



Introduction to Asset Management

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Let's Start With the Basics

- What does your water system do?



Water Systems Serve Multiple Purposes

Sometimes Those Purposes Conflict

- 1) System serves an important **environmental and health purpose** -- protecting community's water resources and supplying community with highest quality drinking water.



Dr. John L. Leal



Water Systems Serve Multiple Purposes

Sometimes Those Purposes Conflict

- 1) System serves an important **environmental and health purpose** -- protecting community's water resources and supplying community with highest quality drinking water.
- 2) System serves an important **public service** – providing community with basic services that everyone in the community can afford.
- 3) System serves as a well managed **public enterprise** – putting into practice forward-thinking sustainable business practices.



In the United States, there are

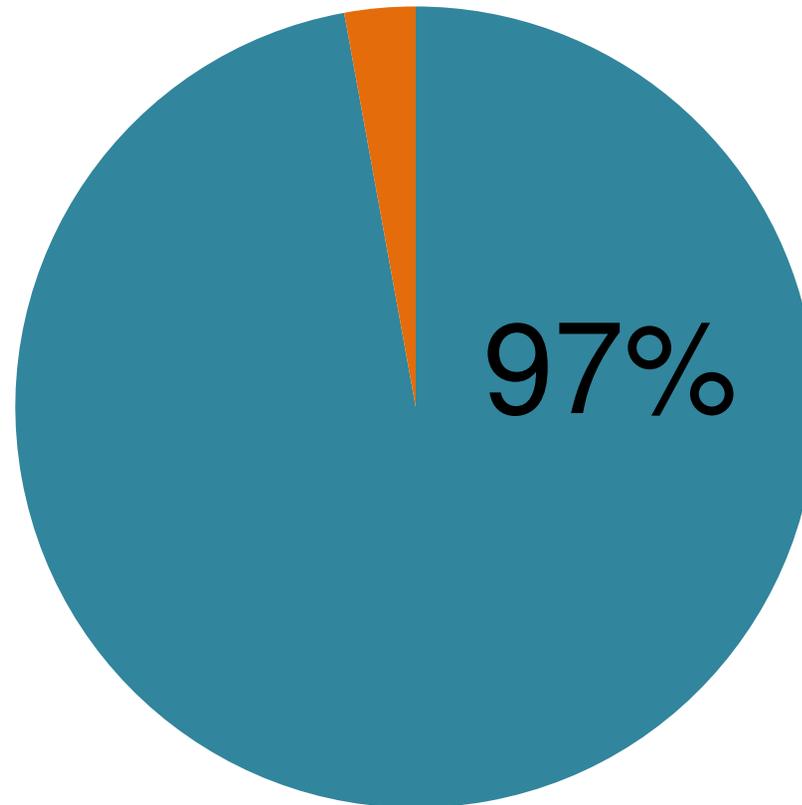
157,230

**“public” drinking
water systems**



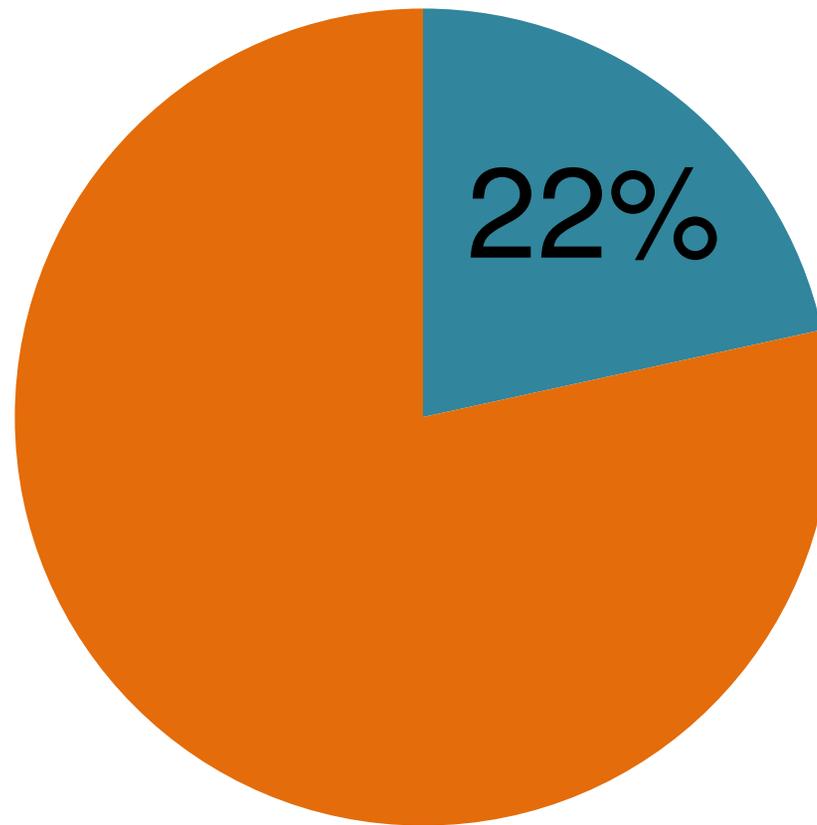
Most Water Systems are Small

They serve 10,000 or fewer customers





Collectively, Though, **Large Systems** Serve Far More Total People



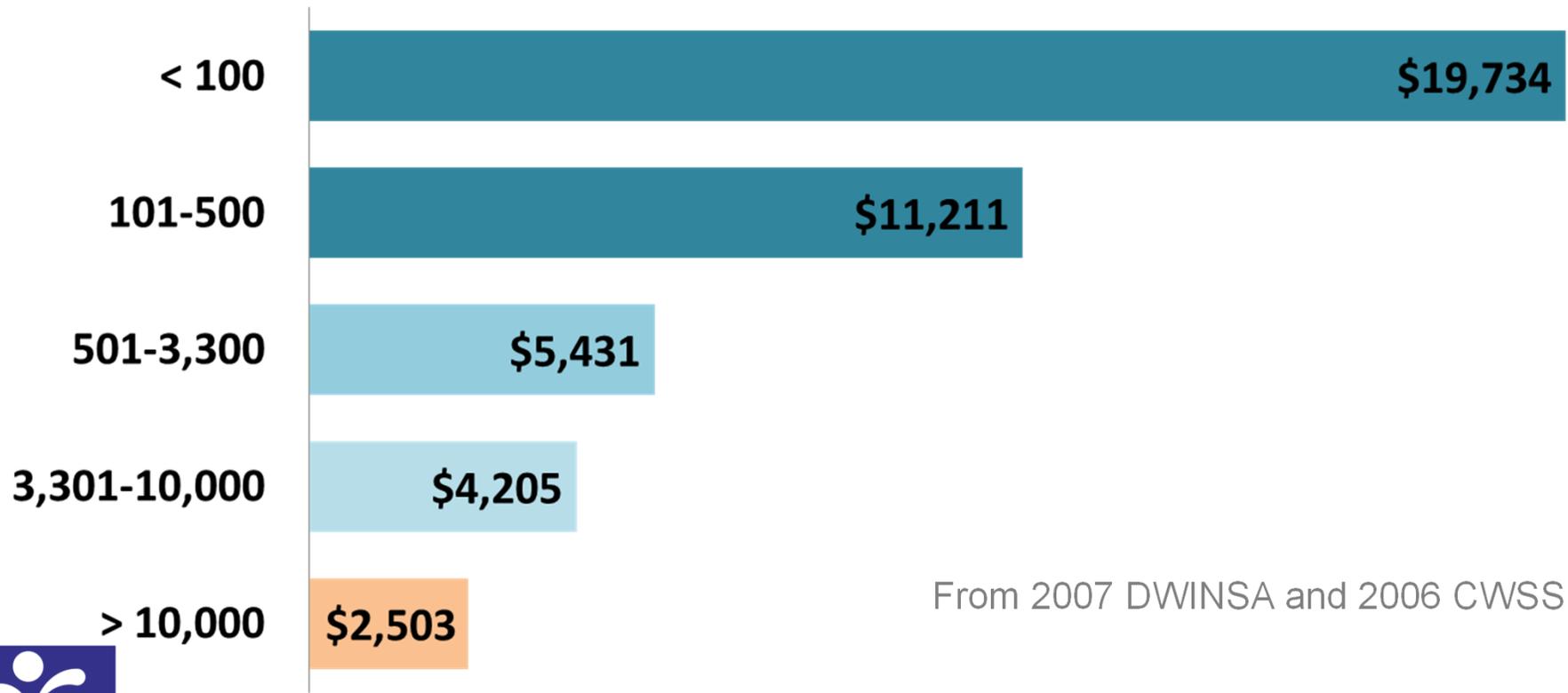


Why does system size matter?

What's the issue with small systems?



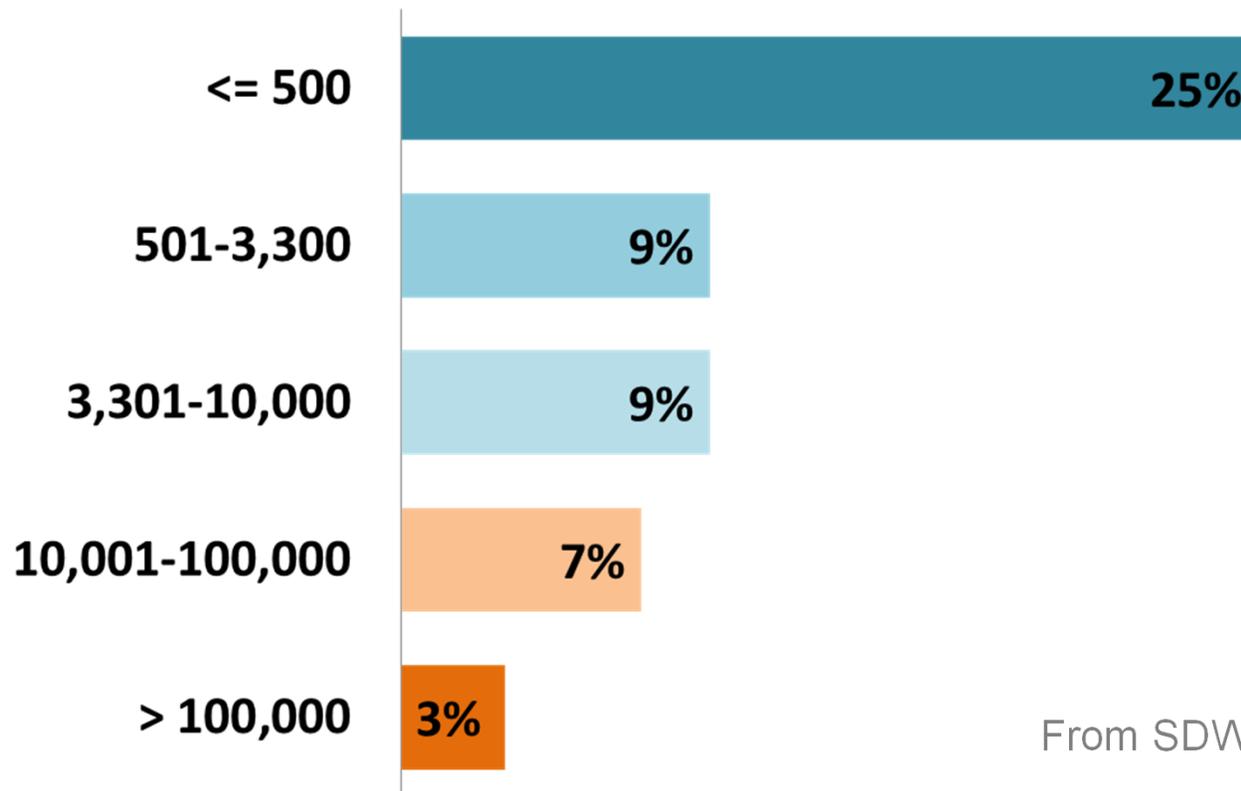
The Infrastructure Needs Per Residential Connection are Much Greater for Small Systems



From 2007 DWINSA and 2006 CWSS



And Small Systems Have Far Higher Numbers of Annual Health Violations



From SDWIS 2011 Q3 Data



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

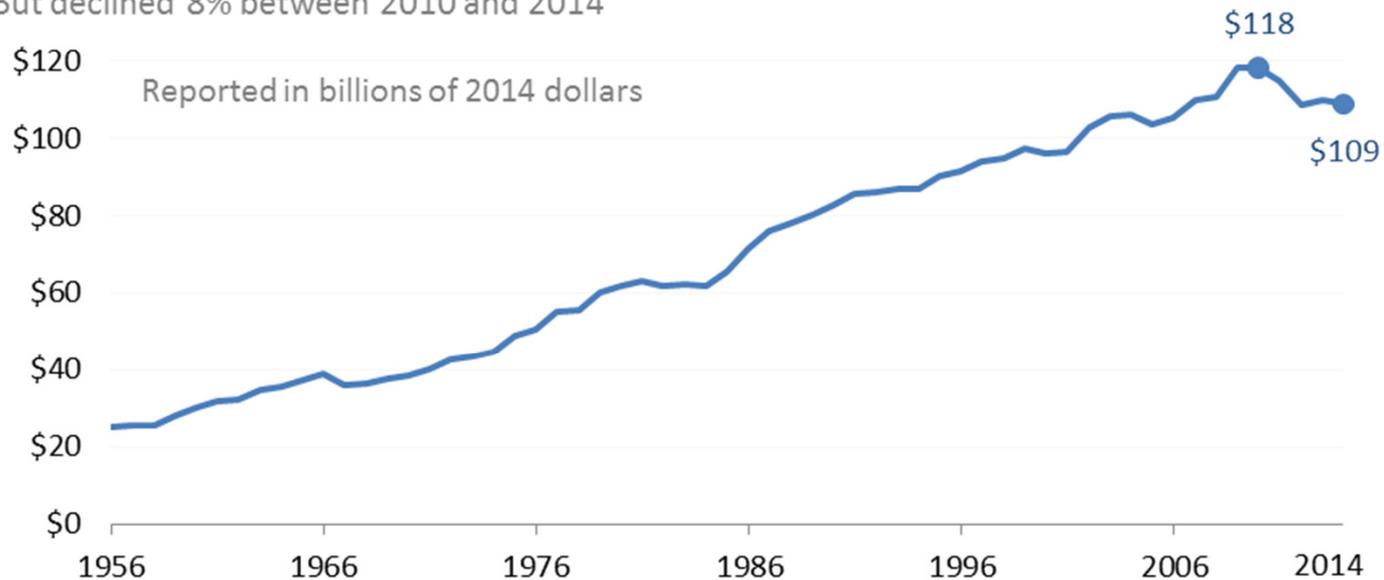
- The money never really was “free”—it came from tax dollars
- Today, there is a different philosophy of how to pay for water system capital improvements



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.

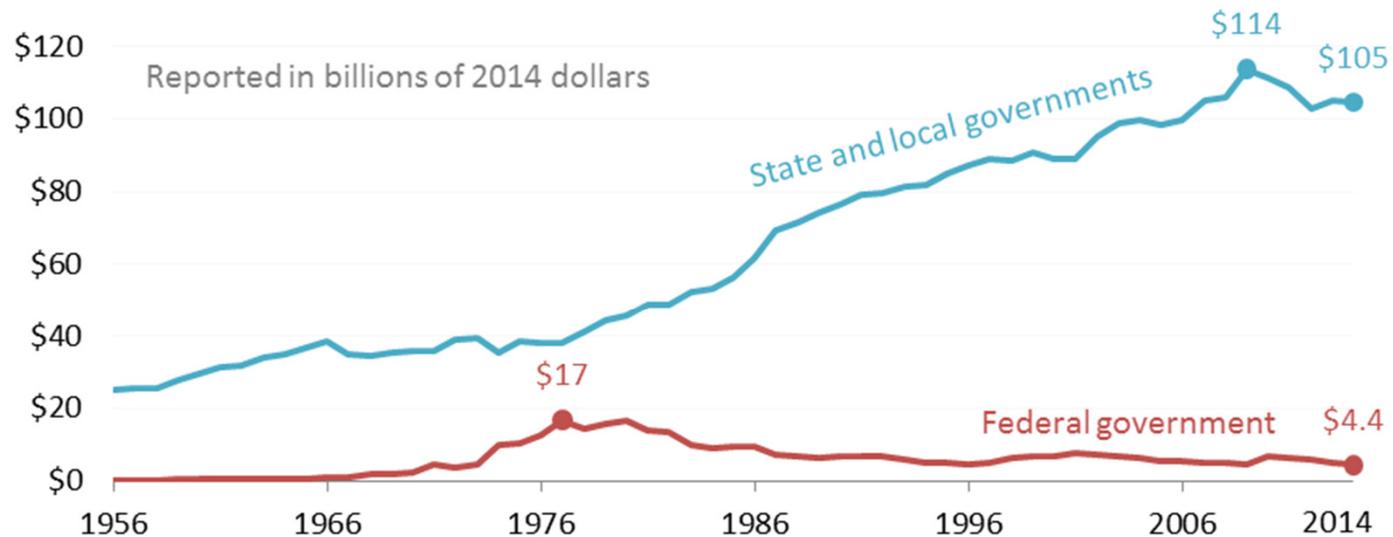
Source: Congressional Budget Office supplemental data for the *Public Spending on Transportation and Water Infrastructure, 1956 to 2014* report (March 2015). Displays public spending on supply systems for distributing potable water as well as wastewater and sewage treatment systems and plants. Real spending 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



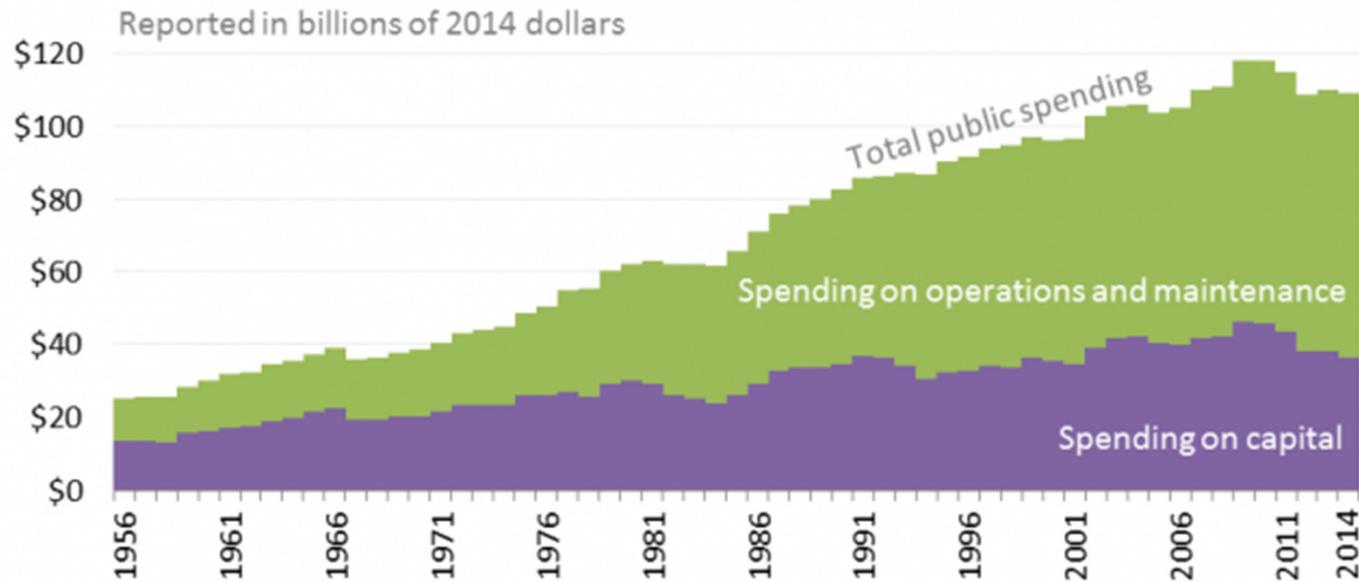
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...And Mostly for O&M, not Capital

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



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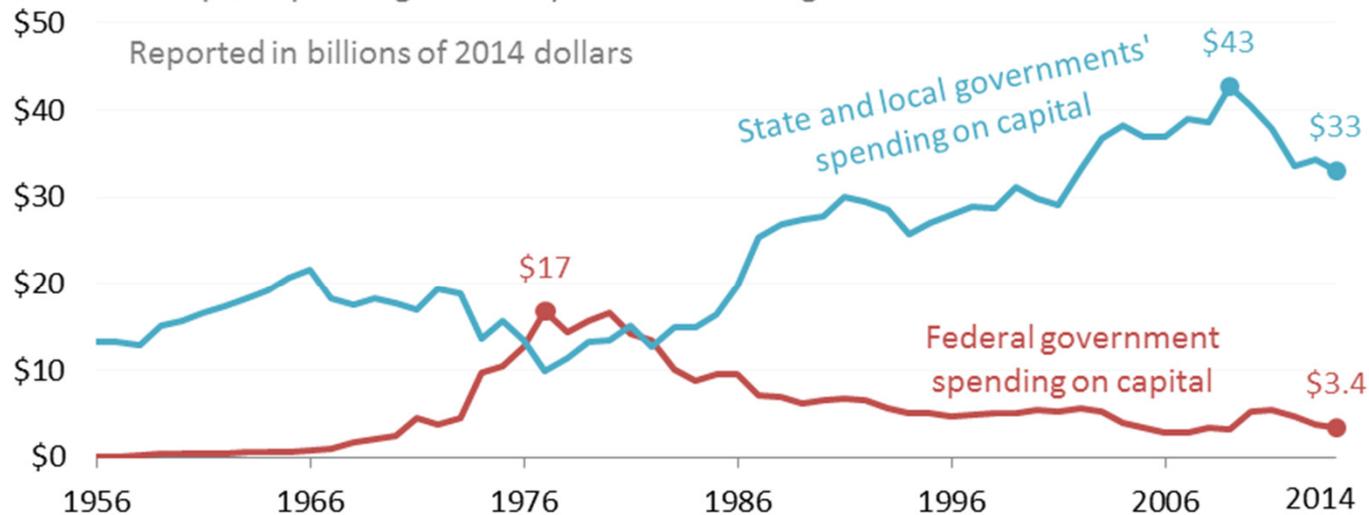
Source: Congressional Budget Office supplemental data for the *Public Spending on Transportation and Water Infrastructure, 1956 to 2014* report (March 2015). Displays public spending on supply systems for distributing potable water as well as wastewater and sewage treatment systems and plants. Real spending 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/>

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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-



www.efcnetwork.org



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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	Ports	e
Bridges	e+	Public Parks	e-
Dams	D	Rail	e+
Drinking Water	D	Roads	D
Energy	D+	Schools	D
Hazardous Waste	D	Solid Waste	B-
Inland Waterways	D.	Transit	D
Levees	D.	Wastewater	D



www.etcnetwork.org

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



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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:

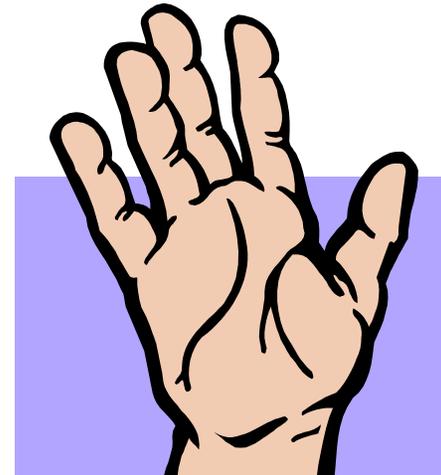
Asset Management & Capital Planning



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

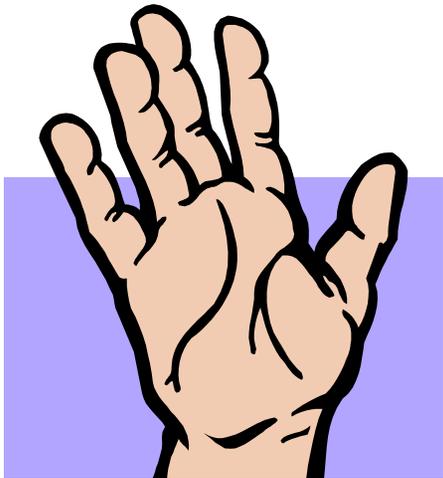


Inadequate Revenues



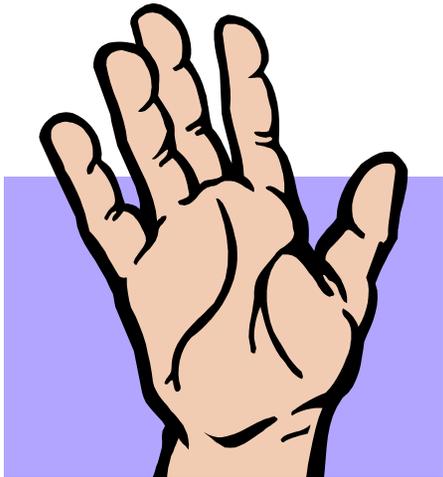


Aging Infrastructure



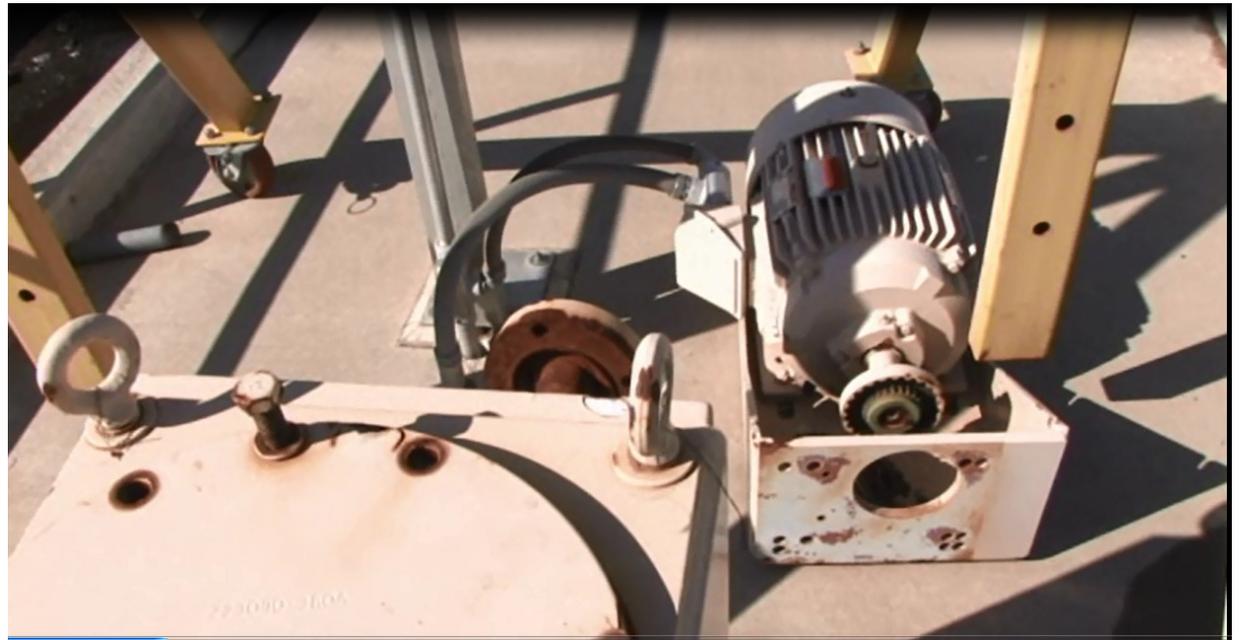
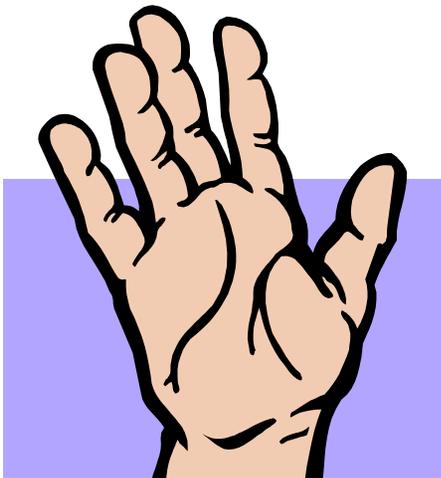


No Economies of Scale



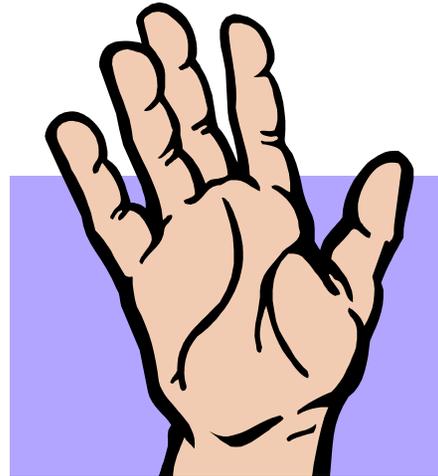


Early Failure of Assets/ No Maintenance Program





Expensive Compliance





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





Analyze Filter

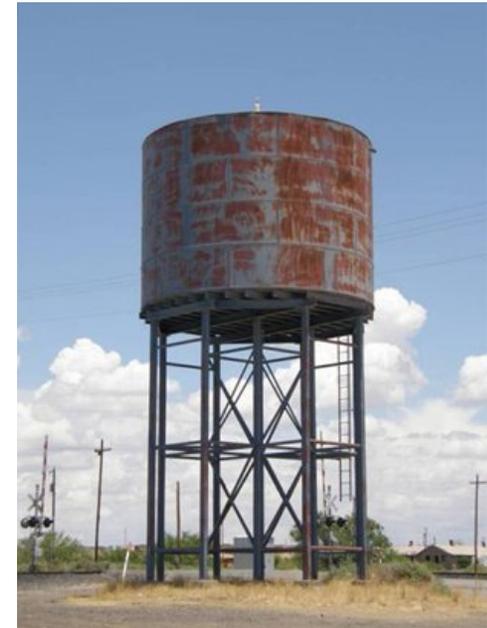


Look for root cause of problem; check media; Look for rehab options



Analyze Tank

Check structural integrity; Look for rehab options: Can you sand blast? Repaint? Recoat interior? Clean sediment?





Analyze Pump



Replace pump
impeller, keep
pump



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





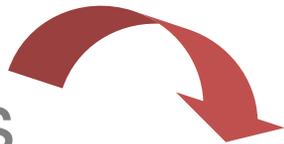
Current State of the Assets

- 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?

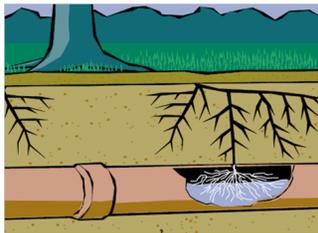


Asset Criticality

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





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

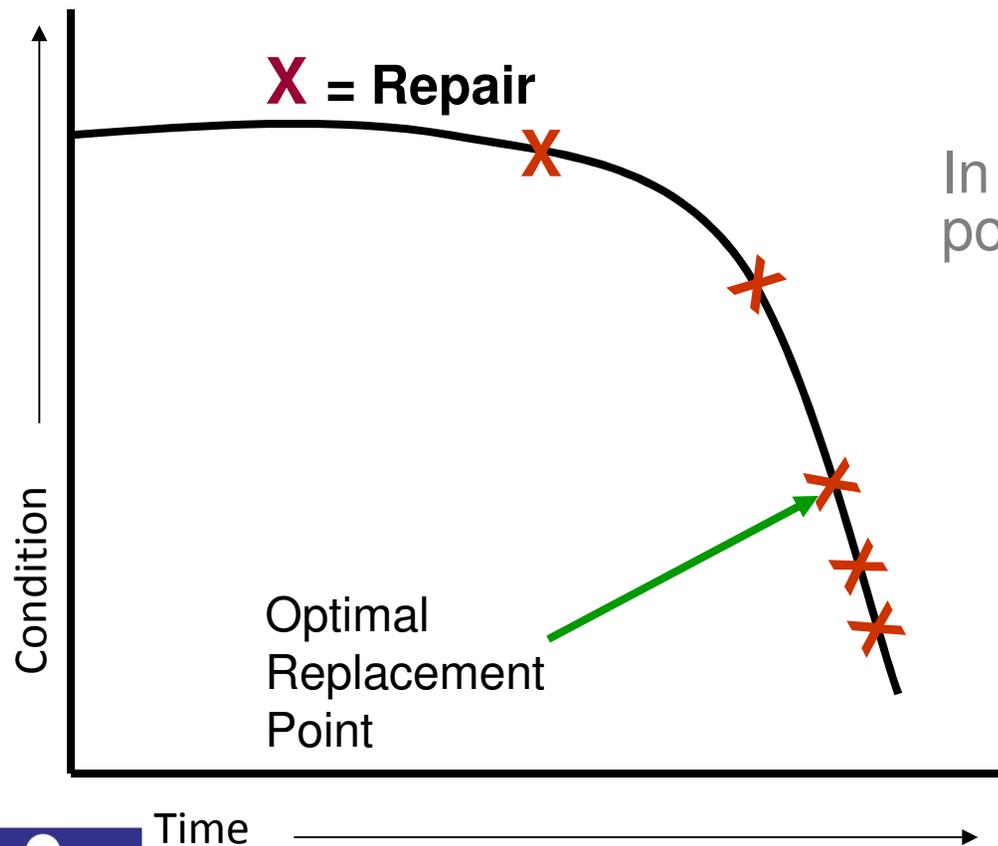


Asset Criticality





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

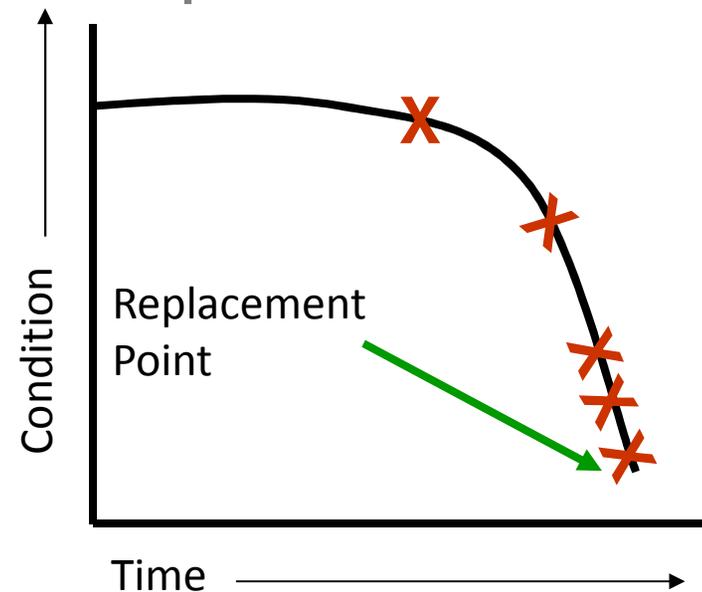
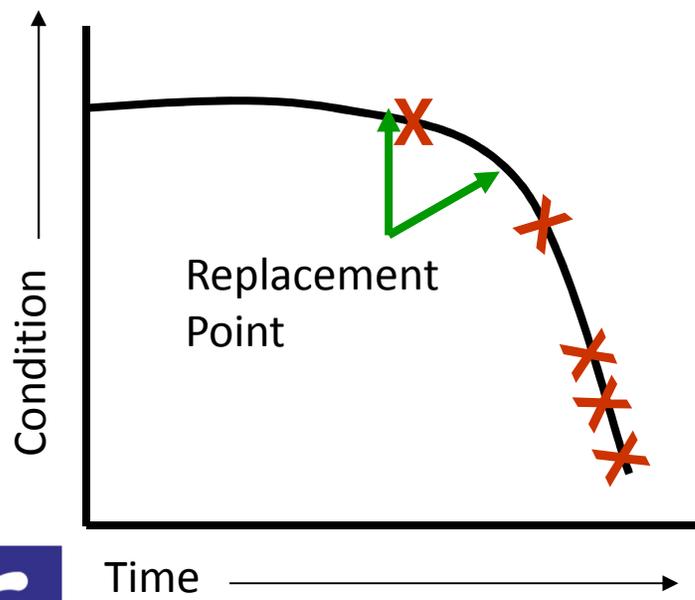
So... need to use the concept of risk



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 - 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.

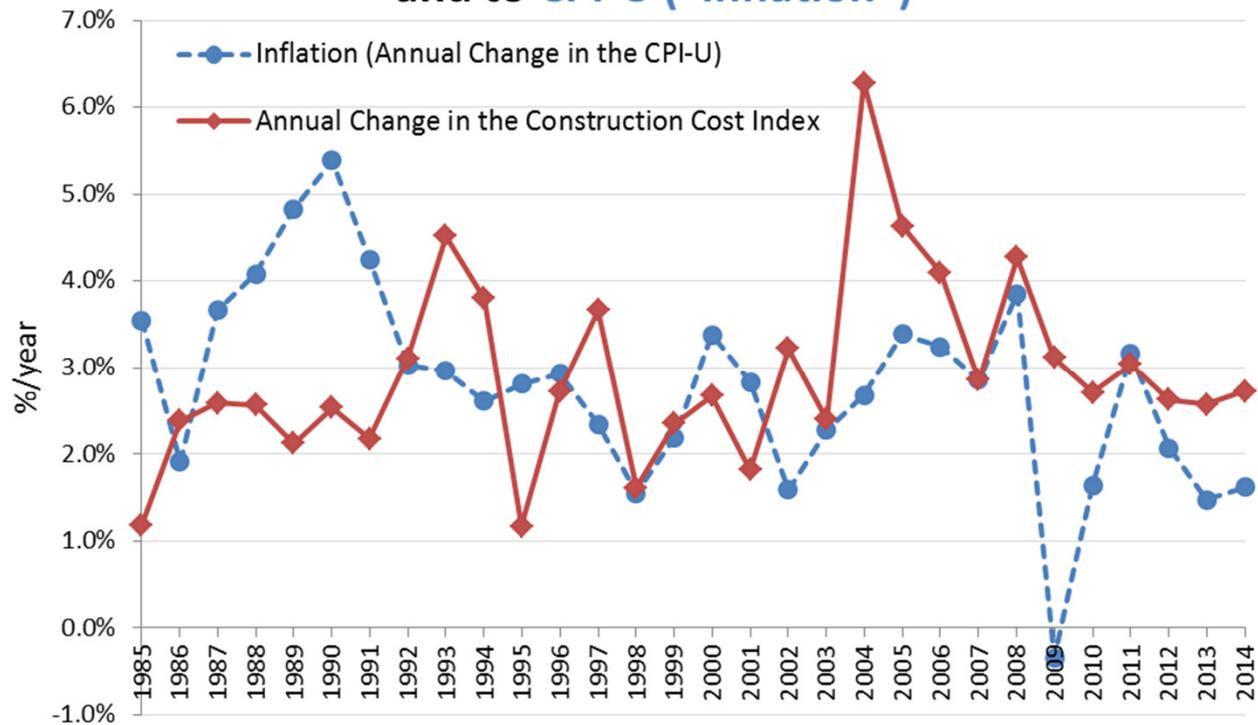


Measures of Inflation

- **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")

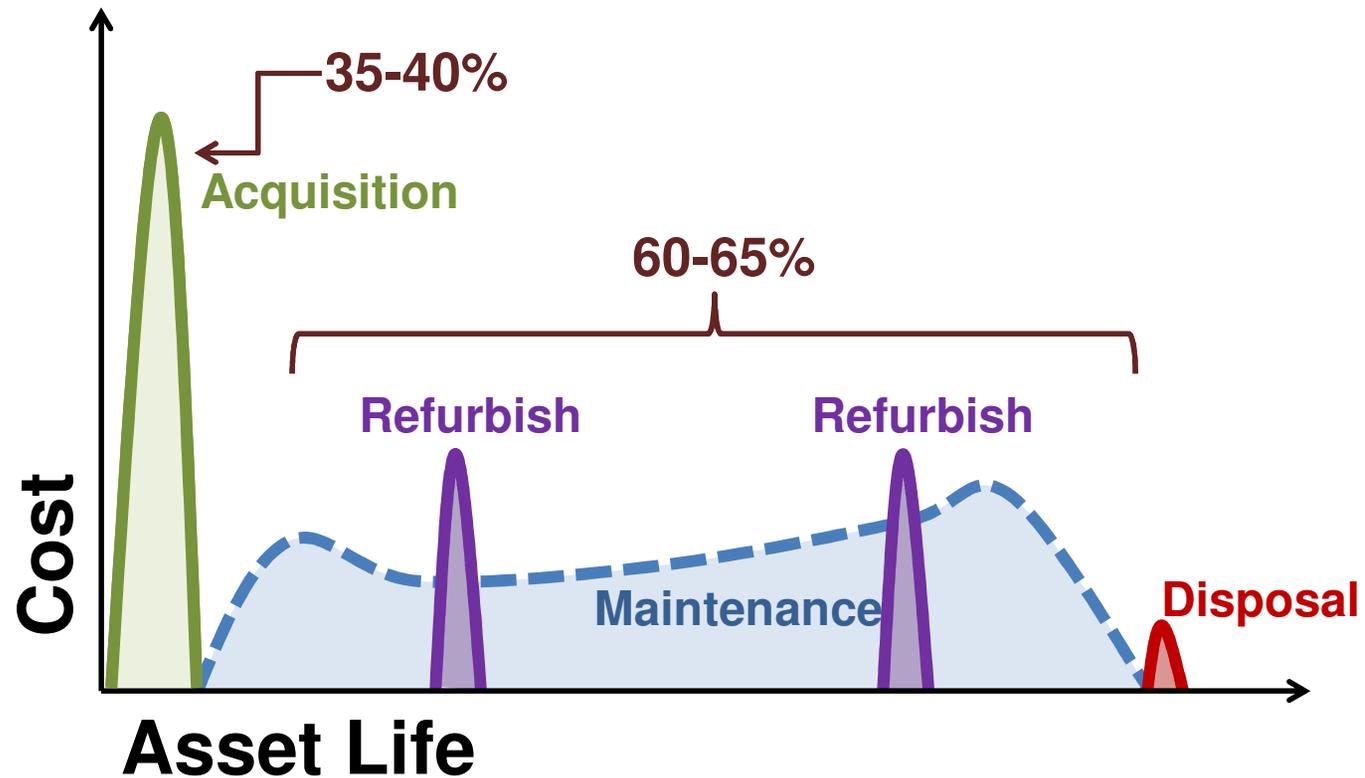


Data analyzed by the Environmental Finance Center at the University of North Carolina, Chapel Hill.
 Data Sources: Bureau of Labor Statistics, Engineering News-Record ENR.com, InflationData.com, USDA Natural Resources Conservation Services.

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



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

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

View Dashboard

Pre-Exist Input annual incurred for

Financed \$ 950,000

et \$ 750,000

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 Construction Year	Project Construction Period (Years)	Estimated Construction Cost	Annual Construction Cost Inflation Factor (C/Year)	Estimated Cost in the Start Year	End of Construction Year
Project 1	Water main replacement	FY22	1	1,000,000	2.0%	1,000,000	2022
Project 2	Water treatment plant expansion	FY23	2	2,000,000	2.0%	2,000,000	2024
Project 3	Water treatment plant expansion	FY24	2	500,000	2.0%	500,000	2026
Project 4	Wastewater treatment plant expansion	FY25	2	1,000,000	2.0%	1,000,000	2027
Project 5	Wastewater treatment plant expansion	FY26	2	1,000,000	2.0%	1,000,000	2028
Project 6	Wastewater treatment plant expansion	FY27	2	1,000,000	2.0%	1,000,000	2029
Project 7	Wastewater treatment plant expansion	FY28	2	1,000,000	2.0%	1,000,000	2030
Project 8	Wastewater treatment plant expansion	FY29	2	1,000,000	2.0%	1,000,000	2031
Project 9	Wastewater treatment plant expansion	FY30	2	1,000,000	2.0%	1,000,000	2032

	FY15	FY16	FY17	FY18
Estimated Rate Changes Needed to Maintain the Fund Balance				
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	\$1.51	\$0.79
Increase (Decrease) in the Monthly Base Charge	N/A	\$0.00	\$0.54	\$0.34
Monthly Base Charge ("Minimum Charge")	\$12.34	\$12.34	\$12.98	\$13.31
Volumetric Rate at 5,000 gallons/month (5/1000 gallons)	\$5.67	\$5.67	\$5.96	\$6.11
Volumetric Rate at 1,000 gallons/month (1/1000 gallons)	2	2	2	2
Volume Included with the Base Charge (1,000's of gallons)				
Appropriate Monthly Charge for 5,000 gallons (5)	\$29.35	\$29.35	\$30.86	\$31.65
Projected Fund Balance				
Total Revenues	\$ 1,515,000	\$ 1,503,589	\$ 1,278,327	\$ 1,364,605
Base Charges	\$ 1,776,960	\$ 1,795,322	\$ 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	\$ 9,485	\$ 9,485	\$ 9,167	\$ 9,897
Revenues from Other Sources Besides Charges	\$ 103,200	\$ 104,266	\$ 106,344	\$ 106,433
Fund Balance, End of Year	\$ 1,447,000	\$ 1,457,500	\$ 1,468,000	\$ 1,478,500



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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



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