Financial Management for Small Water Utilities

December 4, 2023 1:00 – 3:00 PM (ET)

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The GLEIC became the newest EPA Environmental Finance Center in 2016.

Great Lakes Environmental Infrastructure Center
Environmental Finance Center for EPA Region 5

Serves small communities (population < 10,000) throughout EPA Region 5 primarily as well as nationally through the EFCNetwork
Provides Training and Technical Assistance to increase technical, managerial, and financial capacity of utilities. Focus areas: Asset management, infrastructure funding, and financial management

GLEIC Staff
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In this webinar we will cover:

1. Financial Management
2. Factors that affect budgets
3. Rate Analysis
4. Affordability
5. Funding sources

Financial Management Overview

Understanding financial statements

Financial Statements require an Accounting system

Financial statements two main items:

1. Balance sheet: Assets, Liabilities and Net Worth
   (for Utility Proprietary Funds the Balance Sheet may be listed as Statement of Net Position)
2. Income Statement lists the Revenues and Expenses with Changes in Fund Net Position

GAAP

Generally Accepted Accounting Principles (GAAP) is the set of rules in which United States companies must prepare their financial statements.

It is the guidelines that explain how to record transactions, when to recognize revenue, and when expenses must be recognized.

Benefits: Standardizes the accounting procedures used in the utility, and allows greater clarity when reading and interpreting financial statements.

Financial statements show how a business operates.

Provides insight into

- how the utility generates revenues
- the cost of doing business
- how efficiently the utility manages its cash
- what its assets and liabilities are.

Financial statements provide insight into how well or poorly a company manages itself.

Three financial reports & how they answer essential questions.

Balance Sheet

- *Is the utility making sufficient investments into infrastructure to offset depreciation?*

Statement of Cash Flows

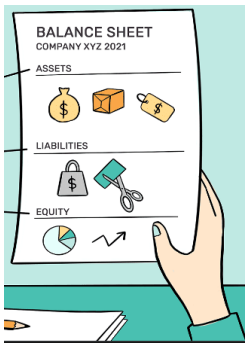
- *Where is cash being spent? What types of revenue sources does the utility have?*

Income Statement (profit & loss)

- *Is the utility earning sufficient revenue to cover expenses?*

Balance Sheet

Purpose: **Determines net worth of the utility.**



Main features to notice

- **Assets** are what the utility **owns** including infrastructure (property, plant & equipment), cash, investments, and accounts receivable.
- **Liabilities** are what the utility **owes**: debt and accounts payable.
- **Net Worth** (Equity)

Balance Sheet

Assets - **Liabilities** = **Net Worth** (equity)

Statement of Cash Flows

Purpose: **Identifies how cash is flowing into or out of the utility and shows the changes in cash position from one period to another.**

Divides cash flow into 3 categories

- **Operating activities** : net income from user rates, receivables collected, accounts paid.
- **Investing activities**: Purchases or sales of bonds, real estate, and investments into infrastructure.
- **Financing activities**: Issuing bonds, receiving or repaying debt.

Net cash flows can be negative or positive.

- If revenue exceeds operational costs, operational cash flows will be positive because cash is coming into the utility.
- If the utility is also paying off debt, financing activity cash flows could show as negative because the cash is leaving the utility.

Statement of Cash Flows
Year Ended December 31, 2020

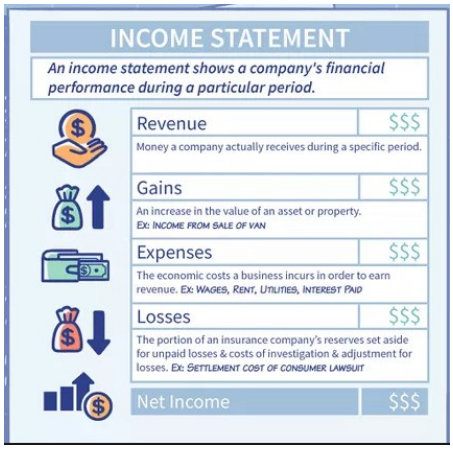
Cash flows from operating activities	$ xxx
Cash flows from investing activities	xxx
Cash flows from financing activities	xxx
Net increase (decrease) in cash	xxx
Cash at the beginning of the year	xxx
Cash at the end of the year	$ xxx

Income Statement

Purpose: **Shows whether the utility made sufficient revenue to cover all expenses.**

Main features to notice

- Top line shows the total revenue
- Net income is calculated by subtracting all operating costs
- Shows financial performance for a period of time, such as a quarter or a year.



Income Statement Example

Revenues – COGS = Gross Profit

–

Expenses

=

Net Income

Revenues		
From Operations	2,520,000	
From Other	80,000	
TOTAL REVENUES		2,600,000
Cost of Goods Sold (COGS)		
Materials	1,200,000	
Labor	970,000	
Other	33,000	
TOTAL COGS		2,203,000
GROSS PROFIT		397,000
Expenses		
Management Salaries	155,000	
Advertising	14,000	
Computer and Internet	6,000	
General Insurance	17,500	
Interest Expense	13,500	
Rent	18,000	
Etc.	42,000	
TOTAL EXPENSES		266,000
NET INCOME		131,000

Summary: Financial statements are records that convey the business activities and financial performance of the utility.

The balance sheet provides an overview of assets, liabilities, and net worth (equity) as a snapshot in time.

The cash flow statement measures how well a company generates cash to pay debt obligations, fund operating expenses, and fund investments.

The income statement shows revenues and expenses during a particular period. Revenue – expenses = net income.

Financial Management Basics

The Financial Plan includes:

- Forecast of the utility's financial needs
  - Five year capital improvement plan
  - Asset Management program
- Accounting system
- Governance structure
- Budgeting
- Revenue sources to fund the financial needs

Financial Indicators

From Analysis of Financial Statements

- Negative or positive cash flows
- Increase or decrease in equity over time
- Net income changes

Financial Ratios

- Operating Ratio
- Debt Ratio

Operating Ratio = $\frac{\text{Revenue}}{\text{Expense + } \textit{depreciation}}$

Evaluating OR

- **OR < 1.0**: The utility is losing money
- **OR = 1.0**: Expenses and Revenue are equal
- **OR > 1.0**: The utility is able to fund reserves and respond to unplanned emergencies to some degree.

Generally utilities set a target operating ratio above 1.0.

***Depreciation**: The estimated loss of asset value per year*

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Debt Service Coverage Ratio = $\frac{\text{Net Revenue}}{\text{Annual principal + interest}}$

Evaluating DSCR

DSCR = 1.0: A debt service coverage ratio of 1.0 means that the system has exactly enough money from its operating revenue to pay off its annual debt service once it has paid all of its operating expenses.

DSCR > 1.2: A debt service coverage ratio of 1.2 or higher means the utility will have enough revenue coming in to pay O&M costs and debt service and still have a buffer and security for potentially lean years..

DSCR below 1.0 indicates the utility may not be able to make loan payments.

Lenders require the debt ratio to be generally 1.2 or above.

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Asset Depreciation Ratio

Listed at the balance sheet are:

- Total Capital Assets (TCA)
- Accumulated Depreciation (AD)

Asset Depreciation Ratio = AD/TCA

- The goal for AD/TCA should be 35%
- Any percent > 35% indicates a need for more investment in Capital Assets

Asset Depreciation Example

The Water Fund Total Capital Assets are $3,454,911. The Accumulated Depreciation is $2,135,419.

The Sewer Fund listing for Capital Assets are $11,889,600 and Accumulated Depreciation is $6,431,29.

The following slide shows the calculation of the asset depreciation ratio for the two funds.

Asset Depreciation Ratio Calculation

- Water Fund

  AD/TCA = $2,135,419/$3,454,911 = 62%

  It would take a $2,646,286 capital investment to bring the ratio for the Water Fund to 35%.

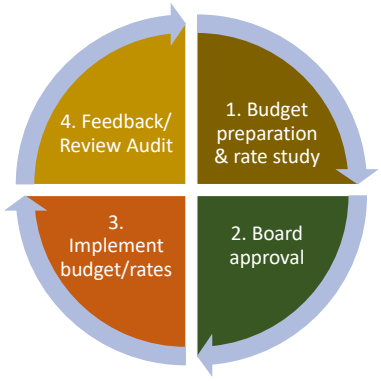
- Sewer Fund

  AD/TCA = $6,431,293/$11,889,600 = 54%

  It would take a $6,485,553 capital investment to bring the ratio for the Sewer Fund to 35%.

Wastewater Utilities Annual Budget

- Primary fiscal control mechanism
- Critical planning tool for the coming year
- Key component of rate setting



Governance Structure

- Elected officials
- Appointed board

Fiscal Control Mechanism

- A budget is how the board or council sets priorities and controls a utility's spending.
- A budget should provide staff with clear direction and limits on projects and purchases that are expected to be completed in the budget's time frame.

Utility budgets need to address:

- Asset management repair and replacement reserves
- Asset lifecycle costs
- Full cost budgeting vs financing strategies
- Capital improvement planning
- Workforce analysis
- Inflation and interest rates

Utility System Expenses

- Operation & Maintenance (O & M)
- Repair and Replacement (R & R)
- Capital Improvements (CIP)
- Debt Service (DS)

Operation & Maintenance

Typical Expense Line Items

- **Wages & Salaries**
- Employee Benefits
- Overtime Pay
- **Utilities- Electric, gas, water, sewer**
- Chemicals
- Insurance
- Phone/Internet
- Office Supplies
- General Supplies
- **Repairs/Replacements**
- Dues, Licenses, Permits
- Training/travel
- Contract Services
- Engineering Fees
- Administration Expense/Accounting/ Audit
- **Capital Improvements**
- Debt Service- Principal, Interest
- **Reserves**

Typical Utility Budget Item - Labor

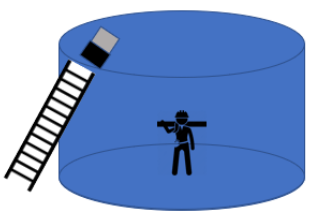
Item	Expense Category	Description
2	**Benefits**	Medical, vision, dental
3	**Power and Utilities**	Electrical, communications, gas
4	**Chemicals and Treatment**	Treatment and disinfection chemicals
5	**Sampling**	Sampling and laboratory costs
6	**Materials, parts, supplies**	Supplies for maintenance and repair
7	**Transportation**	Vehicle costs
8	**Office Supplies & postage**	printing, copying, mailing costs
9	**Insurance**	Liability, workers comp
10	**Permits and fees**	Expenses related to regulatory permits
11	**Licenses and fees**	Certifications, licenses, and memberships
12	**Training**	Cost for staff training and related travel
13	**Professional Services**	Engineering, legal, and accounting
14	**Repair & Replacement**	Large asset repair or replacement
15	**Debt Service**	Annual loan payment (principal + interest)

Salaries & wages are usually the largest item in the budget.

Trained operators are the greatest asset to the system and community.

Workforce analysis Concepts

- A full time operator with 2 weeks of vacation time will have approximately 2,000 hours of available work-time.
- Operator hours are the number of hours needed to complete a task times the number of operators needed for the task.



Safety Consideration
In a confined space operation, at least one additional employee will be needed to monitor the safety of the space. So the number of operator hours to complete the task would be doubled.

Workforce analysis

How to conduct a basic workforce analysis for operations.

Step 1: Estimate the operator hours needed to conduct all preventative maintenance tasks and sampling in the utility. **say 4,600**

Step 2: Include time for planning, reporting, inventory, safety, and data collection associated with these tasks that operators will perform. **say 400**

Step 3: Using data from previous years, estimate the operator hours required for reactive maintenance. **say 2,500**

Step 4: Add the total hours and divide by 2,000 hours to get a rough estimate of the number of operators required at the utility.

7500 ÷ 2,000 = 3.75 operators (4 full-time operators)

Step 5: Refine the workforce analysis by considering specialized skills required and backups. Consider supplementing with contractors.

Workforce analysis example

Planned cleaning of an 800-foot section of collection main with a jet truck is estimated to require two operators two hours to complete. 2 hours x 2 operators = 4 operator hours.

Other time factors to consider:

- Time and additional staff required for traffic safety setup and flagging
- Time required to inspect the jet truck, set up safety equipment, put on PPE, and drive to the location
- Time required to enter data about the maintenance event.

Typical Utility Budget Item – Utility costs

Item	Expense Category	Description
1	**Salaries and wages**	Employee wages and contractor salaries
2	**Benefits**	Medical, vision, dental
3		
4	**Chemicals and Treatment**	Treatment and disinfection chemicals
5	**Sampling**	Sampling and laboratory costs
6	**Materials, parts, supplies**	Supplies for maintenance and repair
7	**Transportation**	Vehicle costs
8	**Office Supplies & postage**	printing, copying, mailing costs
9	**Insurance**	Liability, workers comp
10	**Permits and fees**	Expenses related to regulatory permits
11	**Licenses and fees**	Certifications, licenses, and memberships
12	**Training**	Cost for staff training and related travel
13	**Professional Services**	Engineering, legal, and accounting
14	**Repair & Replacement**	Large asset repair or replacement
15	**Debt Service**	Annual loan payment (principal + interest)

The next highest O&M budget line item is usually Power and Utilities.

Pumps and aerators consumer large amounts of electricity.

Typical Utility Budget Item

Item	Expense Category	Description
1	**Salaries and wages**	Employee wages and contractor salaries
2	**Benefits**	Medical, vision, dental
3	**Power and Utilities**	Electrical, communications, gas
4	**Chemicals and Treatment**	Treatment and disinfection chemicals
5	**Sampling**	Sampling and laboratory costs
6	**Materials, parts, supplies**	Supplies for maintenance and repair
7	**Transportation**	Vehicle costs
8	**Office Supplies & postage**	printing, copying, mailing costs
9	**Insurance**	Liability, workers comp
10	**Permits and fees**	Expenses related to regulatory permits
11	**Licenses and fees**	Certifications, licenses, and memberships
12	**Training**	Cost for staff training and related travel
13	**Professional Services**	Engineering, legal, and accounting
14		
15	**Debt Service**	Annual loan payment (principal + interest)

The repair and replacement line item is related to the asset management program.

These funds may be saved toward funding future replacement or used to conduct current repairs. Some utilities may separate this into two line items, repairs and replacements.

Replacement spreadsheet used to calculate annual reserve contribution .

A	B	C	
Projects	Remaining Useful Life in Years	Replacement Cost	Reserve Required Each Year
Replace Aeration Basin	30	$ 750,000	$ 25,000
Replace Headworks Comminutor	15	$ 50,000	$ 3,333
Replace Aeration Basin Interior Coating	10	$ 80,000	$ 8,000
Replace Headworks Lift Pump #1	5	$ 25,000	$ 5,000
Replace Headworks Lift Pump #2	7	$ 25,000	$ 3,571
Replace UV disinfection lamps and controls	6	$ 13,500	$ 2,250
Enter asset to be replaced	0	$ -	$ -
Enter asset to be replaced	0	$ -	$ -
Enter asset to be replaced	0	$ -	$ -
Enter asset to be replaced	0	$ -	$ -
Enter asset to be replaced	0	$ -	$ -
Enter asset to be replaced	0	$ -	$ -
Total Replacement reserves required in the current year			$ 47,155
			Click Total to add to Budget

Expenditures	Budget
Operation, Maintenance and Repair (OM&R)	
Salaries	$ 200,000
* Insurance	$ 45,000
* Dental	$ 5,500
* MERS	$ 8,500
* Medicare	$ 13,500
* FICA	$ 5,000
* Disability	$ 7,400
Unemployment Insurance	$ 6,300
Postage	$ 2,500
Bank Charges	$ 250
Operating Supplies	$ 73,000
Contract Services	$ 6,700
Telephone	$ 12,000
Dues	$ 950
Printing	$ 1,450
Insurance & Bonds	$ 2,000
Utilities	$ 96,000
Repairs	$ 25,000
Maintenance	$ 7,500
Rentals	$ -
GIS software	$ 2,300
Replacement (See Table 4)	$ 47,155
Total OM&R	**$ 568,005**
Capital Improvement (See Table 5)	$ 13,500
Operating Reserves	$ 65,100
Debt Expenses	$ 23,000
Miscellaneous	$ 500
Total Water System Expenses	**$ 670,105**

The annual replacement reserve contribution becomes a budget line-item

GIS software	$ 2,300
Replacement (See Table 4)	$ 47,155
Total OM&R	**$ 568,005**
Capital Improvement (See Table 5)	$ 13,500

Repair & Replacement

Asset Management

- Life Cycle Costs
  - Original Cost
  - Repair Cost
  - Replacement Cost
  - Salvage Value

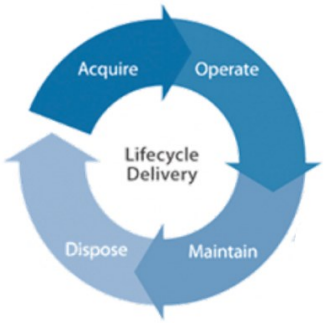
Asset life cycle

Activities and costs that will occur over the life of the asset include:

1. Routine maintenance
2. Repairs
3. Rehabilitation and/or replacement

What are the costs associated with each of these activities for a given asset?

- How will they appear in the budget?
- How will they affect rates?



The asset life cycle begins with acquisition ends with final disposal of the asset

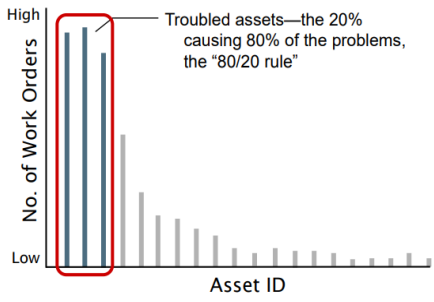
Asset Management Plan/Program

- Extend the useful life of the asset
- Obtain Value from the assets
- Minimize the total cost of owning and operating the asset
- Improve capacity, sustainability, and resilience

Asset Management Elements

- Planned maintenance
- Repair, rehabilitation, and replacement
- Adequate revenue

Pareto Principle for Assets



- The majority of problems are due to a small percentage of assets.
- Focus your efforts to mitigate the root causes.
- **Predict the associated costs for problem assets:** maintenance, inspection, rehabilitation, repair.

Preventive Maintenance

Preventive maintenance is:

- Conducted by operators based on calendar time or operational hours of an asset.
- The purpose is to allow assets to last longer and perform well throughout the asset life cycle.

The required time to conduct PM, number of operators needed, and costs can be planned ahead of time and budgeted.

Predictive Maintenance.

Predictive maintenance is conducted based upon the results of condition assessment

Applied when and to the extent needed

Saves money by applying targeted maintenance and preventing breakdowns

Reactive Maintenance

Unplanned repairs are more costly and less safe.

- Results in service disruptions and public health impacts
- Costs found to be seven times more expensive then planned maintenance

Capital Improvement Programs

Capital improvement programs are short-range, 5 to 20 year plans that:

- Outline upcoming capital projects and equipment purchases.
- Include a timeline and financing options for completing them.
- The CIP should have its own budget so it is not as severely impacted by economic crises, or other factors that may affect the O&M budget.

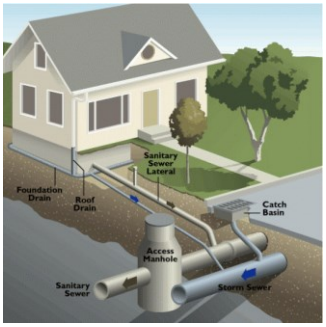
Capital Improvement Plan Elements

- Future facility improvements
- Timing of improvements
- Cost of improvements
- Financing options for the improvements

Capital improvement planning

A capital improvement plan (CIP) is a plan to add or redesign assets to extend or improve the system.

- Extending service into currently underserved areas
- Increasing the capacity of infrastructure
- Increasing the efficiency or sustainability of the system



Capital Improvement Planning Windows

Current year improvements - need to be listed as an expense in annual budget

Five Year Capital Improvement Plan

Twenty Year Capital Improvement Plan

Capital improvement challenges

According to a 2018 financial survey by the National Association of Clean Water Agencies

(1) the highest percentage of CIP budget spending was used to replace/rehab sewers and pump stations

(2) WW treatment facility replacement and rehabilitation was the second highest second highest CIP cost category.

The Congressional Budget Office reported that in 2018

- 72% of total water & wastewater spending was used for O&M
- The remaining 28% went to capital spending

Capital improvement projects tend to be deferred during economic downturns such as recessions and pandemics.

Capital improvement planning example

The utility will convert the lift pumps at the wastewater headworks to Variable Frequency Drives (VFD).

- The project is expected to cost $25,000 and is planned to begin in 8 years.
- The annual CIP contribution for this project will be **$25,000 ÷ 8 yrs. = $3,125**
- The annual contribution would be added to the utility budget for 8 years and added to the CIP fund earmarked for this project.

Capital improvement planning costs

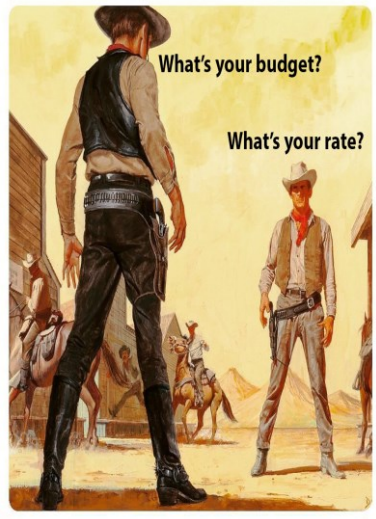
A CIP includes the costs of all planned improvements over a projected time window – such as over the next 5-year or 20-year period.

- Annual costs to save for these improvements are included in the utility budget

A	B	C	
Projects	Years Until Project Must Begin	Cost	Reserve Required Each Year
Convert lift pumps to VFD	8	$ 25,000	$ 3,125
Extend sewer main	11	$ 42,000	$ 3,818
Install lift station	12	$ 45,000	$ 3,750
Purchase GIS Software and Equipment	3	$ 8,000	$ 2,667
Upgrade controls and SCADA software	8	$ 13,000	$ 1,625
Enter project	0	$ -	$ -
Enter project	0	$ -	$ -
Total Capital Improvement reserve required in the current year			$ 14,985
			Click Total to add to Budget

The Foundation of Rates

- Revenue needs to cover expenses are determined by a budget. This creates the budget revenue target.
- Expenses are forecasted in the budget.
- Total revenues should meet or exceed total expenses, if not then the rates need go up.
- The budget should justify your rates.



Purpose of Utility Rates

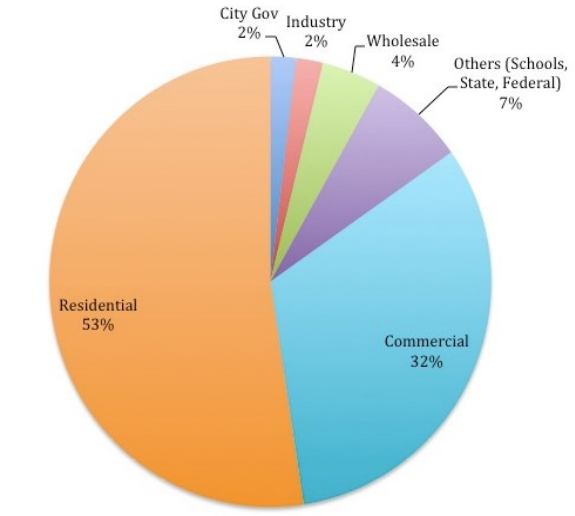
Generate revenue to cover all of the costs related to the administration, operation and maintenance, repair and replacement, debt service, and reserves for the utility system.

The rate setting process

1. Create an annual budget
2. Analyze customer types and usage
3. Allocate fixed and variable costs
4. Set base and usage rates
5. Choose a rate structure
6. Determine number of EDUs
7. Compare with affordability metrics

Customers/Rate payers

- Residential
- Commercial
- Industrial
- Institutional



https://atlantaclimateactionplan.files.wordpress.com/2015/07/water-consumed-3.jpg

Rate Characteristics

- Fair and equitable
- Cover utility system costs only
- Consumers should know and understand the rates
- Annually reviewed
- Based on actual financial information
- Easy to administer

Examine the Current Rates

- Did revenues exceed expenses for the past three years?
- Are debt payments made on time?
- Are reserve accounts funded each year?
- Were repair and replacement costs covered?
- Is the system in compliance with state standards and regulations?
- Has there been a rate increase in the last three years?

Utility System Budget Process

Separating water and wastewater costs

- Determine percentage of labor, utilities, and supplies spent on all water and wastewater activities.
- Should be separate for budgeting, financing, and rate analysis.
- Prepare separate budgets for each utility.
- Determine separate rates for each utility.

Create an annual budget for the upcoming year

Review the last 3 years of operating revenues and expenses

	Last year	2 years ago	3 years ago
Total operating revenues*			
Total operating expenses**			
NET OPERATING REVENUES			

Questions for Analysis

1. Was revenue sufficient to cover all expenses and debt service payments over the last three years?
2. Have there been overall changes in revenues or expenses? Are there any trends?
3. Do you expect any expense items to change significantly in the following year?
4. Are the operating and debt ratios changing?

Budget analysis for the upcoming year

	Last year	2 years ago	3 years ago
Total operating revenues*	*$200,100*	*$198,000*	*$199,000*
Total operating expenses**	*$170,800*	*$163,900*	*$159,200*
NET OPERATING REVENUES	*$29,300*	*$34,100*	*$39,800*

Analysis

A. **The operating expense has been steadily increasing over the last three years**, while the revenue has remained relatively stable.

B. **The operating ratio decreased from 1.25 from three years ago to 1.17** last year. This may impair the utility's ability to cover emergencies, fund infrastructure improvement, and cover debt service payments.

Operating Ratio (last year): $200,100 ÷ $170,800 = 1.17

Operating Ratio (3 years): $199,000 ÷ $159,200 = 1.25

Investigate expected changes in budget line items

	O&M Expense Line Item	Last Year Actual	Current Year Projected	MOE*	Expansion	Next Year Projected
1	Salaries and wages	$ 62,000	$ 62,000	% 3		$ 63,860
2	Personnel benefits	$	$	%		$
3	Power and other utilities	$ 56,000	$ 58,000	% 5		$ 60,900
4	Chemicals and treatment	$	$	%		$
5	Sampling	$	$	%		$
6	Materials, parts and repairs	$ 36,000	$ 36,720	% 2		$ 37,455
7	Transportation	$	$	%		$
8	Office supplies and postage	$	$	%		$
9	Insurance	$	$	%		$
11	Permits and fees	$	$	%		$
12	Licenses, dues and subscriptions	$	$	%		$
13	Trainings, meetings and mileage	$	$	%		$
14	Professional services	$	$	%		$
15	Other deductions, fees and expenses	$	$	%		$
16	Repair & Replacement	$	$	%		$
17	Taxes	$	$	%		$

3% raise for staff

Power expected to increase by 5%.

Trend over last 3 years suggests a 2% increase each year

The following are annual reserve fund contribution line items to be included in the budget.

- **Debt service reserve** – as required by lender
- **Emergency reserve** – set aside to cover restoring service of critical infrastructure.
- **Operating reserve** – to cover 45 days to 3 months operating expense
- **Capital Improvement reserves** – to cover planned asset improvements and replacements

Amounts to be allocated toward reserves

		Prior Year	Current Year	Next Year
		Actual Budget	Annual Adopted Budget	Projected Budget
1	**Debt Service Reserve**			
2	Annual installment (Reference Table 1.5)			*$3,500*
3	Withdrawals			
4	Running balance			
5	Target balance			
6	**Operating Reserve**			
7	Annual installment (Reference Table 1.5)			*$17,500*
8	Withdrawals			
9	Running balance			
10	Target balance			
11	**Emergency Reserve**			
12	Annual installment (Reference Table 1.5)			*$5,000*
13	Withdrawals			
14	Running balance			
15	Target balance			
16	**Capital Improvement Reserve**			
17	Annual installment			*$5,500*
21	TOTAL ANNUAL RESERVE INSTALLMENTS (add lines 2+ 7+12+17)	$	$	$ ***$31,500***

5 minute break

Rate structure types

Water rates are developed in the following general ways.

1. Based on water usage
2. Flat rate
3. Customer type
4. A combination of customer type and estimated flow
5. Metered rate based on actual metered water flow

Types of Rates

- Base rate for fixed costs
  - Long term debt
  - Reserve funding
  - Administration expense
  - Administration salaries
- Flow rate for variable costs
  - Utilities
  - Chemicals
  - Operational labor
  - Repair and replacement

Analysis of customer water usage

(C) Monthly Water Usage (In Gallons)	(D) # of Customers Using this Amount of Water	(E) Total # of Customers in this Usage Level	(F) Total Estimated Water Use (Gal)	(G) Total % of water	(H) % Total Customers
Under 1,000					
1,001-2,000					
2,001-3,000					
3,001-4,000					
4,001-5,000					
5,001-6,000					
6,001-7,000					
7,001-8,000					
8,001-9,000					
9,001-10,001					
10,001-15,000					
15,001-20,000					
20,001-30,000					
30,001-40,000					
40,001-50,000					
All Over 50,001					

Total Annual Water Billed (A) *38,000,000*	gallons
Total # of Customers (B) *600*	

	LINE ITEM	ANNUAL EXPENSE	FIXED %	FIXED AMOUNT	VARIABLE %	VARIABLE AMOUNT
Example:						
	Salaries	*$15,000*	*75%*	*$11,250*	*25%*	*$3,750*
	Personnel Benefits	*$5,000*	*60%*	*$3,000*	*40%*	*$2,000*
Fixed / variable percentages of budget		67.5%	$14,250	32.5	$5,750	
1	Salaries and wages					
2	Personnel benefits					
3	Power and other utilities					
4	Chemicals and treatment					
5	Sampling					
6	Materials, parts and repairs					
7	Transportation					
8	Office supplies and postage					
9	Insurance					
10	Permits and fees					
11	Licenses, dues and subscriptions					
12	Trainings, meetings and mileage					
13	Professional services					
14	Other deductions, fees and expenses					
15	Repair & Replacement					
16	Taxes					
17	Rent					
18	Other:					
19	Other:					
Fixed / variable percentages of budget				*154,577*		*51,526*

Identifying fixed and variable costs

We will use total fixed expenses to calculated the base rate charge and the total variable expenses to calculate a usage rate.

Calculate residential base rate

Total fixed cost from budget ÷ number of customers = Annual base rate

$154,577 ÷ 600 customers = $257.63 per year

Monthly base rate charge = $257.63 ÷ 12 = $21.47

Calculate residential usage rate

Divide total variable expense by total gallons used in previous year and multiply by 1,000

[$51,526 ÷ 38,000,000 gallons] x 1,000 = $1.36 per 1,000 gallons

Finalizing the rate

The water rate becomes a:

Monthly base rate charge of $21.47 plus a usage charge of $1.36 for every 1,000 gallons

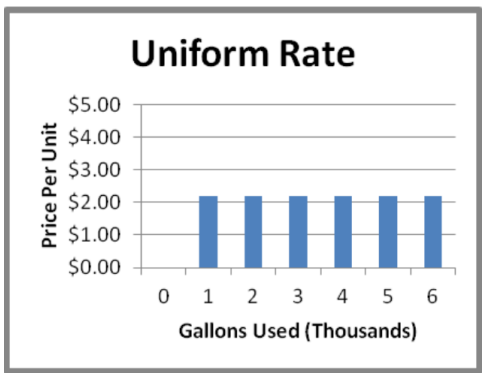
Next

- Consider if rate will be stepped or tiered to promote conservation
- Evaluate affordability metrics

Rate Structures

- Uniform Flat rate
- Single Block rate
- Decreasing Block rate
- Increasing Block rate

Uniform Rate is a structure that has a constant per unit price for all metered units of water consumed on a year-round basis.

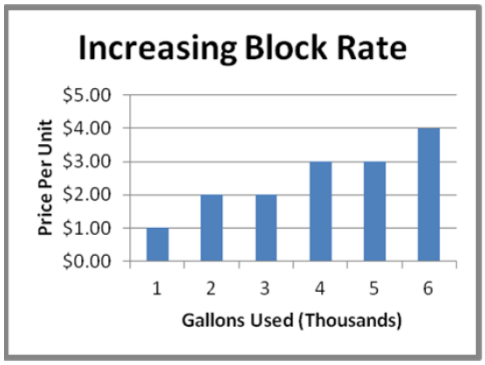


Example: For a resident that uses 6,000 gallons, the metered rate would be 6 x $2 = $12

For a final bill, the metered rate will be added to a base rate plus any taxes and fees.

Uniform rate differs from a flat fee in that it requires metered service.

Increasing Block Rates is a rate structure in which the unit price of each succeeding block of usage is charged at a higher unit rate than the previous block(s). Also called a "tiered" rate structure

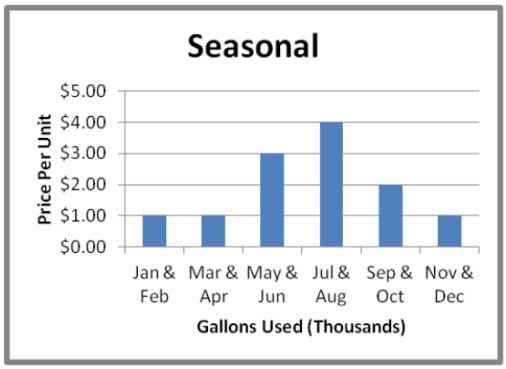


Example: For a resident that uses 6,000 gallons:

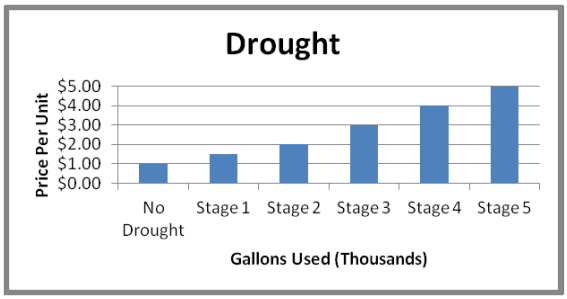
1st	$1
2nd	$2
3rd	$2
4th	$3
5th	$3
6th	$4

Metered portion of bill = $16

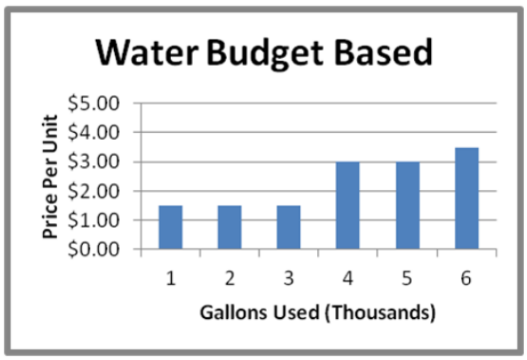
Increasing block rates are designed to promote conservation .



Seasonal Rates are rates that cover a specific time period. They are established to encourage conservation during peak use periods.



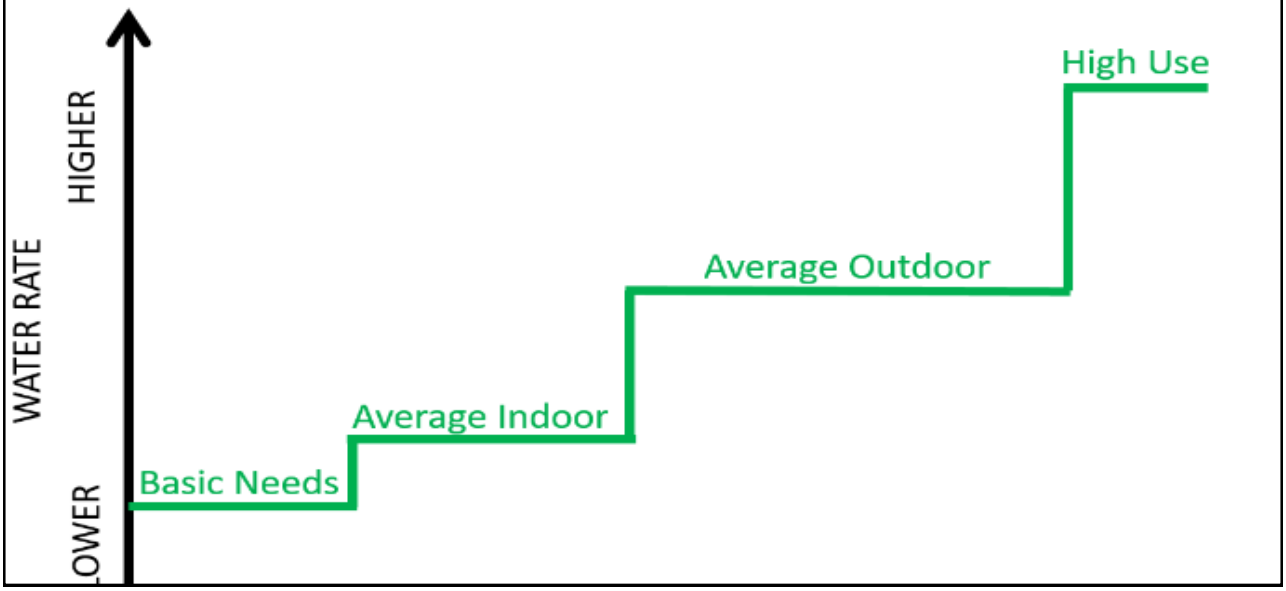
Drought Rates are similar to seasonal rates but instead of applying higher rates during an entire time period, they adjust rates based on the local area's drought level.



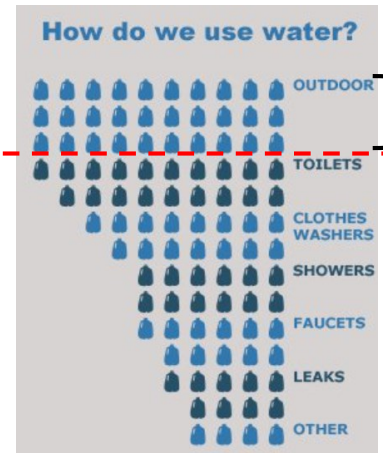
Households are given a "water budget" based on the anticipated needs of that household.

Users are charged a certain rate for use within their budget and a higher rate for use that exceeds their budget.

Inclining Tiered Rates: Rates based on levels of use and the costs associated with serving the next unit of water



Indoor water usage and wastewater are related

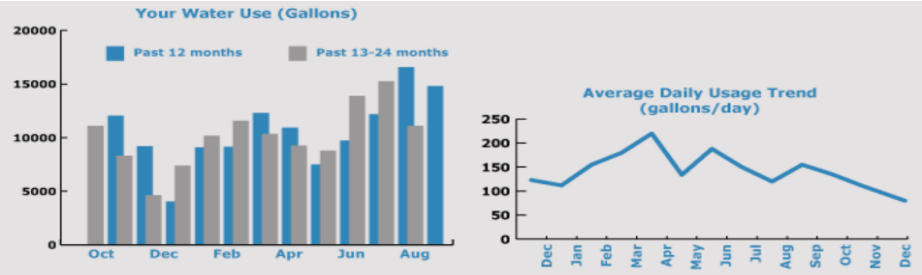


Does not contribute to wastewater flow.

Indoor usage contributes to wastewater flow

Generally water usage in the winter is a good indicator of the wastewater produced by a household year round.

Water and wastewater flow variations



Water use varies throughout the year because of higher use in the summer for irrigation. Wastewater flow on the other hand will remain more constant.

Rate Structure Comparison

Rate Structure	Description	Advantages	Disadvantages
Flat Rate or Fixed Fee	All customers pay the same amount each month regardless of quantity of water used.	• Easy to implement	• Everyone pays too much or too little for what they consume • Does not promote water conservation
Uniform Rate or Single Block Rate	Customers are charged a uniform rate per unit of water (per 1,000 gallons, per cubic feet) regardless of the amount of water used. Often coupled with a minimum monthly charge. Used in metered systems.	• Easy to administer • May encourage water conservation • Cost to the customer is in direct proportion to the water consumption	• Has the ability to discourage high volume users
Decreasing Block Rate	The price of water declines as the amount used increases. Each succeeding consumption block is cheaper. Used in metered systems.	• Attractive to high volume users	• High water consumption increases the need for wastewater treatment facilities • Does not offer an incentive to conserve water • It is complex to determine and administer
Increasing Block Rate	The price of water increases as the consumption increases. Used in metered systems.	• Promotes water conservation • Provides a reasonable amount of water at reasonable price • May discourage high volume use	• Requires a computerized billing system
Seasonal Rate	Rates vary according to the time of year. This rate is normally used in conjunction with block rates or uniform rates.	• Promotes water conservation • Equitable for transient communities (campgrounds, seasonal communities, etc.)	• May affect high-consumption users during the time of the year when rates are highest • Revenues will most likely fluctuate

Determining equivalent dwelling unit usage (EDUs)

Equivalent Dwelling Unit Usage is the average annual water usage of residential homes.

USDA RD Customer User Information

	Number of Existing Customers	Total Monthly Service Usage (In gallons)	Number of Users after Improvements	Projected Total Monthly Service Use (In gallons)	EDUs*
Residential Dwellings:					
Commercial (non-residential) Users:					

EDU (residential) = Sum of monthly flow for residential units / # of residential units

Non residential EDUs = all other flow (commercial, industrial, schools, etc.) / EDU residential flow

Total EDUs = # of EDU residential + # of Non residential EDUs

Total EDUs X 1.5 % MHI = Total community Annual Affordable User Charge (GOAL)

* Equivalent Dwelling Units

Calculating water usage with EDUs

1 EDU = $\frac{\text{total annual usage by all residential water users}}{\text{total residential dwellings}}$

Example: $\frac{\textit{38,000,000 gallons used in 2021}}{\textit{600 residential customers}}$ = *63,333 gallons per EDU*

Application:

We can use the EDU to evaluate the usage by other types of customers.

If an industrial customer used 316,665 gallons in a year, we can divide the amount by the residential EDU amount of 63,333 gallons to determine the number of EDUs for the customer.

316,665 gal ÷ 63,333 gal/EDU = **5 EDU**

USDA RD Affordable Loan Calculations (ALC)

Step 1. Review the Annual System Expense Budget line items:

- Operations and maintenance
- Repair and replacement*
- Debt service
  - Existing debt
  - Debt service reserves
- Total: Annual System Expense (ASE)

*include all equipment in the system with a life < 40 years

USDA RD Affordable Loan Calculations (ALC)

Step 2. Total EDUs X 1.5% of MHI = Affordable Annual User Charge (AAUC)

Step 3. AAUC – ASE = Affordable New Debt service payment (AND)

Step 4. AND/Capital Recovery Factor* = Affordable New Loan (ANL)

Step 5. Proposed Project Cost – ANL = Amount of Grant the community **MAY** be eligible for

*The capital recovery factor is the **ratio used to determine** the present value of a series of equal annual cash payments.

Capital Recovery Factors (CRF)

Term of loan 40 years, amount $600,000

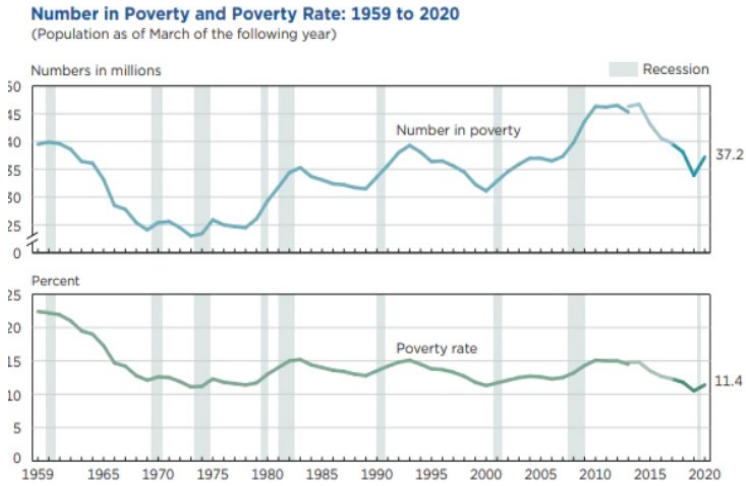
Interest rates*	CRF	Annual payment**
P = 2.375%	0.039	$23,400
I = 3.125%	0.044	$26,400
M = 3.875%	0.05	$30,000

*USDA RD 10/1/23 – 12/31/23

** Principal & Interest

Affordability

- USEPA definition of affordability
- USDA Rural Development definition and use of affordability
- Determining Median Household Income and poverty levels
- Socio-economic factors that affect affordability
- Customer Assistance Programs
- Strategies for balancing affordability and rate adequacy

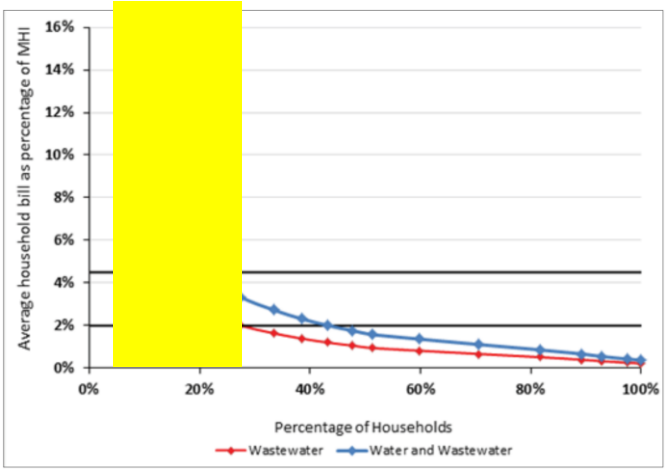


U.S. Census: https://www.census.gov/newsroom/stories/poverty-awareness-month.html

In 2020, there were 37.2 million people in poverty; 11.4% of the total US population.

12 percent of men and 15 percent of women "rely on their monthly Social Security check for 90 percent or more of their needs.

Households which require excessive % of income for utility bills



Some households with special circumstances have water bills that require as high as 15% of household income to cover water and wastewater costs and 9% of household income to cover wastewater only.

Affordability Assessment Tool for Federal Water Mandates. AWWA & WEF (2013). https://www.awwa.org/Portals/0/AWWA/ETS/Resources/AffordabilityAssessmentTool.pdf

Determining Residential Indicator Affordability Metric for water – 6 steps

1. **Proportion of residential water flow:** Determine the proportion of water flow attributable to residential customers and divide by total water flow.
2. **Residential Share of Cost**: Multiply proportion of residential water flow by total costs of the utility. Total costs are total O&M costs plus debt service disregarding depreciation.
3. **Cost per Household (CPH):** Residential Share of Costs divided by number of households.
4. **Determine the Median Household Income (MHI)** of the service area using census data.
5. **Residential Indicator (RI):** Divide the annual Cost per Household by the MHI of the service area.
6. **Evaluate the RI**: <1% Low , 1% to 2% Mid-range , >2% High

Affordability analysis

Residential Indicator (RI) = Annual Water Cost per household/Annual Median Household Income x 100%

Financial Impacts	Residential Indicator (CPH as % MHI)
Low	Less than 1% of MHI
Mid-Range	1–2% of MHI
High	Greater than 2% of MHI

Alternative affordability analysis equation.

Residential Indicator (RI) =
Annual Water Cost per household /MHI Income by quintile and/or by poverty rate x 100%

This alternative equation can help to delve deeper into the affordability for lower income groups within the community that earn below the median household income. This information can be used to support customer assistance programs.

Defining and measuring water Affordability. University of Illinois Extension. https://iiseagrant.org/wp-content/uploads/2019/08/DMWA_FINAL.pdf

Affordability calculations and considerations

Household type	MHI (2011$)	Average household water and wastewater cost as a percentage of MHI
All households	37,036	2.03%
Elderly households	27,955	2.68%
Renter-occupied	24,898	3.01%
Owner-occupied	47,272	1.59%

Source: U.S. Census Bureau ACS, 2012 (2011 single-year estimates).

In Kansas City, 2013 the average annual water and wastewater bill was $752.

This was 2.03% of the median household income.

$752 ÷ $37,036 x 100% = 2.03%

Notice that the bill required a larger percentage of household income for elderly households and for renters.

The balance between rates and affordability

Factors that require higher rates

- Replacing aging infrastructure
- Increasing regulations
- Capital improvements
- Sustainability needs
- Workforce needs
- Technology
- Inflation

Affordability Factors

The balance between rates and affordability

Factors that require higher rates

- Replacing aging infrastructure
- Increasing regulations
- Capital improvement
- Sustainability
- Workforce
- Technology
- Inflation

Affordability Factors

- Percentage of household income required for utility bill
- Employment status
- Poverty levels
- Fixed incomes
- Inflation

Types of Customer Assistance Programs

Bill Discount — Utilities reduce a customer's bill based on income and other eligibility criteria.

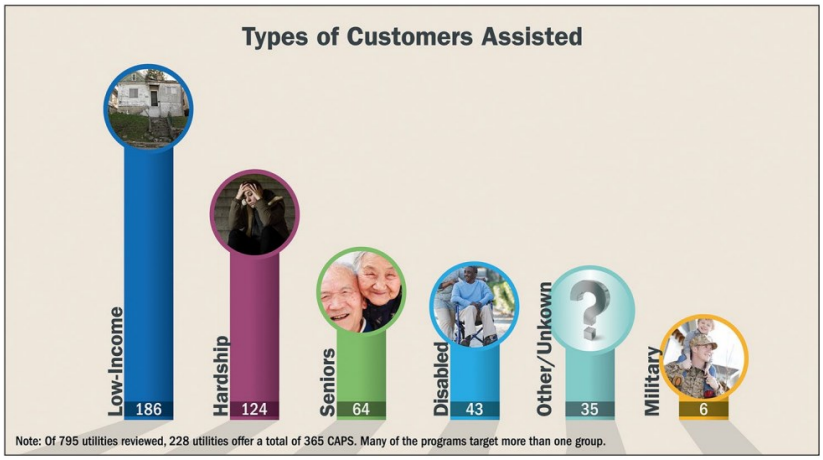
Flexible Terms — Utilities help customers afford services by partially forgiving old debt and establishing a payment plan for future payments

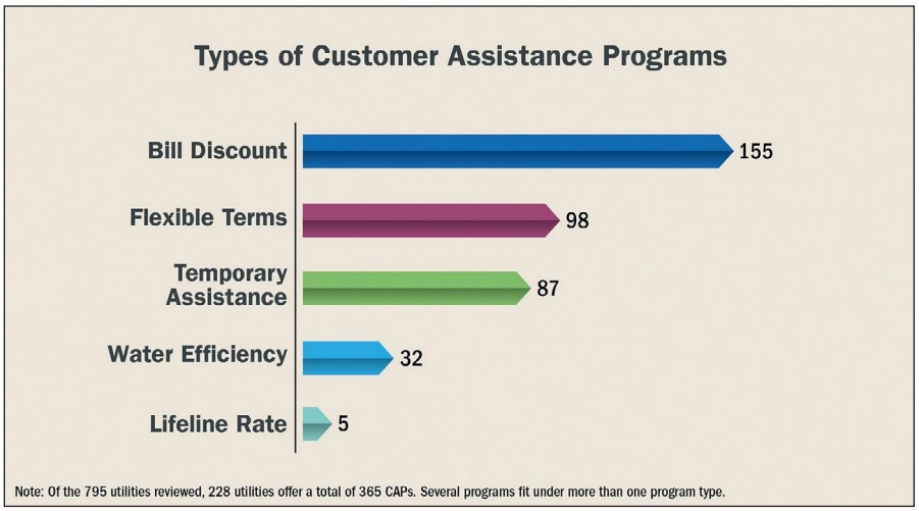
Lifeline Rate — Customers pay a subsidized rate for a fixed amount of water, which is expected to cover that customer's basic water needs.

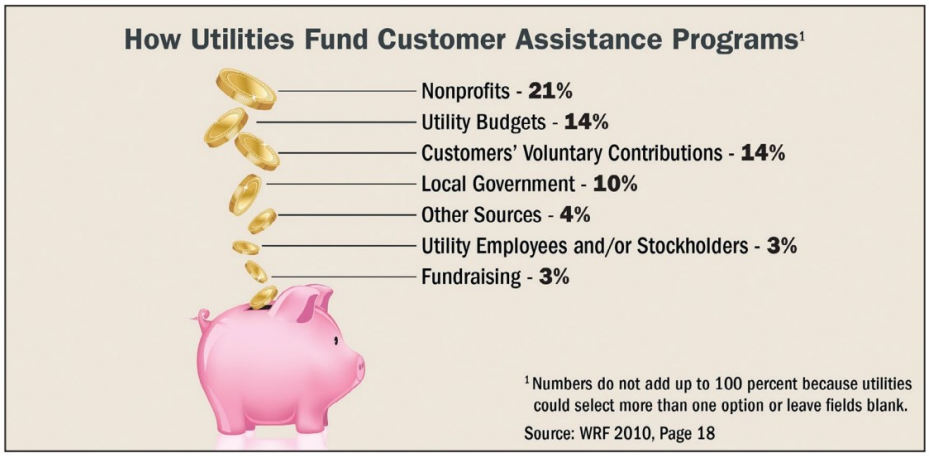
Temporary Assistance — Utilities help customers on a short-term or one-time basis to prevent disconnection of service or restore service.

Water Efficiency — Utilities subsidize water efficiency measures by providing financial assistance for leak repairs and offering rebates for WaterSense-certified fixtures, toilets, and appliances.

Customer Assistance Programs

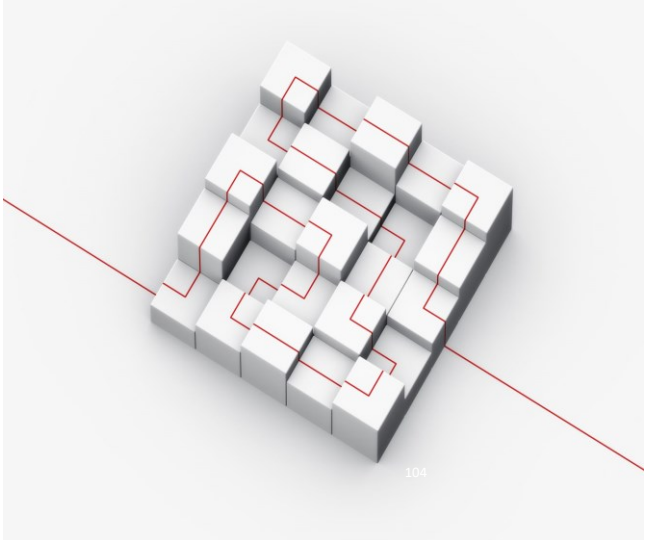






The life of an Infrastructure Project

1. Identify funding sources for the intended project
2. Assemble a team of professionals
3. Create a project plan
4. Apply for funding
5. Secure funding
6. Design and build the project
7. Operate & Maintain, R&R, Debt Service



Water System Infrastructure Funding Sources

Loans

Common Sources

- Local Bank- generally small and short term
- Public Bond Sale
- USDA RD
- State Revolving Loan Funds

Loans/Bonds

- General Obligation
- Limited General Obligation
- Special Assessment Bonds
- Revenue Bonds

Major Environmental Infrastructure Funding Sources

- USDA Rural Development (RD)
- State Revolving Loan Funds

Secondary Funding Sources

- H.U.D. Community Development Block Grants (CDBG)
- U.S. Economic Development Grants (EDA)
- Other State Programs

Major Environmental Infrastructure Funding Mechanism

USDA Rural Development (RD)

- National program, provides a variety of grants and loans for water and wastewater projects
- For small communities, population 10,000 or less

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USDA Rural Development (RD)

- Long term loans, up to 40 years, available for water and wastewater projects.
- Interest rates, generally below market rates, vary quarterly and are based on the need for the project and the medium household income (MHI) of the area to be served.
- Grants are available to keep user costs reasonable

  MHI between $ * and $ **, grant up to 45%

  MHI < $ * and project necessary to alleviate health or sanitary problem, grant up to 75%

  There are other factors that are considered for RD grants

  * 80% of state non-metropolitan MHI (MI 10/1/23 $53,452)

  ** state non-metropolitan MHI (MI 10/1/23 $66,815)

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State Revolving Loan Funds - Two Programs

- Clean Water State Revolving Fund, low-interest loans
- Drinking Water State Revolving Fund, low interest loans
- Principal Forgiveness- disadvantaged community/affordability (MHI & annual user costs) & Green project components

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Federal Water Pollution Control Act

- Federal Water Pollution Control Act Amendments of 1972 (**33 U.S.C. 1251 et seq.**), as amended in 1977 (P.L. 95-217), this law became commonly known as the **Clean Water Act** (CWA). The CWA is the principle law governing pollution control and water quality of the Nation's waterways.
- The **Clean Water State Revolving Fund** (CWSRF) is a self-perpetuating **loan** assistance authority for **water** quality improvement projects in the United States. Congress established the fund in the Water Quality Act of 1987. The **fund** is administered by the Environmental Protection Agency and state agencies. The CWSRF, which replaced the Clean Water Act Construction Grants program, provides loans for the construction of municipal wastewater facilities.
- The Water Resources Reform and Development Act of 2014 (WRRDA) amended the Federal Water Pollution Control Act to require Clean Water State Revolving Fund (CWSRF) programs to develop affordability criteria that includes income and unemployment data, population trends, and other data determined relevant by the State.

Safe Drinking Water Act

- The success of the Clean Water State Revolving Fund program prompted the creation of the Drinking Water State Revolving Fund (DWSRF) by the 1996 Amendments to the Safe Drinking Water Act (SDWA) the program provides financial support to water systems and to state safe water programs.
- The DWSRF program is a State operated program to provide loans and other financial assistance for public drinking water improvement projects. The SDWA requires that states provide 20 percent matching funds to federal dollars, in order to capitalize the DWSRF program. Therefore, every one dollar invested by the State secures five federal dollars.
- The DWSRF provides funding to public water systems to improve or replace water system pipes, treatment plants, storage tanks and sources of water to ensure safe drinking water and provide essential public health protection.

Questions?

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