



Smart Management for
Small Water Systems

Webinar | Ask the Expert - Advice on Capital Planning

June 14, 2017



UNC
ENVIRONMENTAL
FINANCE CENTER

This program is made possible under a
cooperative agreement with EPA.



About the Environmental Finance Center Network (EFCN)

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

The Smart Management for Small Water Systems Program

This program is offered free of charge to all who are interested. The Program Team will conduct activities in every state, territory, and the Navajo Nation. All small drinking water systems are eligible to receive free training and technical assistance.

What We Offer

Individualized technical assistance, workshops, small group support, webinars, eLearning, online tools & resources, blogs



The Small Systems Program Team

- Environmental Finance Center at The University of North Carolina at Chapel Hill
- Environmental Finance Center at Wichita State University
- EFC West
- New England Environmental Finance Center at the University of Southern Maine
- Southwest Environmental Finance Center at the University of New Mexico
- Syracuse University Environmental Finance Center
- Environmental Finance Center at the University of Maryland
- American Water Works Association (AWWA)



UNC
ENVIRONMENTAL
FINANCE CENTER



**WICHITA STATE
UNIVERSITY**

**HUGO WALL SCHOOL
OF PUBLIC AFFAIRS**

Environmental Finance Center



EFCWest
Environmental Finance Center West



**New England
Environmental
Finance Center**



**SOUTHWEST
ENVIRONMENTAL
FINANCE CENTER**



**Environmental
Finance
Center**
Syracuse University



**ENVIRONMENTAL
FINANCE CENTER**



**American Water Works
Association**

Areas of Expertise



Asset Management



Rate Setting and Fiscal Planning



Leadership Through Decision-making and Communication



Water Loss Reduction



Energy Management Planning



Accessing Infrastructure Financing Programs



Workforce Development



Water Conservation Finance and Management



Collaborating with Other Water Systems



Resiliency Planning



Managing Drought



You ask, we answer!



Shadi Eskaf

(919) 962-2785

eskaf@sog.unc.edu



Glenn Barnes

(919) 962-2789

glennbarnes@sog.unc.edu



Submitted Question

How do you start capital planning?



Hope for Divine Intervention



Pope Francis Lays Hands On Ailing U.S. Infrastructure

NEWS IN BRIEF

September 25, 2015

VOL 51 ISSUE 38

News · Religion · World
Leaders · Pope



NEW YORK—Treating the frail, long-overlooked structures with an unparalleled display of compassion, Pope Francis reportedly inspired a crowd of onlookers Friday by laying his hands upon the ailing United States infrastructure. “My heart just melted when I watched the pope



Two Related Concepts of Long Term System Planning:

Asset Management
&
Capital Planning



Submitted Questions

What is the difference between capital planning and asset management?

What is the danger of not doing this?

Five Core Components of AM



Current State of the Assets



Level of Service



Criticality



Life Cycle Costing



Long-Term Funding



Long Term Capital Planning

- This is strongly related to asset management
- An official multi-year document that identifies and prioritizes capital projects, identifies funding sources, and sets timelines



Capital Improvement Program - Timelines

- Use **Asset Management Plan** to plan for capital expenses in the long term (~20 years)



Capital Improvement Program - Timelines

- Create a **Capital Improvement Plan** with a narrower timeline (~5 years) in more detail. Specify the projects and accurate estimates of cost. Plan where money will come from.

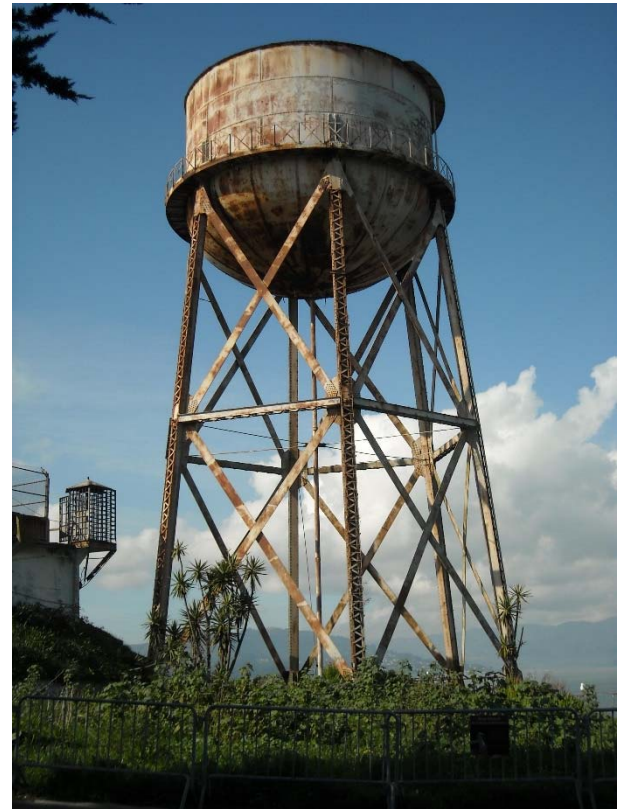
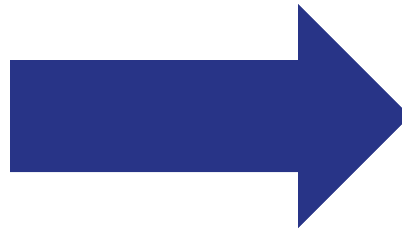


Capital Improvement Program - Timelines

- Create a **Capital Improvement Budget** with an even narrower timeline (1 – 2 years) committing funds for the planned capital projects. Get it approved/adopted.



The Risk: Infrastructure Wears Out No Matter What





Submitted Question

What is the best way to budget for capital planning?



Start with your C.I.P.

- Know how much you need to spend and when
- Break down expenses by debt versus cash reserves
- Plan to put into your budget a few years ahead of time to save up over time

- Alternative for those that do not have a CIP or assessment of capital costs going forward: fund your depreciation at least

<https://www.youtube.com/watch?v=d8A7MJXFV1U>



The video player displays a presentation slide with a blue header image showing industrial water pipes. The slide content includes:

- 
Smart Management for
Small Water Systems
- Demystifying Depreciation
and How to Make Use of It**
- December 1, 2016
- Logos for EFCN (Environmental Finance Center Network), American Water Works Association, and UNC Environmental Finance Center.
- Text: "This program is made possible under a cooperative agreement with EPA."

The video player controls at the bottom show a play button, a progress bar at 0:03 / 1:03:02, a volume icon, and the website www.efcnetwork.org. Additional icons for closed captions, settings, and full screen are also visible.

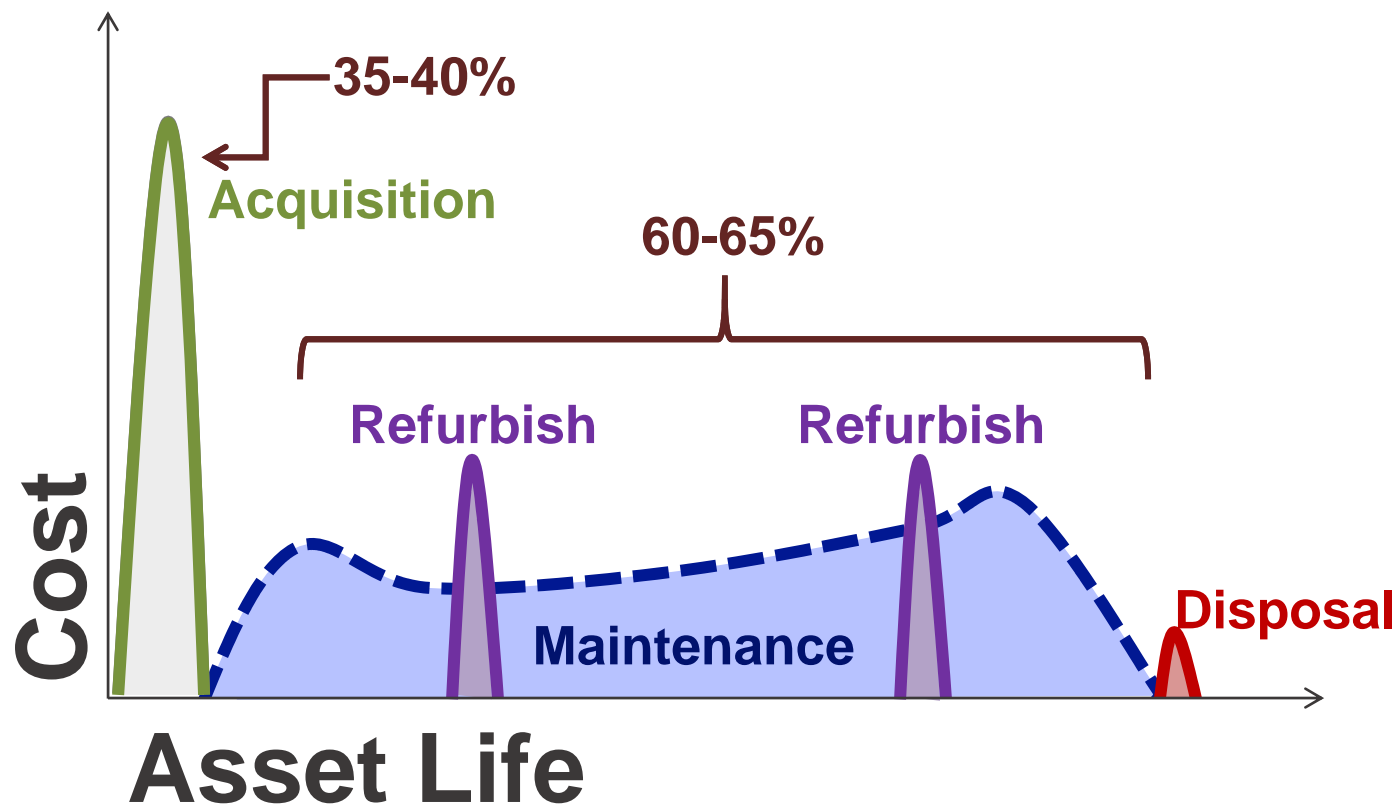


Submitted Question

Wells cost millions of dollars. How do I raise rates for reserves to pay for capital, when expenses are also increasing?



Capital Investments are Just the Tip of the Iceberg...

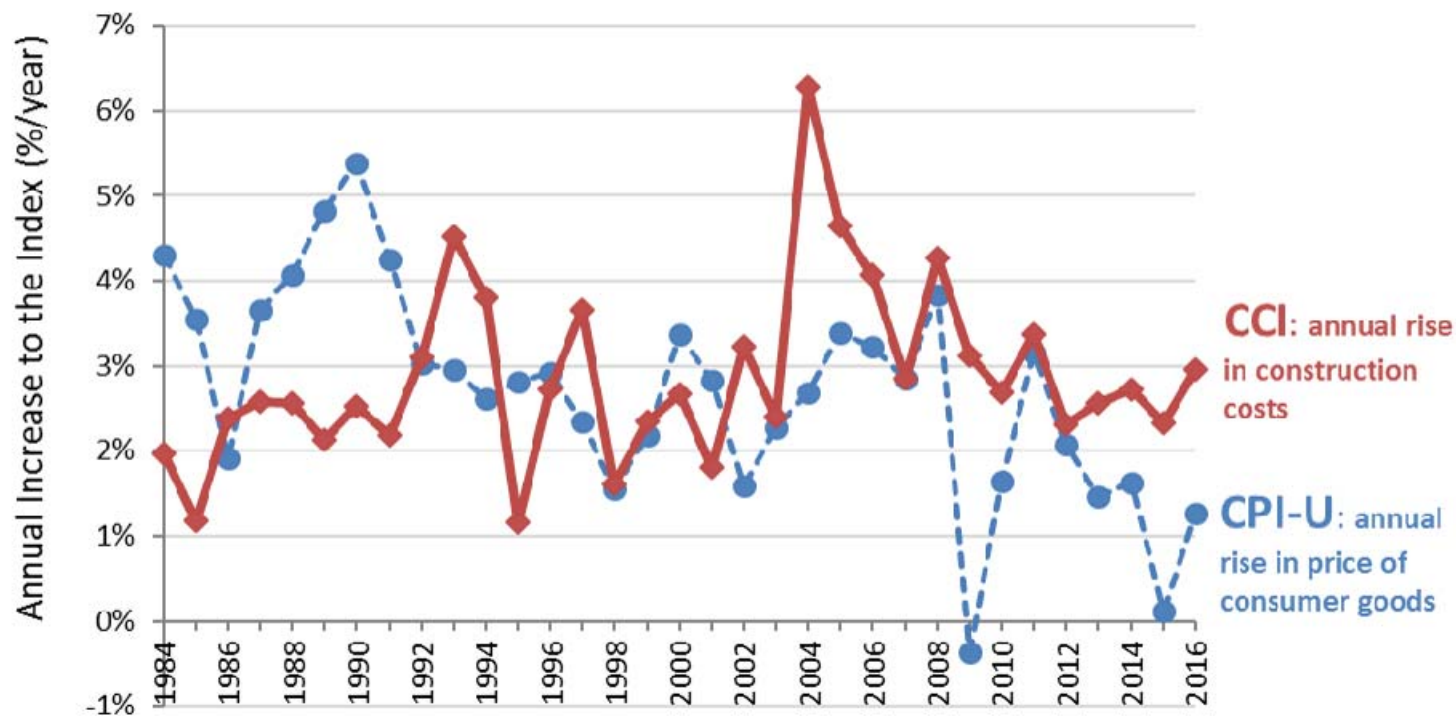


Source: Adapted from Steve Allbee, USEPA



The **Construction Cost Index (CCI)** has been rising faster than the **Consumer Price Index-Urban (CPI-U)** in recent years

Construction costs (CCI) rose on average of **2.6%/year** in the last five years, while consumer goods (CPI-U) only rose an average of **1.3%/year** in the same period



Data graphed by the Environmental Finance Center at the University of North Carolina, Chapel Hill.

Data Sources: Bureau of Labor Statistics (CPI-U), Engineering News-Record ENR.com (CCI), InflationData.com (CPI-U), USDA Natural Resources Conservation Services (spreadsheet containing CCI and CPI U).

Source: *Environmental Finance* blog post available at <http://efc.web.unc.edu/2012/09/26/using-an-index-to-help-project-capital-costs-into-the-future/>



Submitted Question

Where can I find information on replacement costs of assets?



Where Can You Find the Prices?

- Call a vendor. Actually, call a few.
- Ask other systems
- Look at past expenses but adjust for increases in costs



Submitted Questions

How much should a small water system set aside in reserves?

Are there limits on cash reserves?



How Much Do You Need In Your Reserves?

- It depends
- Enough to pay for your most expensive piece of equipment?
- Enough to cover your costs if you had no revenue for two months?
- Enough to cover the projects in your capital improvement plan?



Submitted Question

What are some best practices and typical funding sources for components of water/wastewater systems?



Ways To Pay

- Pay as you go (current receipts)
- Save in advance and pay
- Pay later (someone loans you money)
- Grants (let someone else pay)



Plan to Pay tool

<i>Estimated Cost in the Start Year</i>	Expected Grants at Time of Construction	<i>Project Cost in the Start Year Net of Grants</i>	Financing Mechanism: Debt Financing or Capital Reserves?	Term of Debt (years)
2,000,000	\$ 100,000	\$ 1,900,000	Capital Reserves	
2,390,023	\$ -	\$ 2,390,023	Debt Financing	15
500,000	\$ -	\$ 500,000	Capital Reserves	
360,500	\$ -	\$ 360,500	Capital Reserves	
4,742,336	\$ -	\$ 4,742,336	Debt Financing	20



For Debt, Remember Expected Useful Life





EPA guide: Taking Stock of Your Water System A Simple Asset Inventory for Very Small Drinking Water Systems



Taking Stock of Your Water System A Simple Asset Inventory for Very Small Drinking Water Systems



How Long Will it Last?

Typical Life Expectancies of Water System Equipment

Component	Worksheet	Useful Life
Wells and Springs	Drinking Water Source	25 years
Intake Structures		35 years
Pumping Equipment		10 years
Disinfection Equipment	Treatment System	5 years
Hydropneumatic Tanks	Tanks	10 years
Concrete and Metal Storage Tanks		30 years
Transmission Structures (Pipes)	Distribution System	35 years
Valves	Valves	35 years
Mechanical Valves		15 years
Computer Equipment/Software	Electrical Systems	5 years
Transformers/Switchgears/Wiring		20 years
Motor Controls/Variable Frequency Drives		10 years
Sensors		7 years
Buildings	Buildings	30 years
Service Lines	Service Lines	30 years
Hydrants	Hydrants	40 years

Note: These expected useful lives are drawn from a variety of sources. The estimates assume that assets have been properly maintained. The adjusted useful life of an asset will be equal to or less than typical useful life.

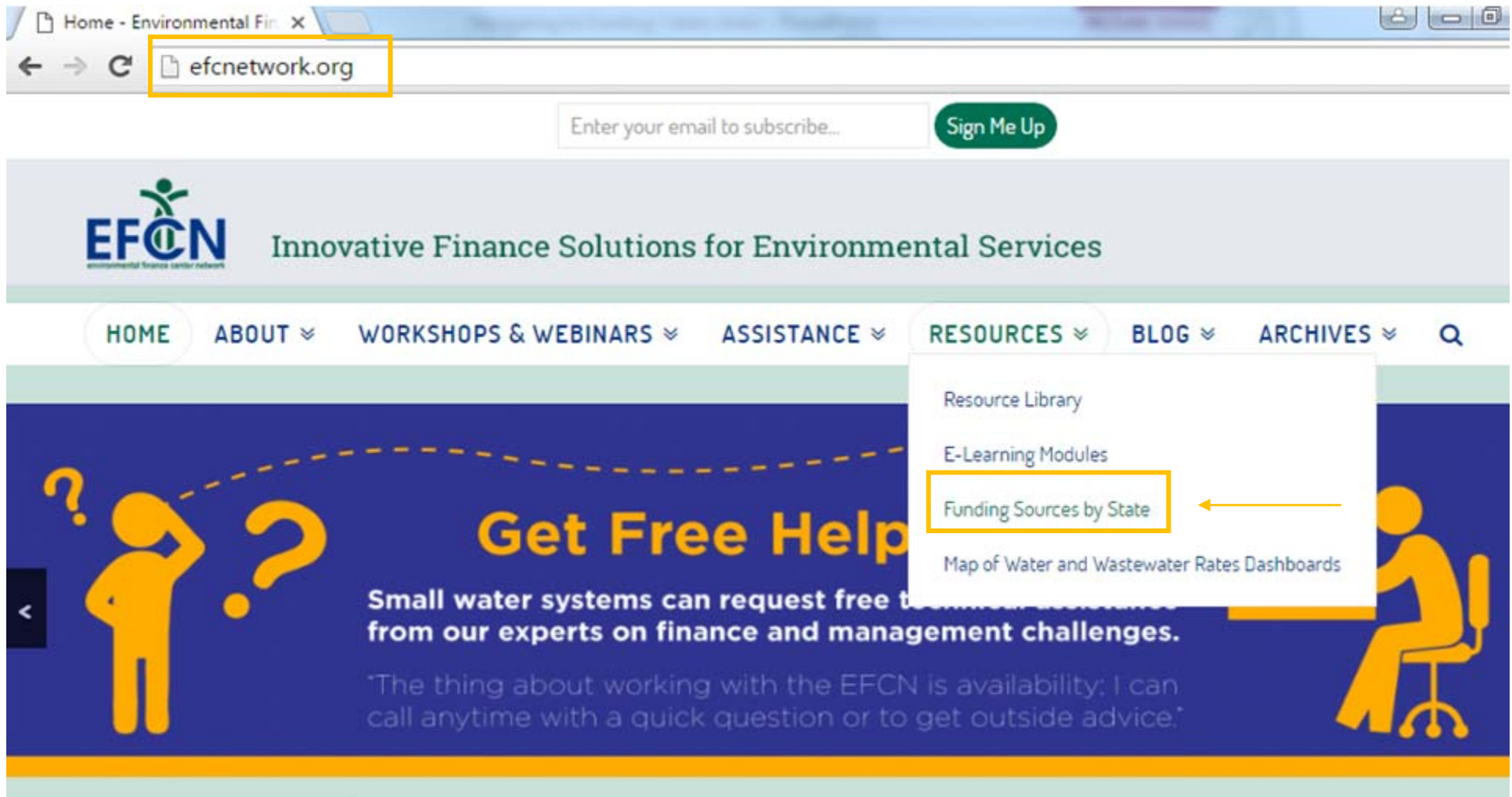
Source: <https://www.epa.gov/sites/production/files/2015-04/documents/epa816k03002.pdf>



Submitted Questions

What are the best funding sources for small privately-owned systems?

Which ones don't require personally guaranteeing loans?



Navigating to Funding Tables

Step 1: efcnetwork.org

Step 2: Select "Funding Sources by State" under the Resources Tab

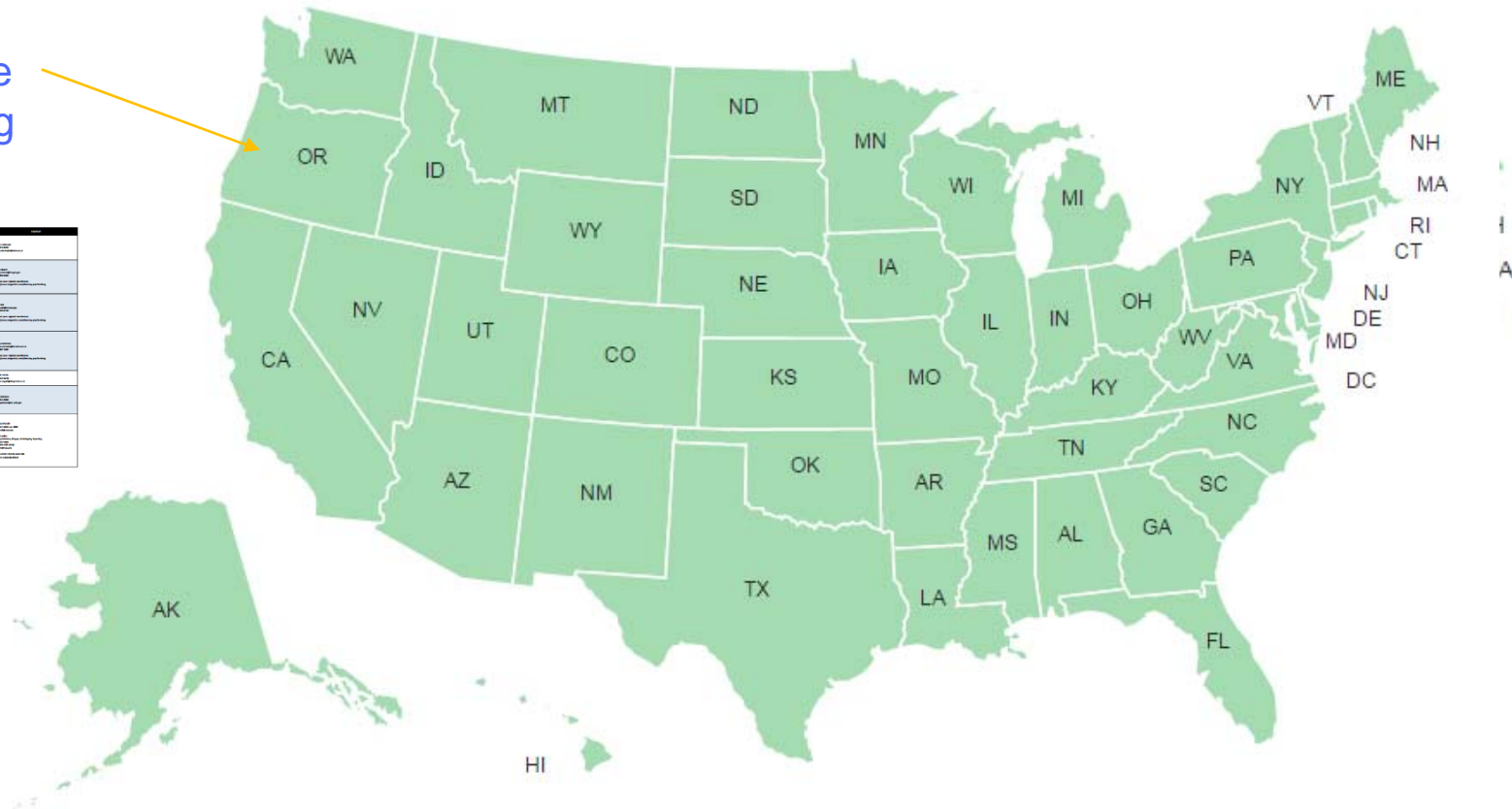
Funding Sources by State

Note: Some states may have additional resources listed below the map.

Click on the map below to view funding sources for each state:

Click on an individual state to view funding table.

State	Funding Source	Link
Alabama	Alabama Department of Education	Alabama Department of Education
Alaska	Alaska Department of Education	Alaska Department of Education
Arizona	Arizona Department of Education	Arizona Department of Education
Arkansas	Arkansas Department of Education	Arkansas Department of Education
California	California Department of Education	California Department of Education
Colorado	Colorado Department of Education	Colorado Department of Education
Connecticut	Connecticut Department of Education	Connecticut Department of Education
Delaware	Delaware Department of Education	Delaware Department of Education
Florida	Florida Department of Education	Florida Department of Education
Georgia	Georgia Department of Education	Georgia Department of Education
Hawaii	Hawaii Department of Education	Hawaii Department of Education
Idaho	Idaho Department of Education	Idaho Department of Education
Illinois	Illinois Department of Education	Illinois Department of Education
Indiana	Indiana Department of Education	Indiana Department of Education
Iowa	Iowa Department of Education	Iowa Department of Education
Kansas	Kansas Department of Education	Kansas Department of Education
Kentucky	Kentucky Department of Education	Kentucky Department of Education
Louisiana	Louisiana Department of Education	Louisiana Department of Education
Maine	Maine Department of Education	Maine Department of Education
Maryland	Maryland Department of Education	Maryland Department of Education
Massachusetts	Massachusetts Department of Education	Massachusetts Department of Education
Michigan	Michigan Department of Education	Michigan Department of Education
Minnesota	Minnesota Department of Education	Minnesota Department of Education
Mississippi	Mississippi Department of Education	Mississippi Department of Education
Missouri	Missouri Department of Education	Missouri Department of Education
Montana	Montana Department of Education	Montana Department of Education
Nebraska	Nebraska Department of Education	Nebraska Department of Education
Nevada	Nevada Department of Education	Nevada Department of Education
New Hampshire	New Hampshire Department of Education	New Hampshire Department of Education
New Jersey	New Jersey Department of Education	New Jersey Department of Education
New Mexico	New Mexico Department of Education	New Mexico Department of Education
New York	New York Department of Education	New York Department of Education
North Carolina	North Carolina Department of Education	North Carolina Department of Education
North Dakota	North Dakota Department of Education	North Dakota Department of Education
Ohio	Ohio Department of Education	Ohio Department of Education
Oklahoma	Oklahoma Department of Education	Oklahoma Department of Education
Oregon	Oregon Department of Education	Oregon Department of Education
Pennsylvania	Pennsylvania Department of Education	Pennsylvania Department of Education
Rhode Island	Rhode Island Department of Education	Rhode Island Department of Education
South Carolina	South Carolina Department of Education	South Carolina Department of Education
South Dakota	South Dakota Department of Education	South Dakota Department of Education
Tennessee	Tennessee Department of Education	Tennessee Department of Education
Texas	Texas Department of Education	Texas Department of Education
Utah	Utah Department of Education	Utah Department of Education
Vermont	Vermont Department of Education	Vermont Department of Education
Virginia	Virginia Department of Education	Virginia Department of Education
Washington	Washington Department of Education	Washington Department of Education
West Virginia	West Virginia Department of Education	West Virginia Department of Education
Wisconsin	Wisconsin Department of Education	Wisconsin Department of Education
Wyoming	Wyoming Department of Education	Wyoming Department of Education





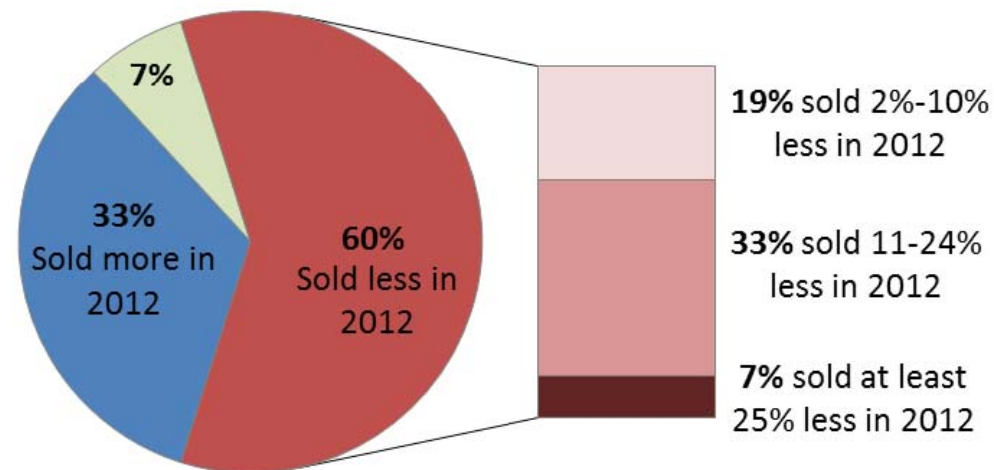
Submitted Question

What types of demand forecasts do you recommend utilities use for capital planning purposes?



Water demand is decreasing for many utilities

Total Water Volume Sales in 2012 Compared to 2006 in 129 Utilities Nationwide

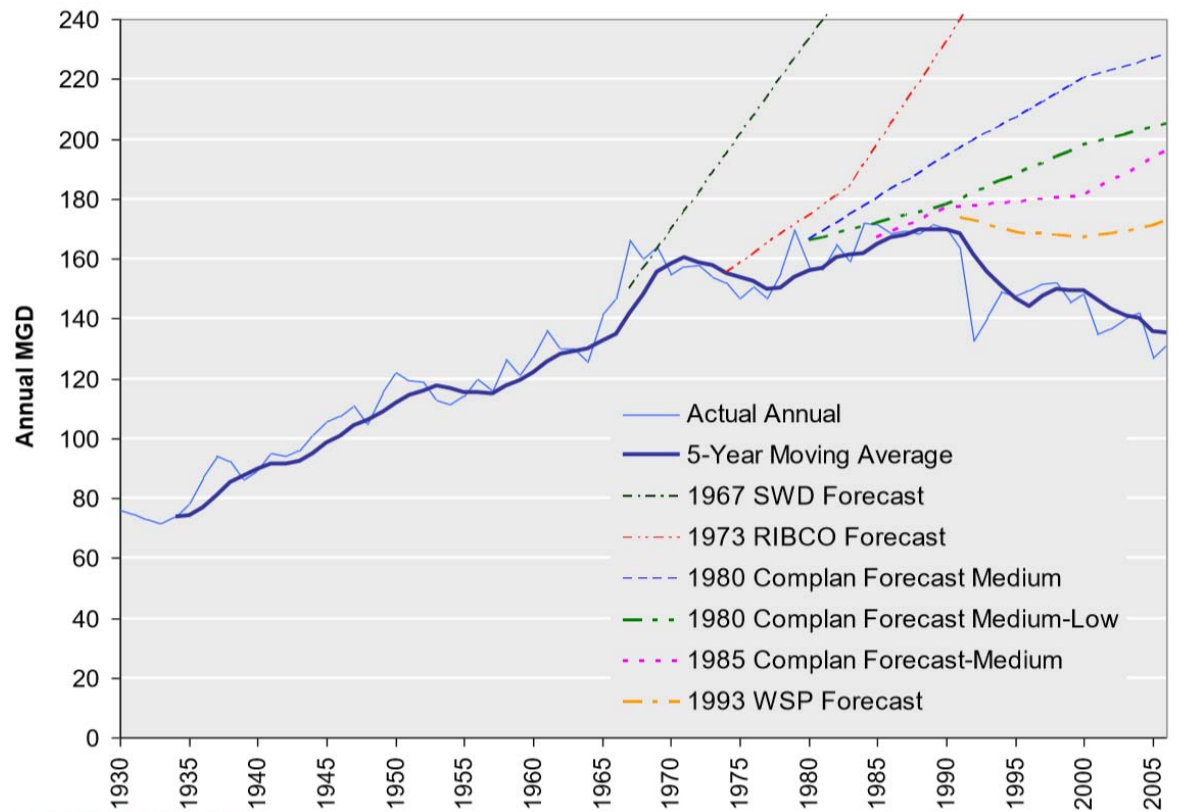


Data analyzed by the Environmental Finance Center at the University of North Carolina, Chapel Hill and Raftelis Financial Consultants, Inc. Data Source: Biennial, national AWWA-RFC Water and Wastewater Rate Surveys in 2006 and 2012. Water utilities that reported their total daily gallons sold (MGD) in 2006 and 2012 are included in this analysis. 81% of the sampled utilities increased total number of accounts from 2006 to 2012.



Example: Seattle's demand forecasts

Water Demand & Forecasts: 1930-2006





Assess the following historic data

- Several years of annual or monthly records (keep records!)
- Total production: MGD, gpd
- Average production or sales: gallons/month/account, gpcd
- Max day demands, or focus on peak months
- Break down by customer class/sector



Short-term forecasting

- Linear projection of demand, or follow the appropriate trend line
- Weight the most recent years the highest
- Adjust average demands down if price is increasing
- Adjust according to known interventions or changes (conservation measures, new customer, etc.)
- Be conservative (assume low use) for financial planning







Long-term forecasting


- Estimate ranges instead of single values
- Adjust average demands down if price is increasing
- Adjust according to known interventions or changes (conservation measures, new customer, etc.)
- Consult with the Council and the town's, county's, or state's planners for local projections on demographics, land use plans, industry changes
- Is there a water resources management plan?



AWE Sales Forecasting and Rate Model

FINANCING SUSTAINABLE WATER
Rates. Revenue. Resources.



A project of the
 Alliance for Water Efficiency

HOME WATER EFFICIENCY BUILDING RATES IMPLEMENTATION FISCAL SUSTAINABILITY **TOOLS** RESOURCE SEARCH

Home Tools AWE Sales Forecasting and Rate Model

Building Better Water Rates for an Uncertain World

AWE Sales Forecasting and Rate Model


Rate Model Video Tutorials

Request Tools

Rate Model User Guide

Appendices: Costing Methods, Demand Forecasting and Revenue Modeling

Communications Tools

 **RATES HANDBOOK**
Building Better

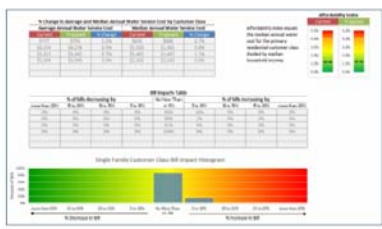
AWE Sales Forecasting and Rate Model

The AWE Sales Forecasting and Rate Model is a new analytical tool that can explicitly model the effects of rate structures. Typical water rate models assume that future sales are known with certainty, and do not respond to price, weather, the economy, or supply shortages — that is to say, not the world we live in. The AWE Sales Forecasting and Rate Model addresses this deficiency and enables analysis of the following:

- Customer Consumption Variability – weather, drought/shortage, or external shock
- Demand Response – Predicting future block sales (volume and revenue) with empirical price elasticities
- Drought Pricing – Contingency planning for revenue neutrality
- Probability Management – Risk theoretic simulation of revenue risks
- Fiscal Sustainability – Sales forecasting over a 5 Year Time Horizon

The Rate Design Module can answer these questions:

- What effect would increasing the top tier rate by 15% have on water demand?
- Will shifting to seasonal rates cause water use to increase or decrease?
- What block rate design could allow us to preserve our current level of revenue while reducing demand?
- How should we adjust rates to support our water demand management objectives during water shortages?
- What proportion of customer bills will



Available at

<http://www.financingsustainablewater.org/>



Submitted Question

Are there simple resources to assist small water systems in getting started and implementing capital planning?



Plan to Pay: Scenarios to Fund your C.I.P.

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

Find the most up-to-date version in Resources / Tools

Free, simplified Excel tool allowing you to list your capital projects and plans for funding them, and automatically estimates rate increases

Tool developed by
UNC ENVIRONMENTAL FINANCE CENTER

Plan to Pay: Scenarios to Fund your C.I.P. (Capital Improvement Plan)

Version 2.6 (Updated November 2015)

20-year capital planning Debt and/or capital reserve financing options Guided data inputs Simple data needs

Financial dashboard outputs Estimates necessary rate increases over time to pay for capital projects

Start

1) Use tabs at bottom of screen and buttons to navigate to different pages.

2) In **"Data Input 1"**, enter utility characteristics, rates and usage information in blue cells.

3) In **"Data Input 2"**, enter details on capital improvement projects in the light blue cells. Each row is a different project.

4) In **"20-Year Projections"**, view your fund balance projections for 20 years and observe the estimated rate increases needed each year to pay for your Capital Improvement. No data entry required on this page.

5) After all your utility information and capital improvement project details are entered, go to the **"Dashboard"** to view long term trends in your financial reserves, rate increases and average bills, and capital investments.

INSTRUCTIONS

FINANCED
\$ 950,000
et \$ 750,000

Pre-Exist
Input amount incurred for

Capital Improvement Projects - 20 Years

Project Name	Project Start Year	Project End Year	Project Cost (\$)	Annual Construction Cost (\$)	Estimated Cost at the Start Year	Estimated Cost at the End Year
Project 1: Water main replacement	2015	2016	1,000,000	1,000,000	1,000,000	1,000,000
Project 2: Sewer main replacement	2017	2018	2,500,000	2,500,000	2,500,000	2,500,000
Project 3: Water treatment plant upgrade	2019	2020	1,500,000	1,500,000	1,500,000	1,500,000
Project 4: Distribution system upgrade	2021	2022	2,000,000	2,000,000	2,000,000	2,000,000
Project 5: Stormwater management	2023	2024	1,000,000	1,000,000	1,000,000	1,000,000

Water and Sewer Rates in FY15

Input the residential customer water & sewer rates at 5,000 gallons/month of use and 8.7 customers. Current monthly rates:

Rate Type	Current Rate (\$)	Current Rate (\$/1000 gal)
Water	12.34	\$12.34
Sewer	12.34	\$12.34

Expected Revenues and Expenses - FY15

Annual Operating and Non-Operating Revenues: \$ 5,616,000
Annual Non-Capital Expenses (SOG Admin, etc.): \$ 4,525,000
Expected Annual Net Revenues (FY15): \$ 1,091,000

Usage Billed to Customers in FY15

Customer Type	Residential	Non-Residential
Number of Customers	60,000	2,000
Total Monthly Use (1,000s of gallons)	60,000	20,000
Annual Customer Rate (Growth Factor)	1.0%	1.2%

Estimated Rate Changes Needed to Maintain the Fund Balance

Category	FY15	FY16	FY17	FY18
Year Increase (Decrease) in Rates (Base and Volumetric)	N/A	0.0%	5.1%	2.0%
Increase (Decrease) in the Monthly Bill for 5,000 Gallons	N/A	\$0.00	\$1.51	\$0.79
Revenue (Decrease) in the Monthly Rate Charge	N/A	\$0.00	\$0.64	\$0.34
Monthly Rate Charge ("Minimum Charge")	\$12.34	\$12.34	\$12.98	\$13.31
Volumetric Rate at 5,000 gallons/month (\$/1000 gallons)	\$6.67	\$6.67	\$6.96	\$6.11
Volume Included with the Base Charge (1,000s of gallons)	2	2	2	2
Approximate Monthly Charge for 5,000 gallons (\$)	\$29.35	\$29.35	\$30.94	\$31.65

Projected Fund Balance

Category	FY15	FY16	FY17	FY18
Total Revenues	\$ 5,616,000	\$ 5,001,000	\$ 5,238,307	\$ 5,364,000
Base Charges	\$ 1,776,800	\$ 1,795,322	\$ 1,907,288	\$ 1,970,733
Usage Charges	\$ 3,159,800	\$ 3,084,086	\$ 3,216,108	\$ 3,293,762
Interest Earned from Previous Year's Positive Balance	\$ 0	\$ 9,405	\$ 9,167	\$ 9,037
Revenues from Other Sources (Reserve Charges)	\$ 103,200	\$ 106,286	\$ 106,346	\$ 106,433

Financial Reserves (End of Year)

Rate Increases

Total Capital Expenses

Total Cumulative System Investment



<http://southwestefc.unm.edu/amkan/main.php?chapterId=Front&page=1>

A.M. KAN WORK!

An Asset Management and Energy Efficiency Manual



Helping Water and Wastewater Utilities Achieve Sustainability
Through Sound Management Practices

Sponsored by:



<http://www.kdheks.gov>

Prepared by:



Southwest
Environmental
Finance
Center



<http://southwestefc.unm.edu/AssetManagementIQ/main.php>

Appendix F

ASSET MANAGEMENT IQ

An Asset Management IQ Test is presented here in order to help you review the concepts of the various core components of Asset Management. Both the test and a scoring table are also available as a [printable pdf](#), which may be copied for use by multiple personnel within your utility.

In the web version of the test, clicking on a choice will automatically enter the number of points for that option and keep track of the score for each section of the Asset Management IQ as well as the total cumulative score. If a new answer is selected, the new choice and the new points will appear and the old points will be removed.

If the user completes the entire Asset Management IQ tool (all 30 questions) before starting Asset Management, it will provide a baseline evaluation at the beginning of Asset Management. Comparing the scores of each of the six sections will show which areas have the biggest gaps in terms of Asset Management activities. These scores may provide information about where efforts should be focused. You may wish to start with areas that are the weakest, offering a large improvement with a little effort, or with areas that are strong, which would offer a chance to get started in a familiar area.

As the utility progresses, the Asset Management IQ can be repeated and the scores compared to previous scores. At a minimum, you may wish to repeat the Asset Management IQ every year.


It should be noted that a total score of 150 would represent best practice in all areas of Asset Management. Not all utilities will be interested in achieving this goal. The utility should set its own target levels. The tool is meant to help utilities gauge their progress over time.









Software: CUPSS (EPA)







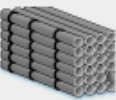



<http://www.epa.gov/cupss/>

**Check Up Program for Small Systems**Set-up | Switch Utility | Create User | Help | Training | Exit

**My Home****My Inventory****My O & M****My Finances****My Check up****My CUPSS Plan**

Welcome Back Helen, Beauty View Acres Subdivision - DW

What would you like to do today?

[Do Some Training](#)[Enter a New Task or Work Order](#)[Create or Update My Schematic](#)[Search Asset and Maintenance](#)[Create or Update My Inventory](#)[Enter My Finances](#)[Print My Check Up Reports](#)[Work on My CUPSS Plan](#)

My Calendar

← April 2008 →

Sun	Mon	Tue	Wed	Thu	Fri	Sat
30	31	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	1	2	3
4	5	6	7	8	9	10

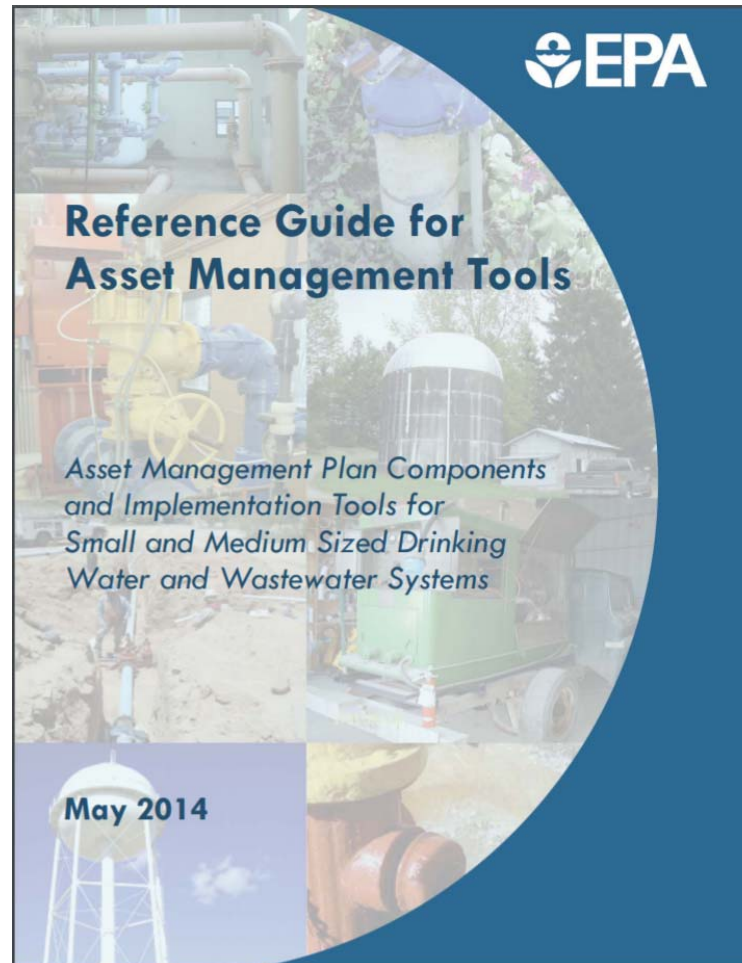
My Messages and Alerts

Popup Messages Are Off. Click To Turn On.

Reminder - Today's Tasks	8
Tasks Currently Past Due	160
Assets Needing Update	0
Number of High Risk Assets	2



https://www.epa.gov/sites/production/files/2016-04/documents/am_tools_guide_may_2014.pdf





Submitted Question

How can I set up a rate stabilization fund to help smooth out future downturns in revenue to help my CIP budget?



Thank you



Shadi Eskaf

(919) 962-2785

eskaf@sog.unc.edu



Glenn Barnes

(919) 962-2789

glennbarnes@sog.unc.edu