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Welcome!

Water and Wastewater Utility Operation, Maintenance and Management

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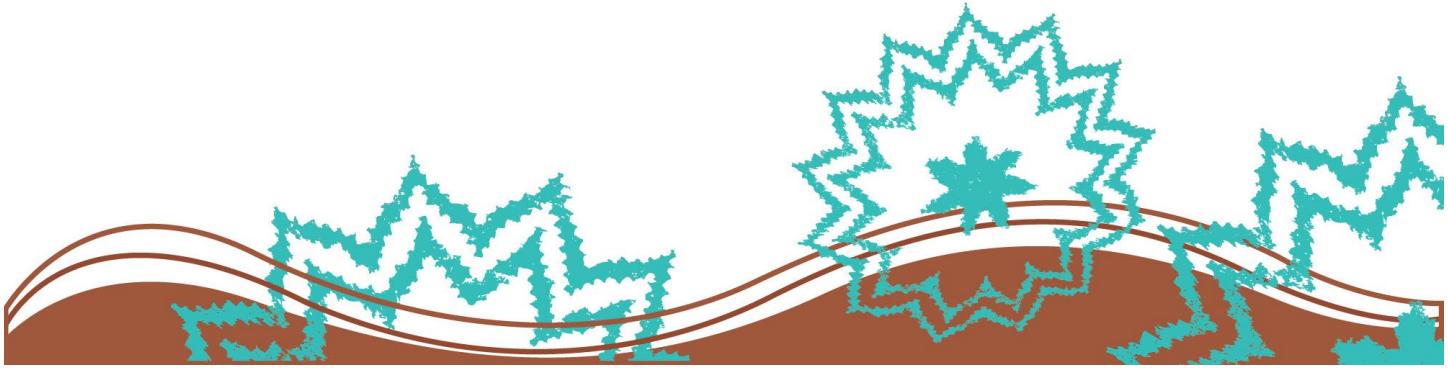
Today's Session

Asset Management
Planning for the Future



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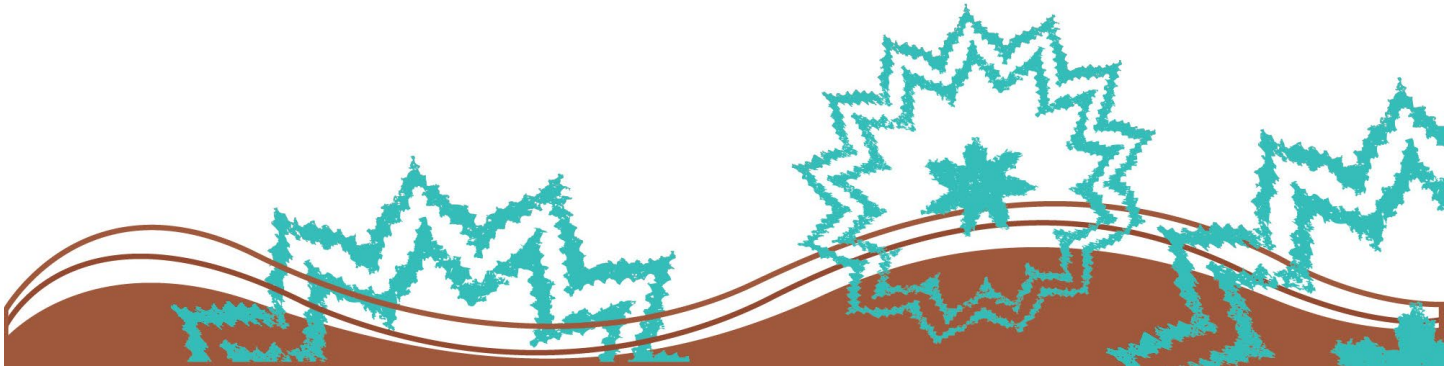
Today's Presenters

Mark Nelson

Geraldine Camilli, P.E.

Gemma Kite, P.E.

Michael Demanche



WEBINAR OVERVIEW

This session is being recorded.

To receive a certificate of attendance you need to:

Stay through the whole event – if you leave you must return within 5 minutes;

Participate at least TWICE in the chat or poll questions.

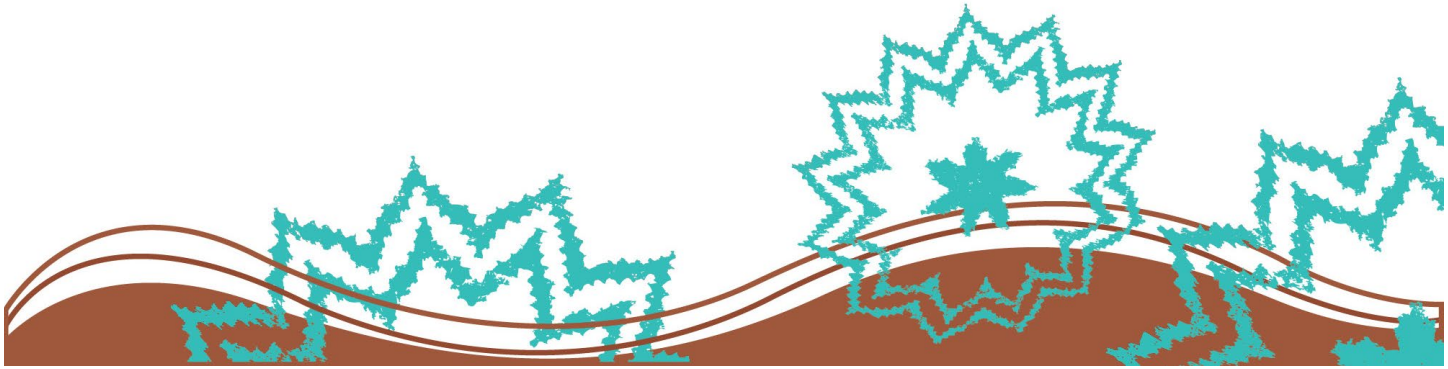
WEBINAR OVERVIEW

Presentations and other resources are available for you to download

If you have questions about the webinar platform

Chat with

Lena Porell or Mike Demanche



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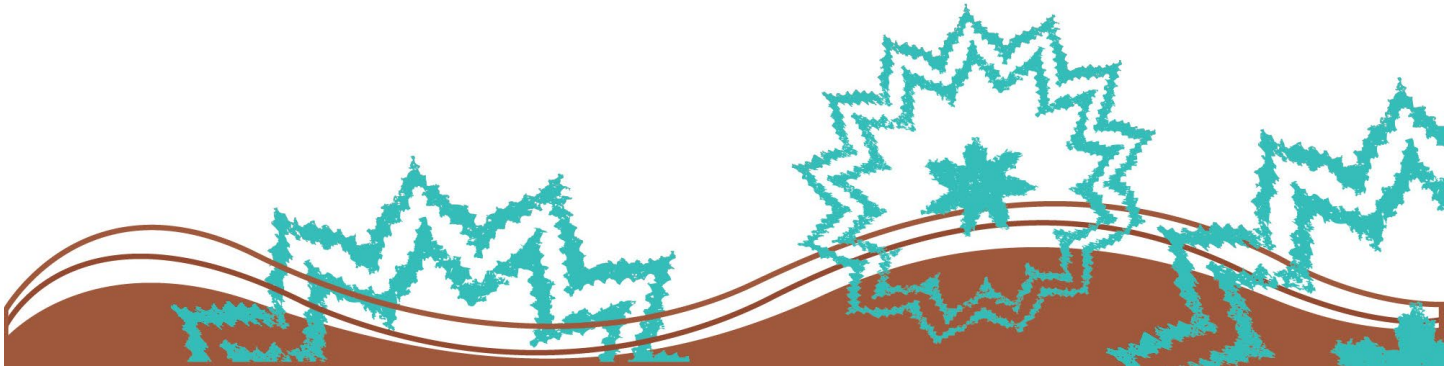

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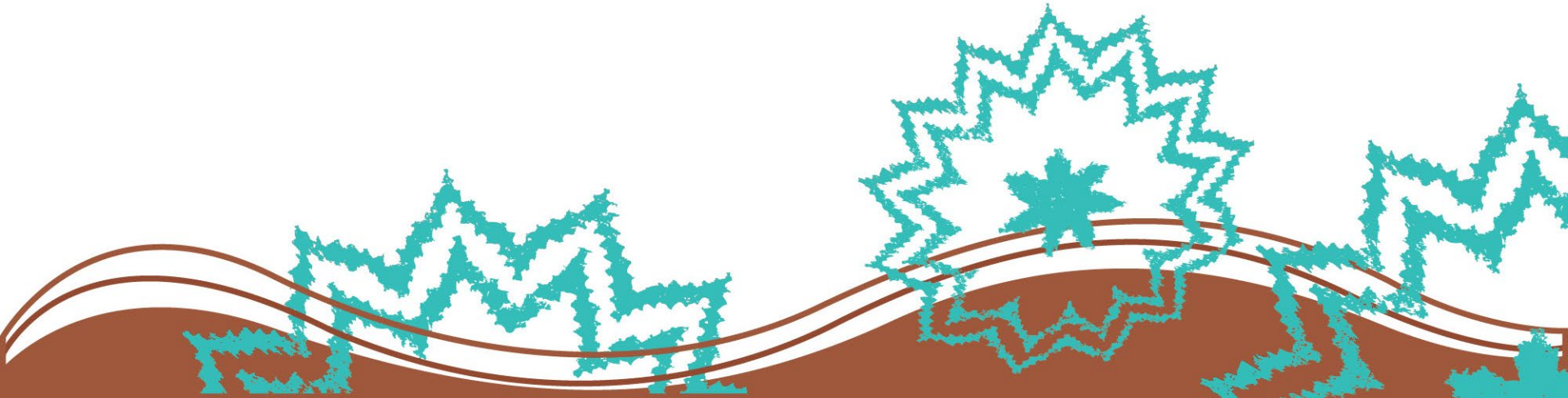
Today's Agenda

Overview of Asset Management – Tools for Small Utilities

Asset Management Tool Demonstration

Asset Management Exercise

Setting Rates to Pay Your Bills



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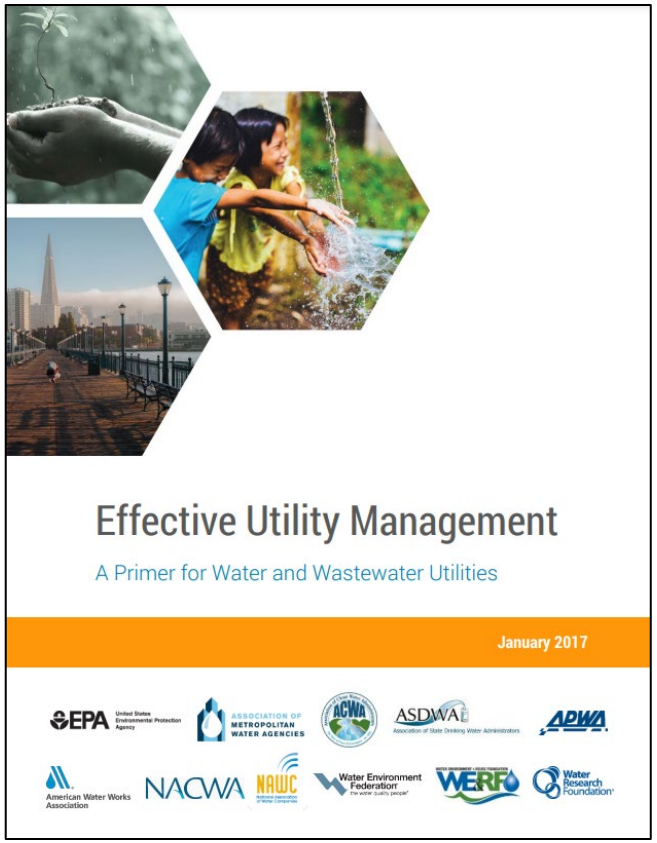
Asset Management Overview

Effective Utility Management

Effective utility management is essential to sustaining our nation's water and wastewater infrastructure.



https://www.epa.gov/sustainable-water-infrastructure/effective-utility-management-primer-water-and-wastewater-utilities

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Keys to Successful Management

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Five Keys to Management Success

1. Leadership

- Day-to-day management and direction

2. Strategic Business Planning

- Balance organizational goals and adapt for the future

3. Knowledge Management

- Retain plans, policies, procedures.

4. Measurement

- “If you can’t measure it, you can’t improve it”

5. Continual Improvement Management

- “Plan-Do-Check-Act”

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Asset Management Overview

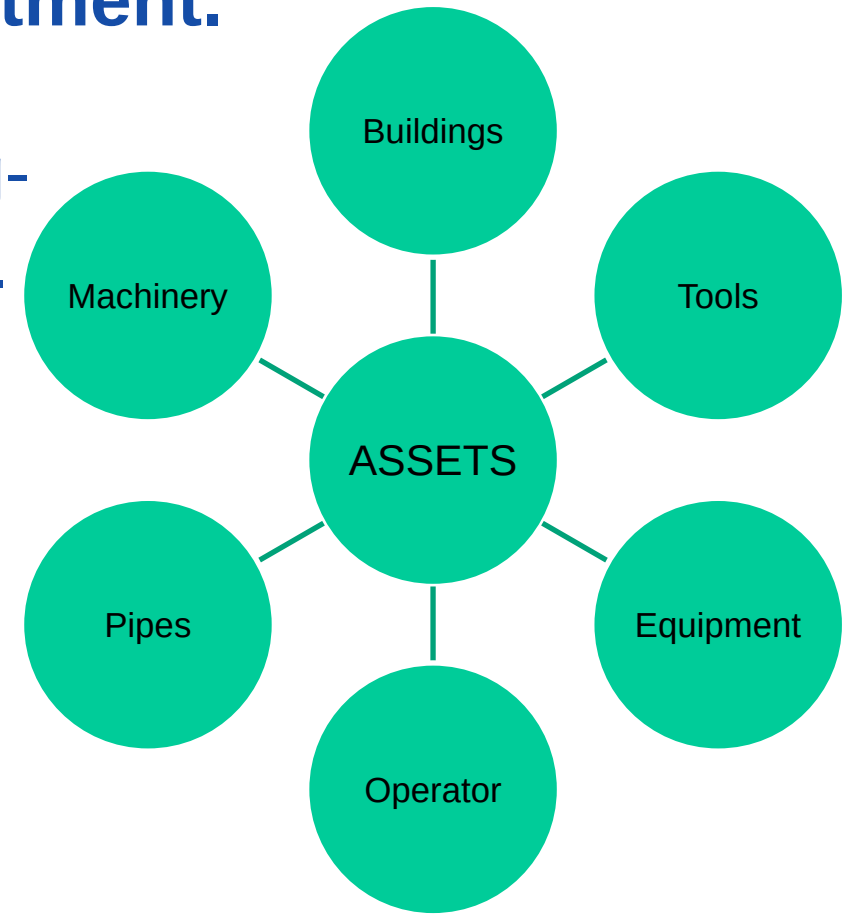
- What is an Asset?
- What is Asset Management?
- What are the Benefits of Implementing Asset Management Principles?



Assets Are…

All the equipment, buildings, land, people and other components needed for water and/or wastewater treatment.

- Large, expensive, long-lived, and often buried.
- Essential to protect public health.



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Asset Management Is…

A process for maintaining a desired level of customer service while optimizing cost-effectiveness.

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Asset Management Includes…

- **Building an inventory of your assets.**
- **Scheduling and tracking maintenance tasks.**
- **Managing your budgeted and actual annual expenses and revenue.**

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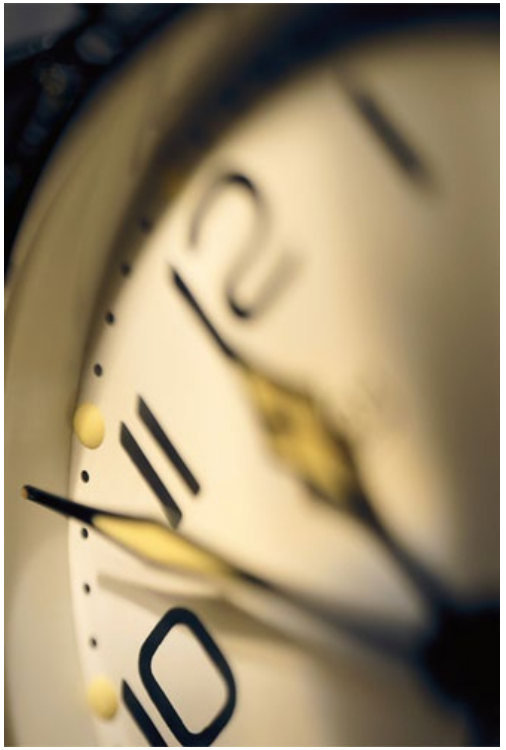
Asset Management Benefits

- Back up budget talks with solid facts
- Boost utility efficiency
- Save staff time
- Understand that a utility is a customer service business
- Improve customer service



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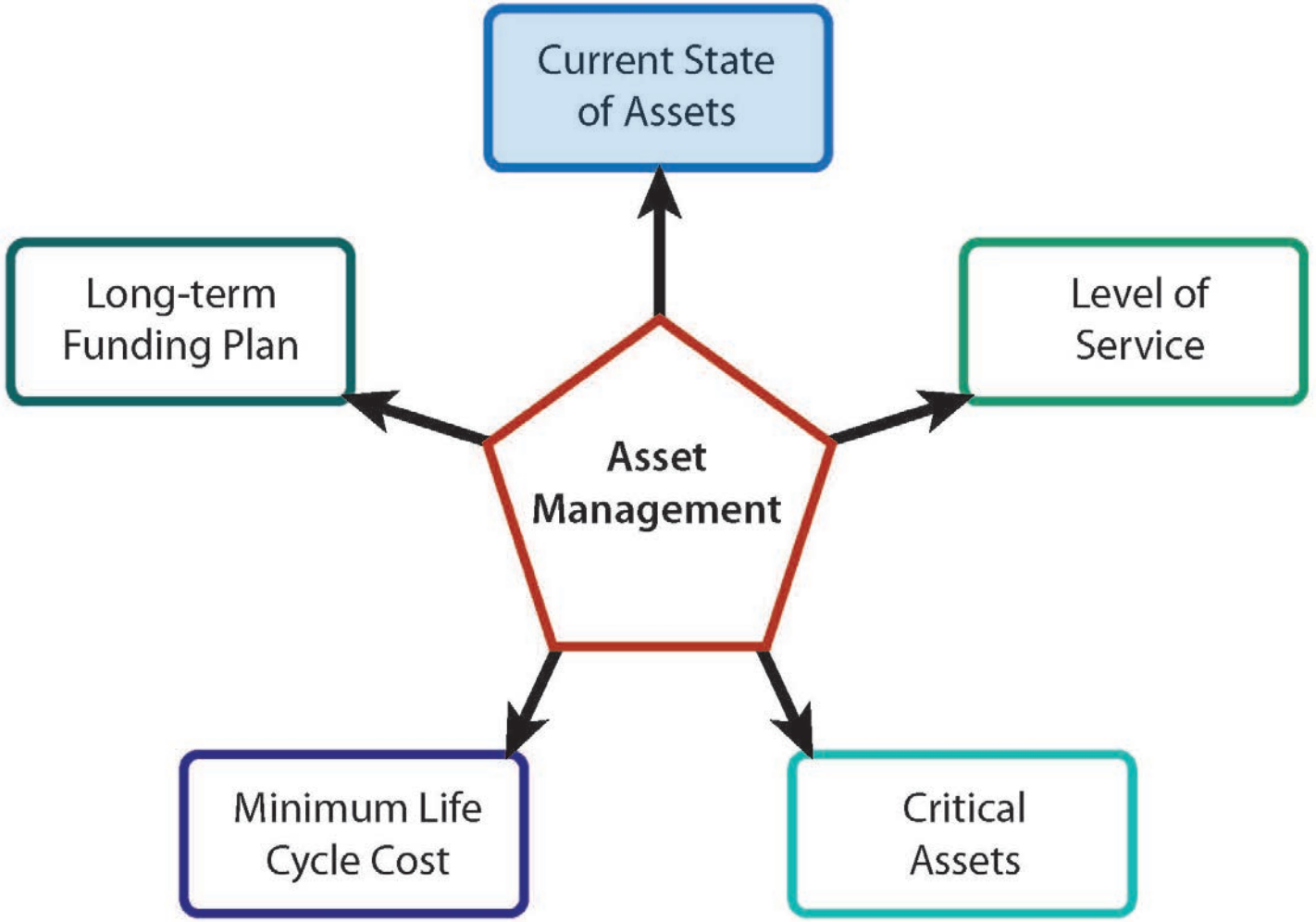
Asset Management Framework



1. Current State of Assets

- What does the utility own?
- Where is it?
- What is its condition?
- What is its remaining useful life?
- What is its value?

Aeration tank at a small wastewater facility

Credit: U.S. EPA

Asset Inventory

To perform an inventory, determine your assets and list the following information:

- **Condition**
- **Age**
- **Service history**
- **Useful life**
  - Manufacturer's recommendation
  - Adjust by service history and current condition

Aging pipes

Credit: EcoWatch

Example Inventory Worksheet

System Inventory Worksheet						
Date Worksheet Completed: 4/20/2021						
Asset	**Expected Useful Life**	**Condition**	**Service History**	**Adjusted Useful Life**	**Age**	**Remaining Useful Life**
Lift Station 1 (2013)	30	good		30	8	22
Lift Station 1 pump	10	good	rehab (2016)	10	8	2
Lift Station 2 (2013)	30	good		30	8	22
Lift Station 2 pump	10	good	rehab (2016)	10	8	2
Electrical Components	10	some corrosion	rehab (2014)	10	8	2
Equal. Basin (2013)	40	good	rehab (2010) $17k	40	8	32

Adapted from: Asset Management: A Handbook for Small Water Systems, EPA 816-R-03-016, 2003

Asset Prioritization

To prioritize your assets, consider:

- **Remaining useful life**
- **Ability to provide service**
- **Redundancy**
- **The big picture**
  - e.g., community development
- **Plans and evaluations**

WWTP aerial view

Credit: Ohio RCAP

Example Prioritization Worksheet

Prioritization Worksheet				
Date Worksheet Completed: 4/21/2021				
Asset	**Remaining Useful Life**	**Importance**	**Redundancy**	**Priority (1 is high)**
Lift Station 1 (2013)	22	needed for service	none -need backup	6
Lift Station 1 pump	2	needed for service	none -need backup	3
Lift Station 2 (2013)	22	needed for service	none -need backup	6
Lift Station 2 pump	2	needed for service	none -need backup	3
Electrical Components	2	needed for service	none -need backup	2

Adapted from: Asset Management: A Handbook for Small Water Systems, EPA 816-R-03-016, 2003

Required Reserve

To help you determine estimated costs:

- **Contact local contractors**
- **Contact equipment manufacturers**
- **Talk to other systems**
- **Talk to state, tribal, rural, and technical assistance organizations**

Example Reserve Worksheet

Required Reserve Worksheet[1]				
Date Worksheet Completed: 4/21/2021				
Asset (list from highest to lowest priority)	**Activity**	**Years until action needed**	**Cost ($)**	**Reserve required current year**
Lift Station Electrical	Replace with controller	2	$2,000	$1,000
Lift Station Pumps	Replace lift station 1 pump	2	$10,000	$5,000
	Replace lift station 2 pump	2	$10,000	$5,000
Next lift station pumps	Replace lift station 1 pump	12	$10,000	$830
	Replace lift station 2 pump	12	$10,000	$830
			Total reserve in the current year	$12,680

[1]Note: The Required Reserve Worksheet only helps you account for the additional funds you will require to rehabilitate or replace your asset. Standard O&M costs are not included in this calculation.

Adapted from: Asset Management: A Handbook for Small Water Systems, EPA 816-R-03-016, 2003

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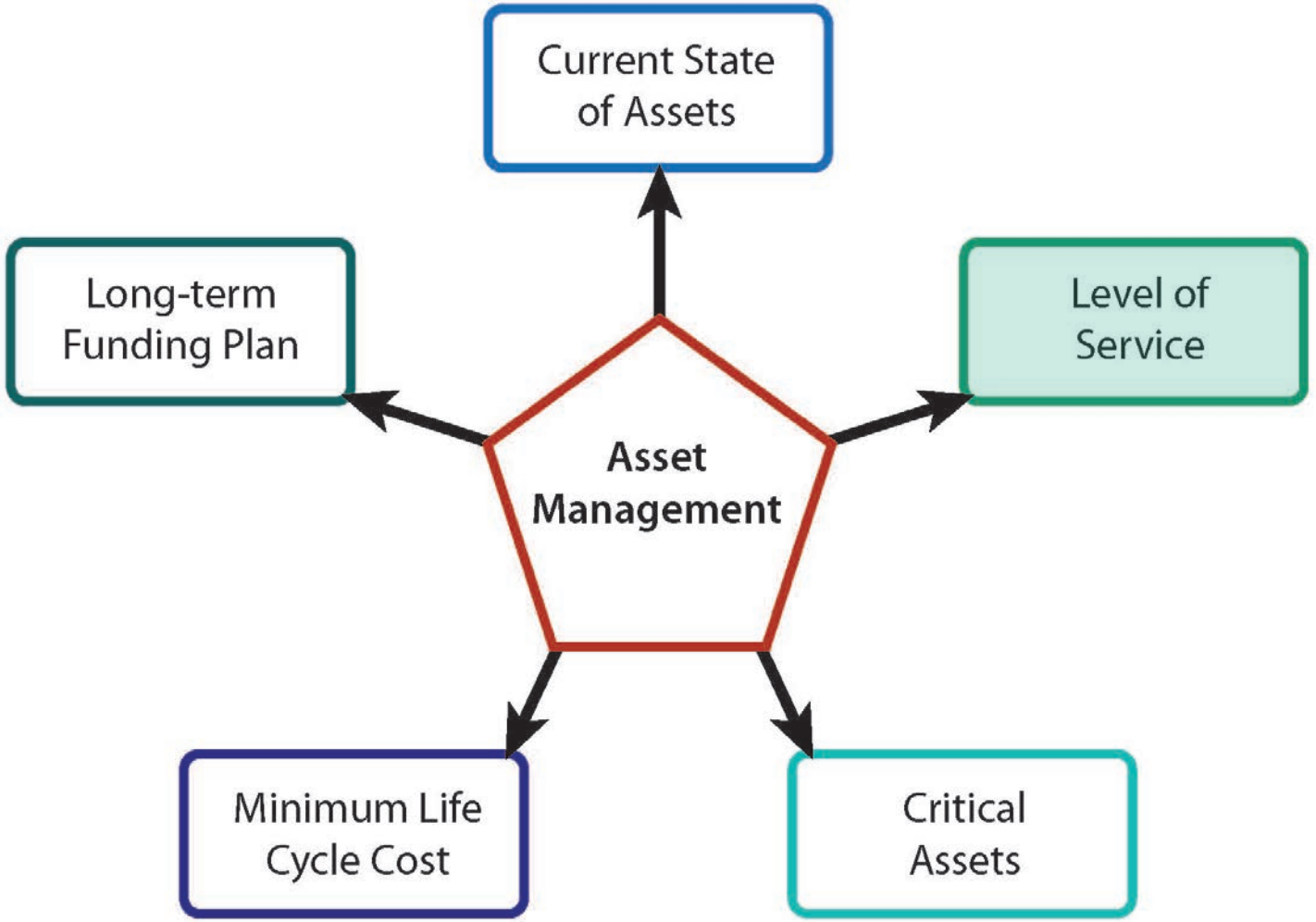
Asset Management Framework



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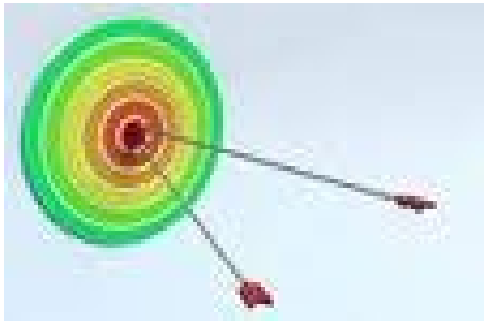
2. Level of Service

- What do the regulators require?
- What are the utility's performance goals?
- What level of service (LOS) do the utility's customers demand?
- What are the physical capabilities of the utility's assets?



Performance Indicators

- Failures per year
- Stoppages per year per mile of pipe
- Overflows per year per mile of pipe
- Electrical usage
- Customer complaints per mile of pipe

Sewer overflow

Credit: City of Raleigh, NC

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LOS Goal

LOS goals should be SMART:

Specific
Measurable
Action-oriented
Realistic
Timely

By using the SMART Approach, a utility can not only set goals but also achieve them.

Examples of LOS Goals:

- ***System will meet all state and federal regulatory standards.***
- ***Total sewer outages due to maintenance issues will be kept to less than 24 hours per year.***
- ***All customer complaints will be investigated within 2 business days of the complaint.***

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Best Practices

- ✓ Analyze customer demand and satisfaction
- ✓ Understand regulatory requirements
- ✓ Communicate to the public a level of service “agreement”
- ✓ Make your service objectives meaningful to the customers
- ✓ Use level of service standards

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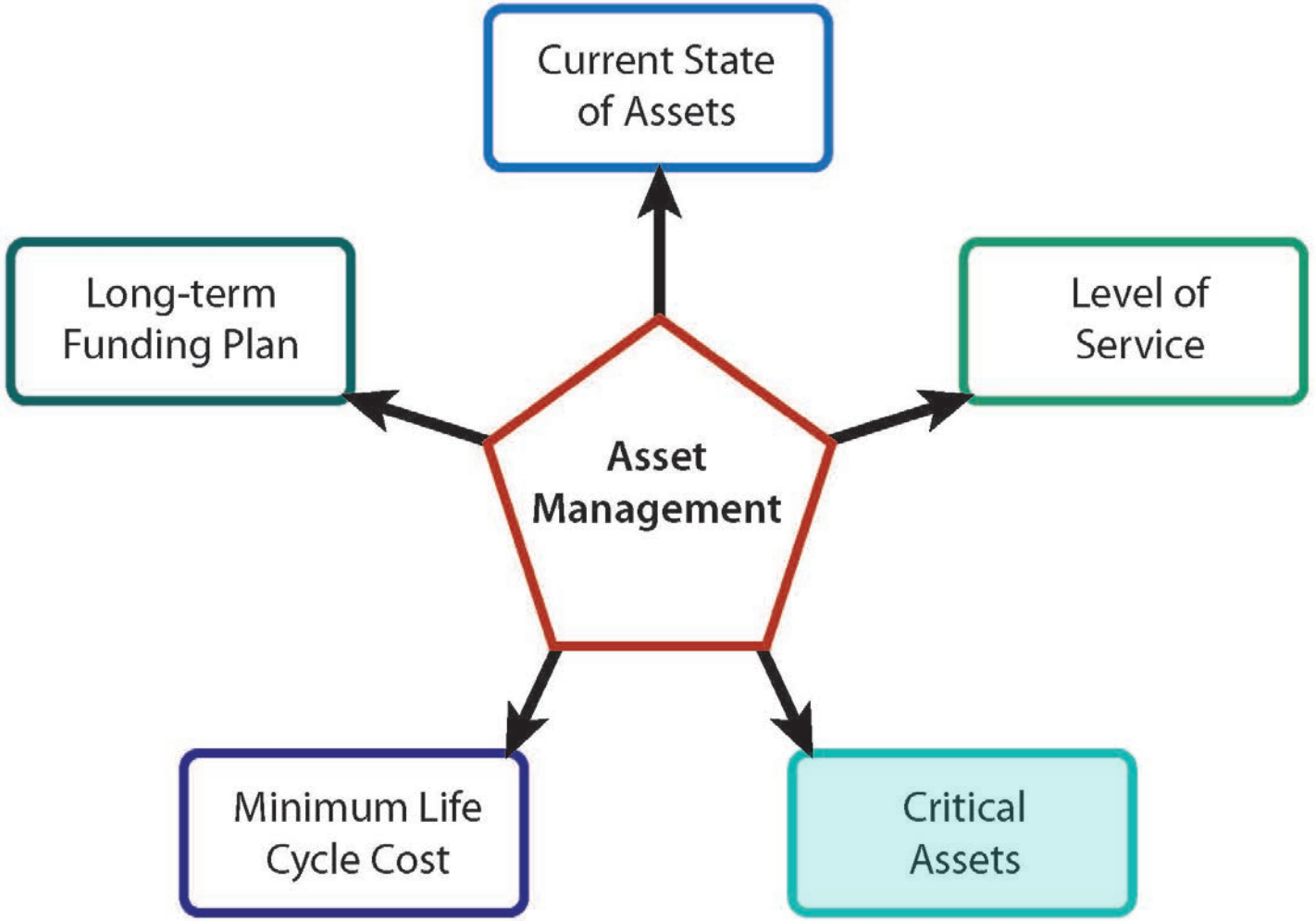
Asset Management Framework



3. Critical Assets

Credit: WDSU News New Orleans

- How can assets fail?
- How do assets fail?
- What are the likelihood and consequences of asset failure?
- What does it cost to repair the asset?
- What are other costs that are associated with asset failure?

Understanding Asset Risks

Perfect World = Knowing Asset Risks

- **Predict when an asset will fail (i.e., likelihood)**
- **Fully understand consequences of failure (i.e., impact)**

Roots growing into a sewer collection pipe

Credit: Los Angeles Department of Public Works

Failed leaching trench results in surface breakout

Credit: King County Washington

Best Practices to Ensure LOS

NYC pipe explosion, July 2007
Credit: Mario Tama, Getty Images

- ✓ **List assets based on criticality**
- ✓ **Conduct a failure analysis**
- ✓ **Determine probability of failure**
- ✓ **Analyze failure risk and consequences**

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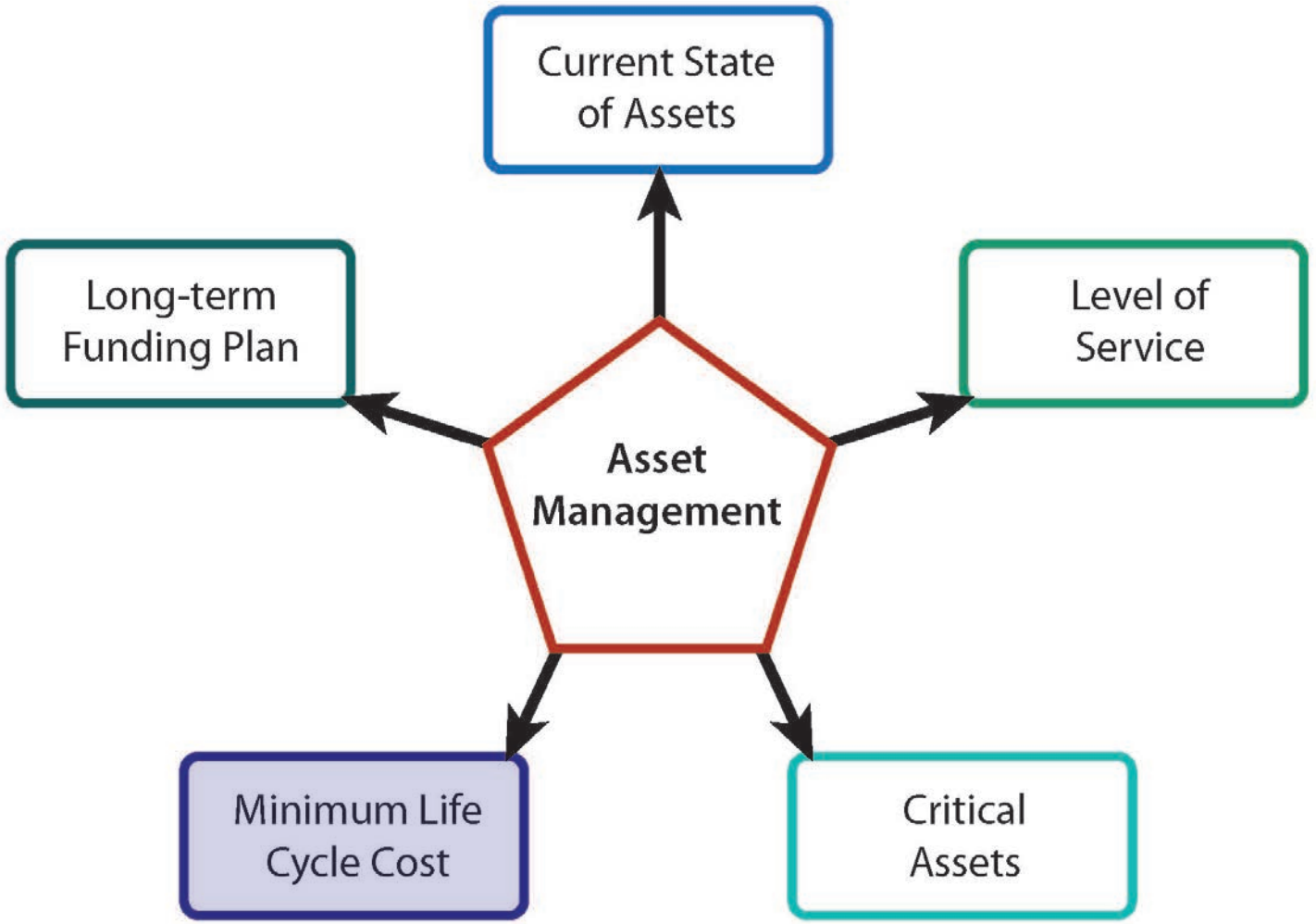
Asset Management Framework



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4. Minimum Life Cycle Cost

- What are the best Capital Improvement Projects (CIP) and Operation and Maintenance (O&M) strategies?
- What management strategies are the most feasible for my organization?
- What are the costs for rehabilitation, repair, or replacement of critical assets?

Asset Maintenance Options

- **Non-preventive (wait until it breaks)**
- **Preventive (plan before it breaks)**

  – Repair
  – Refurbish/rehabilitate
  – Replace
  – Decommission

Grit removal and grinder/screener units

Credit: Village of Boyd, WI

Return Activated Sludge (RAS) station and two associated Pad Mounted Transformers (PMTs) Credit: City of Lincoln, IL

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Management Decisions

- What are utility work crews doing and where are they doing it – AND WHY!!?
- What Capital Improvement Projects (CIP) should be done and when?
- When to repair, when to rehab, and when to replace?

These decisions typically account for 85% of a utility's annual expenditures!

Best Practices to Ensure LOS

- ✓ Move from reactive to proactive maintenance
- ✓ Know the costs and benefits of rehabilitation vs. replacement
- ✓ Look at lifecycle costs for critical assets
- ✓ Deploy resources based on asset conditions
- ✓ Develop and validate CIP

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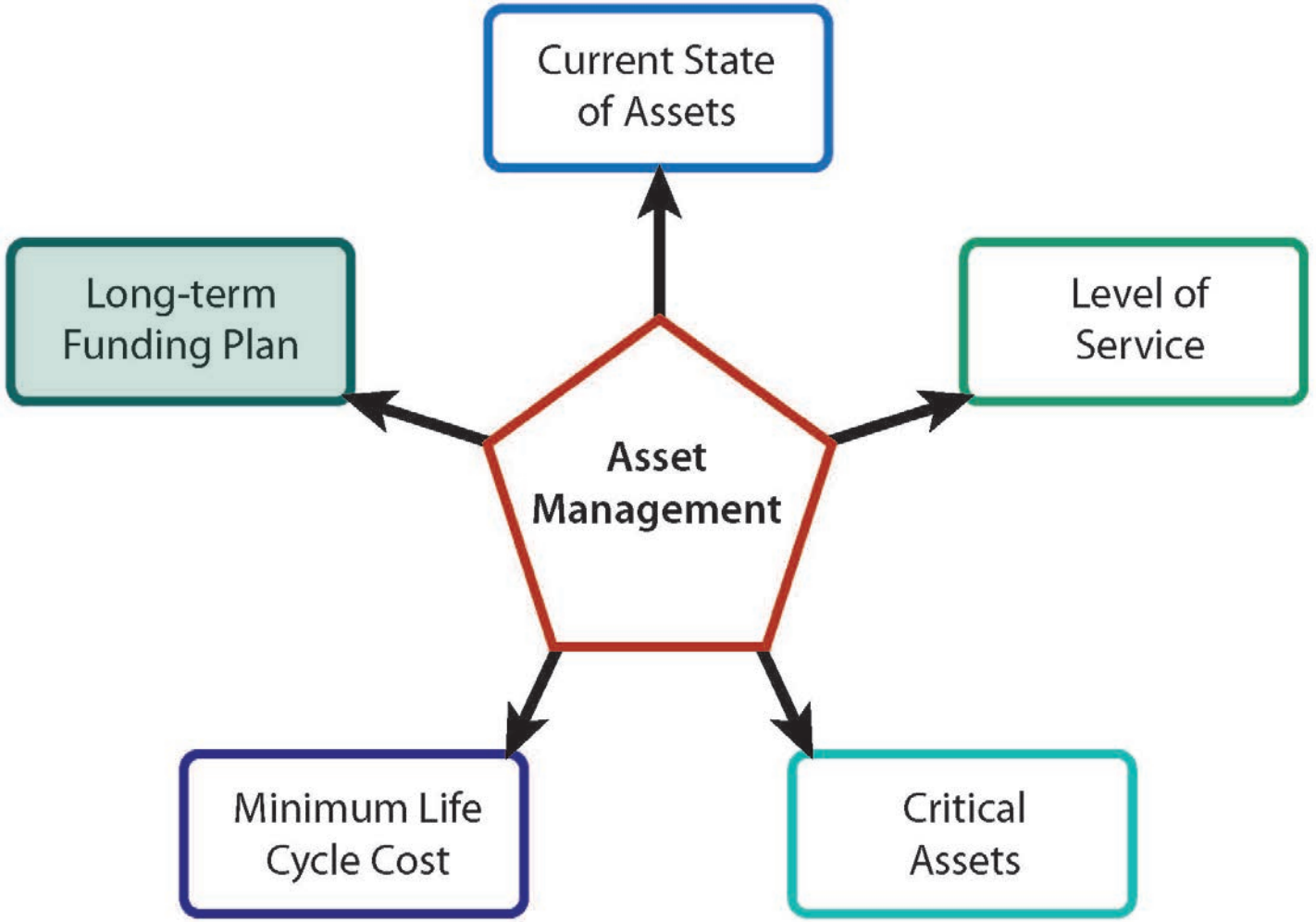
Asset Management Framework

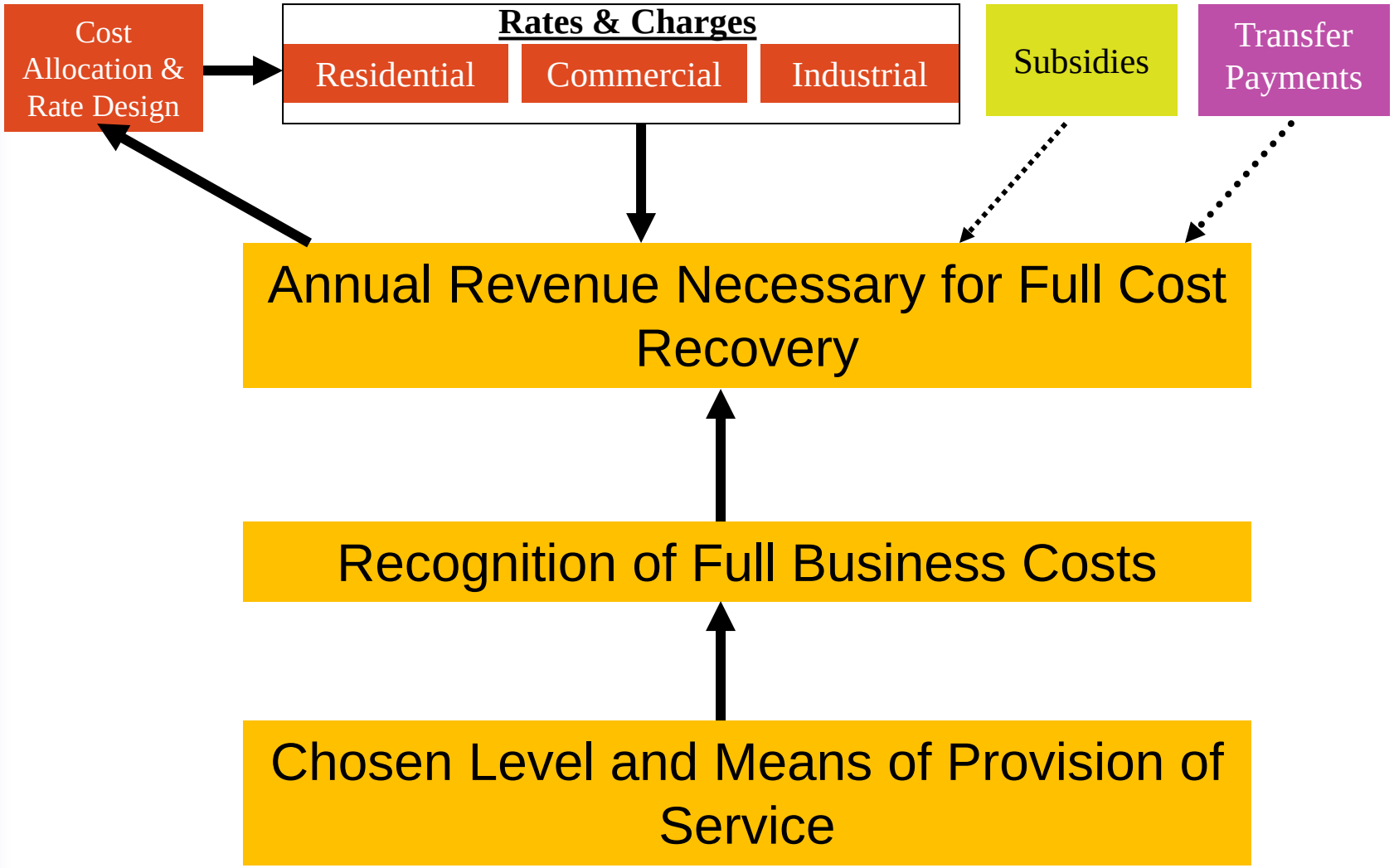


5. Long-term Funding Plan

Best Long-Term Financing Strategy

- What are the full economic costs associated with the utility?
- Is there enough funding to maintain assets for the required level of service?
- How can full cost pricing be implemented?
- Is the rate structure sustainable for the system's long-term needs?

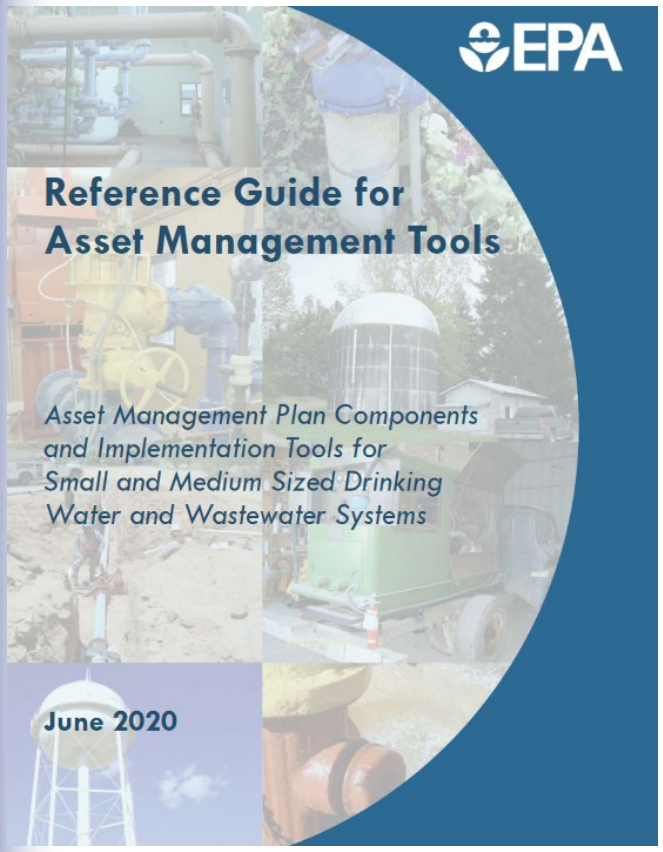
Cost of Sustainable Utility Services



Best Practices to Ensure LOS

- ✓ **Routinely review and revise the rate structure**
- ✓ **Fund a dedicated reserve from current revenues**
- ✓ **Finance asset renewal and replacement through borrowing**

Tools: EPA's Reference Guide

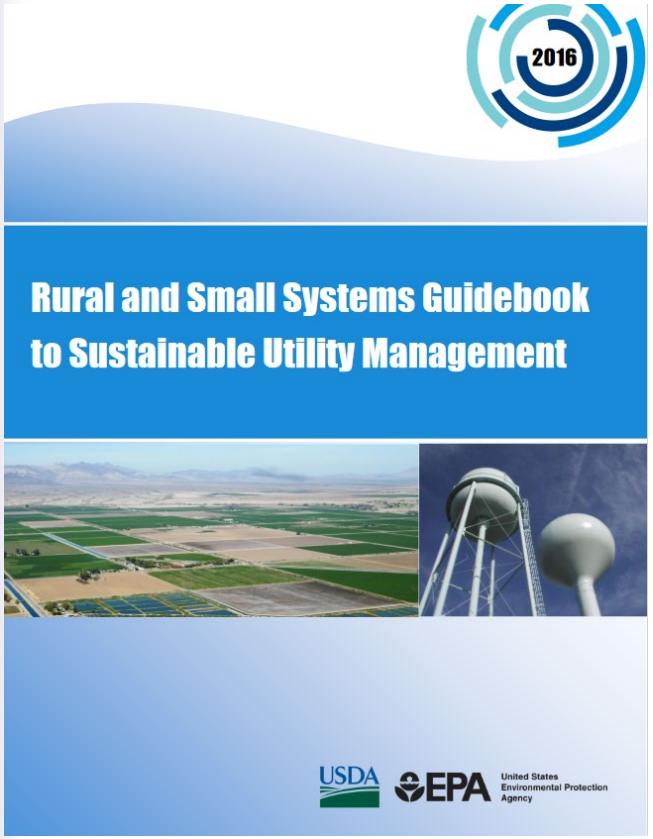


- **Target audience: small and medium sized drinking water and wastewater utilities**
- **Purpose: provide tools and resources that can be used to implement asset management practices, including:**
  - **Developing an asset management plan**
  - **Identifying capital improvements**

https://www.epa.gov/sites/production/files/2020-06/documents/reference_guide_for_asset_management_tools_2020.pdf

What are some additional components to include/consider in your asset management plan?

Resources: EPA and USDA Guidebook



- **This guidebook is designed to introduce rural and small water and wastewater systems to the key areas of effectively managed systems**
- **Provides background information on 10 key management areas, and instruction how to assess a system in the key management areas.**

https://www.epa.gov/sites/production/files/2016-06/documents/rural_and_small_systems_guidebook_-_may_2016_508.pdf

Small Community Assistance Planning Asset Management Tool

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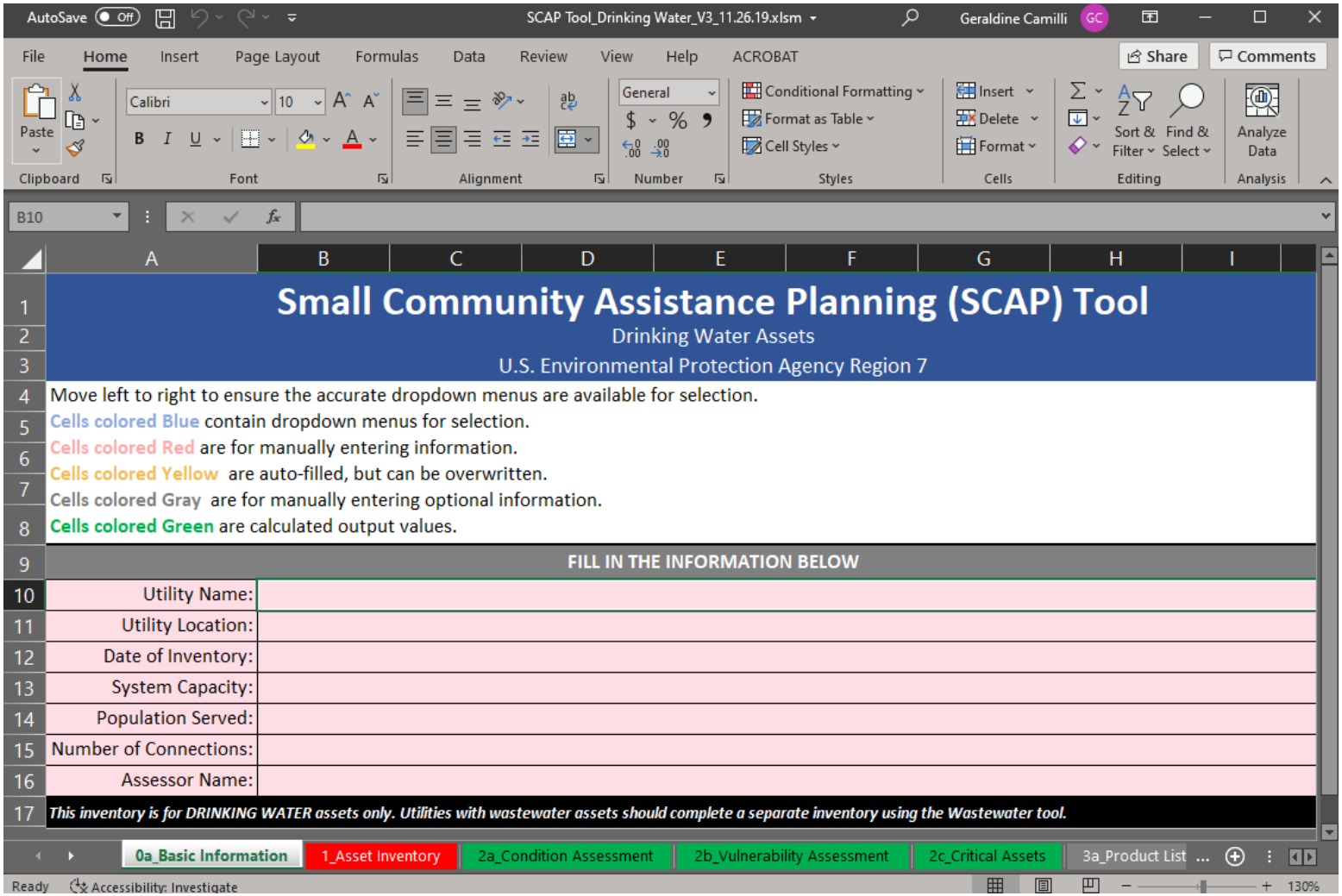

Tool available for download at https://www.asdwa.org/small-systems/capacity-development/ for both water and wastewater systems.

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Small Community Asset Management Tool Demonstration

Tool available for download at https://www.asdwa.org/small-systems/capacity-development/ for both water and wastewater systems.

Tools and Resources

Refer to EPA's Building the Capacity of Drinking Water Systems for the latest capacity development tools.

- Information and resources for states.

Small Community Assistance Planning Asset Management Tool: Guide for Tool Users: – allows users to track either wastewater or drinking water assets and conduct a basic condition and criticality assessment.

- SCAP Tool Drinking Water*
- SCAP Tool Wastewater*

**Before using these tools, save as macro enabled for full function.*

Small Community Assistance Planning Asset Management Tool

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1. Drinking Water Tool
2. Wastewater Tool

Both set up to mange the majority of equipment/assets used by a small utility

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Small Community Asset Management Tool Demonstration

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Breakout Session

- **Breakout into 2 groups.**
- **We will work with the Small Systems Asset Management Spreadsheets to Identify, Prioritize and Analyze Replacement Costs for 4 Assets**
- **We need information from you to input into the spreadsheets- please participate!!**
- **Assess Management Handbook available for download**

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Breakout Session Summary

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Techniques for Developing a Rate Structure

Wastewater Utility Operation and Management for Small Communities

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Rate Structure Overview

- Revenue requirements
- Cost allocation methods
- Distributing costs to customers
- Rate design
- Administration of rates and charges
- Financial stability
- Rate Setting STEP guide

Introduction

Rates should be cost-based and non-discriminatory

- Rates should fairly allocate costs to classes of users
- Rates should be stable

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Introduction (cont.)

You will need to develop a general rate setting action strategy.

- Gather budgets, budget reports, and customer-related records
- Once you know your past financial and operating history, you can begin to:
  - Determine total annual revenue requirements
  - Allocate revenue to costs
  - Distribute costs to customers
  - Design rates for customer classes to recover costs

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Revenue Requirements

Determine revenue needs and identify expected cost for:

- Expenses - Operation & Maintenance (O&M) and Administrative
- Debt service on borrowed funds
- Rehabilitation, replacement and expansion costs
- Cash reserve (10% of O&M)

Major Revenue Requirements

O&M Expenses:

- Operating costs for the treatment plant, EQ tanks, parts replacement, other treatment, collection, and/or distribution systems
- Costs to maintain facilities and equipment
- Administration and personnel expenses

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Major Revenue Requirements

Capital Costs:

- Annual costs associated with plant construction investment
- Debt service
- Costs associated with facilities replacement, expansion, and upgrades
- Cash reserves (??)

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Forecasting Expenditures

Don’t forget to forecast expenses:

- Unexpected increases in flow
- System growth rate
- Inflation
- Capital improvement program
- Financing requirements (e.g., bonds)

Select a Method for a Revenue Base

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There are two basic accounting methods for establishing revenue:

1. Cash basis – a publicly-owned utility raises money to cover all cash needs including debt service

2. Utility basis – an investor-owned utility establishes rates that includes a reasonable rate of return (profit)

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Allocate Costs

Not all system users make similar demands on the wastewater (or water) system:

- Some customers may generate more (or peak flows) effluent than others, causing a utility to need:
  - Larger pumps
  - Larger mains
  - More storage
- So, this class of customer needs to pay more for peak demand costs in addition to their share of average demand costs.

Commodity – Demand Method

Identify the utility costs related to the following service categories:

1. Commodity (Water) Costs
2. Demand (Peak Flow) Costs
3. Customer Service Costs
4. Compliance Costs (e.g., Fines or Sampling)

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Kinds of Costs

Commodity

- Chemicals, Energy Used

Demand

- Collection, Storage (EQ), Treatment, Disposal

Customer

- Billing, collection, accounting, (meters?)

Compliance

- On-going Water Quality Sampling or Fees/Fines

Distributing Costs

The next step is to establish different classes of service by customer groups. Classes should separate users by load demand and peaking characteristics.

The following general customer classes are frequently used by many utilities:

- Residential
- Commercial
- Industrial
- Agricultural (Irrigation)
- Other (Government, Schools, etc.)

Rate Design

The final step is to design utility rates that will recover appropriate costs.

- Rates should always be based on the cost of service
- Good judgment must also be used in rate setting

Common Rate Structures

Flat Rate/Fixed Fee Rate

- All pay the same (don't need meters)

Uniform Rates

- Based on consumption (number of bedrooms, amount of flow)

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Common Rate Structures

Increasing Block Rate

- More you use, the more you pay

Decreasing Block Rate

- More you use, the less you pay

Seasonal/Peak Flow Rate

- Charge more during peak season/flow events

Case Study: Small Wastewater Utility

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Customers (services):

- 800 dwellings

Population:

- 2,250 people

Case Study: Small Wastewater Utility

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Annual Expenses:

Labor + fringe benefits	$150,000
Professional fees	6,100
O&M costs	6,000
Materials and supplies	5,500
Insurance	7,300
Travel	1,500
Utilities (phone, heat)	9,200
Vehicles	4,600
Services	8,600
Capital replacement	16,500
Other	2,000
Total Revenue Requirement:	**$217,300**

Case Study: Small Wastewater Utility

United States Environmental Protection Agency

Determine monthly utility service charge:

$$\frac{\text{Total Revenue Requirement (\$/yr)}}{\text{(Number of Dwellings)(12 mo/yr)}}$$

$$\frac{\$217{,}300}{\text{(800 dwellings)(12 mo/yr)}}$$

$$\$22.63/\text{mo per dwelling}$$

How does a monthly sewer charge of $22.63 per month compare to your community's utility?

Case Study: Small Water Utility

Sources of Supply:

- Two wells and one storage tank

Customers (services):

- 200

Population:

- 500 people

Average daily consumption:

- 50,000 gallons

Case Study: Small Water Utility

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Expenses:

Power	$3,000
Chemicals (chlorine)	$1,200
Salaries	$40,000
Materials and supplies	$9,000
Vehicles	$4,000
Administration	$20,000
Utilities (phone, heat)	$1,000
Office rent	$3,000
Debt service	$8,000
Repair, replace, reserve	$10,000
Total Revenue Requirement:	**$99,200**

Case Study: Small Water Utility

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Allocate Costs:

- O&M expenses $57,200
  - $57,200 (commodity and demand)
  - $24,000 (customer)
- Debt service $8,000
  - (commodity and demand)
- Repair, replace, reserve $10,000
  - (commodity and demand)

Total Costs: $99,200

- $75,200 (commodity and demand)
- $24,000 (customer)

Case Study: Small Water Utility

United States Environmental Protection Agency

Determine monthly meter service charge:

$$\frac{\text{Customer Charge (\$/yr)}}{\text{(\# of meters)(12 mo/yr)}}$$

$$\frac{\$24{,}000/\text{yr}}{(200 \text{ meters})(12 \text{ mo/yr})}$$

$$\$10.00/\text{mo}$$

Case Study: Small Water Utility

United States Environmental Protection Agency

Determine monthly volumetric water charge:

Step 1

Total annual Water Use in 1,000 gal/yr

(average daily use, gpd)(365 days/yr)

(50,000 gpd)(365 days/yr) = 18,250,000 gal/yr

18,250 thousand gallons/yr

Case Study: Small Water Utility

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Determine monthly volumetric water charge:

Step 2

Volumetric Water Charge in $/1,000 gal

(Total commodity and demand cost, $/yr)
(Total water use, 1,000 gal/yr)

$75,200/yr
18,250 thousand gals/yr

$4.10 per thousand gallons

Case Study: Small Water Utility

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So, our customers will pay:

$10.00/month per meter

Plus

$4.10 for every 1,000 gallons of water used

<u>Quick Question:</u>

What is the water bill for a customer who used 10,000 gallons of water in a month?

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Case Study: Small Water Utility

So, our customers will pay:

$10.00/month per meter

Plus

$4.10 for every 1,000 gallons of water used

<u>Quick Question:</u>

What is the water bill for a customer who used 10,000 gallons of water in a month?

$10.00+$4.10(10,000/1,000) = $51.00

How does a monthly water bill of $51.00 compare to your community's utility?

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Administration of Rates and Charges

- **Be sure you can justify your rates**
- **Use graphics in presentations that show:**
  - Recent cost performance
  - Current revenue versus projected revenue
  - Effect of rate increases on user groups
  - Rate comparison with other utilities
- **Water utilities should take advantage of the Consumer Confidence Report (CCR)**

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Planning for Financial Stability

- Measuring stability
- Budgeting
- Recordkeeping

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Budgeting

- **The only way to prepare a good budget is to have good records from the year before**
  - Track every expense (e.g., purchase order system)
  - Realize you can't do everything
- **Understand how you spent your money over the last year**
- **Take into account cost increases while trying to minimize costs**

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Recordkeeping

Recordkeeping is important for:

- Setting accurate water and sewer rates
- Legal requirements
- Solving O&M problems
- Designing expansions and upgrades

Types of records include:

- Equipment and maintenance records
- Plant operations data
- Procurement records
- Inventory records
- Personnel records

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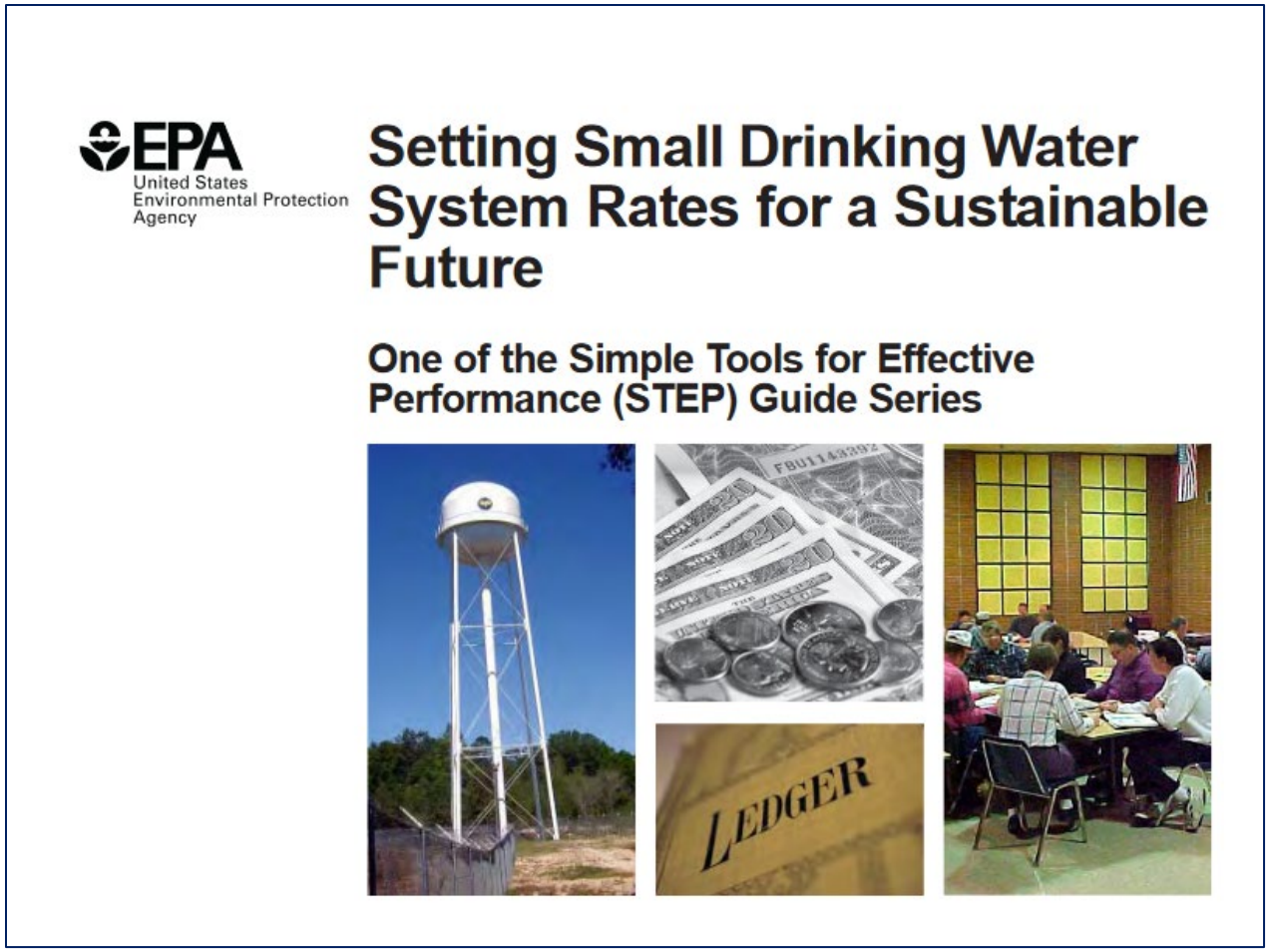
How Long Should I Keep Records?

- As long as they are useful or for as long as legally required
- Data that can be used for future design or expansion should be kept indefinitely
- Laboratory data should be kept indefinitely
- Regulatory agencies may specify how long to keep water quality analyses or customer complaint records
- Set up a schedule to regularly review records and dispose of those no longer needed

Tools: EPA Rate Setting Guide



https://www.epa.gov/dwcapacity/resources-setting-small-system-water-rates

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Inside You Will Find…

- Determining your costs
- Determining your current revenues
- Setting aside a reserve
- Determining the actual revenue required from your customers
- Designing, implementing, and reviewing your rate

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Thanks for Participating!

Please take a moment to provide feedback on this webinar

A certificate of attendance will be sent to you within the next week.

Thanks for Participating!

If you have a question about CEU's please contact us

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