Exchange, May 17, 2003 - present

receipt. The program is advertised in billing inserts, on TWRD's website, on television ads, at festivals, and in TWRD's quarterly magazine.

During the time of the toilet rebate program, especially from 2002 to 2004, the area was experiencing a drought and there were ongoing water conservation campaigns to mitigate the effects of the drought. However, a major snowstorm in March 2003 improved TWRD's water supply situation. Another important measure taking place during the period of the toilet rebate program was the utility-wide transition from a flat rate structure to a conservation rate structure in May 2003.

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 toilet rebates between May 1 and December 31, 2003. The water savings were calculated and a cost benefit analysis was performed for this time period. Results refer to this time period, not to the ongoing program. The lifespan of the toilets, which is used as the period of analysis, was assumed to be twenty years.

All quantified costs and benefits have been discounted to the first year of the analysis (2003) and inflated to 2004 dollars. The discount rate used in this analysis was 4.65%. The CPI values that were used in this analysis were the 2004 value of 188.9 and the 2003 value of 184.0.

Since two complete years of pre- and post-measure water use could

not be acquired for this analysis, water use data for the participants was acquired from 18 months before the program and 18 months after the program for all households that were residing there for that full period. The pre-measure period includes January 2002 to June 2003, and the post-measure period includes January 2004 to June 2005.

The population studied for this analysis was comprised of all participants who received the toilet rebates between May 1 and December 31, 2003. There were 102 usable participants out of 131 total participants during the period under analysis.

All TRWD single family households, including the participants, were used as the control group. The average annual pre-measure water use of the participants (113,129 gallons) was higher than that of the control group (107,839 gallons). The number of control group connections varied by month, from a minimum of 20,148 to a maximum of 24,532.

ASSUMPTIONS

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

The 2003 CPI value, 184.0, and the 2004 CPI value, 188.9, were used in this analysis.

Participants who participated in any other water conservation program during the period of analysis were not included in the study.

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

Any participants that had 11 to 13 months of usage per year were included in the study.

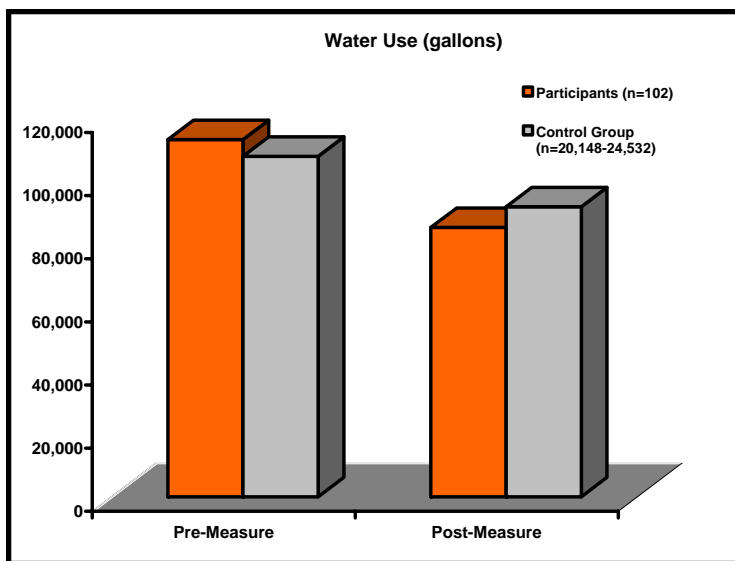
The control group consisted of all single family residential connections, including participants.

The percentage of toilet rebate program participants who lived inside the city was 90%. However, it was assumed that 100% of participants lived inside the city, thus Inside-City rates apply for all cost benefit analysis calculations.

Since all participants were assumed to reside inside the city, Outside-City connections were not included in the control group.

It was assumed that the average number of toilets rebated per participant was 1.32.

It was assumed that 30% of the toilet rebate participants paid \$80 for professional installation, and 70% installed the toilet themselves.



It was assumed that average participant water use falls into tier 1 or 2 of the increasing block rate structure implemented in 2003.

RESULTS - WATER SAVINGS

During the 18 months after receiving the toilet rebates, water savings amounted to 1,682,181 gallons, or 16,492 gallons per participant (9.7% of pre-measure water use). The average savings per year was 1,121,454 gallons, or 10,995 gallons per participant per year (gppy) (9.7% of pre-measure water use). **The total savings over the twenty year assumed lifespan was 22,429,075 gallons (68.8 AF), or 219,893 gallons per participant.**

During the 18 months before participating in the toilet rebate program, the participant group's water use was, on average, 104.9% of the control group's use. During the 18 months after, the participant group's water use was 92.9% of the control group's use, on average. The participant group's water use decreased by 24.6%, whereas the control group's use decreased by 14.9%. **The resulting overall water savings attributed to this program was 9.7%.**

RESULTS - COST BENEFIT ANALYSIS

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

- ◆ The quantified cost to the utility was \$18,153 (\$178 per participant). This cost includes the cost of financial incentives, \$13,823 (\$136 per participant), labor, \$4,239 (\$42 per participant), and advertising, \$91 (\$1 per participant).
- ◆ The quantified benefit to the utility was \$0.
- ◆ The quantified cost to the participants was \$19,699 (\$193 per participant). This includes the estimated cost of the toilets, \$17,186 (\$168 per participant) and installation, \$2,513 (\$25 per participant).
- ◆ The quantified benefit to the participants was \$58,173 (\$570 per participant). This includes the benefits of water bills savings, \$44,351 (\$435 per participant) and financial incentives, \$13,823 (\$136 per participant).

Quantified Costs and Benefits							
Utility				Participants			
Costs		Benefits		Costs		Benefits	
Financial Incentives	\$13,823	Not Quantified		Toilets	\$17,186	Water bill savings	\$44,351
Labor	\$4,239			Installation	\$2,513	Financial Incentives	\$13,823
Advertising	\$91			Total	\$19,699	Total	\$58,173
Total	\$18,153						

UTILITY PERSPECTIVE

Results of the cost benefit analysis show a net benefit (net present value) of -\$18,153 from the utility perspective over the twenty year assumed lifespan of the toilets. This is a net benefit of -\$178 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 \$264.**

PARTICIPANT PERSPECTIVE

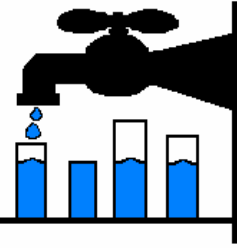
Results of the cost benefit analysis show a net benefit (net present value) of \$38,474 from the perspective of the participant. This is a net benefit of \$377 per participant. The quantified costs to the participants were less than the quantified benefits to the participants. **The cost per acre-foot of water saved from the participant perspective was \$286.**

OVERALL PERSPECTIVE

Results of the cost benefit analysis show a net benefit (net present value) of \$120,321 from an overall perspective. This is a net benefit of \$199 per participant. The quantified costs to the participants and utility were less than the quantified benefits to the participants and utility. **The cost per acre-foot of water saved from the overall perspective was \$550.**

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Results of Cost Benefit Analysis-Lifespan (20 Years)

	UTILITY	PARTICIPANT	OVERALL
<u>Present Value Costs</u>			
Costs to Utility	18,153	NA	18,153
Costs to Participants	NA	19,699	19,699
Costs to Others	NA	NA	0
Total Costs	\$18,153	\$19,699	\$38,974
<u>Present Value Benefits</u>			
Total Water Savings	68.83 AF	68.83 AF	68.83 AF
Benefits to Utility	0	NA	0
Benefits to Participants	NA	58,173	58,173
Benefits to Others	NA	NA	0
Total Benefits	\$0	\$58,173	\$58,173
<u>Cost Benefit Calculations</u>			
Net Present Value (NPV) (Total Benefits - Total Costs)	-\$18,153	\$38,474	\$20,321
Cost Effectiveness Analysis (CEA) (Total Costs ÷ Total Water Savings)	\$264 /AF	\$286 /AF	\$550 /AF