

# Port Angeles Utilities Dept.

## Washing Machine Rebate Program

The City of Port Angeles Public Works and Utilities Department serves the city of Port Angeles in Clallam County, Washington. As of the 2000 Census, the median household income in Port Angeles was \$33,130, which is lower than the statewide median of \$45,776.<sup>1</sup>

### UTILITY DEMOGRAPHICS

As of 2004, the City of Port Angeles had 7,928 connections, 89% of which was residential. Of their total connections, 6,900 were single family residential, 195 were multifamily residential, 831 were commercial, and 2 were industrial.

The City of Port Angeles' total service area is 14 square miles. The population of this service area as of the 2000 census is approximately 18,000. As of 2004, the City of Port Angeles' total water use was 155 gallons per capita per day (gpcd) and their residential water use was 84 gpcd.

<b>WASHING MACHINE REBATE PROGRAM</b>	
<b>Voucher Amount:</b>	<b>\$75</b>
<b>Eligible Customers:</b>	<b>SF, MF</b>
<b>Customers Analyzed:</b>	<b>SF</b>
<b>Program Years:</b>	<b>2001-present</b>
<b>Years Analyzed:</b>	<b>2001-2002</b>

### UTILITY RATE STRUCTURE AND PRICES

The City of Port Angeles uses a flat rate structure. Effective January 1, 2005, the monthly base rate for service is \$14.95 for 5/8" meters, which includes zero gallons of water.<sup>2</sup> Consumption charges for single family and multifamily residential connections are \$1.19 per ccf (\$1.59 per 1,000 gallons).

### CURRENT CAPACITY AND WATER SOURCES

The City of Port Angeles has a storage capacity of approximately 18 million gallons. The City of Port Angeles' water supply is groundwater, accessed by a 60 foot deep collector well near the Elwha River. The pumping system is currently able to provide 11 millions gallons per day.

### FUTURE PLANS TO MEET DEMAND

The population within the City of Port Angeles' service area is growing at a rate of 1%. The District plans to meet future water demand through the use of current sources. They are permitted to use up to 32.5 mgd through the year 2015.

### WASHING MACHINE REBATE PROGRAM - DESCRIPTION

The City of Port Angeles' washing machine rebate program was first initiated on June 1, 2001 and is continuing. The rebate is offered with the purchase of an efficient washing machine. The washing machine must be an Energy Star machine, and the customer must have an electric water heater to qualify. The initial rebate amount was \$75. Since the program began, there have been several changes in the

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

<sup>2</sup> City of Port Angeles website

rebate amount offered to customers. The rebates offered for 2001, 2002, 2003, 2004, and 2005 were \$75, \$150, \$100, \$100, and \$50 respectively. The financial incentives are funded by the Bonneville Power Administration energy conservation program.

**OTHER PORT ANGELES CONSERVATION PROGRAMS**  
**Showerhead & Aerator Giveaway, July 2001-present**  
**Conservation Ordinance, 2000-present**  
**Adopted as part of a drought response plan,**  
**with water shortage stages and corresponding**  
**water conservation actions.**

The District informs its customers about the washing machine rebate program through bill inserts, newspaper articles, radio advertisements, television advertisements, and internet. In addition,

plumbing retailers have encouraged customers to participate in the program upon purchasing new ultra low flow toilets.

## **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 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 washing machines was assumed to be twelve 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 5.39%. 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 for this analysis was comprised of participants who received rebates in 2001 or 2002. One hundred twenty-two customers received rebates during this time period. Of those 122 participants, 111 customers were usable for this analysis. Sufficient raw data was not available for 11 program participants (9.0%).

A random sample of 133 City of Port Angeles single family residential households were used in the control group for this analysis. The average pre-measure water use of the 2001 participants (78,839 gallons) was higher than that of the control group (77,031 gallons). The pre-measure water use of the 2002 participants (92,921 gallons) was also higher than the control group (75,532 gallons).

## **ASSUMPTIONS**

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

The control group is a random sample of single family connections.

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

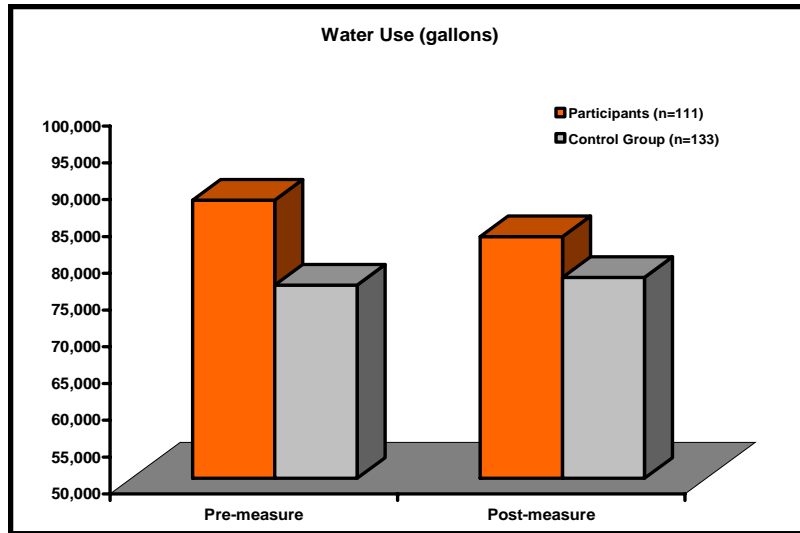
The price of water used in determining the benefits to customers from reduced water bills is the variable portion of the customers' water bill (\$1.07 per ccf in 2002, \$1.11 per ccf in 2003, \$1.16 per ccf in 2004, and \$1.19 per ccf in 2005 and beyond).

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.

The discount rate used in this analysis was 5.39%.

The CPI values that were used in this analysis were the 2004 value of 188.9 and the 2001 value of 177.1.



## RESULTS - WATER SAVINGS

In the first year after the 2001 washing machine rebate program, the water savings amounted to 307,233 gallons, or 7,681 gallons per participant per year (gppy) (9.7% of pre-measure water use). The second year after, the water savings amounted to 157,416 gallons, or 3,935 gppy (5.0% of pre-measure water use). The average savings per year was 232,324 gallons or 5,808 gppy (7.4% of pre-measure water use). **Over the twelve year lifespan of the washing machine, the total water savings was 2,787,890 gallons (8.6 AF), or 69,697 gallons per participant.**

In the first year after the 2002 rebate program, the water savings amounted to 307,968 gallons, or 4,338 gallons per participant per year (gppy) (4.7% of pre-measure water use). The second year after, the water savings amounted to 760,506 gallons, or 10,711 gppy (11.5% of pre-measure water use). The average savings per year was 534,237 gallons or 7,524 gppy (8.1% of pre-measure water use). **Over the twelve year lifespan of the washing machine, the total water savings was 6,410,843 gallons (19.7 AF), or 90,294 gallons per participant.**

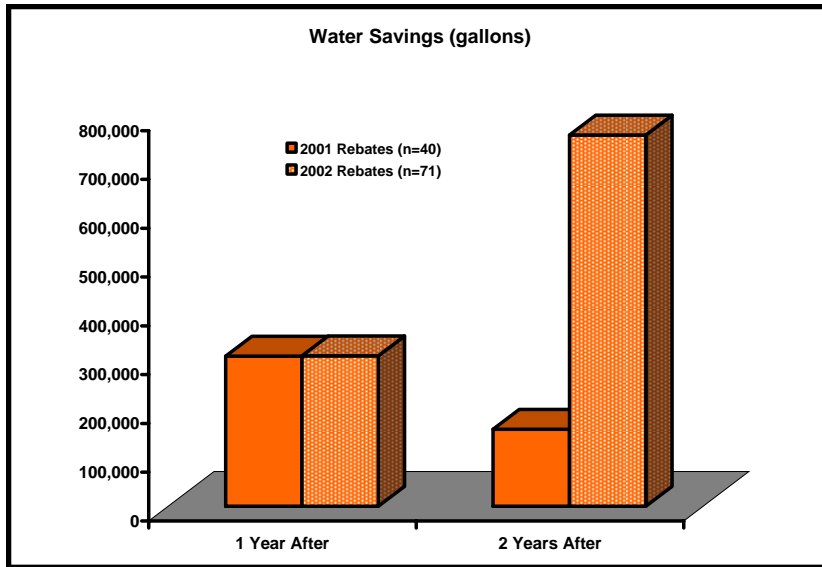
Total water savings for the two years studied was 615,201 gallons, or 5,542 gppy (6.3% of weighted pre-measure water use) during the first year after the rebates and 917,921 gallons, or 8,270 gppy (9.4% of weighted pre-measure water use) during the second year after the

rebates. The total savings over the twelve year assumed lifespan of the washing machines was 9,198,733 gallons (28.2 AF), or 82,871 gallons per participant.

During the two years before participating in the program, participants' water use was 115.2% of the control group's use, on average. During

the two years after participating in the audit program, their water use was 107.2% of the control group's use, on average.

The participants' water use decreased by 5.7% from pre-measure to post-measure, whereas the control group's use increased by 1.4%. The resulting overall water savings attributed to this program was 7.1%.



## RESULTS - COST BENEFIT ANALYSIS

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

### 2001 REBATES

- ◆ The quantified cost to the utility was \$0.
- ◆ The quantified benefit to the utility was \$0.
- ◆ The quantified cost to the participants was \$25,599 (\$640 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 the participants was \$8,468 (\$212 per participant). This includes water bill savings, \$3,348 (\$84 per participant), and financial incentives \$5,120 (\$128 per participant).
- ◆ The quantified cost to others was \$5,120 (\$128 per participant), including payment of financial incentives by the Bonneville Power Administration.
- ◆ The quantified benefit to others was \$0.

### UTILITY PERSPECTIVE - 2001

Results of the cost benefit analysis show a net benefit (net present value) of \$0 from the utility perspective. This is a net benefit of \$0 per participant. The quantified costs to the utility were equal to the quantified benefits to the utility. The cost per acre-foot of water saved from the utility perspective was \$0.

**PARTICIPANT PERSPECTIVE - 2001**

Results of the cost benefit analysis show a net benefit (net present value) of -\$17,131 from the participant perspective. This is a net benefit of -\$428 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 \$2,992.**

**OVERALL PERSPECTIVE - 2001**

Results of cost benefit analysis show a net benefit (net present value) of -\$22,251 from an overall perspective. This is a net benefit of -\$556 per participant. The quantified costs to the participants, utility, and others were greater than the quantified benefits to the participants, utility, and others. **The cost per acre-foot of water saved from an overall perspective was \$3,590.**

2001 Quantified Costs and Benefits					
Utility		Participants			
Costs	Benefits	Costs		Benefits	
Not Quantified		Equipment	\$25,599	Water Bill Savings	\$3,348
				Financial Incentives	\$5,120
		Total	\$25,599	Total	\$8,468

2001 Quantified Costs and Benefits		
Bonneville Power Administration		
Costs		Benefits
Financial Incentive Payments	\$5,120	Not Quantified
Total	\$5,120	

**2002 REBATES**

- ◆ The quantified cost to the utility was \$0.
- ◆ The quantified benefit to the utility was \$0.
- ◆ The quantified cost to the participants was \$43,115 (\$607 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 the participants was \$18,307 (\$258 per participant). This includes water bill savings, \$7,377 (\$104 per participant), and financial incentives \$10,930 (\$154 per participant).
- ◆ The quantified cost to others was \$10,930 (\$154 per participant), including payment of financial incentives by the Bonneville Power Administration.
- ◆ The quantified benefit to others was \$0.

**UTILITY PERSPECTIVE - 2002**

Results of the cost benefit analysis show a net benefit (net present value) of \$0 from the utility perspective. This is a net benefit of \$0 per participant. The quantified costs to the utility were equal to the quantified benefits to the utility. **The cost per acre-foot of water saved from the utility perspective was \$0.**

**PARTICIPANT PERSPECTIVE - 2002**

Results of the cost benefit analysis show a net benefit (net present value) of -\$24,807 from the participant perspective. This is a net benefit of -\$349 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 \$2,191.**

**OVERALL PERSPECTIVE - 2002**

Results of cost benefit analysis show a net benefit (net present value) of -\$35,738 from an overall perspective. This is a net benefit of -\$503 per participant. The quantified costs to the participants, utility, and

2002 Quantified Costs and Benefits					
Utility		Participants			
Costs	Benefits	Costs		Benefits	
Not Quantified		Equipment	\$43,115	Water Bill Savings	\$7,397
				Financial Incentives	\$10,930
		<b>Total</b>	<b>\$43,115</b>	<b>Total</b>	<b>\$18,307</b>

others were greater than the quantified benefits to the participants, utility, and others. **The cost per acre-foot of water saved from an overall perspective was \$2,747.**

2002 Quantified Costs and Benefits			
Bonneville Power Administration			
Costs		Benefits	
Financial Incentive Payments	\$10,930	Not Quantified	
<b>Total</b>	<b>\$10,930</b>		

**BOTH YEARS**

- ◆ The quantified cost to the utility was \$0.
- ◆ The quantified benefit to the utility was \$0.
- ◆ The quantified cost to the participants was \$68,714 (\$619 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 the participants was \$26,775 (\$241 per participant). This includes water bill savings, \$10,725 (\$97 per participant), and financial incentives \$16,050 (\$145 per participant).
- ◆ The quantified cost to others was \$16,050 (\$145 per participant), including payment of financial incentives by the Bonneville Power Administration.
- ◆ The quantified benefit to others was \$0.

**UTILITY PERSPECTIVE - BOTH YEARS**

Results of the cost benefit analysis show a net benefit (net present value) of \$0 from the utility perspective. This is a net benefit of \$0 per participant. The quantified costs to the utility were equal to the quantified benefits to the utility. **The cost per acre-foot of water saved from the utility perspective was \$0.**

**PARTICIPANT PERSPECTIVE - BOTH YEARS**

Results of the cost benefit analysis show a net benefit (net present

value) of -\$41,938 from the participant perspective. This is a net benefit of -\$378 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 \$2,434.**

BOTH YEARS Quantified Costs and Benefits					
Utility		Participants			
Costs	Benefits	Costs		Benefits	
Not Quantified		Equipment	\$68,714	Water Bill Savings	\$10,725
				Financial Incentives	\$16,050
		Total	\$68,714	Total	\$26,775

BOTH YEARS Quantified Costs and Benefits		
Bonneville Power Administration		
Costs		Benefits
Financial Incentive Payments	\$16,050	Not Quantified
Total	\$16,050	

**OVERALL PERSPECTIVE - BOTH YEARS**

Results of cost benefit analysis show a net benefit (net present value) of -\$57,989 from an overall perspective. This is a net benefit of -\$522 per participant. The quantified costs to the participants, utility, and others were greater than the quantified benefits to the participants, utility, and others. **The cost per acre-foot of water saved from an overall perspective was \$3,003.**

**UNQUANTIFIED COSTS AND BENEFITS**

**Costs**

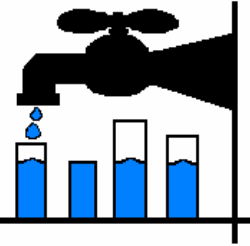
- The customers’ time spent installing the washing machines.
- Proper disposal of old washing machines.
- Advertising and administration costs of the program.

**Benefits**

- Financial savings on sewer bills for participants.
- Avoided cost of acquisition and distribution of water saved.
- Environmental benefits of reduced use of water.
- Increased public awareness about water conservation.
- Water saved for future municipal use.
- Program participants received new washing machines.
- Possible income to participants from the sale of old washing machines.
- Environmental and monetary benefits of reduced use of energy.
- Improved public relations for the utility

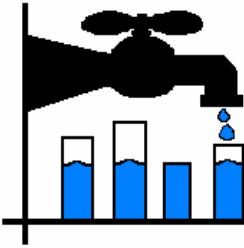
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<b>2001</b>		<b>Results of Cost Benefit Analysis-Lifespan (12 Years)</b>		
	UTILITY	PARTICIPANT	OVERALL	
<b><u>Present Value Costs</u></b>				
Costs to Utility	0	NA	0	0
Costs to Participants	NA	25,599	25,599	25,599
Costs to Others	NA	NA	5,120	5,120
<b>Total Costs</b>	<b>\$0</b>	<b>\$25,599</b>	<b>\$25,599</b>	<b>\$30,719</b>
<b><u>Present Value Benefits</u></b>				
<b>Total Water Savings</b>	<b>8.56 AF</b>	<b>8.56 AF</b>	<b>8.56 AF</b>	<b>8.56 AF</b>
Benefits to Utility	0	NA	0	0
Benefits to Participants	NA	8,468	8,468	8,468
Benefits to Others	NA	NA	0	0
<b>Total Benefits</b>	<b>\$0</b>	<b>\$8,468</b>	<b>\$8,468</b>	<b>\$8,468</b>
<b><u>Cost Benefit Calculations</u></b>				
<b>Net Present Value (NPV)</b> (Total Benefits - Total Costs)	<b>\$0</b>	<b>-\$17,131</b>	<b>-\$17,131</b>	<b>-\$22,251</b>
<b>Cost Effectiveness Analysis (CEA)</b> (Total Costs ÷ Total Water Savings)	<b>\$0 /AF</b>	<b>\$2,992 /AF</b>	<b>\$2,992 /AF</b>	<b>\$3,590 /AF</b>

<b>2002</b>		<b>Results of Cost Benefit Analysis-Lifespan (12 Years)</b>		
	UTILITY	PARTICIPANT	OVERALL	
<b><u>Present Value Costs</u></b>				
Costs to Utility	0	NA	0	0
Costs to Participants	NA	43,115	43,115	43,115
Costs to Others	NA	NA	10,930	10,930
<b>Total Costs</b>	<b>\$0</b>	<b>\$43,115</b>	<b>\$43,115</b>	<b>\$54,045</b>
<b><u>Present Value Benefits</u></b>				
<b>Total Water Savings</b>	<b>19.67 AF</b>	<b>19.67 AF</b>	<b>19.67 AF</b>	<b>19.67 AF</b>
Benefits to Utility	0	NA	0	0
Benefits to Participants	NA	18,307	18,307	18,307
Benefits to Others	NA	NA	0	0
<b>Total Benefits</b>	<b>\$0</b>	<b>\$18,307</b>	<b>\$18,307</b>	<b>\$18,307</b>
<b><u>Cost Benefit Calculations</u></b>				
<b>Net Present Value (NPV)</b> (Total Benefits - Total Costs)	<b>\$0</b>	<b>-\$24,807</b>	<b>-\$24,807</b>	<b>-\$35,738</b>
<b>Cost Effectiveness Analysis (CEA)</b> (Total Costs ÷ Total Water Savings)	<b>\$0 /AF</b>	<b>\$2,191 /AF</b>	<b>\$2,191 /AF</b>	<b>\$2,747 /AF</b>



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## Washing Machine Rebate Program

<b>BOTH YEARS</b>	<b>Results of Cost Benefit Analysis-Lifespan (12 Years)</b>		
	<b>UTILITY</b>	<b>PARTICIPANT</b>	<b>OVERALL</b>
<i><u>Present Value Costs</u></i>			
Costs to Utility	0	NA	0
Costs to Customers	NA	68,714	68,714
Costs to Others	NA	NA	16,050
<b>Total Costs</b>	<b>\$0</b>	<b>\$68,714</b>	<b>\$84,764</b>
<i><u>Present Value Benefits</u></i>			
<b>Total Water Savings</b>	<b>28.23 AF</b>	<b>28.23 AF</b>	<b>28.23 AF</b>
Benefits to Utility	0	NA	0
Benefits to Customers	NA	26,775	26,775
Benefits to Others	NA	NA	0
<b>Total Benefits</b>	<b>\$0</b>	<b>\$26,775</b>	<b>\$26,775</b>
<i><u>Cost Benefit Calculations</u></i>			
<b>Net Present Value (NPV)</b> (Total Benefits - Total Costs)	<b>\$0</b>	<b>-\$41,938</b>	<b>-\$57,989</b>
<b>Cost Effectiveness Analysis (CEA)</b> (Total Costs ÷ Total Water Savings)	<b>\$0 /AF</b>	<b>\$2,434 /AF</b>	<b>\$3,003 /AF</b>

