



# Price & Non-Price Approaches to Promoting Conservation

Glenn Barnes

Environmental Finance Center

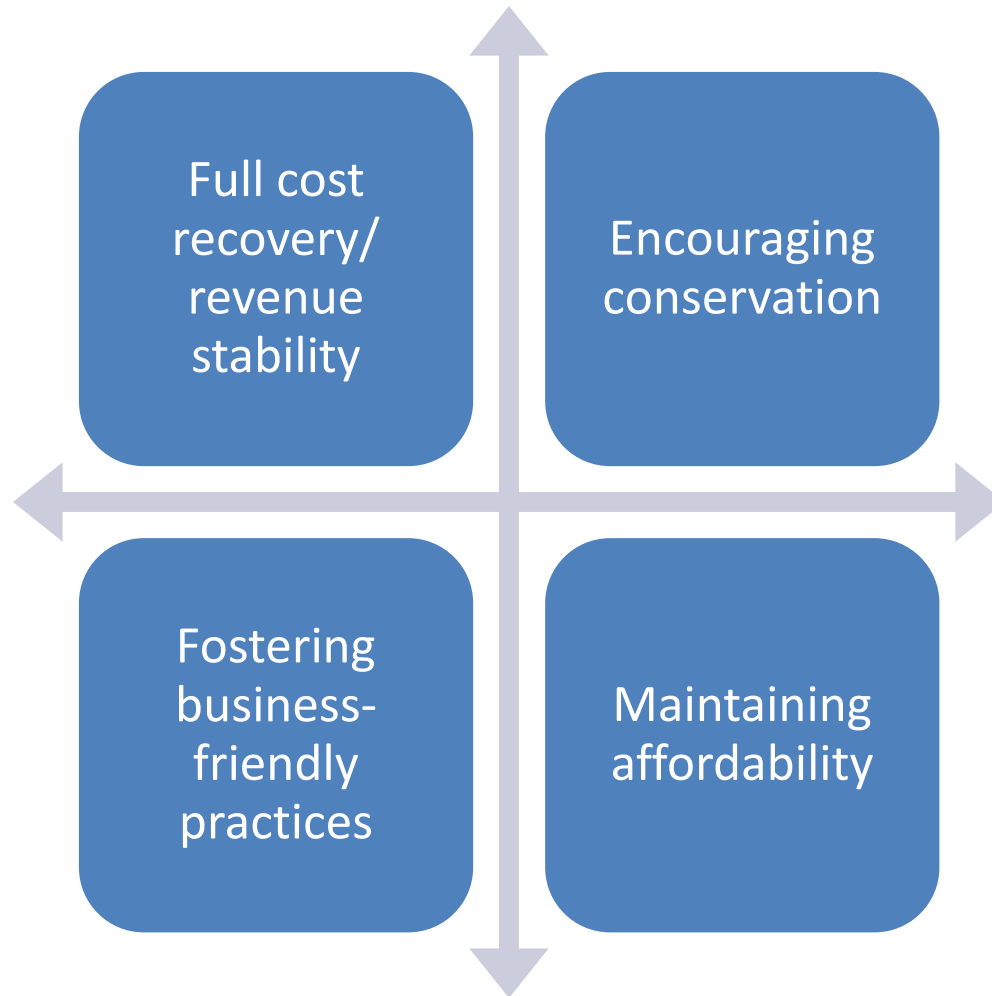
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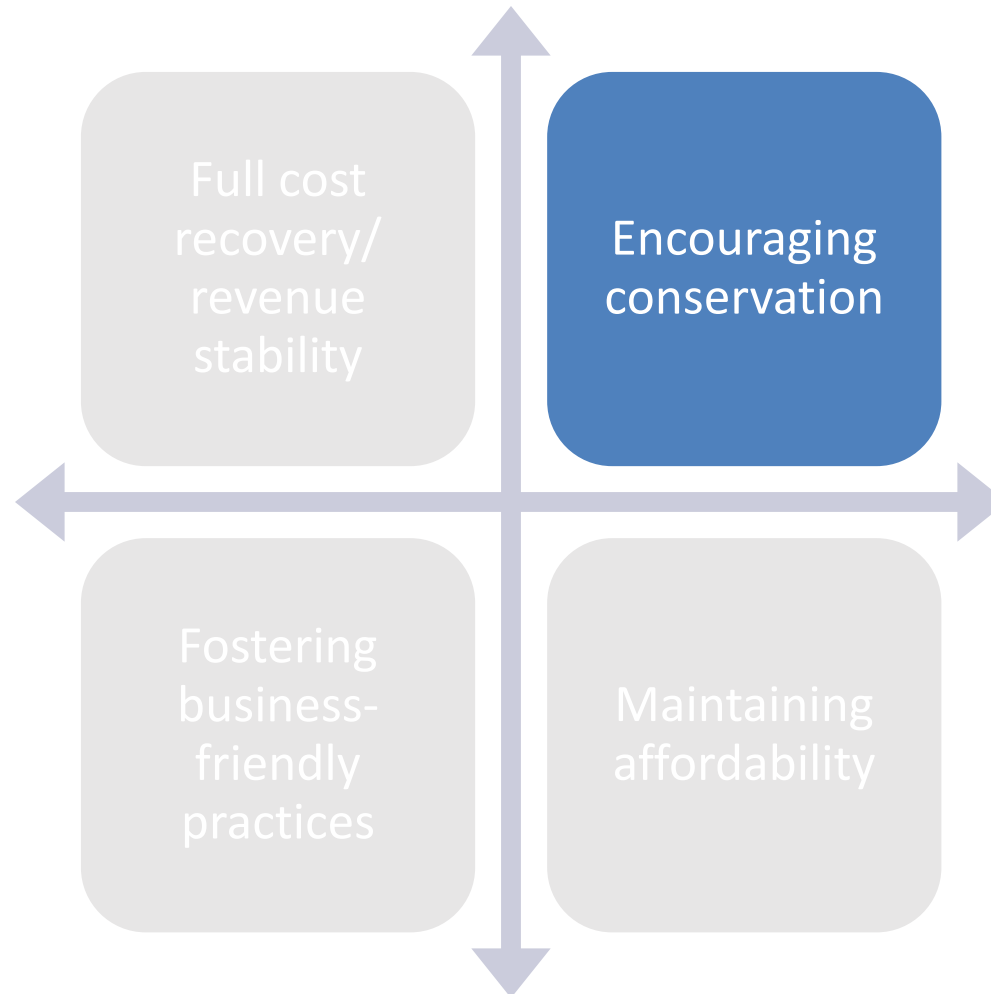
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# Water System Objectives



# Water System Objectives

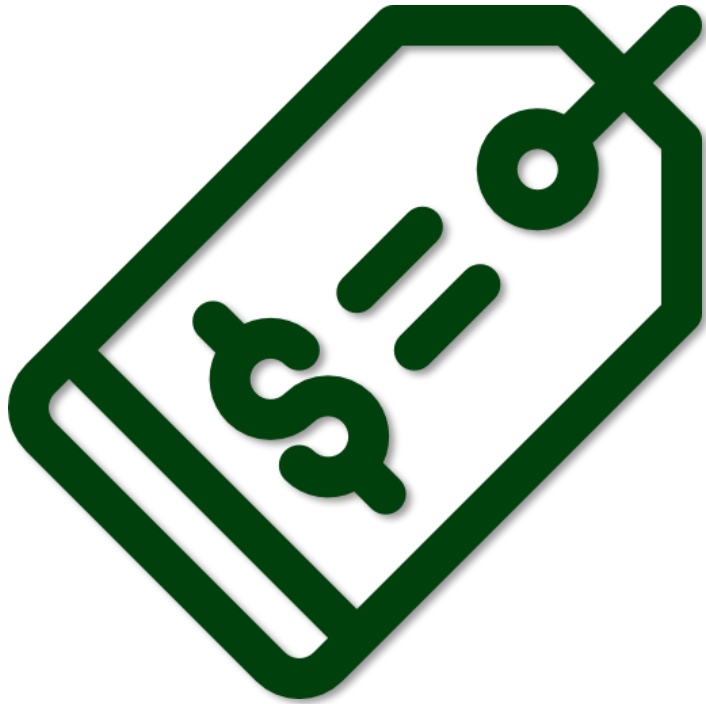




# Why Encourage Conservation?

- 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

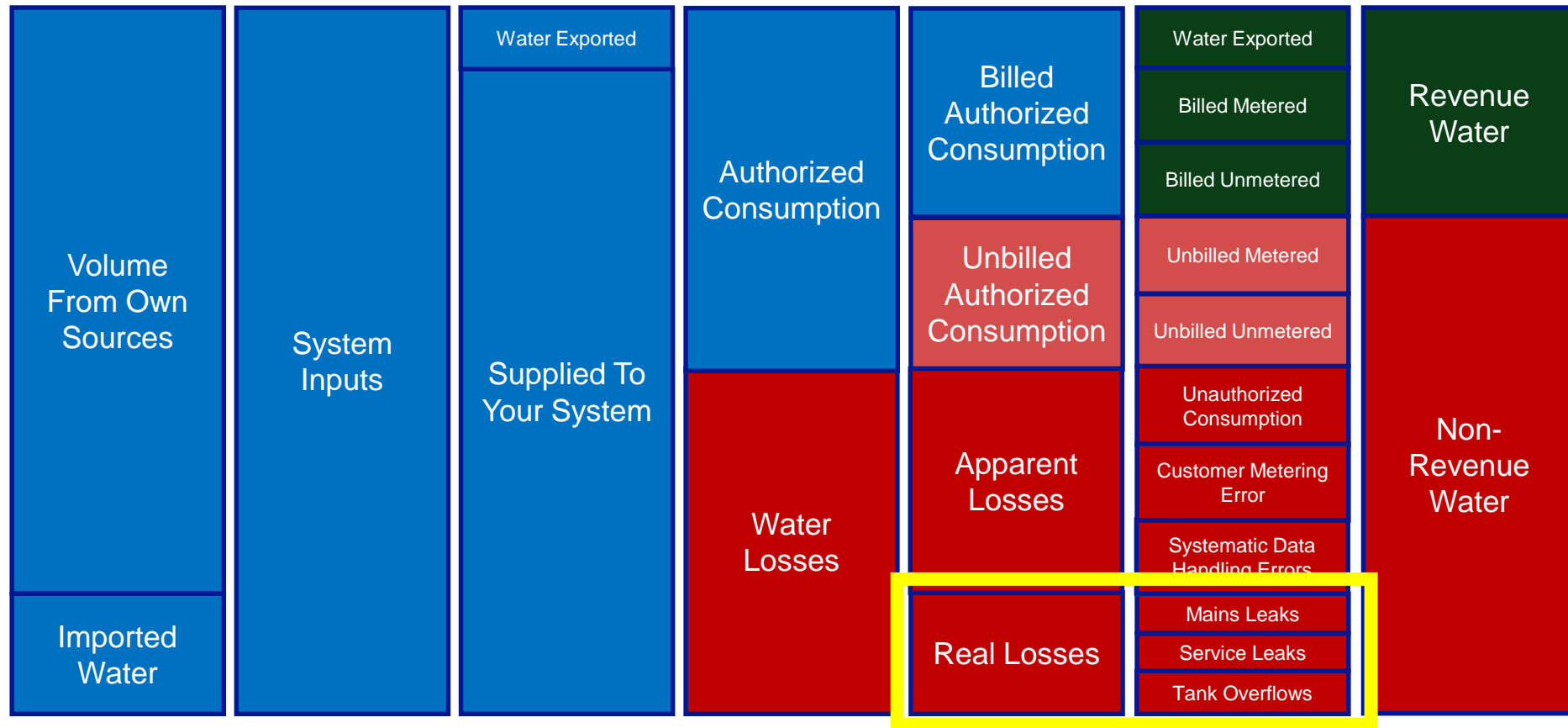


Pricing signals  
through your rates



Non-price strategies

# System Level—Real Water Loss





# Customer Focused Conservation

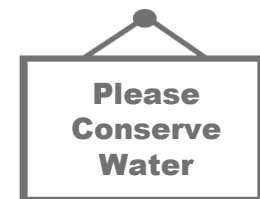
- Increase customer information
- Help customers reduce usage
- Alternative sources for outdoor irrigation
- Usage restrictions





# Increase Customer Information

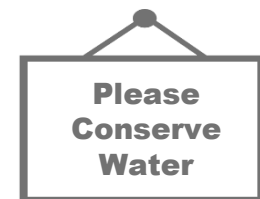
- Use monthly billing
- Provide price and historic usage information on customer bills
- Compare customer usage to local averages





# Increase Customer Information

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



## WaterSense

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Certifications

Product Search

# 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>

## WaterSense

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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



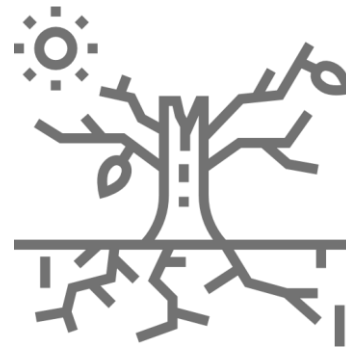
- Use raw water, discharge water from water treatment, or treated wastewater for irrigation in lieu of using potable water
- Rain barrels



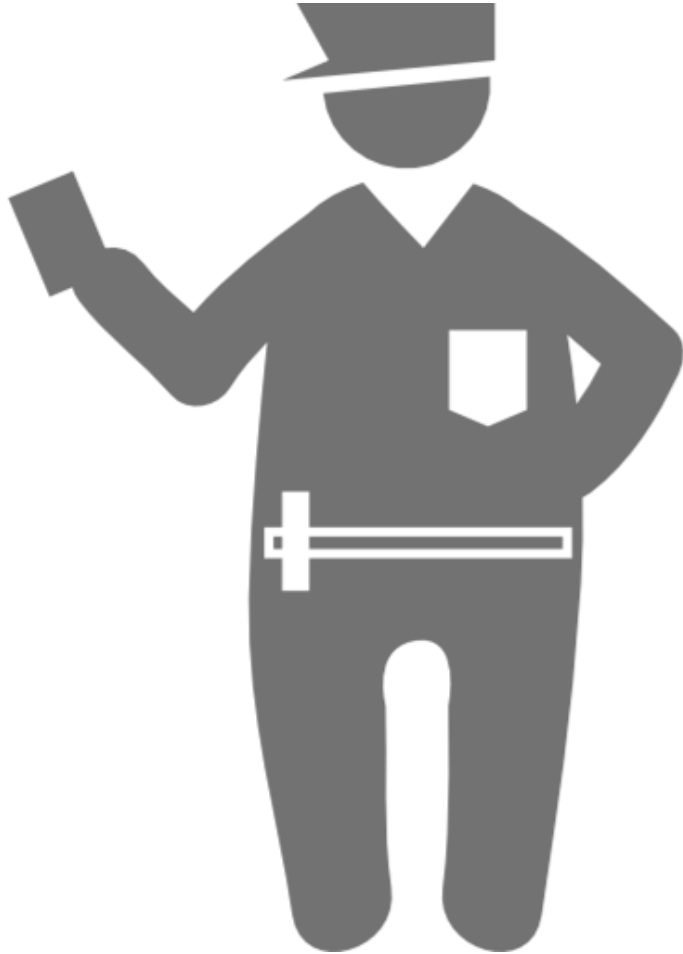


# Restrict Outdoor Usage

- 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



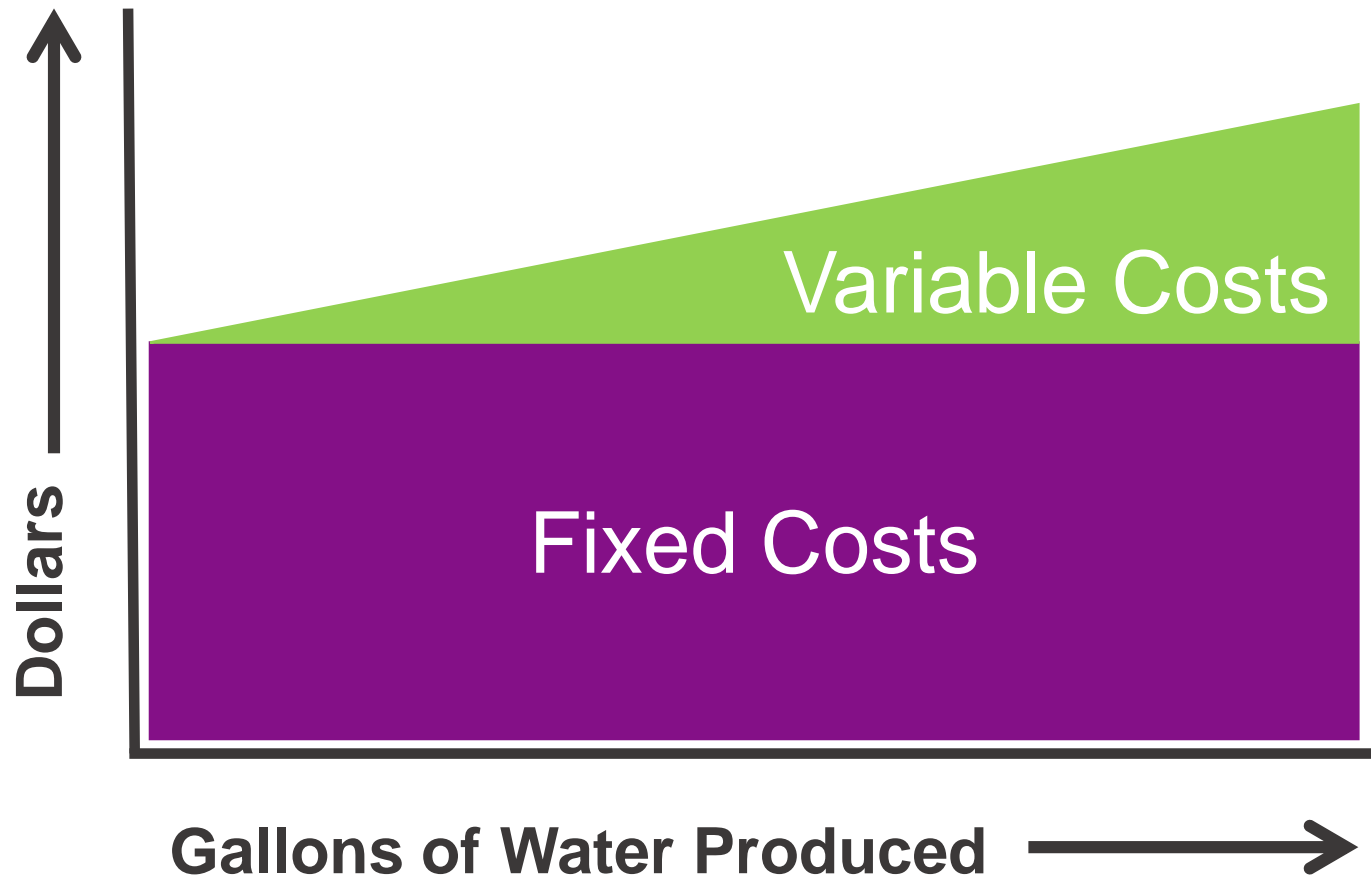
Fixed  
Cost



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

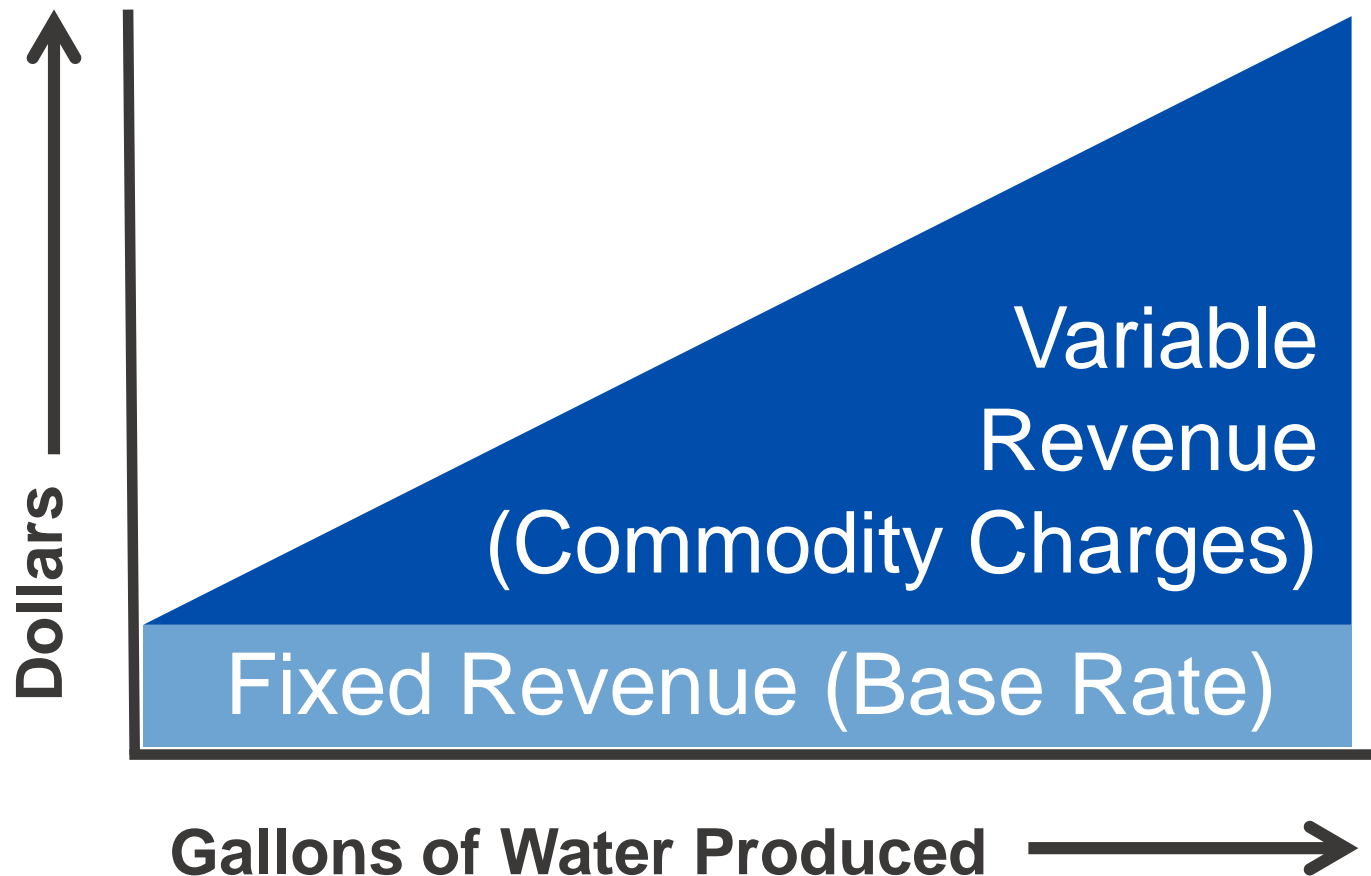




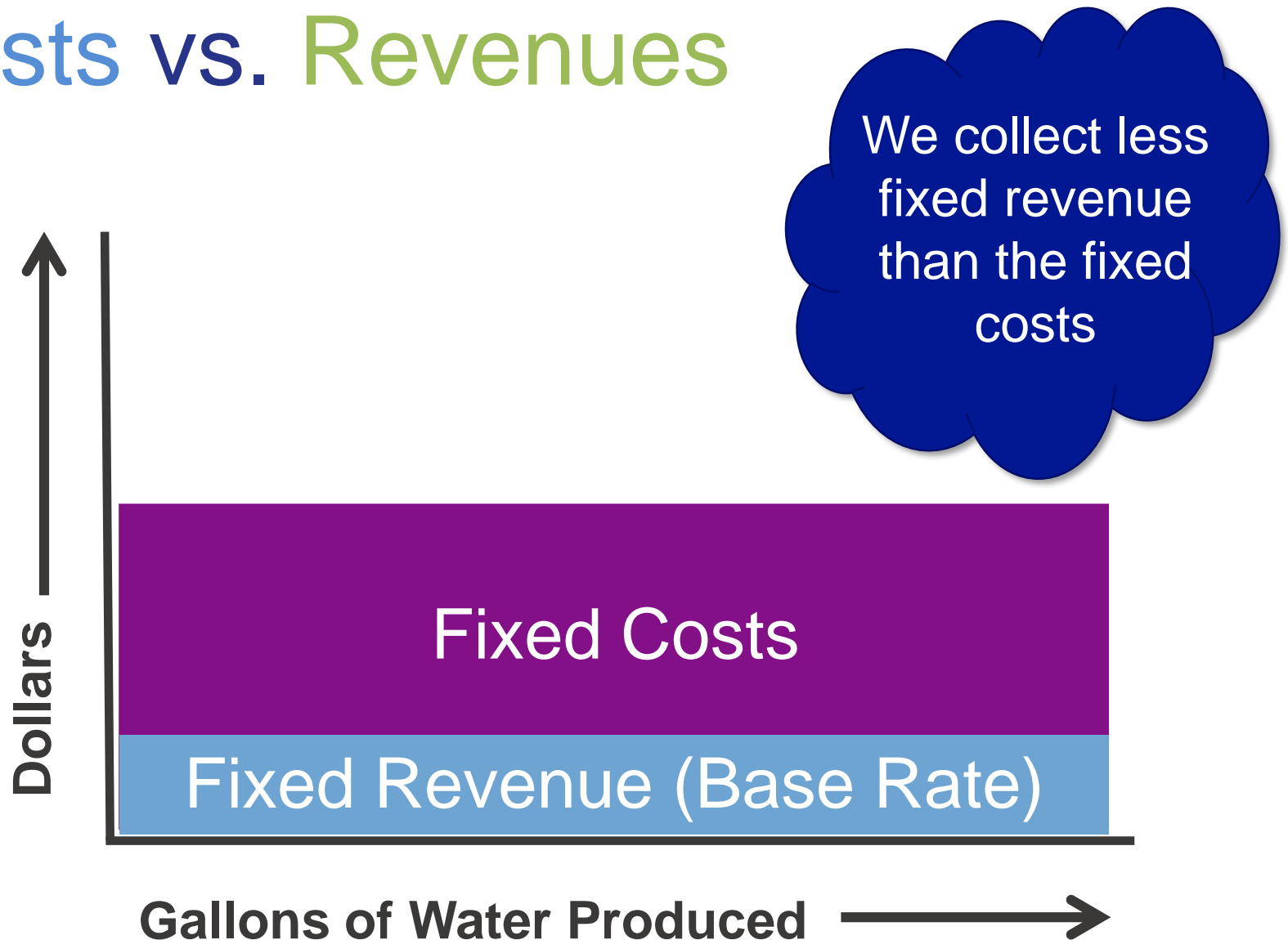
# Two Types of Revenues

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

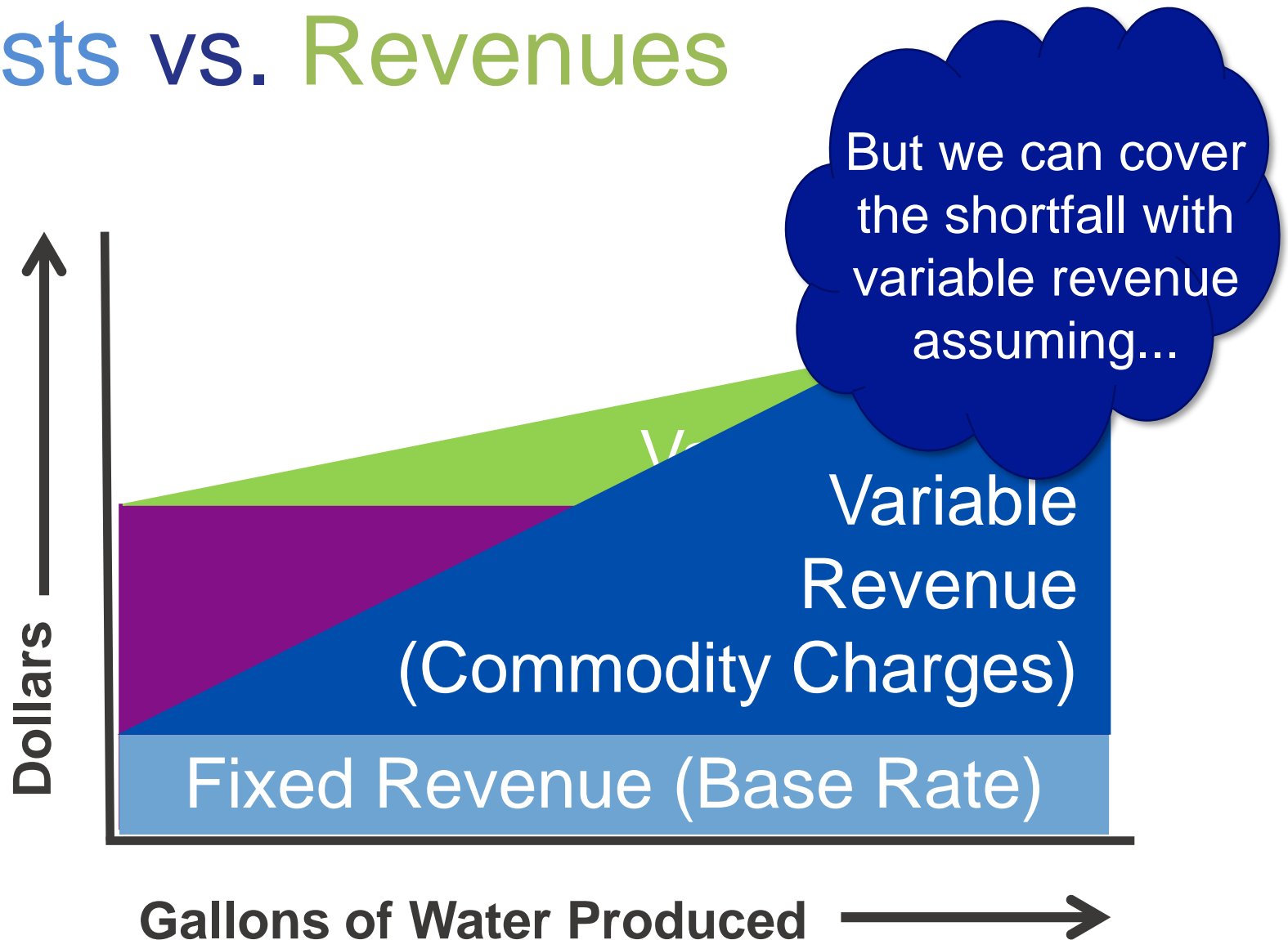
# The Revenue Picture



# Costs vs. Revenues

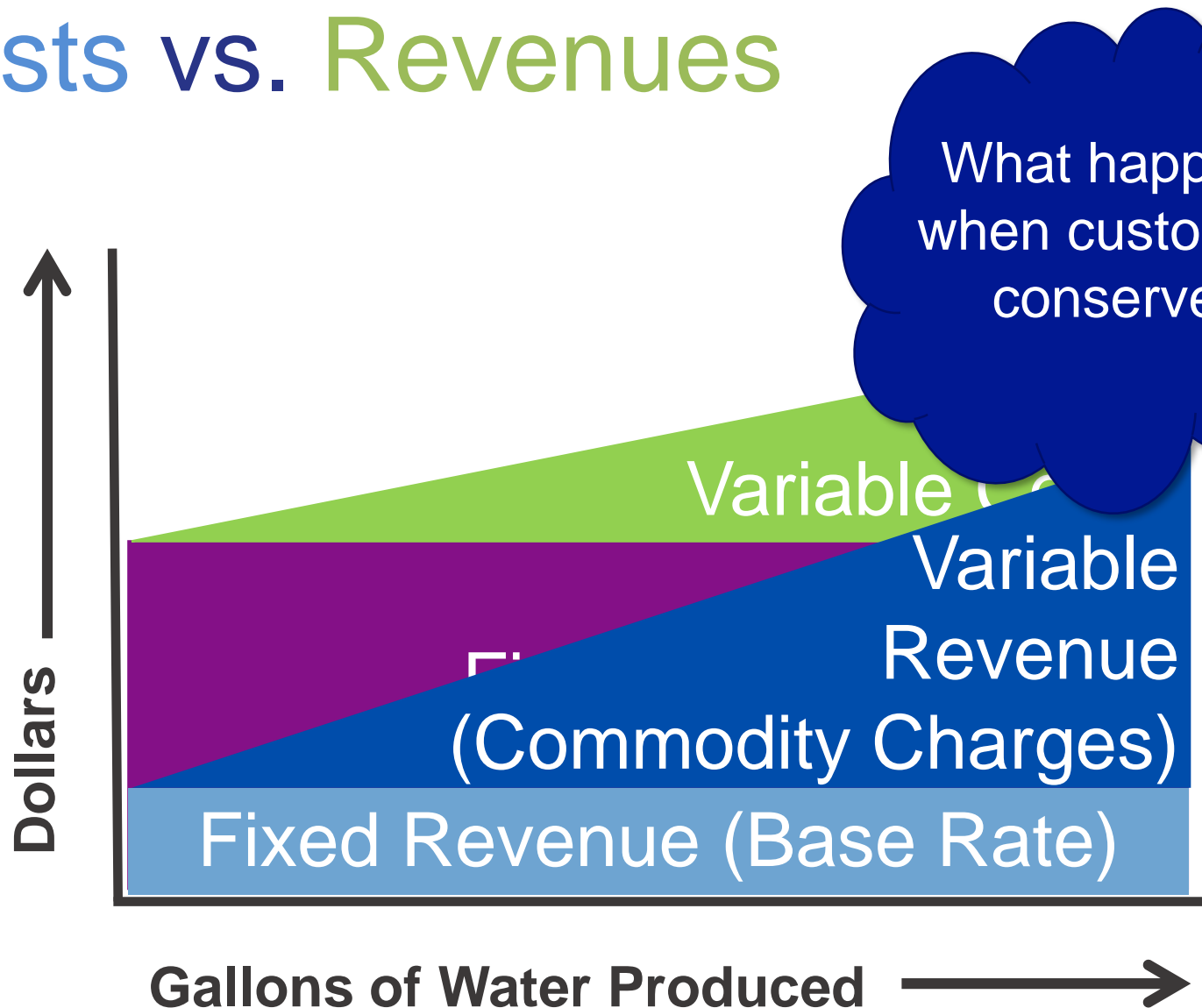


# Costs vs. Revenues

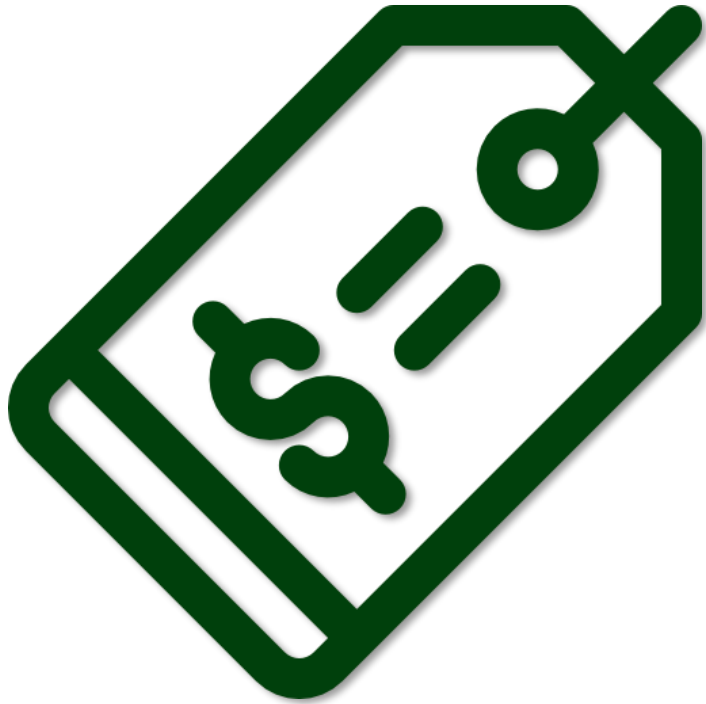




# Costs vs. Revenues



# 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

<b>Tier</b>	<b>Water Usage</b>	<b>Rate per 1,000 gallons (\$)</b>
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

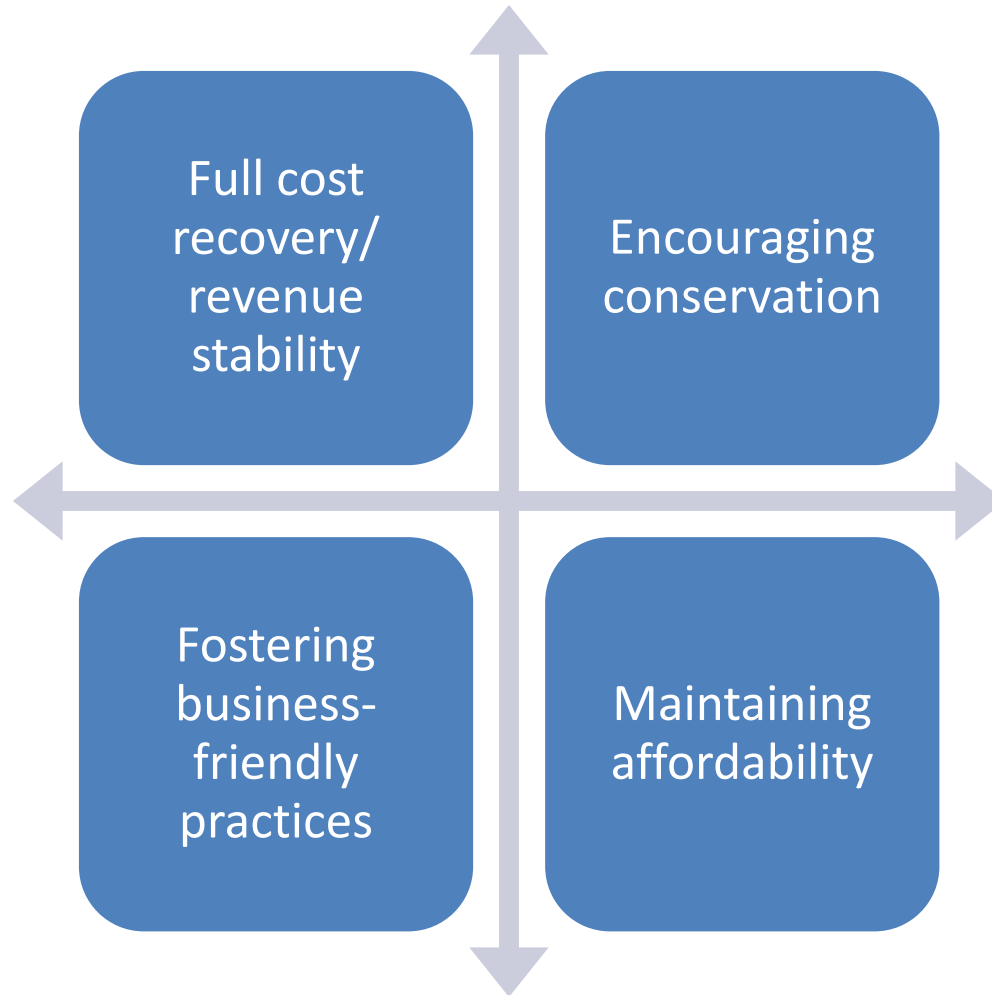
## COMMODITY RATES PER 1,000 GALLONS PER MONTH BY CONSERVATION STAGE IN EFFECT

(Zero Gallons Included in Base Rate)		Stages 1 & 2	Stage 3 <sup>a</sup>	Stage 4 <sup>a</sup>
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

<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).

Tonto Hills Water Improvement District, AZ

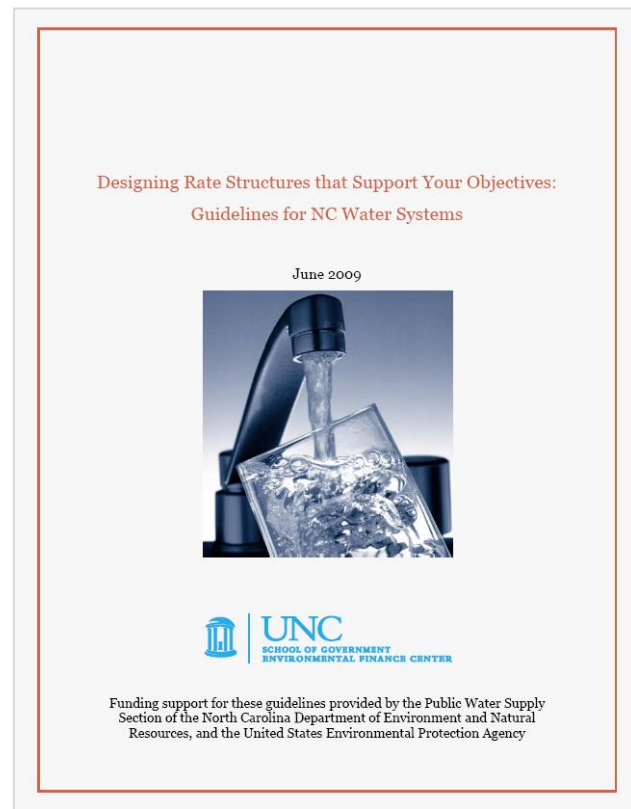
# Competing Objectives



# 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)



UNC  
ENVIRONMENTAL FINANCE CENTER



Division of  
WATER  
RESOURCES  
Public Water  
Supply Section

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**

- 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

**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
Debt Service	\$ 1,150,000	\$ 1,150,000	\$ 1,150,000	\$ 1,150,000	\$ 1,150,000	\$ 1,150,000
Other Known Annual Expenses	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000

Category	2015
Administrative	\$ 250,000
Capital Expenses	\$ 250,000
Construction	\$ 250,000
General Services	\$ 250,000
Interest	\$ 250,000
Regional Sewer Authority operations & maintenance	\$ 250,000
Regional Sewer Authority capital expenses	\$ 250,000
Regional Sewer Authority debt service	\$ 250,000
Regional Sewer Authority other	\$ 250,000
Regional Sewer Authority total	\$ 2,500,000
Other charges	\$ 400,000

Year	2015	2016	2017	2018	2019	2020
Existing	\$11.50	\$13.00	\$14.50	\$16.00	\$17.50	\$19.00
New	\$11.50	\$13.00	\$14.50	\$16.00	\$17.50	\$19.00
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	\$6.00	\$6.50	\$7.00	\$7.50

Back to top

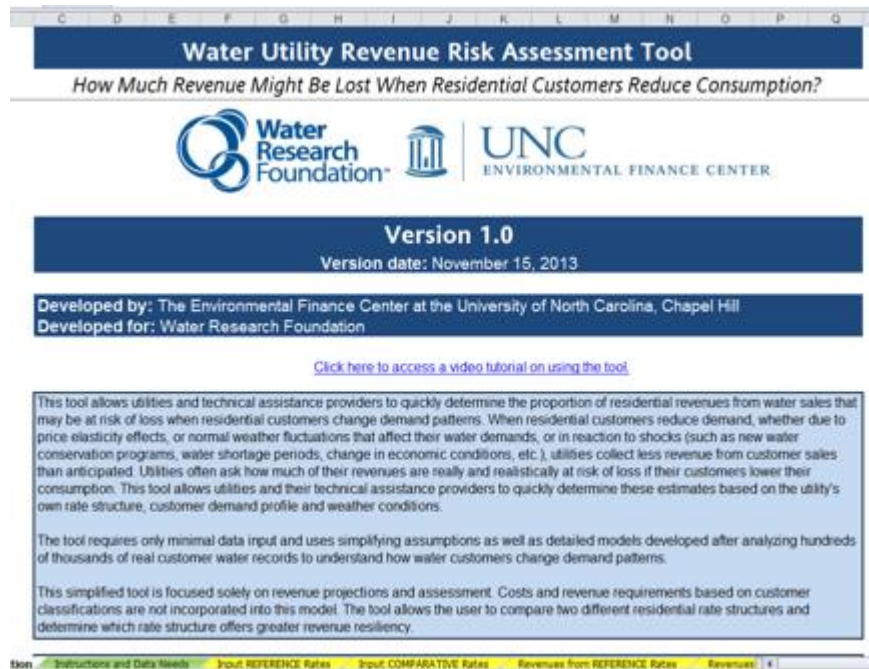
Error: missing block rates  
Error: missing block size

Watch out for red "Error" messages describing where data entry errors

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

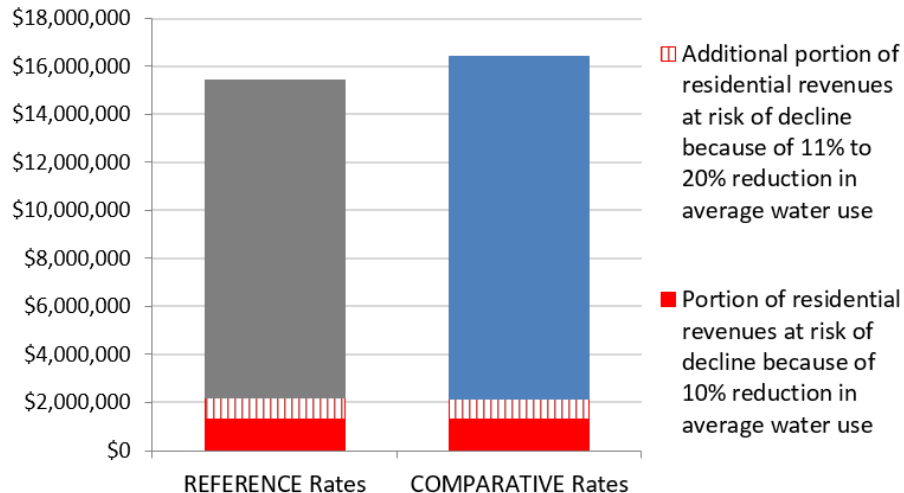
Free to download and use at  
[www.waterrf.org](http://www.waterrf.org)  
[www.efc.sog.unc.edu](http://www.efc.sog.unc.edu)

# 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/>



A project of the  
 Alliance for Water Efficiency

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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



The screenshot displays the AWE Sales Forecasting and Rate Model interface. It includes a table titled 'No change in demand and weather annual block sales forecast for Customer Class' with columns for 'Average Annual Water Service Cost' and 'Median Annual Water Service Cost' for various customer classes. Below this is a 'Rate Design Module' section with a 'Single Family Customer Class RFR Impact Histogram' showing the distribution of bills. To the right, there are 'affordability index' and 'affordability index' charts showing the impact of rate changes on different customer classes.



<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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