

Designing Appropriate Rate Structures for Small Water Systems

September 24, 2013 – National Webinar

Sponsored by the U.S. Environmental Protection Agency.

One of several webinars conducted by the Environmental Finance Center Network for the Smart Management for Small Water Systems project.

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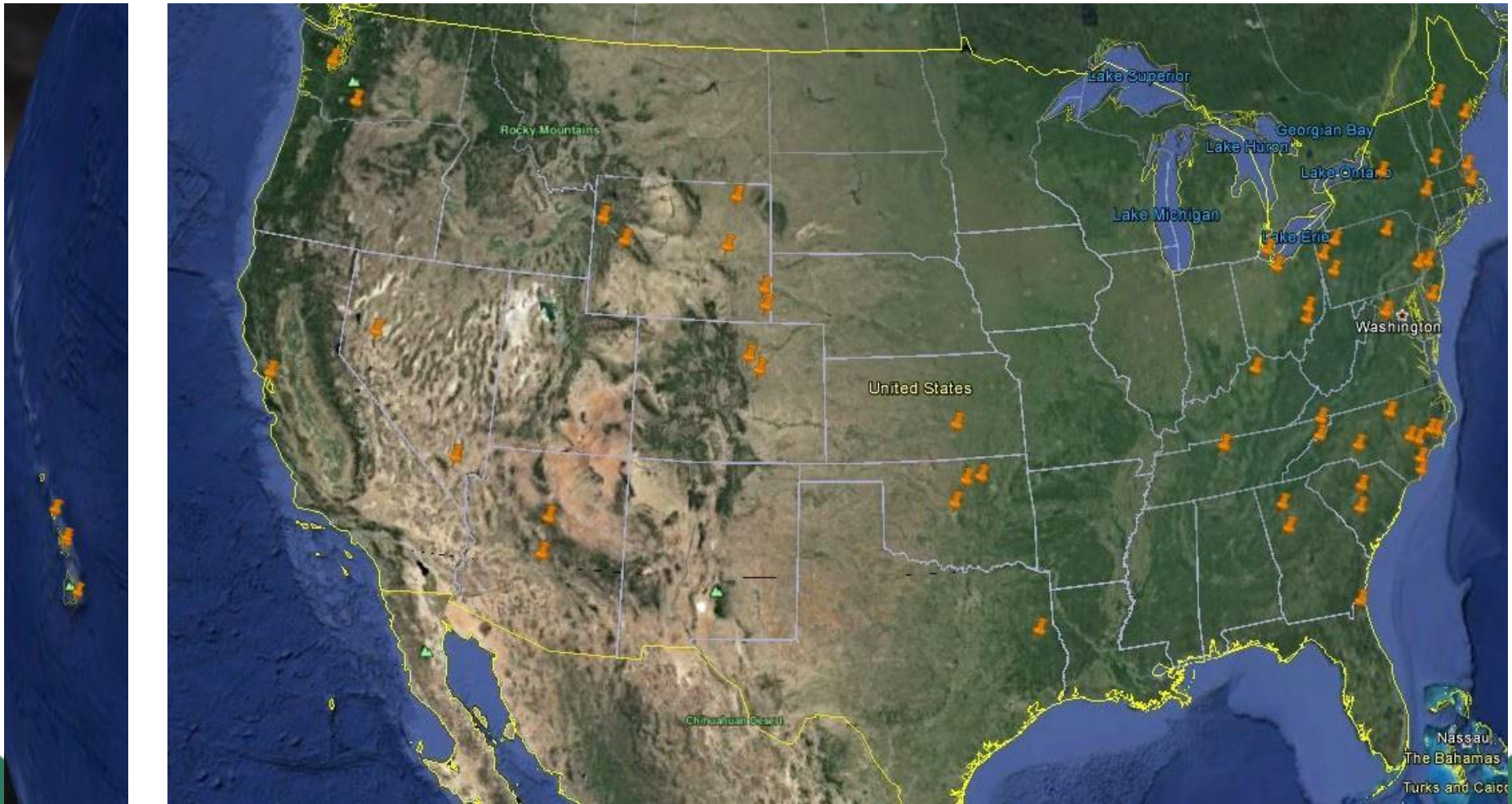
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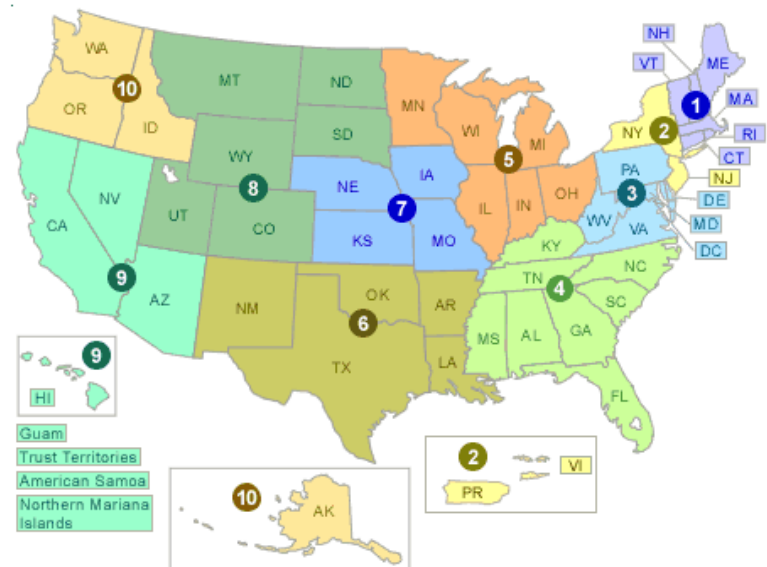
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The Environmental Finance Center Network

ABOUT THE NETWORK

The Environmental Finance Center Network (EFCN) is a university-based organization creating innovative solutions to the difficult how-to-pay issues of environmental protection and improvement. The EFCN works with the public and private sectors to promote sustainable environmental solutions while bolstering efforts to manage costs.



Environmental Finance Centers are located throughout the United States.

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Smart Management for Small Water Systems

under a Cooperative Agreement with the US EPA

- The EFCN provides training and technical assistance to small public water systems in all fifty states and five territories to help local water systems achieve and maintain compliance with the Safe Drinking Water Act.
- Workshops, trainings and direct assistance are provided on:
 - Asset Management
 - Water Loss Reduction
 - Water System Collaboration
 - **Fiscal Planning and Rate Setting**
 - Energy Management
 - Funding Coordination, and
 - Managerial and Financial Leadership
- Sign up for direct assistance at <http://efcnetwork.org/one-on-one/>



Definitions

Rates

Price per month or unit of consumption

(e.g.: \$4.50/1000 gallons, \$35.00/month, etc.)

Rate Structures

Rules by which the different rates are applied to a customer



**There is no one rate structure
that works perfectly for all water
utilities**



Session Objectives

- Present the basics of different rate structure design components
- Discuss when it is appropriate to favor some elements over others
- Introduce tools and resources to help you with rate setting



Rate Setting Resources



Setting Small Drinking Water System Rates for a Sustainable Future

One of the Simple Tools for Effective Performance (STEP) Guide Series



<http://www.awwa.org>

<http://www.epa.gov/safewater/smallsystems>



Rate Setting Resource

Free guide written for utility managers. Also applies to non-NC utilities.

<http://efc.sog.unc.edu/>

Find it in Resources / Publications

Designing Rate Structures that Support Your Objectives:
Guidelines for NC Water Systems

June 2009



Funding support for these guidelines provided by the Public Water Supply Section of the North Carolina Department of Environment and Natural Resources, and the United States Environmental Protection Agency

What Goes Into Reviewing Rates for the Next Year?

Will it provide sufficient cost recovery?

What exactly does this include?

Are we following the applicable laws?

Will revenues be resilient to changing water demands?

Are we allocating the costs to the right customers?

Do these rates send the right signals to our customers, based on our objectives?



Will our customers understand these rates?

Will our customers be able to pay these rates?



The Process of Setting Rates

Learn essential background information about rates

Determine critical characteristics of your utility and community

Design the most appropriate rate structure

Cost-of-Service Study
Compute the rates using projected costs and revenues

Re-evaluate/adjust rate structure to fit primary objectives



Know your Costs

- What are your operating expenses next year?
- Is your customer base changing next year?
- Is water demand changing?
- Do you have any debt service payment requirements?
- Do you anticipate any large capital expenses in the next few years? [Check/create your C.I.P. and asset management plan.](#)
- How much of your projected expenses are fixed vs. variable?



Fixed vs. Variable Costs

- Variable costs depend on volume of water:
 - Water purchases, chemicals, energy
- Fixed costs do not depend on volume of water in the short-term:
 - Staffing, lab, meter reading, billing, debt service, capital costs, vehicles, machinery, insurance, technical support, ... basically almost everything
- The balance of fixed/variable costs guides the rate structure design and rate setting



Understanding Your Utility and Served Community

- Do you expect to meet demands comfortably?
- What is the make up of your served community?
Serve many large families? What is the community's ability to pay? Is it a seasonal community? Does demand vary greatly by season? Does a large fraction of your revenues come from a small number of customers? What is the mix of residential and non-residential customers? Who are your biggest customers?
- In the past few years, how much of your revenues were fixed vs. variable?



Fixed vs. Variable Revenues

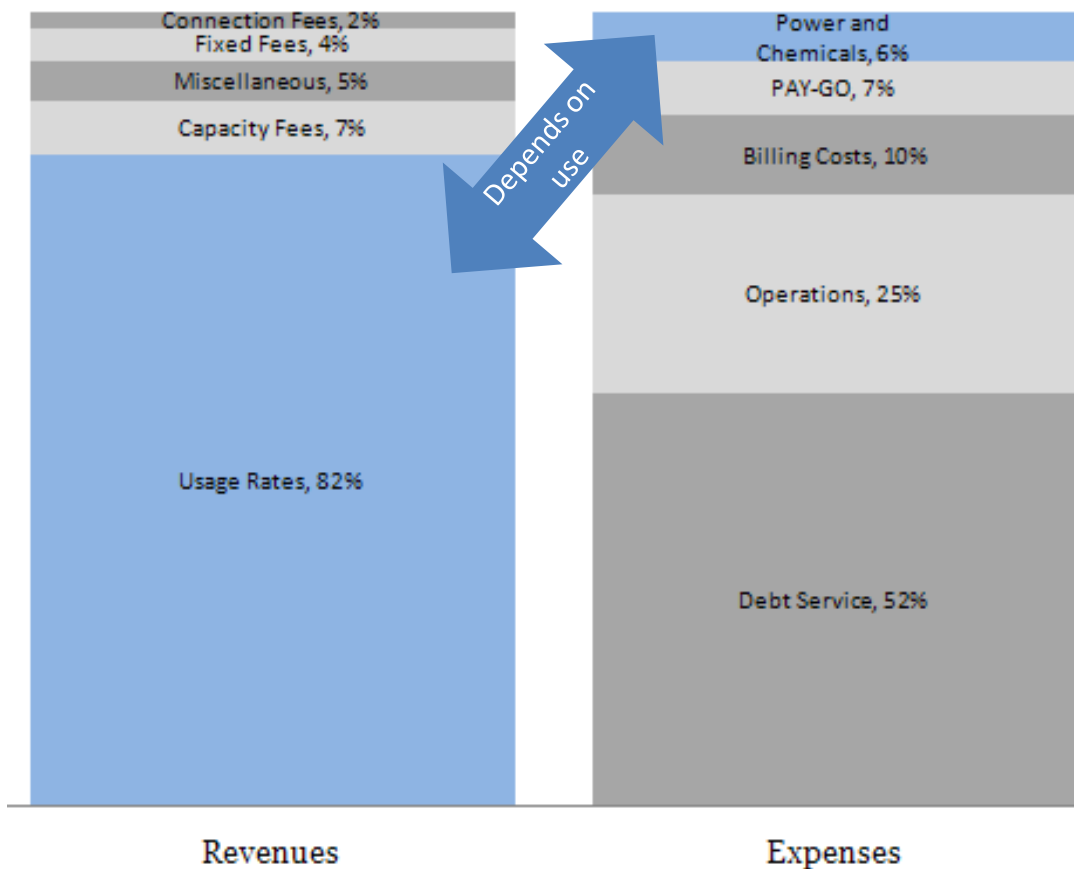
- Variable revenues are 100% dependent on the volume of water:
 - The volumetric rates
- Fixed revenues do not depend on volume of water in the short-term:
 - Base (minimum) charges, flat fees, penalties and charges, connection fees, etc.



How Rates and Water Use Interact

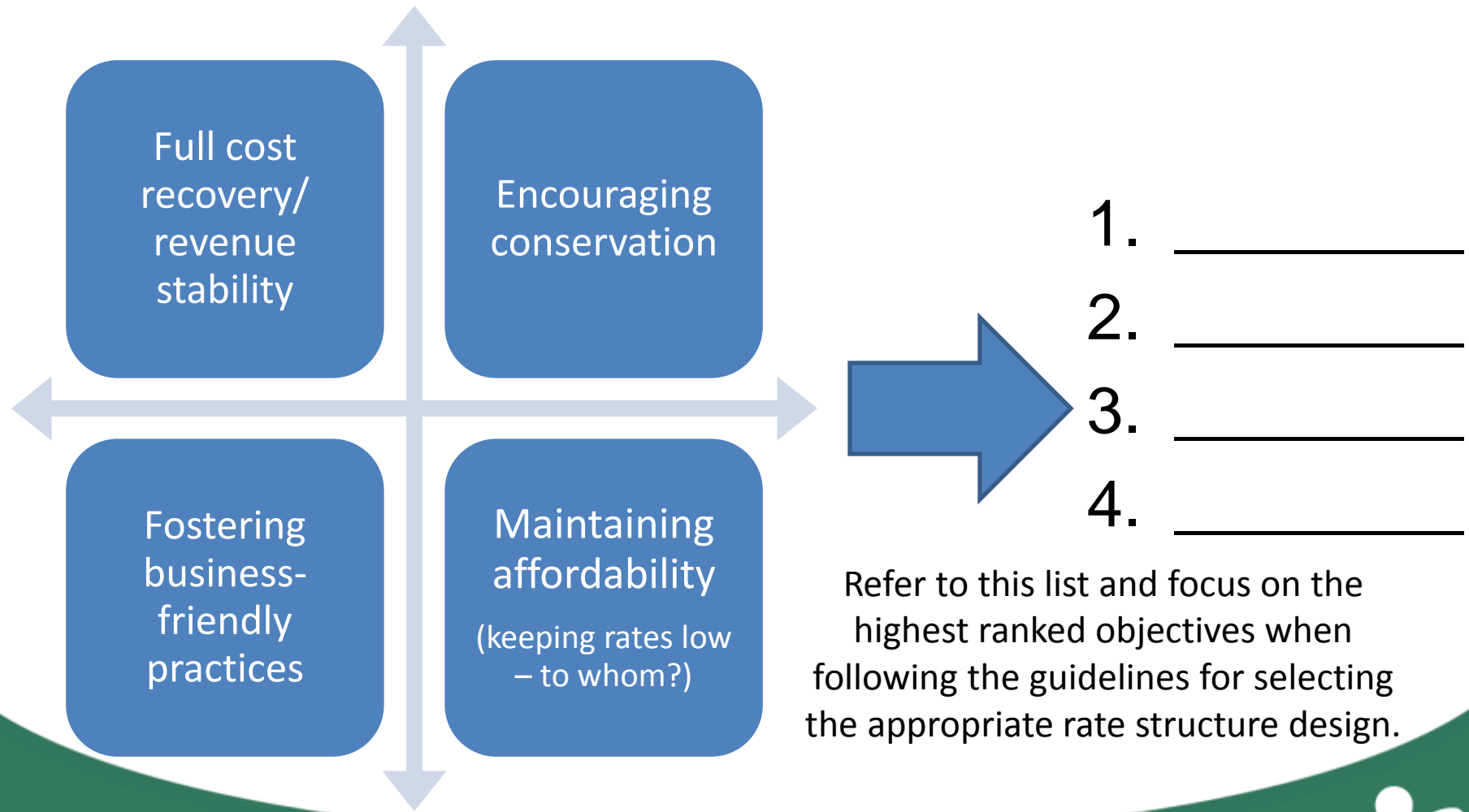
Utilities' costs are mostly fixed, not dependent on the amount of water sold/used by the customers. But the majority of revenues come from the amount of water sold. If demand decreases, revenues drop significantly but not costs.

Revenue and Expenses for Charlotte-Mecklenburg Utilities in a Given Year



Source: CMU Director Doug Bean's presentation to the Charlotte City Council on December 1, 2008.

Before You Begin: Rank Your Utility's Rate Setting Objectives



Refer to this list and focus on the highest ranked objectives when following the guidelines for selecting the appropriate rate structure design.



Elements of Rate Structure Designs

1. Customer classes/distinction
2. Billing period
3. Base charge
4. Consumption allowance included with base charge
5. Volumetric rate structure
6. (If applicable) Number of blocks, block sizes and rate differentials
7. (Optional) Temporal adjustments
8. Frequency of rate changes



Elements of Rate Structure Designs:

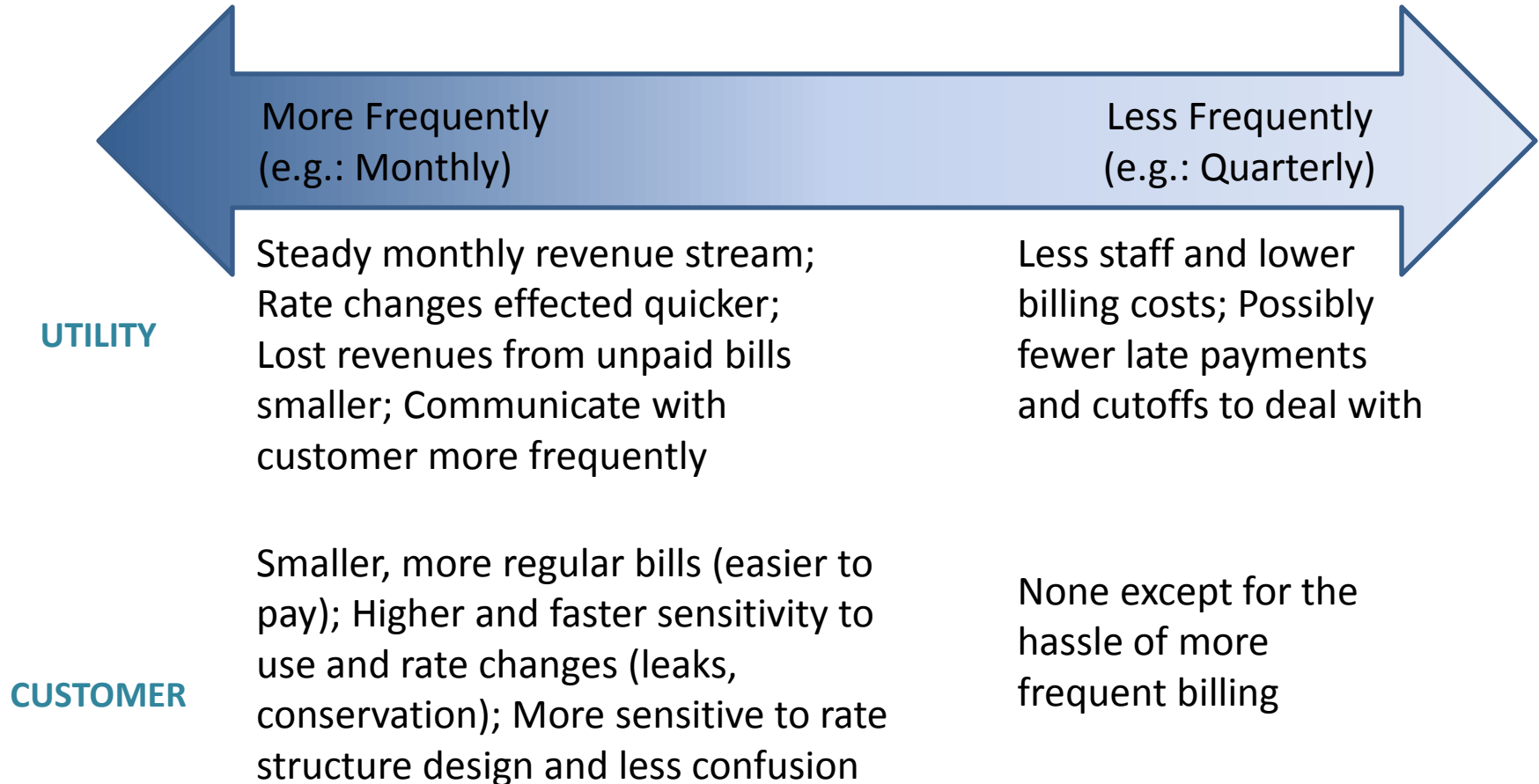
1. Customer Classes/Distinction

Alternative	Targets
One rate structure for all	All are equal
Separate rate structure for residential, irrigation, commercial, industrial, governmental, or wholesale customers	Specific type of customer
One rate structure, but with different base charges based on meter size	Non-residential or multi-family housing
One rate structure for all, but with blocks that implicitly only target non-residential use	Non-residential
Negotiated rate structure with individual high-use customers (typically an industrial customer)	Only one customer
Different rates for customers outside municipal limits/service area boundaries	“Outside” customers



Elements of Rate Structure Designs:

2. Billing Period



Suggestion: Use a monthly billing period if you can afford it



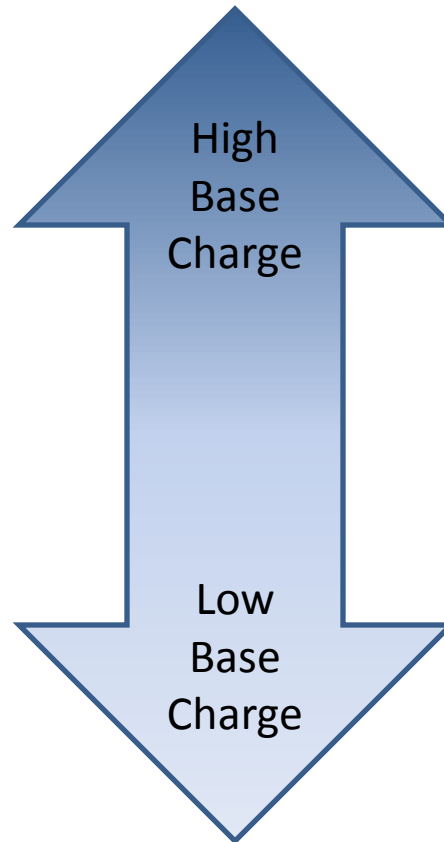
Elements of Rate Structure Designs:

3. Base Charges

PROS

Higher “guaranteed” revenue to pay off the fixed costs;
Higher month-to-month revenue stability

Provides strong incentive to keep use low;
Customers more likely to notice month-to-month change in bill due to change in use



CONS

Customers with very low use are paying a high unit price;
Customers do not witness a significant change in bill if conserve water

Revenues less stable for utility;
Revenues are highly seasonal

Suggestion: Smaller utilities should lean towards higher base charges



Elements of Rate Structure Designs:

3. Base Charges

Two common ways to charge:

- Constant (by customer class): \$35.00/month
- By meter size:
 - \$35.00/month for 5/8" or 3/4" meter
 - \$55.00/month for 1" meter
 - \$105.00/month for 2" meter, etc.



Example of Equivalent Meter-and-Service Ratios

Example described in AWWA M1 Manual, but **you should calculate your own** cost of connection and meter investment ratios. See M1 Manual for method.

Meter Size	Ratio Equivalent to 5/8" Meter (example only; do not use as a rule of thumb)
5/8"	1.0
3/4"	1.1
1"	1.4
1.5"	1.8
2"	2.9
3"	11.0
4"	14.0
6"	21.0
8"	29.0



Elements of Rate Structure Designs:

4. Consumption Allowance with Base Charge

Bills and revenues are more sensitive to use changes

Provides a lifeline amount of water to offset some of the effects of high base charges

Provides a greater offset for the customer, but discourages conservation

Do not include any (0 gallons)

Include some amount (e.g.: 1,000 gallons/month)

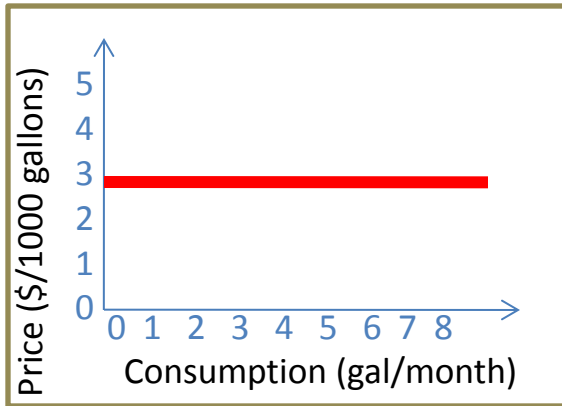
Include high amount (e.g.: 3,000 gallons/month)

Suggestion: For systems with low base charges, do not include any consumption allowance. For systems with high base charges but wish to encourage conservation, keep consumption allowance low, if any.



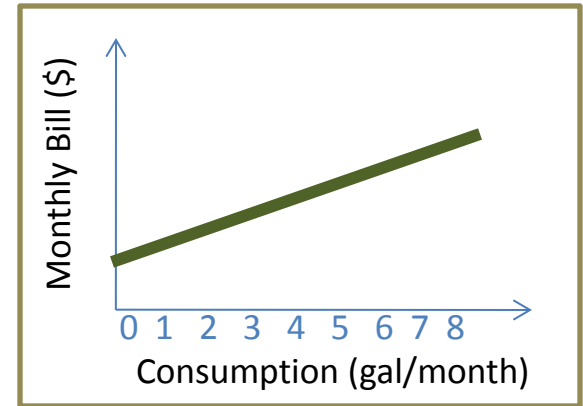
Elements of Rate Structure Designs:

5. Volumetric Rate Structure



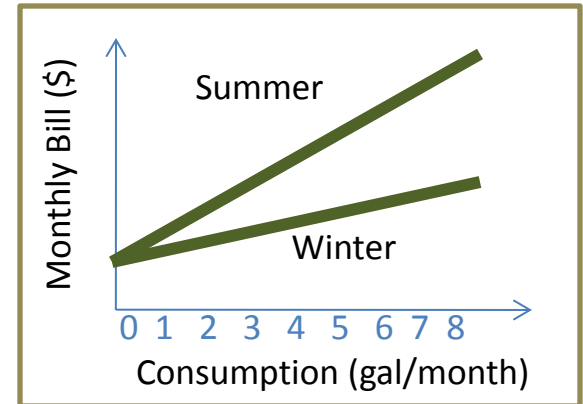
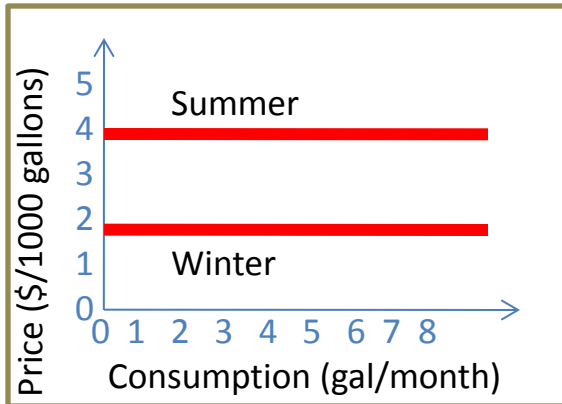
Uniform (“Flat”) Rates

Simple and Fair



Seasonal (Uniform) Rates

Conservation-oriented, good for seasonal communities

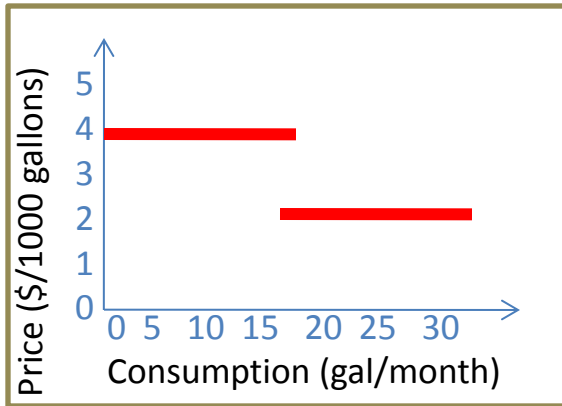


Suggestion: Pick the volumetric rate structure that fits your stated primary objectives best. Do not use decreasing blocks for residential consumption.

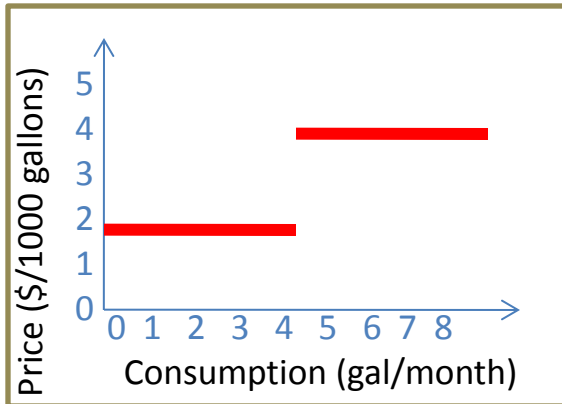
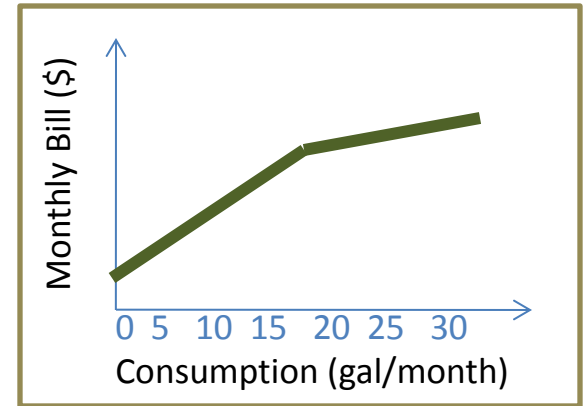


Elements of Rate Structure Designs:

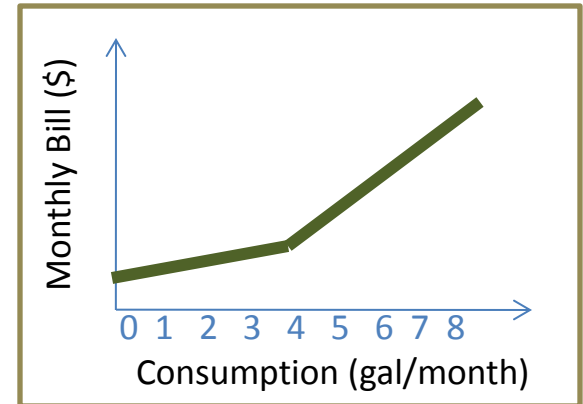
5. Volumetric Rate Structure



Decreasing Block Rates
Provide price break for large users (e.g.: commercial). Do not use for residential.



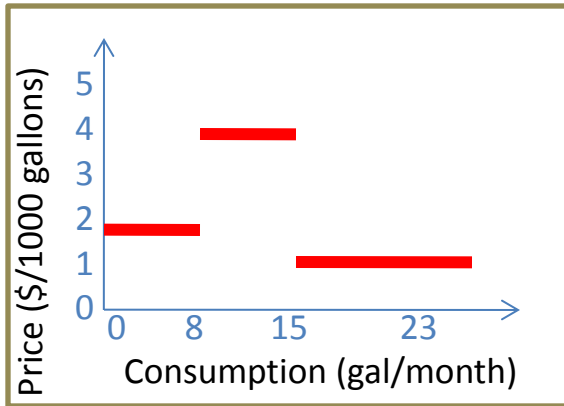
Increasing Block Rates
Conservation-oriented. Consider large families.



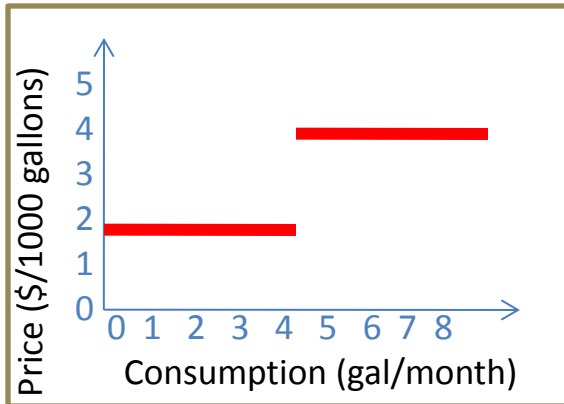
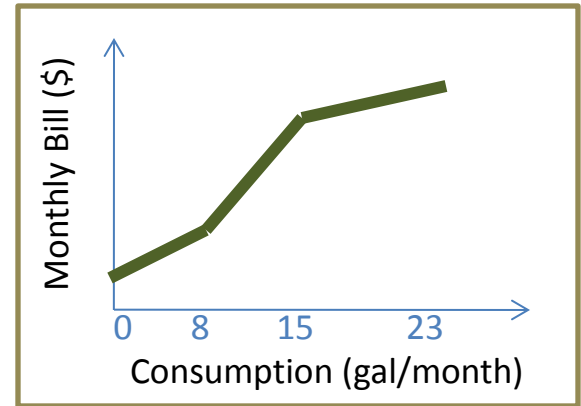
Suggestion: Pick the volumetric rate structure that fits your stated primary objectives best. Do not use decreasing blocks for residential consumption.



Elements of Rate Structure Designs: 5. Volumetric Rate Structure

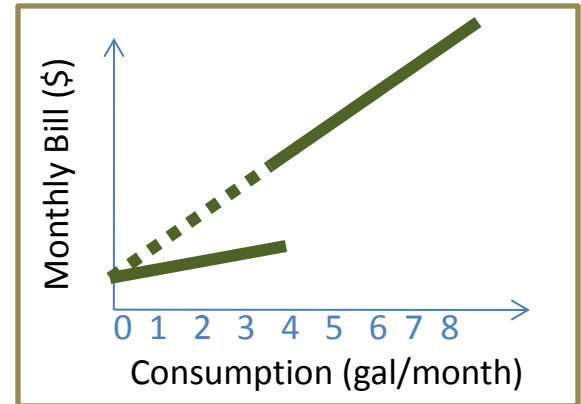


Targeted Block Rates
Increase *and* decrease based on desired targets: increasing for residential, decreasing for commercial



Uniform At One Block

Complex, but greater price incentives over traditional block rate structures

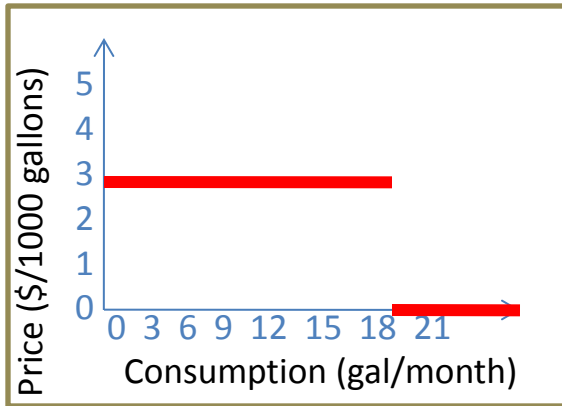


Suggestion: Pick the volumetric rate structure that fits your stated primary objectives best. Do not use decreasing blocks for residential consumption.

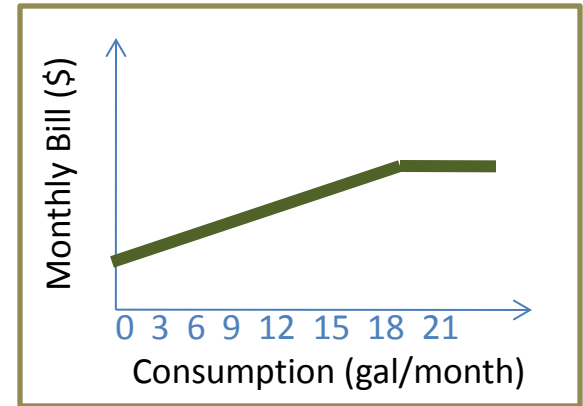


Elements of Rate Structure Designs:

5. Volumetric Rate Structure

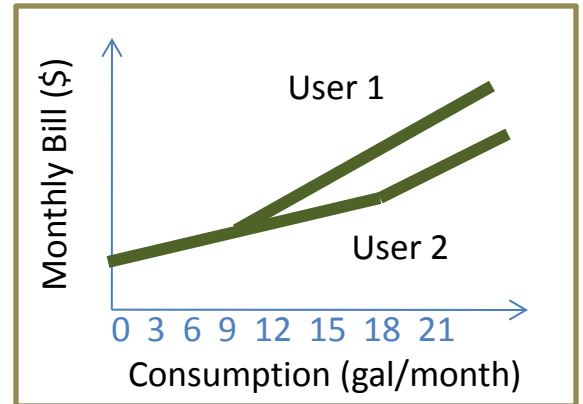
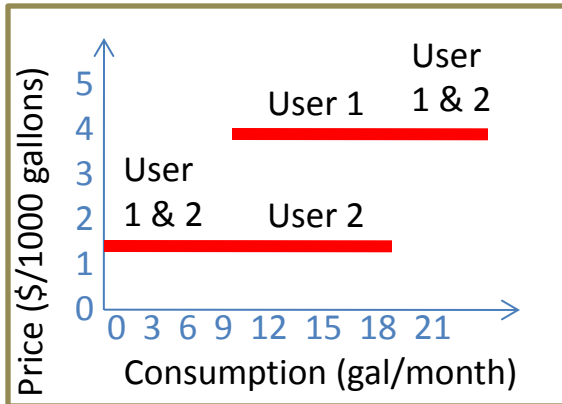


Uniform Rates with Cap
 Only appropriate for residential **sewer**, cap at max. indoor use level



Budget-based Rates

Tailored to each customer, most equitable, accounts for family size and industry, conservation-oriented, but complex



Suggestion: Pick the volumetric rate structure that fits your stated primary objectives best. Do not use decreasing blocks for residential consumption.



Elements of Rate Structure Designs:

5. Volumetric Rate Structure

Another rate structure option:

Non-volumetric! Only charge a periodic fixed (base) charge and not based on volume, or include water with rent.

Not reading meters. Simplest and cheapest option.
Gives the customer zero financial incentive to be efficient in their water use while utility incurs



Elements of Rate Structure Designs:

6. (If Applicable) Block Designs

For block rate structures to be effective:

- **Decide on the correct number of blocks**

How many targets should you set on residential use? Do you want all non-residential use to be charged at a uniform rate, or provide blocks for non-residential use as well?

- **Decide on where the blocks should end/start**

Start the second block only where summertime residential use ends and non-residential use continues (i.e.: charge residential use at uniform rates)? Set increasing block rates for residential customers where the blocks end at average use (e.g.: 5,000 gal/month), then double it (e.g.: 10,000 gal/month), and then over that (to target irrigation use more specifically)?



Elements of Rate Structure Designs:

6. (If Applicable) Block Designs

For block rate structures to be effective:

- **Set significant rate differentials between blocks**

Charging only 50 cents/1,000 gallons more in one block than in the preceding block defeats the purpose of using an increasing block rate structure. If you select a block rate structure, select significant rate differentials to see any added value of your rate structure.

- **Keep in mind your base charge and consumption allowance**

High base charges and consumption allowances may be significant portions of the total bill, greatly diluting the effect of an increasing block rate structure on providing incentives to conserve. Offset high base charges by reducing the consumption allowance, or setting high block rates.



Elements of Rate Structure Designs:

6. (If Applicable) Block Designs

For block rate structures to be effective:

- Meter reading must be punctual

If the meter is read a few days too late, it may unjustly place the last few days' of a customer's use in a higher block.

- Replace meters frequently and repair lines quickly

Faulty meters or leaking pipes will cause the customer to be billed at the wrong block levels, costing either the utility lost revenue or the customer more.



Elements of Rate Structure Designs:

6. (If Applicable) Block Designs

For block rate structures to be effective:

- Consider the adverse effect on large families

Large families consistently use high amounts of water throughout the year and may not have capacity to conserve. An increasing block rate structure therefore negatively affects the customer, without achieving any conservation objectives. Investigate your billing records to estimate the number of residential accounts that consistently use high amounts of water and use this knowledge to select the appropriate block sizes to mitigate this effect. Consider using uniform rates or budget-based rate structures if the community has many large families.



Elements of Rate Structure Designs:

7. (Optional) Temporal Adjustments

- Prepare for drought in advance: create an ordinance *in advance* to give the utility the ability to raise rates temporarily during a water shortage scenario (sometimes called “drought surcharges”).
- Specify the potential rate increases precisely.
- Rate increases should be substantial to encourage conservation.
- Explicitly state the conditions that would trigger the temporary rate changes on and off. Tie the triggers to your water shortage response plans and water reservoir/well levels.

Note: Temporary rate increases that are significant in magnitude have been shown to be effective methods of encouraging conservation while recovering lost revenue.



Elements of Rate Structure Designs:

8. Frequency of Rate Changes

Decide when and how often you will review your rates. Some alternatives:

- Always review your rates annually (recommended)
- Review your financial health indicators annually, and then review your rates if any of the indicators reflect poor financing



Elements of Rate Structure Designs:

8. Frequency of Rate Changes

Important: Avoid maintaining low rates at the expense of your utility's financial health. It will either lead to a sudden, massive rate increase in the future or to failing systems and endangering public health.



Examples of rate structures



A Few Scenarios

Keep in mind:

No one rate structure design fits all utilities, even in each of the following scenarios.

Showing the starting point of discussion – each utility would then have to evaluate and tailor rate structure according to own conditions.



Scenario: Groundwater System with a Very Small Customer Base

High fixed costs, small number of customers

- High base charges, possibly with a consumption allowance.
- Monthly billing if very small number of customers; bi-monthly if cost savings outweigh cash flow stability (phase the meter reading over the two months)

Warning: No one rate structure design fits all utilities, even in this scenario.



Scenario: Small, Purchase Water System

High variable costs, small number of customers

- Lower base charges (sufficient to pay off the monthly fixed/minimum charge to the seller utility plus at least most of own fixed costs),
- No consumption allowance (unless included by the seller utility)
- High volumetric rates that exceed the variable rates you are paying the utility

Warning: No one rate structure design fits all utilities, even in this scenario.



Scenario: Worried About Affordability of Rates for Residential Customers

- Do not compromise revenue sufficiency to maintain artificially low rates!
- Create separate residential rate structure:
 - Low base charges with no consumption allowance
 - Increasing block rates with a first block only up to lifeline amount (~ 2,000 gallons/month)
 - Relatively steep increases in rates between blocks
 - Monthly billing
- Consider separate “Customer Assistance Programs”
- Find out if it is legal to charge different rates for low-income or fixed-income customers (in many cases, it is not)

Warning: No one rate structure design fits all utilities, even in this scenario.



Scenario: Water Demands are Decreasing

- Increase base charges and the percent of revenues from fixed charges.
- If using block rates, considering consolidating some of the blocks and/or decreasing the size of the blocks accordingly.

Warning: No one rate structure design fits all utilities, even in this scenario.



Scenario: Want to Encourage Conservation

- Monthly billing
- Lower base charge with no consumption allowance, higher volumetric rates
- Uniform rates, increasing block rates, or budget-based rates.
- Seasonal rates during peak demand season.
- Many, small block sizes and steep differentials in rates between blocks. Low rate for the first block.
- Have a water shortage rate structure

Warning: No one rate structure design fits all utilities, even in this scenario.



Scenario: Have Highly Seasonal Demands

Resorts, second home communities, etc.

- Charge a base charge year-round
- Consider seasonal rate structure: higher rates during high season(s)
- If seasonal demand is due to irrigation water, have a separate irrigation rate structure where rates are higher than standard water rates

Warning: No one rate structure design fits all utilities, even in this scenario.



You Have a General Rate Structure Design in Mind. Now What?



The Process of Setting Rates

Learn essential background information about rates

Determine critical characteristics of your utility and community

Design the most appropriate rate structure

Cost-of-Service Study
Compute the rates using projected costs and revenues

Re-evaluate/adjust rate structure to fit primary objectives



Compute the Rates

- Use a Cost-of-Service study method to calculate what the rates would have to be to fit into your rate structure model to produce the budgeted revenue requirements
- Resources available



Re-evaluate the Proposed Rate Structure

- ✓ Will your new rate structure provide sufficient revenue next year to be considered “full cost pricing”?
- ✓ Is your rate structure design in tune with statutory and/or funding agency requirements?
- ✓ Is the overall rate structure design in sync with the primary objective(s) you identified?



Re-evaluate the Proposed Rate Structure

- ✓ Is the bill for average residential consumption within the ability to pay of your customers, including your low-income customers?
- ✓ Are the rates fair and equitable to your non-residential customers?
- ✓ Is your rate structure relatively simple to understand?



Rate Setting Resources



Setting Small Drinking Water System Rates for a Sustainable Future

One of the Simple Tools for Effective Performance (STEP) Guide Series



<http://www.awwa.org>


<http://www.epa.gov/safewater/smallsystems>



Water and Sewer Rates Analysis Model

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

Find it in Resources / Tools



Water and Sewer Rates Analysis Model

Version 2.3

20-year fund balance estimates under proposed new rates vs. existing rates: compare side-by-side
Uniform or block rates Residential and non-residential rates Changes to customers and demands

INSTRUCTIONS

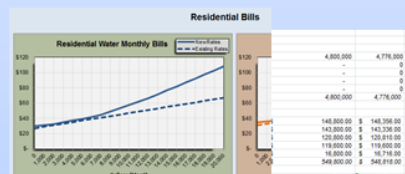
- 1) Click on tabs at bottom of screen to navigate to different pages.
- 2) On the **"Data Input 1"** tab enter current and new rate details in the dark green cells.
- 3) On the **"Data Input 2"** tab enter current consumption levels, utility finances, and other assumptions in the dark green cells.
- 4) On the **"Charts"** tab, see projections of the End of Year Fund Balance, and input a Fund Balance Policy in the dark green cell at the top of the page.
- 5) Compare new rates to existing rates in **"Compare Monthly Bills"** and their impacts on costs and revenues in **"Existing Rates"** or **"New Rates"**.

2012 Existing		2012 Existing	
Starting Fund Balance	\$ 2,500.0		
System Expenses (i.e. treatment, water purchase)	\$ 200.0		
Depreciation	\$ 89.0		
Salaries(*)	\$ 150.0		
Sewage Availability Service	\$ 20.0		
Supplies	\$ 8.0		
Sewage Utilities	\$ 5.0		
Water Billing administrative expense	\$ 5.0		
Lab Tests	\$ 5.0		
Repairs & Maintenance	\$ 20.0		
Miscellaneous Expenses	\$ 15.0		

(*) Salaries of employees who work for water and sewer system, it can include an employee's time, like administrative personnel

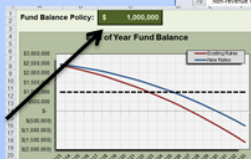
Assumptions		2012 Existing	
Inflation of utility expenses (%/year)			
Residential:			
Change in Average Consumption (%/year)			

Rate Structure				2012	
				Existing	
Water Base Rate				\$10.00	
Water:					
Block Rate 1 (\$/1,000 gal)	2,000 gal/mo	2,000 gal/mo	\$1.00		
Block Rate 2 (\$/1,000 gal)	5,000 gal/mo	5,000 gal/mo	\$2.00		
Block Rate 3 (\$/1,000 gal)	7,000 gal/mo	7,000 gal/mo	\$3.00		
Block Rate 4 (\$/1,000 gal)	12,000 gal/mo	12,000 gal/mo	\$4.00		
Final Block Rate (\$/1,000 gal)	12,001 gal/mo		\$5.00		
Sewer Base Rate				\$10.00	
Sewer:					
Block Rate 1 (\$/1,000 gal)	2,000 gal/mo	2,000 gal/mo	\$1.00		
Block Rate 2 (\$/1,000 gal)	6,000 gal/mo	6,000 gal/mo	\$2.00		
Block Rate 3 (\$/1,000 gal)	7,000 gal/mo	7,000 gal/mo	\$3.00		
Block Rate 4 (\$/1,000 gal)	12,000 gal/mo	12,000 gal/mo	\$4.00		
Final Block Rate (\$/1,000 gal)	12,001 gal/mo		\$5.00		



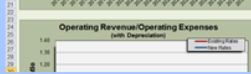
Residential Water Monthly Bills

Year	Existing Rates	New Rates
2012	140,000.00	140,000.00
2013	143,000.00	143,000.00
2014	150,000.00	150,000.00
2015	119,000.00	119,000.00
2016	16,000.00	16,000.00
2017	548,818.00	548,818.00



Fund Balance Policy

Year	Existing Rates	New Rates
2012	\$1,000,000	\$1,000,000
2013	\$1,000,000	\$1,000,000
2014	\$1,000,000	\$1,000,000
2015	\$1,000,000	\$1,000,000
2016	\$1,000,000	\$1,000,000
2017	\$1,000,000	\$1,000,000



Operating Revenue/Operating Expenses

Year	Existing Rates	New Rates
2012	\$551,144	\$557,295
2013	\$631,144	\$638,495
2014	\$614,344	\$622,677

Note: This tool models the impact on a utility's fund balance of a one-time increase in rates, rather than an ongoing series of rate increases.

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Funded by the Public Water Supply Section, Division of Water Resources at the NC Department of Environment and Natural Resources, and the U.S. Environmental Protection Agency



Some EFCN Resources

Tools, trainings, assistance and resources for small water systems: www.efcnetwork.org

Environmental Finance blog
(EFC UNC)
efc.web.unc.edu/

Environmental Finance
at the University of North Carolina

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Last call: Join us at 2:00pm EST to learn about our #water rates dashboards for #NC #WA #VT #HI #TX #CO #AZ <http://t.co/lnu0P1E8Bq> about 30 minutes ago from [web/Rdgh/Rdgherf/arcote](#)

Tomorrow we're talking rates and financial metrics for small #water systems! Join us! <http://t.co/lnu0P1E8Bq> #waterwednesday about 20 hours ago from [web/Rdgh/Rdgherf/arcote](#)

RT @CetWaterSmart: @watermaster @CetWaterSmart @steing @EFCatUNC This is exactly what we'll be discussing in next

Lessons from Drinking Water Systems in Hawai'i and the U.S. Territories
By Alexandra Kay, on August 14th, 2013
by Glenn Barnes

Glenn Barnes is senior project director with the Environmental Finance Center based at the University of North Carolina at Chapel Hill. He is the co-director of the Smart Management for Small Water Systems Project.

Recently, the Environmental Finance Center at UNC led workshops on energy management and rate setting for drinking water [...]

August 14th, 2013 | Tags: energy management, rate setting, regionalization, small system | Category: Drinking Water & Wastewater | Leave a comment

Water, Water Everywhere? The Significance of the Colorado Continental Divide in the 2012 Colorado Water and Wastewater Rates Dashboard
By Christopher Kenrick, on July 25th, 2013

Chris Kenrick is a Research Assistant at the Environmental Finance Center and is pursuing dual master's degrees in information science and public administration.

Have you ever spent hours upon end gathering information from government websites? Some websites have the information you are looking for right on the home page, and then there are others that [...]

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Thank you for attending this webinar.



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