



# Conservation Pricing in Action

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So.....

What does this mean in the real world? What would conservation pricing actually look like?





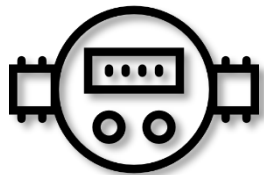


# Irvindale, USA Exercise

Small town with a water and wastewater system



Population: 1,100



Service Connections: 450



MHI: \$24,432





# Exercise

Let's figure out some rates for  
Irvindale that promote  
conservation



A blue-tinted photograph of industrial machinery, possibly a water treatment or irrigation system, featuring large pipes and mechanical components.

# We'll look at four rate structures...

- All volumetric uniform rates
- \$20 base charge with the rest volumetric uniform rates
- Seasonal rates
- Irrigation rates





# Annual Budgeted Revenues

Account	Type	Amount
30-371-01	W/S Charges	\$476,495
30-373-02	Service Charges	\$12,500
30-378-00	I&I Study Grant - Commerce	\$12,000
30-336-00	Fund Balance Appropriated	\$9,188
30-374-00	Online W/S Payment Fee	\$1,600
30-373-00	Tap Connections	\$1,500
30-373-04	Impact Fees	\$1,000
30-385-00	Sale Of Assets	\$0
30-386-00	Transfer From Other Fund	\$0
<b>Total</b>		<b>\$514,283</b>



A blue-tinted photograph of industrial machinery, possibly a water treatment plant, featuring large pipes and mechanical components.

# All Volumetric Uniform Rates

- What information do we need to make this calculation?
- Total revenue needed from rates
- Total gallons sold





# All Volumetric Uniform Rates

\$476,495

*Total Needed Revenue*

32,877,590

*Total Gallons Sold*

**x 1,000 =**

\$14.49

*Price per 1,000 Gallons*





# \$20 Base Charge; Rest from Uniform Volumetric Rates

- What information do we need to make this calculation?
- Total Accounts
- Total Revenue Needed
- Total Gallons



# \$20 Base Charge; Rest from Uniform Volumetric Rates

$$12 \times \$20 \times 450 = \$108,000$$

*Monthly Base Bill*      *Total Accounts*      *Total from Base Bill*

$$\begin{array}{r} \$476,495 \\ \text{Total Revenue Needed} \\ - \$108,000 \\ \text{Total from Base Bill} \\ \hline \$368,495 \\ \text{Total Needed from Volumetric} \end{array}$$

$$\begin{array}{r} \$368,495 \\ \text{Total Needed from Volumetric} \\ \hline 32,877,590 \\ \text{Total Gallons Sold} \end{array} \times 1,000 = \$11.21$$

*Price per 1,000 Gallons*





# Seasonal Rates with a \$20 base charge

- What information do we need to make this calculation?
- Total accounts
- Total revenue needed
- Total winter gallons sold
- Total summer gallons sold





# Seasonal Rates with a \$20 base charge


- The winter price per 1,000 gallons is \$8.60
- This was calculated based on a cost of service analysis



# Seasonal Rates w/ \$20 base

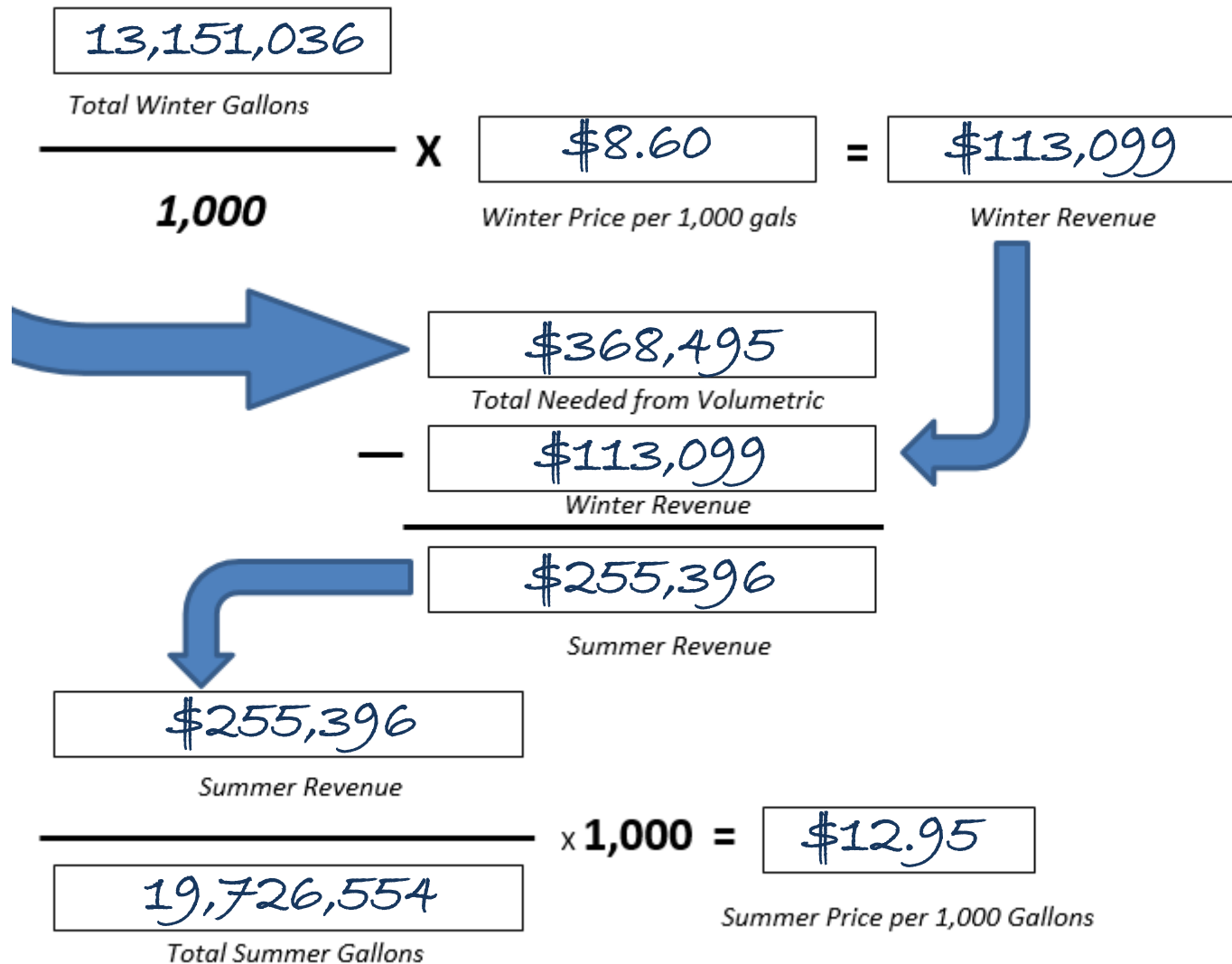
$$12 \times \boxed{\$20} \times \boxed{450} = \boxed{\$108,000}$$

*Monthly Base Bill*      *Total Accounts*      *Total from Base Bill*

$$\begin{array}{r} \boxed{\$476,495} \\ \text{Total Revenue Needed} \\ - \boxed{\$108,000} \\ \text{Total from Base Bill} \\ \hline \boxed{\$368,495} \\ \text{Total Needed from Volumetric} \end{array}$$




# Seasonal Rates w/ \$20 base







# Irrigation Rates with a \$20 base charge

- What information do we need to make this calculation?
- Total accounts
- Total revenue needed
- Total indoor gallons sold
- Total outdoor gallons sold





# Irrigation Rates with a \$20 base charge

- The indoor price per 1,000 gallons is \$8.60
- This was calculated based on a cost of service analysis



# Irrigation Rates w/ \$20 base

$$12 \times \boxed{\$20} \times \boxed{450} = \boxed{\$108,000}$$

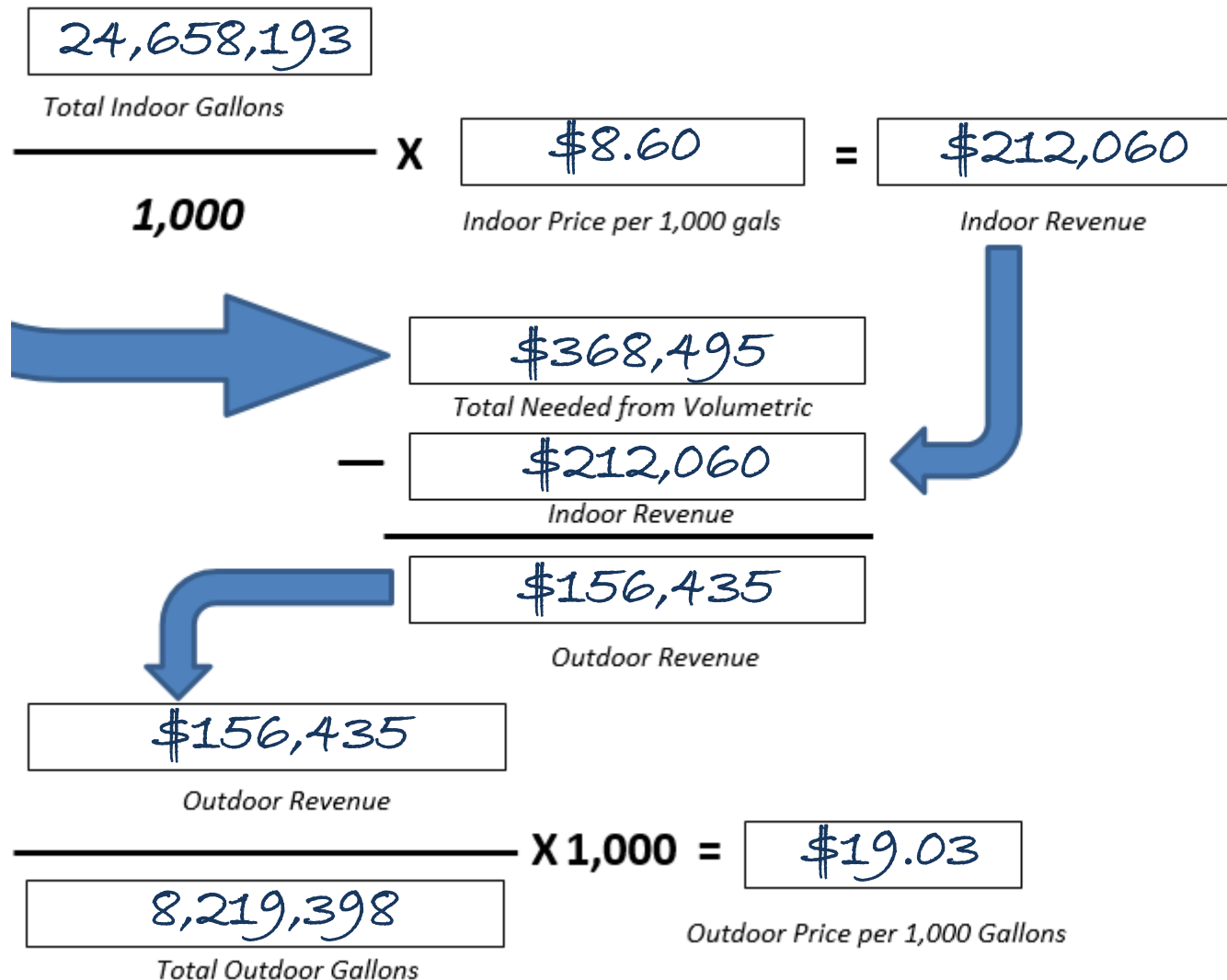
*Monthly Base Bill*                      *Total Accounts*                      *Total from Base Bill*

	<div style="border: 1px solid black; padding: 5px; display: inline-block;"><b>\$476,495</b></div> <i>Total Revenue Needed</i>	
—	<div style="border: 1px solid black; padding: 5px; display: inline-block;"><b>\$108,000</b></div> <i>Total from Base Bill</i>	
	<hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/>	
	<div style="border: 1px solid black; padding: 5px; display: inline-block;"><b>\$368,495</b></div> <i>Total Needed from Volumetric</i>	





# Irrigation Rates w/ \$20 base







# How This Impacts Customers

- All four rate structures get us to the same total revenue
- But how does each approach impact different types of customers?





# Exercise

How much will water service cost per month for different customers under each rate structure?

We'll look at summer usage for the exercise



# How This Impacts Customers



4,000 gallons/month



15,000 gallons/month



10,000 gallons/month



34,000 gallons/month



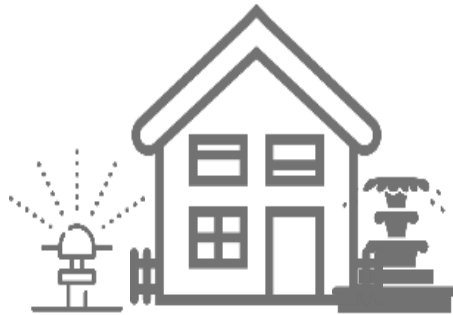


# The Rate Structures

- \$14.49 per 1,000 gallons
- \$20 base;  
\$11.21 per 1,000 gallons
- \$20 base;  
\$12.95 per 1,000 gallons
- \$20 base;  
\$8.60 per 1,000 gallons inside;  
\$19.03 per 1,000 gallons outside



# All Volumetric Uniform Rates



\$57.96

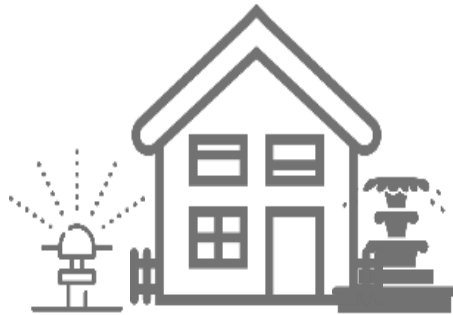
\$217.35

\$144.90

\$492.66



# \$20 Base Charge; Rest from Uniform Volumetric Rates



\$64.84

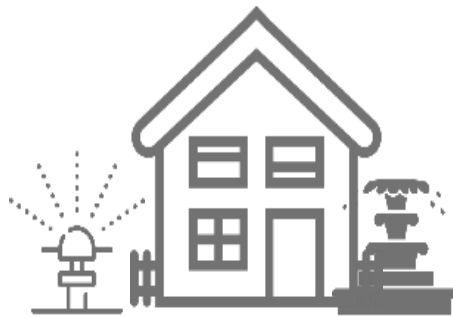
\$188.15

\$132.10

\$401.14



# Seasonal Rates with a \$20 base charge



\$71.80

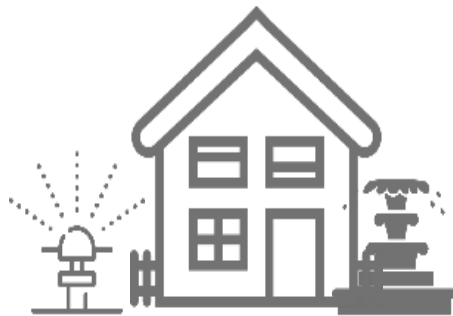
\$214.25

\$149.50

\$460.30



# Irrigation Rates with a \$20 base charge



\$54.40





\$263.73

\$106.00

\$312.40





<i>Gallons per Month:</i>				
Winter Gallons	4,000	4,000	10,000	34,000
<i>Summer Indoor</i>	<i>4,000</i>	<i>4,000</i>	<i>10,000</i>	<i>34,000</i>
<i>Summer Outdoor</i>	<i>0</i>	<i>11,000</i>	<i>0</i>	<i>0</i>
Summer Gallons	4,000	15,000	10,000	34,000
Volume of Product Received	\$57.96	\$217.35	\$144.90	\$492.66
\$20 Base Charge; Rest Volumetric	\$64.84	\$188.15	\$132.10	\$401.14
Seasonal Rates	\$71.80	\$214.25	\$149.50	\$460.30
Irrigation Rates	\$54.40	\$263.73	\$106.00	\$312.40





These numbers are based on  
Irvindale's budget

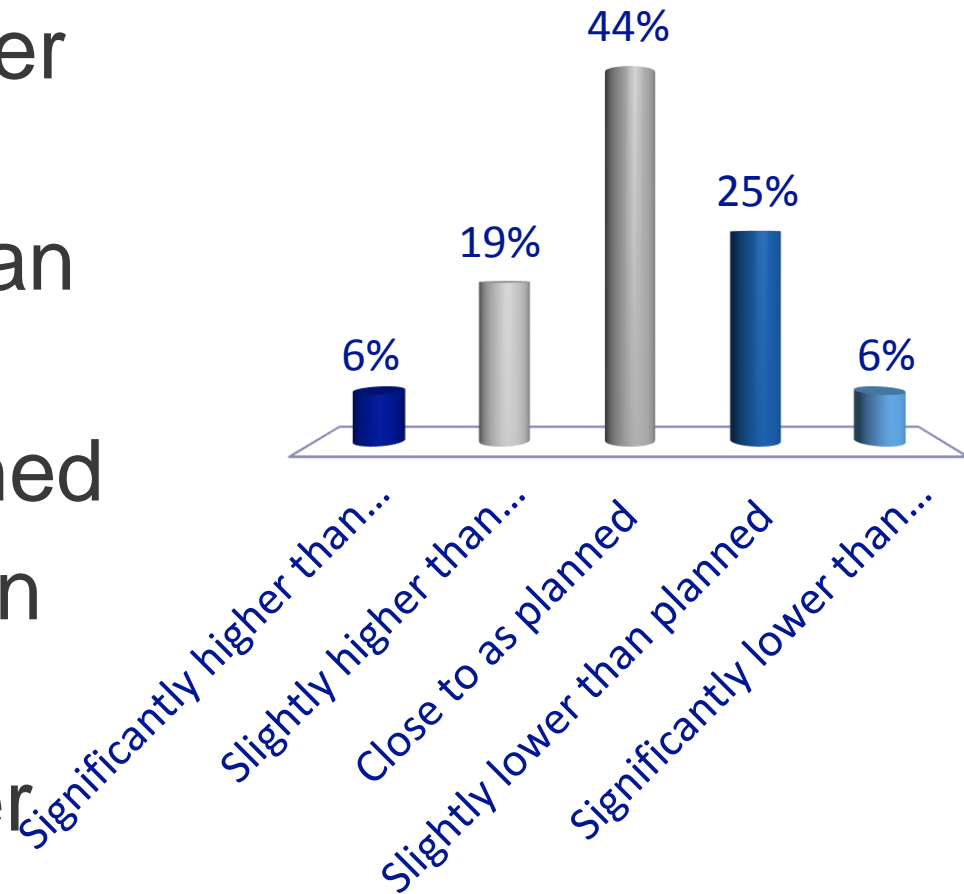
Does

Maybe, but  
probably  
not



# Your revenues last year were...

- A. Significantly higher than expected
- B. Slightly higher than expected
- C. Close to as planned
- D. Slightly lower than planned
- E. Significantly lower than planned





A blue-tinted photograph of industrial machinery, possibly a large pipe or valve, serves as the background for the top portion of the slide.

# What to do?

- Multiple forecasts based on different assumptions
- Ideally, be conservative
- Don't forget price elasticity
- Use tools to stress test projections
- Give board options



# Rate Changes



As rates go up, usage goes down

As a rule of thumb, typically usage goes down 3-4% for every 10% increase in rates



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

# Water & Wastewater Rates Analysis Model

Version 2.8.2 (last updated August 4, 2015)

UNC  
ENVIRONMENTAL FINANCE CENTER

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

Debt Service and Other Known Annual Expenses for Next 20 Years

Year	2015	2016	2017	2018	2019	2020
Interest	\$ 1,250,000	\$ 1,250,000	\$ 1,250,000	\$ 1,250,000	\$ 1,250,000	\$ 1,250,000
Principal	\$ 1,250,000	\$ 1,250,000	\$ 1,250,000	\$ 1,250,000	\$ 1,250,000	\$ 1,250,000
Other	\$ 1,250,000	\$ 1,250,000	\$ 1,250,000	\$ 1,250,000	\$ 1,250,000	\$ 1,250,000
<b>Total</b>	<b>\$ 3,750,000</b>	<b>\$ 3,750,000</b>	<b>\$ 3,750,000</b>	<b>\$ 3,750,000</b>	<b>\$ 3,750,000</b>	<b>\$ 3,750,000</b>

Additional Utility Expenses that occur Every Year

Category	2015
Personnel expenses	\$ 798,075
Electricity	\$ 295,000
Contractual services	\$ 283,000
Regulator/Asset Reliability operations & maintenance	\$ 950,000
Material services	\$ 75,000
Equipment services	\$ 348,500
Repairs and maintenance	\$ 45,125
Other charges	\$ 480,775

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Year:	2015	2016	2017	2018	2019	2020
Existing						
New						
Charge (gallons/month)	\$11.50	\$13.00	\$15.00	\$17.00	\$20.00	\$21.00
Block End	1,000	2,000	3,000	4,000	5,000	6,000
Block Start	0	1,000	2,000	3,000	4,000	5,000
Block Rate	\$2.78	\$2.78	\$2.78	\$3.00	\$3.50	\$4.00
Block Size	1,000	1,000	1,000	1,000	1,000	1,000
Block Rate	\$4.00	\$4.50	\$5.00	\$5.50	\$6.00	\$6.50
Block Size	1,000	1,000	1,000	1,000	1,000	1,000
Block Rate	\$6.00	\$6.50	\$7.00	\$8.00	\$9.00	\$9.50
Block Size	1,000	1,000	1,000	1,000	1,000	1,000

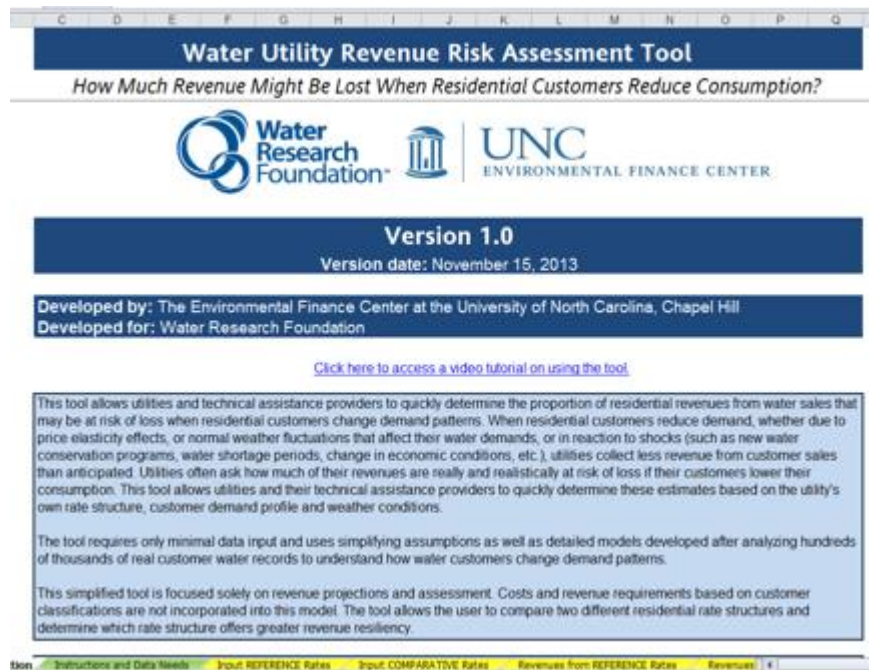
Error: missing block rates  
Error: missing block size

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)

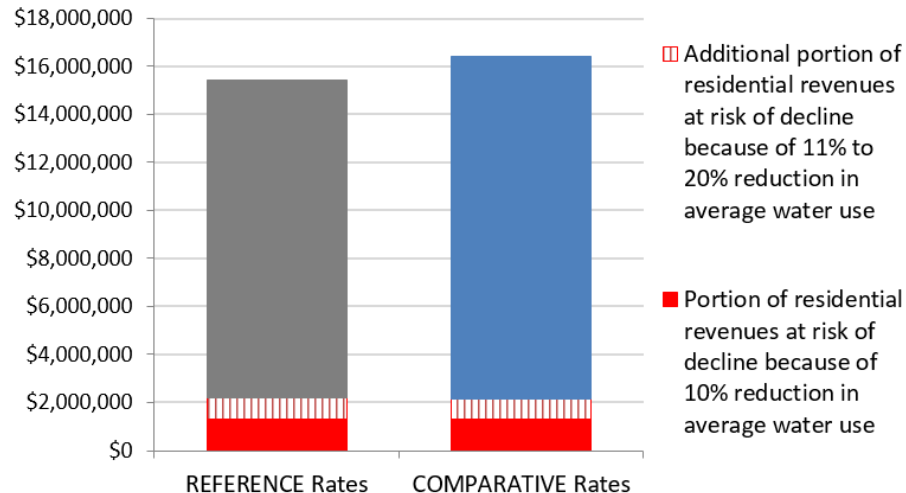


# Water Utility Revenue Risk Assessment Tool

## 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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**Communications Tools**

 **RATES HANDBOOK**  
Building Better

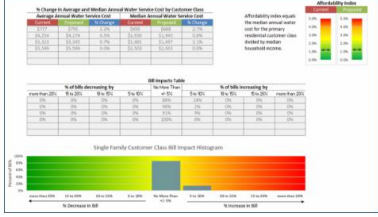
## AWE Sales Forecasting and Rate Model

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







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