



Price & Non-Price Approaches to Promoting Conservation

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Environmental Finance Center

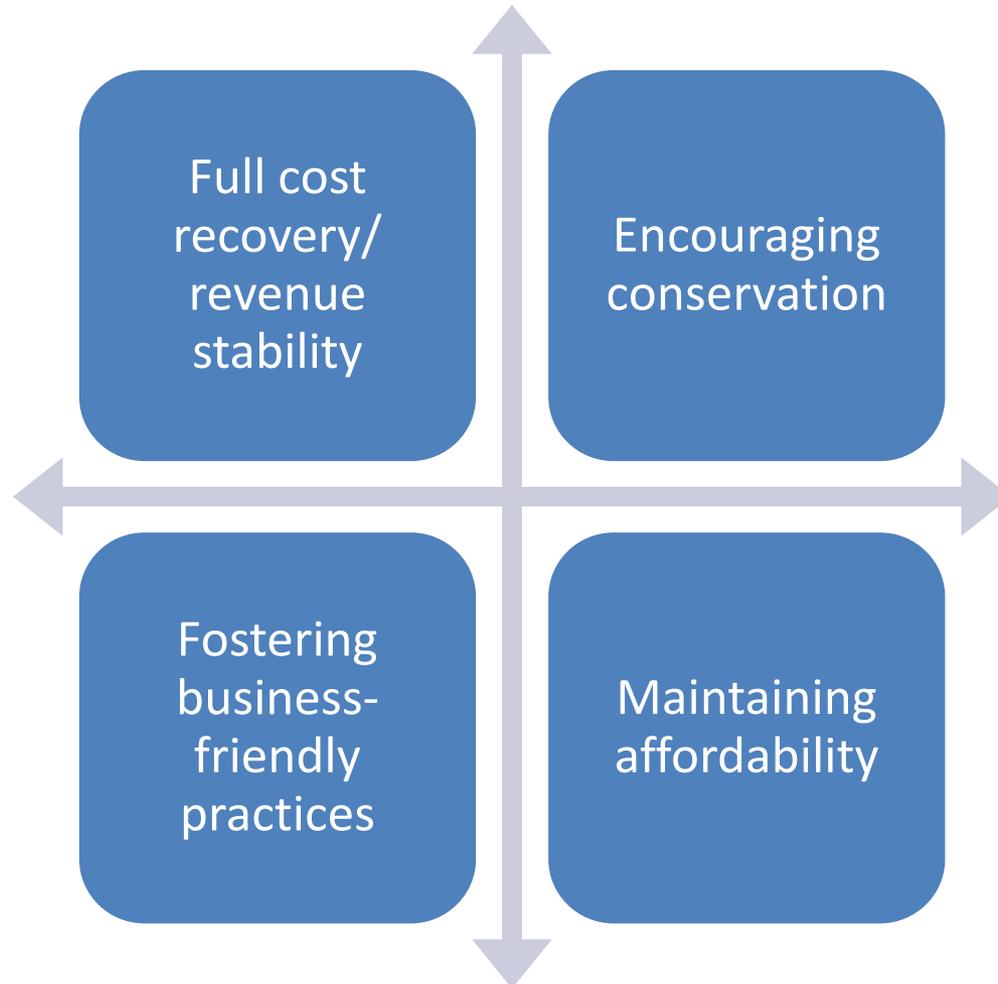
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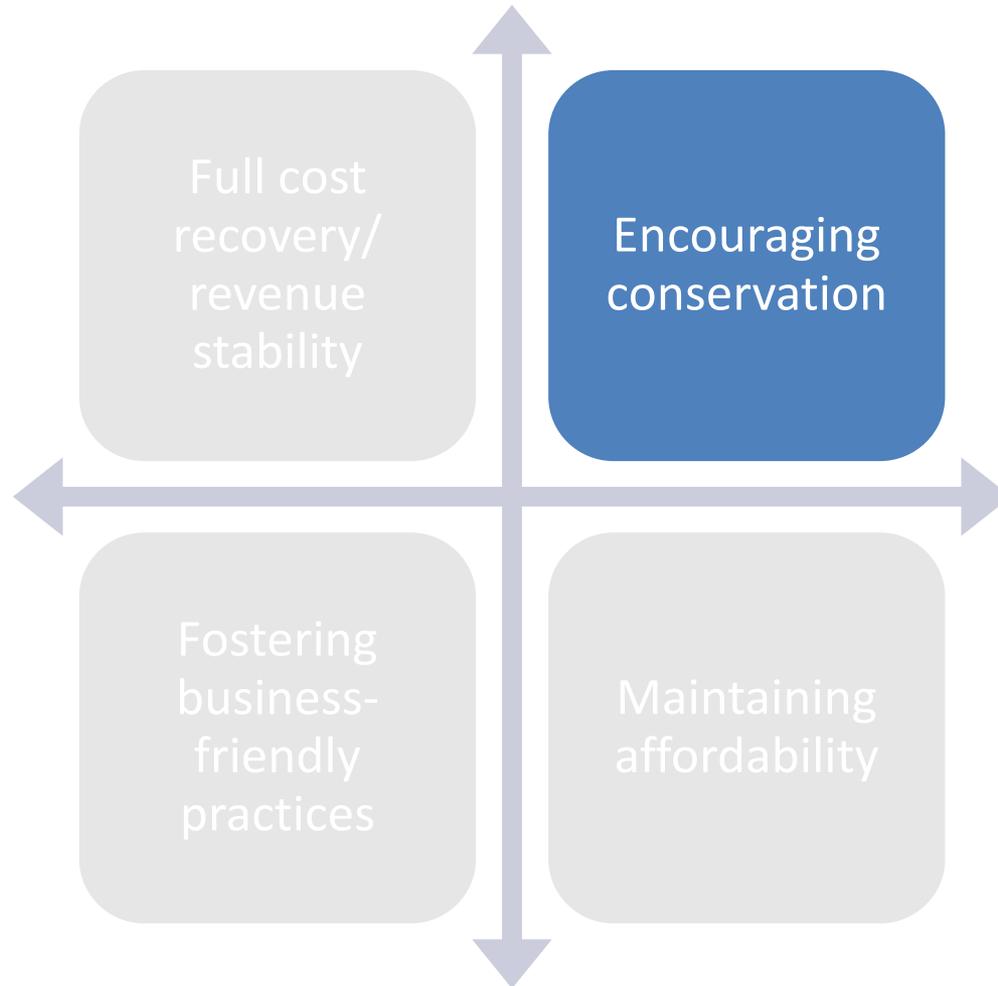


Water System Objectives





Water System Objectives

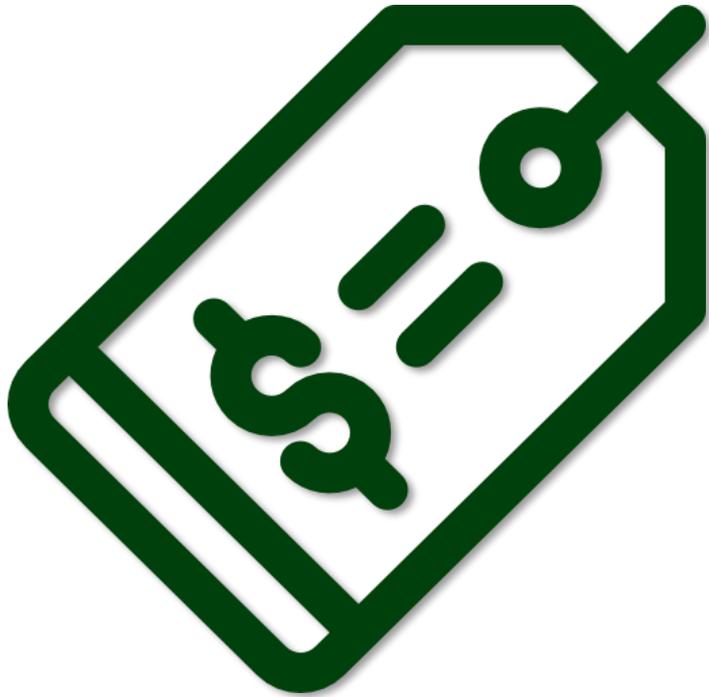




Why Encourage Conservation?

- 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

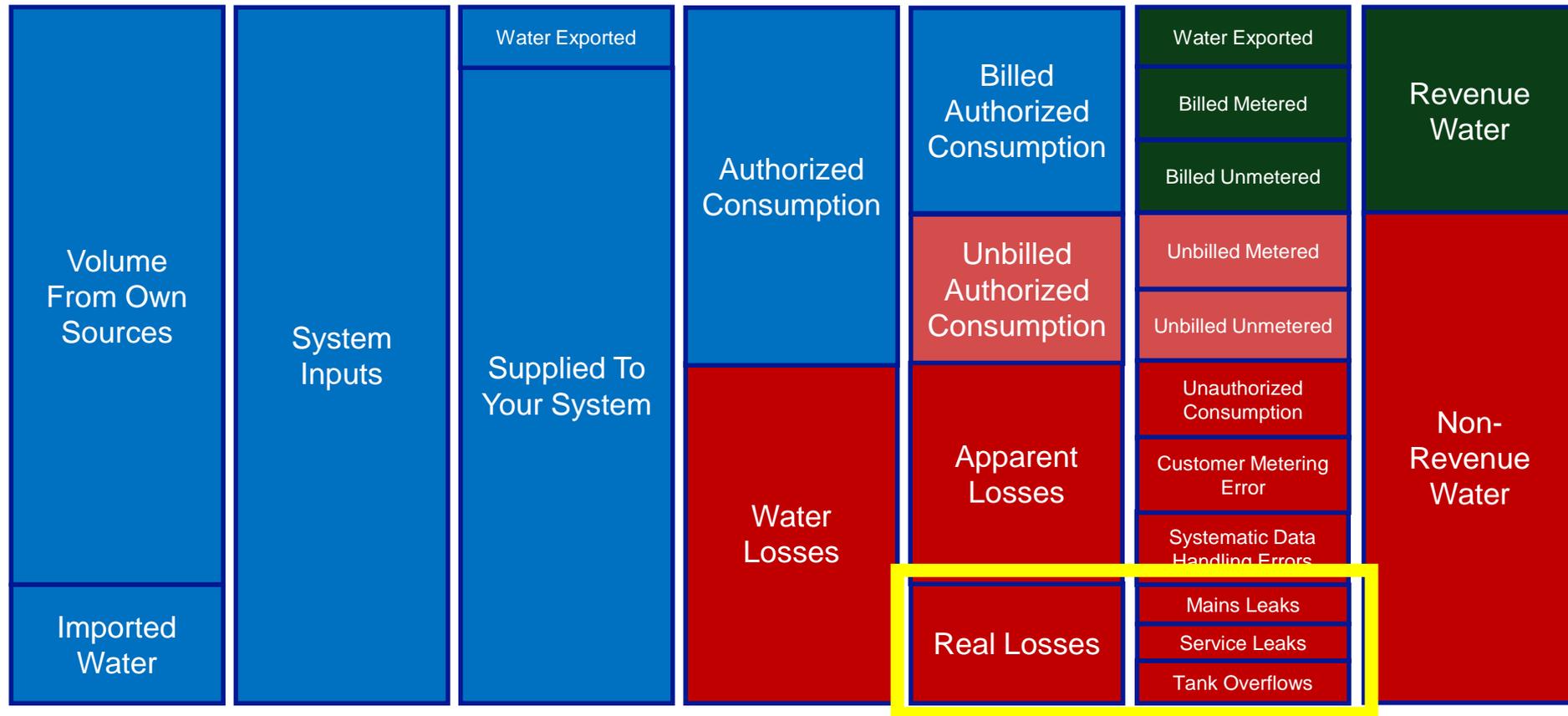


Pricing signals
through your rates



Non-price strategies

System Level—Real Water Loss





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



Increase Customer Information

- Sub-meter multi-family units
- Public conservation notices





WaterSense

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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>

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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



Rebate Type

All Rebates ▼

Partner Name

State/Province

All States ▼

Alternative Sources for Outdoor Irrigation



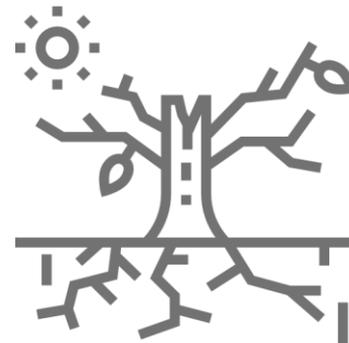
- Use raw water, discharge water from water treatment, or treated wastewater for irrigation in lieu of using potable water
- Rain barrels





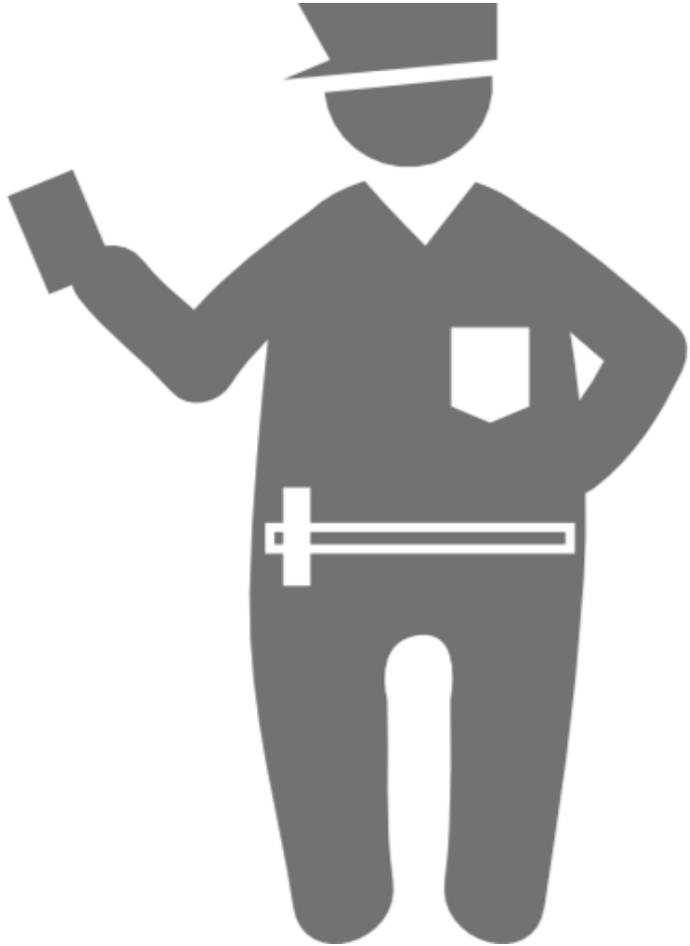
Restrict Outdoor Usage

- 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



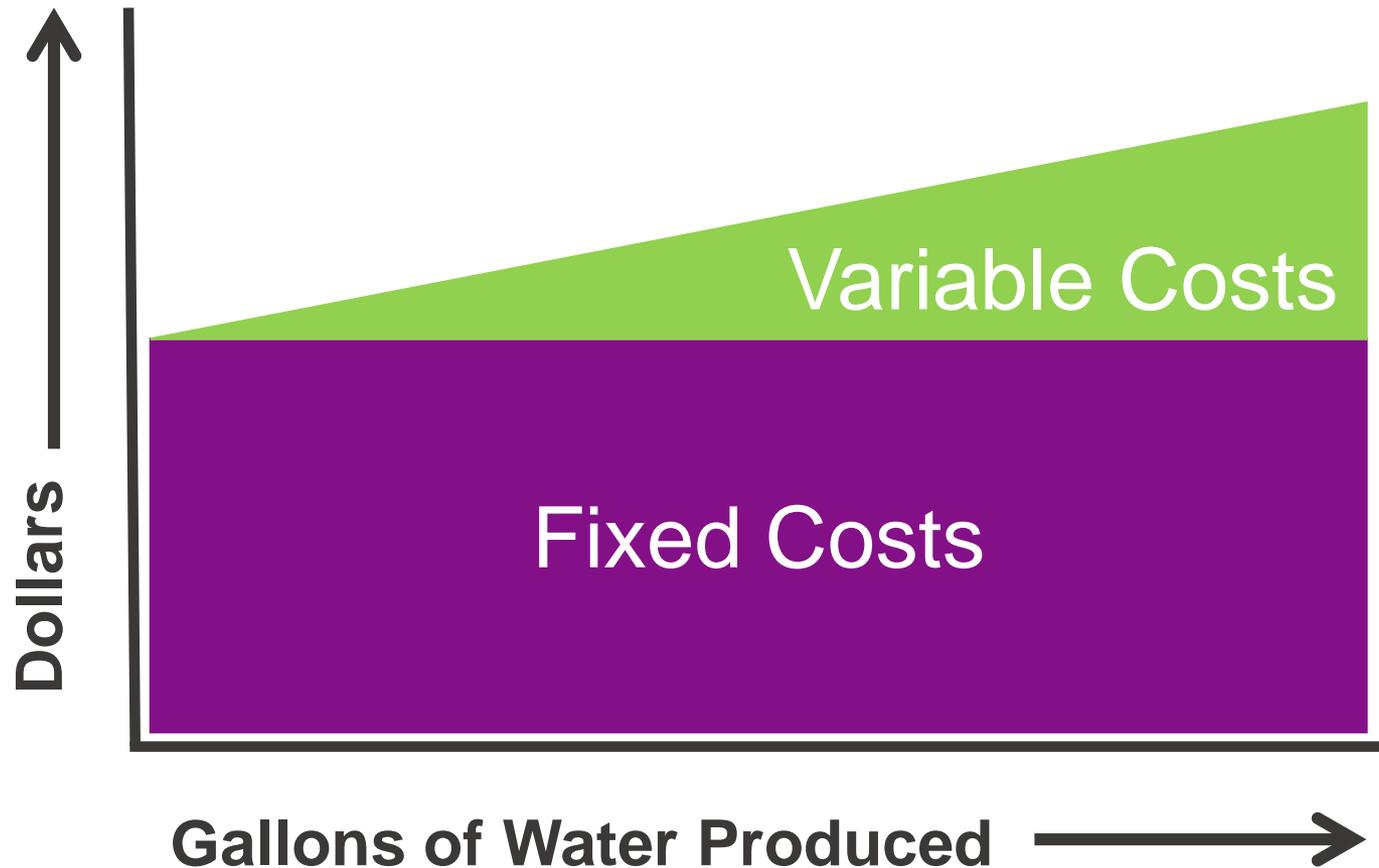
Fixed
Cost



Variable
Cost

- 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

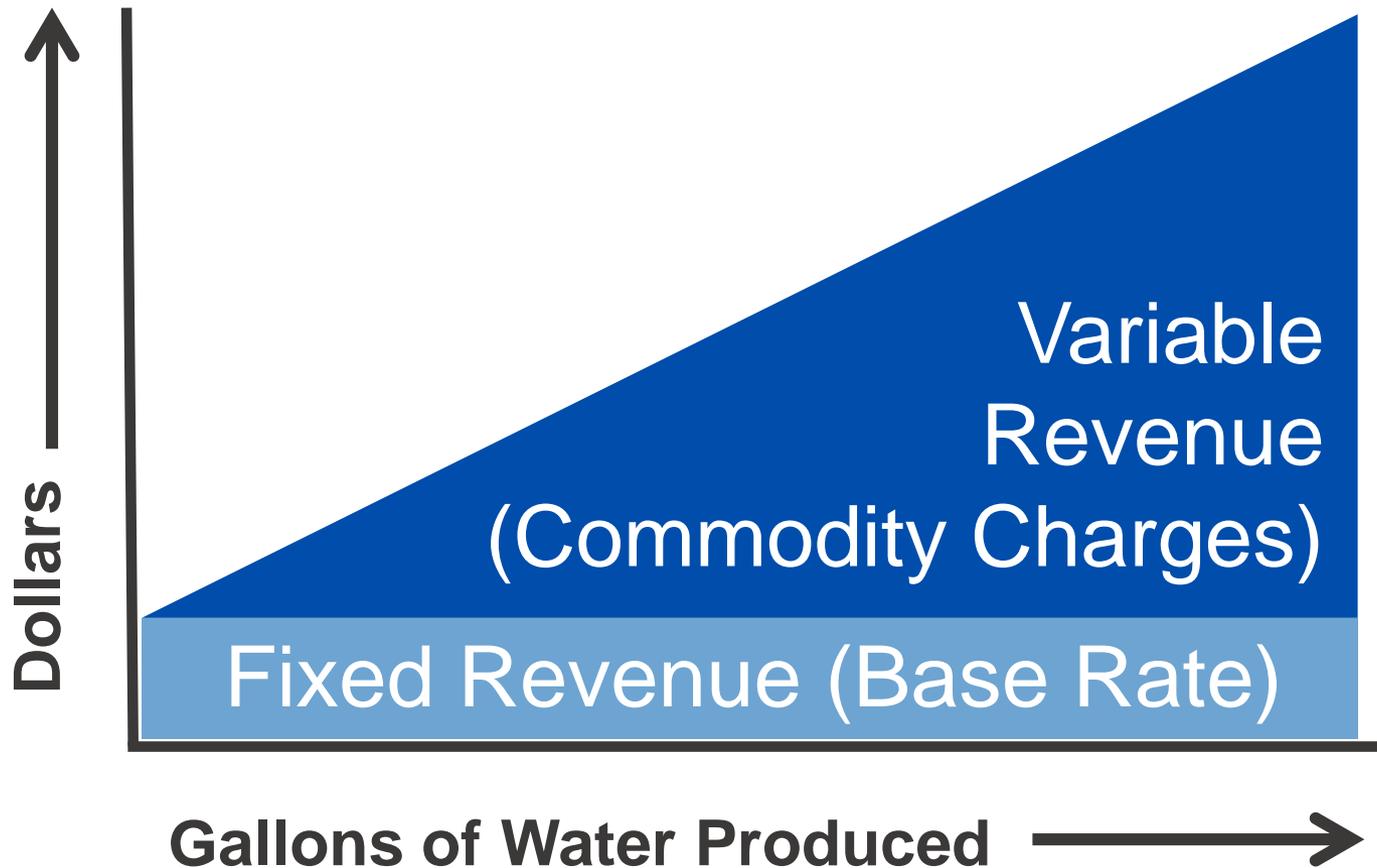




Two Types of Revenues

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

The Revenue Picture

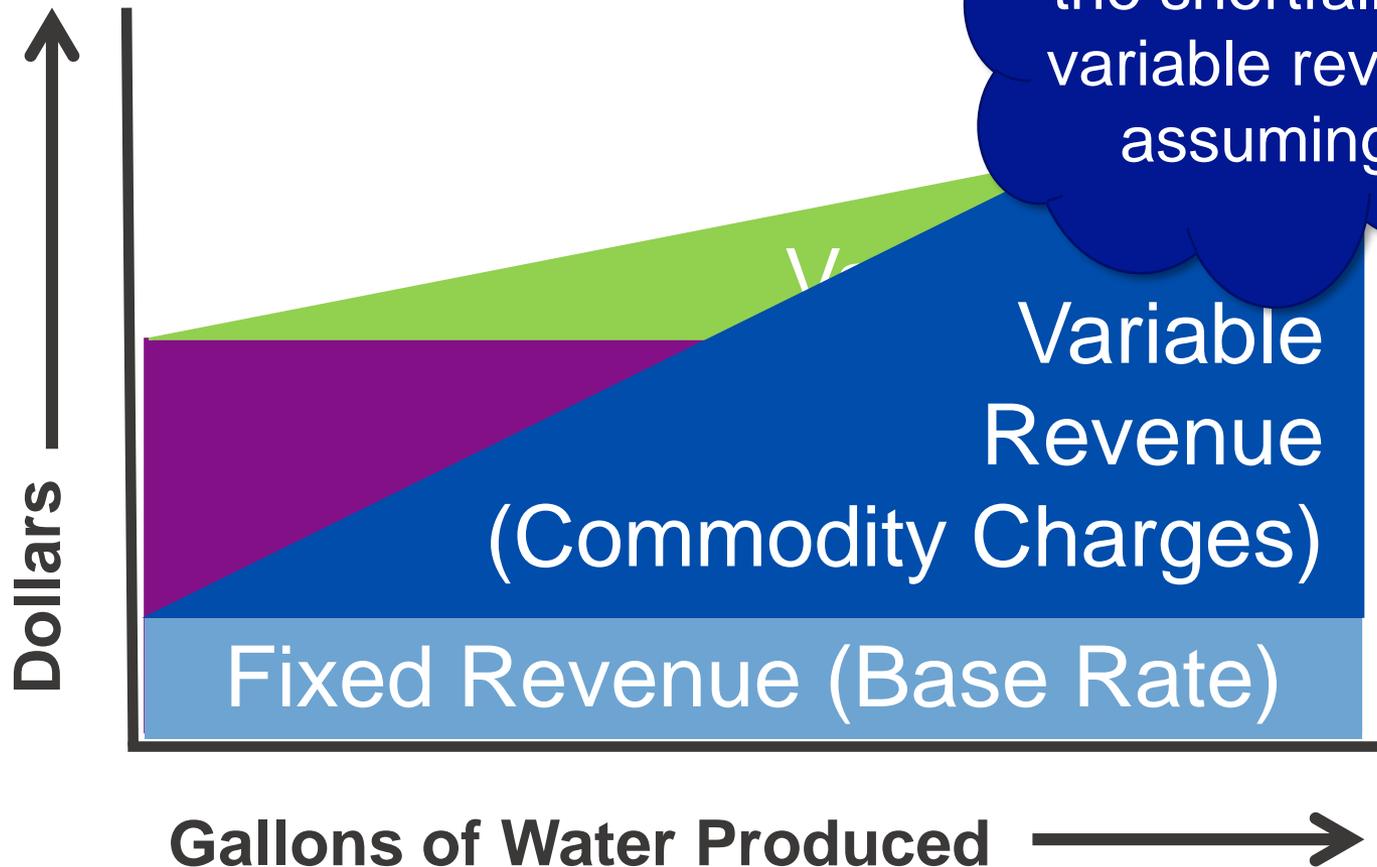


Costs vs. Revenues

We collect less fixed revenue than the fixed costs

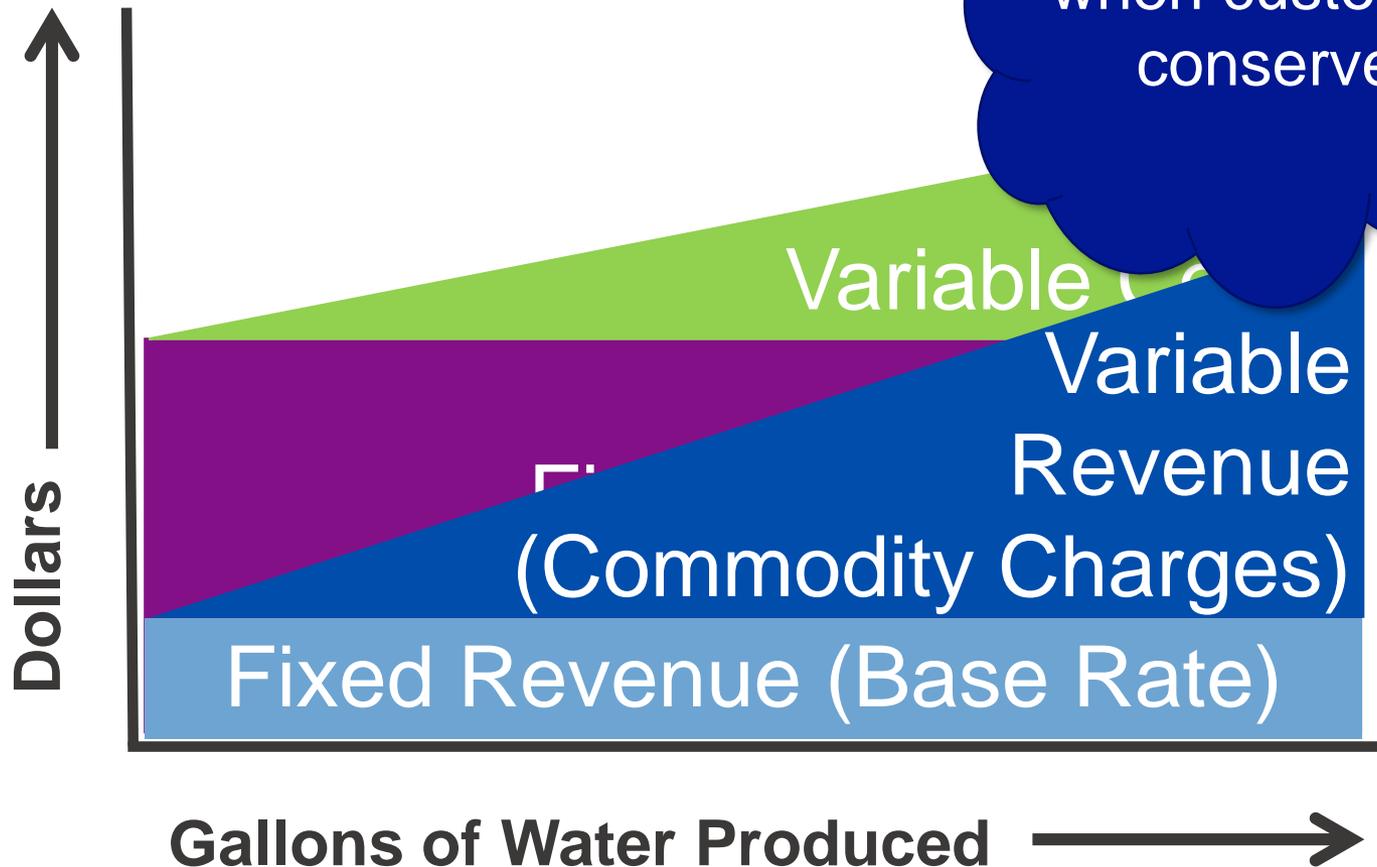


Costs vs. Revenues

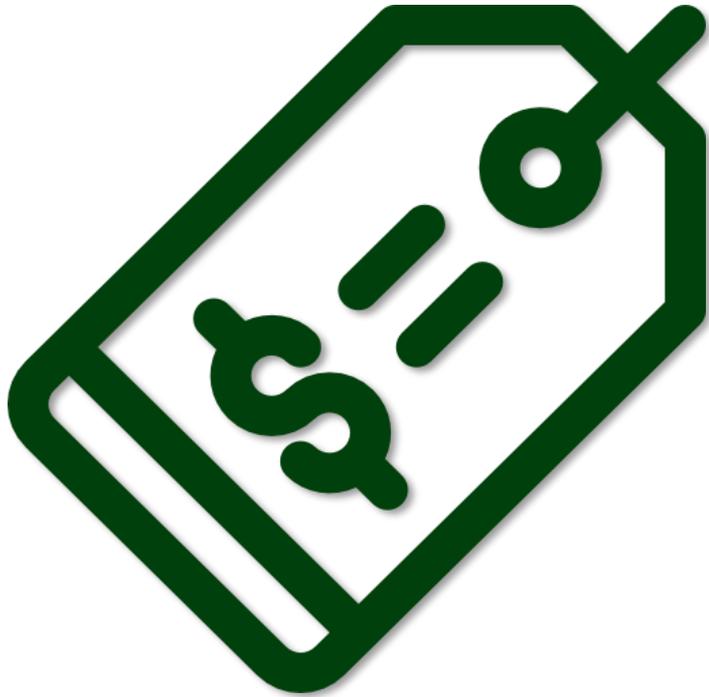


But we can cover the shortfall with variable revenue assuming...

Costs vs. Revenues



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

In Town

Water	\$ 7.72 per 1000 gallons
Sewer	\$ 10.73 per 1000 gallons

Out of Town

Water	\$ 15.44 per 1000 gallons
Sewer	\$ 21.46 per 1000 gallons

Troutman, NC



Increasing Block Rates

- At higher usage levels, the price increases, which encourages customers to cut back on usage



Increasing Block Rates

Tier	Water Usage	Rate per 1,000 gallons (\$)
1	First 5,000 gallons or less	\$13.00
2	Next 5,001 – 15,000	\$17.75
3	Next 15,001 – 25,000 (Over 15,000 cattle lessees)	\$18.75
4	25,001 or more for all except cattle lessees	\$19.75

Napu'u Water Inc., HI

Increasing Block Rates

Water Consumption Charges

Effective July, 1, 2011

Consumption/Month (in gallons)	Residential	Commercial**
0 - 2000	Base Rate (\$20.00)	Base Rate (\$20.00)
Up to 5,000	\$4.50 per 1,000 gallons	\$4.50 per 1,000 gallons
Up to 10,000	\$5.50 per 1,000 gallons	\$5.50 per 1,000 gallons
Up to 15,000	\$6.50 per 1,000 gallons	\$6.50 per 1,000 gallons
Up to 20,000	\$7.50 per 1,000 gallons	\$7.50 per 1,000 gallons
All over 20,000	\$8.50 per 1,000 gallons	\$8.50 per 1,000 gallons

Consumption over 2,000 gallons is billed retroactive to the first gallon used.

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

Currituck County, NC



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

Residential

0 through 4,000 gallons	\$ 5.27 Per Thousand
4,001 through 9,000 gallons	\$ 8.10 Per Thousand
9,001 gallons and up	\$ 10.90 Per Thousand

Commercial, Apartments and Mobile Home Parks

0 through 10,000	\$ 6.69 Per Thousand
10,000 and up	\$ 8.03 Per Thousand

Irrigation

Per thousand gallons	\$ 10.72
----------------------	----------

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:

0	--	2,000 gallons	\$22.00 minimum
2,100	--	7,000 gallons	\$ 5.50/thousand

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

0	--	2,000 gallons	\$22.00 minimum
2,100	--	10,000 gallons	\$15.00 per thousand
10,100	--	up	\$20.00 per thousand

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

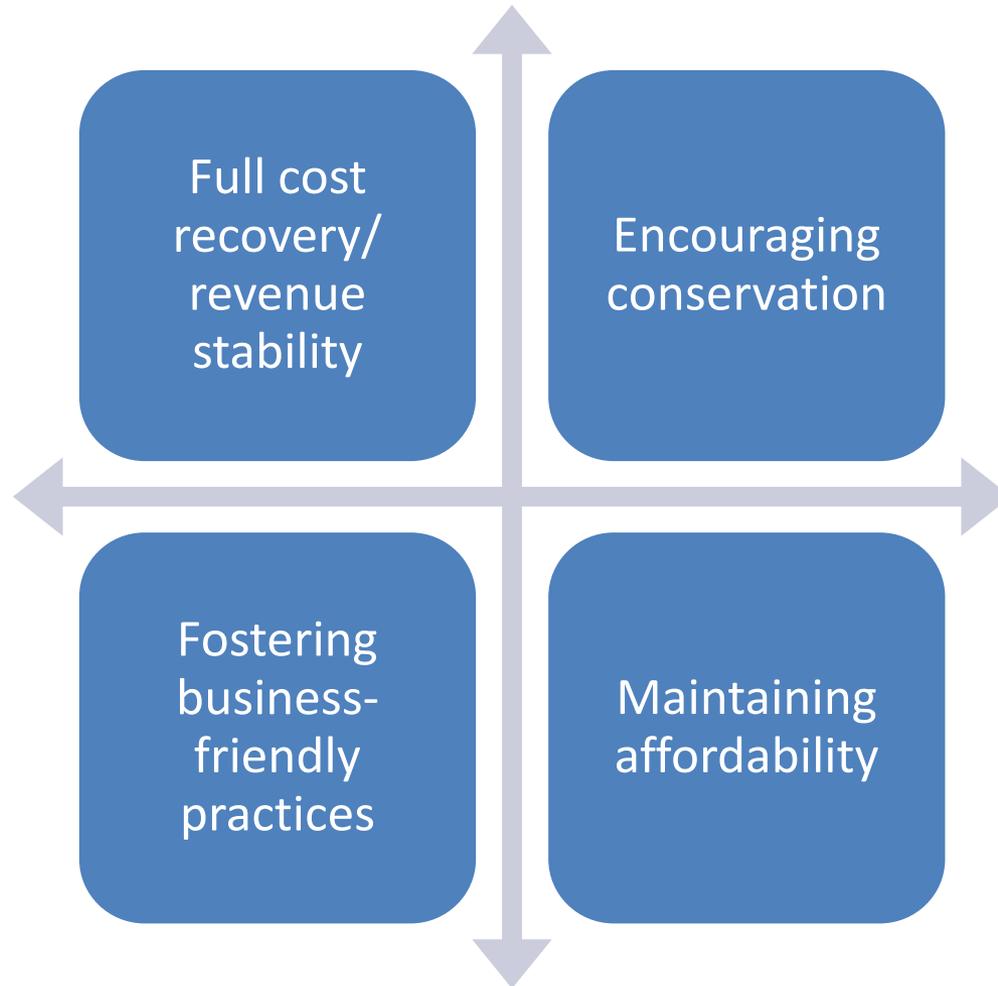
COMMODITY RATES PER 1,000 GALLONS PER MONTH BY CONSERVATION STAGE IN EFFECT

(Zero Gallons Included in Base Rate)		Stages 1 & 2	Stage 3 ^a	Stage 4 ^a
1st Tier: 0 – 4,000 Gallons	\$	6.80	6.80	6.80
2nd Tier: 4,001 – 13,000 Gallons	\$	10.20	10.20	10.20
3rd Tier: 13,001 – 20,000 Gallons	\$	12.30	15.00	20.00
4th Tier: 20,001 – 30,000 Gallons	\$	12.42	20.00	40.00
5th Tier: over 30,000 Gallons	\$	12.55	30.00	70.00

^a 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).

Tonto Hills Water Improvement District, AZ

Competing Objectives

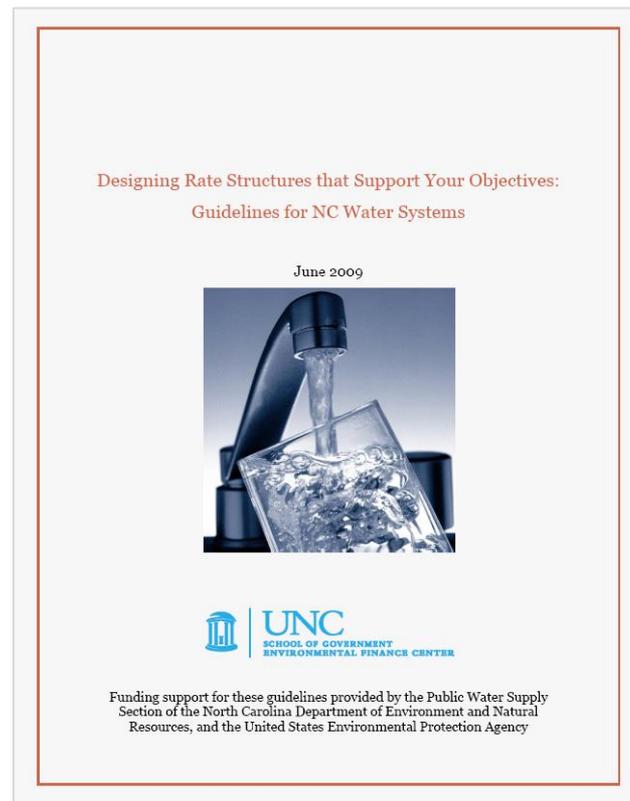


Designing Rate Structures That Support Your Objectives

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)



Developed by the Environmental Finance Center at the University of North Carolina, Chapel Hill
<http://efc.sog.unc.edu>



Funded by the U.S. Environmental Protection Agency and the Public Water Supply Section of the North Carolina Department of Environment and Natural Resources

Get Started

Download a copy of the model populated with data from an example utility

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
- Uniform or block rates (up to 10 blocks)
- Model changes to accounts and water use
- Customizable list of operating and capital expenses
- Building up reserves through rates
- Compare monthly bills under new rates vs. existing rates
- Assess revenue sufficiency and fund balance
- Error notifications

INSTRUCTIONS

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

View Results

Financial forecast of the next few years under 'Existing' rates versus 'New' rates (graphs of cost recovery and end-of-year fund balance)

How new rates compare to existing rates (graphs of monthly bills)

Year:	2015	2016	2017	2018	2019	2020
Rate Inside	\$11.50	\$13.00	\$14.40	\$17.00	\$20.00	\$21.00
charge (gallons/month)	2,000	2,000	2,000	2,000	2,000	2,000

Block End	2015	2016	2017	2018	2019	2020
4,000 gal/mo	\$2.78	\$2.78	\$2.78	\$3.00	\$3.50	\$4.00
7,000 gal/mo	\$4.00	\$4.50	\$5.00	\$5.50	\$6.00	\$6.50
10,000 gal/mo	\$5.00	\$5.50	\$7.00	\$8.00	\$9.00	\$9.00

Error: missing block rates
Error: missing block size

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

The screenshot shows the title page of an Excel spreadsheet. At the top, the title "Water Utility Revenue Risk Assessment Tool" is displayed in a dark blue box, with the subtitle "How Much Revenue Might Be Lost When Residential Customers Reduce Consumption?" below it. Logos for the Water Research Foundation and the UNC Environmental Finance Center are visible. A blue box indicates "Version 1.0" with a version date of "November 15, 2013". Below this, it states "Developed by: The Environmental Finance Center at the University of North Carolina, Chapel Hill" and "Developed for: Water Research Foundation". A link "Click here to access a video tutorial on using the tool" is provided. A text box explains the tool's purpose: "This tool allows utilities and technical assistance providers to quickly determine the proportion of residential revenues from water sales that may be at risk of loss when residential customers change demand patterns. When residential customers reduce demand, whether due to price elasticity effects, or normal weather fluctuations that affect their water demands, or in reaction to shocks (such as new water conservation programs, water shortage periods, change in economic conditions, etc.), utilities collect less revenue from customer sales than anticipated. Utilities often ask how much of their revenues are really and realistically at risk of loss if their customers lower their consumption. This tool allows utilities and their technical assistance providers to quickly determine these estimates based on the utility's own rate structure, customer demand profile and weather conditions." Another text box notes: "The tool requires only minimal data input and uses simplifying assumptions as well as detailed models developed after analyzing hundreds of thousands of real customer water records to understand how water customers change demand patterns." A final text box states: "This simplified tool is focused solely on revenue projections and assessment. Costs and revenue requirements based on customer classifications are not incorporated into this model. The tool allows the user to compare two different residential rate structures and determine which rate structure offers greater revenue resiliency." At the bottom, a navigation bar includes tabs for "Instructions and Data Needs", "Input REFERENCE Rates", "Input COMPARATIVE Rates", "Revenues from REFERENCE Rates", and "Revenues".

- 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

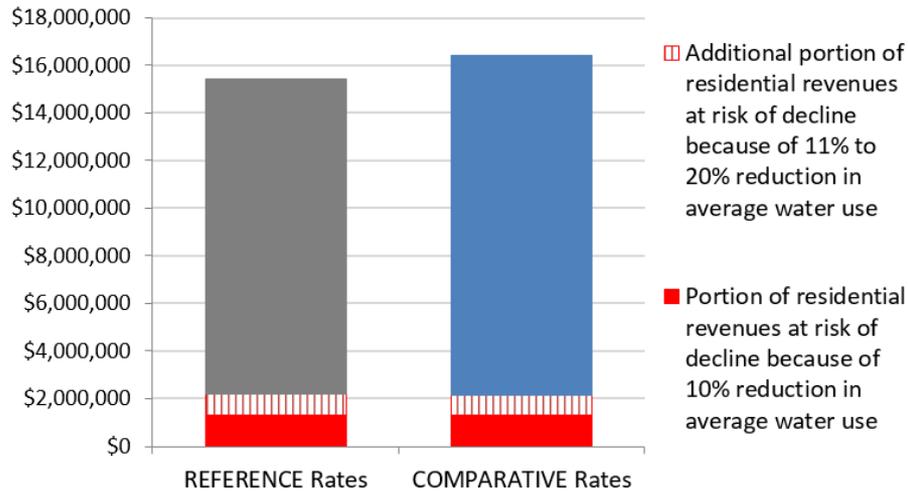
Free to download and use at
www.waterrf.org
www.efc.sog.unc.edu

Water Utility Revenue Risk Assessment Tool

Comparing Revenues After a Significant Decline in Water Use

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



Decline in Total Annual Revenues for a:	REFERENCE Rates	COMPARATIVE Rates
10% reduction in avg use	\$1,311,000	\$1,319,000
20% reduction in avg use	\$2,181,000	\$2,167,000
10% reduction in avg use	8.5%	8.0%
20% reduction in avg use	14.2%	13.2%

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/>

FINANCING SUSTAINABLE WATER
Rates. Revenue. Resources.

A project of the Alliance for Water Efficiency

HOME WATER EFFICIENCY BUILDING RATES IMPLEMENTATION FISCAL SUSTAINABILITY **TOOLS** RESOURCE SEARCH

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Building Better Water Rates for an Uncertain World

AWE Sales Forecasting and Rate Model

Rate Model Video Tutorials

Request Tools

Rate Model User Guide

Appendices: Costing Methods, Demand Forecasting and Revenue Modeling

Communications Tools

RATES HANDBOOK
Building Better

AWE Sales Forecasting and Rate Model

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

Rate Design Module Output:

% Change in Average and Median Annual Water Demand for Customer Class

Customer Class	Scenario	Rate	% Change
Single-Family Residential	Base Case	100%	0%
		115%	-1.5%
	Drought	100%	-15%
		115%	-18%
Commercial	Base Case	100%	0%
		115%	-2.5%
	Drought	100%	-10%
		115%	-12%

Probability Index Matrix

Probability index matrix showing the relative annual water use for the primary and secondary customer classes based on revenue.

MP Impact Table

Scenario	MP Impact Table				
	% of bills decreasing by more than 20%	% of bills decreasing by 10-20%	% of bills increasing by 0-10%	% of bills increasing by 10-20%	% of bills increasing by more than 20%
Base Case	0%	0%	100%	0%	0%
15% Increase	15%	35%	45%	5%	0%
Drought	45%	55%	0%	0%	0%

Single-Family Customer Class MP Impact Histogram

<http://efc.web.unc.edu/2015/11/23/key-financial-benchmarks-for-water-systems-conservation-signal/>



Key Financial Benchmarks for Water Systems: Conservation Signal

NOVEMBER 23, 2015 / GLENN BARNES / 2 COMMENTS

 Print  PDF

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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