Conservation Limits Rate Increases for a Colorado Utility

Demand Reductions Over 30 Years Have Dramatically Reduced Capital Costs

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Why are my rates going up again?

"Why do you ask me to conserve and then raise my rates?" asked a concerned citizen at a public meeting in Westminster, Colorado in 2011.

"Very good question," pondered Westminster Utilities' staff as they struggled with only limited success for a compelling answer. They knew water conservation has had a profound impact on the city by reducing demand, the amount of additional water needed to purchase and eliminating the need for expansion of facilities, but they didn't have a good way to quantify the impacts and respond to the citizen's question.

Similar tough questions have been posed to water utilities across the country as water and wastewater rates have increased faster than the Consumer Price Index (CPI) over the past 15 years, (Beecher 2013), (Craley and Noyes 2013). Managing the public response to and understanding of rate increases has taken on increasing significance in recent years as utilities grapple with the double edged sword of rising infrastructure costs and decreasing demands (Goetz M. 2013).

Rather than leaving the question of customer conservation and rates hanging without a satisfactory response, the Westminster staff decided to do some research to try and come up with some answers using data from their own system. The timing of the question was significant as the City is working towards completing a series of identified projects designed to meet the City's needs at a projected buildout date of 2050 (using current and projected demands which include conservation).

To examine the impact of conservation on rates, the City looked at marginal costs due to the buildout requirements by removing conservation from the equation. The results of the City's research were startling: Reduced water use in Westminster since 1980 has resulted in significant savings in both water resource and infrastructure costs, saving residents and businesses 80% in tap fees and 91% in rates compared to what they would have been without conservation.

The City's research on water demands and rates since 1980 provided a useful response to the citizen's question and revealed previously unexplored and under-appreciated benefits of long-term water conservation in reducing rate increases. Water rates in Westminster are much lower today than they would have been in the absence of demand reductions from conservation. Here's how the City was able to reach this important conclusion.

Change in Water Use

To explore the impacts of demand management on water rates and tap fees, Westminster staff examined water demand records, water rates, tap fees[1], and capital project costs from 1980 through 2010 with the following question in mind: "What would our water rates and tap fees be today if per customer water demands remained unchanged since 1980?". 1980 was chosen because it predated City related conservation programs and two levels of plumbing code related changes.

The first step was to examine water use patterns. To do this, Westminster staff examined water use patterns from 1980 – 2010 by taking total demand (all customer classes) and dividing by the best estimate of the service area population for each year. Westminster has a reclaimed water system that reuses treated wastewater for irrigation thus lowering the City's impact on water resources. To be conservative, reclaimed water was assumed to be a conservation measure. This consumption was added back into potable water use to reflect the full use of water without conservation. As shown in Figure 1 average gpcd, based on total City water use, was 21% higher 30 years ago, starting at 180 gpcd in 1980 and ending at 149 gpcd in 2010. Westminster attributes these changes in demand to three primary management factors:

1. Utility sponsored water conservation programs
2. The City's inclining block and seasonal rate water billing structure
3. National plumbing codes implemented as part of the Energy Policy Act of 1992 (EP Act)

1 Tap fees, also called connection fees or development fees, are the costs paid by new customers to join the water system.

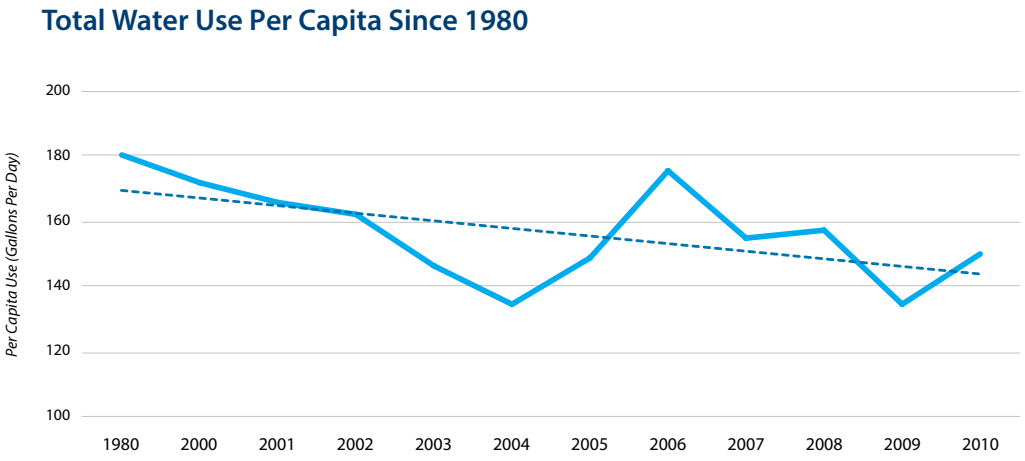


Figure 1: Average gpcd in Westminster, based on total water use 1980 – 2010

New Supply Requirements and Cost

Once the changes in water demand were quantified, the Westminster staff were able to estimate what water use in 2010 would have been without the enactment of water conservation programs and policies. Through this analysis it was concluded that if per capita water use had not decreased by 21%, Westminster would have been required to secure an additional 7,295 acre-feet (AF) of additional water supply order to meet the customer demand while satisfying the City's reliability requirements.

New water supply in Colorado's Front Range does not come cheap. Current market costs for new water supply average $30,000 per acre-foot on Colorado's Front Range. Westminster pays close attention to the cost of new supply as it builds these costs into the tap fees of new customers so that the City can fully recover the expense of serving new customers without burdening existing customers with the cost of growth. The staff also concluded that had conservation from 1980 – 2010 not occurred, the City would have been competing with other water providers in the region to acquire more raw water, further tightening the market and making new water supply even more expensive. At this average price, the estimated cost of obtaining and delivering the required additional 7,295 AF of water would have required a capital investment of $218,850,000. With this simple analysis alone, the cost savings associated with reduced water use became obvious, but staff realized this was only part of the story.

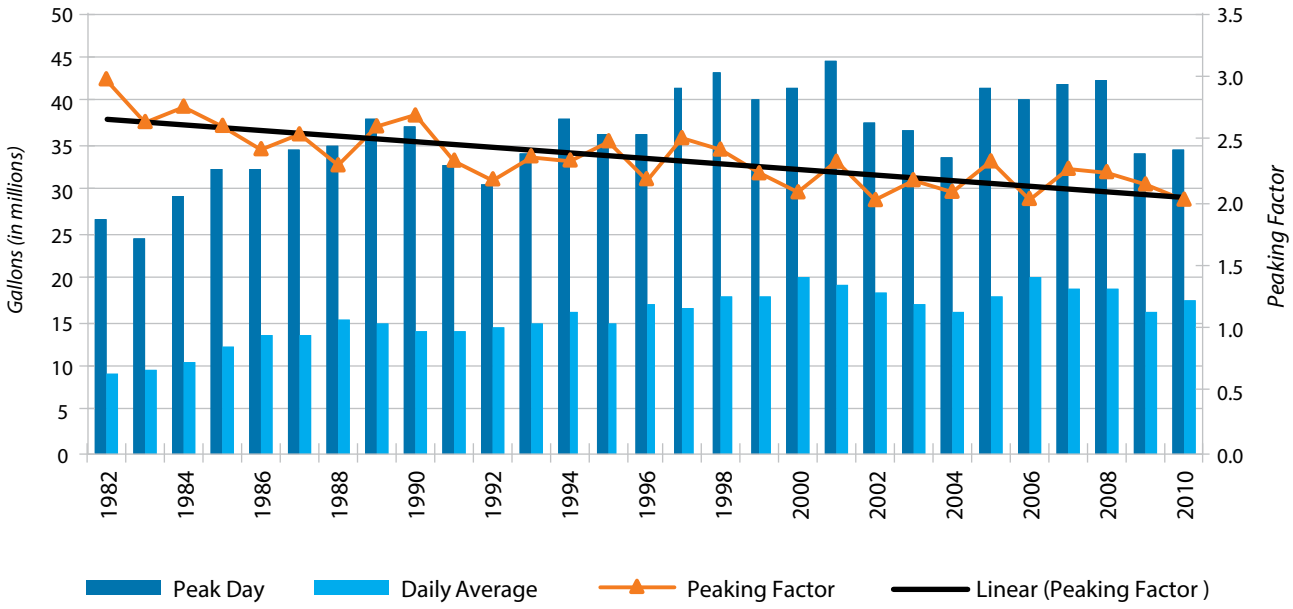
If per capita water use had not decreased by 21%, Westminster would have been required to secure an additional 7,295 acre-feet (AF) of additional water supply order to meet the customer demand.

Additional Peak Demands and Infrastructure Costs

Peak demand in 2010 would also have been considerably higher had conservation not been implemented in Westminster over the past 30 years. The City has found that water conservation programs have altered irrigation patterns thus reducing the system's peak day factor. In 1980 the peak to average day factor in Westminster was 3.0, but by 2010 changes in irrigation practices and reduced water demand cut the peak factor to 2.1 — a 30% reduction.

Potable Water Production

Peak Day, Daily Average, Peaking Factor



If 1980 demand levels had been perpetuated along with the 1980 peaking factor of 3, then the City's peak requirement at buildout was estimated to be 52 MGD *higher* than the current planned maximum capacity. This level of peak demand would require the City to add an additional 52 MGD of treatment capacity at an estimated finished and installed cost of $2,500,000 per MGD[2]. Developing the additional water treatment infrastructure to meet these higher demands would have required a capital investment by the City of approximately $130,000,000.

2 Based on recent projects and engineering estimates

Additional Wastewater Treatment Infrastructure Costs

If conservation were not taken and water demands had stayed at 1980 levels, staff determined that Westminster would have needed to add an additional 4 MGD of wastewater treatment capacity to their system. Adding wastewater treatment capacity costs the City an estimated $5,000,000 per MGD[3]. Thus the additional 4 MGD of wastewater would have required a capital investment by the City of approximately $20,000,000.

Total Estimated Costs of Increased Demand

All estimated costs associated with the hypothetical increased demand were assembled into a single table and then the City added in the costs of debt financing charges which would certainly have been part of these capital construction projects, had they been implemented. As shown in Table 1, had the citizens of Westminster not reduced their water use, the estimated total cost to the City of the increased demand came to $591,850,000 – more than half a billion dollars.

Table 1: Estimated new infrastructure costs of increased demand

Additional water treatment capacity	52 MGD total ($2,500,000/MG)	$130,000,000
Additional wastewater treatment capacity	4 MGD total ($5,000,000/MG)	$20,000,000
Additional water resources	7,295 AF total ($30,000/AF)	$218,850,000
Interest (on debt funding for all projects)*		$223,000,000
Total Costs		**$591,850,000**

** For the purposes of this analysis it is assumed that debt would have been issued, and the resulting debt service would have been paid through rates. Those costs were included in the impacts to rates.*

3 Based on recent projects and engineering estimates

Next the staff examined the increases in operating costs that the City estimates it would have incurred to handle the increased demand and associated additional infrastructure. While no additional staff personnel were assumed to be necessary, it was assumed that operating costs (power, chemicals, and other annual costs related to water and wastewater treatment, distribution and collection) would increase proportionally to the demand increases as shown in Table 2. From this analysis, it was estimated that Westminster would have incurred an additional $1,238,000 per year on average in operating costs associated with the additional demand.

Table 2: Estimated additional operating costs of new demand*

Additional annual operating cost of water treatment facilities	21% increase	$480,400
Additional annual operating cost of wastewater treatment facilities	20% increase	$757,600
Total estimated additional operating costs		**$1,238,000 per year**

**No additional staff personnel were added*

Impact to Water and Wastewater Rates and Tap Fees

Once the cost estimates were completed, the question of how to recover the additional costs through rates and fees was examined. Westminster Utilities has just two sources of revenue that it must use to pay for all costs associated with running the water and wastewater systems: (1) Water and wastewater rates; and (2) Tap fees. In theory, water and wastewater rates are set by the City so that the revenue generated covers operations and maintenance of the system as well as some of the repair and replacement costs, and debt service. Tap fees are set to cover the costs of buying into the existing system based on current value plus any new infrastructure (capital projects), and water resources required by growth.

In practice, existing customers build the City's water and wastewater systems before new customers arrive so that growth can occur. Infrastructure must be planned for future demands and not constructed as needed. When new customers connect and pay their tap fees, current customers are reimbursed for their investment in the City's existing systems. Those funds pay for capital improvement projects including repair and replacement, thus reducing the costs to existing customers. Therefore, both rates and tap fees are impacted by the same projects.

Working from this basic division of costs between rates and tap fees, Westminster developed an estimate of what 2012 water and wastewater rates and tap fees for single-family customers would need to be to cover the additional costs incurred as a result of the hypothetical additional supply requirements. In 2012, the average single-family customer in Westminster paid a total of $410 for water and $245 for wastewater service. To cover the single-family sector's share of the additional annual costs associated with the increased demand considered in this analysis, the average single-family customer would have to pay an additional $553 per year for water service and $43 per year for wastewater service. The weighted average of these additional costs means that the average single-family customer would pay combined water and wastewater rates that are 91% higher than they are today if 1980-level water demands were perpetuated over the past 30 years. These results are shown in Table 3.

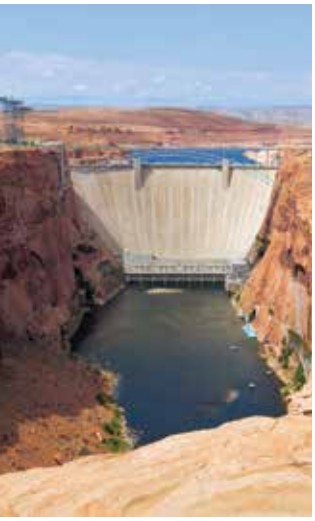
Table 3: New single-family rates and fees required to pay for additional demand

	Total Avg. Per Customer Charges in 2012	Additional Charges Required to Cover New Costs	New 2012 Annual SF Water/Sewer Bill	% Increase in Charges from Additional Demands
Water	$410	$553	$963	135%
Sewer	$245	$43	$288	17%
Total	$655	$596	$1,251	91%

A similar analysis was conducted to examine the impact of increased demands on tap fees for new customers in Westminster. In 2012 the average tap fee for a new customer (residential and non-residential combined) was $21,229, of which 77% was for water and 23% was for wastewater components. The combined cost of new infrastructure, new water resources, and repair and replacement associated with the increased demand modeled in this analysis would require an 80% increase in the average tap fee, up to $38,181 as shown in Table 4.

Table 4: New tap fees required to pay for additional demand

	Avg. Per Customer Tap Fee in 2012	Additional Tap Fee Charges Required to Cover New Costs	New 2012 Avg. Tap Fee	% Increase in Charges from Additional Demands
Water	$16,325	$16,086	$32,411	99%
Sewer	$4,904	$866	$5,770	18%
Total	$21,229	$16,952	$38,181	80%



With Conservation Rates Go Up, But Not Nearly as Much

There is a commonly held belief in the water industry that declining per capita usage due to water conservation has "forced an increase to rates to account for fewer units of volume billed" (Craley and Noyes 2013). But the rate increases necessitated by conservation are actually much smaller than the rate increases that would be necessary to account for population growth in the absence of conservation. The 21% reduction in average per capita water demand that Westminster has experienced over the past 30 years has resulted in significant benefit to its customers and reduced the rate of increase in water and wastewater rates. While water and wastewater rates and tap fees have increased over that 30 year time period, they have increased much less than they would have. Customers in Westminster have avoided increasing their water rates by 99% and their wastewater rates by 18% had this level of water conservation not been achieved. New customers in Westminster have also avoided an 80% increase in water and sewer tap fees. Yes rates have gone up, but because of the costs associated with new water supply and infrastructure, they have gone up much less than they would have.

An answer to the citizen's question about water conservation and rates had been found and the result was far more dramatic than the staff had anticipated. The next time a question was posed about the relationship between conservation and water rates, the Westminster staff was prepared with an answer: Water rates are going to increase with or without water conservation because the costs of operating and maintaining the water system continue to increase. However, water rates increase at a much slower rate if citizens conserve because the city does not need to purchase expensive new water supply and construct expensive new infrastructure. The net results of water conservation is a significant cost savings to the customer in water and wastewater rates and in tap fees.

Each water system is unique, so the results from Westminster may not be applicable to everyone. Utilities could perform a similar analysis to see the real value of conservation. However, the over $590 million dollar cost associated with the additional 7,295 AF of demand reveals the significant hardship associated with expanding water resources supply and wastewater treatment infrastructure in today's environment. The high cost also highlights the tremendous value that is inherent in a utility's water treatment, wastewater treatment and delivery infrastructure. Imagine the cost of obtaining water rights and constructing an entire water supply system today. The cheapest water (by far) is the water we already have and the best way to keep rates and tap fees low is to conserve the water we already have. The cost of water to providers may vary by region but the cost of infrastructure remains more consistent. The least expensive infrastructure to build, operate and maintain is the infrastructure that isn't needed in the first place. Conserve water or don't conserve water – your rates will go up – but if conservation is the lowest cost source of new supply (and it almost always is) then your rates will go up less than they would have without conservation.

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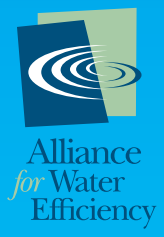

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