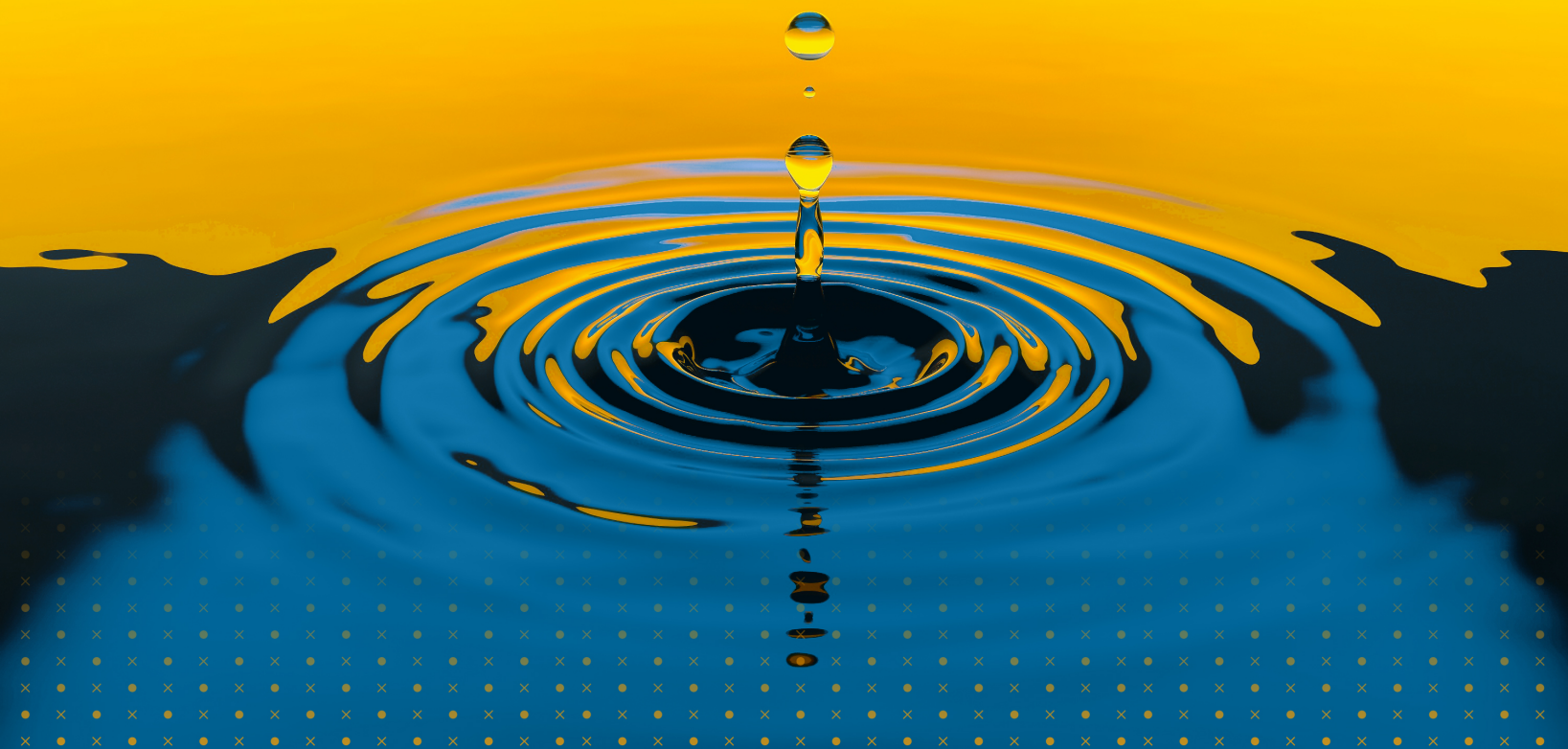
Understanding Conservation Pricing



Understanding Conservation Pricing

What is the right price for water? It depends on whom you ask. Every community has unique needs and must decide what it wants to achieve with water rates—revenue recovery, revenue stability, affordability, economic development, encouraging efficient use of water, to name a few. This factsheet discusses rate design to encourage efficient water use, in other words, conservation pricing.

What is conservation pricing?

Conservation pricing (or conservation rates) is water rate structures that motivate consumers to use water efficiently. These structures come in many forms, such as uniform rates, tiered rates, seasonal rates, and water budget-based rates. For all of these rate structures, wasteful or inefficient water use is more costly for customers than using only what they really need for drinking, cooking, sanitation, and cleaning.

Why implement conservation pricing? What are the benefits? What are the costs?

Every water system, just as every community, is unique. Some systems may benefit from decreasing average daily demands or peak hourly demands. Growing communities may need extra water to service new customers or are dealing with capacity expansion costs, while others may implement conservation pricing as part of a larger sustainability initiative.

In general, conservation is a long-term cost reducer for the utility.[1] In fact, conservation pricing has many potential economic and environmental benefits:

- Water and system demands are reduced through behavior change (reducing discretionary water uses such as outside watering) and the installation of water saving devices (low flow showerheads and toilets).
- Reduced water use can delay, or minimize, an expensive treatment system expansion for utilities approaching peak capacity.
- Operating costs (transporting and treating water, including electricity and energy use) and greenhouse gas emissions are reduced.
- Customers who conserve water may have lower water, wastewater, and energy bills, or may be able to maintain their utility costs in the face of rate increases.
- Maintaining more natural groundwater-table levels and minimizing streamflow capture can protect local aquatic ecosystems.
- Corresponding wastewater collection and treatment costs are reduced.

Potential costs of implementing conservation pricing:

- Revenue variability is increased.
- History of low rates can make implementation difficult.
- Where private wells are available, utilities run the risk of customers disconnecting from the system.

[1] Alliance for Water Efficiency. 2013. Conservation Limits Rate Increase for a Colorado Utility: Demand Reductions Over 30 Years Have Dramatically Reduced Capital Costs. Feinglas, Stuart et al. Available at http://www.allianceforwaterefficiency.org/westminster.aspx.

Correctly designing, implementing, and evaluating rates, including administrative and public education costs, requires time and expertise.

How can water rates and billing encourage efficient water use?

While there is no one-size-fits-all conservation rate, some general rate design guidelines can promote water efficiency. For residential customers, a 10 percent rate increase will likely lead to water use reductions from 1–3 percent. Research indicates that an education campaign can increase customer response to price by 30 percent.[2]

Full Cost Pricing
Full cost pricing is a necessary foundation for a conservation rate. Water rates need to have a cost basis and should not be arbitrary. Full cost rates recover utility costs through user fees, and include all current and future water supply development costs.

Customer Class Price Differentiation
The utility can create different rates for users imposing different costs on the system. This allows the utility to achieve different objectives for different user classes, for example, a conservation objective in the residential user class and an economic development objective for the commercial and/or industrial class.

Billing Frequency and Communication
More frequent billing sends stronger conservation signals to customers – residents billed less frequently are less likely to conserve water. Effectively communicating water price and including information on estimating bills makes customers more aware.

Volumetric Charge
The variable portion of the water rate charge (volumetric charge, $/1000 gallons) can be designed to encourage conservation (Table 1). A volumetric water rate can be combined with a volumetric wastewater charge to increase the strength of the price signal, since customers respond to the combined water and sewer rate.

Base Charge /Minimum Charge/Fixed Component of Bill
The fixed amount consumers are required to pay each billing period does not provide a conservation message, since changes in water use will not impact this portion of the water bill. The fixed charge is important, however, in providing revenue stability. The conservation signal of the fixed charge can be improved by:

- Minimizing the percent of base charges (no more than 30 percent). Smaller utilities may need higher base charges because they are spreading fixed costs over a smaller customer base. Minimizing the base charge is important because although it contributes to revenue stability, it can undermine the conservation message and create affordability concerns for economically disadvantaged customers.
- Varying the fixed portion of the charge to reflect fixed cost differences such as different multi-family housing, commercial or industrial meter sizes.
- Minimize or omit allowed water consumption included in the minimum charge.

Rate Adjustment Frequency
Review and adjust rates annually and/or create an ordinance policy for automatic rate increases linked to inflation.

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2 American Water Works Association (AWWA). (2000). Principles of Water Rates, Fees, and Charges. American Water Works Association Manual of Water Supply Rates, M1. (Fifth Edition) and Gaudin (2006) Effect of price information on residential water demand. Applied Economics 38: 383-393, respectively.

Carefully consider the number of customers that don't receive a water bill because they are not directly metered. These customers don't have a good sense of how much water they are using and how much it costs. Where practical, water users should have individual meters.

Conservation Pricing in Illinois

Analyzing the conservation messages of different rate structures provided by Chicago area utilities reveals that[3]:

- Lack of full-cost water expense knowledge makes assessing the full-cost rate recovery difficult.[4]
- 37 percent of northeastern Illinois water systems have one customer billing class.
- 37 percent of systems bill monthly, with the remainder billing bi-monthly, or quarterly.
- The vast majority of systems use a uniform rate structure (88 percent). Less than 1 percent use decreasing block rates for residential accounts, and 10 percent use increasing block.
- The median uniform rate in the region is $6.72 per 1,000 gallons, compared to $5.66 per 1,000 gallons for the first block charge for both the increasing and decreasing block.
- 58 percent of water suppliers include a minimum use allowance with the base charge. The median monthly consumption allowance is 2000 gallons per billing period.
- On average 30 percent of the bill is recovered from the fixed charge.
- Few systems are using seasonal rates.

Conservation Pricing Case Studies

Algonquin, Illinois

By 2003, the summer demand for water in the Village of Algonquin was more than the system could handle. In response, the village developed a comprehensive water conservation plan in conjunction with a seasonal water rate, tripling the normal rate for June, July, and August for consumption above 18,000 gallons. From 2000-2009, demand remained fairly constant at 2.5 to 3.0 million gallons per day (mgd) in summer even though the population grew by over 7,000 people. The average peak demand in summer has gone down about 2 mgd[5].

St. Charles, Illinois

For many years, St. Charles has used an excess seasonal water rate to encourage conservation of outdoor water during peak summer water demand months. The rate applies to water use greater than 130 percent of monthly winter average water use, and which is greater than 6,500 gallons per month usage. All other water is billed at the base rate. The excess seasonal water rate is $5.69 (FY17) compared to $3.37 per 1000 gallons (FY17) for the base rate.

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[3] Schneemann *Water Rates and Rate Structures in Northeastern Illinois* Presentation to the UCOWR/NIWR 2009 Conference Urban Water Management Issues and Opportunities.

[4] The majority of the population served by water systems in northeastern Illinois receive water from public water systems—97 percent—with only 3 percent served by privately owned utilities. An important building block of regulation is the National Association of Regulatory Utility Commissioners (NARUC) uniform account system, which provides for essential cost knowledge. Since the overwhelming majority of water suppliers in northeastern Illinois are not subject to regulation at the state level, the issue of cost knowledge is especially acute in our region.

[5] CMAP Spotlight on Green Communities

FAQs

What are the revenue impacts of conservation pricing?

Many communities are concerned about the impact of conservation pricing on revenue. Conservation pricing rate structures typically generate increased revenue on excess water use. But, because the price is higher, customers may curtail usage, placing downward pressure on revenue.[6] Which effect is greater, the increase in revenue or the decrease in usage, depends on the *price elasticity of demand*—a measure of the responsiveness of the quantity demanded to price changes.

Empirical studies have shown that consumers are not very responsive to changes in water price—that is, the price elasticity of water demand is *inelastic*. This means that the revenue after the price increase will be greater than the revenue before the price increase, since any decrease in revenue occurring from reductions in quantity purchased as a result of the price increase will be outweighed by the increased revenues raised as a result of the higher price. *Conservation pricing increases system revenue*.

On the other hand, conservation pricing is typically part of a larger conservation program that includes non-price measures (such as installation of water-efficient plumbing devices, education programs). Non-price measures decrease demand, and result in less water sold, decreasing revenue. *Non-price conservation decreases revenues.*

Establishing revenue-neutrality in a conservation program requires balancing these two effects. Better demand and cost forecasting can improve revenue projections, but not change them from being a moving target due to uncertainty in factors affecting costs and demand. Taking additional steps, such as creating a rate stabilization reserve, can address the mismatch of costs of service and revenue.

How are customer classes treated in a conservation pricing rate structure?

Treatment of customer classes in the rate structure will vary according to each utility's system characteristics. Conservation pricing typically targets the residential customer class, as they are usually the system's largest water consumers. However, conservation pricing among classes other than single family residential such as commercial, industrial, institutional, governmental and multi-family is also possible.

- *Multi-Family Conservation Pricing.* Metering each unit in a multi-family building rather than a common meter can be effective for reaching individual tenants. One large meter takes some responsibility for addressing water leaks out of residents' hands. Where individual metering is not possible, budget rates for the building can be used.

- *Commercial or Industrial Conservation Pricing.* Water budgets for these customers are based on actual service needs, historical water use, and site audits, varying the fixed portion of the charge by meter size. High peaking industrial customers are sometimes charged a higher rate

- *Institutional or Governmental Conservation Pricing.* Given the increasing costs associated with providing water service today and the need to reinvest in aging infrastructure, removing any free or deeply discounted water provided to community institutional and governmental agencies is advised.

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[6] Alliance for Water Efficiency. Building Better Rates in an Uncertain World: A Handbook for Balancing Revenue Management, Resource Efficiency and Fiscal Sustainability.

❝ *How does conservation pricing impact low income or bottom-tier consumers?*

It is possible to design a rate structure that addresses the concern that conservation pricing will adversely impact low income customers.[7] Most notably, conservation prices should not be applied to the water use tier that encompasses essential use. Some utilities offer a lifeline rate covering the amount of water required for essential use, and/or subsidies and assistance programs. Other systems use excess revenue from conservation pricing to establish an assistance program, ask for voluntary donations to an assistance program, or spread assistance program costs across other customers.

❝ *Have the conservation benefits of a conservation pricing structure been documented?*

Research supports economic theory in finding that an increased water price can promote water conservation. The impact of conservation pricing, however, will be different for each utility depending on the system characteristics. The benefits and costs of conservation pricing will likewise be different for every community system. Demand and cost forecasting, as well as creating a conservation plan, can help the utility decide whether conservation pricing is the correct course of action.

❝ *What is the public response to conservation pricing?*

Communicating with the public before the new rate takes effect through public involvement programs is important, as customers often will respond negatively to rate increases. Conveying the impact of artificially low rates to system maintenance (images of pipe conditions, etc.) can help utilities sell rate increases to councils, boards, and the public. Explaining why rates were not increased to maintain the system after the system fails will be harder than increasing rates now. Taking an incremental approach to implementation, including phasing in the necessary rate increase over time, can help build public support. Coupling a rate increase with conservation program elements that give customers the option to manage their bills can also help to increase acceptance.

❝ *Are there other resources on this topic?*

AWWA (2017). Principles of Water Rates, Fees, and Charges: Manual of Water Supply Practices, M1. 7th edition.
AWWA (2000) Water Conservation Programs: A Planning Manual, M52.
AWWA (2005) Water Conservation-Oriented Rates: Strategies to Extend Supply, Promote Equity, and Meet Minimum Flow Levels.
Alliance for Water Efficiency. Building Better Rates in an Uncertain World: A Handbook for Balancing Revenue Management, Resource Efficiency and Fiscal Sustainability.
Alliance for Water Efficiency. AWE Sales Forecasting and Rate Model.
Alliance for Water Efficiency. AWE Water Conservation Tracking Tool.
Alliance for Water Efficiency. Water rates message plan and free video for utility use.
Chicago Metropolitan Agency for Planning. (2012). Full Cost Water Pricing Guidebook for Community Water Systems.
Raftelis, George A. (2005). Water and Wastewater Finance and Pricing: A Comprehensive Guide.
University of North Carolina Environmental Finance Center. Northeastern Illinois Water and Wastewater Rates Dashboard.

[7] Water and Wastewater Residential Rates Affordability Assessment Tool

Table 1: Summary of Conservation Rate Structures

Type of Rate	Description
Uniform Rate	A constant charge per volume (such as $/1,000 gallons) for metered water consumption. Under uniform volume rates, the same unit price applies to all water use, so that the water bill increases proportionately with the quantity of water consumed. Even though the unit rate is constant, the bill will increase as more water is used.
Increasing Block	Price per unit increases as consumption increases; targets high volume users to reduce use, typically in the residential customer class. When an increasing block rate is used for residential use: The entire consumption amount can be charged at the block rate of the last unit of water consumed, rather than charging for use at the rate within each block. Design blocks to fall within the range of actual residential use with rate differences significantly large to communicate a change in water use. Give special consideration to large families and classification of multi-family residents to avoid adverse effects. Implement ordinance permitting temporary rate increases during water shortages (drought), taking care to specify the exact triggers of this response.
Seasonal	Charges a higher price to residential consumption in the summer months (peak periods). Can be used to reduce peak consumption and possibly defer expensive capital expansion or capacity projects. Seasonal rates can mean: 1. Charging higher rates for use during periods of peak demand. 2. Designing increasing block rates charging higher rates on use above normal indoor for residential customers. 3. Excess use or water budget type rates.
Time-of-Use	Use during specified times is charged at a higher rate. Requires time-of-use meters.
Excess Use rate	Price is significantly higher for use above a specified threshold. Used to target high consumption during peak periods (such as summer). Sends strong price signal during periods of low water availability.
Water Budget	Increasing block rate structure with the blocks specific to each customer, based on their historical average indoor or winter water use, so more is charged for irrigation use.
Scarcity Pricing	Price per unit increases as available water supply decreases (such as during drought).
Spatial/Zonal rates	Price is based on spatial variations in cost. Used where the distribution system is expanding rapidly in difficult to serve areas to account for costs associated with new or difficult to serve connections.
Humpback rate	Rates first increase, and then decrease. Can be used to meet the dual objectives of decreasing residential irrigation use, and also providing economic development rates for commercial and industrial customers.

About the Illinois Section American Water Works Association (ISAWWA)

The ISAWWA vision is: safe and sustainable water for Illinois. To accomplish this, the ILAWWA provides resources for the management and advocacy of safe and sustainable water.
To learn more, visit: www.isawwa.org/

About the ISAWWA Water Efficiency Committee

The ISAWWA Water Efficiency Committee provides resources and educational materials for implementing and maintaining a water efficiency program at the municipal and utility level in addition to offering information about local water use to the general public, schools, and officials. Interested in the Illinois Section AWWA Water Efficiency Committee and what we are doing? Visit:
http://www.isawwa.org/WaterEfficiency

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