



Smart Management for  
Small Water Systems

# Utility Rate Setting & Financial Planning Training

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Newton, KS  
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UNC  
ENVIRONMENTAL  
FINANCE CENTER

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



# Long Term Capital Planning



# Uh oh! How Do You Pay for This?



Emergency  
repair

vs.

Preventative  
rehab./  
replacement  
(capital  
planning)





# Session Objectives

- Learn about two aspects of long-term system planning: asset management and capital planning
- Figure out how to pay for the future needs



# In the Old Days...

- Water systems took advantage of the federal government's ambitious construction grants program of the 1970s and 1980s
- Everybody loved their “free” money



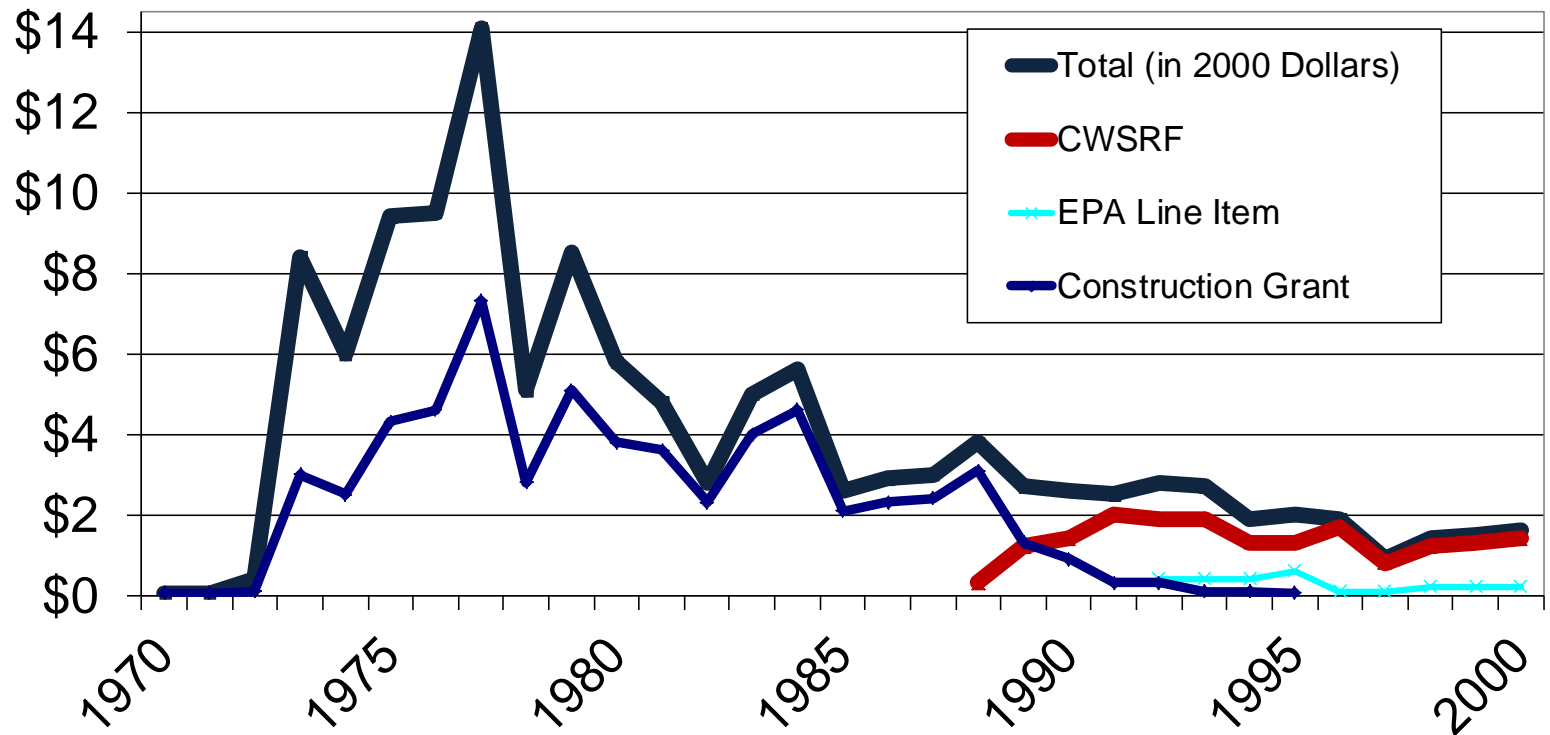
# Capital Finance Today

- The money never really was “free”—it came from tax dollars
- Today, the financial burden has been shifted away from federal and state tax dollars (grants) to funds raised by the water system itself (customer sales and loans). For example...



# Grants Have Been Replaced by Loans

EPA Wastewater Spending by Type (billions of dollars)





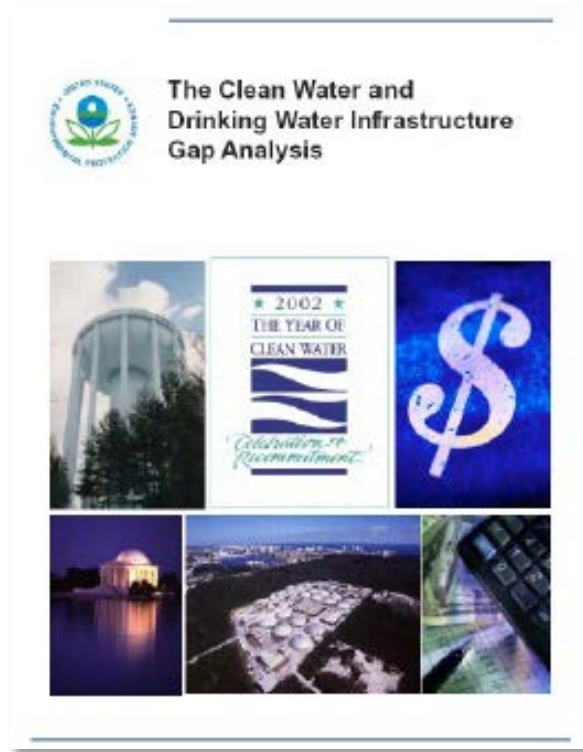
# Capital Finance Today

- In other words, you pay
- The harsh reality is that water and wastewater infrastructure is expensive, regardless of the size of your system. Smaller or poorer systems will likely have a hard time paying for capital improvements





# Nationwide, We Are Behind Where We Should Be

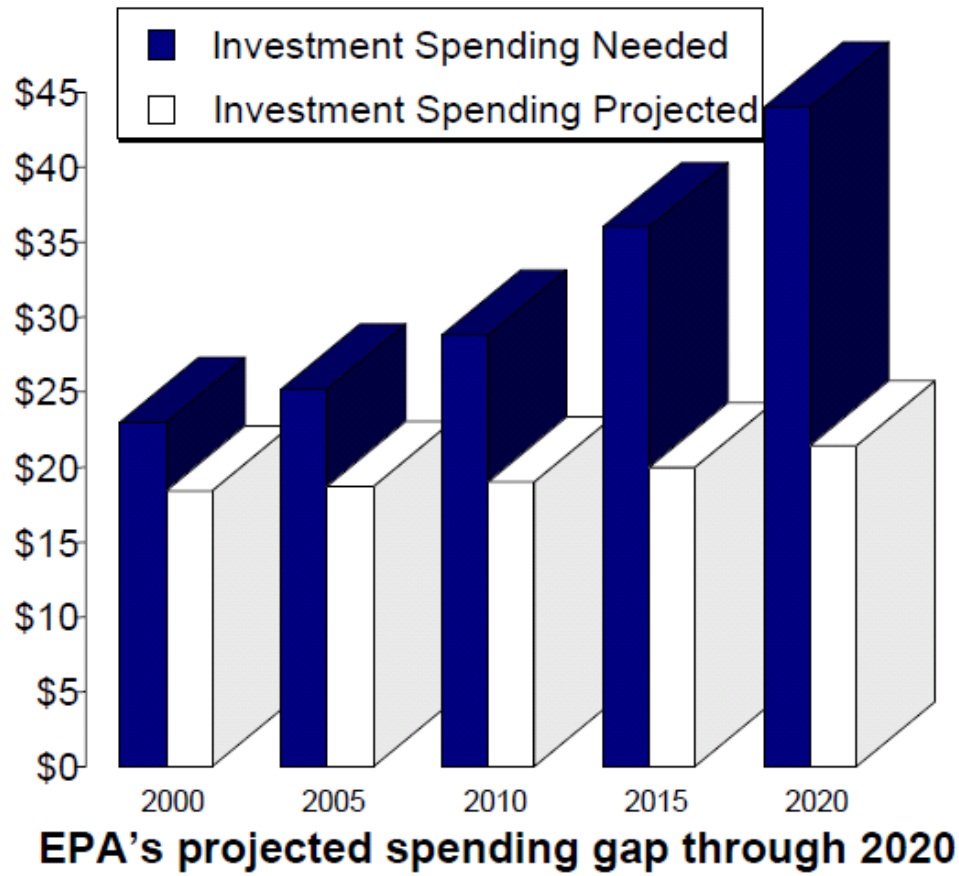


## EPA Report on “Infrastructure Gap”:

<http://www.epa.gov/ogwdw/gapreport.pdf>



# And That Gap Is Growing Every Year





# Poor Investment → Poor Infrastructure

**2013 REPORT CARD for AMERICA'S INFRASTRUCTURE**

ASCE  
AMERICAN SOCIETY OF CIVIL ENGINEERS

LAUNCH THE REPORT CARD > HOME GRADES STATES NEWS TAKE ACTION

EXPLORE ASCE'S 2013 REPORT CARD FOR AMERICA'S INFRASTRUCTURE ONLINE!

- > GRADES
- > STATE
- > VIDEOS
- > INTERACTIVE CHARTS

LAUNCH THE REPORT CARD >

**AMERICA'S GPA:**

**D<sup>+</sup>**

The American Society of Civil Engineers is committed to protecting the health, safety, and welfare of the public, and as such, is equally committed to improving the nation's public infrastructure. To achieve that goal, the Report Card depicts the condition and performance of the nation's infrastructure in the familiar form of a school report card—assigning letter grades that are based on physical condition and needed investments for improvement.

**ESTIMATED INVESTMENT NEEDED BY 2020:**

**\$3.6 TRILLION**



# REPORT CARD

Aviation **D**

Bridges **C+**

Dams **D**

**Drinking Water** **D**

Energy **D+**

Hazardous Waste **D**

Inland Waterways **D-**

Levees **D-**

Ports **C**

Public Parks **C-**

Rail **C+**

Roads **D**

Schools **D**

Solid Waste **B-**

Transit **D**

**Wastewater** **D**

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





# ASCE Gives Drinking Water a **D**

- Bad news: ... much of our drinking water infrastructure is nearing the end of its useful life. ... estimated 240,000 water main breaks per year in the US. Assuming every pipe would need to be replaced, the cost ... could reach more than \$1 trillion, according to AWWA.



# ASCE Gives Drinking Water a **D**

- Good news: The quality of drinking water in the United States remains universally high. Even though pipes and mains are frequently more than 100 years old and in need of replacement, outbreaks of disease attributable to drinking water are rare. (ASCE)



# Two Related Concepts:

## Asset Management & Capital Planning



# Asset Management

1. We do it!
2. Heard of it and might be interested
3. Isn't that difficult software stuff?
4. What now?







# Working **smarter** *not harder* is the essence of Effective Management / Asset Management



Asset Management  
Helps You Have the  
Most Impact in Your  
System By Spending  
Your Limited Dollars in  
the Best Way Possible



# What you want to do....

Replace all  
the assets

New tank  
New pipe  
New pump  
New filter







# \$5 Million

Elected Officials/  
Decision-Makers Say No





## Second Choice: \$3 M

Replace

Some of the

Assets



**Elected Officials/  
Decision-Makers Still Say No**

W Pump





# Now What?

## Repair and Rehabilitate





# Rehab Option: \$1 M

Rehab  
Assets



Reduced  
risk almost  
as low as  
new assets  
for 1/5 the  
cost



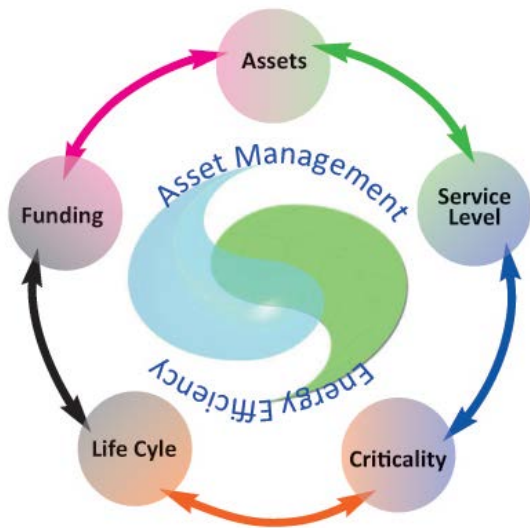


# What does this type of analysis take?

- Nothing more than following a systematic approach for managing the assets
- 5 core components of Asset Management



# Five Core Components of AM



Current State of the Assets



**Level of Service**



Criticality



**Life Cycle Costing**

Long-Term Funding





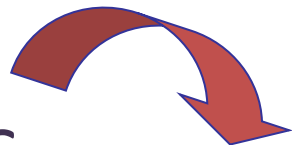
# Current State of the Assets

- What do I own?
- Where are the assets?
- What condition are they in?
- How much useful life is remaining?
- What is the replacement value?



# Level of Service

Involve  
Customers



Measurable  
Goals: Internal  
and External



Track Progress  
Towards  
Meeting Goals

Involve  
Staff



What would my customers want?





# Asset Criticality

What is the probability or likelihood that a given asset will fail?

How do my assets fail?

What's the condition of my assets?





# Asset Criticality

What is the consequence if the asset does fail?

What is the cost of the repair?

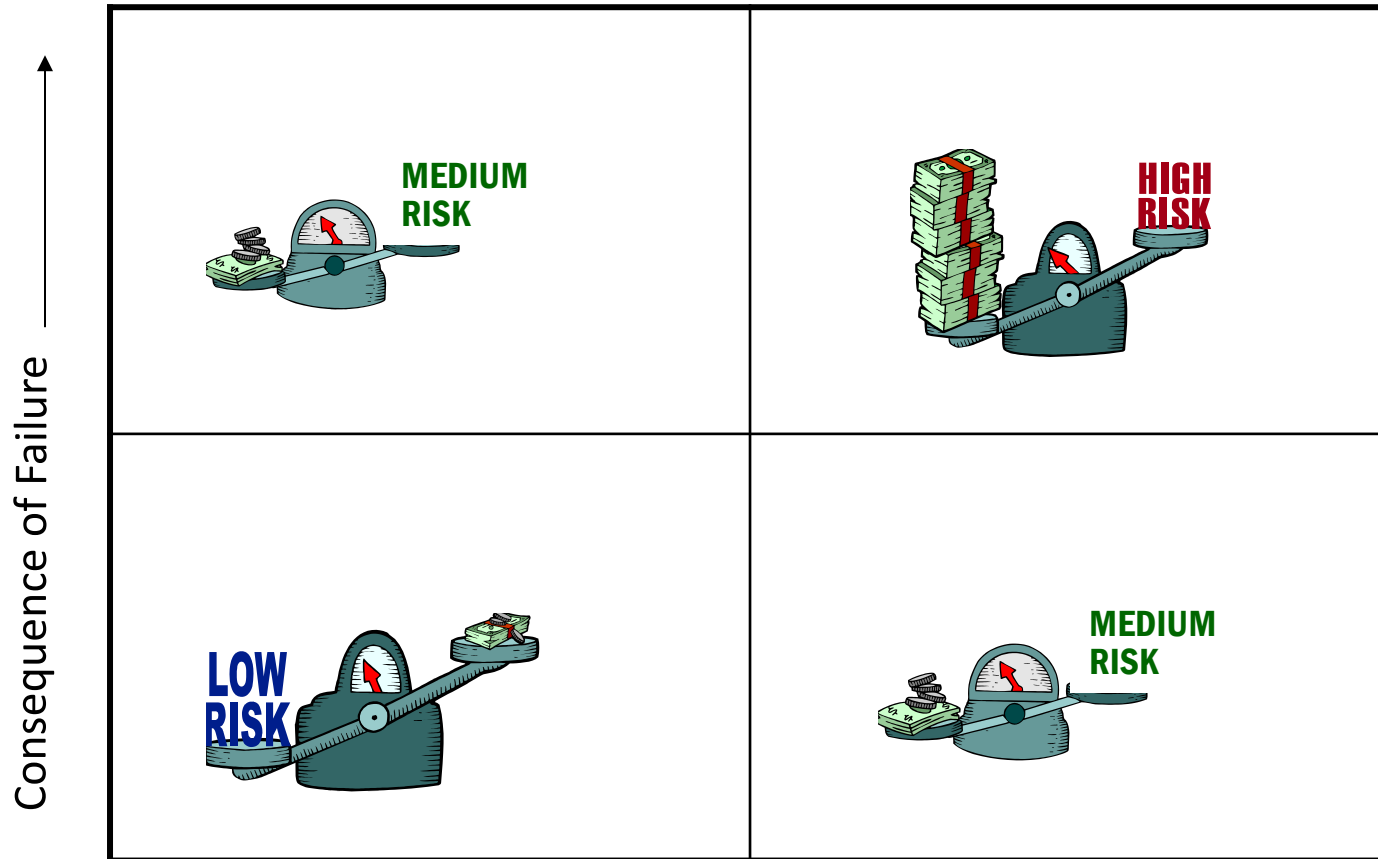
Are there legal consequences,  
environmental consequences,  
social consequences?

Are there redundant assets?





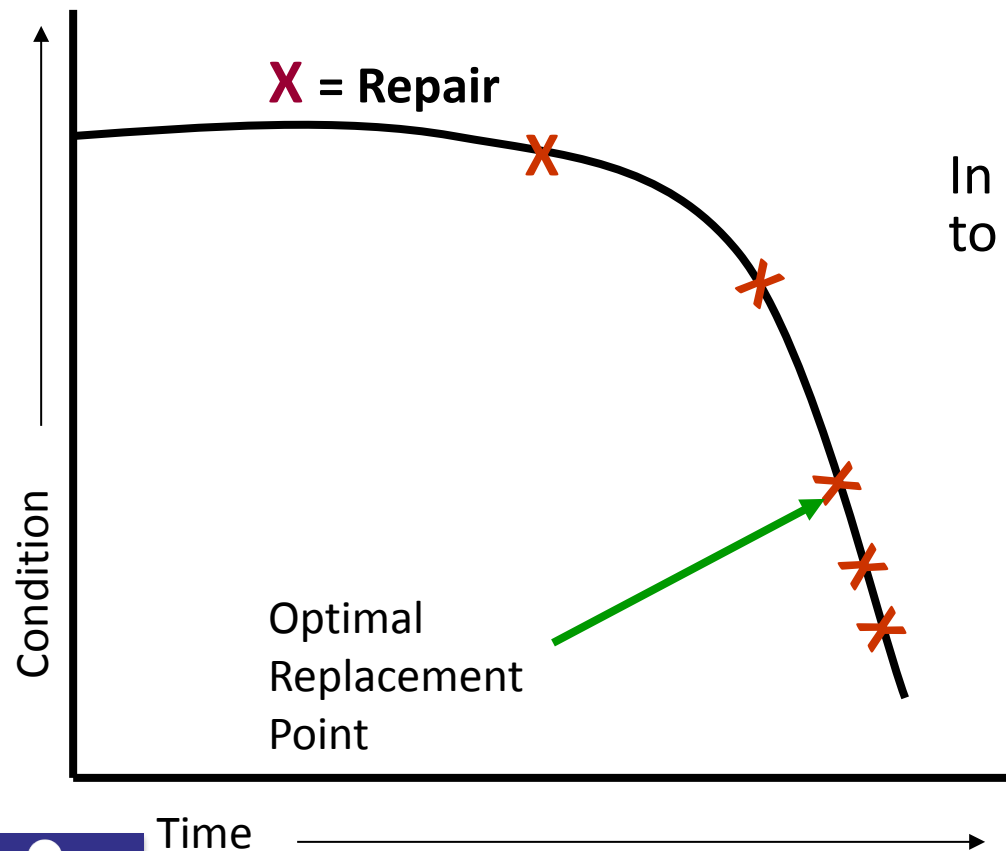
# Asset Criticality



Which category of assets do I care the most about? The least?



# Life Cycle Costing: Replacement of Assets



In Theory, there is an exact right time to replace an asset

Not possible to know the optimal time to replace every asset

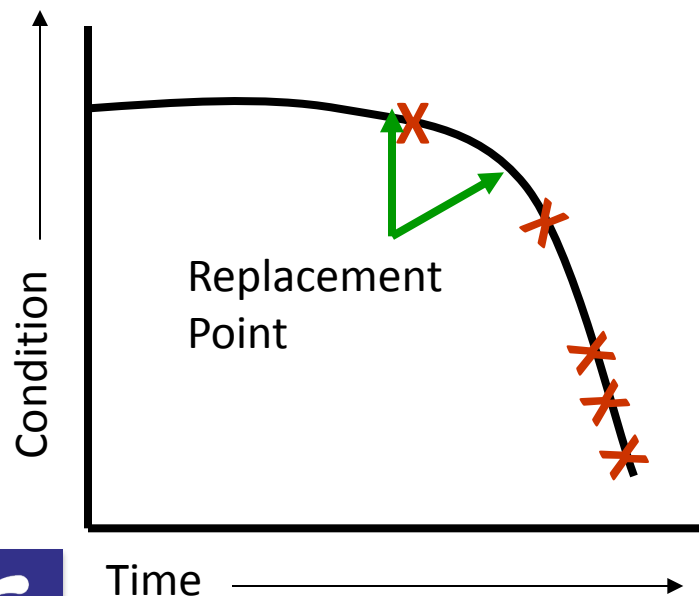
So... need to use the concept of risk



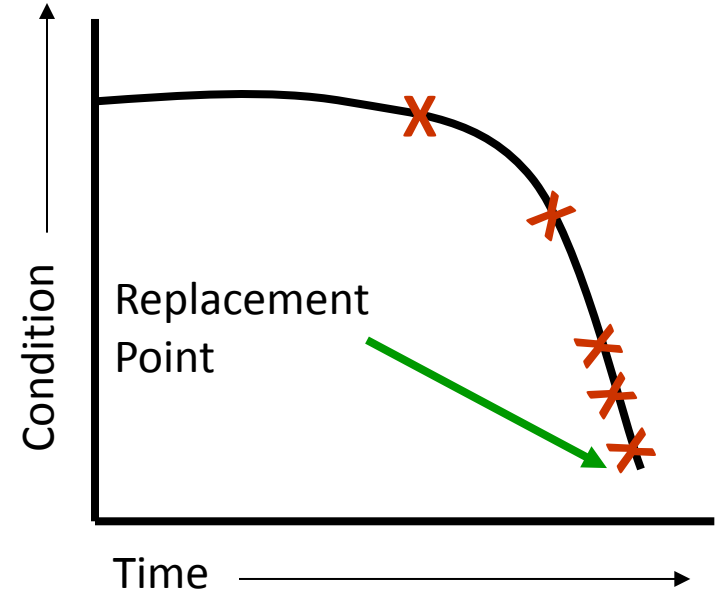


# Life Cycle Costing & Risk

High risk : replace assets early, before failure



Low risk assets: run to failure and replace afterwards





# Long Term Funding

- This is where capital planning comes in
- Once you figure out how to get the longest life out of your assets, plan to have the money you need to replace them when necessary



# Comments from a Few Practitioners



Jim Smith, City of Louisville, KY





Shawn McLean, City of Somersworth, NH



# Capital Planning

1. We do it!
2. Heard of it and might implement
3. Heard of it but not interested so far
4. What now?



# 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

- Identify regulatory deficiencies (discuss with regulatory agencies, look at proposed regulations, talk to consultants), in a 10-20 year window
- Identify growth needs, expansion





# Capital Improvement Program

- Identify deferred maintenance problems or where current service is inadequate
- Prioritize based on need realizing that “hidden” infrastructure tends to be ignored



# 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.





# Example Capital Improvement Plan (CIP)

Project Name	Planning Years (Values in 000s)					Future	Total
	FY 02	FY 03	FY 04	FY 05	FY 06		
<b>Water Supply &amp; Treatment</b>							
<b>Water Treatment Objective</b>							
Lime pumps and slakers	740						740
Chemical Enclosures		500					500
Filter 7-18 Control			330				330
Filter Gallery Rehab	1,140						1,140
High Service Pumps		1,500					1,500
Upgrade or Replace Reclaim System Drier	200						200
New Membrane Skids				5,700			5,700
Sodium Hypochlorite Plant	2,000						2,000
Additional Storage Tanks					5,000	3,300	8,300
Repair R/O Capacity		150					150
Filter Gallery Mech Parts	300						300
MMIS						150	150
VFDs - HSP		344					344
Membrane Replacement		1,600					1,600
Painting of Water Plant						3,000	3,000
Phase II Emergency Power Generator						1,500	1,500
Portable Generator - South Well Field				150			150
Replacement of Fuel Tanks			170				170
Upgrade of Existing Control System @ WTP						580	580
<b>Water Treatment Total</b>	<b>4,380</b>	<b>4,094</b>	<b>500</b>	<b>5,850</b>	<b>5,000</b>	<b>8,530</b>	<b>28,354</b>



# 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

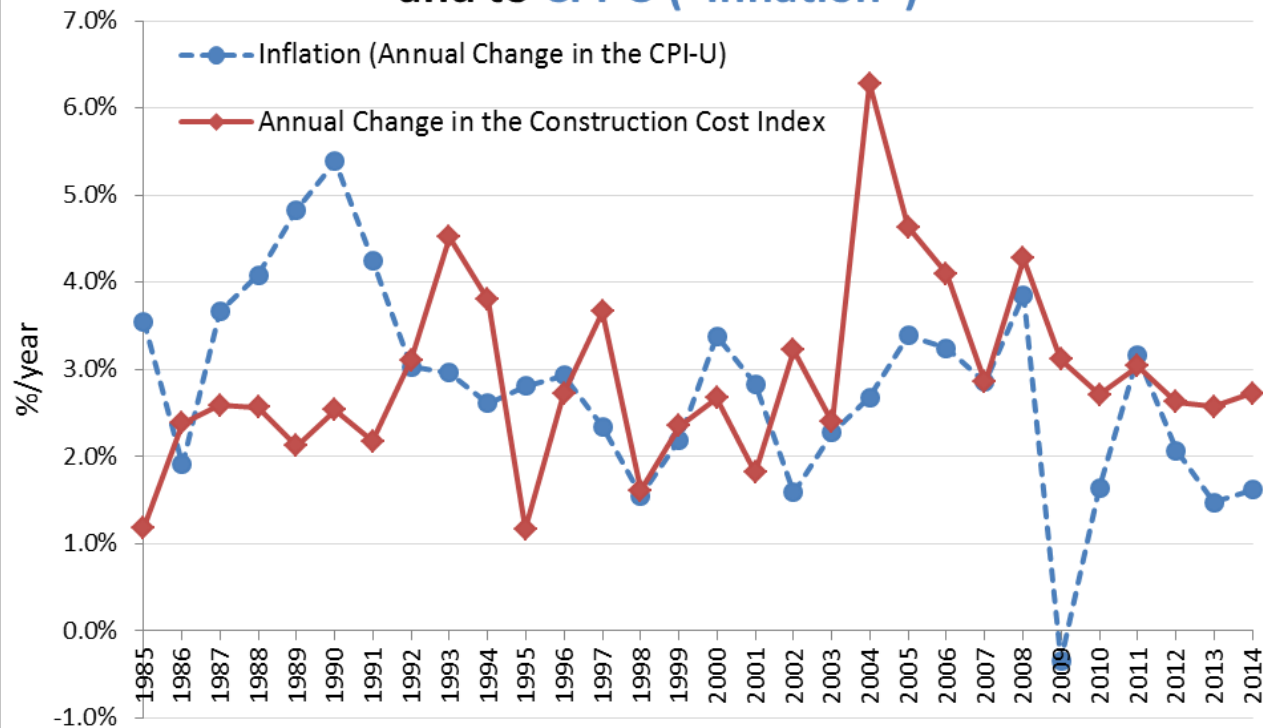


# Measures of Inflation

- **Consumer Price Index (CPI)**—measure of the average change over time in the prices paid by urban consumers for a market basket of consumer goods and services
- **Construction Cost Index (CCI)**—average prices for labor and key construction materials from 20 cities across the United States



## Annual Changes to the **Construction Cost Index** and to **CPI-U ("Inflation")**



Data analyzed by the Environmental Finance Center at the University of North Carolina, Chapel Hill.  
Data Sources: Bureau of Labor Statistics, Engineering News-Record ENR.com, InflationData.com, USDA Natural Resources Conservation Services.

<http://efc.web.unc.edu/2012/09/26/using-an-index-to-help-project-capital-costs-into-the-future/>





# Drive Down the CIP Cost

- Is it possible to
  - Eliminate projects?
  - Defer projects?
  - Repair or refurbish instead of replace?
  - Find a non-asset solution?
  - Find collaboration/partnerships alternatives with neighboring systems?
  - Improve balance of cash vs. debt-financed?
- Re-evaluate water demands of your customers. Many systems are now noticing that *total* demand is *decreasing* over time.



# The Debt Market

- Why Borrow?
- Water infrastructure has a long useful life. You may wish to amortize the loan over the life of the equipment so that the people who benefit from the system pay for it



# When You Need Cash Now: The Debt Market

- Lenders will look at your creditworthiness, your ability to repay the debt, in determining whether to loan to you and your interest rate



# The Debt Market

- Two types—Loans and Bonds
  - Loans are universally available
  - Bonds are typically only available to large systems with significant revenues and managerial capacity





# Loans

- Typically from a bank
- Can be from a government-sponsored program such as the Drinking Water State Revolving Fund



# Bonds

- A written promise to repay borrowed money (on a definite schedule and usually at a fixed rate of interest for the life of the bond)
- Different types exist:
  - General Obligation (GO)
  - Revenue



Source: bettermondays.com

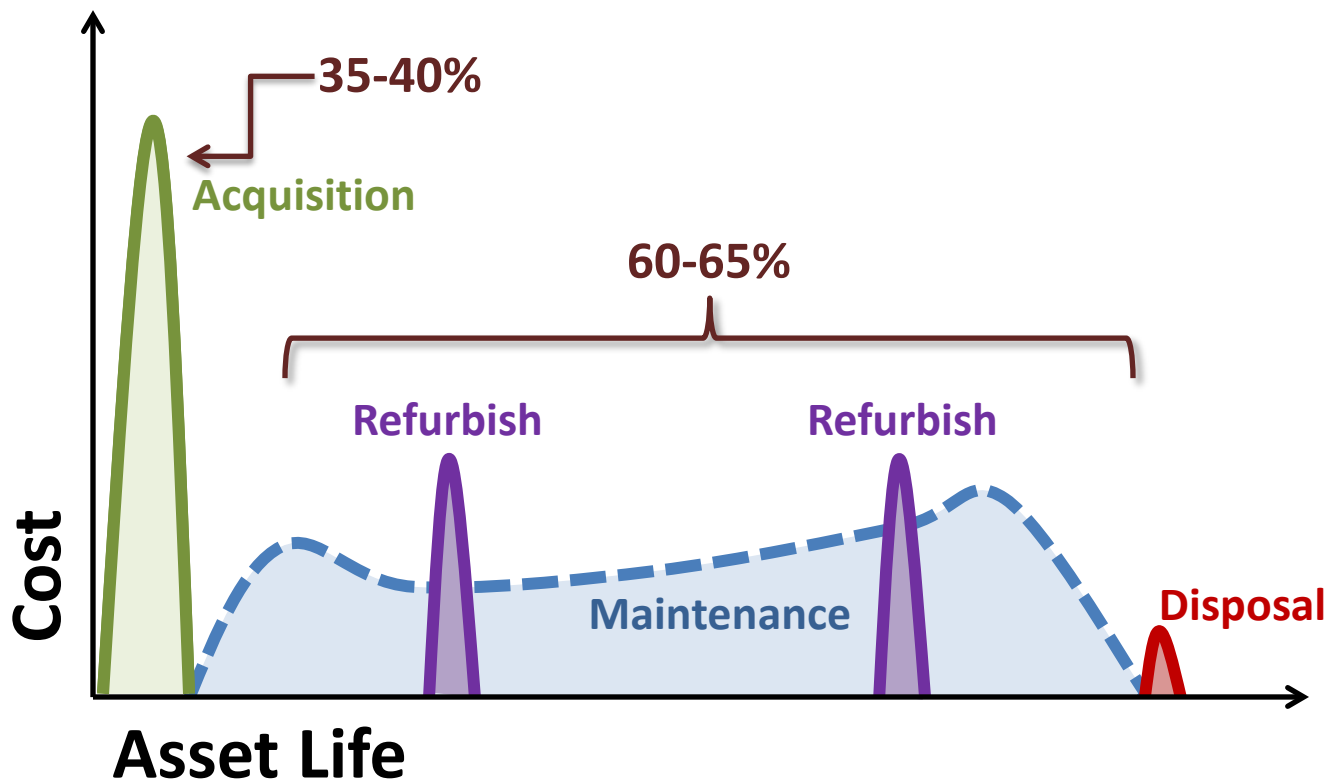


# Reminder: Life Cycle Costing

- Purchase Price  $\neq$  Total Price



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



Source: Adapted from Steve Allbee, USEPA



# Resource Webpage for Capital Planning

UNC SCHOOL of GOVERNMENT

About the School | Courses and Resources | Library | MPA | Publications



UNC  
ENVIRONMENTAL FINANCE CENTER

search this site

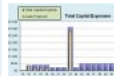
About Services Programs Resources Events

## Mission Statement

We work to enhance the ability of governments and other organizations to provide environmental programs and services in fair, effective and financially sustainable ways.

## Project Tools

### User-friendly Capital Improvement Plan (CIP) Tool for Water & Wastewater Utilities



Calculator, 03/20/2014 (MS Excel, 802 Kb)

Enter in all capital projects and this tool will project your fund balance (revenues, expenses and reserves), and necessary rate increases for the next 20 years, and more!

### What to Include in your Capital Plan:

## PROJECT CAPITAL PLANNING AND WASTEWATER



This project, part of the Support project Department of together many water and was creation of a C Management P

### Blog Post on "Using an Index to Future"

Read a short blog post on selecting an appropriate

## Summary of

### "What to Include in Your Capital Plan: A Reference Guide for NC Water and Wastewater Utilities"

Last updated: February 2011

	EPA's Asset Management: A Handbook for Small Water Systems	Jack Vogel, DCO's Facility's Capital Budgeting and Finance Guide	DEHM PWWS Capacity Development Program	DEHM PWWS Loans and Grants	G.S. 1506-23	USDA Loans and Grants	NC Rural Economic Development Center	EPA Drinking Water Needs Survey	DEHM DWR Local Water Supply Plans	EPA Software: CIPSS
Categories										
Goal statement/Introduction to your capital plan	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	
Date of documentation of capital plan	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
Capital planning time period	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Description of systems		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Existing capacity and demand			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Description of customers		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Inventory of existing assets (details on each asset)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Condition of systems			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Project-specific details (complete for each project in every year)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Financial planning (complete for each year in time period)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Long-term planning descriptions (may be not project-specific)		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Approvals		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Updating the capital plan	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Ties or links to other studies	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

For updates and to view details in each category, go to <http://www.efc.unc.edu/projects/capitalplanning.html>


Created by the Environmental Finance Center at the UNC School of Government

[www.efcnetwork.org](http://www.efcnetwork.org)

# EFC C.I.P. Tool

<http://efc.sog.unc.edu/>

Free, simplified CIP tool using only MS Excel (EFC @ UNC)

Tool developed by  

**UNC ENVIRONMENTAL FINANCE CENTER**

## User-friendly Capital Improvement Plan (CIP) for Water and Wastewater Utilities

Version 2.0 (Created September 2012)

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**

**Capital Improvement Projects - 20 Years**

Project Name	Project Construction Start Year	Project Construction Period (Years)	Estimated Construction Cost (\$)	Annual Construction Cost Inflation Factor (%/year)	Estimated Cost in the Start Year	Cost of CIP
Project 1 - Sewer Main Replacement	FY17	1	1,000,000	2.0%	1,000,000	1,000,000
Project 2 - Wastewater Treatment System	FY17	1	2,000,000	2.0%	2,000,000	2,000,000
Project 3 - Capital Reserve Investment	FY17	1	500,000	2.0%	500,000	500,000
Project 4 - Immediate project, Start next year	FY16	1	1,000,000	2.0%	1,000,000	1,000,000
Project 5 - Immediate CIP	FY15	1	1,000,000	2.0%	1,000,000	1,000,000

**Water and Sewer Rates in FY15**

Category	Rate (\$/1000 gallons)
Residential	5.67
Commercial	14.11
Industrial	22.14

**Usage Billed to Customers in FY15**

Category	Volume (1,000 gallons)	Rate (\$/1000 gallons)	Revenue (\$)
Residential	10,000	5.67	56,700
Commercial	20,000	14.11	282,200
Industrial	10,000	22.14	221,400

**Estimated Rate Changes Needed to Maintain the Fund Balance**

Category	FY15	FY16	FY17	FY18
1-Year Increase (Decrease) in Rates (Base and Volumetric)	0.0%	0.0%	5.1%	2.6%
Increase (Decrease) in the Monthly Bill for 5,000 Gallons	\$0.00	\$1.01	\$0.79	\$0.79
Increase (Decrease) in the Monthly Base Charge	\$0.00	\$0.00	\$0.34	\$0.34
Monthly Base Charge ("Minimum Charge")	\$12.34	\$12.34	\$12.98	\$13.31
Volumetric Rate at 5,000 gallons/month (\$/1000 gallons)	\$5.67	\$5.67	\$5.96	\$6.11
Volume Included with the Base Charge (1,000's of gallons)	2	2	2	2
Approximate Monthly Charge for 5,000 gallons (\$)	\$29.35	\$29.35	\$30.86	\$31.61

**Projected Fund Balance**

Category	FY15	FY16	FY17	FY18
Total Revenues	\$ 1,515,000	\$ 1,503,589	\$ 1,738,347	\$ 1,754,400
Base Charges	\$ 1,776,960	\$ 1,795,322	\$ 1,907,268	\$ 1,976,733
Usage Charges	\$ 3,129,840	\$ 3,094,596	\$ 3,216,569	\$ 3,261,742
Interest Earned from Previous Year's Positive Balance	\$ 9,485	\$ 9,485	\$ 9,485	\$ 9,485
Revenues from Other Sources Besides Charges	\$ 103,200	\$ 104,266	\$ 106,344	\$ 108,433

**Financial Reserves (End of Year)**

**Rate Increases**

**Total Capital Expenses**


**Total Cumulative System Investment**









# Software: CUPSS (EPA)

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





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

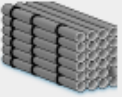
 **My Home** **My Inventory** **My O & M** **My Finances** **My Check up** **My CUPSS Plan**


**Welcome Back Helen, Beauty View Acres Subdivision - DW**


What would you like to do today?


[Do Some Training](#)


[Create or Update My Schematic](#)


[Create or Update My Inventory](#)

[Print My Check Up Reports](#)

[Enter a New Task or Work Order](#)

[Search Asset and Maintenance](#)

[Enter My Finances](#)

[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