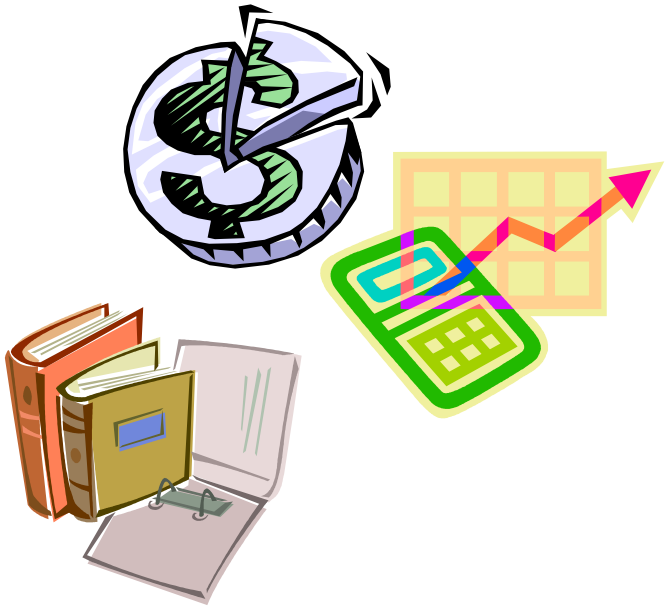
Module 8
Rate Design Overview for Small Water Systems

Workbook



Financial/Managerial Series

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RCAP Solutions, Inc.
Penn State Harrisburg Environmental Training Center

Training Module 8
Rate Design Overview for Small Water Systems

Objectives:

The purpose of this training module is to:

- Define the main types of rate setting methodologies.
- Explain the advantages and disadvantages of each methodology.
- View an example of each type of rate setting methodology.
- Describe what is needed to build support for increased user fees.
- Explain that a sufficient rate is the key to a sound financial base as it can help ensure that revenues exceed costs.

Table of Contents

Introduction

During this training module, we'll be describing:

- The different types of rate structures, their advantages and disadvantages, and how they are set;
- An example of each type of rate structure; and
- Why proper rate setting is important and how to build support for increases.

We'll provide a basic overview of these in this training module.

Rate Structures and Examples

To do this, let's start with the definition of a rate structure.

A rate structure is the mathematical method a water system utilizes to generate revenue by allocating costs among users.

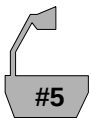
There are many ways a small water system can set up the rate structure. Two of the main examples are a flat rate and a base rate plus usage charge.

The flat rate structure is generally utilized when the users do not have meters installed. Every user pays the same regardless of consumption.

The advantages of a flat rate structure are:

- Reduced costs since there are no meters to read and in many cases there are no bills to generate (many systems use an annual coupon book) and accounting procedures and systems can be simplified.

- Steady revenue stream over time.



The disadvantages of a flat rate structure are:

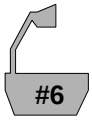
- Revenue does not increase to cover increased costs from increased consumption such as in summer months.

- Lower consuming users forced to subsidize higher consuming users, since all users pay the same regardless of consumption.

- Problems associated with assignment of multiple unit businesses and industry.

- No incentive to conserve water which can result in increased costs and source water depletion.

- Does not indicate tightness of system (leaking) since there are no meters in the homes.



Let's work through a short example. Please refer to the example in your workbook. Take a couple of minutes and see if you can determine the *minimum* rate the system should charge its users.

Exercise #1

The Smallville Water Company is a system that wants to utilize a flat rate structure since water meters have not been installed. Determine the *minimum* rate the system should charge its users based on the information provided below.

Number of users:	500
Projected annual O&M cost:	$35,000
Projected annual Admin cost:	$15,000
Projected annual Salary cost:	$45,000
Projected annual Debt cost:	$55,000
Projected annual Total cost:	$150,000
Minimum monthly rate:	$25.00

Use the space below to complete the exercise.

Rate Setting Tips:

- Don't just use last year's costs. When determining the rate be sure to use your cost projections for the upcoming year and include a reserve for unanticipated expenses.
- When projecting costs for the upcoming year, some of the previous year's costs plus an inflation factor can be used. This data can come from the audit report. However, be certain to include any new expenses you anticipate such as a new truck, storage tank painting, replacing filter sand, a new computer, pump replacement, etc., that you may not have had last year.
- Rate setting is an ongoing process which is most effective if it is done annually.

Now that we've discussed the flat rate, let's cover the next type.

The base rate plus usage charge structure, commonly known as the metered rate, includes two components:

- The base rate allows systems to charge all users the same amount to cover fixed costs such as debt repayment and administrative costs.

- The usage charge allows the system to charge users based on their water consumption to cover its variable costs, or the costs that vary along with water consumption such as O&M and utilities.

The advantages of a base rate plus usage charge (metered rate) structure are:

- Revenue fluctuates with water consumption and costs at the plant.
- Users share equally in the fixed costs and pay for the water they use.
- Encourages conservation and protects against depletion of the water source.
- Meter data can be used to assist in leak detection.
- In communities providing sewage conveyance and/or treatment, assists in determining billing for that service.

The disadvantages of a base rate plus usage charge (metered rate) structure are:

- Unsteady revenue stream throughout the year.
- Increased administrative costs through bill generation and mailing along with costs associated with meter reading.
- Meter ownership and maintenance costs.
- More complex accounting and recordkeeping software.

How does one ensure that this type of rate structure will generate sufficient revenues?

You need to take the flat rate methodology a couple of steps further. We learned in the earlier example that you need to determine your projected costs for the upcoming year. Now you have to split those costs into fixed and variable costs.

Projected fixed costs include debt repayment, office expenses and postage, administrative salaries, meter reading, and other expenses that do not change relative to a user's water consumption.

An example is the cost of bill generation. Regardless of the amount of water used by a customer, it will cost the system the same to read the meter, print the bill, mail the bill, and process payment.

Projected variable costs include utilities, chemicals, and other expenses that change relative to a user's water consumption.

An example is electricity. The electrical costs will vary along with changes in the volume of water treated and pumped.

Rate Setting Tips:

- Note that it's not the number of gallons *treated*, but the number of gallons *billed*. Why? Because you need to recover your costs based on the water that is consumed (i.e. billed) by users. A percentage of the water that is treated is lost through leaks and for other reasons.
- One benefit of this methodology is that it forces you to examine the system's billed gallonage relative to its treated gallonage. This could clue you in to some major leaks in the system if the numbers are very different.

If you have a new system and are trying to determine a rate, your engineer has very likely produced some projections of total water consumption for the system, along with projections of costs. You can use these but be certain that you include a reserve to ensure sufficient revenue in case the projections are off or incomplete.

Rate Setting Tips:

- Even the most complicated rate structure will be inadequate if system costs exceed revenues.
- *KISS* principle: *K*eep *I*t *S*imple, *S*tudent.

So what do you do with all these numbers? Well, let's run through an example to see how you might derive a rate from what we have so far. Since there are some more complicated calculations in this example, let's run through it together.

Exercise #2

Here we have a breakdown of the number of users and the projected fixed costs.

Number of users:	500

Fixed costs:

Projected annual Admin cost:	$ 5,000
Projected annual Debt cost:	$55,000
Projected annual Admin Salary cost:	$15,000
Projected annual Engineering cost:	$ 3,000
Projected annual Audit/Legal cost:	$ 4,000
Projected annual Insurance cost:	$ 3,000
Total Projected Fixed Costs	$85,000

Here we have a breakdown of the projected variable costs and the prior year billed gallons in 1000 gallon units.

Variable costs:

Projected annual Utilities cost:	$15,000
Projected annual Chemicals cost:	$ 5,000
Projected annual Testing cost:	$ 5,000
Projected annual Maintenance cost:	$10,000
Projected annual Plant Salary cost:	$30,000
Total Projected Variable Costs	$65,000
Prior Year Billed Gallons (000s):	35,000

Now what? We need to make a few adjustments.

The numbers assume that all the users will pay their bill every time. We know better than that so we need to include a modifier to compensate for delinquencies. You can use your existing delinquency rate if it is known, otherwise you can use a projection of anywhere from 5-10% as a modifier. However, this doesn't mean a delinquency rate in this range is acceptable. You should always strive for as low a delinquency rate as possible. This range is provided as a guide when no other data is available.

We also need a modifier to cover any projections that may be off. You may want to use a contingency rate of 3-8% for this.

So here's what we have so far:

Number of users:	500
Total Projected Fixed Costs	$85,000
Total Projected Variable Costs	$65,000
Prior Year Billed Gallons (000s):	35,000
Delinquency rate:	5% (0.95 payment rate)
Contingency rate:	5% (1.05 contingency)

Now let's calculate the base rate (customer charge for having service):

$$\frac{\text{(\$85,000 fixed cost) * (1.05 contingency)}}{\text{(12 months) * (500 users) * (0.95 payment rate)}} = \$\_\_\_\_\_ \text{ per month}$$

Instructor Note: *Display Slide #19.*

Now let's calculate the usage charge (per 1000 gallon charge):

$$\frac{\text{(\$65,000 variable cost) * (1.05 contingency)}}{\text{(35,000 thousand gallon units) * (0.95 payment rate)}} = \$\_\_\_\_\_ \text{ per 1000 gal}$$

So let's take a look at the final rate structure:

$15.66 per month base for each user
$ 2.05 per 1000 gallons of water consumption

Exercise 3
Take a few minutes to determine the rate a user would pay if they consumed 4000 gallons per month.

A user that consumes 4000 gallons per month will have a bill of $_____ + (___ * $_____) = $_____.

This amount should be sufficient to cover the system's costs of providing water to that particular user.

Some of you may have all residences as customers, but others may have businesses or industry within their water system. What then? In many cases, the businesses are sufficiently small that they can be treated as residences. In some cases they aren't and need to be billed differently.

That pretty well covers our two main types of rate structures. What other types of rates are out there?

A common one is a variant of the rate structure we just discussed. This variant includes a certain amount of water in the base rate. For example, the base rate includes up to 2000 gallons a month and users are charged for consumption over that level.

Other variants on this structure include those that have a declining per 1000 gallon charge as usage increases (to encourage higher use, typically to attract and retain industry) and those that have an increasing per 1000 gallon charge as usage increases (to encourage conservation in general or in drought conditions). These are known as decreasing block and increasing block, respectively.

Especially if you have a small water system, it might be best to avoid these variants unless you have good justification for using one. Remember the *KISS* principle!

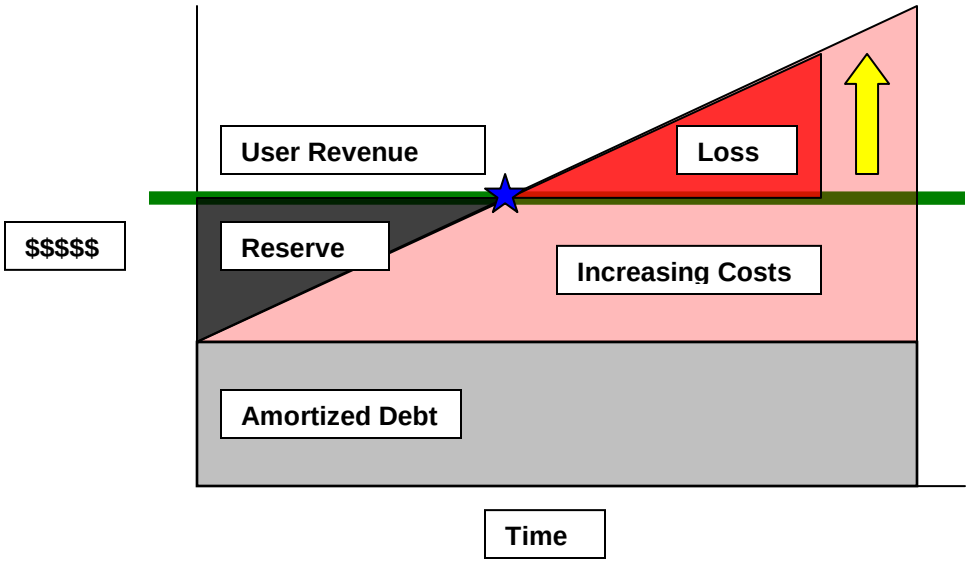
There are still other rates out there that are based on income levels, seasonal residences, and other elements but these are best avoided if possible.

Rate Setting Tips:

- Other things to avoid include discounts and free water.
- Examples include free water for churches and fire halls.
- This practice may be prohibited by funding agencies.

Building Support for Rate Increases

So now we a have a rate structure in place, but at some point in the future the rate will have to be increased. Why is this? Well, let's take a look at the graphic on the slide.



This graphic illustrates how an unchanged rate cannot keep pace with increasing costs indefinitely. Here are all the parts of the graphic:

- The left, vertical side (y-axis) of the graphic shows increasing dollars from bottom to top.
- The bottom, horizontal side (x-axis) of the graphic shows increasing time from left to right.
- The green line represents the revenue, which does not change over time, obtained from users without any rate increases.
- The gray block at the bottom of the graphic represents the expense from amortized debt which does not change over time.
- The pink triangle directly above the amortized debt shows the increasing costs of the water system over time.
- The black triangle on the left side illustrates the profit the system makes over time.
- The red triangle at the top represents the loss the system will incur over time.

- The blue star in the center represents the point in time when the system goes from making money to losing money.

- The yellow arrow in the upper right hand corner represents the amount the rate will have to be raised once system losses have consumed its initial reserves.

Let's recap, what does it all tell us?

When the system starts, its rate will be generating sufficient revenue to cover its expenses as well as some excess revenue that can be kept in reserve. As time goes on, the expenses of the system increase due to inflation and other factors and the system's profit begins to dwindle until the system is only breaking even (at the blue star). If the rate is not increased at this point, the system will begin to lose money every day it operates. Once the system reaches the point in time when its losses have consumed all of its initial reserves, it will become insolvent if the rate is not increased. The costs are considerably higher now than they were at the start and users will experience "sticker shock" as the rate will have to be increased significantly to avoid bankruptcy.

You will eventually have to increase the user rate. You should review the rate annually to ensure that you are recovering your costs and that you won't have to shock your users with a significant increase. How do you go about building public support and acceptance for such an increase? That's the topic of our next section and there are a number of things you can do.

The three most important things you can do are:

Educate!

Educate!!

Educate!!!

Public education is the key to building user support for rate increases.

Before we discuss this further, let’s investigate what you should do before you start the public education process.

If the system is running over budget, there are two ways to solve this:

- Reduce expenses
- Increase revenues

Before you can justify a rate increase, you need to ensure that costs are at a minimum.

Here are some questions you may want to ask yourself before you decide that a rate increase is necessary:

- Are there physical improvements that can be made at the plant?
- Are there operational inefficiencies that can be eliminated at the plant?

- Are there any major leaks and if so, have they been repaired?
- Are water conservation practices in place?
- Is the plant or office staffed properly?
- Is the delinquency rate high and are those users being pursued aggressively?
- Can existing debt be refinanced?
- Can the number of customers be increased?

OK, you've made certain that costs are at a minimum. What now?

Identify the problems that need attention. These can include:

- Worn-out equipment that costs too much to maintain and should be replaced
- Portions of the system need to be upgraded
- Additional engineering or other professional services are needed
- Regulatory violations
- Rising costs due to inflation or other factors

Document everything that justifies the rate increase. Photo and video documentation or other visual evidence can be particularly compelling and will be useful in the next step.

Once it's clear that a rate increase is needed, it's time to start building support for the increase through the public education process.

The most likely forum for this will be a public meeting. If desired, supporting materials can be distributed prior to or during the meeting. Don't forget that this type of meeting should be announced and advertised to allow the customers the opportunity to attend.

Discuss the current situation with the water system. Highlight the problems that have been corrected and discuss those that still need attention and what they will cost. Everything you present should help the users to answer the question of why the rate increase is necessary. Provide as much detail as possible.

Building Support Tip:

- Show the users the reasons for the increase; don't just tell them.

You can show the group a broken piece of equipment or a section of old water line.

Show them a video of old equipment in operation or of the well head or surface intake.

Provide a chart that shows increasing costs over time like the one shown earlier.

You may want to have a “spokesperson” handle this at the meeting while the local officials, engineer, and plant personnel are there to provide support and answer specific questions.

If you’re successful, you will have built user support for the rate increase but you’ll likely have accomplished a few other things well.

These can include:

- User appreciation for the importance of reliable water treatment to public health and safety and the protection of the environment
- Communication of the link between clean water and community growth
- Understanding that clean water is relatively inexpensive relative to the cost of other services such as cable television

Summary

Before we summarize what has been covered, let’s see how we are doing so far. You’ll find a short exercise in your workbooks. Take a few minutes to answer the questions. You can look back through your workbooks if you need.

Rate Setting Exercise

1. What are the two main types of rate structures used by small water systems?
    a. _____
    b. _____
2. When is a flat rate generally used?
    a. _____
3. The base rate plus usage charge divides expenses into two categories. What are they?
    a. _____
    b. _____
4. Besides the two expense categories and number of users, what other information is needed to determine the initial base rate plus usage charge?
    a. _____
5. What is a major assumption of these two rate structures with regards to users?
    a. _____
6. Is it a good practice to provide free or discounted water to certain customers?
    a. _____
7. Is it likely that a water system will have to enact a user rate increase at some point in the future?
    a. _____
8. What are the two main ways to get a system back on budget?
    a. _____
    b. _____
9. What is the most important way to build user support for a rate increase?
    a. _____
10. Can visual aids assist with the public education process?
    a. _____

The key points of this training module are:

- Different systems can have different types of rates structures based on their needs.

- The main rate structures in use by small water systems are:
  - Flat rate
  - Base rate plus usage charge

- Other variations on rate structures exist but should only be used when justified.

- There is a particular methodology associated with each rate structure.

- There are advantages and disadvantages to each rate structure.

- Since expenses almost always increase over time, the rate must also increase to ensure that revenues exceed costs.

- Local officials can use certain techniques to help build local support for increased user fees.

Resources and References

The following are references and resources you can use when you have to structure your own rate.

PA Dept. of Environmental Protection, Technical Assistance and Outreach, (717) 772-4058, Dennis Lee

RCAP Solutions, Inc, (814) 861-6093
Don Schwartz, PA/NJ Program Manager

University System of Maryland, Environmental Finance Center
Jean Holloway, Training Manager

EPA – “Building Support for Increased User Fees” document

RCAP – “Small System Guide to Developing & Setting Water Rates” document

The complete list of training modules includes:

- Module 1, Water Supply System Basics Operations
- Module 2, Responsibilities of Governing Boards
- Module 3, The Safe Drinking Water Act
- Module 4, Dealing with Consultants, Technical Assistance Providers, Regulators, and Funding Agencies
- Module 5, The Basics of Accounting and Finance for Small Water Systems
- Module 6, Business Planning for Small Water Systems
- Module 7, Budgeting and Capital Improvements Planning Overview for Small Water Systems
- Module 8, Rate Design Overview for Small Water Systems
- Module 9, Bidding, Purchasing, and Leasing
- Module 10, Project Management Overview for Small Water Systems