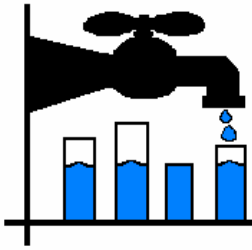

Tualatin Valley Water District

Washing Machine Rebate Program

Tualatin Valley Water District (TVWD), located in eastern Washington County, Oregon, serves the communities of Cedar Hills, Oak Hills, Terra Linda, Cedar Mill, Reedville, Rock Creek, Cooper Mountain, The Bluffs, Progress, Metzger, Bonny Slope, Aloha, and Orenco. In addition, TVWD also serves portions of the cities Tigard, Beaverton, Portland, and Hillsboro. The District serves a population of approximately 192,000 people. The area's economy has been sustained through the development of high technology, retail, and distribution businesses.[1] As of the 2000 census, the median household income for Washington County was $52,122, which is higher than the statewide value of $40,916.[2]

WASHING MACHINE REBATE PROGRAM	
Rebate Amount	**$50**
Eligible Customers:	**SF**
Customers Analyzed:	**SF**
Program Years:	**2002- present**
Years Analyzed:	**2002**

UTILITY DEMOGRAPHICS

As of March 2004, Tualatin Valley Water District maintained 52,933 connections. Single family and multifamily residential customers accounted for about 94% of total connections (49,553 single family users and 709 multifamily users). The remaining 6% of connections are distributed among commercial users (1,372), industrial users (52), irrigation users (692), and miscellaneous users (555). TVWD's service area encompasses approximately 45 square miles. TVWD's average water use jn 2004, in gallons per capita per day (gpcd), was 117. TVWD delivered over 8.8 billion gallons of water in FY2003.[3]

UTILITY RATE STRUCTURE AND PRICES

Tualatin Valley Water District has an increasing block rate structure. As of November 1, 2004, the bimonthly base rate for service to a typical residential connection is $13.88. The price per unit of water is as follows:

Usage	Price
0 to 50 ccf (0 – 37,400 gallons)	$1.63 per ccf ($2.18 per 1000 gallons)
>50ccf (>37,400 gallons)	$2.61 per ccf ($3.49 per 1000 gallons)

CURRENT CAPACITY AND WATER SOURCES

The current storage capacity of Tualatin Valley Water District is over 53 million gallons, spread over 24 covered reservoirs.[4] TVWD purchases its water from the Portland Water Bureau, which comes primarily from the Bull Run Watershed, and the Joint Water Commission, which comes from the Barney Reservoir. Both are surface water sources.

[1] *About Our District*. Tualatin Valley Water District
[2] US Census Bureau.
[3] *Annual Report 2004*. Tualatin Valley Water District.
[4] *Annual Report 2004*. Tualatin Valley Water District.

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FUTURE PLANS TO MEET DEMAND

TVWD plans to meet its future water needs by continuing the use of current sources, through conservation, possibly purchasing more water from their wholesale water providers, and possibly expanding current sources and facilities.

OTHER TUALATIN VALLEY CONSERVATION PROGRAMS

Landscape Rebate Program, *March 2004-present*
Water-Saving Kit Distribution, *2002-present*
Outdoor Audits, *1997-present*
Leak Detection Program, *1970's-present*
Conservation Rates, *1994-present*
Public Education, *1990-present*

REBATE PROGRAM - DESCRIPTION

Since May 2002, Tualatin Valley Water District has offered a rebate of $50 off the purchase price to single family residential customers who replace high water use washing machines with Energy Star machines. TVWD issues a rebate check directly to the customer. Residents of Oregon also are eligible for a tax credit of up to $180 of the purchase price of an Energy Star washing machine.

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 a rebate in 2002. The water savings were calculated and a cost benefit analysis was performed for the year 2002. The findings refer to this year only, not to the ongoing program. The lifespan of the washing machines installed, which is used as the period of this analysis, was assumed to be twelve years.[5]

All quantified costs and benefits have been discounted to the first year of the analysis (2002) and inflated to 2004 dollars. The discount rate used for this analysis was 4.29%. The Consumer Price Index values used in this analysis were the 2004 value of 188.9 and the 2002 value of 179.9.

The population studied for this analysis was comprised of participants who received rebates in 2002. One hundred sixty customers received rebates during this time period. Of those 160 participants, 130 customers (who received 130 rebates) were usable for this analysis. Sufficient raw data was not available for 30 program participants (18.8%). It is possible that some of the remaining 130 households did not live in the household for the full period of analysis.

Tualatin Valley Water District single family residential households,

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

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excluding those included in this analysis, were used as the control group. The control group consisted of 44,667 households in 2000, 46,053 in 2001, 47,370 in 2002, 48,536 in 2003, and 49,578 in 2004.

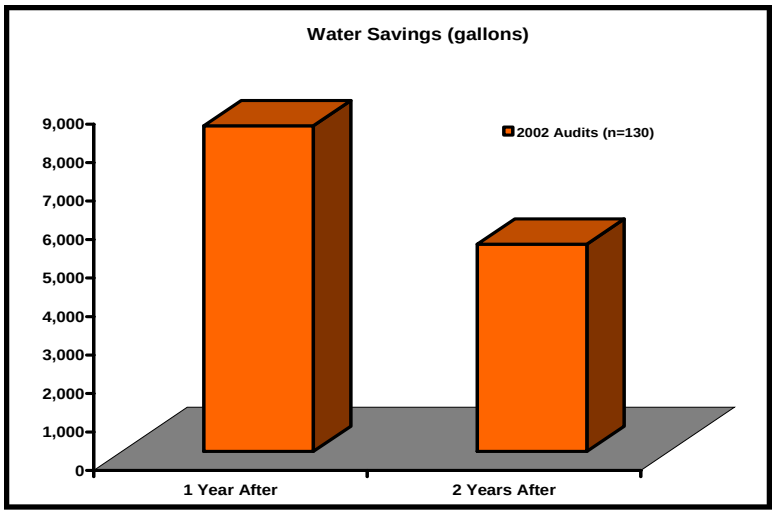
The average pre-measure annual water use of the participants (102,442 gallons) was greater than that of the control group (87,313 gallons).

ASSUMPTIONS

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

The number of single family residential connections used for the control group is an average from throughout the year.

The costs for the program in 2002 were assumed to be $200 for program start-up ($2000 over 10 years), $20 for evaluation, $8 per rebate for processing, $0.03 per participant for a program brochure, and $0.02 per participant for advertising in their newsletter.



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 bimonthly use fell. Average bimonthly use fell into the first tier, so the water rate used was $1.46 per ccf for 2003, $1.50 per ccf for 2004, and $1.63 per ccf for 2005 and beyond.

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

The estimated average cost of high efficiency washers was $1000 each and high water use washers was $400 each. The difference between the two costs ($600) is used as the cost to the participant, as it is assumed that they would have purchased a high water use washer had they not received the rebate.

RESULTS - WATER SAVINGS

The first year after the rebate program, the water savings amounted to 1,100,459 gallons, or 8,465 gallons per participant per year (gppy) (8.3% of pre-measure water use). The second year after the rebates, the water savings amounted to 700,160 gallons or 5,386 gppy (5.3% of pre-measure water use). Average savings per year was 900,309 gallons or 6,926 gppy (6.8% of pre-measure water use). Total savings over the twelve year assumed lifespan was 10,803,716 gallons (33.2 AF) or about 83,106 gallons per participant.

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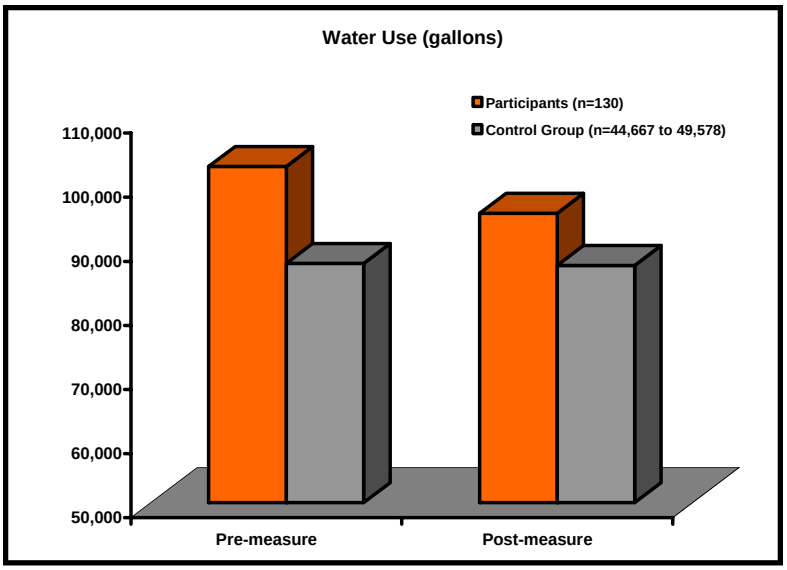

During the two years before replacing the high water use washing machines, the participant group's water usage was 117.3% of the control group's usage, on average. During the two years after replacing the washing machines, the participant group's water usage was 109.4% of the control group's usage, on average. The participant group's water use decreased by 7.1%, whereas the control group's use decreased by 0.4%. **The resulting overall water savings attributed to this program was 6.7%.**

RESULTS - COST BENEFIT ANALYSIS

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

- The quantified cost to the utility was $7,945 ($61 per participant). This cost includes the cost of incentive payments, $6,825 ($53 per participant), labor, $1,092 ($8 per participant), consulting, $21 ($0.16 per participant), and advertising, $7 ($0.05 per participant).
- The quantified benefit to the utility was $0.
- The quantified cost to participants was $81,902 ($630 per participant). This cost includes the difference between the average cost of the high-efficiency washing machines and high water use washing machines.
- The quantified benefit to participants was $25,493 ($197 per participant). This value includes water bill savings, $18,668 ($144 per participant), and the amount that the customers received in financial incentives, -$6,825 ($53 per participant).

Quantified Costs and Benefits							
Utility				Participants			
Costs		Benefits		Costs		Benefits	
Incentive Payments	$6,825	Not Quantified		Washing Machines	$81,902	Water Bill Savings	$18,668
Labor	$1,092					Financial Incentives	$6,825
Consulting	$21						
Advertising	$7						
Total	$7,945			Total	$81,902	Total	$25,493

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UTILITY PERSPECTIVE

Results of cost benefit analysis show a net benefit (net present value) of -$7,945 from the utility perspective. This is a net benefit of -$61 per participant. This is a negative result; 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 $240.**

PARTICIPANT PERSPECTIVE

Results of cost benefit analysis show a net benefit (net present value) of -$56,409 from the participant perspective. This is a net benefit of -$434 per participant. This is a negative result; the quantified costs to program participants were greater than the quantified benefits to the participants. **The cost per acre-foot of water saved from the participant perspective was $2,470.**

OVERALL PERSPECTIVE

Results of cost benefit analysis show a net benefit (net present value) of -$64,354 from an overall perspective. This is a net benefit of -$495 per participant. This is a negative result; 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 $2,710.**

UNQUANTIFIED COSTS AND BENEFITS

Costs

- **Possible landfill disposal of old washing machines.**

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 saved for future municipal use.**
- **Reduced groundwater depletion, subsidence and surface water use.**
- **Program participants received new washing machines.**
- **Possible income from the sale of old machines.**
- **Some machines are refurbished and given to low-income families.**
- **Participants receive a tax credit from the State of Oregon for up to $180.**
- **Participants have decreased energy and sewer bills.**
- **High-efficiency machines use less detergent.**

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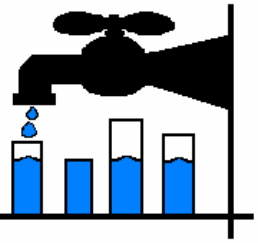
Tualatin Valley Water District

Washing Machine Rebate Program



Results of Cost Benefit Analysis-Lifespan (12 Years)

	UTILITY	PARTICIPANT	OVERALL
Present Value Costs			
Costs to Utility	7,945	NA	7,945
Costs to Participants	NA	81,902	81,902
Costs to Others	NA	NA	0
Total Costs	$7,945	$81,902	$89,847
Present Value Benefits			
Total Water Savings	33.16 AF	33.16 AF	33.16 AF
Benefits to Utility	0	NA	0
Benefits to Participants	NA	25,493	25,493
Benefits to Others	NA	NA	0
Total Benefits	$0	$25,493	$25,493
Cost Benefit Calculations			
Net Present Value (NPV) (Total Benefits - Total Costs)	-$7,945	-$56,409	-$64,354
Cost Effectiveness Analysis (CEA (Total Costs ÷ Total Water Savings)	$240 /AF	$2,470 /AF	$2,710 /AF

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