Price & Non-Price Approaches to Promoting Conservation

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Water System Objectives

- Full cost recovery/revenue stability
- Encouraging conservation
- Fostering business-friendly practices
- Maintaining affordability
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- Full cost recovery/revenue stability
- Encouraging conservation
- Fostering business-friendly practices
- Maintaining affordability
Why Encourage Conservation?

- Lack of source water
- Growing population
- Nearing storage or treatment capacity
- Drought
- Environmental benefits
Two Approaches to Conservation

Pricing signals through your rates

Non-price strategies
Two Approaches to Conservation

Pricing signals through your rates

Non-price strategies
System Level—Real Water Loss

- Volume From Own Sources
  - System Inputs
  - Supplied To Your System
  - Water Exported

- Authorized Consumption
  - Billed Authorized Consumption
  - Unbilled Authorized Consumption

- Water Losses
  - Apparent Losses
  - Real Losses

- Water Exported
  - Billed Metered
  - Billed Unmetered
  - Unbilled Metered
  - Unbilled Unmetered
  - Unauthorized Consumption
  - Customer Metering Error
  - Systematic Data Handling Errors

- Non-Revenue Water
  - Mains Leaks
  - Service Leaks
  - Tank Overflows
Customer Focused Conservation

- Increase customer information
- Help customers reduce usage
- Alternative sources for outdoor irrigation
- Usage restrictions
Increase Customer Information

• Use monthly billing

• Provide price and historic usage information on customer bills

• Compare customer usage to local averages

Please Conserve Water
Increase Customer Information

- Sub-meter multi-family units
- Public conservation notices
Understanding Your Water Bill

The first step in changing the way you use water in the future is by understanding how much water you use today. The best place to find this information is on your monthly water bill. Pull out your water bill and follow the steps below to learn more about it and your own water use.

- **How much do you use?**
- **What is your usage trend?**
- **How does your use compare to that of your neighbor?**
- **How are you being charged?**
Help Customers Reduce Usage

- Reduce indoor water use—toilets, faucets, showerheads, dishwashers, washing machines, commercial kitchens

- Help customers fix leaks

- Reduce outdoor water use—low water landscaping, reduce evaporation
https://www.epa.gov/watersense/rebate-finder

Rebate Finder

Water Efficiency Can Pay Off!

Many WaterSense partners offer rebates for WaterSense labeled products—such as water-efficient toilets, showerheads, and faucets—as well as water conservation services. Search below to see what money-saving rebates are available in your area.

Note about the WaterSense Rebate Finder

<table>
<thead>
<tr>
<th>Rebate Type</th>
<th>Partner Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Rebates</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>State/Province</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>All States</td>
<td></td>
</tr>
</tbody>
</table>
Alternative Sources for Outdoor Irrigation

• Use raw water, discharge water from water treatment, or treated wastewater for irrigation in lieu of using potable water

• Rain barrels
Restrict Outdoor Usage

• At all times by limiting times or days of week that people can irrigate

• Limit customer usage during times of low water supply or drought
Enforce Your Mandates!

Having mandates in place is only effective if they are enforced.
The Problem with Conservation

• We are in the business of selling water

• If we want customers to use less water, what impact does that have on our revenues?

• Let’s take a quick overview of costs and revenues
Three Types of Costs

• **Operating Costs**—what you need to run the system day in and day out

• **Capital Costs**—rehabilitation and replacement of existing infrastructure and new infrastructure

• **Debt Service**—what you owe on loans and bonds
Some costs for a water system are **fixed** regardless of the volume of water treated.

Others **vary** based on the amount of water treated.

Others are somewhere **in between**.
Costs Can be Fixed or Variable

Fixed Costs

Variable Costs

Dollars

Gallons of Water Produced
Two Types of Revenues

- **System Income**—Money from rates, tap fees, system development charges, grants, penalties, other sources

- **Debt**—Money from bonds and loans
The Revenue Picture

- **Fixed Revenue (Base Rate)**
- **Variable Revenue (Commodity Charges)**

Dollars vs. Gallons of Water Produced
Costs vs. Revenues

We collect less fixed revenue than the fixed costs.
Costs vs. Revenues

But we can cover the shortfall with variable revenue assuming...
Costs vs. Revenues

What happens when customers conserve?
Two Approaches to Conservation

- Pricing signals through your rates
- Non-price strategies
Pricing Strategies

• There is no single rate structure that can be called a conservation rate structure

• Many different rate designs can be used to encourage conservation. The devil is in the details
Pricing Strategies

• The rate level matters more than the rate structure

• Consider higher rates at average usage levels in addition to high levels, though be aware of affordability issues
Higher Uniform Volumetric Charge

- Customer’s bill is largely driven by usage, which gives them an incentive to conserve
Higher Uniform Volumetric Charge

**Base Fees:**
- Residential: 25.00
- Commercial: 40.00
- Distribution: 30.00

**Usage fee:** 14.75 per thousand gallons

Holiday Hills DWID, AZ
Low or No Base Charge, Higher Volumetric Charge

**WATER & SEWER RATES**

<table>
<thead>
<tr>
<th>Location</th>
<th>Water</th>
<th>Sewer</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Town</td>
<td>$ 7.72 per 1000 gallons</td>
<td>$ 10.73 per 1000 gallons</td>
</tr>
<tr>
<td>Out of Town</td>
<td>$ 15.44 per 1000 gallons</td>
<td>$ 21.46 per 1000 gallons</td>
</tr>
</tbody>
</table>

Troutman, NC
Increasing Block Rates

• At higher usage levels, the price increases, which encourages customers to cut back on usage
Increasing Block Rates

<table>
<thead>
<tr>
<th>Tier</th>
<th>Water Usage</th>
<th>Rate per 1,000 gallons ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>First 5,000 gallons or less</td>
<td>$13.00</td>
</tr>
<tr>
<td>2</td>
<td>Next 5,001 – 15,000</td>
<td>$17.75</td>
</tr>
<tr>
<td>3</td>
<td>Next 15,001 – 25,000 (Over 15,000 cattle lessees)</td>
<td>$18.75</td>
</tr>
<tr>
<td>4</td>
<td>25,001 or more for all except cattle lessees</td>
<td>$19.75</td>
</tr>
</tbody>
</table>
### Increasing Block Rates

**Water Consumption Charges**

Effective July 1, 2011

<table>
<thead>
<tr>
<th>Consumption/Month (in gallons)</th>
<th>Residential</th>
<th>Commercial**</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 2000</td>
<td>Base Rate ($20.00)</td>
<td>Base Rate ($20.00)</td>
</tr>
<tr>
<td>Up to 5,000</td>
<td>$4.50 per 1,000 gallons</td>
<td>$4.50 per 1,000 gallons</td>
</tr>
<tr>
<td>Up to 10,000</td>
<td>$5.50 per 1,000 gallons</td>
<td>$5.50 per 1,000 gallons</td>
</tr>
<tr>
<td>Up to 15,000</td>
<td>$6.50 per 1,000 gallons</td>
<td>$6.50 per 1,000 gallons</td>
</tr>
<tr>
<td>Up to 20,000</td>
<td>$7.50 per 1,000 gallons</td>
<td>$7.50 per 1,000 gallons</td>
</tr>
<tr>
<td>All over 20,000</td>
<td>$8.50 per 1,000 gallons</td>
<td>$8.50 per 1,000 gallons</td>
</tr>
</tbody>
</table>

* Consumption over 2,000 gallons is billed retroactive to the first gallon used. Customer accounts are charged at the above rates per unit served. Hotels and motels: Four rooms equal one commercial master meter billing unit.
Seasonal Rates

• Prices are higher during high-use times of year, encouraging conservation

• For most systems, this is the summer unless you are a winter holiday area or get a lot of snowbirds
Seasonal Rates

**RATES AND CHARGES**

**OCTOBER THROUGH APRIL**

$3.00 PER 1,000 GALLONS

**MAY THROUGH SEPTEMBER**

$4.60 PER 1,000 GALLONS

Cactus Stellar Limited, AZ
Higher Irrigation Rates

- Meter and charge separately for outdoor water use and price that water higher than for regular water use
Higher Irrigation Rates

<table>
<thead>
<tr>
<th></th>
<th>Gallons</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Residential</strong></td>
<td>0 through 4,000 gallons</td>
<td>$5.27 Per Thousand</td>
</tr>
<tr>
<td></td>
<td>4,001 through 9,000 gallons</td>
<td>$8.10 Per Thousand</td>
</tr>
<tr>
<td></td>
<td>9,001 gallons and up</td>
<td>$10.90 Per Thousand</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Gallons</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Commercial, Apartments and Mobile Home Parks</strong></td>
<td>0 through 10,000</td>
<td>$6.69 Per Thousand</td>
</tr>
<tr>
<td></td>
<td>10,000 and up</td>
<td>$8.03 Per Thousand</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Gallons</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Irrigation</strong></td>
<td>Per thousand gallons</td>
<td>$10.72</td>
</tr>
</tbody>
</table>

Stockbridge, GA
Higher Irrigation Rates

IRRIGATION BASE WATER RATES (Residential and Commercial)

Inside Southport City Limits: $7.45
Outside City Limits: $11.18

Usage Rates 0-10,000 gallons
Inside Southport City Limits: $5.50 per 1,000 gal.
Outside City Limits: $8.25 per 1,000 gal.

Usage Rates > 10,000 gallons
Inside Southport City Limits: $7.00 per 1,000 gal.
Outside City Limits: $10.50 per 1,000 gal.

Southbridge, NC
Higher Irrigation Rates

Rate Structure for Residential Customers:

<table>
<thead>
<tr>
<th>Gallons</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2,000</td>
<td>$22.00 minimum</td>
</tr>
<tr>
<td>2,100-7,000</td>
<td>$5.50/thousand</td>
</tr>
</tbody>
</table>

Irrigation Rate (for those with an irrigation meter only):

<table>
<thead>
<tr>
<th>Gallons</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2,000</td>
<td>$22.00 minimum</td>
</tr>
<tr>
<td>2,100-10,000</td>
<td>$15.00 per thousand</td>
</tr>
<tr>
<td>10,100-</td>
<td>$20.00 per thousand</td>
</tr>
</tbody>
</table>

Marbury Water System, AZ
Low Supply and Drought Surcharges

- Prices increase only when supplies of water are limited, encouraging conservation at crucial times
## Low Supply Surcharges

<table>
<thead>
<tr>
<th>(Zero Gallons Included in Base Rate)</th>
<th>Stages 1 &amp; 2</th>
<th>Stage 3&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Stage 4&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Tier: 0 – 4,000 Gallons</td>
<td>$6.80</td>
<td>6.80</td>
<td>6.80</td>
</tr>
<tr>
<td>2nd Tier: 4,001 – 13,000 Gallons</td>
<td>$10.20</td>
<td>10.20</td>
<td>10.20</td>
</tr>
<tr>
<td>3rd Tier: 13,001 – 20,000 Gallons</td>
<td>$12.30</td>
<td>15.00</td>
<td>20.00</td>
</tr>
<tr>
<td>4th Tier: 20,001 – 30,000 Gallons</td>
<td>$12.42</td>
<td>20.00</td>
<td>40.00</td>
</tr>
<tr>
<td>5th Tier: over 30,000 Gallons</td>
<td>$12.55</td>
<td>30.00</td>
<td>70.00</td>
</tr>
</tbody>
</table>

<sup>a</sup> Stage 3 and 4 water resource conditions are reached when any combination of build-out, water use, and adjustments to useable CAP allocation causes 80% or 90%, respectively, of the total useable CAP allocation to be used (see Policies & Procedures).
Competing Objectives

- Full cost recovery/revenue stability
- Encouraging conservation
- Fostering business-friendly practices
- Maintaining affordability
Designing Rate Structures That Support Your Objectives

Free guide written for system managers

Available at: http://efc.sog.unc.edu/
Water and Wastewater Rates Analysis Model

http://efc.sog.unc.edu or http://efcnetwork.org

Find the most up-to-date version in Resources / Tools

Water & Wastewater Rates Analysis Model
Version 2.8.2 (last updated August 4, 2015)

DESCRIPTION
A do-it-yourself, simplified financial model to assist utility managers and private system owners in setting water and wastewater rates.

FEATURES
- Comparisons of annual fund balance projections (for up to 20 years) under proposed new rates vs. staying with existing rates
- Adjust rates for the next 1-5 years
- Up to 12 rate structures
- Model changes to accounts and water use
- Customizable list of operating and capital expenses
- Uniform or block rates (up to 10 blocks)
- Building up reserves through rates
- Compare monthly bills under new rates vs. existing rates
- Assess revenue sufficiency and fund balance
- Error notifications

INSTRUCTIONS
1) Navigate using worksheet tabs at bottom of screen or following arrows and clicking on buttons
2) In the green "Data Input" worksheets, input data in the dark green cells

Created by the Environmental Finance Center at the University of North Carolina, Chapel Hill
Funded by the U.S. E.P.A. and the N.C. Department of Environment and Natural Resources
Water Utility Revenue Risk Assessment Tool

- Excel tool (simplified)
- Focus on residential revenues
- Utility inputs own:
  - Rate structure details
  - Residential customer water use profile
  - Weather patterns
  - Assumptions on price elasticity
- Tool estimates the proportion of revenues that may be lost due to changes in water use patterns due to:
  - Rate increase, alone or plus:
  - Normal weather pattern changes, or
  - One-time, significant and sudden conservation effort

Free to download and use at
www.waterrf.org
www.efc.sog.unc.edu
How do the total revenues compare under both rate structures if there is a reduction of 10% - 20% in average water use and subsequent demand distribution shifts?

### Portions of Annual Revenues under REFERENCE and COMPARATIVE Rate Structures that are at Risk of Loss Due to Significant Reductions in Average Water Use

- Additional portion of residential revenues at risk of decline because of 11% to 20% reduction in average water use
- Portion of residential revenues at risk of decline because of 10% reduction in average water use

<table>
<thead>
<tr>
<th>Decline in Total Annual Revenues for a:</th>
<th>REFERENCE Rates</th>
<th>COMPARATIVE Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>10% reduction in avg use</td>
<td>$1,311,000</td>
<td>$1,319,000</td>
</tr>
<tr>
<td>20% reduction in avg use</td>
<td>$2,181,000</td>
<td>$2,167,000</td>
</tr>
<tr>
<td>10% reduction in avg use</td>
<td>8.5%</td>
<td>8.0%</td>
</tr>
<tr>
<td>20% reduction in avg use</td>
<td>14.2%</td>
<td>13.2%</td>
</tr>
</tbody>
</table>

The comparative rate structure generates revenues that are MORE resilient to sudden and significant declines in residential water use than the revenues generated by the reference rate structure. Revenues under the comparative rate structure are projected to drop 8% - 13.2% for a 10% - 20% reduction in average water use, and their related shifts in demand distribution. These declines occur after including the effect of price elasticity when adjusting rates from the reference rate structure to the comparative rate structure. By comparison, revenues under the reference rate structure are projected to drop 8.5% - 14.2% for the same declines in residential water use.
AWE Sales Forecasting and Rate Model

Available for Alliance for Water Efficiency members
http://www.financingsustainablewater.org/

The AWE Sales Forecasting and Rate Model is a new analytical tool that can explicitly model the effects of rate structures. Typical water rate models assume that future sales are known with certainty, and do not respond to price, weather, the economy, or supply shortages — that is to say, not the world we live in. The AWE Sales Forecasting and Rate Model addresses this deficiency and enables analysis of the following:

- Customer Consumption Variability - weather, drought/shortage, or external shock
- Demand Response - Predicting future block sales (volume and revenue) with empirical price elasticities
- Drought Pricing - Contingency planning for revenue neutrality
- Probability Management - Risk theoretic simulation of revenue risks
- Fiscal Sustainability - Sales forecasting over a 5 Year Time Horizon

The Rate Design Module can answer these questions:

- What effect would increasing the top tier rate by 15% have on water demand?
- Will shifting to seasonal rates cause water use to increase or decrease?
- What block rate design could allow us to preserve our current level of revenue while reducing demand?
- How should we adjust rates to support our water demand management objectives during water shortages?
- What proportion of customer bills will
Key Financial Benchmarks for Water Systems: Conservation Signal

November 23, 2015 / Glenn Barnes / 2 Comments

At our workshops and through our discussions with water systems during technical assistance work, many water systems, in particular small systems, ask what seems like a simple question: “Are our rates right?”

I suspect our initial answer is somewhat unsatisfying: “It depends.”

Even when rates are sufficient to generate the revenues needed for the utility, whether or not rates are “right” depends on what a particular water system
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