2013 Water Management Workshop Series

MetropolitanPlanningCouncil

Chicago Metropolitan Agency for Planning

Water Rates and Revenue–
August 28, 2013

Course ID 7256

DuPage Water Commission is Preserving Every Drop

DuPAGE WATER COMMISSION · ILLINOIS ·

Workshop series overview

Give conservation coordinators tools to educate and encourage customers to conserve water by emphasizing the importance of conservation and the role it plays in utility management, regulations and ordinances, water and revenues.

1. **May 29: Utility planning and asset management**
2. **June 26: Regulations and ordinances**
3. **July 31: Indoor and outdoor water use**
4. **August 28: Water rates and revenue**

The Conservation Foundation's Conservation@Work

Commission Water Conservation Improvements

- Two 7,500 gallon water-storage cisterns to catch rainwater
- Bioswale that naturally filters storm water and reduces runoff
- Detention pond that provides a settling area for removal of suspended solids
- Converting six acres of non-native landscaping to prairie grass
- 6,786 SF green roof made of succulent plants designed to retain and filter water prior to release into the cisterns
- Various native plantings that reduce 50% of water used for landscaping
- Reduced storm water runoff rate by 32%
- Visit http://www.theconservationfoundation.org/what-we-do/conservationhome/conservationwork.html

Key takeaways

1. **Understand the relationship between water rates and utility revenues, including the effect of water conservation.**
2. **Design water pricing mechanisms that fit utility goals, customer types and effective management.**
3. **Learn about opportunities for financing water infrastructure investments from both traditional sources, as well as from emerging sources.**

Financing Options for Water Infrastructure Investments: Non-traditional Options

Ted Hamer, KPMG

KPMG

cutting through complexity™

Private Sector Participation in Water

Environmental Committee Meeting,

Metropolitan Mayors Caucus

August 2013

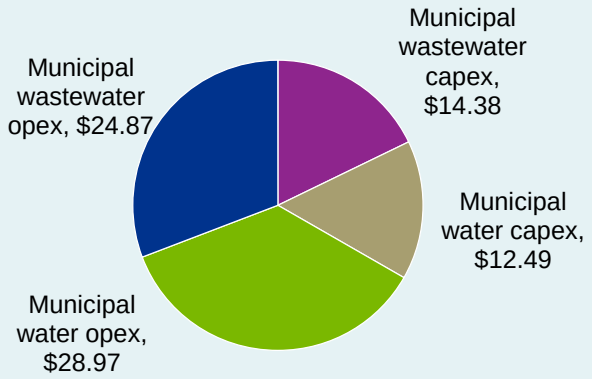
Market Overview: Overview

- The total utility water market in the United States has an approximate market value of over $80 billion
- Anticipated annual market value growth through 2016 is estimated at 5.5 to 6%
  - Total market value will increase to $112.1 billion in 2016
- Water utility revenue for public utilities was about $60 billion in 2008 with about $40 billion in expenditures, leaving $20 billion in cash flows
- Estimated need for investment in water infrastructure is over $500 billion over the next 20 years
- Over 40,000 water and wastewater utilities in the U.S. are mostly owned by local municipalities.
  - 30% of the population is served by private sector participation through privately owned utilities, privately regulated utilities or municipal utilities that have contracted out operations to private contractors

United States water and wastewater services by provider type

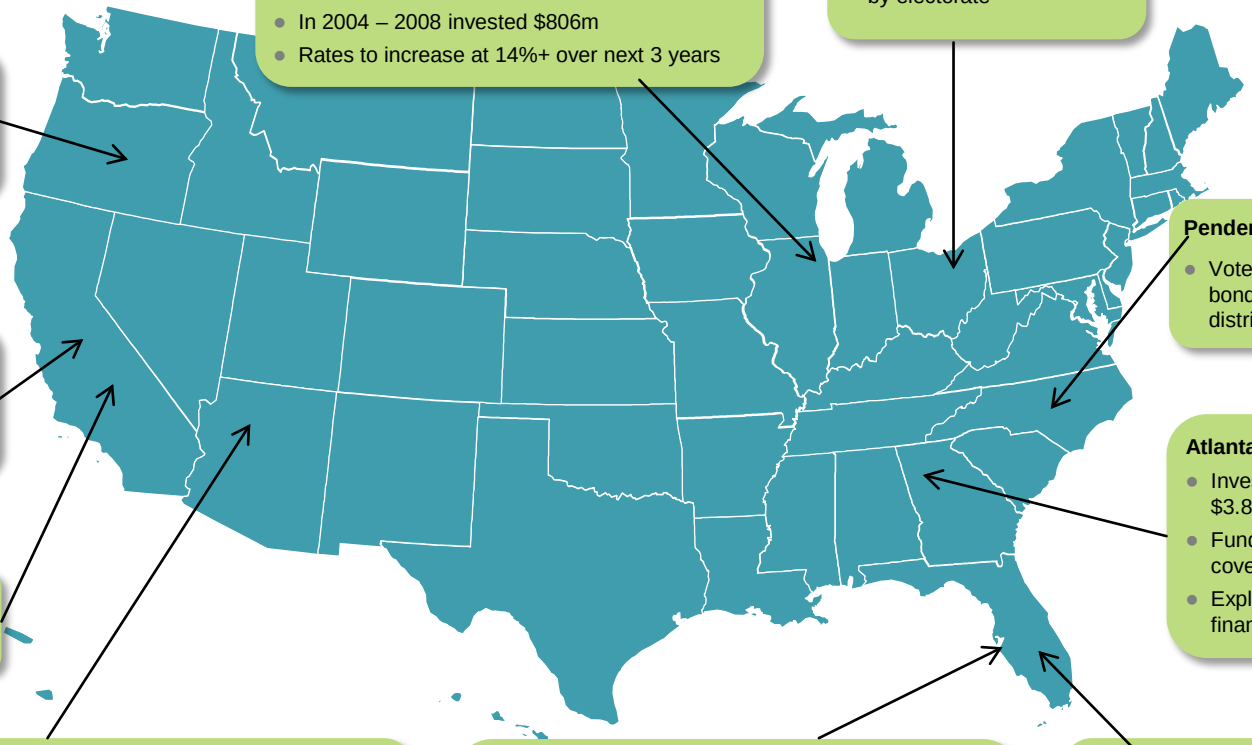
	Water services	Wastewater services
Provider type	**% of population**	**% of population**
Regulated utilities	8.8%	0.3
Municipal outsourcing	6.5%	7.8%
Municipal	69.5%	63.9%
Privately served	15.2%	28.0%
Total	**100.0%**	**100.0%**

Total U.S. Utility Water Market, 2010
Total $80.7 ($ billion)



Source: Global Water Intelligence

Market Overview: Sample Projects



Chicago, IL
- Significant requirement – Consent Decree to invest $800m to sewer system to reduce overflows
- In 2004 – 2008 invested $806m
- Rates to increase at 14%+ over next 3 years

Akron, OH
- Mayor considered Lease of sewer system – Rejected by electorate

Oregon
- $50m wastewater STP refurbishment and operation P3 announced

Pender County, NC
- Voters rejected $50m bond to pay for distribution system

California
- Santa Paula – PB announced on Water reclamation P3 ($125m)

Atlanta, GA
- Investment program $3.8bn
- Funding identified covers $3bn
- Exploring alternative financing

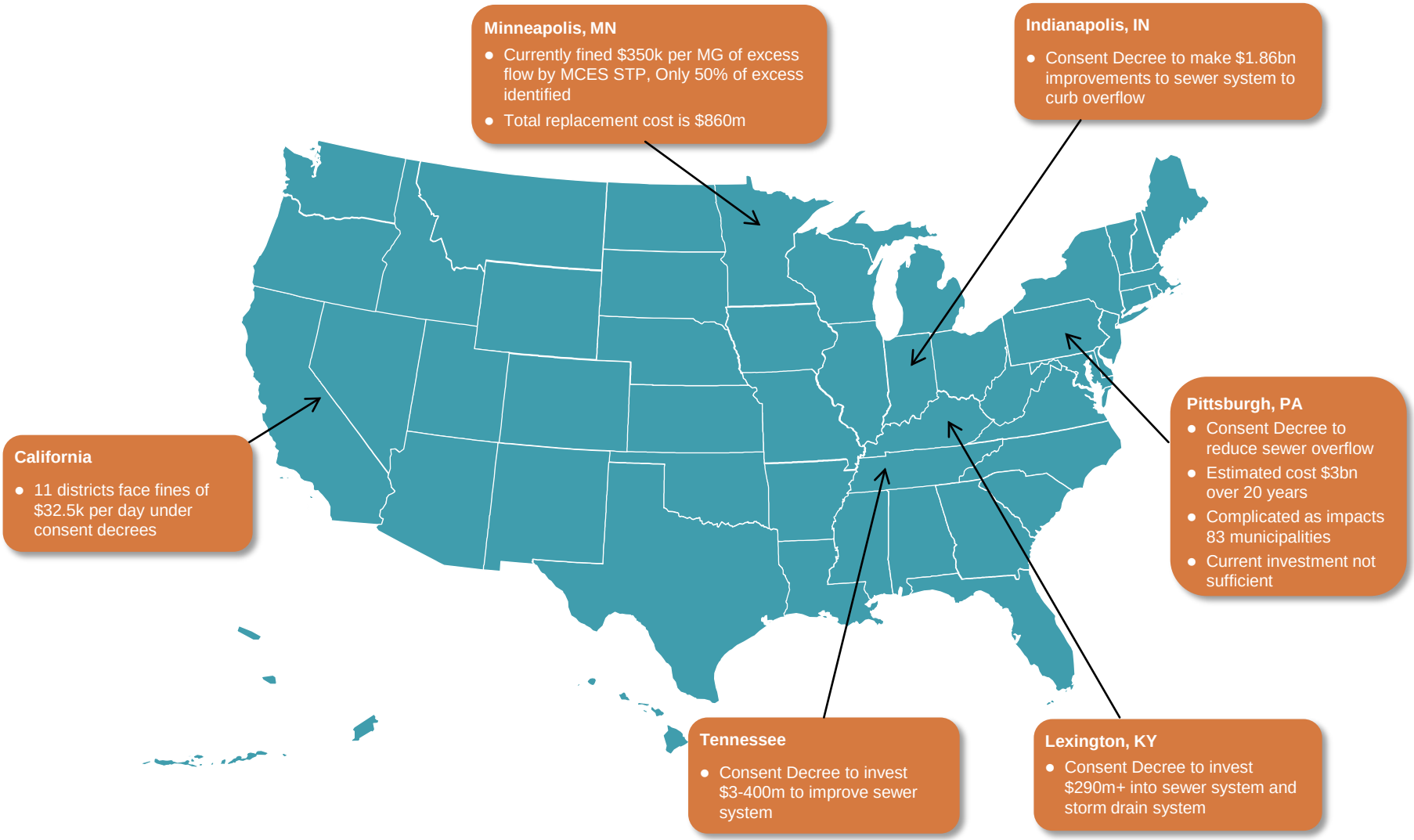
Carlsbad, CA
- Approved 8/08, Outreach started 2001

Prescott, AZ
- $170m Big Chino Water Delivery Project – 45 mile network to pump 12,000 acre feet annually
- Sold effluent at auction for $67m – Related to developers need to prove water supply

Tampa Bay, FL
- $296m CIP
- Bad experience with seawater desal, identified over 300 projects, only 19 included in CIP
- Use of non-profit private sector in P3
- Demand set to increase by 26% over 28 years

Florida
- 3 desal plants under review
  - Port St. Lucie
  - St. Johns WRMD
  - Hialeah

Market Overview: Consent Decree



Market Drivers

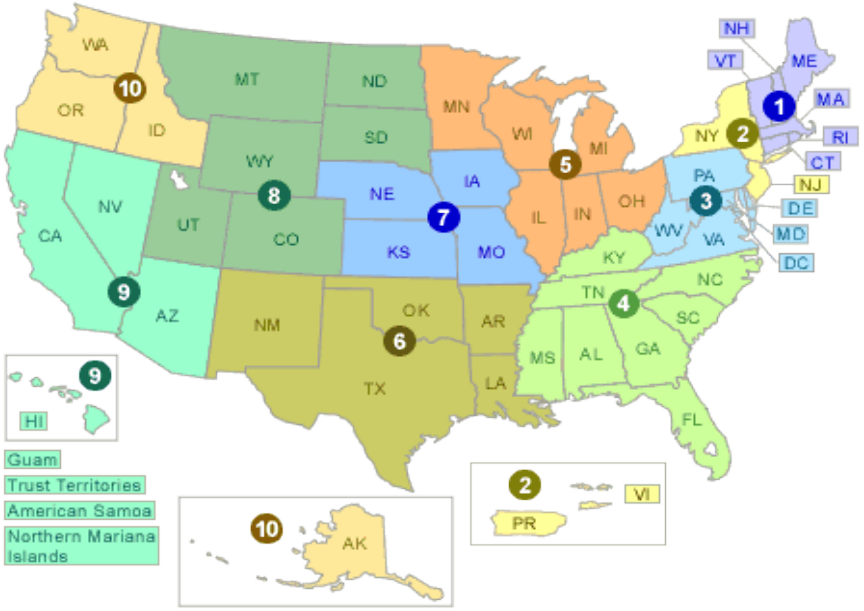
Regulatory requirements	• EPA tap water standards more onerous than FDA bottled water standards • Wastewater and stormwater runoff treatment standards rising and many systems are forced to upgrade under EPA consent decrees • Utilities will invest where needed to meet regulatory guidelines • IRS regulations govern private use of publicly funded assets
Appealing commercial aspects	• Stable consumption patterns – Steady, consistent demand of water for domestic, industrial, agricultural and thermoelectric uses – Domestic demand has grown due to larger per capita use and population growth – U.S. uses more water per capita than almost any country (average of 207 m^3/yr) – Thermoelectric water use accounts for almost half of all water used annually in the U.S. • Predictable revenue generation – Water and wastewater utilities provide consistent returns and reliable cash flows even during economic downturns • High barriers to entry limit future competition
Significant pressure on local government budgets	• Monetization opportunities – Private sector participation may increase as cities seek alternative ways to fund water systems • Increases in U.S. water rates outpaced inflation in 2010 with room for significant additional growth – U.S. average water prices increased about 9.7% in major U.S. cities in 2010 – America has the lowest percent of household income spent on water out of the 18 OECD countries – Higher water prices can support future infrastructure and new technology investments

Regulatory Requirements of Water and Wastewater

U.S. Environmental Protection Agency (EPA)

- Federal agency created in 1970 in response to environmental degradation
- Responsible for establishing and enforcing national water and wastewater regulation
- Ability to enforce regulations limited to fines, sanctions and similar measures
- Delegates some permitting, monitoring, and enforcement responsibility to states
- Provides federal funding for state and local water systems
  - 10 regional EPA offices oversee allocation
  - Two grant programs: Clean Water State Revolving Funds and Drinking Water State Revolving Funds
- EPA Executive Order 12803 categorizes water and wastewater PPPs into contract operation and disposition. Disposition agreements require EPA approval.

Map of EPA 10 Regional Offices



State and Local Governments

- State and local governments also have water and wastewater agencies, which vary in structure
- Some states, such as California, divide the responsibility for overseeing water use among several agencies
- Other states, like Florida, have centralized state oversight systems

EPA Regulation of Water Public Private Partnerships

The U.S. Environmental Protection Agency (EPA) is the federal oversight authority that regulates water and wastewater P3 agreements

- Executive Order 12803 categorizes water and wastewater P3's into two buckets:
  1. Contract Operation
  2. Disposition Agreement

EPA Categorization	Characteristics	Distinction	Transaction Subject to EPA Approval?	Transaction Subject to EPA Grant Regulations?
Contract Operation	• Private entity can perform any combination of the following: – Operate – Maintain – Replace equipment – Manage the facility • Certain infrastructure investments are permissible, subject to EPA approval	• Private entity can only receive operational revenues	No	No
Disposition Agreement	• Private entity pays a concession fee to the local and/or state government • Private entity has the ability to make infrastructure investments as necessary	• Private entity pays a concession fee to the local or state government for the right to operate	Yes	Yes

Internal Revenue Service Regulation of Public-Private Partnerships

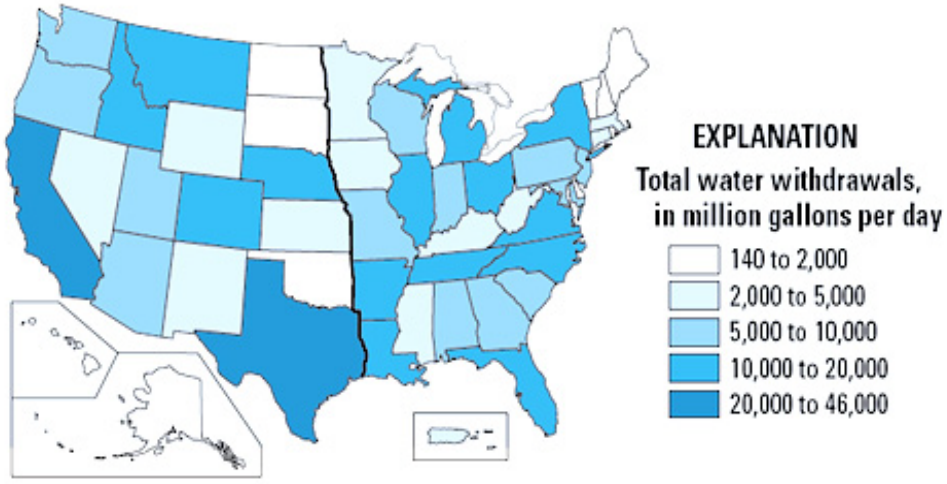
IRS removed a long-standing obstacle to public-private partnerships in 1997 and implemented Rev. Proc. 97-13 that allows for up to 20 years of private municipal facilities operation

- Compensation to the private operator is a combination of periodic fixed fee (PFF) and variable compensation (e.g., cost reduction sharing, increased revenue sharing, etc.)
- Allowable contract term length is correlated to the amount of PFF compensation that is paid to the private operator
- The longest operation contract term of 20 years is only possible if the facility is classified as a “public utility property”

Compensation Type	Contract Term	Characteristics	Cancellable?
PFF – Stage 1	5 years	<80% and >=50% of compensation from PFF	After 3 years with no penalties
PFF – Stage 2	10 years	<95% and >=80% of compensation from PFF	Yes with penalties
PFF – Stage 3	15 years	>= 95% of compensation from PFF	Yes with penalties
Public Utility Property classification	20 years	Facility must be classified as a public facility >=80% of compensation from PFF	Yes with penalties

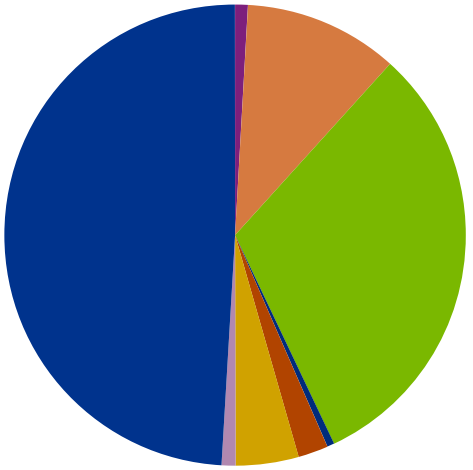
Market Structure
Water Demand and Supply

Estimated Water Use by State



Source: U.S. Geological Survey Fact Sheet 2009 (all data for 2005)

Estimated Water Use by Category



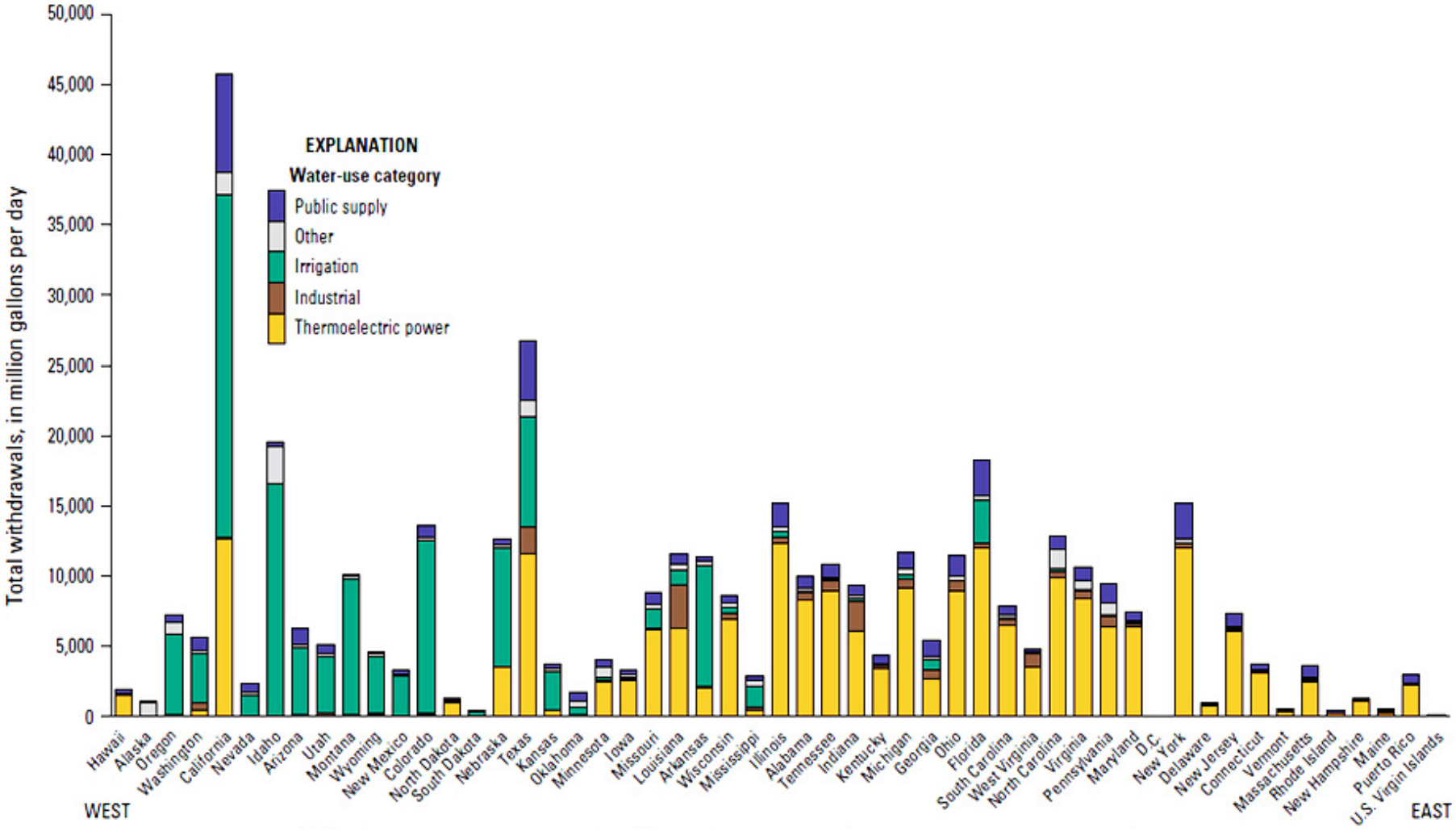
- Municipal (public supply)
- Municipal (private supply)
- Agriculture
- Livestock
- Aquaculture
- Manufacturing
- Mining
- Thermoelectric

Water Supply

- Renewable water supply in the U.S. is relatively constant
  - Groundwater supply per year is 1,300 km^3
  - Surface water supply per year is 2,913 km^3
  - Desalination and reuse technique combined total volume is less than 9 km^3 per year
- Water supply varies greatly by region
  - Water supply less able to meet demands in Western states with high population growth (CA, AZ, NV)

Source: Food and Agriculture Organization of the United Nations (FAO) AQUASTAT

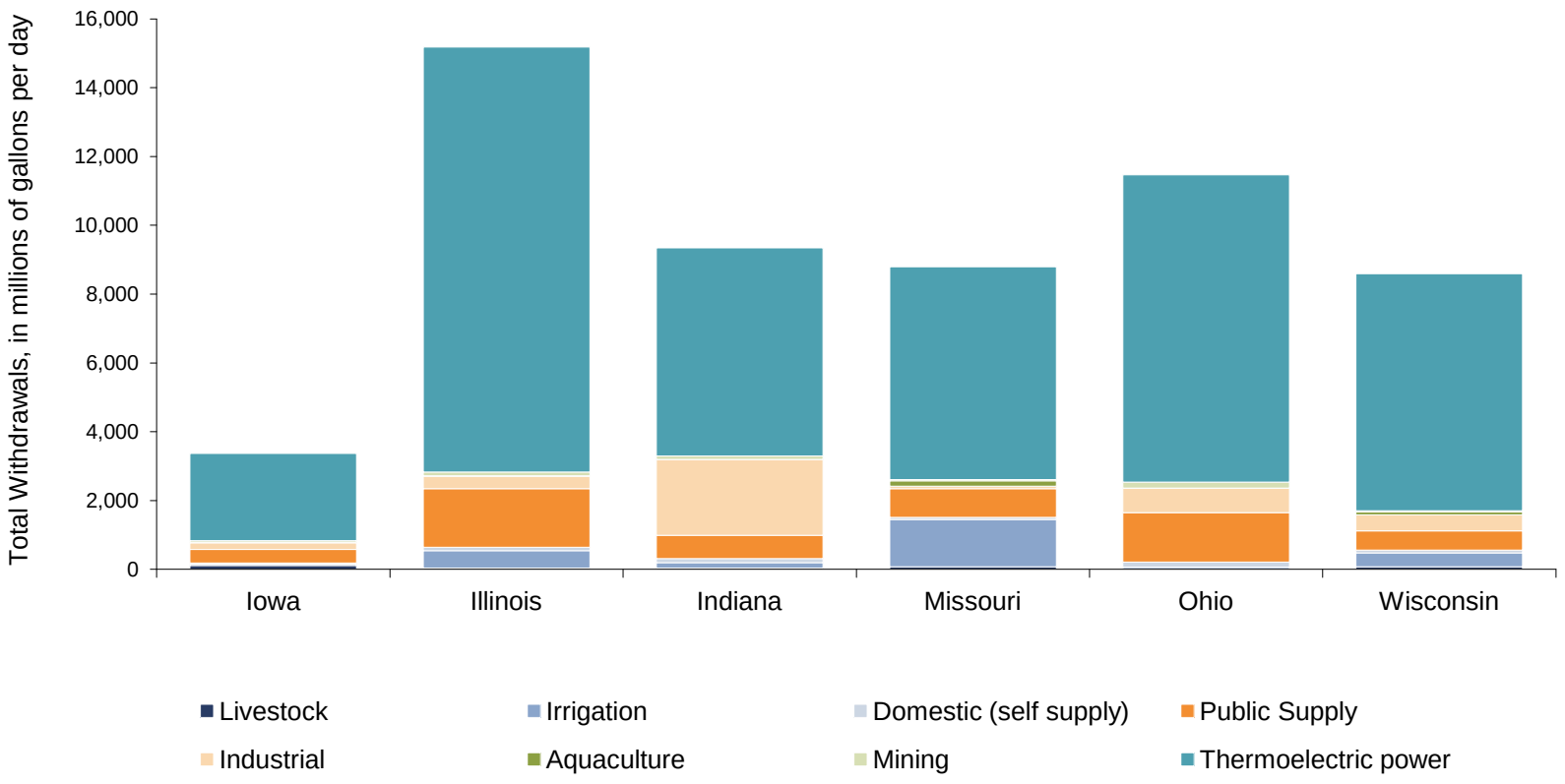
Market Structure
Water Use by Category



Source: U.S. Geological Survey Fact Sheet 2009 (all data for 2005)

Market Overview: Midwestern States

Water Use for Midwestern States



Source: U.S. Geological Survey Fact Sheet 2009 (all data for 2005)

U.S. Water Financing

User fees

- Typically covers operation of plants
- Rates often set by local board and/or governed by regulation
- Average fee in U.S. in 2009 was $2.45/m^3
- Range of fees includes connection fees and surcharges

Tax-Exempt Public Bonds

- Bond issuances often pay for capital improvements
- Tax-exempt bonds allow public utilities access to lower interest rates
- Private Activity Bonds can be used to provide tax-exempt financing for private projects with a public purpose – but these bonds are limited

Federal Funds

- Clean Water State Revolving Funds
  - Approx. $70 billion in grants since 1987
  - Low-interest loans to municipalities for public water systems
- Drinking Water State Revolving Fund

Private Investment

- Not a primary source of funding historically for U.S. water systems
- Needs of U.S. water infrastructure indicate a need for investment in future years
- Increasingly viewed as an option by public sponsors

Private Participants

Private sector participation in water serves about 30% of the U.S. population, further development faces the following challenges:

- Fragmented sector
- Subsidized public financing – tax-exempt public bonds are less expensive than private bonds
- Public perception typically opposes private-sector participation

In spite of challenges, companies have found opportunities in the water market. Some of the largest participants include:

Water Companies in U.S. Market	Overview	Geography	Revenue (2009)
American Water	Largest investor-owned water company in U.S.	Several states – largest base in PA, NJ, MI	$2.44 billion
Veolia Water North America	Largest contract operator in U.S.	National	$628 million*
United Water	Subsidiary of Suez Environment, one of world's largest water companies	National	$763 million
Aqua America	Another of largest investor-owned water companies in U.S.	East Coast and Maryland	$671 million
California Water Services	Owns six operating subsidiaries	Several Western states	$770 million
American States Water Company	Provides water and wastewater services	California and Arizona	$628 million

* Veolia revenue is for 2008 for its contract operations business

Opportunities for Private Sector Participation

Operation and Maintenance Contracts

- 5-20 year contract duration
- Widely accepted

Investor-Owned Utilities

- M&A within existing pool of private utilities (both private-private and public-private)
- Most deals are less than $100 million

Public-Private Transactions

- DBFO most widely accepted, limited investment term
- PPP concessions for new capacity is gaining popularity
- Monetization may be high profile and have significant political risks

Water Sector Opportunities

- **P3 is increasingly seen as a potential option for capital investment needs**
- **Potential grants could address some needs, but will not likely close funding gaps**
- **Recent market activity sets precedent for strong growth**
- **Political sensitivity/acceptability issues are greater on drinking water projects**
- **Best opportunities appear to lie in desalination, wastewater treatment and bulk supply**
  - Offtaker is typically a public entity
  - Less market risk through single offtaker
  - Single site (inside the fence) facilities limit technical and construction risks
  - WW projects driven by EPA decrees, expedient action required

Appendix 1
Case Examples

Case Studies

Santa Paula, California
Water recycling facility replacement

- 30 year Design-Build-Finance-Operate and Maintenance (DBFOM) contract with Santa Paula Water LLC (a company formed by Pacific Environmental Resources, Corp. and Alinda Capital)
- $47 million tem loan tranche used to design, build, finance and operate a water recycling facility in the city of Santa Paula
- Financial close reached March 10, 2009
- 4.2 MGD facility capacity to treat and reclaim wastewater
- Operations building includes: processing equipment, lavatory, workshops, break rooms and administrative offices
- Design and operations encompass new technology e.g. noise and odor control, disinfection etc.
- Environmentally friendly design e.g. aesthetically pleasing design, small footprint etc.

Tampa Bay Water
Surface water treatment plant development

- In 2000,Tampa Bay Water entered into a 15-year design-build-operate (DBO) agreement with Veolia Water
- $144 million, 15-year agreement with an optional 5-year renewal
- 250,000 cubic meters/day regional surface water treatment plant
- Contract includes performance standards for ensuring water quality, water production, chemical and electrical usage, as well as compliance with all federal and state drinking water regulations
- Veolia provides water at 53.9 cents per 1000 gallons, which is significantly lower than TBW's original estimates
- Second-largest water production DBO contract in the United States
- Facility began operation in September 2002 on time and on budget

Case Studies

Indianapolis, Indiana
Operations of city drinking water services

- In 2002, Indianapolis entered into a 20-year, $1.5 billion contract with Veolia Water North America to manage and operate its drinking water services
- Additionally, the company will oversee more that $400 million in capital improvement projects.
- In addition to a base contractual fee, an incentive-based performance plan provides payment of fees based on meeting 40 quantifiable performance metrics
- 1.1 million people served
- 7.06 billion cubic feet of water distributed annually
- 4,000 miles of water distribution system
- Largest water sector public private partnership in the U.S., annual revenues of $45.9 million
- In 2005, the drinking water system was awarded with the ISO 9001 and ISO 14001. The first time that a U.S. water company achieved accreditation for both quality and environmental responsibility
- United States Conference of Mayors 2006 Excellence in Public Private Partnerships Award

Lower Colorado River Authority (LCRA)
Sale of water and wastewater utilities

- LCRA put on sale its 32 water and wastewater systems across Central Texas in February 2011
- Its water/wastewater utility revenues are budgeted at $36 million a year
- 12,500 people served
- Assets for sale include: water intakes, water and wastewater treatment plants, pumps, storage tanks collection and distribution pipes, and various associated facilities
- Interested buyers submitted preliminary bids to BMO Capital Markets, the LCRA's financial consultant, on 23 May and a shortlist was selected mid-June. A decision is expected in late September.

Case Studies

Cranston, Rhode Island
Wastewater system lease

- Cranston signed a 25 year lease and service agreement with Triton Ocean to manage, operate and maintain it's wastewater systems
- $400 million lease arrangement value
- Assets included: wastewater treatment system, collection system, pumping stations, industrial pretreatment repair and maintenance distribution system
- Concessionaire provides the municipality up-front cash to retire debt and address other spending priorities; improves the infrastructure in the early years; and manages, operates and maintains the entire system
- Triton provides the City with an upfront payment of $48 million in order to defease $26 million Sewer Fund debt, repay the General Fund $8.6 million owed by the Sewer Fund, eliminate the $6.9 million General Fund deficit, and establish a $6 million General Fund surplus
- $30 million of private financing for the State and federally mandated capital improvements were committed by the concessionaire

Carlsbad Seawater Desalination
Greenfield Desalination Plant

- Carlsbad signed a 30 year concession with Poseidon Resources Inc. (concessionaire) to design, build, finance, operate and maintain the seawater desalination plant
- 50m gallon-per-day seawater desalination facility, which will be developed next to the existing Encina power station.
- Converts the seawater run-off from the power station into potable drinking water to serve San Diego's distribution system, providing water to around 300,000 residents or 9% of the county's supply.
- The project has secured 30-year purchase agreements with nine municipal water agencies in San Diego county.
- Under the agreements, the price of water provision is capped so as not to exceed the rates of the existing supplier, the San Diego County Water Authority (SDCWA).
- One of the first, large-scale privately financed desalination plants in the US

Useful Resources

2002 EPA Clean Water and Drinking Water Infrastructure Gap Analysis

- Although it was published 6 years ago, it is still the most cited for the extent of the water and wastewater needs in the U.S.
- http://www.epa.gov/safewater/gapreport.pdf

American Society for Civil Engineers Report Card published in 2005

- http://www.asce.org/reportcard/2005/page.cfm?id=203

Water Partnership Council also developed a guide to PPPs in the U.S.

- http://www.waterpartnership.org/publications/index.html (just fill out the form, submit and download)

April 2008 report on Water/Wastewater PPPs in the U.S. from the EPA

- http://www.epa.gov/efinpage/publications/PPP_4-08_Final.pdf

A presentation from CH2MHill on when to do water PPPs

- http://www.omi.ch2mhill.com/communities/images/WhenToP3.pdf

American Water White Paper on Water PPPs

- http://files.shareholder.com/downloads/AMERPR/407078680x0x188153/38598562-1200-4545-A08E-63C9B6D5EE85/Challenges%20In%20The%20Water%20Industry%20PPP041608.pdf

Water & Wastewater Case Studies

- NCPPP http://www.ncppp.org/cases/index.shtml
- WPC http://www.waterpartnership.org/studies/index.html

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Financing Options for Water Infrastructure Investments: Traditional Options

Gerry Bakker and Andy Bielanski, U.S. EPA

Water Infrastructure Financing in Illinois – The State Revolving Fund (SRF) Programs

- Drinking Water SRF Program (DWSRF)
  - Federal Capitalization
  - Program administration by IEPA
- Clean Water SRF Program (CWSRF)
  - Federal Capitalization
  - Program administration by IEPA
  - Illinois' "Clean Water Initiative" (CWI), and its coordination with the CWSRF

Drinking Water SRF

- Federal funding awarded to States to capitalize funds that provide subsidized interest rate loans to local agencies for eligible water projects
- Eligible Activities
  - Installation and replacement of failing treatment facilities
  - Storage facilities
  - Transmission and distribution systems
  - Projects to consolidate water supplies
- FY 2013 federal appropriation of $861 million
- Illinois allocation of $31.8 million

IEPA 2013 Drinking Water SRF Intended Use Plan (IUP)

- Available funding: $60 million
  - USEPA funds, State Match, loan repayments, etc.
- Subsidized SRF Loan Interest rate: 1.93%
  - Considerable savings from market-rate loans
  - Principal forgiveness for eligible communities
- Maximum Term 20 years
- Scoring/Ranking of Projects
- IUP administration
  - Subject to public comment
  - Posted on IEPA website

Clean Water SRF

- Federal funding awarded to States to capitalize funds that provide subsidized interest rate loans to local agencies for eligible wastewater projects
- Eligible Activities
  - Build/improve water treatment plants
  - Improve collection systems, combined sewer systems
  - Non-point source projects
- FY 2013 federal appropriation of $1.38 billion
- Illinois allocation of $61 million

IEPA 2013 Clean Water SRF Intended Use Plan (IUP)

- Available funding: $300 million
  - USEPA funds, State Match, loan repayments, etc.
- Subsidized SRF Loan Interest rate: 1.93%
  - Considerable savings from market-rate loans
  - Principal forgiveness for eligible communities
- Maximum Term 20 years
- Scoring/Ranking of Projects
- IUP administration
  - Subject to public comment
  - Posted on IEPA website

The Illinois "Clean Water Initiative" (CWI) & the Clean Water SRF Program

- CWI Expands the Funding Capacity of the CWSRF
- Proposed Bond Sale may provide $1 billion
- Bonding may also provide State Match needed to access Federal Capitalization Grants

Contacts & Websites

- Geoff Andres, SRF Manager, IEPA
- 217-782-2027
- geoff.andres@illinois.gov
- SRF Information & IUPs:
  http://www.epa.state.il.us/water/financial-assistance/state-revolving-fund.html
- CWI Information:
- http://www.epa.state.il.us/water/financial-assistance/clean-water-initiative/index.html

- Gerry Bakker, USEPA
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Role of Rates in Full-Cost Pricing in Conservation and Water Supply Management

Margaret Schneemann, Illinois-Indiana Sea Grant/Chicago Metropolitan Agency for Planning

Water Rates, Revenue, Risk

Presented to

DuPage Water Commission 2013 Water Management Workshop Series

Workshop 4: Water Rates and Revenue

August 28, 2013

Presented by

Margaret Schneemann, Water Resource Economist

Chicago Metropolitan Agency for Planning

University of Illinois Extension

Sea Grant Illinois - Indiana

Elected and appointed leaders have a choice to make about how to manage water assets

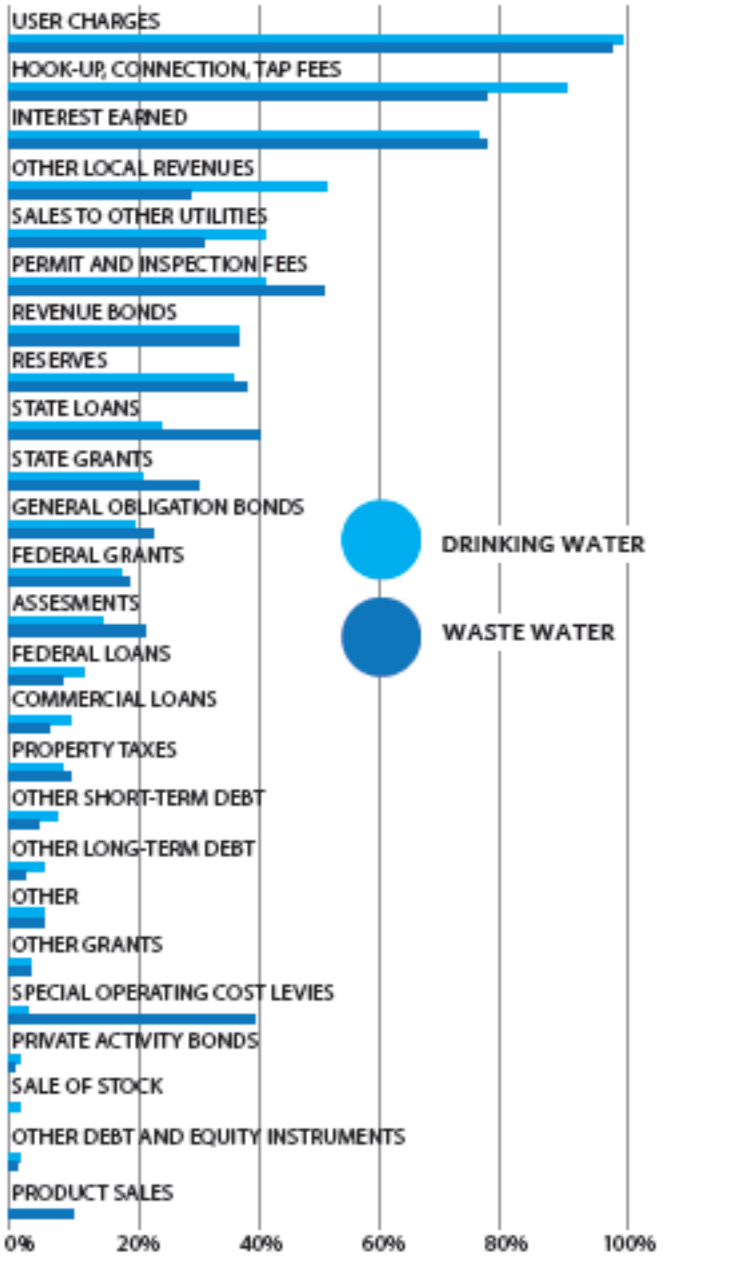
Avoid the issue and risk…

- emergency repairs
- business interruption
- public health impacts
- regulatory problems
- higher long-term costs

OR…

Invest proactively in sustainable management of water infrastructure assets to continue providing high-quality, reliable service. (at a lower long-term cost)

Figure 1. Estimated percentage of utilities using source of funding

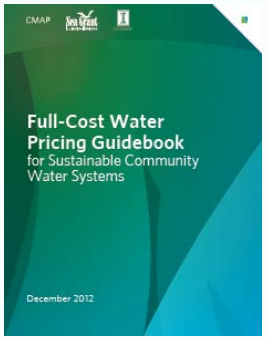


Source: U.S. General Accounting Office Water Infrastructure: Information on Financing, Capital Planning and Prioritization, August 2002.

Revenue sufficiency

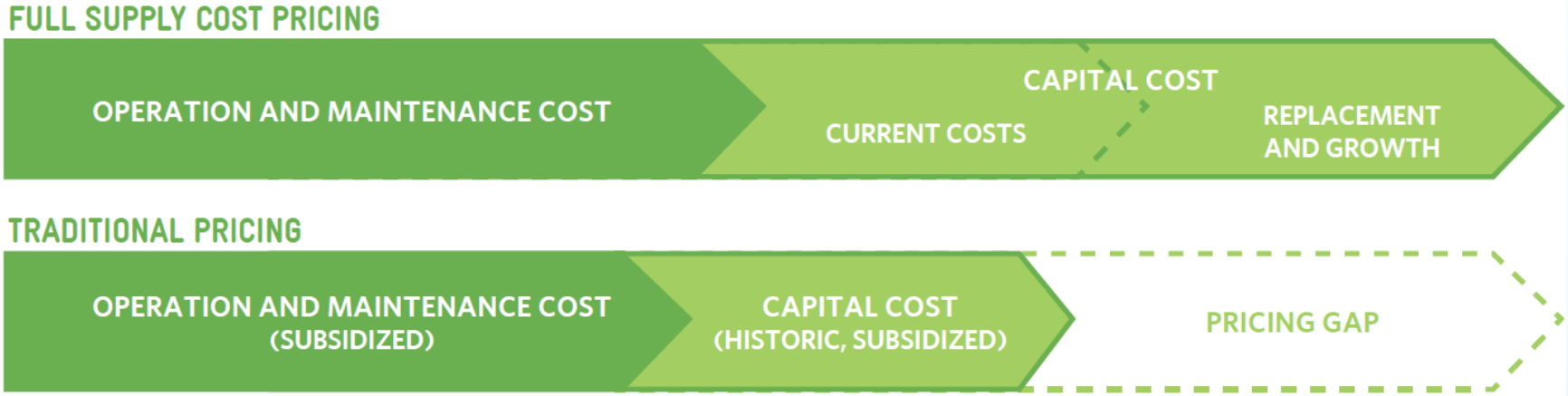
The American Water Works Association (AWWA), has issued a policy statement defining and supporting specific full-cost pricing policies to achieve sufficient revenue recovery, including[19]:

- Rates covering operation and maintenance, capital costs, working capital and required reserves.
- Utility accounting system maintained separate from other municipal functions.
- Use of a uniform system of accounts based on generally accepted accounting principles.[20]
- Fair and equitable cost allocation of water service costs across customer classes.
- Maintaining a record of assets for use in infrastructure management and in communicating needed system improvements and their costs.



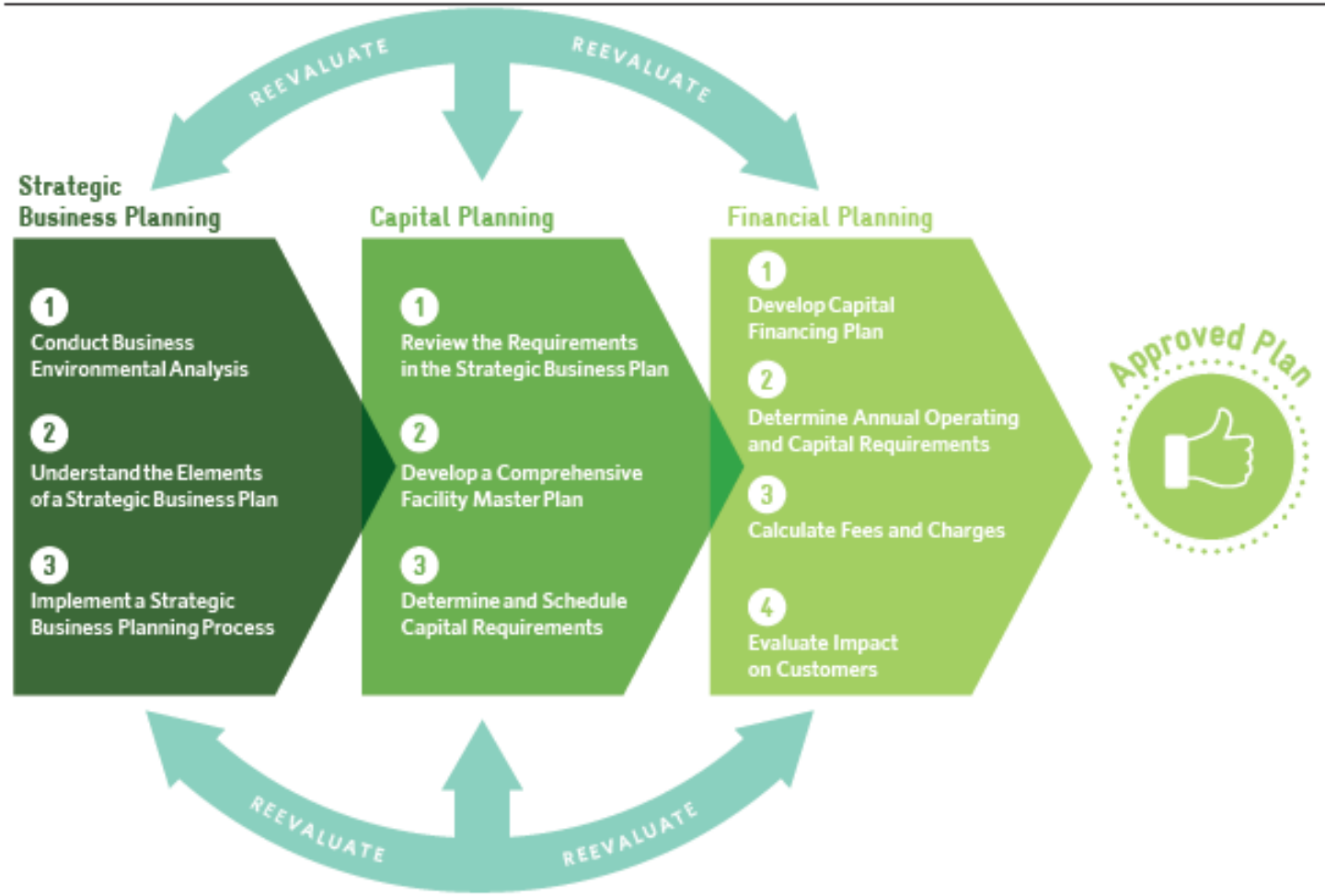
The Pricing Gap

Adjusting price towards full supply cost.



Source: Figure adapted from Rogers, P., R. Bhatia, and A. Huber. 1997. Water as a social and economic good: how to put the principle into practice. Paper prepared for the meeting of the Technical Advisory Committee of the Global Water Partnership in Namibia and Marbek Resource Consultants Analysis of Economic Instruments for Water Conservation Final Report to the Canadian Council of Ministers of the Environment: Water Conservation and Economics Rask Group.

Figure 5. Planning context of full-cost pricing

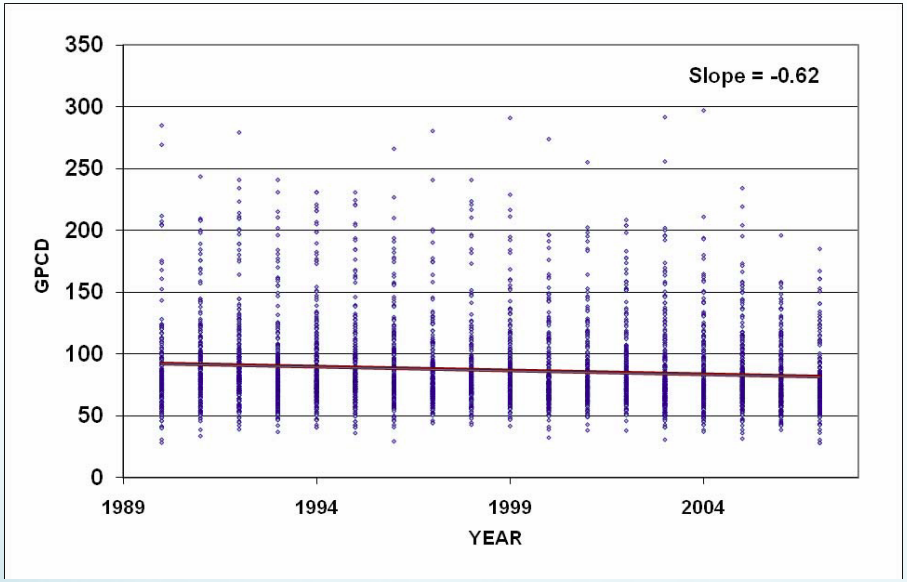


Source: Adapted from Raftelis, George A. Water and Wastewater Finance and Pricing: A Comprehensive Guide. Third Edition 2005.

Activity & Discussion:
Capital Improvement Plan

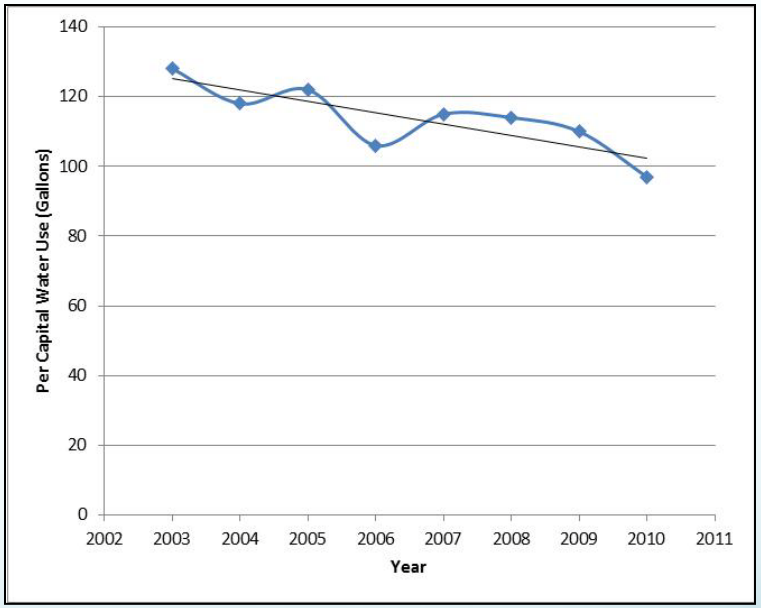
Trends in Water Demand
Temporary or the New Normal?

Illinois



Source: **Residential Water Use in Northeastern Illinois:** Estimating Water-Use Effects of In-Fill Growth versus Exurban Expansion Prepared by: Ben Dziegielewski August 25, 2009

Community Example



Source: Evanston Water Conservation/Efficiency Plan CMAP 2012

Activity & Discussion:
Pumping Data

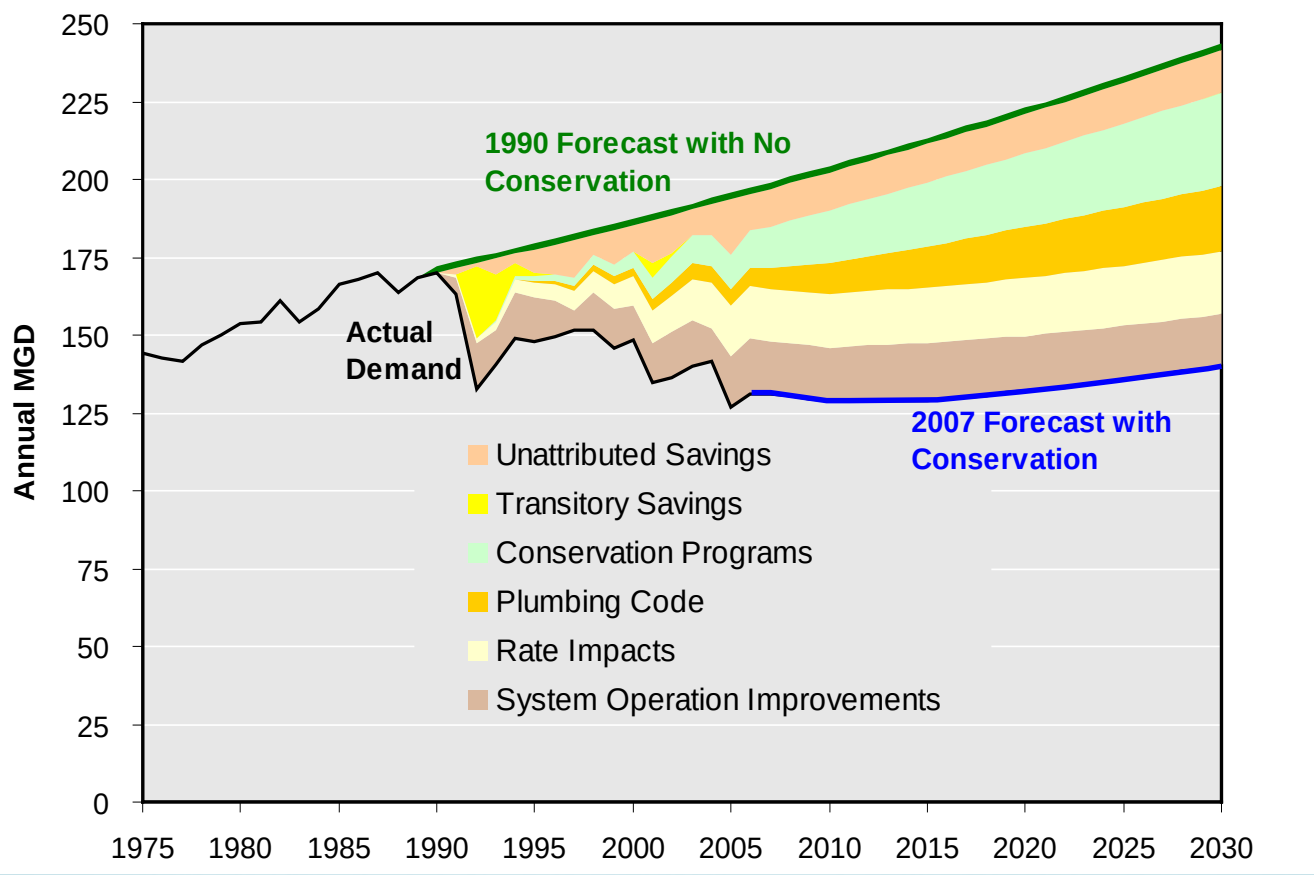
Understanding Water Use Trends

- Short & Middle Term Factors
  - Weather Patterns (wet weather/drought)
  - Cyclical Economic Conditions
- Long Term Factors
  - Policy
  - Efficiency Improvements
  - Water Conservation Efforts

Service Area and Population Heterogeneity

- Populations Served
- Climate Conditions
- Sector Demand
- Age of Housing Stock
- Average Lot Size
- Average Income
- Economic Development Policies
- Local Ordinances
- Other Variables
- Household Size
- Education Level
- Household Income
- Housing Characteristics
- Owned Versus Rented
- Other Variables
- Unobserved Variables

Seattle Public Utilities
Water System Plan

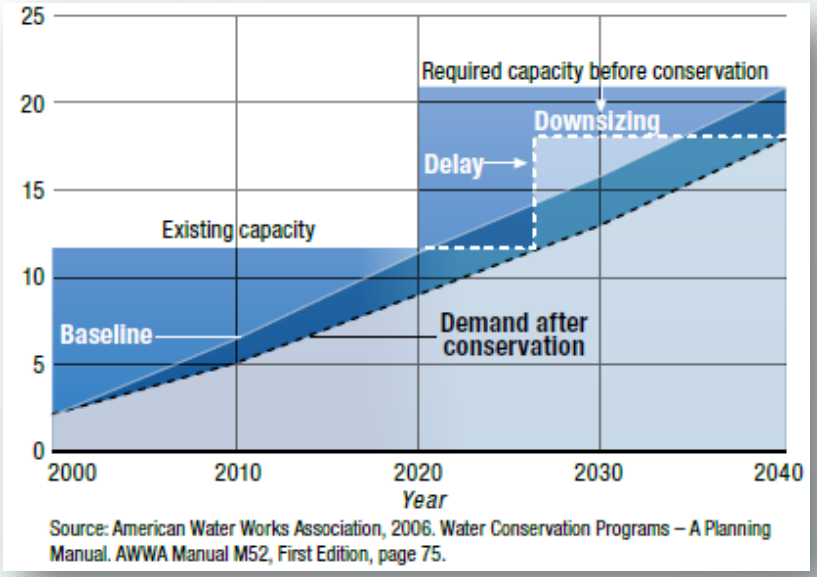


Source: Dietemann, Al. Seattle Public Utilities 2008.

Benefits (Avoided Costs) of Demand Reduction

Benefits to Utilities

- Deferral and/or downsizing of capital facilities
- Reduced operation & maintenance expenses
- Reduced water purchases
- Enhanced reputation and customer relations
- Avoided wastewater treatment costs
- Reduced energy costs



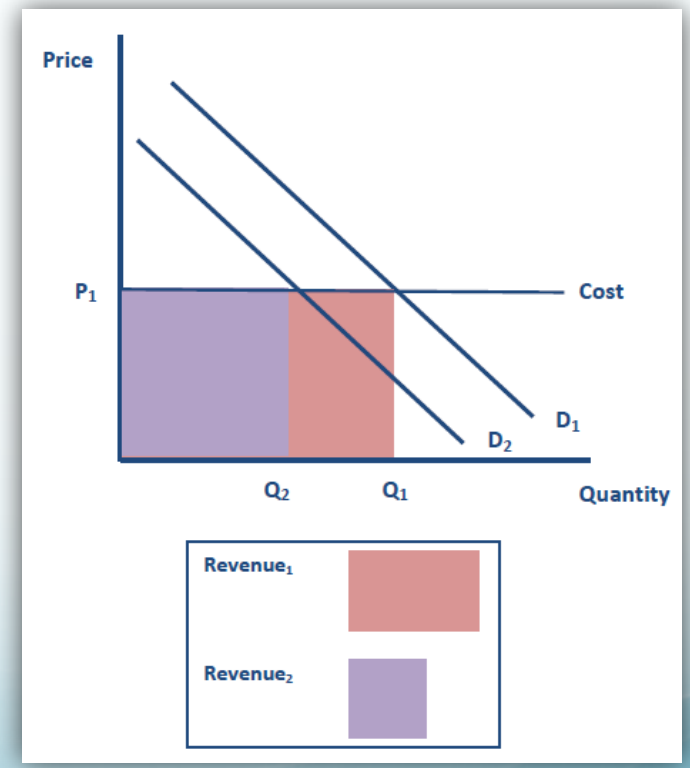
Source: American Water Works Association, 2006. Water Conservation Programs – A Planning Manual. AWWA Manual M52, First Edition, page 75.

Costs of Conservation Planning

Demand ↓ →Revenue ↓
ceteris paribus

Conservation is not free

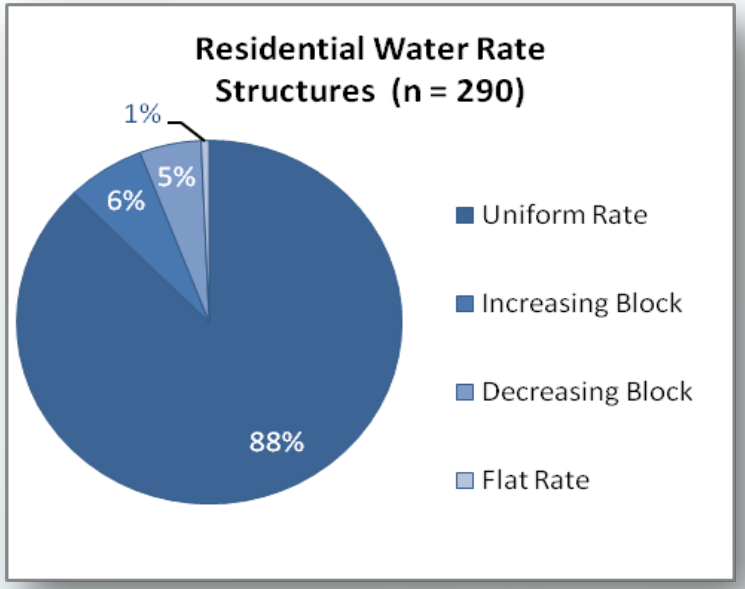
- Planning Costs
- Plan Implementation
  - Cost of recommended strategies
  - Revenue adjustments



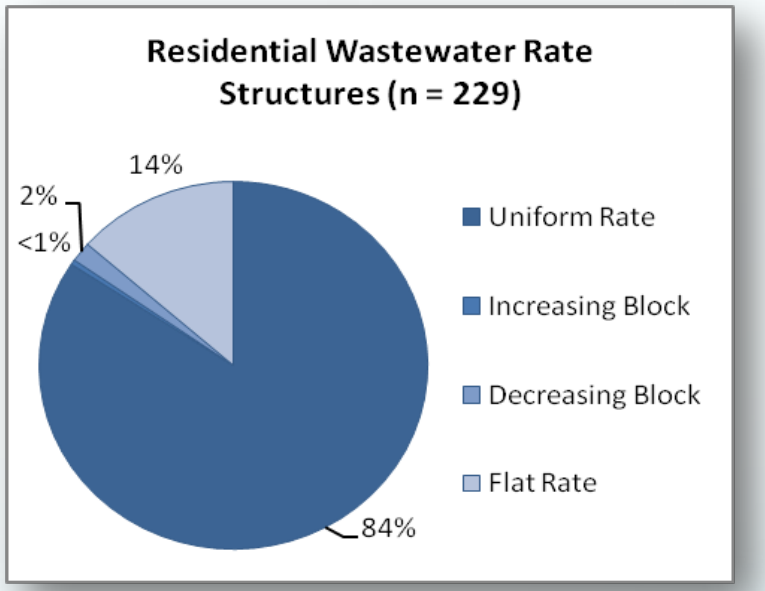
Rate Structure: Volumetric Charges

NE IL utilities with service population greater than 1,000

Water Rate Structure



Wastewater Rate Structure



Uniform Rate: Volumetric Charge = $p_1 x^*$

Increasing Block (2 Blocks): Volumetric Charge = $p_1 x_1 + p_2 (x^* - x_1)$ where $p_1 < p_2$

Decreasing Block (2 Blocks) Volumetric Charge = $p_1 x_1 + p_2 (x^* - x_1)$ where $p_1 > p_2$

Flat: Volumetric Charge = FC

Demand Reduction Impacts

- ↓ Revenue
- ↓ Costs
  - Operational Costs
  - Capital Costs

Short-term impact:

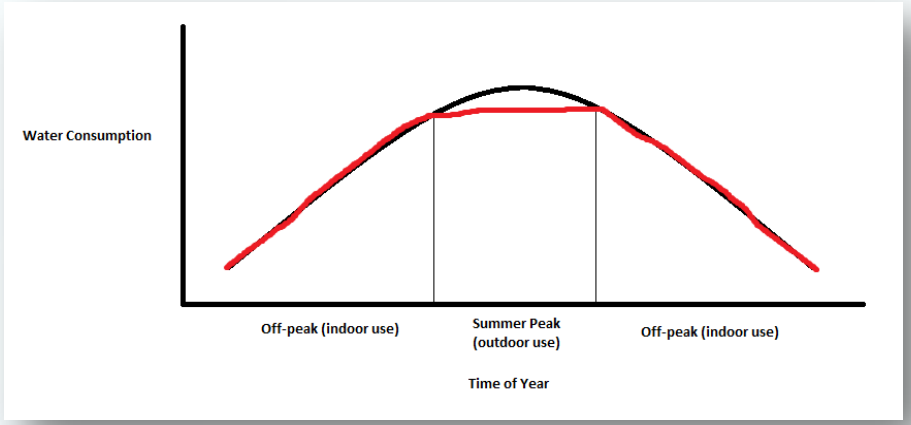
- Avoided short-term costs

Long term impact:

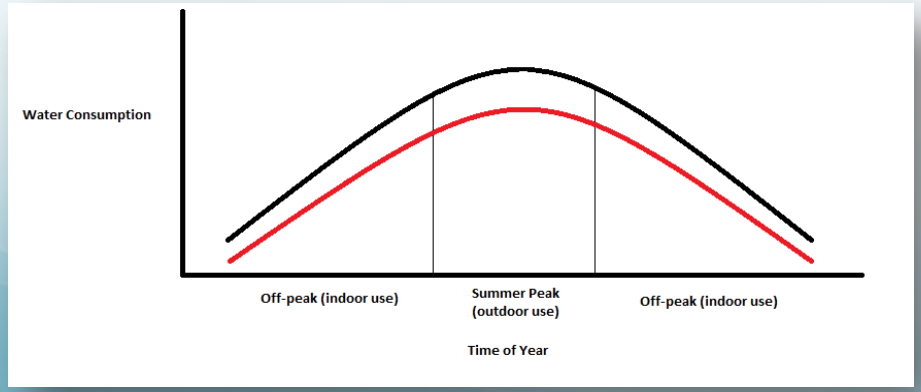
- Avoided capital costs

Water Demand Trend Characteristics

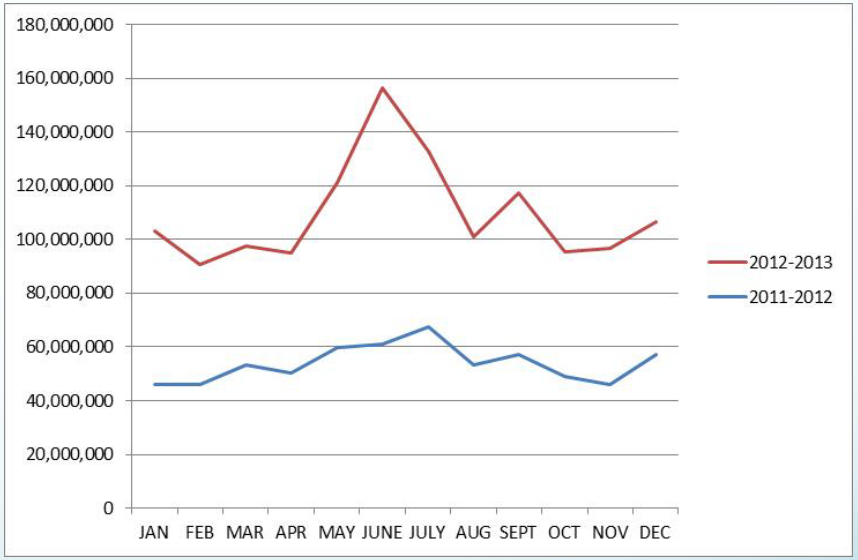
Peak Demand Reduction



Average Demand



Activity & Discussion: Pumping Data



Interaction of Rates and Demand

$$\text{Price elasticity of demand} = \frac{\text{Percentage Change in Quantity Demanded}}{\text{Percentage Change in Price}}$$

Elasticity Value		Definition	Price Increase Impact on Revenue
Greater than 1	Elastic	Percent change in quantity demanded is *greater* than the percent change in price	Revenues fall
Equal to 1	Unit Elastic	Percent change in quantity demanded is *equal* to the percent change in price	Revenues constant
Less than 1	Inelastic	Percent change in quantity demanded is *less* than the percent change in price	Revenues increase

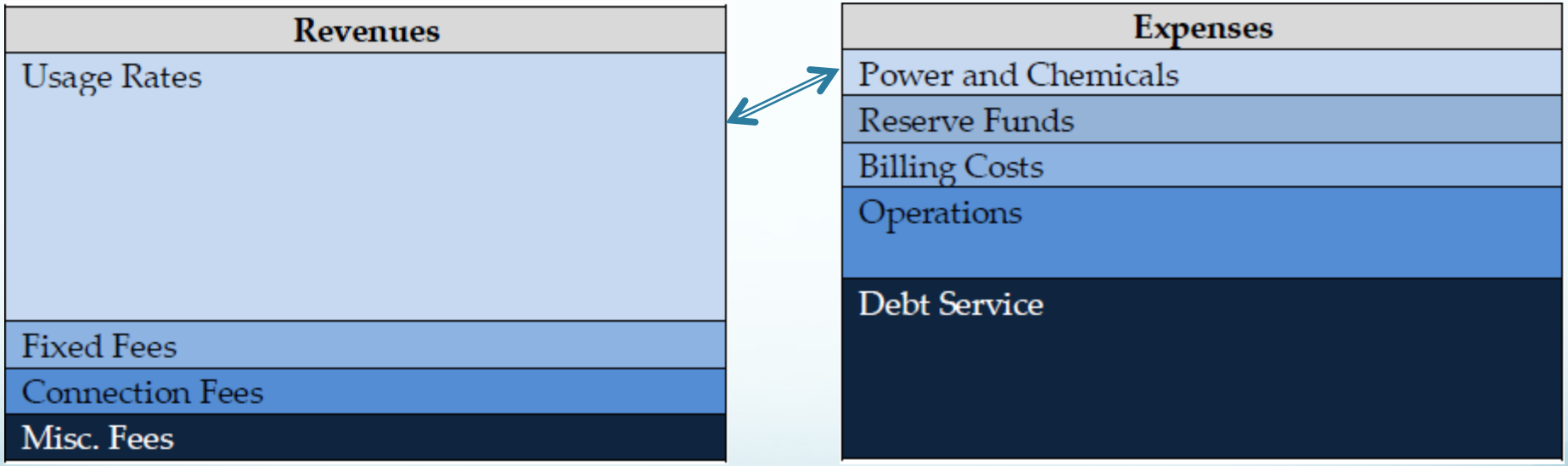
Interaction of Rates and Demand

- Water demand often treated as non-responsive to price (perfectly inelastic) in water planning.
- Empirical research shows that price elasticity coefficients are not zero (customers respond to price).
- Financial planning for capital improvements becomes more challenging…
- …And economic methods of demand (sales) forecasting incorporating price effects is increasingly important.

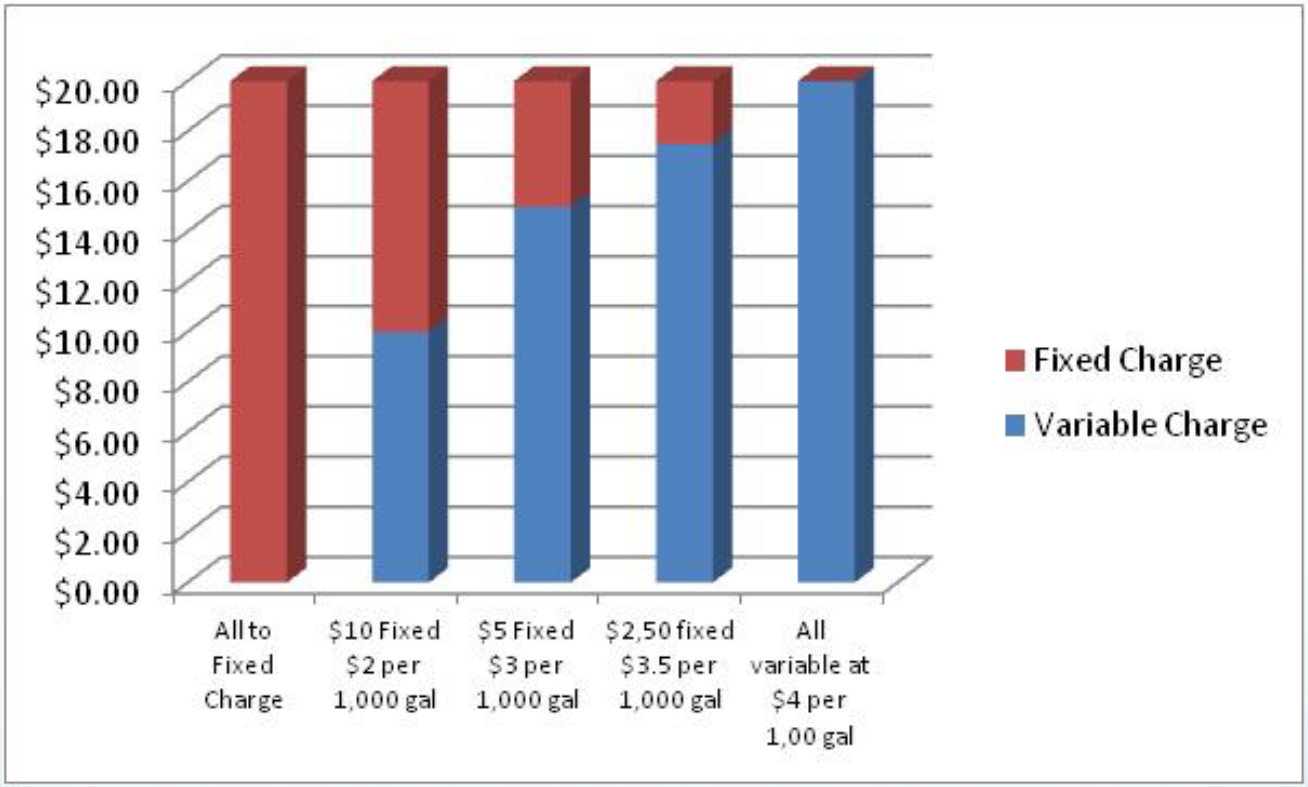
Residential water demand is inelastic

- Residential water demand price elasticity ~0.33 to 0.51
- Means: 10% increase in price leads to 3.3% to 5.1% decrease in quantity demanded
  - Short-run ~ 0.38
  - Long-run ~ 0.64
  - Indoor ~ 0.04 to 0.13
  - Outdoor ~ 0.31 to 0.38
- Northeastern Illinois Region: 0.15

Revenue-Expense Mismatch



Rate-design for $20 revenue recovery



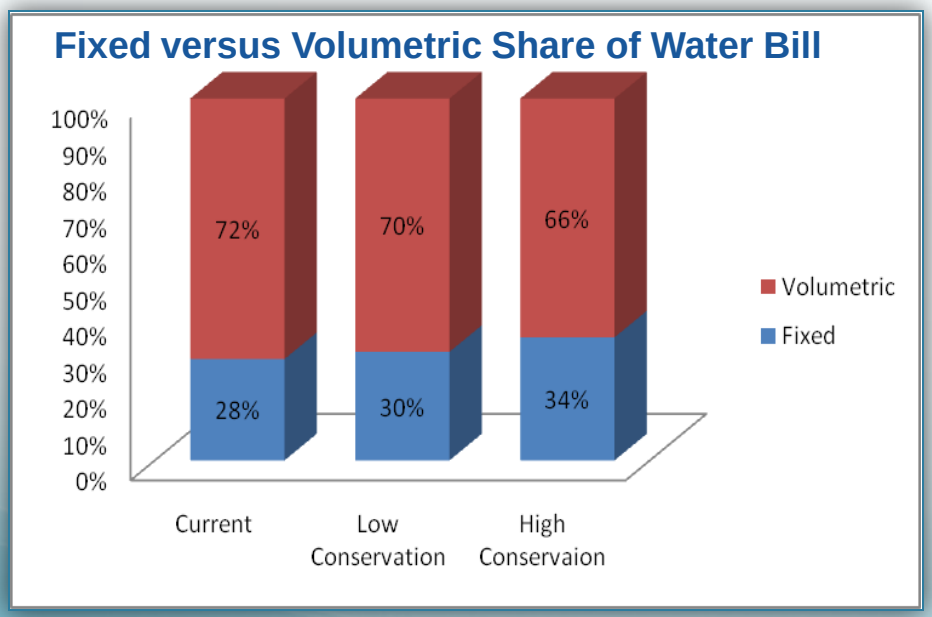
	All to Fixed Charge	$10 Fixed $2 per 1,000 gal	$5 Fixed $3 per 1,000 gal	$2,50 fixed $3.5 per 1,000 gal	All variable at $4 per 1,00 gal
Variable Charge	$0.00	$10.00	$15.00	$17.50	$20.00
Fixed Charge	$20.00	$10.00	$5.00	$2.50	$0.00

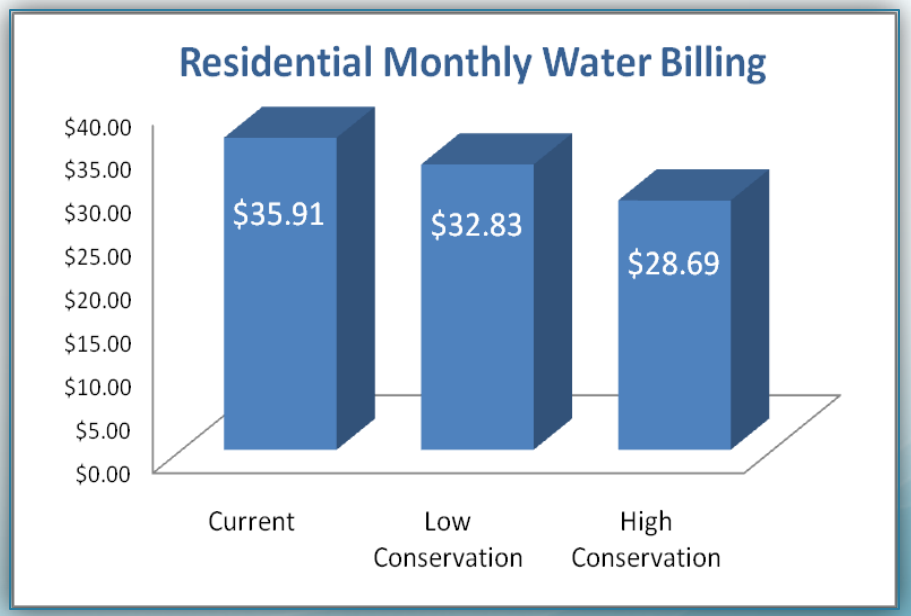
Source: Adopted from Beecher (2009)

Fixed versus Volumetric Share of Water Bill
NE IL utilities with service population greater than 1,000

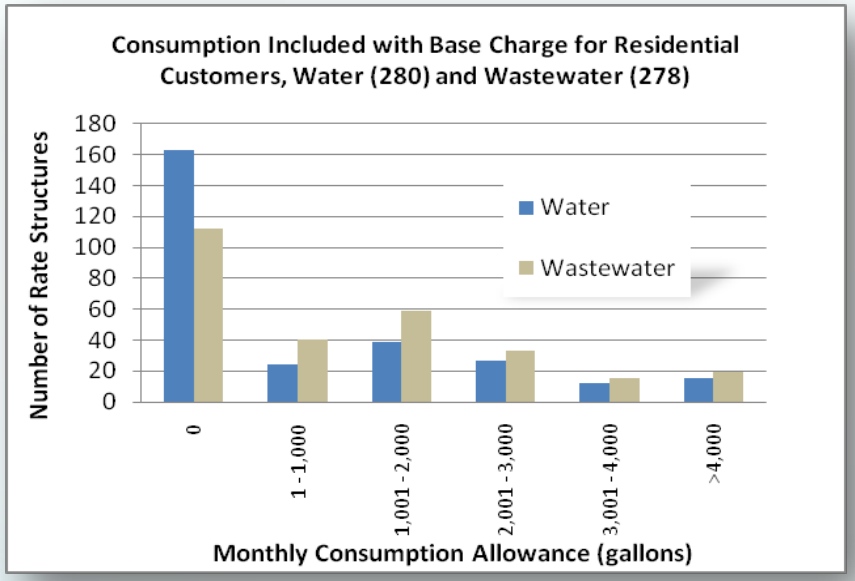
Regional conservation potential of non-price conservation programs

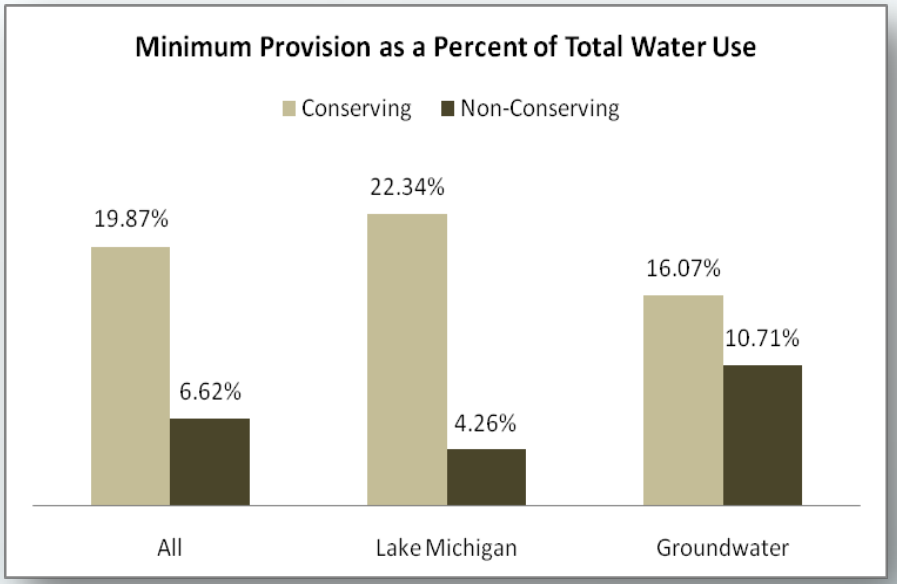
- NE IL Average 90 gpcd
- Low Conservation 10 gpcd decrease
- High Conservation 25 gpcd decrease





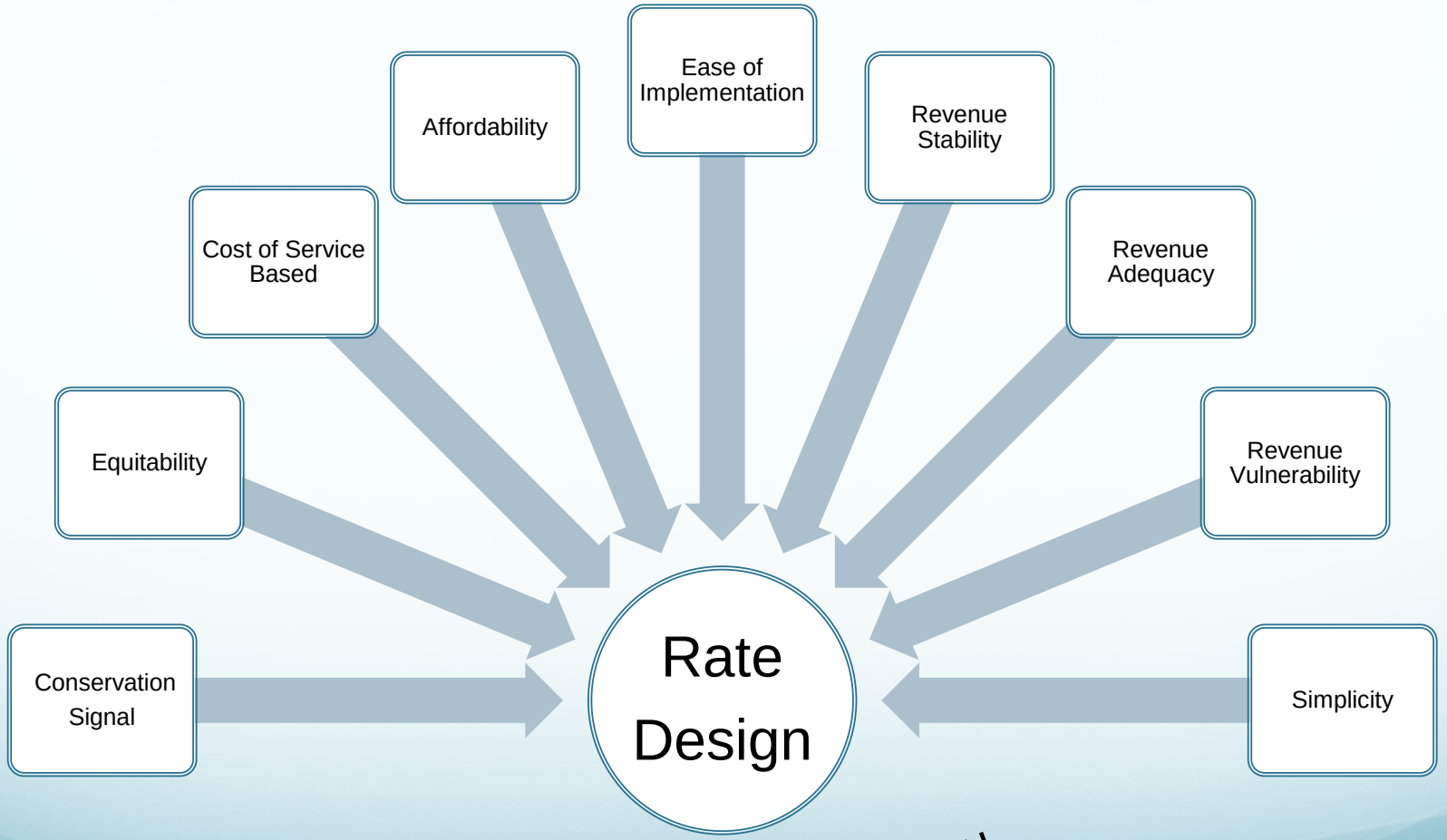
Rate Structure: Base Charge and Provision





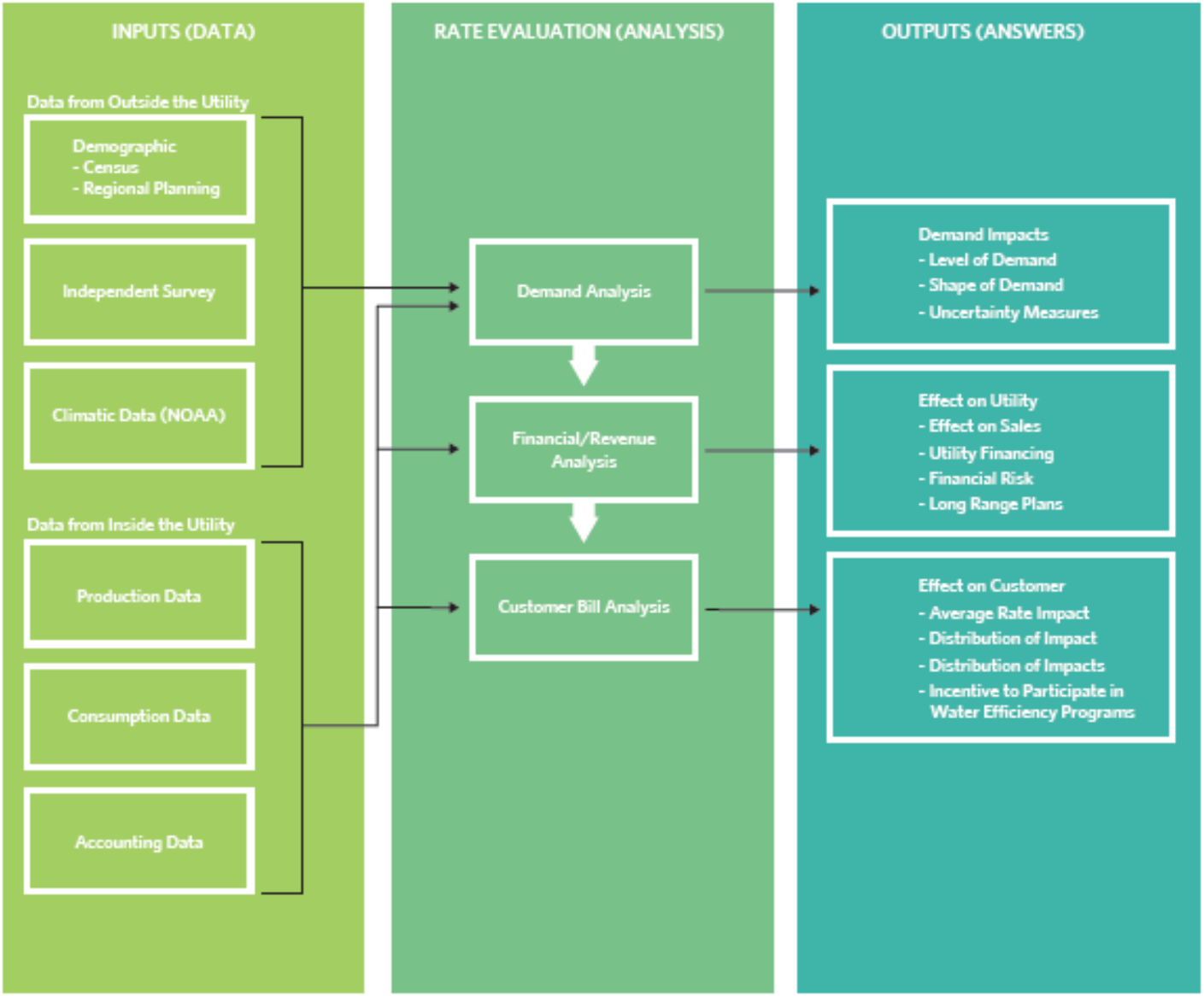
Balancing Fixed and Variable Charges

Rate Objectives: Art, Politics, Science



Activity & Discussion: Rates

Figure 10. The rate evaluation process



Source: Adapted from Chestnutt, Thomas A. et. al. *Designing, Evaluating, and Implemeting Conservation Rate Structures*, July 1997.

Revenue Risk: Key Questions

- Competitiveness
- Affordability
- Revenue Sufficiency
- Revenue Vulnerability
- Conservation Pricing

Policy Analysis of a Price Adjustment

Price plays a critical role in finding the right balance between supply and demand. The demand for water is a downward sloping curve, meaning that as the price of water increases, the quantity of water demanded decreases. As volumetric price increases, less urgent, or discretionary water needs (outdoor lawn watering) are reduced so that essential water needs can be met (drinking, businesses). Users also adopt more efficient ways of meeting their essential water needs, such as installing more efficient plumbing fixtures. An efficient level of water use is attained where supply and demand are balanced.[51]

When volumetric price increases, there are three policy impacts to consider:

- **Pricing effect on consumer well-being:** Increasing volumetric prices results in consumers using less water and pay a higher price per unit of water consumed. The total water bill may remain unchanged, increase, or even decrease, depending on consumers response to the price change and the rate structure.[52]
- **Pricing impact on utility revenue:** When volumetric price increases, revenues per unit sold increase, resulting in a gain to producers; however, utilities also sell less water, placing downward pressure on revenue. The net impact on producers depends on both the rate structure as well as the consumer response to the price change.[53]
- **Pricing impact on utility production costs:** Because the utility is selling less water, the production costs are potentially decreased; it does not have to process and deliver as much water.

Full-cost pricing can also be implemented in conjunction with a demand management (water conservation) program. When this is the case, additional policy impacts to consider include:

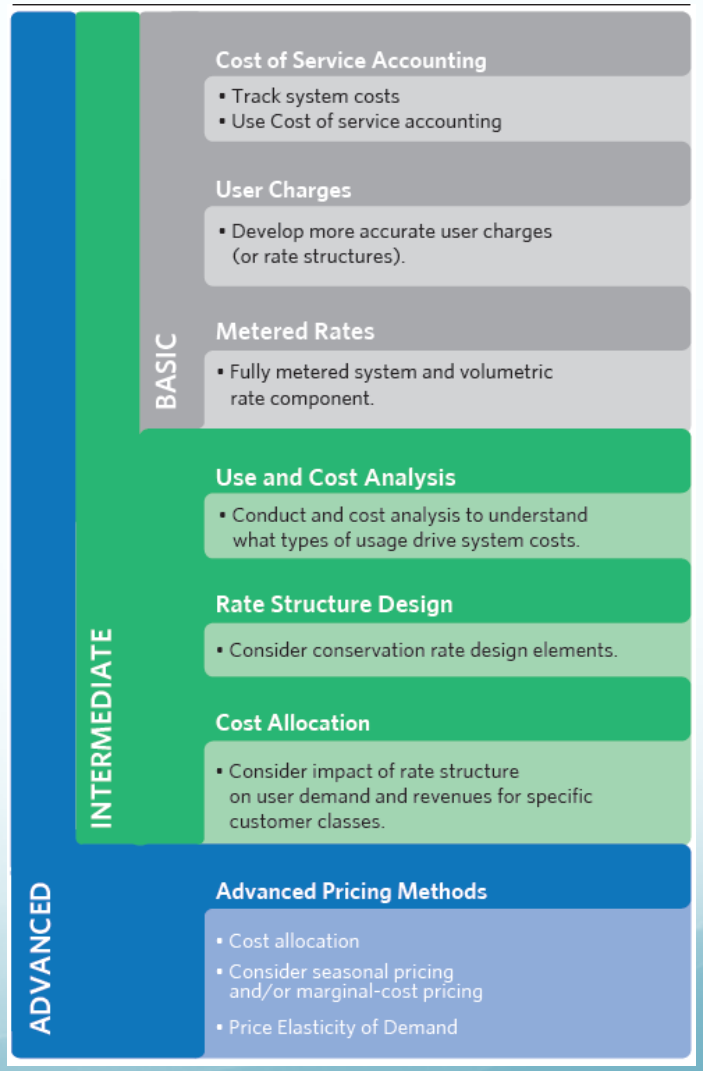
- **Conservation effect on consumer well-being:** Decreasing use places downward pressure on water bills, after accounting for any outlays on water-conservation and loss in consumer values from reduced water use.
- **Conservation impact on utility revenue:** When demand decreases, revenues decrease, resulting in a loss to producers.[54]
- **Conservation impact on utility production costs:** Reduced demand potentially enables water to be supplied at a lower cost (after accounting for any conservation program costs).

Looking at these policy impacts together, the benefits of implementing full-cost pricing in conjunction with a water efficiency/conservation program are apparent—full-cost pricing provides sufficient revenue while water efficiency/conservation programs allow residents to manage their water bills.

Rates, Revenue, and Water Conservation Planning

Water Rates

- Used to recover costs of conservation program
- Used to influence behavior - as part of the conservation program (price elasticity of demand)



Water Conservation and Revenue

Programs

Decrease quantity sold (Q)

↓

Total revenue falls

Pricing

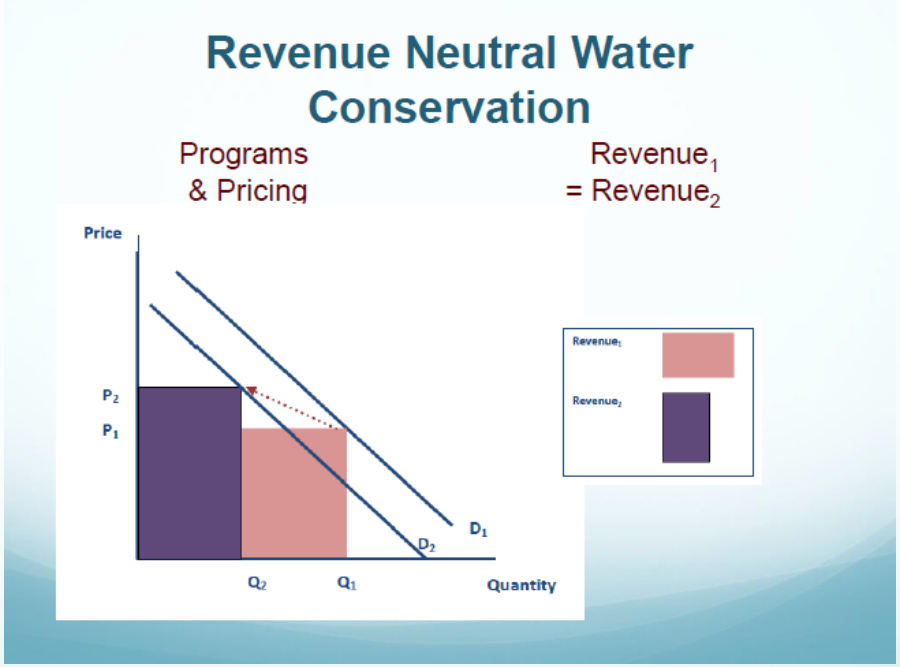
Increase price

↓

Decrease quantity sold (Q)

↓

Total revenue increases



Metrics for Benchmarking

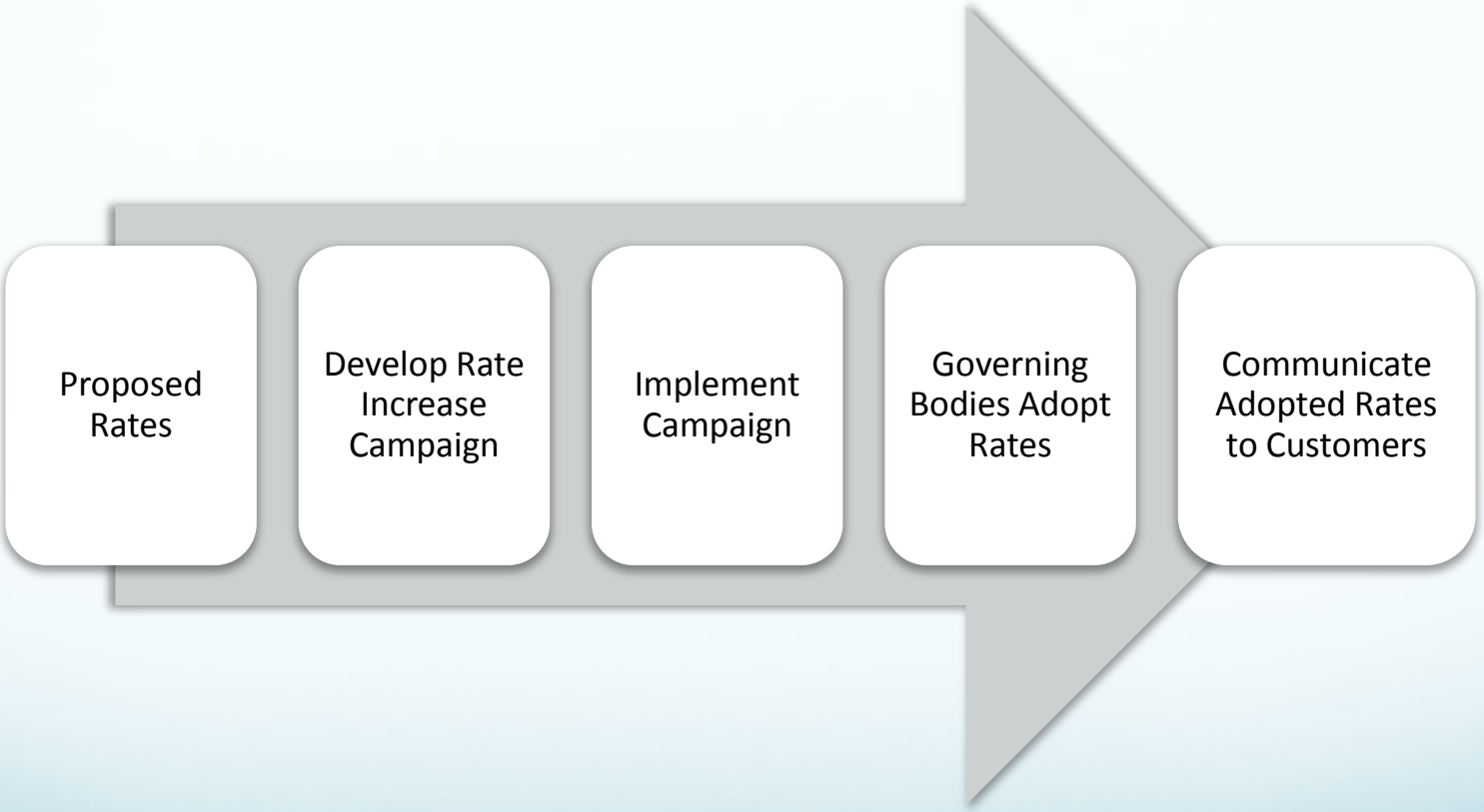
Description of Metric	Calculation	Benchmark
Operating Ratio	$\frac{\text{Operating Revenues}}{\text{Operating Expenses}}$	1.0
Debt Service Coverage Ratio	$\frac{\text{Operating Revenues} - \text{Operating Expenditures}}{\text{Debt Service}}$	1.0
Active Debt per Customer	$\frac{\text{Total Active Debt}}{\text{Number of Customers}}$	Average
Percent of Annual Operating Expenditures in Cash Reserves	$\frac{\text{Cash Reserves}}{\text{Annual Operating Expenditures}}$	One month

Source: Adapted from UNC School of Government Environment Finance Center *The State of Full Cost Pricing: Full Cost Pricing Among Public Water & Sewer Utilities in the Southeast* 2008

Planning

- Asset management
- Effective rate setting
  - Periodic rate adjustments
  - Improved forecasting
  - Balancing fixed and variable charges
  - Movement toward full cost pricing
- Outreach and messaging

Public Involvement



Infrastructure/Value of Water

- USEPA, water.epa.gov/infrastructure/sustain/index.cfm
  - Move Toward Sustainability, local officials, talking points at rates

- Water Environment Federation (WEF), www.wef.org/wil.aspx
  - Water Is Life, and Infrastructure Makes it Happen™
  - Complimentary CD with outreach materials

- American Society of Civil Engineers (ASCE)/Colcom Foundation
  - Liquid Assets Documentary, Community Toolkit Outreach Guide

www.liquidassets.psu.edu

- AWWA Only Tap Water Delivers
  - Public outreach campaign
  - Materials available: PSAs, Print Ads, Bill stuffers, Fact sheets, Web banners, Campaign talking points, Children's activities, etc.
  - 100's of utilities across the U.S. **www.awwa.org**

Questions?

MSchneemann@cmap.illinois.gov
312.676.7456

University of Illinois Extension

Sea Grant Illinois - Indiana

Additional Tools for Saving Water and Money: Performance Contracting

Ben Disney, Ameresco

ENERGY SAVINGS PERFORMANCE CONTRACTING

Ben Disney
Account Executive
W: 312-994-8619
C: 224-558-9569
bdisney@ameresco.com

AMERESCO
Green • Clean • Sustainable

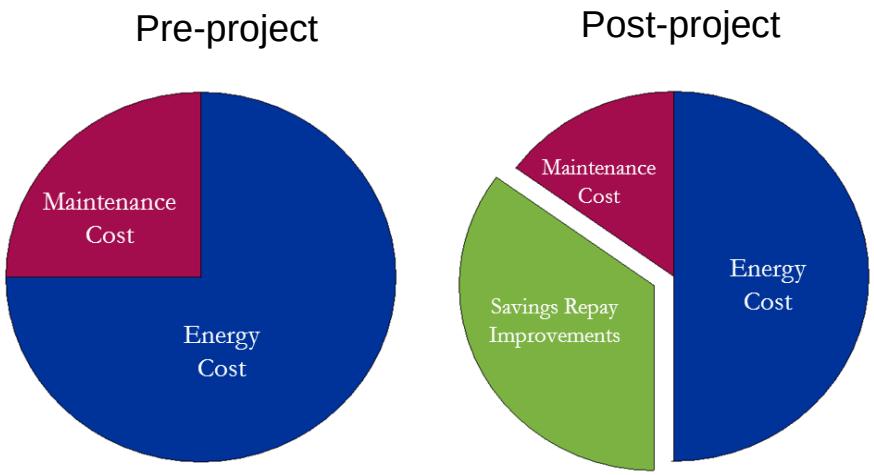
What is Performance Contracting?

What it is

"The use of guaranteed savings from the maintenance and operations budget (utilities) as capital to make needed upgrades and modernizations to your building environmental systems, financed over a specified period of time."

-United States Department of Energy

How it works



- Contractually guaranteed results (zero risk)
- Improvements made with no disruption to customer operations
- Single source responsibility (design-build)
- Fixed Cost Contract, No Change Order Construction
- Local preferred trades

50 ILCS 515/1 – Local Government

The Illinois Legislature gave Counties & Municipalities a procurement tool to combine multiple, comprehensive infrastructure improvements into one turn-key, design-build project

This tool will:

- Reduce Utility Costs
- Reduce Operational Costs
- Modernize Infrastructure
- Improve the Working Environment
- Provides Counties & Municipalities with an alternative method to get things done

Since inception, millions of dollars in renovations have taken place in Illinois Cities, Counties, School Districts, and Higher Ed Institutions using this legislative tool.

AMERESCO Company Overview

- Only Major Energy Services Company independent from any utility, manufacturer, or parent company
- Public Company - NYSE (AMRC)
- Technology and Equipment Neutral, Objective, and Flexible
- Over $500 million in projects in Illinois
- Performance Contracting is our core business
- Deliver the most comprehensive project at the greatest value
- Local, In-House Engineering, Project Development and Management Expertise

Awards

2012 Globe
100 List of Top-Performing Public Companies in 2012 Groundbreaker of the Year

2012 Renewable Energy World Excellence in Renewable Energy Award

2011 Forbes 100 List
America's Best Small Companies

2010 New England Energy Council
Employer of the Year

2009 Frost & Sullivan Award
Green Excellence

2008 Award for Excellence
Division of Capital Asset Management

2004, 2008 EPA
Industry Partner of the Year

NAESCO ACCREDITED ENERGY SERVICE PROVIDER

ENERGY STAR PARTNER

CLINTON FOUNDATION CLINTON CLIMATE INITIATIVE

U.S. GREEN BUILDING COUNCIL MEMBER

ASHRAE
Advancing HVAC&R to serve humanity and promote a sustainable world

Examples

2010 LMO-2 Data Used

- Average (not including Chicago)
  - Households → 6,400
  - Daily NAP → 2,100 Kg
  - Daily MUL + UFF → 255 Kg = 12.2% of NAP
  - ANNUAL Savings when MUL + UFF = 8% → $151,000.00+
- City A (Northern Suburbs)
  - Households → 30,000+
  - Daily NAP → 8,000+ Kg
  - Daily MUL + UFF → 900+ Kg = 11.2% of NAP
  - ANNUAL Savings when MUL + UFF = 8% → $380,000.00+
- City B (South Suburbs)
  - Households → 8,000+
  - Daily NAP → 5,500+ Kg
  - Daily MUL + UFF → 1300+ Kg = 23.7% of NAP
  - ANNUAL Savings when MUL + UFF = 8% → $1,000,000.00+

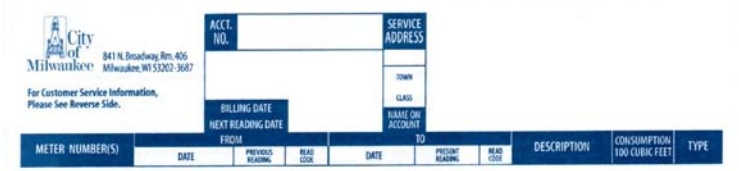
Additional Tools for Saving Water and Money: H2Oscore

McGee Young, Marquette University

Conserve Differently

mcgee.young@h2oscore.com

The Problem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Milwaukee, WI 53202-3687
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SERVICE ADDRESS
TOWN
CLASS
NAME ON ACCOUNT
BILLING DATE
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METER NUMBER(S)
FROM
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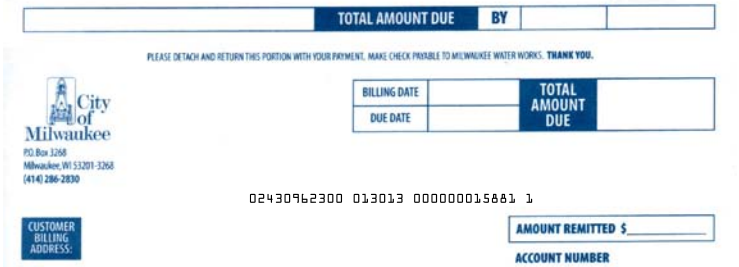
PREVIOUS READING
READ CODE
TO
DATE
PRESENT READING
READ CODE
DESCRIPTION
CONSUMPTION 100 CUBIC FEET
TYPE


TOTAL AMOUNT DUE
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PLEASE DETACH AND RETURN THIS PORTION WITH YOUR PAYMENT. MAKE CHECK PAYABLE TO MILWAUKEE WATER WORKS. THANK YOU.
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TOTAL AMOUNT DUE
0243096230O 013013 OOOOOOO15881 1
CUSTOMER BILLING ADDRESS:
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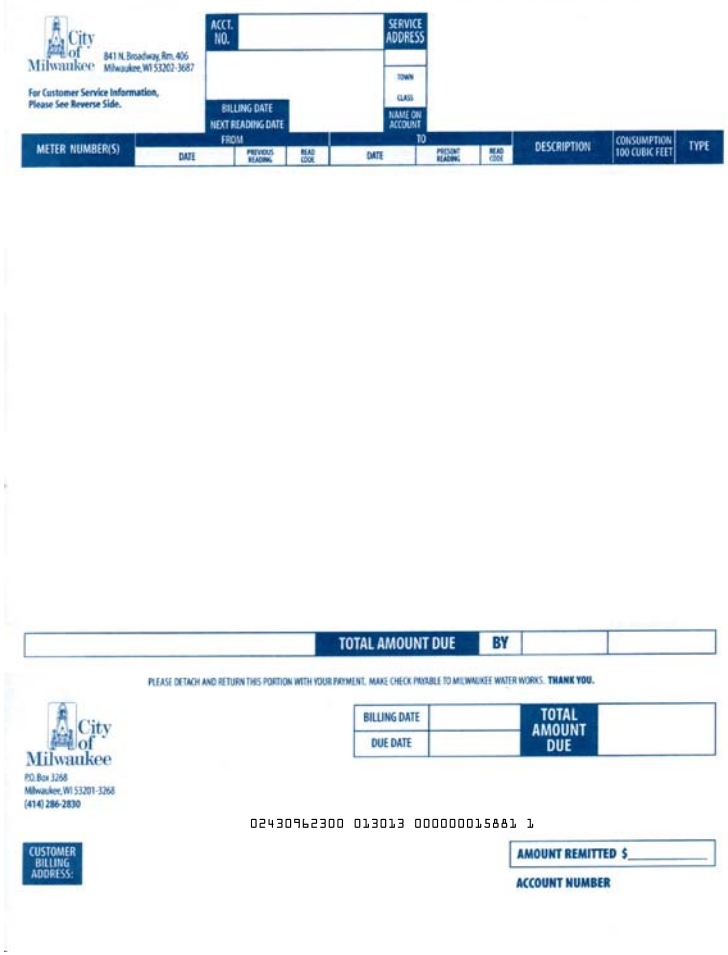
ACCOUNT NUMBER

The Problem



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NEXT READING DATE

METER NUMBER(S)	FROM DATE	PREVIOUS READING	READ CODE	TO DATE	PRESENT READING	READ CODE	DESCRIPTION	CONSUMPTION 100 CUBIC FEET	TYPE

TOTAL AMOUNT DUE BY

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BILLING DATE	
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CUSTOMER BILLING ADDRESS:

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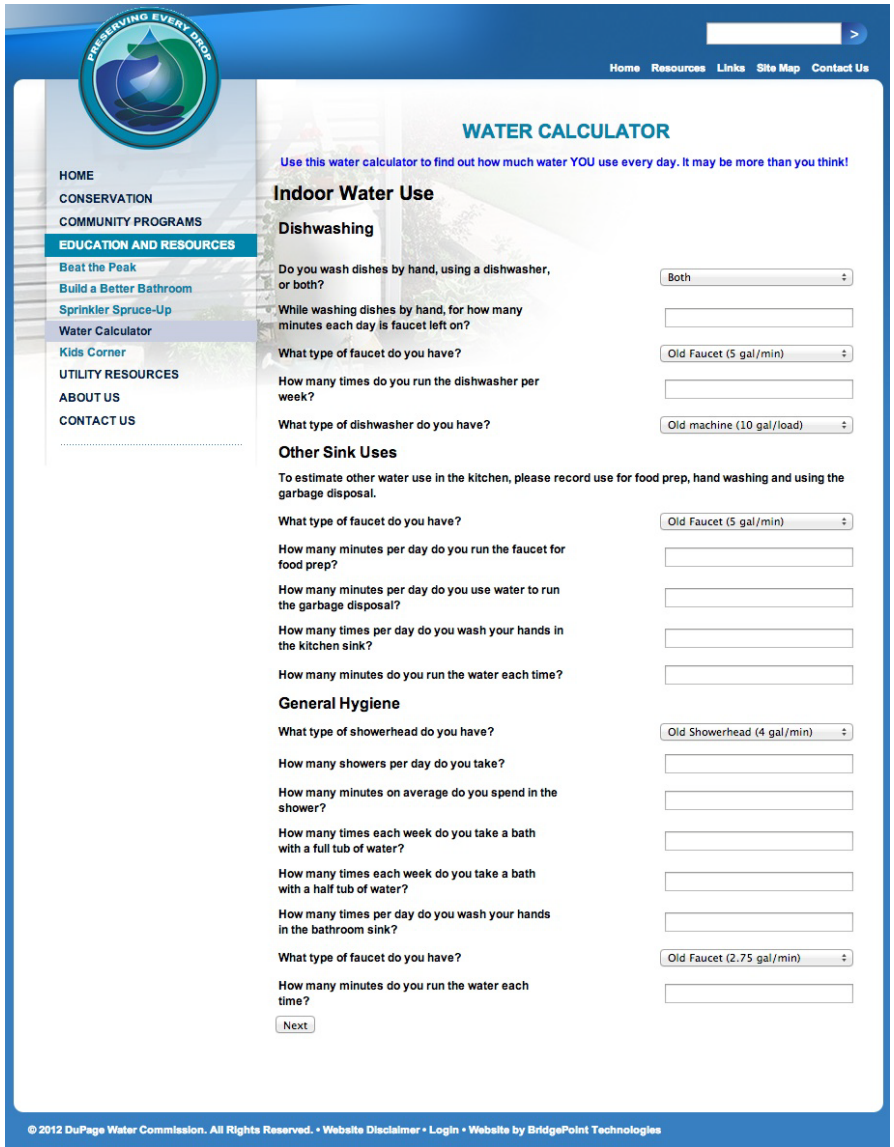
ACCOUNT NUMBER



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Build a Better Bathroom
Sprinkler Spruce-Up
Water Calculator
Kids Corner
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CONTACT US

WATER CALCULATOR

Use this water calculator to find out how much water YOU use every day. It may be more than you think!

Indoor Water Use

Dishwashing

Do you wash dishes by hand, using a dishwasher, or both? — Both

While washing dishes by hand, for how many minutes each day is faucet left on?

What type of faucet do you have? — Old Faucet (5 gal/min)

How many times do you run the dishwasher per week?

What type of dishwasher do you have? — Old machine (10 gal/load)

Other Sink Uses

To estimate other water use in the kitchen, please record use for food prep, hand washing and using the garbage disposal.

What type of faucet do you have? — Old Faucet (5 gal/min)

How many minutes per day do you run the faucet for food prep?

How many minutes per day do you use water to run the garbage disposal?

How many times per day do you wash your hands in the kitchen sink?

How many minutes do you run the water each time?

General Hygiene

What type of showerhead do you have? — Old Showerhead (4 gal/min)

How many showers per day do you take?

How many minutes on average do you spend in the shower?

How many times each week do you take a bath with a full tub of water?

How many times each week do you take a bath with a half tub of water?

How many times per day do you wash your hands in the bathroom sink?

What type of faucet do you have? — Old Faucet (2.75 gal/min)

How many minutes do you run the water each time?

Next

How We Engage Customers

Welcome back McGee!

Dashboard

Consumption:

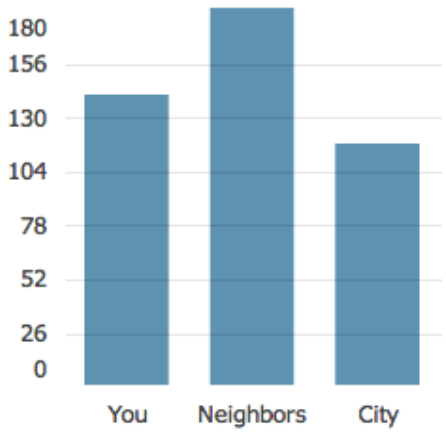
City records show your household averaged

139

gallons of water per day (GPD) over the last billing cycle

Comparisons:

(Lower is better)



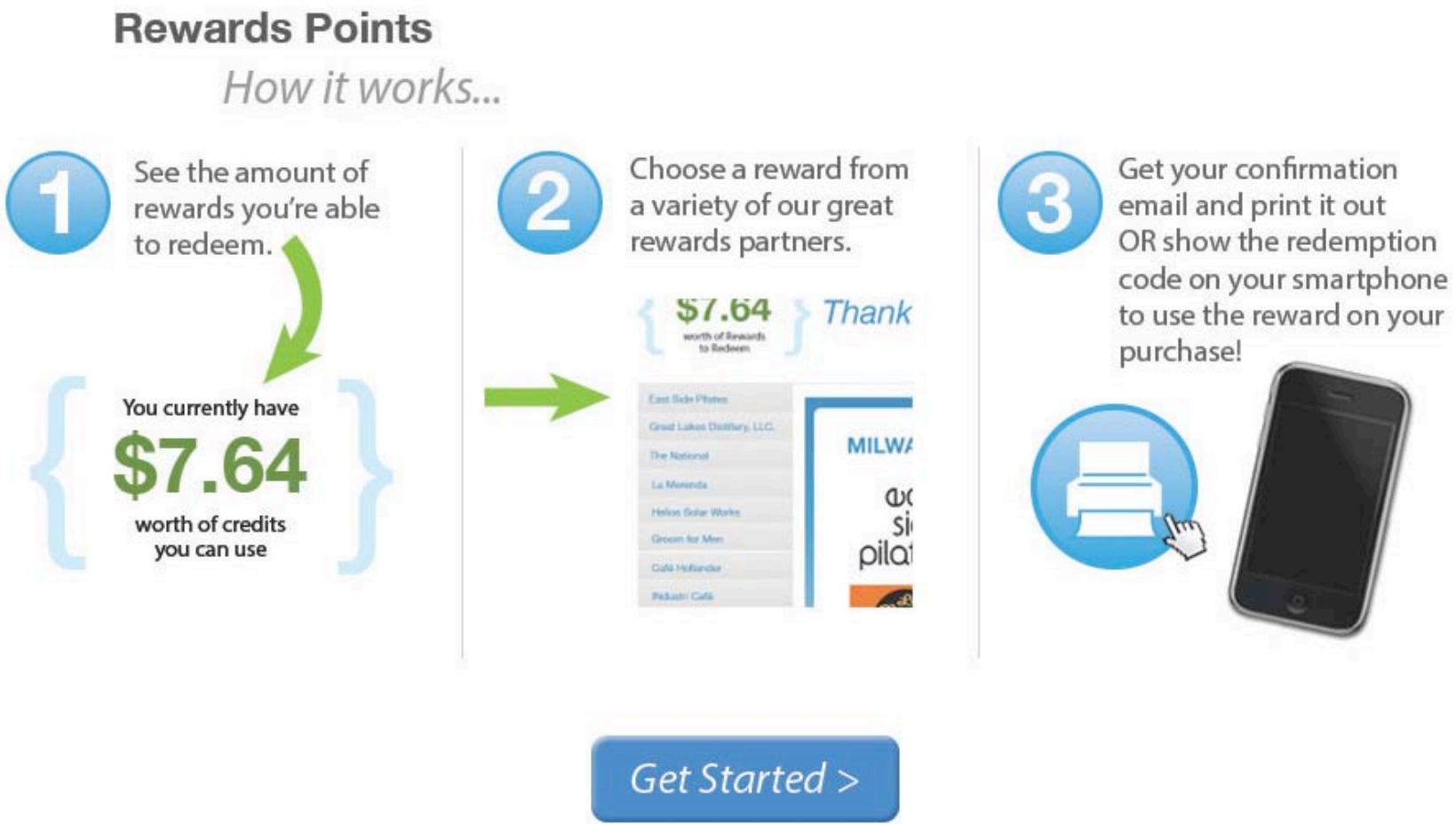
Rank vs Neighbors:

(Lower is better)

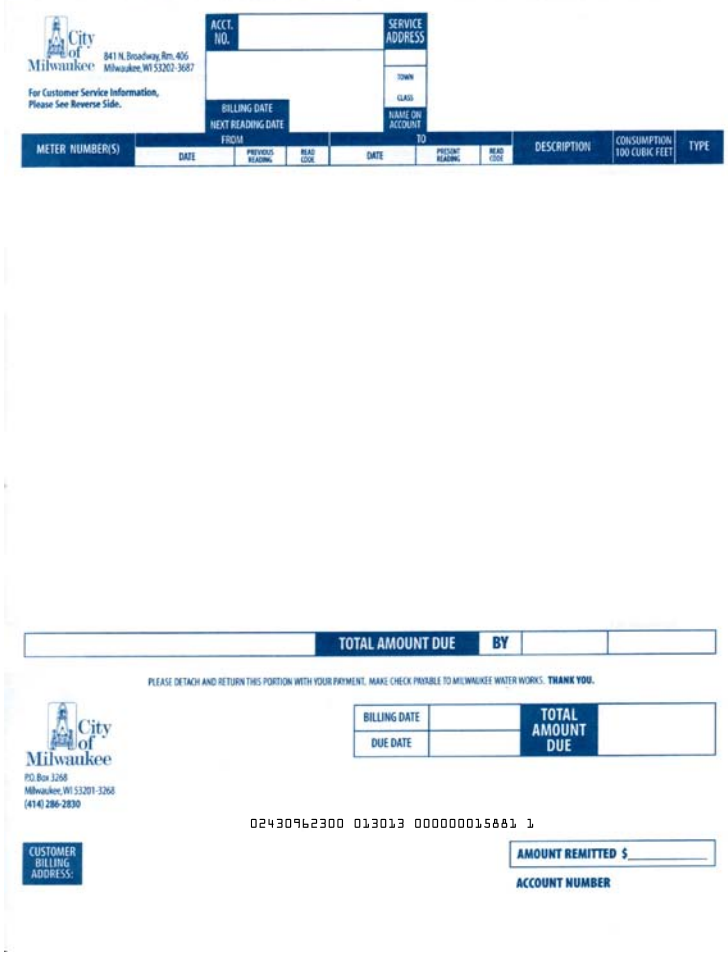
Your household rank is 34 of 103 in your neighborhood.

How We Engage The Community

“Like a Sustainability Groupon”



Problem Solved



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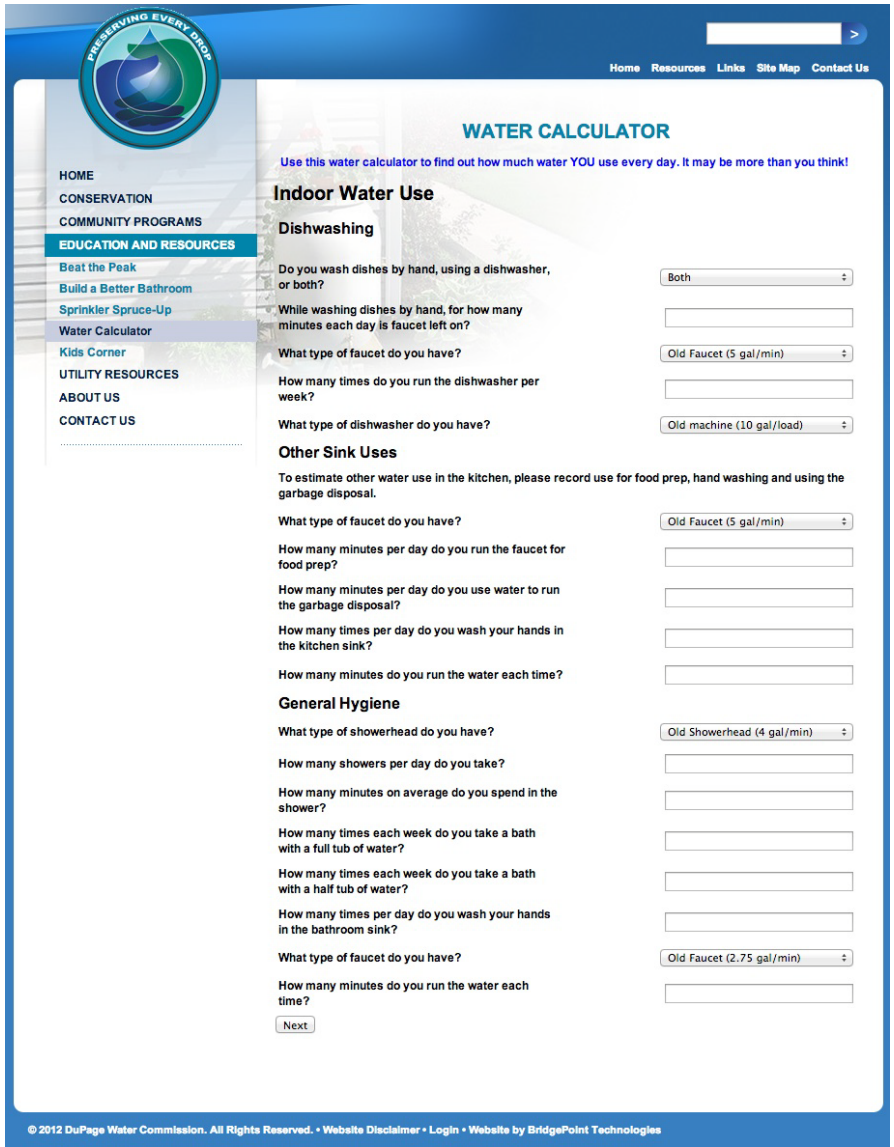
AMOUNT REMITTED $_____

ACCOUNT NUMBER



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Discussion: Internal & External Communications and Outreach Strategies

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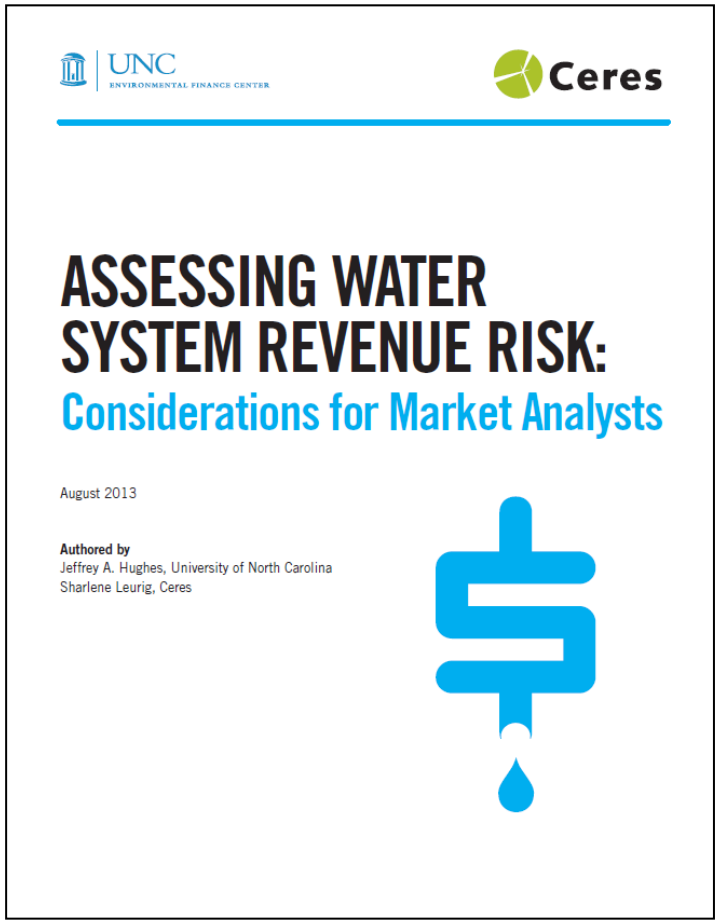
Rachel Carnahan, Metropolitan Planning Council

Assessing Water System Revenue Risk: Considerations for Market Analysts



http://www.ceres.org/resources/reports/assessing-water-system-revenue-risk-considerations-for-market-analysts/view

Assessing Water System Revenue Risk: Considerations for Market Analysts

Table 2: Sample Metrics for Assessing Drinking Water Provider Pricing Structure

Issue of Concern	Commonly Used Metric	Alternative or Additional Metrics	Rationale
Competitiveness. Comparison of household expenditures for water service between systems. How much does a utility charge versus another utility?	Residential customer water bill at consumption level of 7,500 gallons per month.	Residential customer water bill at consumption level of 5,000 gallons per month.	Average household use for utilities has declined significantly in recent years, and in many places is now much lower than 7,500 gal/mo. Many utilities see the vast majority of their customers using 5,000 gallons or less per month.
Affordability. Might households have trouble making payments and governing boards be under political pressure to limit price adjustments?	Typical household monthly water bill divided by Median Household Income (MHI) for community	Typical household monthly water bill divided by the poverty income for a family of four at time of analysis. Percentage of households in service area that are at or below poverty line.	As income distributions have dispersed and water service bills have increased in real and nominal terms, understanding affordability stresses requires additional metrics beyond simply the percentage of expenditure over MHI. By looking at the percentage of expenditure for an at-risk family and assessing the relative number of those types of families in a service area, an analyst would learn more about challenges facing a particular area.
Revenue Sufficiency. Does the pricing in place provide investors with confidence that it generates sufficient revenues to meet debt requirements?	Debt Service Coverage (DSC)—typically expect range of 1.2 to 2	Modified annual DSC that incorporates annual operating revenues plus annual drawdowns from a sufficiently funded rate stabilization fund (e.g. withdrawals in a given year never exceed more than 25% of rate stabilization fund). Alternatively, if a utility maintains a rate stabilization fund, DSC could be analyzed as a rolling three-year average to allow for natural revenue variation.	Under current pricing structures, the inherent revenue swings due to normal usage changes make maintaining high DSC year in and year out much more challenging. Utilities that take steps to cushion this variation with a rate stabilization fund are arguably reducing investor risk, while at the same time minimizing pressure to over charge to compensate for revenue variability.
Revenue Vulnerability. Does the utility's pricing structure expose it to excessive revenue reduction from adoption of basic water efficiency measures, such as fixture and appliance replacements?	Rate structure defined by the change in commodity price over different consumption blocks. (e.g. decreasing vs. uniform vs. increasing block)	Percent of household charge at 5,000 gallons per month attributed to fixed fee. Percent of operational revenue attributed to fixed charges.	Some simplified characterizations of pricing focus primarily on block structure. But rate structure may have less significance on pricing signals and revenue variability than does the size of the base charge or fixed fee.
Revenue Vulnerability. Does the utility's demand profile expose the utility to excessive revenue variability from changes in customer composition or use patterns?	Revenue from top 10 customers.	Average amount of revenue attributed to irrigation as a percentage of total revenue.	Investors should remain aware of dependence on a small number of customers and should continue to document the percent of revenue attributed to top customers. But heavy dependence on outdoor irrigation for revenue can also be a risk driver, since drought-induced watering restrictions or even pricing responsiveness in inclining block rate structure may cause significant reductions in revenue as customers reduce outdoor usage.
Revenue Vulnerability. Does the utility's pricing structure expose the utility to excessive revenue variability in the event of outdoor watering reductions?	Rate structure defined by the change in commodity price over different consumption blocks.	Percent of household bill at 10,000 gallons per month that is attributed to fixed fee.	Similar to above, but provides insight into vulnerability of revenues to usage changes by water users in higher tiers.
Conservation Pricing Signals. How strong an incentive does pricing structure create for reduced usage?	Presence of inclining block rate structure.	Percentage of household charge at a given consumption point that is attributed to variable charge. Percentage change in bill for a set change in consumption. Absolute change in charge for a set change in consumption.	Some dialogue around conservation pricing signals focuses on the general block structure of the pricing. The block structure can influence pricing signal, but these other factors can have a more significant role in influencing the price incentive for reducing usage.

Wrap-up, Questions, Announcements

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