

A blue-tinted photograph of industrial machinery, possibly a water treatment plant, featuring large pipes and valves.

Long Term Capital Planning

Glenn Barnes

Environmental Finance Center

The University of North Carolina at Chapel Hill

919-962-2789

glennbarnes@sog.unc.edu



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



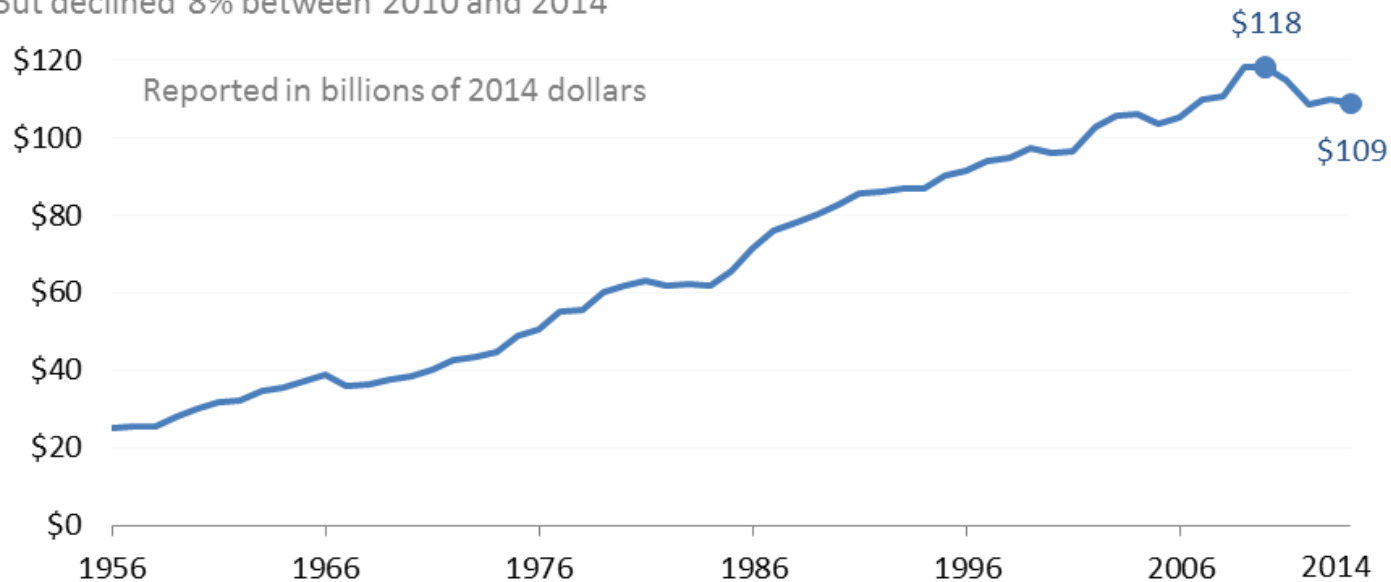
Capital Finance Today

- 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



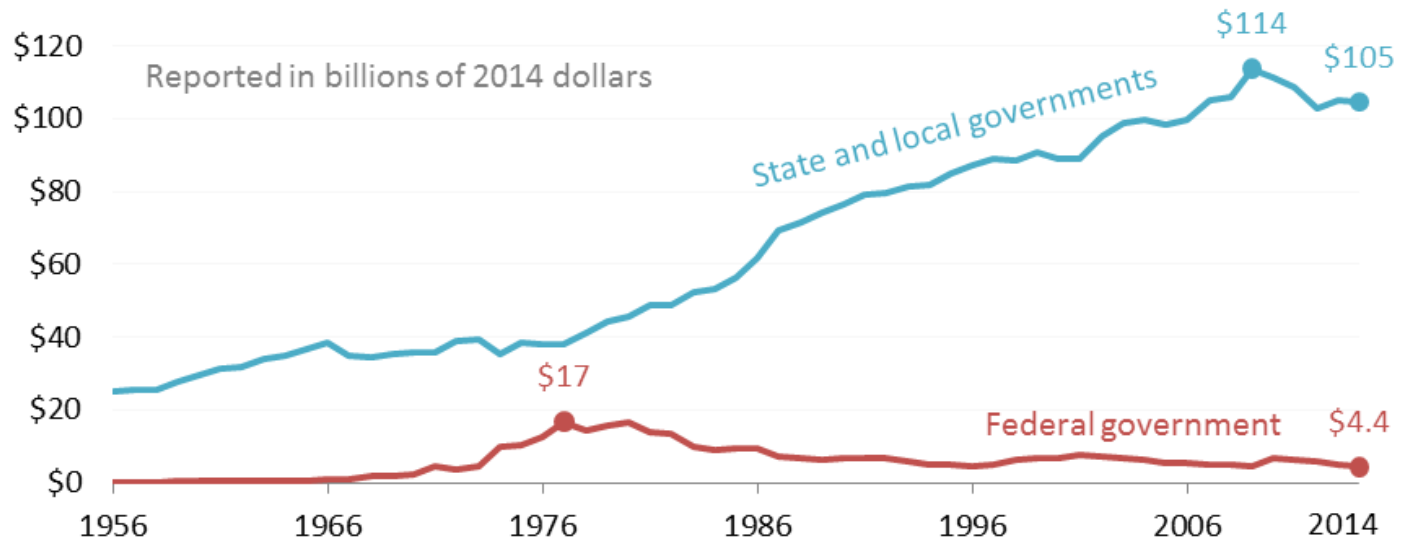
Graphed by the Environmental Finance Center at the University of North Carolina, Chapel Hill.

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 State and Local Governments

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

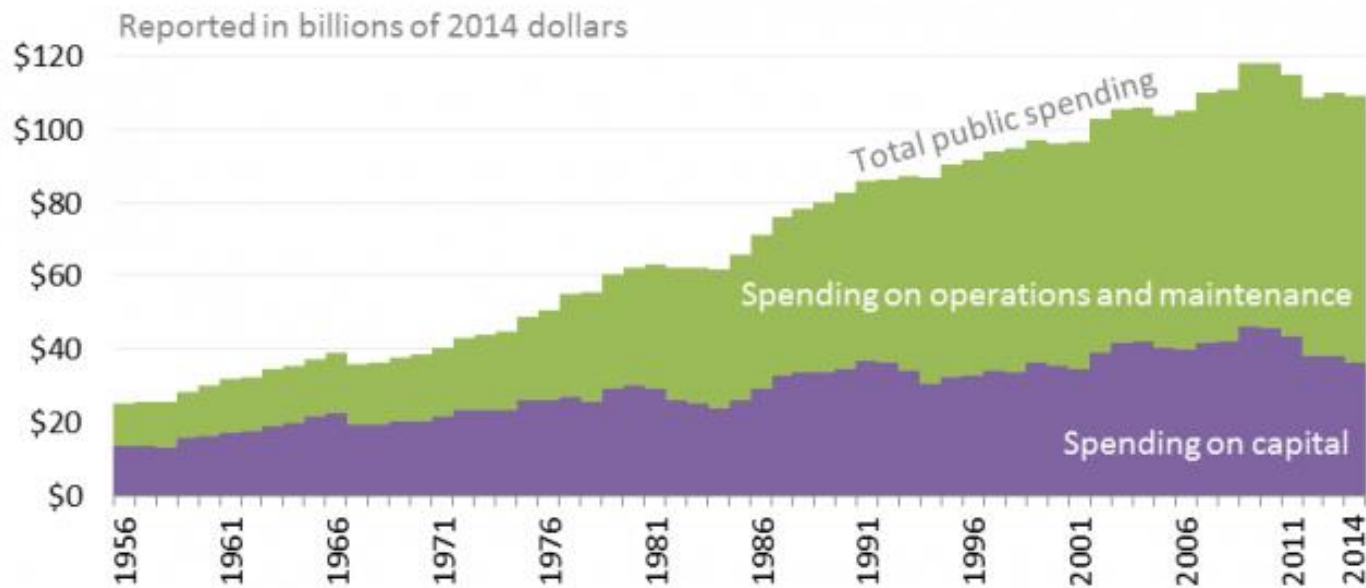


Graphed by the Environmental Finance Center at the University of North Carolina, Chapel Hill.

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



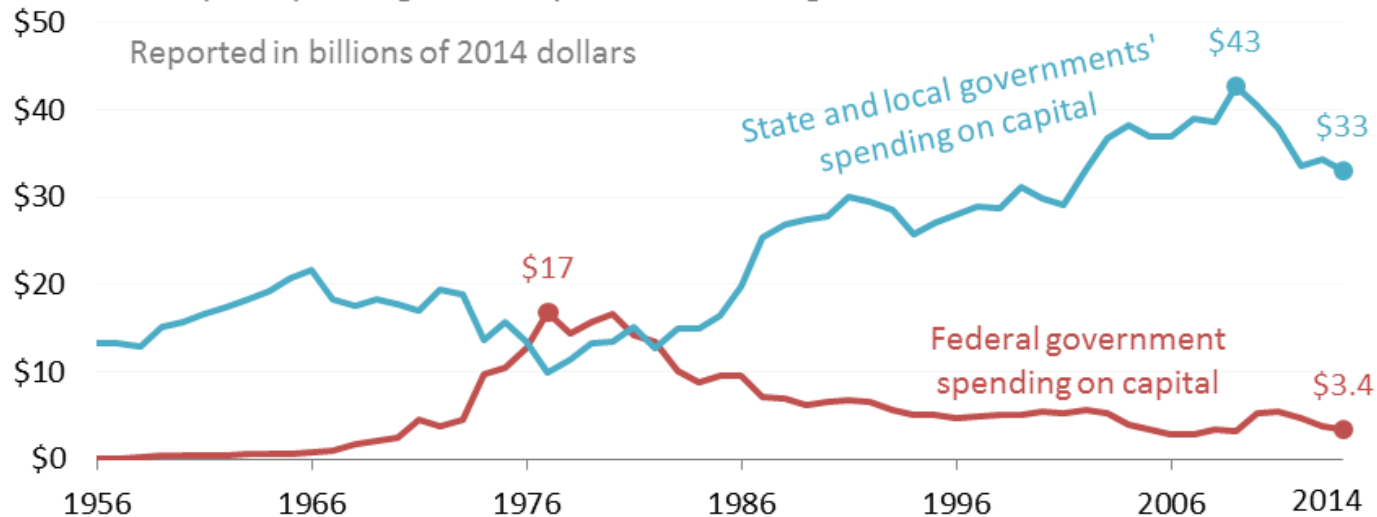
Graphed by the Environmental Finance Center at the University of North Carolina, Chapel Hill.

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⁺

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



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



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

Let's hear from a practitioner...



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?

What do customers care about?

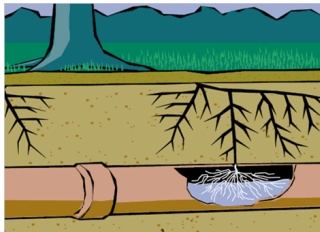


Asset Criticality

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





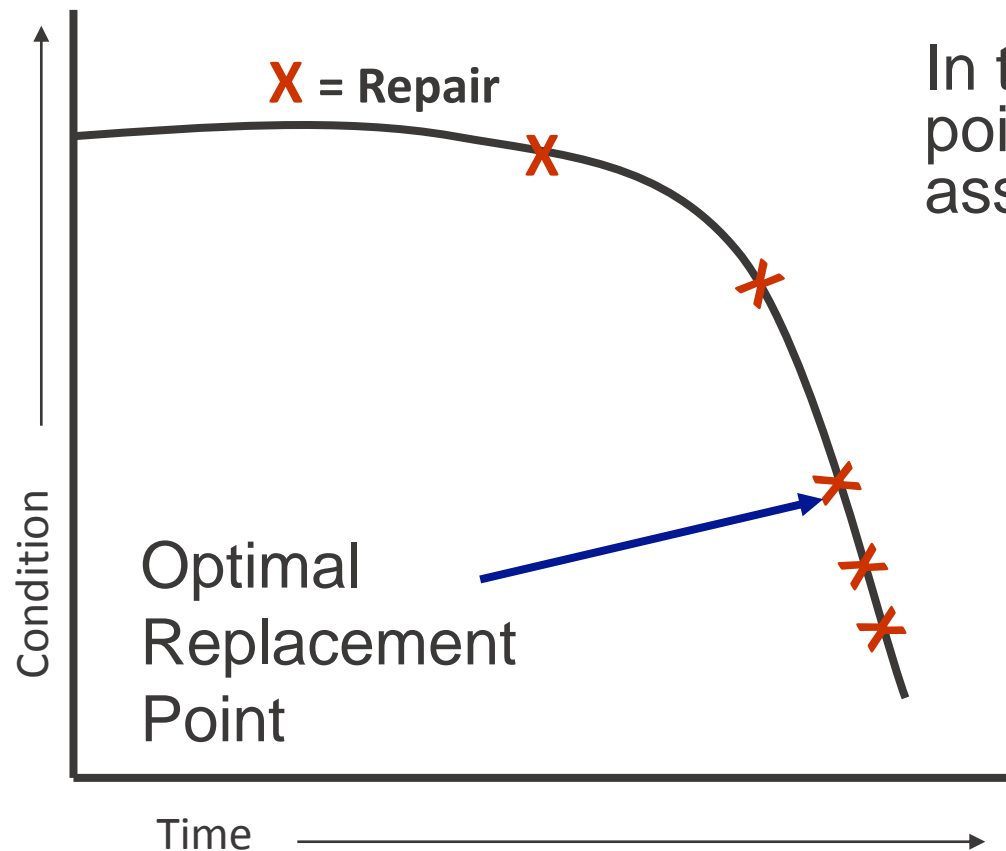
Quick Exercise—4 Assets

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



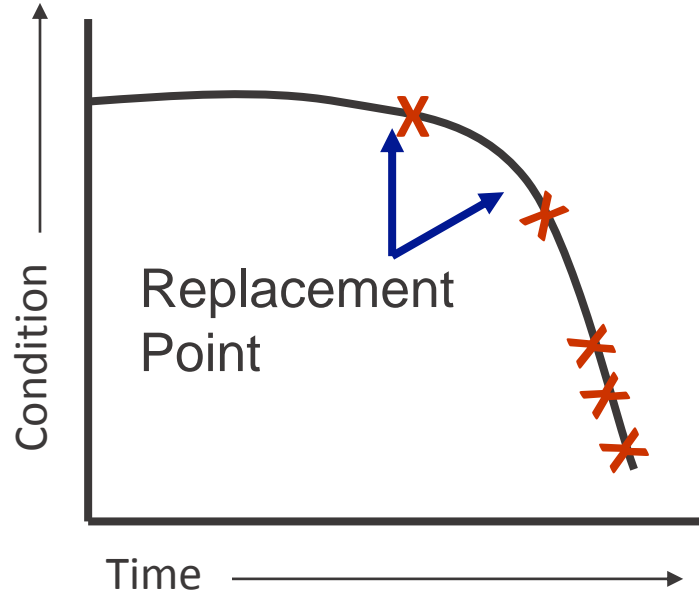
In theory, there is an exact right point at which to replace an asset

Not possible to know the optimal time to replace every asset

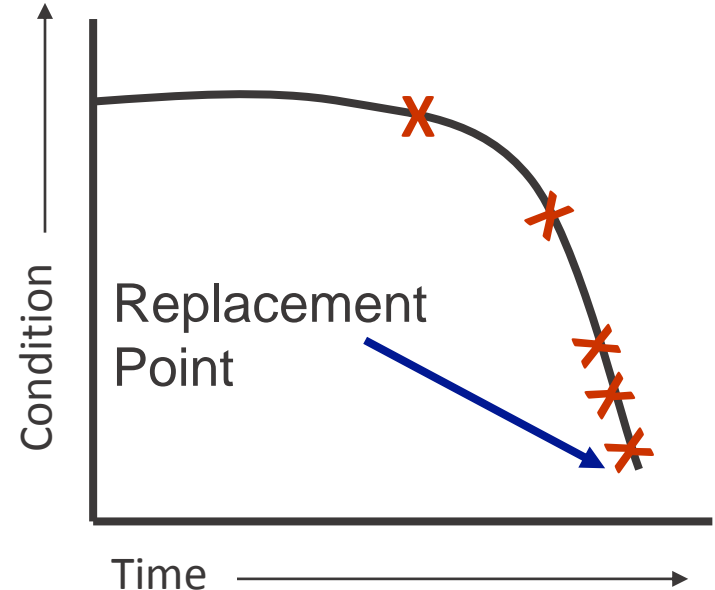
So... need to use the concept of risk

Life Cycle Costing & Risk

High risk assets:
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 population changes (growth, stagnation, decline)
- Identify deferred maintenance problems or where current service is inadequate



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?

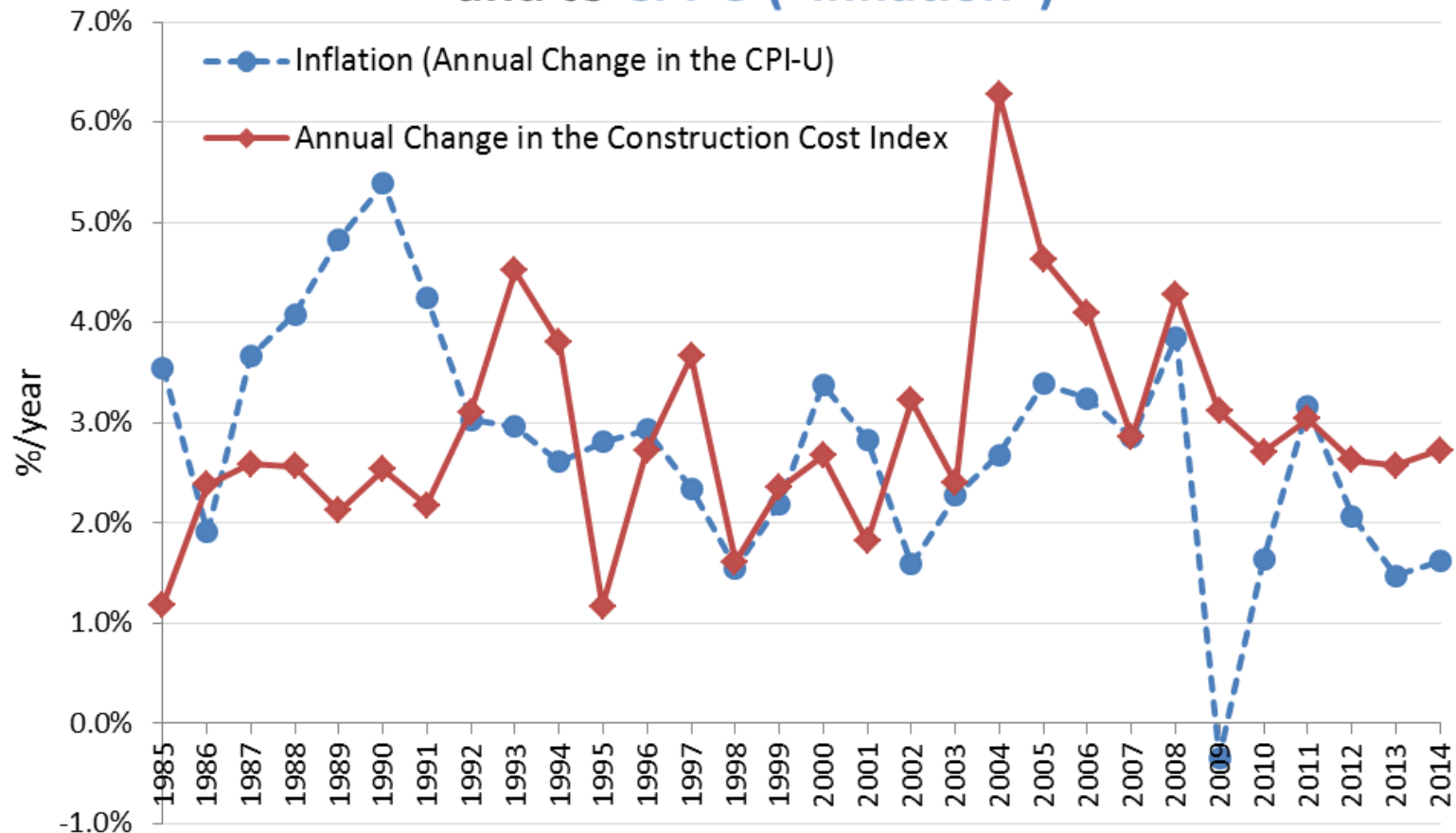
- Call a vendor. Actually, call a few.
- Ask other systems
- Look at past expenses but adjust for increases in costs



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.

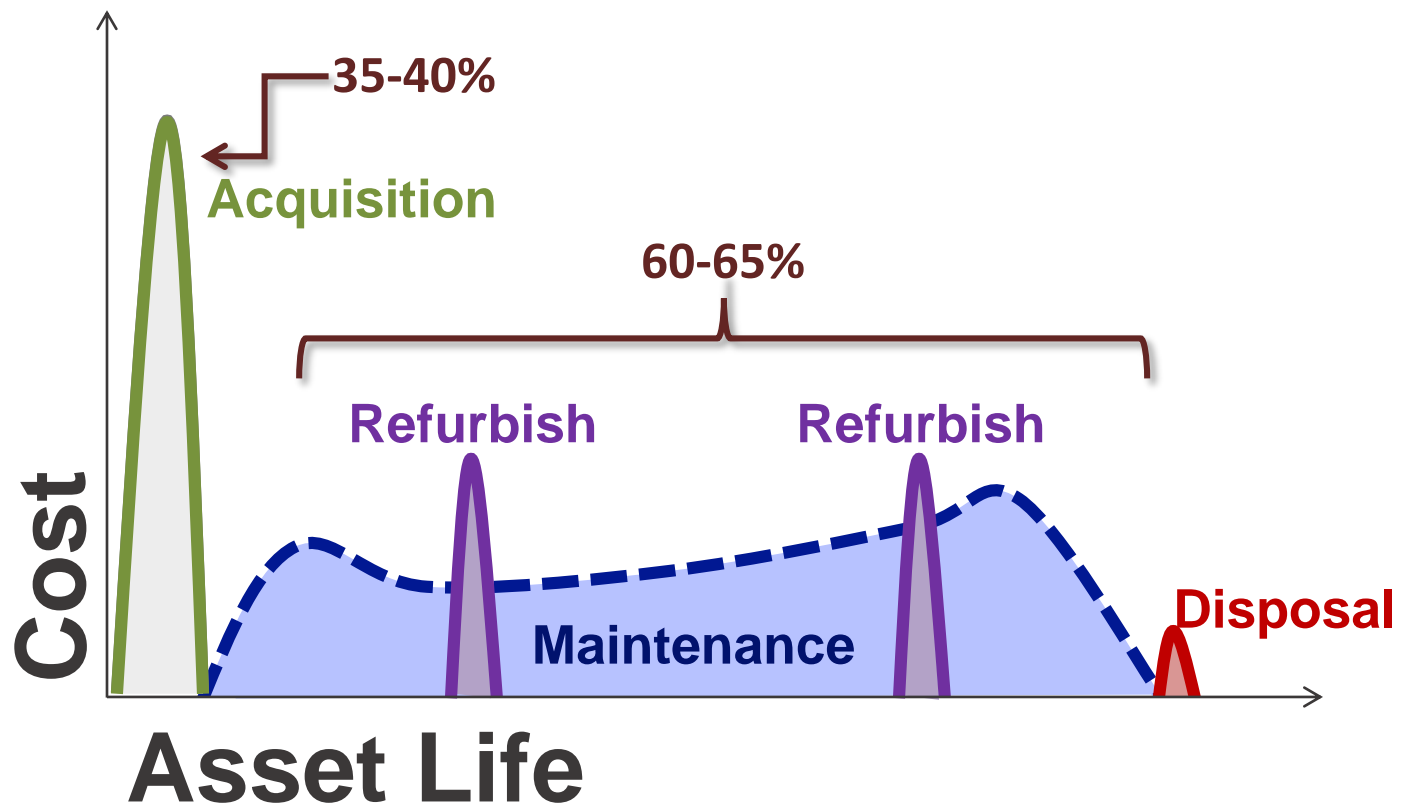
<http://efc.web.unc.edu/2012/09/26/using-an-index-to-help-project-capital-costs-into-the-future/>



Reminder: Life Cycle Costing

- Purchase Price \neq Total Price

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




Source: Adapted from Steve Allbee, USEPA

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.

Next: Enter C.I.P. Projects View Fund Balance
 et \$ 950,000
 \$ 750,000 Pre-Exist

INSTRUCTIONS

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.

CAPITAL IMPROVEMENT PROJECTS - 20 YEARS

Project Name	Project Construction Start Year	Project Construction Period (Years)	Estimated Construction Cost (\$1,000's)	Annual Construction Cost Inflation Factor (1/Year)	Estimated Cost in the Start Year	Cost of Capital
Project 1 - Sewer Main Replacement	FY12	3	1,000,000	2.0%	1,000,000	\$
Project 2 - Sewer Main Replacement	FY13	3	2,000,000	2.0%	2,000,000	\$
Project 3 - Sewer Main Replacement	FY14	3	3,000,000	2.0%	3,000,000	\$
Project 4 - Sewer Main Replacement	FY15	3	4,000,000	2.0%	4,000,000	\$

Water and Sewer Rates in FY15

Rate Type	Rate (\$/1,000 gallons/month)
Residential	\$ 5.67
Commercial	\$ 11.34

Expected Revenues and Expenses in FY15

Category	Amount (\$1,000's)
Annual Operating and Non-Operating Revenues	5,000,000
Annual Non-Capital Expenditures (O&M, Admin, etc.)	4,525,000
Expected Annual Inflation of Expenditures (1/Year)	2.7%

Usage Billed to Customers in FY15

Customer Type	Number of Customers	Total Monthly Use (1,000's of gallons)	Annual Customer Rate Receipts (1/Year)
Residential	10,000	20,000	\$ 567,000
Non-Residential	2,000	4,000	\$ 113,400

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	\$1.61	\$0.79	\$0.39
Increase (Decrease) in the Monthly Base Charge	\$0.00	\$0.64	\$0.34	\$0.17
Monthly Base Charge ("Minimum Charge")	\$12.34	\$12.34	\$12.98	\$13.31
Volumetric Rate at 5,000 gallons/month (\$/1,000 of 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	\$ 5,000,000	\$ 5,000,000	\$ 5,238,267	\$ 5,264,601
Base Charges	\$ 1,776,900	\$ 1,795,322	\$ 1,907,268	\$ 1,976,723
Usage Charges	\$ 3,123,840	\$ 3,094,596	\$ 3,216,569	\$ 3,261,742
Interest Earned from Previous Year's Positive Balance	\$	\$ 9,485	\$ 9,167	\$ 8,897
Revenues from Other Sources Besides Charges	\$ 103,260	\$ 104,268	\$ 105,344	\$ 106,433
Total Expenses	\$ 4,525,000	\$ 4,525,000	\$ 4,525,000	\$ 4,525,000

Financial Reserves (End of Year)

Rate Increases

Total Capital Expenses


Total Cumulative System Investment









Software: CUPSS (EPA)

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



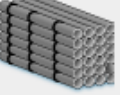







**Check Up Program for Small Systems**Set-up | Switch Utility | Create User | Help | Training | Exit

 **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