



# Long Term Capital Planning

Glenn Barnes

Environmental Finance Center

University of North Carolina at Chapel Hill

919-962-2789

[glennbarnes@sog.unc.edu](mailto:glennbarnes@sog.unc.edu)



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



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# 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

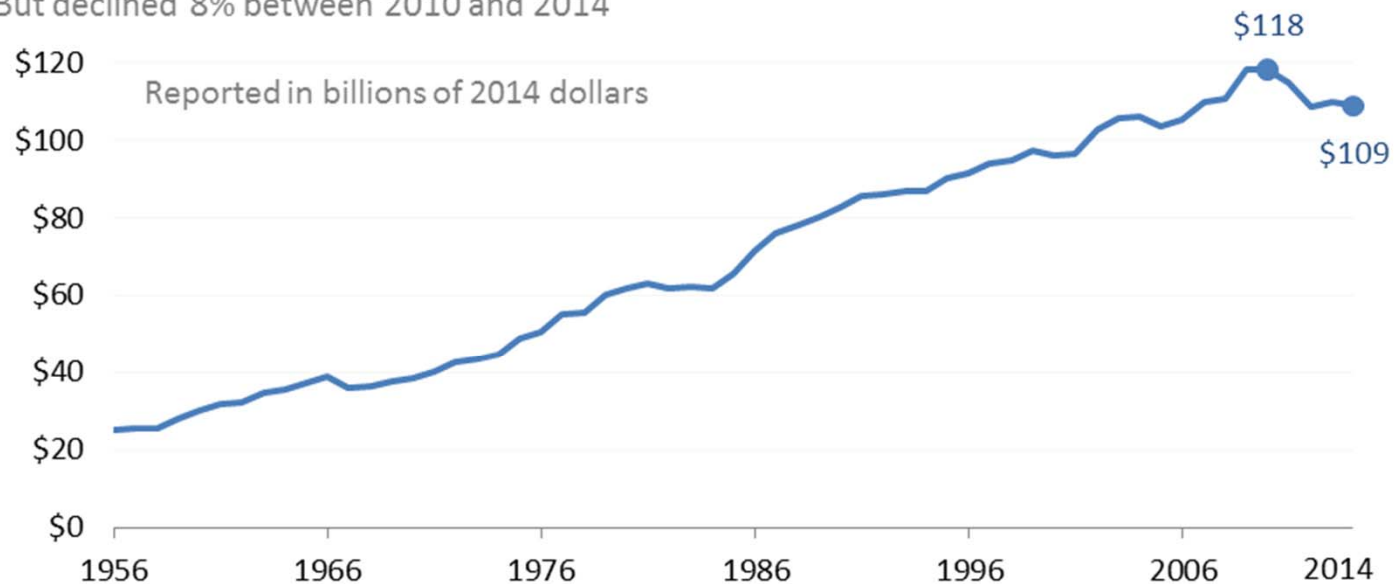
- The money never really was “free”—it came from tax dollars
- Today, there is a different philosophy of how to pay for water system capital improvements



# Total Public Spending Has Grown...

**Total federal, state and local government spending on water and wastewater utilities grew steadily over time**

But declined 8% between 2010 and 2014



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

Source: Congressional Budget Office supplemental data for the *Public Spending on Transportation and Water Infrastructure, 1956 to 2014* report (March 2015). Displays public spending on supply systems for distributing potable water as well as wastewater and sewage treatment systems and plants. Real spending is shown after adjusting nominal spending to their 2014 dollar equivalent using infrastructure-specific price indexes.

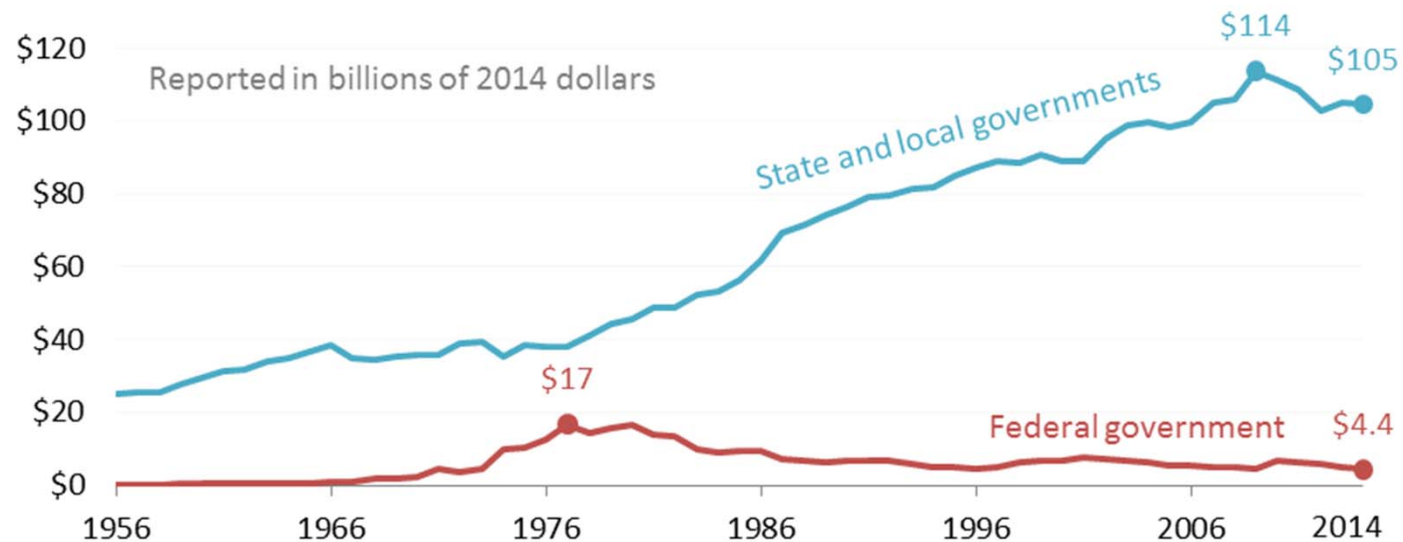




# ...Mostly from States and Locals

**State and local government spending** on water and wastewater utilities continued to grow while **federal spending** declined since the 1980s

State and local governments spent 24 times as much as the federal government in 2014



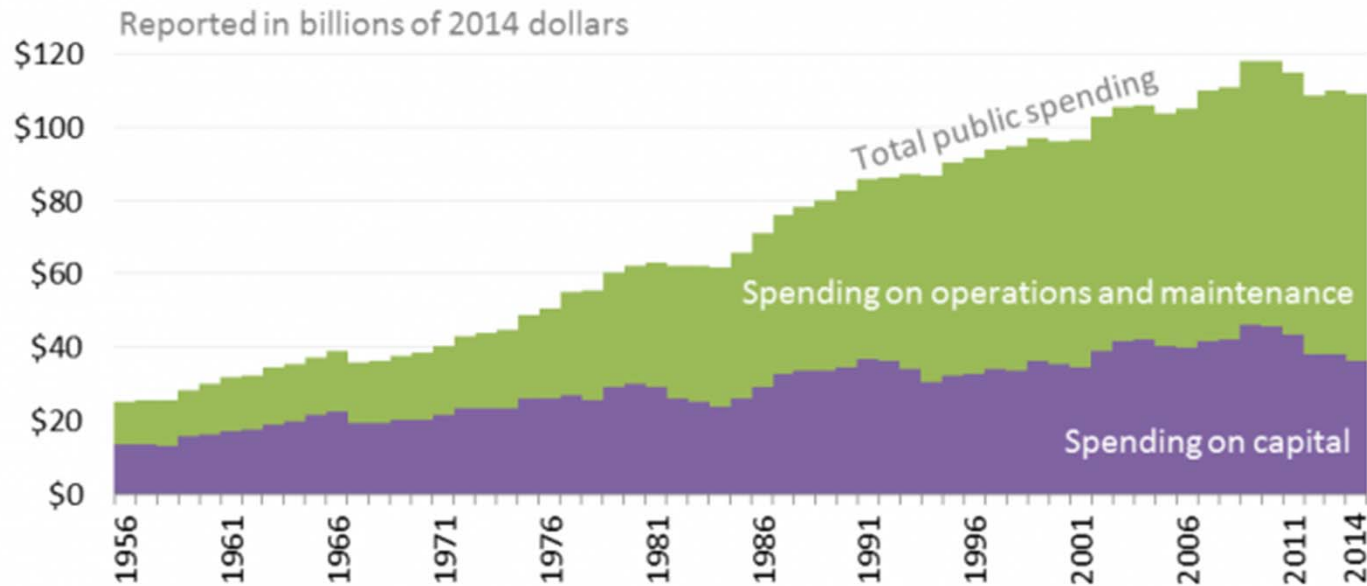
Graphed by the Environmental Finance Center at the University of North Carolina, Chapel Hill.

Source: Congressional Budget Office supplemental data for the *Public Spending on Transportation and Water Infrastructure, 1956 to 2014* report (March 2015). Displays public spending on supply systems for distributing potable water as well as wastewater and sewage treatment systems and plants. Real spending is shown after adjusting nominal spending to their 2014 dollar equivalent using infrastructure-specific price indexes.



# ...And Mostly for O&M, not Capital

Federal, state and local government spending on water and wastewater utilities, 1956 - 2014



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

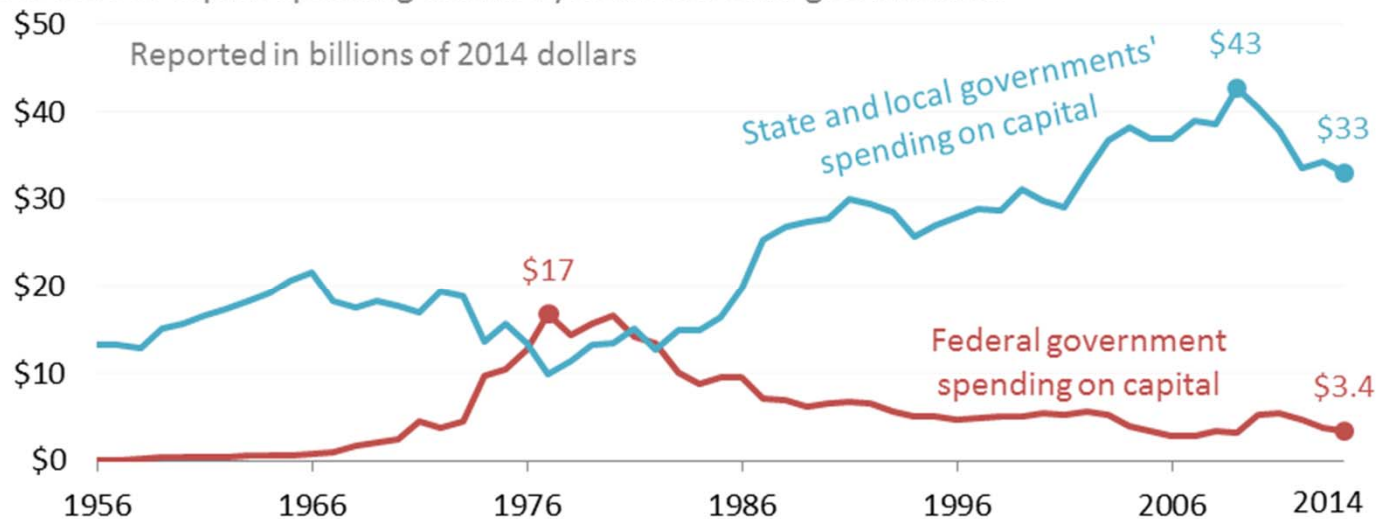
Source: Congressional Budget Office supplemental data for the *Public Spending on Transportation and Water Infrastructure, 1956 to 2014* report (March 2015). Displays public spending on supply systems for distributing potable water as well as wastewater and sewage treatment systems and plants. Real spending is shown after adjusting nominal spending to their 2014 dollar equivalent using infrastructure-specific price indexes.



# Feds Used to Spend More on Capital

Spending on capital infrastructure for water and wastewater utilities has increasingly been provided by **state and local governments** while **federal spending on capital infrastructure** declined since the 1980s

Over 90% of capital spending occurs by state and local governments



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

Source: Congressional Budget Office supplemental data for the *Public Spending on Transportation and Water Infrastructure, 1956 to 2014* report (March 2015). Displays public spending on supply systems for distributing potable water as well as wastewater and sewage treatment systems and plants. Real spending is shown after adjusting nominal spending to their 2014 dollar equivalent using infrastructure-specific price indexes.





# Capital Finance Today

- In other words, you pay (no sense in sugar-coating this)
- The 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



<http://efc.web.unc.edu/2015/09/09/four-trends-government-spending-water/>

Graphed by the Environmental Finance Center at the University of North Carolina, Chapel Hill.  
Source: Congressional Budget Office supplemental data for the *Public Spending on Transportation and Water Infrastructure, 1956 to 2014* report (March 2015). Displays public spending on supply systems for distributing potable water as well as wastewater and sewage treatment systems and plants. Real spending is shown after adjusting nominal spending to their 2014 dollar equivalent using infrastructure-specific price indexes.

# Four Trends in Government Spending on Water and Wastewater Utilities Since 1956

SEPTEMBER 9, 2015 / SHADI ESKAF / 0 COMMENTS

 Print  PDF

According to data collected and published by the Congressional Budget Office (CBO), federal, state and local governments in the United States spent more than \$2.2 trillion in the last 59 years on operations, maintenance and capital infrastructure of water and wastewater utilities. That equates to more than \$4 131 000 000 000 in 2014 dollars adjusting for inflation of infrastructure-





# 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	Ports	C
Bridges	C+	Public Parks	C-
Dams	D	Rail	C+
<b>Drinking Water</b>	<b>D</b>	Roads	D
Energy	D+	Schools	D
Hazardous Waste	D	Solid Waste	B-
Inland Waterways	D-	Transit	D
Levees	D-	<b>Wastewater</b>	<b>D</b>

<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)



# 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



ONION VIDEO



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



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# Two Related Concepts:

## Asset Management & Capital Planning







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

Let's hear from a practitioner...



## Mike Daly, White Cliffs, NM **Video Profile**



Asset management helps you have the most impact in your system by spending your limited dollars in the best way possible





# 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





# Quick Exercise—4 Assets

1. Brand new overhead storage tank
2. Aging booster pumps that serve a hospital and neighborhood
3. 20 year old lines on Forest Drive, a typical residential neighborhood
4. 20 year old meters



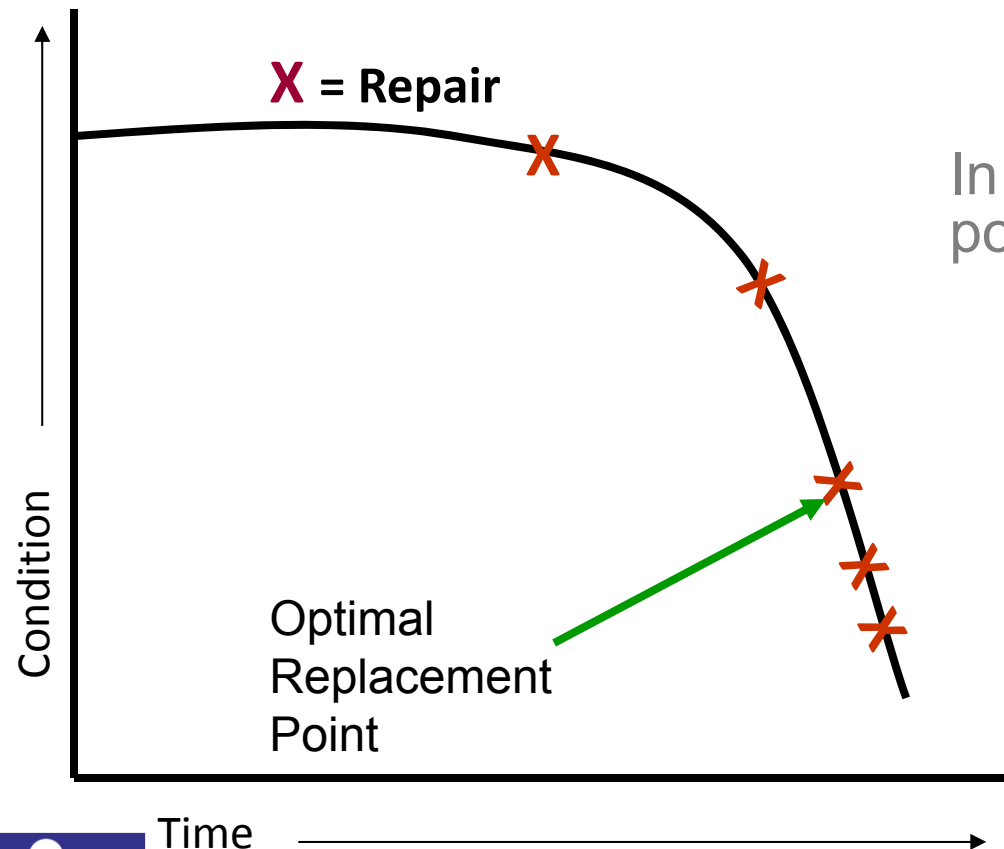


# Asset Criticality





# Life Cycle Costing: Replacement of Assets



In theory, there is an exact right point at which to replace an asset

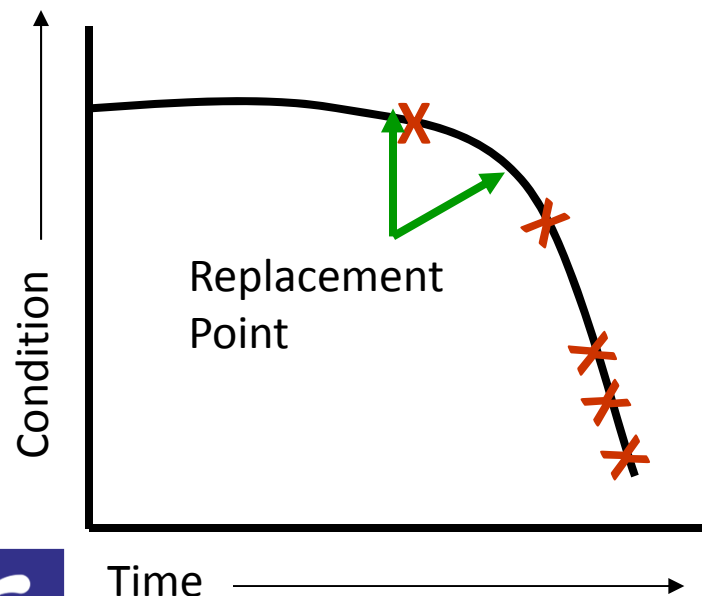
Not possible to know the optimal time to replace every asset

So... need to use the concept of risk

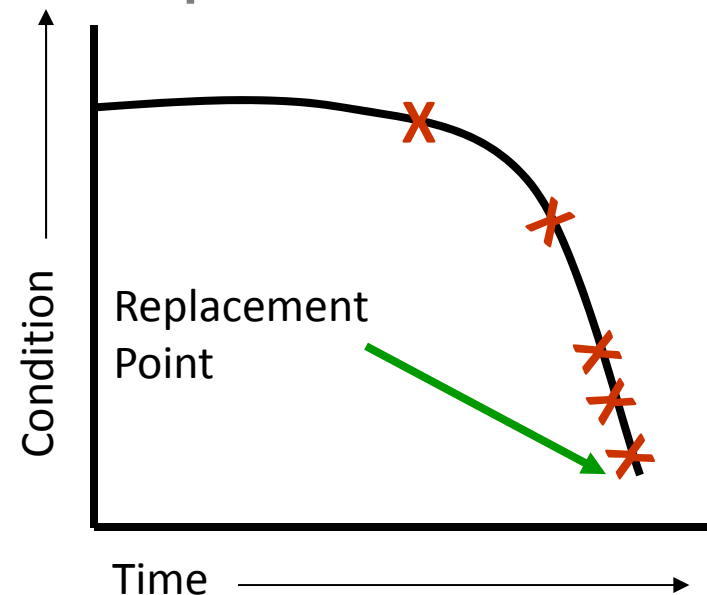


# Life Cycle Costing & Risk

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





# 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.



# 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



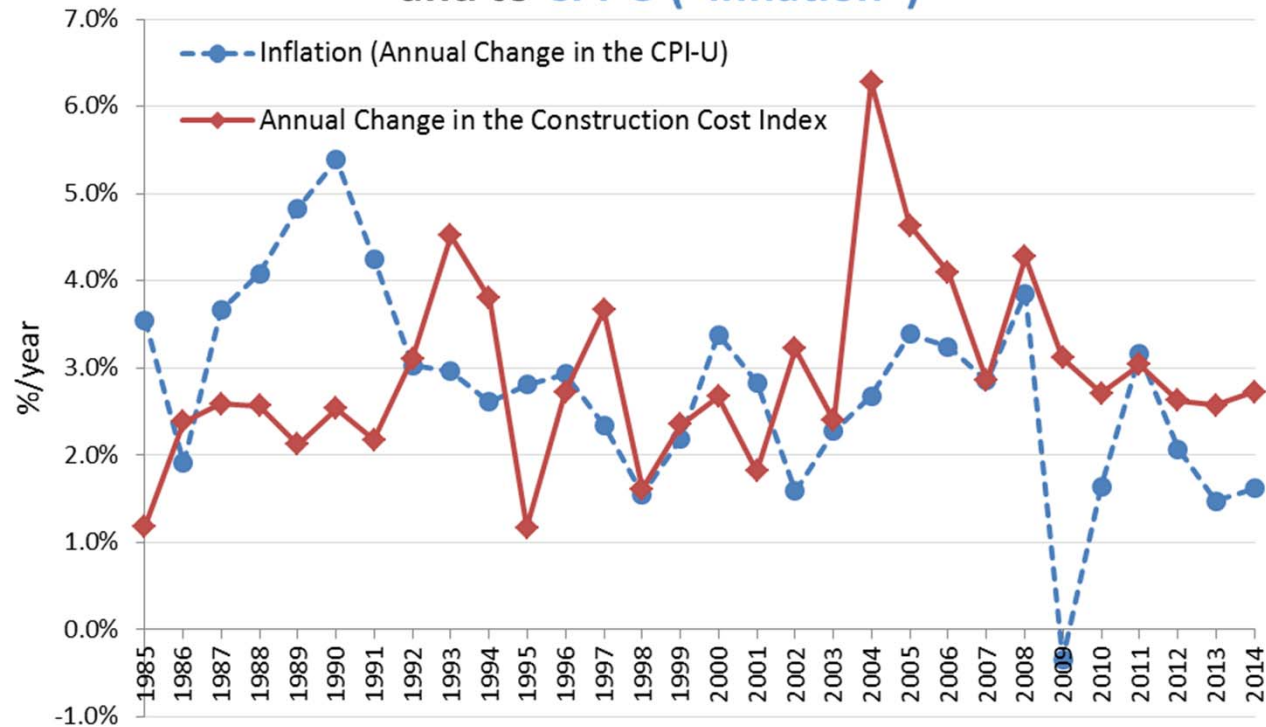
# Measures of Inflation

- **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.

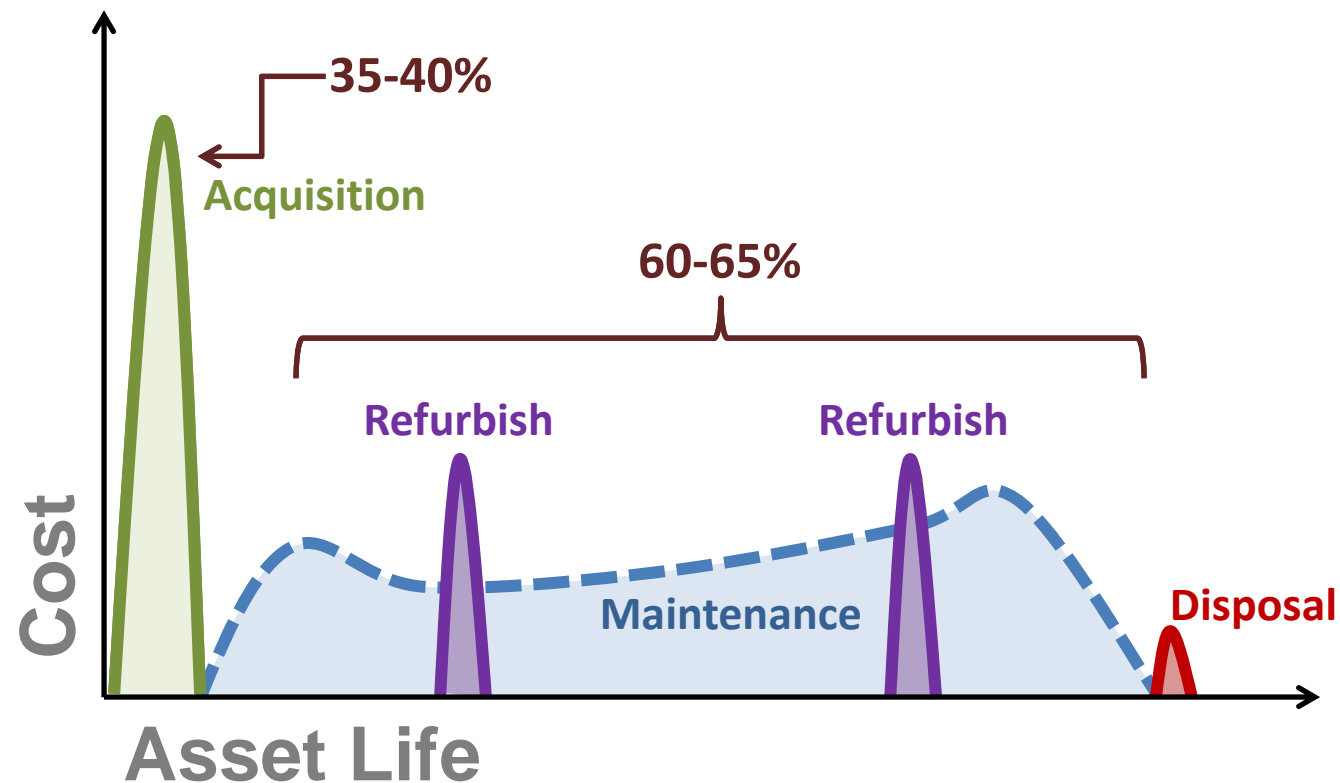


# Reminder: Life Cycle Costing

- 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

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## 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, p  
Support projec  
Department of  
together many  
water and wast  
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

Categories	EPA's "Asset Management: A Handbook for Small Water Systems"	DEHM PWS Capacity Development Program	DEHM PWS Loans and Grants	DEHM DWA Construction Grants and Loans	G.S. 1506-23	USDA Loans and Grants	NC Rural Economic Development Center	Local Government Development Center	EPA Drinking Water Needs Survey	DEHM DWA Local Water Supply Plans	EPA Software: CIPSS
Goal statement/Introduction to your capital plan	<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"/>
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"/>	<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"/>	<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"/>	<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"/>	<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"/>
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"/>		
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"/>		
Updating the capital plan	<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"/>		

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)



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# 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**

**FINANCIAL DASHBOARD**

Next: Enter C.I.P. Projects      View Fund Balance      View Dashboard

Financed: \$ 950,000  
et: \$ 750,000

Pre-Exist: Input annual incurred for

**CAPITAL IMPROVEMENT PROJECTS - 20 YEARS**

Project	Project Construction Start Year	Project Construction Period (Years)	Estimated Construction Cost (\$)	Annual Construction Cost Inflation Factor (%/year)	Estimated Cost at the Start Year	End of Co
Project 1: Replace water main	2012	1	1,000,000	2.0%	1,000,000	
Project 2: Replace water main	2013	1	2,000,000	2.0%	2,000,000	
Project 3: Replace water main	2014	1	3,000,000	2.0%	3,000,000	
Project 4: Replace water main	2015	1	4,000,000	2.0%	4,000,000	
Project 5: Replace water main	2016	1	5,000,000	2.0%	5,000,000	

**Water and Sewer Rates in FY15**

Input the residential combined water & sewer rate at 5,000 gallons/month of use (or 0.7 cubic feet). Convert to monthly rate.

Volume Rate at 5,000 gallons/month (0.7 cubic feet): \$ 5.47  
Monthly Base Charge (Minimum Charge): \$ 12.12

**Expected Revenues and Expenses in FY15**

Annual Operating and Non-operating Revenues: \$ 5,910,000  
Annual Non-Capital Expenditures (O&M, Admin., etc.): \$ 4,525,000  
Expected Annual Inflation of Expenditures (%/year): 2.7%

**Usage Billed to Customers in FY15**

Number of Customers: Residential: 10,000; Non-residential: 2,000  
Total Monthly Use (1,000's of gallons): Residential: 50,000; Non-residential: 20,000  
Annual Customer Rate (Monthly Rate/Year): Residential: \$ 65.64; Non-residential: \$ 262.56

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

	FY15	FY16	FY17	FY18
1-Year Increase (Decrease) in Rates (Base and Volumetric)	N/A	0.0%	5.1%	2.6%
Increase (Decrease) in the Monthly Bill for 5,000 Gallons	N/A	\$0.00	\$1.01	\$0.79
Increase (Decrease) in the Monthly Base Charge	N/A	\$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 (0.7 cubic feet)	\$5.47	\$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 (S)	\$29.35	\$29.35	\$30.86	\$31.65

**Projected Fund Balance**

	FY15	FY16	FY17	FY18
Total Revenues	\$ 5,910,000	\$ 6,063,580	\$ 6,278,327	\$ 6,464,606
Base Charges	\$ 1,776,960	\$ 1,796,322	\$ 1,907,268	\$ 1,976,733
Usage Charges	\$ 3,129,840	\$ 3,094,595	\$ 3,216,588	\$ 3,261,742
Interest Earned from Previous Year's Positive Balance	\$ 103,200	\$ 104,266	\$ 105,344	\$ 106,433
Revenues from Other Sources Besides Charges	\$ 0	\$ 0	\$ 0	\$ 0

**Financial Reserves (End of Year)**

**Rate Increases**

**Total Capital Expenses**

**Total Cumulative System Investment**

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Development of this tool was funded by the NC Department of Environment and Natural Resources and the U.S. Environmental Protection Agency  
[Download this tool at www.efc.unc.edu/tools](http://www.efc.unc.edu/tools)





# 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