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
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
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.

<table>
<thead>
<tr>
<th>United States water and wastewater services by provider type</th>
<th>Water services</th>
<th>Wastewater services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provider type</td>
<td>% of population</td>
<td>% of population</td>
</tr>
<tr>
<td>Regulated utilities</td>
<td>8.8%</td>
<td>0.3</td>
</tr>
<tr>
<td>Municipal outsourcing</td>
<td>6.5%</td>
<td>7.8%</td>
</tr>
<tr>
<td>Municipal</td>
<td>69.5%</td>
<td>63.9%</td>
</tr>
<tr>
<td>Privately served</td>
<td>15.2%</td>
<td>28.0%</td>
</tr>
<tr>
<td>Total</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

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

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

**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

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

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

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

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**Market Overview: Consent Decree**

- **Minneapolis, MN**
  - Currently fined $350k per MG of excess flow by MCES STP, Only 50% of excess identified
  - Total replacement cost is $860m

- **Indianapolis, IN**
  - Consent Decree to make $1.86bn improvements to sewer system to curb overflow

- **Pittsburgh, PA**
  - Consent Decree to reduce sewer overflow
  - Estimated cost $3bn over 20 years
  - Complicated as impacts 83 municipalities
  - Current investment not sufficient

- **California**
  - 11 districts face fines of $32.5k per day under consent decrees

- **Tennessee**
  - Consent Decree to invest $3-400m to improve sewer system

- **Lexington, KY**
  - Consent Decree to invest $290m+ into sewer system and storm drain system
### 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 m³/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.

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

<table>
<thead>
<tr>
<th>EPA Categorization</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contract Operation</td>
<td>● Private entity can perform any combination of the following:</td>
</tr>
<tr>
<td></td>
<td>- Operate</td>
</tr>
<tr>
<td></td>
<td>- Maintain</td>
</tr>
<tr>
<td></td>
<td>- Replace equipment</td>
</tr>
<tr>
<td></td>
<td>- Manage the facility</td>
</tr>
<tr>
<td></td>
<td>● Certain infrastructure investments are permissible, subject to EPA approval</td>
</tr>
<tr>
<td></td>
<td>● Certain infrastructure investments are permissible, subject to EPA approval</td>
</tr>
<tr>
<td></td>
<td>● Private entity can only receive operational revenues</td>
</tr>
<tr>
<td></td>
<td>● Private entity can only receive operational revenues</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Disposition Agreement</td>
<td>● Private entity pays a concession fee to the local and/or state government</td>
</tr>
<tr>
<td></td>
<td>● Private entity has the ability to make infrastructure investments as necessary</td>
</tr>
<tr>
<td></td>
<td>● Private entity pays a concession fee to the local or state government for the right to operate</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>
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”.

<table>
<thead>
<tr>
<th>Compensation Type</th>
<th>Contract Term</th>
<th>Characteristics</th>
<th>Cancellable?</th>
</tr>
</thead>
<tbody>
<tr>
<td>PFF – Stage 1</td>
<td>5 years</td>
<td>&lt;80% and &gt;=50% of compensation from PFF</td>
<td>After 3 years with no penalties</td>
</tr>
<tr>
<td>PFF – Stage 2</td>
<td>10 years</td>
<td>&lt;95% and &gt;=80% of compensation from PFF</td>
<td>Yes with penalties</td>
</tr>
<tr>
<td>PFF – Stage 3</td>
<td>15 years</td>
<td>&gt;= 95% of compensation from PFF</td>
<td>Yes with penalties</td>
</tr>
<tr>
<td>Public Utility Property</td>
<td>20 years</td>
<td>Facility must be classified as a public facility</td>
<td>Yes with penalties</td>
</tr>
<tr>
<td>classification</td>
<td></td>
<td>&gt;=80% of compensation from PFF</td>
<td></td>
</tr>
</tbody>
</table>
Market Structure
Water Demand and Supply

Estimated Water Use by State


Water Supply

- Renewable water supply in the U.S. is relatively constant
  - Groundwater supply per year is 1,300 km³
  - Surface water supply per year is 2,913 km³
  - Desalination and reuse technique combined total volume is less than 9 km³ 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

Market Overview: Midwestern States

Water Use for Midwestern States

![Water Use Chart]

**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/m³
- 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:

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

* 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
### 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 term 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.

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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 its 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.

American Society for Civil Engineers Report Card published in 2005

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 CH2MHiIl on when to do water PPPs

American Water White Paper on Water PPPs

Water & Wastewater Case Studies
- NCPPP http://www.ncppp.org/cases/index.shtml
- WPC http://www.waterpartnership.org/studies/index.html
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
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
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
  312–886–0177
  bakker.gerry@epa.gov

- Andrew Bielanski, USEPA
  312–886–0208
  bielanski.andrew@epa.gov
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
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)
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:

- 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.
- 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.

**FULL SUPPLY COST PRICING**

- OPERATION AND MAINTENANCE COST
- CAPITAL COST
  - CURRENT COSTS
  - REPLACEMENT AND GROWTH

**TRADITIONAL PRICING**

- OPERATION AND MAINTENANCE COST (SUBSIDIZED)
- CAPITAL COST (HISTORIC, SUBSIDIZED)
- PRICING GAP

Activity & Discussion: Capital Improvement Plan Plan Context of Full-Cost Pricing

- **Strategic Business Planning**
  1. Conduct Business Environmental Analysis
  2. Understand the Elements of a Strategic Business Plan
  3. Implement a Strategic Business Planning Process

- **Capital Planning**
  1. Review the Requirements in the Strategic Business Plan
  2. Develop a Comprehensive Facility Master Plan
  3. Determine and Schedule Capital Requirements

- **Financial Planning**
  1. Develop Capital Financing Plan
  2. Determine Annual Operating and Capital Requirements
  3. Calculate Fees and Charges
  4. Evaluate Impact on Customers

Trends in Water Demand
Temporary or the New Normal?

Illinois

Activity & Discussion:
Pumping Data

Community Example


Source: Evanston Water Conservation/Efficiency Plan CMAP 2012
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

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
Costs of Conservation Planning

Conservation is not free

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

Demand ↓ → Revenue ↓
ceteris paribus
Rate Structure: Volumetric Charges

NE IL utilities with service population greater than 1,000

**Water Rate Structure**

- **Uniform Rate:**
  \[ \text{Volumetric Charge} = p_1 x^* \]

- **Increasing Block (2 Blocks):**
  \[ \text{Volumetric Charge} = p_1 x_1 + p_2 (x^* - x_1) \text{ where } p_1 < p_2 \]

- **Decreasing Block (2 Blocks):**
  \[ \text{Volumetric Charge} = p_1 x_1 + p_2 (x^* - x_1) \text{ where } p_1 > p_2 \]

- **Flat:**
  \[ \text{Volumetric Charge} = FC \]

**Wastewater Rate Structure**

- **Uniform Rate:**
  \[ \text{Volumetric Charge} = p_1 x^* \]

- **Increasing Block:**
  \[ \text{Volumetric Charge} = p_1 x_1 + p_2 (x^* - x_1) \]

- **Decreasing Block:**
  \[ \text{Volumetric Charge} = p_1 x_1 + p_2 (x^* - x_1) \]

- **Flat:**
  \[ \text{Volumetric Charge} = FC \]
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

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

<table>
<thead>
<tr>
<th>Elasticity Value</th>
<th>Definition</th>
<th>Price Increase Impact on Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater than 1</td>
<td>Elastic</td>
<td>Percent change in quantity demanded is <em>greater</em> than the percent change in price</td>
</tr>
<tr>
<td>Equal to 1</td>
<td>Unit Elastic</td>
<td>Percent change in quantity demanded is <em>equal</em> to the percent change in price</td>
</tr>
<tr>
<td>Less than 1</td>
<td>Inelastic</td>
<td>Percent change in quantity demanded is <em>less</em> than the percent change in price</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Revenues</th>
<th>Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usage Rates</td>
<td>Power and Chemicals</td>
</tr>
<tr>
<td>Fixed Fees</td>
<td>Reserve Funds</td>
</tr>
<tr>
<td>Connection Fees</td>
<td>Billing Costs</td>
</tr>
<tr>
<td>Misc. Fees</td>
<td>Operations</td>
</tr>
<tr>
<td></td>
<td>Debt Service</td>
</tr>
</tbody>
</table>
Rate-design for $20 revenue recovery

Source: Adopted from Beecher (2009)
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

Consumption Included with Base Charge for Residential Customers, Water (280) and Wastewater (278)

Minimum Provision as a Percent of Total Water Use

- Conserving
- Non-Conserving
Balancing Fixed and Variable Charges

Recovering more costs through fixed charges

- Revenue Stability
- Weakens price signal
- Revenue Sufficiency

Recovering more costs through variable charges

- More Revenue Risk
- Strengthened price signal
- More Equitable
Rate Objectives: Art, Politics, Science

- Affordability
- Ease of Implementation
- Revenue Stability
- Revenue Adequacy
- Revenue Vulnerability
- Simplicity
- Equitability
- Cost of Service Based
- Conservation Signal

Rate Design

Activity & Discussion: Rates
Figure 10. The rate evaluation process

**INPUTS (DATA)**
- Data from Outside the Utility
  - Demographic
    - Census
    - Regional Planning
  - Independent Survey
  - Climatic Data (NOAA)
- Data from Inside the Utility
  - Production Data
  - Consumption Data
  - Accounting Data

**RATE EVALUATION (ANALYSIS)**
- Demand Analysis
- Financial/Revenue Analysis
- Customer Bill Analysis

**OUTPUTS (ANSWERS)**
- Demand Impacts
  - Level of Demand
  - Shape of Demand
  - Uncertainty Measures
- Effect on Utility
  - Effect on Sales
  - Utility Financing
  - Financial Risk
  - Long Range Plans
- Effect on Customer
  - Average Rate Impact
  - Distribution of Impact
  - Distribution of Impacts
  - Incentive to Participate in Water Efficiency Programs

Source: Adapted from Chestnut, Thomas A. et. al. Designing, Evaluating, and Implementing 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.\(^9\)

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.\(^9\)

- **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.\(^9\)

- **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.\(^4\)

- **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

Revenue Neutral Water Conservation

Price

Revenue

Programs & Pricing

Revenues

Programs

Revenue: Revenue₁ = Revenue₂
Metrics for Benchmarking

<table>
<thead>
<tr>
<th>Description of Metric</th>
<th>Calculation</th>
<th>Benchmark</th>
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</thead>
<tbody>
<tr>
<td>Operating Ratio</td>
<td>Operating Revenues</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>Operating Expenses</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debt Service Coverage Ratio</td>
<td>Operating Revenues − Operating Expenditures</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>Debt Service</td>
<td></td>
</tr>
<tr>
<td>Active Debt per Customer</td>
<td>Total Active Debt</td>
<td>Average</td>
</tr>
<tr>
<td></td>
<td>Number of Customers</td>
<td></td>
</tr>
<tr>
<td>Percent of Annual Operating Expenditures in Cash Reserves</td>
<td>Cash Reserves</td>
<td>One month</td>
</tr>
<tr>
<td></td>
<td>Annual Operating Expenditures</td>
<td></td>
</tr>
</tbody>
</table>
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

- Proposed Rates
- Develop Rate Increase Campaign
- Implement Campaign
- Governing Bodies Adopt Rates
- Communicate Adopted Rates to Customers
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
Additional Tools for Saving Water and Money: Performance Contracting

Ben Disney, Ameresco
ENERGY SAVINGS
PERFORMANCE CONTRACTING

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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
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
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
The Problem
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”

Rewards Points
How it works...

1. See the amount of rewards you’re able to redeem.
   You currently have **$7.64** worth of credits you can use.

2. Choose a reward from a variety of our great rewards partners.

3. Get your confirmation email and print it out OR show the redemption code on your smartphone to use the reward on your purchase!

Get Started >
Problem Solved
Connect with Us

- McGee Young – Founder
  414-759-2599
  mcgee.young@h2oscore.com
  www.h2oscore.com
  @h2oscore

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Discussion: Internal & External Communications and Outreach Strategies

Abby Crisostomo, Metropolitan Planning Council
Margaret Schneemann, Illinois-Indiana Sea Grant/Chicago Metropolitan Agency for Planning
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>
<thead>
<tr>
<th>Table 2: Sample Metrics for Assessing Drinking Water Provider Pricing Structure</th>
</tr>
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<tbody>
<tr>
<td><strong>Issue of Concern</strong></td>
</tr>
<tr>
<td>Competitiveness.</td>
</tr>
<tr>
<td>Affordability.</td>
</tr>
<tr>
<td>Revenue Sufficiency.</td>
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Wrap-up, Questions, Announcements

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