Formulate Great Rates

The Guide to Conducting a Rate Study for a Small System

RURAL COMMUNITY ASSISTANCE PARTNERSHIP

an equal opportunity provider and employer

This guide was originally written by the Midwest Assistance Program, the Midwest RCAP, on behalf of Rural Community Assistance Partnership, Inc. RCAP, Inc. updated the guide with insight from Water Finance Assistance.

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Introduction

Is your water or wastewater system rate-regulated?

This guidebook is primarily intended for water and wastewater systems that have the authority to set their own rates, subject to board approval. Most states and territories have a public service commission or public utility commission that regulates utilities that provide essential services, including drinking water and wastewater. Some, but not all, water and wastewater systems in a state or territory fall under the regulation of these commissions. If your water or wastewater system falls under the regulation of a commission and does not have the authority to set its own rates, you should follow the commission's ratemaking process, which may differ from the processes recommended in this guidebook.

Your water system has an important responsibility to your community. Your job is to ensure that the water system provides residents and businesses with an adequate supply of safe drinking water delivered at a price that not only covers all of the costs of providing the service but also allows the system to prepare and plan for providing that service for many years to come. You must ensure that the water meets all regulatory standards, is reliable, meets the expectations of your community, and is available in sufficient quantity for all current and future users. This is a big responsibility.

Water systems operate much like a business. You are providing a product or a service—safe drinking water—which costs money to produce, and you have revenue that customers give to you to provide that service according to the rates you set. Your customers pay you for the amount of service they receive through their water bill. If you work for a governmental system, this funding source operates very differently from the property taxes and sales taxes that fund other public services.

In order to protect public health and to provide safe drinking water to your current and future users, your water system must generate sufficient revenue to pay for:

- The operations and maintenance of your system to treat, store, pump, and distribute water to your customers in compliance with regulations.
- The replacement of capital assets as they wear out and the acquisition of new assets to meet changes in customer demand and in regulations.
- The financial security of your water system during emergencies and unexpected changes in revenue.

To remain viable for the future and to keep rates at a reasonable level for their customers, most small water systems will likely need to incur debt to cover the cost of infrastructure over time. Small water systems that set appropriate rates and maintain good financial records are more likely to access the loans necessary to maintain their assets and are more likely to qualify for favorable interest rates and terms.

The purpose of this guide is to help you analyze the sufficiency of your system's current rates and to make adjustments to those rates where needed. When you go through the process outlined in this guide and set rates accordingly, you will know that the system will receive the proper amount of revenue from customers to cover all of the functions of the water system.

This guide breaks down all the steps that need to be taken in the process of analyzing the sufficiency of your rates. Chapter 1 provides an overview of the elements of rate structures and rate development, as well as the policy decisions that water systems have to make as part of the rate analysis process. Chapter 2 discusses preparing for the rate analysis by ensuring that revenues will be spent as efficiently as possible and that future needs are identified properly. Chapter 3 describes the process of collecting necessary data, projecting costs over time, and measuring the sufficiency of current rates. Chapter 4 demonstrates how to price water appropriately to cover current and future expenses. And Chapter 5 illustrates how to educate customers about the need for rate adjustments now and in the future.

Your community is counting on you to make the right—if often difficult—decisions for the water system. This guide will help you make better decisions by showing you what is involved in the process and raising the issues that need to be addressed.

Engaging technical assistance providers

The process of completing a thorough rate analysis is long and is most successful when conducted by someone with experience. As a result, you may wish to engage the services of a technical assistance provider with a background in rate analysis. Small systems may be able to receive free technical assistance from RCAP (who produced this guide) and other organizations, and there are consultants for hire that specialize in rate analyses. Page **57** of the guide provides information about RCAP's national network of nonprofit organizations working to ensure that rural and small communities throughout the United States have access to safe drinking water and sanitary waste disposal.

Many water systems update their rates periodically by making incremental changes to their current prices based on their annual budget. This strategy may not fully capture all of the current and future expenses of the system, nor may it capture the efficiencies that can be achieved in operations. Or rates are set by looking at neighboring communities which may have very different costs and infrastructure needs. A better approach to rate analyses includes understanding future capital needs, minimizing costs, and developing multiple rate alternatives to find the design that best meets the needs of the community. It may be difficult for water systems with small staffs, potentially part-time or volunteer, to commit the time and resources necessary for a thorough analysis on its own. And a technical assistance provider brings an array of ideas and experience from working with multiple water systems across a geographic area.

Funding agencies tend to look more favorably on applications from water systems that have engaged the assistance of an expert in designing

their rates, and some funders are requiring systems to undergo a rates audit from an expert prior to receiving any loans or grants. Customers and boards may also be more accepting of necessary rate adjustments when they are proposed by a neutral, third-party expert rather than from staff.

If you decide to engage the expertise of a technical assistance provider, it is important to find one who can best assist your community. Find out what services the technical assistance provider can offer to you. Ensure that they are familiar with the regulations in your state, territory, or tribal nation. And ask for references from water systems that have worked with them previously that are similar to you in size, demographics, and ownership.

This guide can be used by a community to develop its own rate analysis. It can also be used in conjunction with a technical assistance provider.

Wastewater

Many small communities also provide wastewater service, which is vital to protecting public health and the environment. Like drinking water, wastewater systems have a lot of expensive infrastructure to collect and treat sewage, and that infrastructure must be maintained over time. Wastewater rates charged to customers must also bring in enough revenue to pay for operations and maintenance, capital replacement, and reserve funds. The processes recommended in this guidebook can be used to analyze and adjust wastewater rates as well. Throughout the guide, there are callout boxes that highlight special considerations for wastewater rates.

Notes

Chapter 1: How to structure rates and set rate policies

"Our job is to keep rates low!"

"They'd vote the board out if we raise rates!"

"We haven't raised rates in 15 years, and we're proud of it!"

"We have a lot of folks on fixed incomes who can't afford to pay more!"

Chances are you have heard comments like these. Maybe you've made them yourself. If so, you're not alone. For far too long, both water systems and their customers have undervalued water. Some customers may even say, "Water should be free!" The water itself might be free, but the process of pumping, treating, storing, distributing, operating, and maintaining the system in compliance with regulations is definitely *not* free. And, for most systems, the costs for these functions are going up every year. Water is a product and a service, and it should be paid for in proportion to the amount used.

We need a new mindset. Water systems should operate as self-sustaining entities, and the largest source of revenue for most water systems is the rates it charges its customers for water use. You are responsible for making sure that customers are charged enough to cover all of the expenses to run the system. You are also responsible for spreading those charges fairly and equitably among all the customers served by your system. Rather than bragging about keeping rates artificially low, we should instead take pride in having rates that will allow us to deliver safe, reliable drinking water to current and future customers.

This guide will outline the steps necessary to set the best rates for your community. First, it is important to identify how rates are structured and what policy decisions water systems must make regarding rates and finances.

Base rates and flow rates—fixed expenses and variable expenses

Rate structures may include a base rate—a charge per billing period regardless of usage—and a flow rate—a charge based on the volume of water consumed. Many rate structures include both. The reason for having these two different rate elements is tied to your expenses. Your system has expenses called "fixed expenses" that will have to be covered even if you never produce a single drop of water, such as long-term debt, reserve funding, billing and collecting expenses, operator salaries, a portion of the clerk's salary, etc. The base rate is like paying for membership in the system—a share of what it cost to put the system in and the privilege of being hooked to it, regardless of how much water is actually used. You also have expenses

called “variable expenses” that are directly related to producing water, such as chemicals and equipment, utilities, contracted repairs, etc. Customers who use more water should pay more towards these costs.

Types of pricing structures

The table below describes the four most common types of pricing structures. As you will see, each structure type has advantages and disadvantages.

Uniform flat rate

- Customers pay the same amount, regardless of the quantity of water used
- Used in unmetered systems

Example:
Each customer is charged a flat rate of $30 per month for unlimited water use

Advantages:

- No expense for installing and reading meters
- Easy to calculate and administer
- Billing is cheaper and easier and would not require specialized software

Disadvantages:

- All users pay either too much or too little for what they use
- Promotes high consumption
- No financial incentive to fix leaks

Single block rate

- Customers are charged a constant flow rate (price per gallon or cubic foot), regardless of the amount of water used
- Often is coupled with a base rate for having service available

Example:
$21 base rate + $4.50 per 1,000 gallons used

Advantages:

- Easy to administer and simple to understand
- Cost to customer is in roughly direct proportion to amount used
- May encourage water conservation if priced appropriately

Disadvantages:

- May discourage businesses, industries, and institutional customers that use high volumes of water

Decreasing block rate

- The flow rate declines as the amount used increases
- Each succeeding consumption block rate is less expensive
- Structure is based on the assumption that the cost to produce the next gallon declines as consumption goes up

Example:
$25 for first 2,000 gallons used

$3.50 per 1,000 gallons from 2,001 to 6,000 gallons

$3.00 per 1,000 gallons from 6,001 to 10,000 gallons

$2.50 per 1,000 gallons for everything over 10,001 gallons

Advantages:

- Attractive to large-volume users

Disadvantages:

- At higher usage levels, water may be billed below what it costs to produce
- Low-volume users may be subsidizing large-volume users

Increasing block rate

- The flow rate increases as the amount used increases
- Each succeeding consumption block is more expensive
- Structure is based on the assumption that water rates should promote water conservation and reduce the stress on the system caused by increased demand

Example:
$25 for first 2,000 gallons used

$2.50 per 1,000 gallons for 2,001 to 6,000 gallons

$3.00 per 1,000 gallons for 6,001 to 10,000 gallons

$3.50 per 1,000 gallons for everything over 10,001 gallons

Advantages:

- May promote water conservation, which is especially important in areas of limited water supplies, limited water rights, or systems that are approaching treatment or storage capacity
- Provides water for essential indoor use at a reasonable price and charges a premium to those with discretionary water use

Disadvantages:

- Higher costs for high usage may discourage industry from locating in service area
- Larger households pay higher bills even if per-capita water use is typical for the community

Wastewater Rate Considerations

Wastewater rates can be structured in the same way that water rates are structured. One important issue for communities is how to determine the volume of wastewater collection. Most wastewater systems are not metered. Rather, they rely on meter readings from the drinking water system to determine the volume of wastewater collected. Many communities charge one gallon of wastewater for every gallon of water read by the meter, a 1:1 relationship. But not every gallon of drinking water ends up in the wastewater system, especially if it is used for outdoor irrigation. Some communities meter outdoor water use separately and do not include it in wastewater bills. Others use a formula to approximate wastewater use (for example, 80 percent of water bills). Or they take the average drinking water use of three months where outdoor irrigation is not typical (for example, December through February) and use it as the wastewater volume throughout the year. You may also choose to levy a surcharge on customers with "high-strength discharges," which are typically non-residential customers with higher-than-average levels of biochemical oxygen demand (BOD), total suspended solids (TSS), oil and grease (0&0), metals, and so forth.

Other rate structure elements

You have a few other rate structure elements to consider:

- **How often to bill?** Most water systems bill their customers every month, every other month, or once a quarter. Monthly billing gives you a steadier flow of funds into the water system and can help your customers identify leaks more quickly. And monthly billing can make it easier for customers who are struggling financially to pay their bill. But the cost of billing will be higher.
- **How to separate out customers, if at all?** If all of your customers are similar (for example, mostly residences), you may wish to put all of your customers into one category and charge them the same rate. But if your customer base includes a mix of residential, commercial, industrial, and institutional customers, or if you are a governmental water system that serves customers outside your jurisdictional boundary, you may wish to create separate customer classes and charge different rates. As a proxy, some water systems will charge a different base rate based on the meter size but charge the same flow rate to all customers.
- **What usage to include in the base rate, if any?** You have the option to include some consumption in the base rate that customers must pay every month, and that amount can vary with meter size if your base rate varies with meter size. It is not uncommon for water systems to include up to 3,000 gallons a month or more in the base rate, though the national trend is towards not including any use in the base rate.
- **How often should rates change?** You should review your rates at least annually using the procedure outlined in this guide, and you should make adjustments anytime the rates fail to recover enough revenue to meet all of your needs. Some systems choose to pass automatic rate increases, either over a set time period or indefinitely, to ensure that revenues at least keep pace with inflation. But having an automatic rate increase does not relieve you of the responsibility to evaluate your rates regularly.

Base Rate by Meter Size

One method of calculating the base rate by meter size is to use the concept of equivalent residential units, or ERUs, which also known as equivalent residential connections (ERCs) or equivalent dwelling units (EDUs). A residential household would be 1 ERU, and customers with larger meters would be multiple ERUs. A common way to calculate ERUs is based on the maximum flow capacity of each meter size. For example, a typical 5/8" meter for a residential customer may have a maximum flow capacity of 20 gpm. That same system may have a 2" meter with a maximum flow capacity of 160 gpm. To calculate ERUs, simply divide the flow capacity of the larger meter by the flow capacity of the smaller meter. The 2" meter here is 8.0 EDUs. If the base rate for the residential customer were $10 per month, the base rate for the customer with the 2" meter would be 8.0 *x* $10, or $80 per month. You can obtain the maximum flow capacity of your meters from their manufacturers.

If rates are reviewed annually as part of the budgeting process, they can be adjusted in small, annual increments instead of in infrequent but large increases. Customers are much more likely to be unhappy with an increase every few years of 10 percent, 20 percent, or even as high as 50 percent or more than they would be if there were very small (1 to 4 percent) annual increases. After all, most people's incomes

increase slowly year-to-year and not in big jumps every few years, so why should things they pay for, like water service, jump in price suddenly and unpredictably?

Which rate structure is right for your community?

No one rate structure is inherently better than another. Any rate structure can be priced to allow you to collect the correct amount of revenue. Here are a few issues that should be kept in mind as you determine which rate structure is best for your community:

- **Rates must be set at a level that covers *all* of the costs to produce, treat, store, and distribute water to all current *and future* customers.** These functions include other parts of a "business" that are not so visible—replacing assets, servicing debt, funding financial reserves, and other operations, maintenance, and administrative costs, including those associated with regulatory compliance.
- **Rates must be fair and equitable.** Fair means that they are high enough to cover all costs of operating the system. Equitable means that each class (or type) of customer is paying what is rightfully its share of the costs.
- **A water system's revenues *must not* be used to pay for other services.** Using water revenues for other purposes while not adequately maintaining financial reserves or fully funding maintenance needs will only increase the costs of operations in the long run. Governments should not use revenue from their water systems to subsidize general government programs. Likewise, the rates and revenues for drinking water should be separate from those for wastewater, stormwater, solid waste, or other public services.
- **Customers should know what the rates are.** This is a time when people demand transparency. Your rates should be posted publicly in the water or general office, on your website (if you have one), and/or comply with any other notification or approval requirements dictated by your state, territory, or tribal nation. The rate schedule should be sent to all customers at least once a year and every time there is an adjustment to the rates. The annual Consumer Confidence Report or CCR is a good time to remind customers about your rates and how system revenue is being spent.
- **The rate structure should be easy to understand.** In general, smaller systems (fewer than 5,000 users) should have between one and five user classifications and between one and three consumption blocks.
- **Water rates have a short life span.** The existing rate structure should be examined at least once a year as part of the budget-development process to determine if an adjustment needs to be made. If a dramatic change in income or expenses is experienced during the year, an analysis should be done to determine if an adjustment is necessary before the regular budgeting process.
- **Good rate structures are based on actual, accurate financial information and good customer records.** It's very difficult to develop a fair and equitable rate structure if you're not sure what your income and expenses have been for the last two to three years and how much water you are selling to each customer. The more detailed your budget and usage information, the more accurate your rate modeling will be.
- **The rate structure should be easy to administer.** If it is too complex, chances are it's going to be hard for customers to understand and support.

You need to make careful and thoughtful decisions that balance the needs of different segments of your customer base. For example, if you are trying to develop or attract industry, you might want to select a rate structure that is more favorable to large-volume users. However, you need to be aware of the impact that rate structure has on smaller commercial and residential users. Giving a break to one group of customers means the rest of the customers will need to pay more to cover all expenses.

You should also consider the need to conserve. If your water supply is abundant and your treatment costs are relatively low and will remain so even with meeting new drinking water regulatory standards, you might not view conservation as paramount. Most funding agencies do consider conservation in evaluating financing for new projects, so that will need to be kept in mind. Conservation can also help in maintaining your level of storage as well as avoiding peak power rates that some electrical companies charge. And some infrastructure funding programs give extra points or consideration to projects that promote conservation or to systems with a conservation plan in place.

Likewise, you should consider whether members of your customer base have difficulty affording your water service. The cost of water service is still below that of other utilities, including ones not necessary to sustain life. However, as water systems catch up on needed capital projects and as grants continue to be limited, across the country the price for water is rising faster than that of other utilities, faster than salaries, and faster than inflation. This can make water service less affordable *over time*, especially for customers who rely on Social Security or other retirement or disability income that may be fixed or pegged to inflation. Delaying needed rate increases can actually make this problem worse, as rates will have to rise sharply to cover past revenue shortfalls.

If your system is not metered and is using a uniform flat rate, it is strongly recommended that you install meters. If your system's meters are more than ten years old, you should formulate a plan to begin replacing the meters. Meters are the "cash register" of your system. As meters age, they tend to slow down and under-register the water flowing through them, and, as a result, your customers will receive more water than they will be billed for. If the meters are not reading accurately, you are losing revenue that your system needs in order to operate.

Overall, you will want to select a rate structure that is the most fair and equitable to all users and produces the revenue necessary to operate your system.

Money in the bank

A best practice for water systems is to maintain reserve funds—money in the bank. Water systems may wish to build up reserves for

- equipment replacement of short-lived assets such as pumps, meters, generators, and SCADA systems
- planned system expansions or improvements consistent with long-range capital needs
- local share of expansion and upgrade costs such as preliminary engineering reports (PERs) and required matches for infrastructure grants and loans
- emergency funds for unforeseen breakdowns, damage from natural disasters, and system repairs
- funds for unexpected revenue shortfalls from economic downturns, the loss of high-use customers, and other issues
- debt-service reserve funds that may be required by lenders. The debt service reserve is for making regular debt-service payments should other funds for making debt-service payments not be available

There are no nationally accepted standards for the amount of money that water systems should keep in the bank. Some states and territories have minimum or maximum guidelines for how much money can be set aside into reserves, and most utility commissions have separate guidelines for the systems they regulate. Additionally, some funders, like USDA, have reserve requirements for borrowers. Beyond what is required for debt service, you must decide what amount is most appropriate for your water system (for example, 90-180 days of operating expenses, or enough to replace all short-lived assets on a set schedule) and build that into the rates calculations. It is appropriate for the governing body of the water system to set an official policy for reserves. Governing bodies should also ensure that water system reserve funds are spent only on the water system and not on general fund or other fund needs.

Restricted and Unrestricted Reserves

Your money in the bank is divided between unrestricted and restricted reserves. Unrestricted reserves can be used for any expense—operations and maintenance, capital, or debt service. But certain types of reserve funds have restricted uses. For example, customer deposits should be held in a dedicated account and not used to cover any expenses. Debt covenants may require that the funds used for debt service coverage are held in a restricted account. And some states, territories, and tribal nations allow water systems to create a capital improvement fund that is restricted to infrastructure projects only. The proceeds of impact fees and system development charges should be restricted for capital projects only as well.

Charges to new customers

Typically, new customers incur two different types of charges: deposits and connection fees. Deposits are set and collected to ensure that if customers do not pay their bills, the system has money in reserve to cover expenses. Deposits should be set aside in an account so that the money can be refunded to customers if they discontinue service. Connection fees (also called tap fees, capital-improvement fees, subdivision fees, or development fees) are charged to a customer or group of customers to help the system cover the costs of capital improvements that have already been paid for or are being paid for by current customers or to cover the cost that the system will incur due to the additional connections. These fees are not refundable.

Determining which rate structure best meets community needs and setting reserve policies are two of the steps you should take before beginning a rate analysis. Chapter 2 outlines several other best practices to ensure that revenues are being spent as efficiently as possible and that future needs are identified properly.

Notes

Chapter 2: Ensuring that revenues are spent efficiently

The process in this guide focuses on measuring the adequacy of current rates to cover future costs. An important step in that process is to ensure that money isn't being wasted. You may have opportunities to spend your money more efficiently while maintaining the same level of service. Your system should be well-managed; customers should not have to pay for inefficiency and waste. Your board should be able to point out to customers all the ways you have streamlined operations and minimized expenses when you are explaining why a rate increase is needed—that you have done your work first before asking for more of your customers. In addition, before beginning a rates analysis, it is also important to know which capital projects are critical in the next 5 years. If you choose to engage a technical assistance provider to assist with your rates analysis, they can likely also help you with these asset management and capital improvement analyses as well.

Quick efficiency checks

Below are some quick efficiency checks that will help you manage your system better and that will probably help with your cash flow as well:

- **Customer billing:** Make sure that all meters are read and that bills are sent out in a timely manner.
- **Billing all users:** Do all customers that receive water from your system have a meter? If not, install them. Are all customers being billed? In some communities, hospitals, churches, and other governmental departments (police and fire departments, city parks, public buildings) receive water without charge. This is not a good practice, may not be legal, and is not fair to other users of the system. Are there customers that are stealing water? Illegal taps into the system, tampering with meters, bypassing meters, or taking water from hydrants to avoid paying are all theft. Establish and enforce stiff penalties. When your meter reader is out, make sure he/she is observant for signs of theft.
- **Paying your bills:** Avoid paying late-payment penalties, if possible. Postpone any large, non-essential purchases if you do not have enough money to cover current liabilities.
- **Put your money to work:** When money is collected, is it immediately deposited? Are your bank accounts earning the highest possible interest rate? Shop around for banking services, use more than one bank, and place reserves in higher-interest certificates of deposit or money market accounts. If allowed, you should be earning interest on your money.
- **Fees, deposits, surcharges:** Review your current fee and deposit policies to make sure they reflect the cost of providing services. Does your hook-up fee really cover the full cost of hooking up a new customer? Does your service-fee structure cover the extra cost of night and weekend work? Make sure all of your policies are in writing, and *always* treat customers equally.

Are we getting paid for every gallon we produce or purchase?

Not every gallon that is produced by your system or delivered to a customer is paid for. Minimizing these unpaid gallons will control costs and boost revenues without needing to raise rates. In preparation for a rate analysis, water systems should conduct a water audit and an evaluation of collections.

Water audits can be invaluable in controlling wasted water, thereby controlling costs. If you know how much water is coming from your treatment facility and you can determine how much water your customers are using, the difference between the two amounts is non-revenue water. Non-revenue water across the United States can range from around 5 percent to more than 50 percent at individual systems. Non-revenue water consists of two primary components—apparent water losses and real water losses. Systems are encouraged to conduct a water audit and to fix any discrepancies prior to making rate adjustments.

Apparent water losses are non-physical losses that occur due to customer meter inaccuracies, data-handling errors in customer-billing systems, and unauthorized consumption—water that is consumed but is not accurately measured, accounted for, or paid for. These losses cost your system revenue and distort data on customer use. Water audits can also identify and quantify unbilled, authorized consumption (such as for fire suppression).

Some corrections for apparent water losses are relatively inexpensive procedural changes, but those changes can pay off in a big way. If you compare your billing process with the expected income for the amount of water treated, you can identify shortcomings that can be remedied. Is water taken without the knowledge and authorization of the system (for instance, by street cleaners, construction water trucks, or others)? Do all of your customers have an active account in the billing system? Is meter reading accurate and complete? Look for illegal taps, reversed water meters, and other signs of water theft.

Meters that are under-reading are another cause of apparent water loss. In general, as meters get older, they slow down and do not read all of the water passing through them. Many water systems wait for meters to stop measuring water at all to replace them but having widespread meters across a system under-reading (even by 10 percent) can impact utility revenues significantly.

Real water losses are physical losses of water from the distribution system, including leakage and storage overflows. These losses inflate production costs and stress water resources—the water is pumped and treated, but never reaches your users, so you receive no revenue for it.

Many drinking water systems respond to real losses only after they have received a report of water erupting from a street or a complaint from a customer about a damp basement or poor pressure. If you use this type of reactive leakage response, your system will most likely have excessive leakage that will never be contained reliably. In fact, many leaks never reach the surface. Controlling leakage effectively relies upon a proactive leakage-management program, including a means to identify hidden leaks, optimize repair functions, manage excessive water-pressure levels, and upgrade piping infrastructure before its useful life ends.

Effective technologies have been developed in recent years, including flow and component analysis to quantify leakage amounts, equipment

to pinpoint leaks, and pressure management to help systematically reduce leakage. Automatic meter reading (AMR) and advanced metering infrastructure (AMI) systems may allow water systems to improve their efficiency and can help identify wasteful usage and leaks to help manage water and revenue losses.

Water Audit Resources

The International Water Association (IWA) and American Water Works Association (AWWA) Water Audit Method is the accepted industry standard for measuring non-revenue water. AWWA offers Free Water Audit Software© to all water systems to calculate non-revenue water. This Excel tool is available for download at: https://www.awwa.org/Resources-Tools/Resource-Topics/Water-Loss-Control

Also, customers don't necessarily pay you for every gallon the meter reads. Improving a system's bill **collection rate** is another way to increase revenue without raising rates. Your water system should have written customer service policies regarding when bills are considered past due, when disconnections will occur due to non-payment, and what penalties will be assessed. If your collection and shut-off policies are not being strictly enforced, your system is losing revenue. The customers who pay on time are subsidizing late payers, which isn't fair. If you have a large amount of accounts receivable, you should consider reducing the amount of time that customers are given to pay their bills. Also, your penalty for late payments is perhaps not high enough to encourage customers to pay on time. Ideally, you should strive to have a 100 percent collection rate. Systems are encouraged to review collection policies and practices prior to making rate adjustments.

Water Loss and Wastewater

Because wastewater bills are often tied to water usage, apparent water loss—in particular, under-reading meters and theft—also negatively impact wastewater revenue. Replacing old and faulty meters can help with the long-term sustainability of both systems.

Are energy bills as low as possible?

For most water systems, energy is the largest cost related to the amount of water treated and sold. It is also a cost that can be controlled while still offering the same level of service. Before adjusting rates, systems are encouraged to determine whether they can achieve any cost savings through **energy management**. There are several steps that you can take to manage your system's energy costs:

- **Reduce real water loss.** As discussed above, real water losses include leakage and storage overflows. Energy is typically necessary to treat and distribute water, so reducing the amount of water that is produced but that never reaches customers lowers energy consumption and therefore lowers energy bills.
- **Install energy-efficient assets.** Energy efficiency involves using less electricity to achieve the same or better level of performance. The assets that use the most energy at most water systems are pumps, motors, and treatment technologies. By sizing these pieces of equipment properly and installing energy efficient models such as variable speed pumps, you can reduce your energy consumption. Lighting and HVAC systems in treatment plants and other buildings are another group of assets

to assess. Often a more energy-efficient asset will cost more to purchase but less to operate over its useful life, so be sure to consider life-cycle costs and not purchase prices alone when acquiring new assets. Inquire whether your electricity provider offers free energy audits, and take advantage if they do.

- **Ensure you are on the proper electric rate.** Often, electric providers have multiple rates and classes of customers. You can work with your electric utility representative to ensure that your system is on the most appropriate rate structure possible. Keep in mind that your system likely has several electricity bills. Take this opportunity to also ensure that all of your bills are on the same rate structure and that you are receiving the correct number of electricity bills each month.
- **Fill storage tanks during off-peak hours.** Many electric rates are structured to be higher during heavy times of demand, such as during the business day, and lower during lighter times of demand, such as overnight. If you pay these "time-of-use" rates, you could consider making changes to your operations so that energy-intensive activities take place during the lower cost times of day. For example, you may choose to pump water into your elevated storage tank at night instead of in the middle of the afternoon. This will not reduce your energy consumption at all, but if you have time-of-use rates or peak demand charges, it will reduce your energy bill.
- **Reduce energy purchases by generating electricity on-site.** Your water system can produce its own electricity on-site to reduce the need to purchase electricity from electric providers. Water systems can install renewable energy generation through solar photovoltaic (PV) panels and small-scale wind turbines. Some water systems also install turbines in their water lines, in particular near pressure-release valves, that can spin and generate electricity. Note, however, that the cost of these capital projects can be high, and governmental and non-profit water systems are likely not eligible for tax incentives used to lower purchase costs. Generating on-site electricity likely makes the most sense for water systems that pay high energy rates.
- **Promote customer water efficiency.** A final way to lower energy costs is for customers to lower their water consumption, which lowers pumping and treatment costs. Water systems can promote conservation through pricing strategies, though water-use restrictions, through programs to reduce outdoor water use, and through programs to incentivize low-flow fixtures and appliances. While promoting conservation may lower energy costs, it also could lower your system's revenue if you charge customers based on the volume of water they consume. You may find the energy savings do not completely offset the loss of revenue.

The RCAP Guide on Energy Audits and More

Sustainable Infrastructure for Small System Public Services: A Planning and Resource Guide

Rather than presenting theories, this guidebook provides information, worksheets, examples, case studies and resources on water conservation, energy efficiency and renewable-energy resources for small systems. This planning and resources guide includes a step-by-step process for system decision makers, staff and community members wanting to operate increasingly efficient water systems. It offers a flexible approach to evaluating sustainable alternatives for system operations. The guide is available at: https://www.rcap.org/resource/sustainable-infrastructure-for-small-system-public-services-a-planning-and-resource-guide/

Wastewater and Energy

Wastewater operations typically uses more energy than drinking water and is often the largest energy expense in small communities. There are often opportunities to install energy efficient controls for aerators, centrifuges, pumps, blowers, mixers, and UV systems. There may also be opportunities to run processes at different times of day to reduce peak-hour electricity usage. And there are opportunities to reduce the energy consumption of wastewater facilities through lighting controls and efficient HVAC systems.

Working together to increase efficiencies

As a small water system, you have to provide all of the same services as a larger water system, but you have fewer customers to help share in the cost. Water systems can often find efficiencies by working with other water systems through **regionalization**. It is becoming increasingly difficult to sustain small public water systems as regulations increase, infrastructure deteriorates, and operating costs increase. Before adjusting rates, systems are encouraged to explore whether regional arrangements would be fruitful.

Working together can increase efficiencies by eliminating duplicative services, add or improve services you can't afford to deliver on your own, and provide services more cost effectively. Regionalization can range from informal partnerships such as mutual aid agreements in case of an emergency or the sharing of heavy equipment, to more formal partnerships such as the formation of a Joint Powers Authority to develop a new water source or a full physical and/or managerial consolidation. Even an arrangement to purchase commonly used materials or chemicals in bulk can save all participating systems money. Regionalization is a good solution when existing and future water or natural resources need to be protected, your capacity to operate in a business-like manner is limited, funding capacity is limited, compliance is not attainable affordably, source redundancy is lacking, your staff and volunteers are burning out, or if there is an opportunity to create economies of scale.

Lessons Learned on Regionalization from Community Leaders

RCAP's report "Resiliency Through Water and Wastewater System Partnerships: 10 Lessons from Community Leaders" looks at community utility partnerships from a rural and tribal perspective. As small communities across the country seek solutions for common economic, operational and compliance challenges, this research highlights the experiences of those who chose water and/or wastewater system partnerships as a solution. Some systems are collaborating to build capacity and become more resilient, enabling them to successfully sustain their systems not only financially, but technically and managerially, for years to come. The report highlights 10 lessons from community leaders who undertook and facilitated regional collaboration, also called regionalization, projects – the successes they saw, the challenges they overcame, and the difficult questions they faced throughout the process. You can access the report here: https://www.rcap.org/blog/regionalizationresearch/

Are we getting the longest useful life out of our assets?

Your water system is made up of many capital assets, including wells and other water sources, treatment technology, storage tanks, pumps, valves, pipelines, hydrants, meters, vehicles, and buildings. All of these assets will eventually need to be replaced. And unless your system is able to obtain grants, your customers will be paying for the replacement, either through current revenues, debt, or reserve funds. The rates you charge should cover not only the cost of your daily operations but the cost of replacing assets as well.

For smaller water systems, replacing capital assets can be challenging because there are not as many customers to share in the cost. But having fewer customers does not necessarily mean less infrastructure. Small systems may be geographically spread out. Fire flow requirements may necessitate having more infrastructure than would be necessary for domestic water use only. And there is a minimum amount of infrastructure needed to comply with Safe Drinking Water Act requirements regardless of the number of people served. As a result, it is important that small communities like yours get the longest useful life out of your assets. Replacing an asset too early means that you have not gotten the maximum value out of your infrastructure investment. Replacing an asset too late often results in increased maintenance costs and risks disrupting service or endangering public health. You have to find the sweet spot, and asset management can help.

Asset management is a comprehensive, integrated process for maintaining system infrastructure assets and equipment for the most effective, least-cost allocation of resources, in order to *sustain* the water system over time. True asset management looks at each piece of equipment in a big-picture, "whole life" way that includes planning, financing, assessing risks, maintaining it, record-keeping and prioritizing replacement. Asset management may seem time-intensive and costly, but it is a long-view investment that has helped many communities save money over time. By being proactive versus reactive and not waiting until something breaks to replace it, systems are often able to provide more affordable, reliable service with fewer negative impacts for customers.

To do this requires asking and answering five critical "core" questions, identified by the U.S. Environmental Protection Agency:

- What are my assets, and what condition are they in?
- What are my sustainable level-of-service goals?
- What assets are most critical in achieving those goals?
- What are the minimum life-cycle costs of those critical assets?
- What is the best long-term funding strategy?

Ideally, before adjusting rates, systems are encouraged to go through the process of asset management to identify the infrastructure that will need to be replaced in at least the next five years. But asset management isn't a wish list. The process assumes that you do not have enough money to do all of the capital projects you wish, so it helps to identify which projects are most critical to maintain compliance and to maintain your level of service. Not all capital assets are equally important to your system, obviously. The meter at one customer's house failing is not as detrimental as your primary storage tank failing. Those most critical capital replacements will need to be factored into any rate adjustment you make.

If you do not have time to undergo the full asset management process, at the very least you should make a list of your water system's assets (also referred to as an asset inventory), identify any that will need to be replaced in the next five years, and determine whether you will pay for their replacement with debt, with current revenues, or with reserve funds. You will need this information when you calculate the amount of money your rates need to generate each year.

Asset Management Resources

The U.S. Environmental Protection Agency maintains a series of free guidebooks and tools related to asset management, including Asset Management: A Handbook for Small Public Water Systems, which is part of their Simple Tools for Effective Performance (STEP) Guide Series and is geared towards small systems. The EPA resources are available at: https://www.epa.gov/sustainable-water-infrastructure/asset-management-water-and-wastewater-utilities

In addition, the Southwest Environmental Finance Center has partnered with EPA to create a repository of documentation and tools related to Asset Management for water and wastewater systems called the Asset Management Switchboard. The Switchboard is available at: https://swefcamswitchboard.unm.edu/am/

Now that you have assessed whether there are any efficiencies to be gained in your current operations, the next step is to determine whether your current rates are sufficient to cover your costs over the next several years. Chapter 3 will explain how to project your costs and revenues over time.

Notes

Chapter 3: Is it time for a rate increase?

Each year, water systems should examine their rates. The following questions can help you decide if a rate adjustment is needed:

- Did your system's revenues exceed expenses in each of the last three years?
- Were you able to make all scheduled payments on your long-term debt?
- Are you fully funding reserve accounts?
- Were you able to cover the cost of emergency and preventative maintenance as needed?
- Is your system in compliance with your primacy agency's drinking water standards and regulations?
- Have you had a rate increase in the last three years?

The best way to answer these questions is to prepare a **financial forecast**, and if any of the answers are "no," it may be time to make rate adjustments. A financial forecast looks at your expected revenues and expenses over the next three to five years, including operations, debt payments, capital outlays, and contributions to reserve funds. The financial forecast will determine whether your current rates will be sufficient to cover the full and true costs of running the water system. The first step in the financial forecast is to gather the appropriate data.

City of Anytown, USA

Introduction

Throughout this guide, we will use the City of Anytown, USA for our calculations. While the name of the community is obviously made up, the numbers are accurate for a small system of its size. Here are some basic facts about Anytown:

- Serves 1,580 people
- 580 service connections
- Charges uniform rates monthly, with a $13.65 base rate and $3.75 per 1,000-gallon flow rate
- All customers are on the same base rate and flow rate
- Rates have not changed in the past three years
- Collection rate is 98 percent
- Sold between 31 million and 35 million gallons per year over past three years
- The median household income for the community is $31,085
- Has unrestricted reserves to cover any operations and maintenance, capital, or debt service cost
- Has restricted reserves for required debt service coverage and for customer deposits

Gathering data

To complete the financial forecast, you will need to gather the following data:

- Actual end-of-year revenues and expenses from at least the past 2 to 3 fiscal years. You may find this information on audited financial statements or from budgets if you record actuals at the end of the fiscal year. Ideally, do not use budgeted amounts as they may not reflect the actual costs you incurred and the actual revenues you received, though comparing budgeted amounts to actual amounts will help you see the accuracy of your budgets.
- A year-to-date financial report that shows revenues and expenses in this fiscal year.
- End-of-year restricted and unrestricted reserve balances from at least the past 2 to 3 years, including funds for operations, for contingencies or emergencies, for required debt service reserves, and for capital projects.
- Capital improvement plan or list of scheduled capital improvements in the next 2 to 3 years.
- Any current debt agreements.
- Rate schedules and their effective dates from at least the past 2 to 3 years.
- Number of customers / bills and total amount of water sold (gallons or cubic feet) in at least each of the past 2 to 3 years.
- Count of customers by level of usage per billing period (for example, 0-1,000 gallons of use, 1,001 to 2,000 gallons of use, etc.).
- List of any operational or financial abnormalities from the past 2 to 3 years that would greatly impact financial analysis (non-typical revenue and expenditures).
- Any compliance letters/documents from your primacy agency that you are attempting to resolve.

Separating Out Different Services

As you begin the process of collecting income and expense data from the past few years, you may discover that multiple services—water, wastewater, stormwater, and solid waste—may be lumped together into a single budget. But each service should be self-sufficient, so if that is the case, it will be necessary to separate them out in order to conduct the financial forecast. Some expenses will clearly be for one service or another. For less obvious expenses, like salaries of staff shared across multiple services, divide them based on the percentage of time they spend on each service. Your technical assistance provider can help you with this separation process. You may need to separate out the financials for the various services in order to apply for funding from USDA and other programs.

Your budget actuals and financial statements contain many of the costs of running your system, but do they include all of the costs associated with being sustainable over time? If not, this is a good time to make that correction. A few examples of hidden costs that may not be directly paid by the water system are:

- The salaries of a clerk or other administrative employees. At least a portion of those salaries should be allocated to the system based on the percentage of time that employee spends on the water system vs. other job functions.
- A portion of the expenses related to the elected body—salaries or stipends, meeting expenses, the cost of elections—in proportion to the time the board spends on the water system vs. other services and programs.

- Office expenses, such as rent, utilities, supplies, etc. At least a portion should be allocated to the utility.
- Insurance: The portion of the premium that covers any property of the system, liability for the system, or employees of the system should be allocated to the water system.
- Professional services, such as accounting, auditing, legal, or any others, should have a portion allocated to the water system.
- Any other services, such as lawn mowing, snow removal, etc., that benefit the system should have a portion allocated to the water system.

Hopefully, your water system already has all of the documents necessary for the financial forecast, in particular an annual budget for the water system alone. Your state, territory or tribal nation, or your public funding source for your infrastructure, may require one. A budget is a plan for organizing and managing your system's financial operations. It is important to track actual income and expenses and compare that information with your budget on a regular basis. If you don't know that your income and/or expenses are off from what you budgeted (planned) until after the budget year is completed, you can't adjust spending as needed during the year, and you cannot accurately forecast your revenues and expenses as part of your rates analysis. Don't let the meeting at which you adopt the budget be the last time you look at it for a year. The budget should be reviewed by your board or council on a monthly or at least a quarterly basis. Your budget is your plan, and the only way a plan will work is if you follow the plan. If you engage a technical assistance provider, they can help you develop a budget. The income and expense worksheet in this chapter can serve as a template.

The operating revenues you should include in your projections are:

- Water sales: base rate and flow rate
- Fees customers pay to connect to the system
- Penalties
- Any membership fees

In addition, you should include any unrestricted, non-operating revenue such as interest on bank accounts, revenue from the sale of equipment, revenue from leasing water tower space for cell phone or radio receivers, and debt proceeds if you borrow money.

The operating expenses you should include in your projections are:

- Salaries and fringe benefits (health care, retirement, etc.) for anyone within your organization who works for/with the water system, in proportion to the level of effort they work with the system
- Supplies and chemicals needed for water treatment and operations
- Electricity and other utilities paid by the water system
- Insurance costs on the system
- Contracted labor for operations
- Regular repairs and system maintenance, including spare parts
- Taxes, or payment in lieu of taxes, if applicable
- Fuel and oil costs for vehicles and heavy machinery
- Telephone and mobile phone costs
- Write-offs of unpaid bills ("bad debt expense")
- Contracted legal and accounting services

- Postage for mailing bills to customers and other correspondence
- Office expenses
- Conference fees, course fees, and other continuing education expenses
- Uniforms and other employee equipment
- Water testing and analysis laboratory fees
- Vehicle maintenance and upkeep
- Bank charges
- Miscellaneous expenses
- Any other cost incurred in the operation of your water system

Also, your projections should include non-operating expenses such as capital outlays, principal and interest payments on long-term debt, and contributions to reserves.

Financial Basics Explained

Not sure if your budget is comprehensive? Need to differentiate between balance sheets, income statements and cash-flow statements? RCAP's *The Basics of Financial Management for Small-community Utilities* is a primer on financial management. *The Basics* guide covers key parts of financial reports and a lot more. It discusses the importance of solid, effective financial management of a water system—developing a system that is financially sustainable. The guide is available for download at: https://www.rcap.org/resource/basics-of-financial-management-guidebook/

Page **26** shows the End-of-Year Revenues and Expenses Table. The top portion of the table includes operating revenues and then operating expenses. These are the costs of running the water system day-to-day. The bottom portion of the table includes other revenues and expenses, such as those related to capital assets and debt. Column A shows the revenue or expense category. The table then includes actual end-of-year revenues and expenses in Columns B-D from three consecutive fiscal years.

You may not have consistent line items in your budget year-to-year, especially if you have had different personnel prepare the budget each year. You may need to take some time to reorganize the budgets for each fiscal year into the same categories before entering data into the table. That way, you are making an apples-to-apples comparison across multiple years.

Total up the operating revenues and operating expenses for each year, and subtract expenses from revenues to get net operating income or losses. Then add up the other income and expenses for each year, and add that to the net operating income. This gives you your net income or loss for each year. These numbers show you whether you are covering operating expenses and all expenses with your revenue.

The bottom two rows contain information about your unrestricted reserve funds. Add the net income for each year to the Unrestricted Reserves at Beginning of Year row to get the Unrestricted Reserves at End of Year total. The Unrestricted Reserves at End of Year for one fiscal year becomes the Unrestricted Reserves at Beginning of Year for the next fiscal year. This shows you changes in your unrestricted reserve funds over time. Note any patterns in changes to unrestricted reserve fund balances, such as a reduction in unrestricted reserves each year to cover operating expenses.

In columns E and F, the differences among the three fiscal years are calculated to determine the growth or decline in the previous years' budget numbers. Column E expresses the difference in dollars (Column D minus Column B), and Column F expresses the difference as a percentage (Column E divided by Column B). This shows you the trend for your income and expenses over time. Note any years with unusual revenues or expenses. These atypical years can create issues with your projection. You may wish to exclude them from these calculations.

If you do not have a template to show budget actuals over multiple years, you can use this example table for your water system. Simply adjust the line items to match your budgets and financial statements and add your own data. A copy of the blank spreadsheet is available in the Excel tables download file that accompanies this guide. Your technical assistance provider can help you compile your actual revenues and expenses. And remember, this table should show data for the water system only. It should be separate from any general functions of your government or organization, and it should be separate from other services such as wastewater, stormwater, and solid waste.

Explanation of Example—City of Anytown, USA

End-of-Year Revenues and Expenses Data

The table on page **27** shows Anytown's actual revenues and expenses from three consecutive fiscal years—2018, 2019, and 2020.

Over the three-year period, operating revenues declined a little while operating expenses increased. Anytown generated positive net operating income in all three years. But Anytown's debt payments and capital outlays exceeded their net operating income and other income, meaning they had to dip into their unrestricted reserve funds to cover all expenses. Over the three-year period, the total unrestricted reserves for Anytown dropped by nearly 90 percent. Anytown did not make any contributions to unrestricted reserves over the three-year period. Note that these calculations exclude Anytown's restricted reserves for debt service coverage and for customer deposits.

End-of-Year Revenues and Expenses Table

A	B	C	D	E	F
Operating Revenue	**Actual Yr 1**	**Actual Yr 2**	**Actual Yr 3**	**3-yr Diff + or –**	**% Diff 3-year period**
Water Sales					
Misc. Construction & Meter Conn.					
Service Charges & Misc. Income					
Total Revenue					
Operating expenses					
Salaries & Fringe Benefits					
Service Supplies					
Electricity & Utilities					
Insurance					
Contract Labor					
System Repair & Maintenance					
Taxes & Licenses					
Fuel & Oil					
Telephone					
Bad-debt Expense					
Legal & Accounting					
Miscellaneous					
Postage					
Office Expenses					
Continuing Education					
Uniforms					
Testing & Analysis					
Truck Expense					
Bank Charges					
Total Operating expenses					
NET Operating Income (LOSS)					
Other Income & expenses					
Interest Income					
Gain on Sale of Equipment					
Principal and Interest Payments on Long Term Debt					
Capital Outlay					
Total Other Income & Expenses					
NET Income (LOSS)					
Unrestricted Reserves at Beginning of Year					
Unrestricted Reserves at End of Year					

End-of-Year Revenues and Expenses Table for **Anytown, USA**

A	B	C	D	E	F
Operating Revenue	**Actual 2018**	**Actual 2019**	**Actual 2020**	**3-yr Diff + or –**	**% Diff 3-year period**
Water Sales	219,342	215,919	210,199	(9,143)	-4%
Misc. Construction & Meter Conn.	2,400	5,550	5,300	2,900	121%
Service Charges & Misc. Income	5,286	9,642	6,750	1,464	28%
Total Revenue	**$227,028**	**$231,111**	**$222,249**	**($4,779)**	**-2%**
Operating expenses					
Salaries & Fringe Benefits	88,471	96,989	100,959	12,488	14%
Service Supplies	20,121	26,549	25,231	5,110	25%
Electricity & Utilities	24,006	22,486	21,651	(2,355)	-10%
Insurance	2,176	2,646	2,406	230	11%
Contract Labor	19,952	17,258	27,676	7,724	39%
System Repair & Maintenance	16,024	6,549	20,665	4,641	29%
Taxes & Licenses	1,579	1,622	1,474	(105)	-7%
Fuel & Oil	1,430	1,280	1,164	(266)	-19%
Telephone	1,825	2,347	2,134	309	17%
Bad-debt Expense	792	213	194	(598)	-76%
Legal & Accounting	8,308	2,347	2,134	(6,174)	-74%
Miscellaneous	70	299	272	202	289%
Postage	1,404	2,219	2,018	614	44%
Office Expenses	1,055	2,219	2,018	963	91%
Continuing Education	702	256	233	(469)	-67%
Uniforms	246	256	233	(13)	-5%
Testing & Analysis	2,201	2,689	2,444	243	11%
Truck Expense	421	341	310	(111)	-26%
Bank Charges	44	43	39	(5)	-11%
Total Operating expenses	**$190,827**	**$188,608**	**$213,255**	**$22,428**	**12%**
NET Operating Income (LOSS)	**$36,201**	**$42,503**	**$8,994**	**($27,207)**	**-75%**
Other Income & expenses					
Interest Income	1,928	717	801	($1,127)	-58%
Gain on Sale of Equipment	9,500	0	0	($9,500)	-100%
Principal and Interest Payments on Long Term Debt	(126,753)	(116,249)	(118,865)	$7,888	-6%
Capital Outlay	(94,447)	0	0	$94,447	-100%
Total Other Income & Expenses	**($209,772)**	**($115,532)**	**($118,064)**	**$91,708**	**-44%**
NET Income (LOSS)	**($173,571)**	**($73,029)**	**($109,070)**	**$64,501**	**-37%**
Unrestricted Reserves at Beginning of Year	**$382,702**	**$209,131**	**$136,102**	**($246,600)**	**-64%**
Unrestricted Reserves at End of Year	**$209,131**	**$136,102**	**$27,032**	**($182,099)**	**-87%**

Projecting changes in revenue over time

The next step in the financial forecast process is to determine whether your *current* rates will generate enough revenue to cover expenses in the next three to five years. Both revenues and expenses change over time. Your projection is a guess—none of us can predict the future. But by using data, you can have a more educated guess. The financial forecast is meant to measure whether your current rates will be adequate to cover future expenses.

Obviously, you would expect revenues to go up some if you have raised rates. But even if you have not raised rates, you may see revenues changing year-to-year. The three factors that most impact revenues are:

- The number of customers that receive a bill for a base rate each year
- The volume of water your meters register each year
- The number of customers that pay their bills on time and in full

The majority of your revenue will likely come from your water sales, and you will need to calculate revenue from the base rate and the flow rate separately. The formula for calculating revenue from the base rate is:

$$\textit{Number of Customers} \times \textit{Base Rate} \times \textit{Billing Periods} \times \textit{Collection Rate}$$

Here, you will need to estimate both the number of customers you will have over the next three to five years and what your collection rate will be. Is your community growing, shrinking, or remaining stable? How many residential and commercial units around town are vacant? These factors impact the number of customers you charge each billing period. You will have to run this calculation multiple times if you have separate customer classes or if you vary the base rate based on the meter size.

The formula for calculating revenue from the flow rate is:

$$\frac{\textit{(Volume of Water Charged to Customers per Year} \times \textit{Flow Rate} \times \textit{Collection Rate)}}{\textit{(1,000 gallons or 100 cubic feet (CF)/100 cubic meters (CM))}}$$

Remember, because of non-revenue water, this calculation is based on gallons or cubic feet/cubic meters of water *sold*, not on the amount of water produced. And if you include a certain amount of usage in the base rate, be sure to remove it from the total.

There are a number of factors that can impact the amount of water you sell, in addition to changes in the number of customers you are serving:

- Changes in the number of large users such as commercial, industrial, agricultural, or institutional customers
- Changes in economic conditions within the community and across the country
- Rainy weather, causing people to reduce outdoor irrigation
- Drought conditions, causing people to irrigate more, or causing your system to institute usage restrictions

- Meter under-reads, which reduce bills but not your water production (apparent water loss), including the percent of meter inaccuracy, if known

And, in general, per capita water usage has been declining in the United States for decades. This is mostly driven by technological changes—more efficient toilets, faucets, showerheads, and appliances.

Other types of revenue, such as connection fees, penalties, and interest, can be projected using historical trends.

Projecting changes in expenses over time

In general, the costs of goods and services your water system purchases go up every year. This concept is known as inflation. Likewise, for most water systems, salaries also increase every year. You may assume, then, that all of your operating expenses are constantly increasing. But that may not necessarily be the case. Your expenditures depend both on the price of whatever you spend money on and the quantity consumed. So, if you are fixing water leaks or reducing energy use, as described in Chapter 2, you may see your total cost of energy go down even if the price of energy is steady or even if it is going up. Likewise, you may have a long-time operator retire and be replaced by a new, younger operator with a lower salary. Overtime or contract labor may go up or down each year depending on your staffing level and how many emergencies you have.

And even if the costs of different items are going up, they may be increasing at different rates. For example, while salaries and health insurance costs generally both increase over time, health care costs may increase faster than salaries.

You may project operating expenses using a simple multiplier for all expense line items based on historical trends. This provides a close enough estimation for total operating expenses over time, but for the reasons discussed above, these projections are less accurate than those based on projections made on each individual line item. The revenue and expenses table includes columns that look at how amounts have changed over the three-year time horizon for each line of the budget. These historical trends can help you make guesses about how individual expenses will change over time. Your technical assistance provider is an important resource in making these projections.

Whether you project all operating costs with one number or each line item individually, the formula for calculating changes in operating expenses is:

Expense Base Number × (1+ Rate of Change)

The expense base number can either be the figure from the last full fiscal year or perhaps an average of the past 3 to 5 fiscal years. What is important is that the number comes from a representative year. If your last fiscal year included an unusual occurrence—say a natural disaster or global pandemic—you may wish to choose a different year or an average of years for your projection.

The cost of infrastructure rehabilitation and replacement is also not static. Projects are completed on a planned or as-needed basis and are paid for by a mix of current revenues, reserve funds, and debt. The particular slate of capital projects and the funding source will vary each year, having an impact on non-operating expenses. Rather than using a formula, these expenses should be projected based on your capital improvement plan and your existing or anticipated debt agreements. If you have not developed a capital improvement plan, your technical assistance provider can help you identify which projects will be most critical in the coming years.

Are your current rates adequate for the future?

Page **32** contains the Financial Forecast Table. In Column A, put the same line items as you had on the End-of-Year Revenues and Expenses Table. Column B is your base year—either your last fiscal year or an average of the last few fiscal years.

The top of the table has fields related to your current rate structure: your current base rate, your current flow rate, and your current annual billing periods (monthly billing would be 12, for example). These fields are constant throughout the projection. There are additional fields for your number of customers, gallons sold, and collection rate in the base year. You can adjust these fields in each of the projection years based on a multiplier. The Water Sales for each of the three projected years are calculated from these numbers.

The remainder of the operating revenues, the operating expenses, and the Interest Income and Sale of Equipment in other income and expenses can all be projected using a multiplier. Finally, the capital outlays and principal and interest payments on long-term debt should be based on planned or current projects and debt.

Just as with the end-of-year revenue and expenses table, total up the operating revenues

Explanation of Example—City of Anytown, USA

Financial Forecast Data

The table on page **33** shows Anytown's projected revenues and expenses for the next three fiscal years.

Anytown anticipates retaining the same number of customers over the next three fiscal years and maintaining their 98 percent collection rate. Their debt service remains unchanged over the next three years, and they have one capital project slated for the second year, which they plan to pay for using reserves.

Over the previous three fiscal years, Anytown's water use has been trending downward, about 5 percent per year. That is reflected in the financial forecast, and as a result, their expected revenue from water sales is down. At the same time, many of their operating expenses were trending upward, and overall operating expenses have been increasing about 4 percent per year. While some line items are trending up and others trending downward, the 4 percent per year increase overall produces a close enough estimation of future operating expenses.

Anytown will not be able cover its operating expenses with operating revenues over the next three years, and revenues will not be sufficient to also cover their debt service and capital outlays. Because their unrestricted reserve funds had been depleted over the past three fiscal years, Anytown will not have enough money to cover all of its expenses just one year from now. They will need to find ways to cut costs, raise revenues, or both.

and operating expenses for each year, and subtract expenses from revenues to get net operating income or loss. Then add up the other income and expenses for each year, and add that to the net operating income. This gives you your net income or loss for each year. These numbers show you whether you are covering operating expenses and all expenses with your revenue.

The bottom two rows contain information about your unrestricted reserve funds. Add the net income for each year to the Unrestricted Reserves at Beginning of Year row to get the Unrestricted Reserves at End of Year total. The Unrestricted Reserves at End of Year for one fiscal year becomes the Unrestricted Reserves at Beginning of Year for the next fiscal year. This shows you changes in your reserve funds over time.

The bottom lines of the table are the bottom line—will your current rates provide enough revenue for you to cover operating expenses, capital outlays, and debt service in the next three years? And what will be the impact to your unrestricted reserve funds? If you find that the current rates are not sufficient, a rate adjustment will be needed. That process is covered in Chapter 4.

Financial Forecast Table

A	B	C	D	E	F
Projected Operating Revenue	**Base Year**	**Multiplier**	**Base Year +1**	**Base Year +2**	**Base Year +3**
Current Base Rate					
Current Flow Rate (per 1,000 gallons)					
Current Annual Billing Periods					
Expected Total Customers					
Expected Total Gallons Sold					
Expected Collection Rate					
Water Sales					
Misc. Construction & Meter Conn.					
Service Charges & Misc. Income					
Total Projected Operating Revenue					
Projected Operating Expenses					
Salaries & Fringe Benefits					
Service Supplies					
Electricity & Utilities					
Insurance					
Contract Labor					
System Repair & Maintenance					
Taxes & Licenses					
Fuel & Oil					
Telephone					
Bad-debt Expense					
Legal & Accounting					
Miscellaneous					
Postage					
Office Expenses					
Continuing Education					
Uniforms					
Testing & Analysis					
Truck Expense					
Bank Charges					
Total Projected Operating Expenses					
Projected NET Operating Income (LOSS)					
Projected Other Income & Expenses					
Interest Income					
Gain on Sale of Equipment					
Principal and Interest Payments on Long Term Debt					
Capital Outlay					
Total Projected Other Income & Expenses					
Projected NET Income (LOSS)					
Projected Unrestricted Reserves at Beginning of Year					
Projected Unrestricted Reserves at End of Year					

Financial Forecast Table for **Anytown, USA**

A	B	C	D	E	F
Projected Operating Revenue	**Base Year**	**Multiplier**	**Base Year +1**	**Base Year +2**	**Base Year +3**
Current Base Rate	$13.65				
Current Flow Rate (per 1,000 gallons)	$3.75				
Current Annual Billing Periods	12				
Expected Total Customers	580	0%	580	580	580
Expected Total Gallons Sold	31,225,355	-5%	29,664,087	28,180,883	26,771,839
Expected Collection Rate	98%	0%	98.0%	98.0%	98.0%
Water Sales	210,199		202,119	196,669	191,490
Misc. Construction & Meter Conn.	5,300	10%	5,830	6,413	7,054
Service Charges & Misc. Income	6,750	10%	7,425	8,168	8,985
Total Projected Operating Revenue	**$222,249**		**$215,374**	**$211,250**	**$207,529**
Operating expenses					
Salaries & Fringe Benefits	100,959	4.0%	104,997	109,197	113,565
Service Supplies	25,231	4.0%	26,240	27,290	28,382
Electricity & Utilities	21,651	4.0%	22,517	23,418	24,355
Insurance	2,406	4.0%	2,502	2,602	2,706
Contract Labor	27,676	4.0%	28,783	29,934	31,131
System Repair & Maintenance	20,665	4.0%	21,492	22,352	23,246
Taxes & Licenses	1,474	4.0%	1,533	1,594	1,658
Fuel & Oil	1,164	4.0%	1,211	1,259	1,309
Telephone	2,134	4.0%	2,219	2,308	2,400
Bad-debt Expense	194	4.0%	202	210	218
Legal & Accounting	2,134	4.0%	2,219	2,308	2,400
Miscellaneous	272	4.0%	283	294	306
Postage	2,018	4.0%	2,099	2,183	2,270
Office Expenses	2,018	4.0%	2,099	2,183	2,270
Continuing Education	233	4.0%	242	252	262
Uniforms	233	4.0%	242	252	262
Testing & Analysis	2,444	4.0%	2,542	2,644	2,750
Truck Expense	310	4.0%	322	335	348
Bank Charges	39	4.0%	41	43	45
Total Projected Operating Expenses	**$213,255**		**$221,785**	**$230,658**	**$239,883**
Projected NET Operating Income (LOSS)	**$8,994**		**($6,411)**	**($19,408)**	**($32,354)**
Projected Other Income & Expenses					
Interest Income	801	-10%	721	649	584
Gain on Sale of Equipment	0	0%	0	0	0
Principal and Interest Payments on Long Term Debt	(118,865)		(118,865)	(118,865)	(118,865)
Capital Outlay	0		0	($88,374)	0
Total Projected Other Income & Expenses	**($118,064)**		**($118,144)**	**($206,590)**	**($118,281)**
Projected NET Income (LOSS)	**($109,070)**		**($124,555)**	**($225,998)**	**($150,635)**
Projected Unrestricted Reserves at Beginning of Year	**$126,161**		**$39,072**	**($85,483)**	**($311,481)**
Projected Unrestricted Reserves at End of Year	**$39,072**		**($85,483)**	**($311,481)**	**($462,116)**

Notes

Chapter 4: Adjusting the base and flow rates

There is a **financial target** you need to reach each year to cover all of your projected future expenses. After completing the financial forecast in Chapter 3, you may find that your current rates are not sufficient. If there are not ways to reduce your expenses, you will need to raise your revenues instead. But there are multiple ways to get to that target—you have a few options to consider!

Calculating your financial target and revenue needs

Your annual financial target includes three items discussed in Chapter 3:

- Your annual operating expenses
- Your annual principal and interest payments on long-term debt
- Your annual capital outlays

There is one more element to include—how much money you want in unrestricted reserve funds at the end of the year. As discussed in Chapter 1, having money in the bank allows water systems to pay for capital and to cover emergencies or unexpected revenue shortfalls. Reserves may also be required for systems with debt. While there is no accepted target for the amount of money to keep in reserves (beyond debt service coverage), you should have a goal for how much money you want in unrestricted reserves at the end of the year and set rates to meet that goal. Building unrestricted reserves is an important part of your financial responsibility—the goal should be a hard goal built into the rates, and not whatever is left over at the end of the year when other expenses are paid. Healthy unrestricted reserves are a necessity for water systems.

The Financial Target and Additional Revenue table on page **37** can be used to calculate how much money your rates will need to generate each year. First, pull over your operating expense, debt, and capital outlay numbers from the Financial Forecast worksheet and total them. Then, enter your unrestricted reserve target and your current unrestricted reserves for the first year, and subtract your current unrestricted reserves from the unrestricted reserve target. Note that it is possible to have a negative number if your current unrestricted reserves exceed your future target. Then add the total expenses to the unrestricted reserve need to calculate your funding target. Repeat the process for each successive year, noting that the unrestricted reserve target for one year becomes the current unrestricted reserves for the next year. For example, if your unrestricted reserve target for the first year is $50,000, your beginning unrestricted reserve balance in the second year is $50,000.

Next, pull over all of the revenue that is not from water sales from the Financial Forecast table—meter connection fees, service charges, interest income, and gains on sale of equipment—and total them. Subtract this number from the financial target to calculate the revenue needed from water sales. Then pull over the projected water sales from the Financial Forecast table and subtract them from the needed revenue. This gives you the additional revenue you will need to generate from water sales to cover all expenses and reserve targets.

Explanation of Example—City of Anytown, USA

Financial Forecast Data

The table on page **38** shows Anytown's financial targets for the next three fiscal years. Anytown has a capital project slated for the second year that they planned to pay for with unrestricted reserve funds. However, as was calculated in the End-of-year Revenues and Expenses Table, their unrestricted reserve funds have been depleted over the past three years to cover previous debt and capital expenses. Anytown has set an unrestricted reserve target in year 1 equal to the cost of the capital project, and an unrestricted reserve goal of $50,000 in the second year, and an unrestricted reserve goal of $100,000 in the third year, which equate to about 90 days and 180 days of operating costs respectively.

Based on those targets and on Anytown's projected expenses, Anytown's current rates are not sufficient to cover these future costs. Anytown's water sales will need to generate between $170,000 and $200,000 extra each year to cover all costs. This is a substantial amount. Current revenues from water sales are only slightly above $200,000. Anytown will need to raise its base rate, or its flow rate, or both. By not examining rates sooner and depleting unrestricted reserve funds to cover all of its expenses, Anytown finds itself in a difficult financial situation.

Facing this reality, Anytown could choose to pay for the capital project by borrowing money, which would help spread out the cost over time. It might also be tempted to delay its capital project and/or lower its unrestricted reserve targets, but that would not be in keeping with financial and managerial best practices. Anytown wants to follow the right path. The remainder of the guide shows how Anytown can pay for all of these necessary expenses to sustain the water system for years to come.

Financial Target and Additional Revenue Table

A	B	C	D
	Base Year +1	Base Year +2	Base Year +3
Total Projected Operating Expenses			
Principal and Interest Payments on Long Term Debt			
Capital Outlay			
Total Expenses			
Unrestricted Reserve Target			
Current Unrestricted Reserve Funds			
Additional Unrestricted Reserve Funds Needed			
Financial Target			
Misc. Construction & Meter Conn.			
Service Charges & Misc. Income			
Interest Income			
Gain on Sale of Equipment			
Total Revenue Other Than Water Sales			
Revenue Needed from Water Sales			
Projected Water Sales Under Current Rates			
Additional Revenue Needed from Water Sales			

Financial Target Table for **Anytown, USA**

A	B	C	D
	Base Year +1	Base Year +2	Base Year +3
Total Projected Operating Expenses	221,785	230,658	239,883
Principal and Interest Payments on Long Term Debt	118,865	118,865	118,865
Capital Outlay	0	88,374	0
Total Expenses	$340,650	$437,897	$358,748
Unrestricted Reserve Target	88,374	50,000	100,000
Current Unrestricted Reserve Funds	39,072	88,374	50,000
Additional Unrestricted Reserve Funds Needed	**$49,302**	**($38,374)**	**$50,000**
Financial Target	**$389,952**	**$399,523**	**$408,748**
Misc. Construction & Meter Conn.	5,830	6,413	7,054
Service Charges & Misc. Income	7,425	8,168	8,985
Interest Income	721	649	584
Gain on Sale of Equipment	0	0	0
Total Revenue Other Than Water Sales	**$13,976**	**$15,230**	**$16,623**
Revenue Needed from Water Sales	375,976	384,293	392,125
Projected Water Sales Under Current Rates	202,119	196,669	191,490
Additional Revenue Needed from Water Sales	**$173,857**	**$187,624**	**$200,635**

Adjusting your gallon allowance in the base rate

If your rate structure includes a usage allowance with your base rate, one option you have to raise revenue is to reduce or eliminate that allowance. For example, if you include 3,000 gallons of usage in your monthly base rate, you can reduce that allowance to 1,000 gallons or eliminate it entirely. If your customers continue to use the same volume of water, they will now pay for more gallons of their usage.

To calculate how much extra revenue you could receive from lowering or eliminating the gallon allowance, use this equation:

$$\frac{\textit{Gallons Reduced from Base Rate} \times \textit{Flow Rate} \times \textit{Annual Billing Periods} \times \textit{Collection Rate}}{\textit{(1,000 gallons or 100 cubic feet (CF)/100 cubic meters (CM))}}$$

Be conservative with your estimates. This equation assumes that users will not make any adjustments to their usage patterns once they start to pay for more gallons or cubic feet than they did before, which may not be true as customer bills go up. Often, systems raising rates see a small drop in usage initially, though usage may return to previous levels over time.

Adjusting your current base rate and flow rate

When additional revenues are needed from water sales, most water systems make incremental adjustments to their current rate structure. That rate structure is familiar to your customers, and you know your billing software can handle it.

These incremental changes can either be made to the base rate, to the flow rate, or to both. One strategy is to calculate covering the additional revenue needed from water sales with just an increase in the base rate and then calculating covering the additional revenue needed with just an increase in the flow rate. You can either choose one of these two options, or you can decide to raise both and know the range of those increases.

The formula for calculating how much your base rate will need to increase to cover all of the additional revenue needed is:

$$\frac{\textit{Additional Revenue Needed from Water Sales}}{\textit{(Customers} \times \textit{Annual Billing Periods} \times \textit{Collection Rate)}}$$

The formula for calculating how much your flow rate will need to increase to cover all of the additional revenue needed is:

$$\frac{\textit{Additional Revenue Needed from Water Sales}}{\textit{(Annual Gallons Sold} \times \textit{Collection Rate)}} \times \textit{1,000 gallons (or 100 CF/CM)}$$

If you wish to adjust both the base rate and the flow rate, it is possible to do the calculations by hand, but it is advisable to use a spreadsheet like the one provided in the Excel tables download file that accompanies this guide.

Some systems that raise rates don't always generate as much revenue as they anticipate. It is important to note that these calculations assume that your estimates for the number of customers, volume of water purchased, and collection rate are accurate. Obviously, as discussed above, a lot of factors—many out of your control—can cause these numbers to vary. But there is also some basic economics at work. As the price of a product like a gallon of water increases, customers tend to consume less of it if they can. The higher your rates, the lower you should expect your usage to be—to a degree. Regardless of price, there is a certain amount of water that each person requires to function in modern society. There is not a perfect relationship between price increasing and usage decreasing for drinking water. One rule of thumb is for every 10 percent increase in rates, you should expect usage to drop by about 3 to 4 percent. As a result, it is helpful to be conservative in your estimates about new revenue generated and to expect to have to continue to make rate revisions over time until you have found the correct numbers.

Explanation of Example—City of Anytown, USA

Rate Adjustment Data

The table on page **42** shows how Anytown's rates will need to change to meet its revenue needs. If Anytown were to change their base rate only, it would need to increase from $13.65 a month to $39.14 per month in the first year, then increase slightly in years 2 and 3 to $41.16 and $43.07, respectively. If Anytown were to change their flow rate only, it would need to increase from $3.75 per 1,000 gallons to $9.73 in year 1, $10.54 in year 2, and $11.40 in year 3.

To make up the additional revenue needed from water sales, Anytown can also adjust both the base rate and the flow rate. One option would be to increase the base rate to $25.00 per month for all three years, which would make the volumetric rate $7.55 in year 1, $8.29 in year 2, and $9.08 in year 3. Note that $25.00 is an arbitrary number, chosen because it falls between the current base rate and the maximum possible base rate.

All three of these rate structures will yield the same amount of annual revenue assuming that the anticipated number of customers, number of gallons sold, and collection rate are accurate.

Rates Adjustment Table

A	B	C	D
	Base Year +1	Base Year +2	Base Year +3
Current Base Rate			
Current Flow Rate (per 1,000 gallons)			
Current Annual Billing Periods			
Expected Total Customers			
Expected Total Gallons Sold			
Expected Collection Rate			
Additional Revenue Needed from Water Sales			

Increase from Base Rate Only:

New Base Rate ($/month)			
Existing Flow Rate ($/1,000 gallons)			

Increase from Flow Rate Only:

Existing Base Rate ($/month)			
New Flow Rate ($/1,000 gallons)			

Increases to Both Base Rate and Flow Rate:

New Base Rate ($/month)			
New Flow Rate ($/1,000 gallons)			

Rates Adjustment Table for **Anytown, USA**

A	B	C	D
	Base Year +1	Base Year +2	Base Year +3
Current Base Rate	$13.65		
Current Flow Rate (per 1,000 gallons)	$3.75		
Current Annual Billing Periods	12		
Expected Total Customers	580	580	580
Expected Total Gallons Sold	29,664,087	28,180,883	26,771,839
Expected Collection Rate	98.0%	98.0%	98.0%
Additional Revenue Needed from Water Sales	$173,857	$187,624	$200,635

Increase from Base Rate Only:

New Base Rate ($/month)	$39.14	$41.16	$43.07
Existing Flow Rate ($/1,000 gallons)	$3.75	$3.75	$3.75

Increase from Flow Rate Only:

Existing Base Rate ($/month)	$13.65	$13.65	$13.65
New Flow Rate ($/1,000 gallons)	$9.73	$10.54	$11.40

Increases to Both Base Rate and Flow Rate:

New Base Rate ($/month)	$25.00	$25.00	$25.00
New Flow Rate ($/1,000 gallons)	$7.55	$8.29	$9.08

Another approach: fixed and variable expenses

If you have to adjust your rates to increase revenue from water sales, you can also choose to make wholesale changes to your rates rather than incremental changes to the existing rate structure. A rates analysis is an opportunity to ask yourself why your rates are set the way they are. Were they calculated with a specific methodology in mind, or are they set the way they are because that's the way the rates have always been? You may find that you are making arbitrary adjustments to arbitrary rates.

One approach is to be intentional about what costs will be covered by the base rate and what costs will be covered by the flow rate. As discussed in Chapter 1, some costs of running a water system do not change based on how much water you treat and sell in a given year. These are known as "fixed expenses." Other costs are directly tied to the volume of water you treat and sell, and these are known as "variable expenses." One way to approach setting rates is to have the fixed expenses covered entirely by your base rate and the variable expenses covered entirely by your flow rate.

There are many opinions about what expenses should be considered fixed and what expenses should be considered variable, and determining them is not always going to be exact. A good rule of thumb is to consider expenses that you would have to pay even if your system never produced a single drop of water as fixed expenses and all expenses directly associated with producing and delivering water as variable expenses.

The most common variable expenses are:

- Service supplies, including chemicals, filters, and other items related to treatment
- Electricity and utilities
- Contract labor tied to operations
- System repair and maintenance, to a degree
- Purchase of bulk water for resale

Everything else is a fixed expense, including debt service and capital outlays. From your financial forecast, total up the lines that are fixed expenses and the lines that are variable expenses. Also add in your reserve funds needed from the financial target table as a fixed expense.

The formula for calculating how much your base rate will need to be to cover all fixed expenses is:

$$\frac{\textit{Total Annual Fixed Expenses}}{\textit{(Customers} \times \textit{Annual Billing Periods} \times \textit{Collection Rate)}}$$

The formula for calculating how much your flow rate will need to be to cover all variable expenses is:

$$\frac{\textit{Total Annual Variable Expenses}}{\textit{(Annual Gallons Sold} \times \textit{Collection Rate)} \times \textit{1,000 gallons (or 100 CF/CM)}}$$

If your system includes 1,000 or 2,000 gallons of water in the base rate, your base rate needs to include the cost of this water. The reason for including this cost is that there are operation and maintenance costs associated with producing the first 1,000 gallons just as there are costs to produce the second, third, or fourth thousand gallons. To include these costs in the base rate, multiply the variable expenses per 1,000 gallons (calculated above) by the number of units of water included in the minimum. Then add this number to the fixed cost per customer to determine the base rate.

Explanation of Example—City of Anytown, USA

Rates Based on Fixed and Variable Expenses

The table on page **45** shows what Anytown's rates would be if fixed expenses are covered by the base rate and variable expenses are fully covered by the flow rate. Over the three-year projection, Anytown's fixed expenses increase slightly from $290,920 in year 1 to $301,634 in year 3, which means the base rate will increase slightly over that time period. At the same time, variable expenses also increase slightly, but expected usage declines, meaning that the flow rate has to go up at a faster rate.

To cover all projected fixed expenses, Anytown's base rate would need to be $42.65 in year 1, increasing to $44.22 by year 3. To cover all projected variable expenses, the flow rate would need to be $3.41 in year 1, increasing to $4.08 in year 3.

Rates Based on Fixed and Variable Expenses Table

A	B	C	D
	Base Year +1	Base Year +2	Base Year +3
Fixed Operating Expenses			
Principal and Interest Payments on Long Term Debt			
Capital Outlay			
Additional Reserve Funds Needed			
Total Fixed Expenses			
Total Variable Expenses			
Expected Annual Billing Periods			
Expected Total Customers			
Expected Total Gallons Sold			
Expected Collection Rate			
Base Rate Covering Fixed Expenses			
Flow Rate Covering Variable Expenses			

Rates Based on Fixed and Variable Expenses Table for **Anytown, USA**

A	B	C	D
	Base Year +1	Base Year +2	Base Year +3
Fixed Operating Expenses	122,753	127,664	132,769
Principal and Interest Payments on Long Term Debt	118,865	118,865	118,865
Capital Outlay	0	88,374	0
Additional Reserve Funds Needed	49,302	(38,374)	50,000
Total Fixed Expenses	**$290,920**	**$296,529**	**$301,634**
Total Variable Expenses	**$99,032**	**$102,994**	**$107,114**
Expected Annual Billing Periods	12	12	12
Expected Total Customers	580	580	580
Expected Total Gallons Sold	29,664,087	28,180,883	26,771,839
Expected Collection Rate	98%	98%	98%
Base Rate Covering Fixed Expenses	$42.65	$43.47	$44.22
Flow Rate Covering Variable Expenses	$3.41	$3.73	$4.08

So which rate is right?

There is no one right rate structure for your water system. The primary purpose of a rates analysis is to ensure that rates are set high enough to cover all costs of running the system. However, there are community conditions and circumstances that may require other factors be considered in the process of determining rates. Below are some factors to consider as you adjust your rates:

- Base rates for commercial and industrial customers may need to be higher due to possible higher costs of providing service, such as more expensive metering systems, or if these users require additional peak-production capacities (well production, treatment plant, storage, pumping, etc.) to meet their requirements.
- Some systems may want to minimize costs to commercial and industrial users in order to attract new business to the community by shifting a larger portion of the costs to residential users.
- Limits on the amount of water available to the system may require a rate structure that encourages conservation and that charges a premium for wasting water or for high usage.
- A community whose wastewater treatment facility is at or very near capacity may choose a rate structure that discourages high usage in order to avoid the expense of expanding and/or upgrading wastewater facilities.
- To avoid the shock to customers of a single, large rate increase, some systems may wish to phase in their rate increase over several years. This may be especially true for systems that have not changed their rates in a long time.

If you have multiple customer classes or charge different base rates based on meter size, one of the most difficult yet most important aspects of rate setting is making sure that different customer types are paying their fair share. You should be intentional about setting rates for each customer type based on data and community conditions. Avoid the easy trap of overcharging one customer type while undercharging another, which can create animosity towards the water system from overcharged customers.

You may wish to generate multiple alternatives for consideration when you are adjusting rates. Each alternative will generate the same amount of revenue (assuming assumptions are correct), but they impact customers in dramatically different ways. For example, a high base charge will have more of an impact on low-gallon users, while a high flow rate will have more impact on high-gallon users.

Ultimately, what constitutes “fair” is a policy decision that you and your water system’s leadership need to make. Is it fair for an elderly customer using 1,500 gallons a month to pay the same share of fixed expenses as a household that uses 15,000 gallons a month to irrigate their yard and fill their pool? Some would argue that bigger users should pay a greater share of fixed expenses, while others would argue that because fixed expenses don’t change with usage, every customer should pay the same amount. Have specific reasons for the choices you make.

One practice that is helpful when comparing rate alternatives is showing what different customers would pay under different rate alternatives. First, using usage data, identify a group of typical customers for your system or customers of concern. That could include very low users, average users, high residential users, water-intensive small businesses, agriculture, or institutions like schools or hospitals. USDA, for example, estimates 5,000 gallons a month as typical residential use. Then calculate how much each of those customers would pay under each rate alternative and put the findings into a table. That makes head-to-head comparisons

of rate options easier. You may wish to calculate the difference between the lowest and highest possible rate for each example customer. The Customer Comparison table is provided on page **49.**

Another helpful practice is to show what the monthly bill would be at 1,000-gallon increments (0-1,000 gallons, 1,001-2,000 gallons, etc.) and the number of customers that fall into each usage level. Many utility billing systems have built-in reporting functions that are able to produce this type of usage summary. Otherwise, you can use the Customer Impact table on page **49**.

Customer usage information can be found in your billing records. One method is to calculate each customer's total usage for the last 12 months and then calculate an average by dividing by the number of billing periods. As mentioned, if you have a computer and billing software, this should be very easy to do. Customer usage does change throughout the year, so another method is to sort all of the bills sent to your customers in a one-year period into the usage levels and then divide each level by the number of billing periods.

If your billing software cannot easily export these data, you may have to do the tabulation by hand. If this is the case, a faster method is to use a sample of four months. The general rule for selecting months is to use the months with the highest and lowest usage and two medium-usage months (for example, July, December, October, and March). You may still want to tabulate all 12 months for your largest users, especially if they have seasonal variation in water use. If your system charges different rates for residential and commercial customers, you need to calculate the average monthly usage for each customer class.

Then enter the bill scenarios and calculate the price at each level of usage. Use the high end of the range for the calculation. So, for 0 to 1,000 gallons, calculate the bill for 1,000 gallons. For 1,001 to 2,000 gallons, calculate the bill for 2,000 gallons, and so on. In column G, record a cumulative total of the customers up through that usage level, and then in Column H, record a cumulative percentage of the customers up through that usage level (the number of customers up through that level divided by total customers). For example, Column G for the 1,001 to 2,000 gallons line would be the total of customers for 0 to 1,000 gallons and 1,001 to 2,000 gallons. And Column G for the 2,001 to 3,000 gallons line would be the total of customers for 0 to 1,000 gallons, 1,001 to 2,000 gallons, and 2,001 to 3,000 gallons.

When completed, you can see the number of customers each month in each usage level, what they would pay for water under each rate scenario, and what percentage of all customers will pay no more than that level.

In a variation on this table, you can also include the current rates and then show how much the monthly bill will go up under each of the rate scenarios. That way, you can see the percentage of customers that will pay no more than $5.00 extra per month, or no more than $10.00 extra per month.

Increasing the Rates of Multiple Services

It is a best practice to review the adequacy of current rates for all of your services each year. You may find that you need to raise both drinking water and wastewater rates at the same time. While you should calculate each of the new rates separately, if most of your customers receive both services, you may wish to look at the customer impact of the two rate increases together.

Explanation of Example—City of Anytown, USA

Customer Comparisons

The top table on page **50** shows what representative customers from Anytown would pay per month under the four different rate structures described earlier. Anytown chose to compare four customers—low residential users consuming 1,500 gallons a month, average residential users consuming 5,500 gallons a month, high residential users consuming 15,000 gallons a month, and their Main Street café, a customer of concern, which consumes 36,000 gallons a month.

All four rate structures are single block with a base fee that does not include a gallon allowance. Even though all four rate structures should yield the same amount of revenue, there is a great disparity in the base rates and flow rates across the four options.

Interestingly, the average customer pays roughly the same monthly bill under all four scenarios. But the low residential user and the high residential user see much bigger swings based on which rate structure is selected—in both cases, their highest potential bill is about double their lowest potential bill. For the café, the difference between the lowest and highest bill is almost $200 a month. These comparisons can help Anytown discuss which rate is most fair and most appropriate for their community.

The bottom table on page **50** shows the maximum monthly bill customers at different usage levels would pay under each of the four rate scenarios. The columns at the right show the cumulative number and percentage of customers that would pay no more than that amount per month. About half of Anytown's customers use 5,000 gallons or less every month, so their monthly bills would be no more than roughly $63.00 under any of the four scenarios.

Customer Comparison Table

A	B	C	D	E	F	G
	Description of Rate Option					
	Base Rate					
	Flow Rate					
Customer	Typical Usage	Monthly Bill: Option 1	Monthly Bill: Option 2	Monthly Bill: Option 3	Monthly Bill: Option 4	Difference of Lowest to Highest

Customer Impact Table

A	B	C	D	E	F	G	H
	Description of Rate Option						
	Base Rate						
	Flow Rate						
Usage Level (Gallons per month)	Number of Customers	Monthly Bill: Option 1	Monthly Bill: Option 2	Monthly Bill: Option 3	Monthly Bill: Option 4	Cumulative Total Customers	Cumulative % of Total Customers
0 to 1,000							
1,001 to 2,000							
2,001 to 3,000							
3,001 to 4,000							
4,001 to 5,000							
5,001 to 6,000							
6,001 to 7,000							
7,001 to 8,000							
8,001 to 9,000							
9,001 to 10,000							
10,001 to 11,000							
11,001 to 12,000							
12,001 to 13,000							
13,001 to 14,000							
14,001 to 15,000							
More than 15,000–at least							

Customer Comparison Table for **Anytown, USA**

A	B	C	D	E	F	
	Description of Rate Option	Raise Base Only	Raise Flow Only	Raise Base and Flow	Fixed by Base; Variable by Flow	
	Base Rate	$39.14	$13.65	$25.00	$42.65	
	Flow Rate	$3.75	$9.73	$7.55	$3.41	
Customer	Typical Usage	Monthly Bill: Option 1	Monthly Bill: Option 2	Monthly Bill: Option 3	Monthly Bill: Option 4	Difference of Lowest to Highest
Low Residential User	1,500	$44.77	$28.25	$36.33	$47.76	$19.52
Average Residential User	5,500	$59.77	$67.17	$66.53	$61.39	$7.40
High Residential User	15,000	$95.39	$159.60	$138.25	$93.75	$65.85
Café on Main Street	36,000	$174.14	$363.93	$296.80	$165.29	$198.64

Customer Imapct Table for **Anytown, USA**

A	B	C	D	E	F	G	H
	Description of Rate Option	Raise Base Only	Raise Flow Only	Raise Base and Flow	Fixed by Base; Variable by Flow		
	Base Rate	$39.14	$13.65	$25.00	$42.65		
	Flow Rate	$3.75	$9.73	$7.55	$3.41		
Usage Level (Gallons per month)	Number of Customers	Monthly Bill: Option 1	Monthly Bill: Option 2	Monthly Bill: Option 3	Monthly Bill: Option 4	Cumulative Total Customers	Cumulative % of Total Customers
0 to 1,000	54	$42.89	$23.38	$32.55	$46.06	54	9%
1,001 to 2,000	36	$46.64	$33.11	$40.10	$49.47	90	16%
2,001 to 3,000	44	$50.39	$42.84	$47.65	$52.87	134	23%
3,001 to 4,000	71	$54.14	$52.57	$55.20	$56.28	205	36%
4,001 to 5,000	79	$57.89	$62.30	$62.75	$59.68	284	49%
5,001 to 6,000	81	$61.64	$72.03	$70.30	$63.09	365	63%
6,001 to 7,000	52	$65.39	$81.76	$77.85	$66.50	417	73%
7,001 to 8,000	51	$69.14	$91.49	$85.40	$69.90	468	81%
8,001 to 9,000	40	$72.89	$101.22	$92.95	$73.31	508	88%
9,001 to 10,000	29	$76.64	$110.95	$100.50	$76.72	537	93%
10,001 to 11,000	15	$80.39	$120.68	$108.05	$80.12	552	96%
11,001 to 12,000	10	$84.14	$130.41	$115.60	$83.53	562	98%
12,001 to 13,000	5	$87.89	$140.14	$123.15	$86.94	567	99%
13,001 to 14,000	1	$91.64	$149.87	$130.70	$90.34	568	99%
14,001 to 15,000	1	$95.39	$159.60	$138.25	$93.75	569	99%
More than 15,000–at least	6	$99.14	$169.33	$145.80	$97.16	575	100%

Your rates and debt

As a small system, you are likely able to cover the cost of short-lived assets like meters and valves through your water sales and reserves funds. But most small systems have not saved enough money to cover the replacement cost of long-lived assets like pipes, tanks, and wells. Instead, these systems have to borrow money to replace these assets as well as for some expensive maintenance tasks like tank painting.

All lenders—whether a bank, the bond market, or a governmental program—will look at your rates and finances as part of evaluating your loan. This process is called underwriting. They are determining whether you are likely to pay back your loan.

Lenders will do an analysis similar to the one described in this guide—measuring the sufficiency of your current rates over time. They will look at whether your operating revenues are enough to cover your operating expenses, whether you have enough money to pay for current and future debt service, and whether your reserves are remaining at a healthy level to handle any unexpected costs or unexpected revenue shortfalls. They may also compare your rates to demographic data within your community and to other, similar water systems around your state or territory or to other, similar tribal nations. You may be required to adjust your rates as a condition of receiving a loan or grant.

If you have existing debt, your lender has likely required you to set aside an amount of money in the bank to ensure that debt payments can be made on time and in full. This is called a debt service reserve, and you must maintain it for the life of the loan. If you are in the process of changing your rates, it is a good practice to give your lender a head's up. In most cases, lenders will let you select any rate structure you feel is most appropriate for your community as long as it maintains your financial health.

Compare with Caution!

When adjusting rates, many systems wonder what their neighboring communities are charging. It's a natural desire to compare. But, when it comes to rates, compare with caution. Your rates should reflect the total cost of running your water system, and that total cost is unique to each system. Even your neighboring communities may have very different financial realities from your own. Nevertheless, some funders like USDA use comparisons with other, similar communities to determine your eligibility for grant and low-interest loan programs. The Environmental Finance Center at the University of North Carolina conducts statewide rate surveys and maintains Financial Sustainability and Rates Dashboards for several states that assist utility managers and local officials to compare and analyze water and wastewater rates against multiple characteristics, including utility finances, system characteristics, customer base socioeconomic conditions, geography, and history. You can access these Rates Dashboards at: https://efc.sog.unc.edu/utility-financial-sustainability-and-rates-dashboards

Beyond the single-block rate structure

The rate structures described in this guide, and the rate structure for Anytown, USA, are single-block rates with one customer class. It is possible to calculate these rates by hand or by using a basic spreadsheet like the one provided in the Excel tables download file that accompanies this guide. If your community has multiple customer classes, varies the base rate with the size of the meter, or wants to institute or revise increasing block or decreasing block rates, you need more advanced resources. In those instances, the assistance from a technical assistance provider with experience in rate analysis would be invaluable for your community.

Chapter 5: Adjusting rates: How you do it makes a difference

By going through the process in this guide, you may discover that your rates need to increase in order to cover the full cost of running the system. You have controlled costs as much as possible, but a rate increase is still necessary to cover the cost of your operations, future capital needs, and reserve goals. Don't be ashamed! For far too long, our industry has viewed rate increases as at best a necessary evil and at worst a failure of management. But a rate increase that is based on sound data analysis is actually a responsible action to protect public health and ensure that the system can run properly for years to come. And you should describe the rate increase that way to your customers.

But make no mistake, your customers will notice when you raise rates, so don't try to hide it from them! Nobody likes that kind of surprise. Some may even complain loudly when they see you in the grocery store. Explanations after you've raised rates will likely sound like excuses to customers. And you will have lost support you could have had if you had made customers aware beforehand. Here are some ideas to help with gaining customer support for the needed increases.

Educate the board

Getting ready for a rate increase starts with the board doing its homework. The board needs to assess the physical and financial condition of the system honestly.

When was the last time the board toured your system's facilities? If it has been more than six months, schedule a date as soon as possible for the entire board to view your facilities with the operator. Together, look at each part of the system—how it works, what preventative maintenance is being done to keep it in good shape, and when it will need to be replaced. Make a list of both the good and bad parts of the system's operation, separating out cosmetic deficiencies like peeling paint on assets from functional deficiencies that may prevent service or endanger public health. Carefully identify any improvements the system plans to make and pay for with a rate increase, and be ready to explain why the improvements are necessary. Have the board review the last inspection from your primacy agency to see that all recommended improvements have been made or are included on your list.

Review next year's budget and identify what costs will be going up. If you know that your costs for electric services and chemicals will be higher, let your customers know. They will understand that you have no choice but to pass those increased costs along to those who receive your final product.

You know you have done your homework when you can knowledgeably answer customers when they ask, "Why do we need a rate increase?" It is easier for your customers to support a rate increase if they know specifically what the money will be spent on. The bottom line is to provide information, so customers know what you are doing and why. This is the essence of transparency.

Technical help for non-technical people

For board members who need to understand some of the technical aspects of a drinking water or wastewater plant and treatment process in order to make decisions about their physical maintenance and development, RCAP has produced two guides. *A Drop of Knowledge: The Non-operator's Guide to Drinking Water Systems* and *A Drop of Knowledge: The Non-operator's Guide to Wastewater Systems* explain in simple, everyday language water and wastewater treatment processes to people without a technical background or who have no prior experience with plant operations.

The drinking water guide is available here: https://www.rcap.org/resource/non-operators-guide/

The wastewater guide is available here: https://www.rcap.org/resource/non-operators-guide-to-wastewater-systems/

Educate your customers before the increase

Your program to educate customers should include the following three points:

1. **The proposed increase will ensure that the water system can comply with current regulations to protect the health and welfare of the community.**

Safe drinking water has both a personal and community impact. Modern water-treatment processes have almost eliminated diseases such as cholera and typhoid and will protect consumers from new and equally deadly contaminants we face due to increased industrialization and use of chemicals. Effects on the community are related to growth and economic development. Businesses and industries will not locate where they cannot be assured of safe, dependable water for their employees and manufacturing or processing needs. Do you think a business would locate to a place where the electricity supply is not stable? It is the same with the water supply. New businesses and residents expect a reliable and safe supply of water.

The Environmental Protection Agency (EPA) continuously updates regulations, such as the list of harmful contaminants, and primacy agencies (so called because they are the primary enforcers of regulations) set regulations to keep our drinking water safe and to protect our environment. As the list of contaminants deemed harmful to humans and the regulations to protect our water supplies expand, so will the cost of treating water. Additional money will be needed to pay for the new technologies to keep our water supply in compliance with these regulations.

Most of your customers have no idea the level of work and infrastructure involved in delivering safe water on demand to homes and businesses. Invite the public to tour your facilities. Use social media channels to talk about your work, and use pictures and videos for emphasis. Partner with your local schools to educate children about water treatment. You may even encourage a few young people to pursue a career in drinking water!

2. **The rate structure you have developed is based on hard data and is as equitable and fair as possible.**

Stress how the proposed rate structure you have developed is as fair as possible to all customers. The rates are based on an analysis of actual revenues and expenses; they aren't pulled out of thin air. Whatever principle or strategy you have used to develop the rate structure, make sure you can explain it to the public. If you have engaged a technical assistance provider in the

process, stress that you brought in a neutral, third-party expert to help with the analysis. Post the rates, and make sure that customers understand them.

3. **The rate increase is needed to cover the full costs of producing, treating, storing, and distributing water to the customers.**

Explain that the system must be self-supporting and that revenue from the sale of water must cover all costs of operating the system. Water systems must be self-sufficient, which is an important part of an industry-wide movement toward sustainability. In order to pay for itself, your system must rely solely on its own income, which comes mainly from water sales. As a system, you are responsible for keeping the public informed of the financial condition of the system and what it costs to provide safe and dependable water. Invite the public to take part in the budget process. Let the public know when you are working on the budget, and post more than the required notices inviting them to attend budget meetings. Use social media to keep the public up to date on your progress. Let residents know that you have nothing to hide—customers expect transparency from their governments and other service providers. The more your customers know about what it takes to provide the safe drinking water they take for granted, the more likely they will be to support a rate increase.

After all, unlike some businesses residents patronize, your community's residents have not only their funds invested month in and month out in your water system through the rates they pay, but the system is something they use and depend on daily—more than they ever think about for the way it fulfills their basic needs. And water systems are essentially monopolies—customers don't often have viable alternatives. A water system owes it to its customers to explain what this service is, how vital it is to their survival and lifestyle, and what it takes to bring them that service.

Getting the word out

As soon as you know a rate increase is coming, start getting the word out. Make sure everyone in the organization—the operator, clerk, all other employees, and the board—understands the need for the rate increase. And everyone is responsible for educating customers.

Think about your community and how to best get the word out. Divide the responsibility for some of the following tasks among board members, system managers, and staff:

- The local newspaper or radio coverage can help. Don't consider only placing an ad, but contact a reporter to pitch a news story as well that could include interesting information about the process the community has for supplying water. This would help with educating customers, which would help them support a rate increase.
- If your water system has a website, post an announcement and an explanation about the rate increase.
- Identify civic, business, or church groups that need to be informed.
- Garner the support of key community leaders.
- Send information home with school-aged children.
- If possible, include an insert with your regular billing, or prepare a separate mailing to all customers.
- Use social media platforms as a quick and inexpensive way to inform your customers about the system. Think about ways to increase the number of customers that follow you on social media.
- Think about other methods you can use to provide customers with information to illustrate the need for the rate increase.

Final thoughts

Don't wait until your system is in deep financial trouble or until a large and expensive piece of your system breaks to start thinking about a rate increase. Small, annual increases are much more acceptable to customers than large increases every three or four years. The task of evaluating the sufficiency of your water system's rates described in this guide is ongoing. You should continue to monitor your revenues and expenses throughout the year and continue to make this type of rate analysis part of your annual budget process. If your system's finances are in such good shape that a rate increase isn't necessary, tell your customers that news as well.

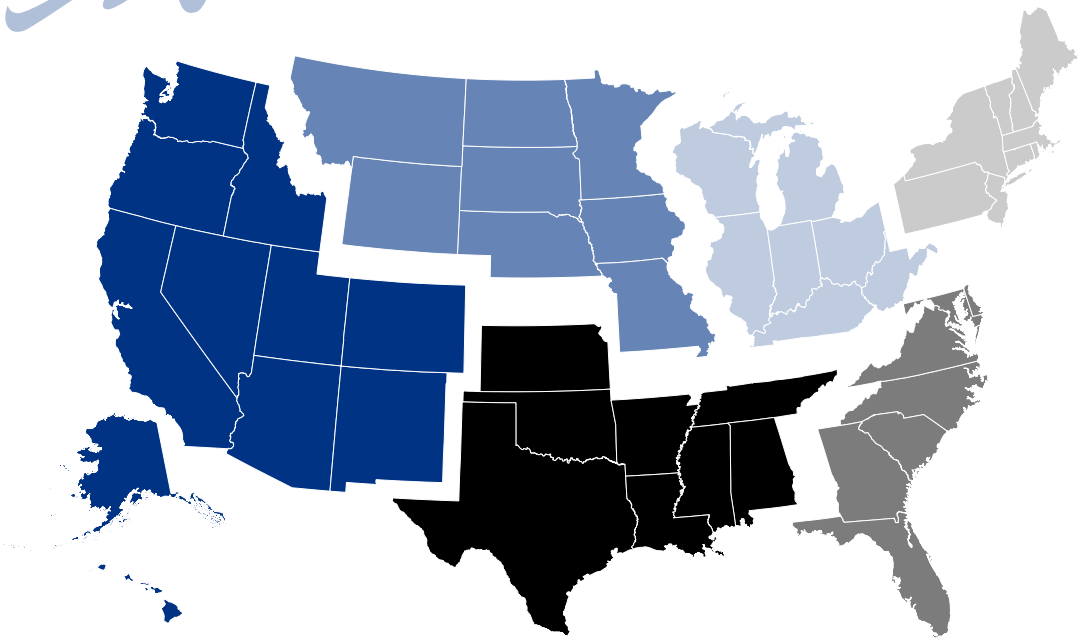
You have a responsibility for providing your community with an uninterrupted supply of safe drinking water. No one is going to thank you for keeping rates low if the water becomes unsafe to drink or the system keeps breaking down and there is no money to pay for repairs. The public trusts you to make the tough decisions, so don't let them down!

Need help with your community's water or wastewater system?

The Rural Community Assistance Partnership (RCAP) is a national network of nonprofit organizations working to ensure that rural and small communities throughout the United States and its territories have access to safe drinking water and sanitary wastewater disposal. The six regional RCAP partners provide a variety of programs to accomplish this goal, such as direct training and technical assistance, leveraging millions of dollars to assist communities develop and improve their water and wastewater systems.

If you are seeking assistance in your community, contact the office for the RCAP region that your state, territory, or tribal nation is in, according to the map below. Work in individual communities is coordinated by these regional offices.

RCAP Rural Community Assistance Partnership



Midwest RCAP
Midwest Assistance Program
303 N Market St., Ste 2
Maryville, MO 64468
(660) 562-2575
www.map-inc.org

Great Lakes RCAP
Great Lakes Community Action Partnership
P.O. Box 590
219 S. Front St., 2nd Floor
Fremont, OH 43420
(800) 775-9767
www.glcap.org

Northeast and Caribbean RCAP
RCAP Solutions
191 May Street
Worcester, MA 01602
(800) 488-1969
www.rcapsolutions.org

Puerto Rico and U.S. Virgin Islands
(Caribbean RCAP)

Western RCAP
Rural Community Assistance Corporation
3120 Freeboard Drive, Suite 201
West Sacramento, CA 95691
(916) 447-2854
www.rcac.org

Southern RCAP
Communities Unlimited
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Fayetteville, AR 72703
(479) 443-2700
www.communitiesu.org

Southeast RCAP
Southeast Rural Community Assistance Project
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Visit our website for other publications, electronic and print periodicals, and ways your community can get assistance with its water and wastewater system.