This presentation premiered at WaterSmart Innovations

watersmartinnovations.com
Flexible Rates: Planning for a Revenue-Stable Water-Efficient Future

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Water Smart Innovations Conference
October 9, 2014

Alliance for Water Efficiency
Coping with Conservation

- Lowered demand means reduced sales revenue
- Reduced sales revenue can mean not fully collecting fixed costs
  - Short-run variable costs (water, pumping energy, chemicals)
  - Long-run capacity costs (supply, transmission, storage, treatment)
- Revenue stability therefore becomes an issue
What Affects Revenue Stability?

- Reduced demand from:
  - efficient fixture replacement under the plumbing and appliance codes
  - active conservation programs
  - the recession: industrial shift layoffs, home foreclosures

- Reduced peak demand in wet years

- Increased infrastructure costs

- Rise in other fixed costs

- Continuing Inflation
Most US major cities will have higher water bills than electric bills in the next 8-10 years.

Source: Energy Information Administration
So Rates Are Rising......

Conservation is still part of the solution

- It is a long-term cost reducer to the utility
- Revenue loss is often due to other drivers
- Every gallon saved is water that does not have to be pumped, treated and delivered
- Conservation is an investment and short-term effects must be planned for
- Reduced utility costs generally mean reduced customer rates in the long-term due to avoided infrastructure capacity increases
Required Capacity Before Conservation

DELAY

DOWNSIZING

Baseline

Demand After Conservation

Existing Capacity

Source: M52 Manual, AWWA
<table>
<thead>
<tr>
<th>Year</th>
<th>Deferred Expansion (Years)</th>
<th>Deferred Capacity (MGD)</th>
<th>Benefit of Deferred Expansion ($)</th>
<th>Avoided Capacity (MGD)</th>
<th>Benefit of Avoided Expansion ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline Demands</td>
<td>2014</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Baseline - Code Savings</td>
<td>2025</td>
<td>11</td>
<td>5.8</td>
<td>$9,764,491</td>
<td>0.0</td>
</tr>
<tr>
<td>Baseline - Code Savings - Program Savings</td>
<td>2027</td>
<td>13</td>
<td>5.8</td>
<td>$11,231,717</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Select Chart to View

Service Area Demands

Service Area Demands

Year Forecasted peak season demand equals existing peak season delivery capacity

Select Chart to View

Service Area Demands

No. of Years to Display: 15 yrs

Chart Explanations

Service Area Demands

Year

Unadjusted Baseline Demand

Less Code Savings

Less Code and Program Savings
Utility Revenue Requirement and Rate Impacts

<table>
<thead>
<tr>
<th>Program Impact on...</th>
<th>Baseline</th>
<th>With Conserv.</th>
<th>Change to Baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Utility Annual Sales Revenue Requirement</td>
<td>$58,848,700</td>
<td>$58,696,890</td>
<td>($151,810)</td>
</tr>
<tr>
<td>% change from baseline</td>
<td>-0.26%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avg. Water Rate ($/Thou Gal)</td>
<td>$2.56</td>
<td>$2.63</td>
<td>$0.07</td>
</tr>
<tr>
<td>% change from baseline</td>
<td></td>
<td>2.66%</td>
<td></td>
</tr>
<tr>
<td>Annualized Bill Impact ($/Mo.)</td>
<td>$55.31</td>
<td>$55.17</td>
<td>($0.14)</td>
</tr>
<tr>
<td>% change from baseline</td>
<td></td>
<td>-0.25%</td>
<td></td>
</tr>
</tbody>
</table>

Select Impact Chart to View

Revenue Requirement
Westminster’s Story

- Citizens complained about being asked to conserve when rates would just go up anyway
- Westminster reviewed marginal costs for future infrastructure if conservation had not been done
- Since 1980 conservation has saved residents and businesses 80% in tap fees and 91% in rates compared to what they would have been without conservation
- Report posted on AWE web site at www.a4we.org
Financing Sustainable Water

- Practical resources needed for utility employees with varying technical ability
- A Handbook to explain key concepts, provide case studies and implementation advice
- A public domain Rate Model to model various scenarios
- Web-based resources to show the latest research and information in one location
AWE Handbook Contents

1. Introduction
2. Today’s Imperative for Utility Financial Management
3. The Role of Ratemaking
4. Building a Better (Efficiency-Oriented) Rate Structure
5. Financial Policies & Planning for Improved Fiscal Health
6. Implementing an Efficiency-Oriented Rate Structure

Appendix A -- Costing Methods
Appendix B -- Demand and Revenue Modeling
Appendix C -- Rate Model User Guide
Key Concepts

- Revenue instability is a feature of **ALL** rate structures
- Efficiency objectives should be identified at the start
- One size does not fit all
- Embracing uncertainty enables better decision-making
- Better rate analysis requires good data
- Customer understanding and empowerment is key
- Sound financial policies can support fiscal sustainability
Water Rates, Efficiency, & Revenue

- Water Rates: A Balancing Act for Water Utilities
  - Revenue Generation-(to pay prudent costs)
  - Resource Efficiency-(to avoid consumptive or productive waste)
  - Fiscal Sustainability-(for sustainable water service delivery)
  - (Other details include Customer Acceptance, Affordability, Legality, etc.)
What is an Efficient Water Rate?

What is Conservation?
- Any reduction in human water consumption?
- Minimizing loss or waste, that is any water reaching the ocean?

Nope.
- Conservation is Resource Efficiency

What is Efficiency?
- Technical Efficiency – Energy per unit mass
- Financial Efficiency--Dollars per Output
- Resource Efficiency-Cost and Benefits broadly defined (TBL)

Conservation that squanders other resources is not very efficiency-oriented.
Efficiency and Sustainability

Embedding water rate setting within Financial Management:
- Water Rate Setting is not a theoretical exercise
- Water Rate Setting occurs within Financial Planning
- Water Rate Setting can be guided by Financial Policies

Deciding on a Water Rate

- There is not one single objective of rate making
  - Cost recovery
  - Efficient Pricing
  - Affordability

- Most rate analyses focus on feasibility

- Better analysis can yield better tradeoffs from competing objectives.
Long Term Risk: Average Outcomes vs. Likely Outcomes

FLAW OF AVERAGES

Fact 1 – Planning for the future is rife with uncertainties.

Fact 2 - Most people are not happy with Fact 1 and prefer to think of the future in terms of average outcomes.

Fact 3 - The “flaw of averages” states that plans based on average assumptions are, on average, wrong.

-adapted from Savage (2012) Flaw of Averages

See: ProbabilityManagement.org

The cyclist is safe on the average path

On average, the cyclist is dead.
Drought Pricing

- Shortages are when, not if.
- Imposing curtailments on customers affects revenues.
- This can be planned for, communicated, and effectively implemented.

Drought Rates Missing from Most Local Drought Plans in California

Posted February 24, 2014 in Living Sustainably, U.S. Law and Policy
Tags: AWWA, California, climatechange, consumer, drought, waterbills, waterconservation, waterrates

Today they're short of water. Tomorrow they'll be short of cash. As water supplies dwindle in the face of the driest year in California's history, most of the state's urban water utilities face 2014 financially flatfooted.

CalTrans Highway Sign 2014 -- photo: Eric Betelle, pedestrianphotographer.com
Overview
Typical water rate models assume that future sales are known with certainty, and do not respond to price, weather, the economy...

The AWE Sales Forecasting and Rate Model addresses this deficiency:
- Customer Consumption Variability—weather, drought/shortage, or external shock
- Demand Response—Predicting future block sales (volume and revenue) with empirical price elasticities
- Drought Pricing—Contingency planning for revenue neutrality
- Probability Management—Risk theoretic simulation of revenue risks
- Fiscal Sustainability—Sales forecasting over a 5 Year Time Horizon

Model Modules
The model is divided into two modules: the Rate Design Module and the Revenue Simulation Module. With the Rate Design Module, you can explore volumetric rates or proposed new volumetric rates. This module can help you answer questions such as: What effect would increasing overall water use to increase or decrease? What block rate design could allow us to preserve our current level of revenue while meeting management objectives during water shortages? What proportion of customer bills will increase (or decrease) under our proposed rate design? The development of effective water rates, and the Rate Design Module is designed to help you answer them. There are other questions that the Rate Design Module is not able to answer. These include questions like: What is the likelihood we will meet our one-year, three-year, five-year, ten-year revenue projections? What level of confidence can we have that our sales will exceed our minimum projections? For near-term water sales forecasting the key uncertainties are weather, growth of accounts, and possible rate changes. The Revenue Simulation Module is designed to help answer sales revenue planning questions addressing risk and uncertainty. It uses a Monte Carlo simulation approach to incorporate account growth and risk of water use curtailment to simulate your water demands and sales revenues over a five-year period.
AWE Sales Forecasting and Rate Model

- Our free public domain model addresses:
  - *Customer Consumption Variability*—weather, drought/shortage, or external shock
  - *Demand Response*—Predicting future block sales (volume and revenue) with empirical price elasticity's
  - *Drought Pricing*—Contingency planning for revenue neutrality
  - *Probability Management*—Risk theoretic simulation of revenue risks
  - *Fiscal Sustainability*—Sales forecasting over a 5 Year Time Horizon
  - *Affordability*—Can customers afford water service?
Under your Proposed rates, the volume charge may go up for some customers and down or stay the same for others. The Bill Impacts Table shows the percentage of bills that will go down, stay the same, or go up -- and by how much. Charts showing the distribution of bill impacts for each customer class are provided on the Bill Impacts worksheet.

### Affordability Index

Affordability index equals the median annual water cost for the primary residential customer class divided by median household income.

<table>
<thead>
<tr>
<th>Customer Class</th>
<th>Current</th>
<th>Proposed</th>
<th>% Change</th>
<th>Current</th>
<th>Proposed</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Family</td>
<td>$777</td>
<td>$804</td>
<td>3.4%</td>
<td>$650</td>
<td>$672</td>
<td>3.3%</td>
</tr>
<tr>
<td>Multi Family</td>
<td>$4,254</td>
<td>$4,294</td>
<td>0.9%</td>
<td>$1,930</td>
<td>$1,942</td>
<td>0.6%</td>
</tr>
<tr>
<td>CII</td>
<td>$3,323</td>
<td>$3,382</td>
<td>1.8%</td>
<td>$1,481</td>
<td>$1,504</td>
<td>1.5%</td>
</tr>
<tr>
<td>Landscape</td>
<td>$5,599</td>
<td>$6,007</td>
<td>7.3%</td>
<td>$2,503</td>
<td>$2,720</td>
<td>8.7%</td>
</tr>
</tbody>
</table>

### Bill Impacts Table

<table>
<thead>
<tr>
<th>% of bills decreasing by</th>
<th>No More Than</th>
<th>15 to 20%</th>
<th>10 to 15%</th>
<th>5 to 10%</th>
<th>+/— 5%</th>
<th>5 to 10%</th>
<th>10 to 15%</th>
<th>15 to 20%</th>
<th>more than 20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Family</td>
<td>0%</td>
<td>0%</td>
<td>21%</td>
<td>38%</td>
<td>9%</td>
<td>4%</td>
<td>17%</td>
<td>11%</td>
<td>0%</td>
</tr>
<tr>
<td>Multi Family</td>
<td>0%</td>
<td>1%</td>
<td>38%</td>
<td>25%</td>
<td>4%</td>
<td>4%</td>
<td>18%</td>
<td>12%</td>
<td>0%</td>
</tr>
<tr>
<td>CII</td>
<td>0%</td>
<td>0%</td>
<td>25%</td>
<td>20%</td>
<td>28%</td>
<td>7%</td>
<td>9%</td>
<td>10%</td>
<td>0%</td>
</tr>
<tr>
<td>Landscape</td>
<td>0%</td>
<td>0%</td>
<td>26%</td>
<td>12%</td>
<td>33%</td>
<td>2%</td>
<td>6%</td>
<td>20%</td>
<td>0%</td>
</tr>
</tbody>
</table>

### Bill Impact Histograms

- Avg and median bill impacts
- Bill Impacts Screenshot
## Specifying Curtailment Levels

1. **Specify Curtailment Levels for Drought/Shortage Stages**
   
   1. Enter the Customer Class curtailment levels for each stage. If you have fewer than 4 stages, enter the last curtailment level in the unused stages. Stage 0 is the default No Shortage condition. Do not modify the settings for this stage.
   
   2. For each stage, enter the expected compliance rate. The compliance rate can vary by stage. For example, stages with voluntary curtailment may have lower compliance than stages where curtailment is mandatory and enforced. The expected curtailment level for a stage is the product of the stage’s curtailment level and the expected compliance rate.

### Drought/Shortage Stage Customer Class Curtailment Levels Table

<table>
<thead>
<tr>
<th>Customer Class</th>
<th>Stage 0</th>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
<th>Stage 4</th>
<th>Expected Curtailment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Family</td>
<td>0%</td>
<td>10%</td>
<td>15%</td>
<td>20%</td>
<td>25%</td>
<td>0% 8% 12% 17% 21%</td>
</tr>
<tr>
<td>Multi Family</td>
<td>0%</td>
<td>10%</td>
<td>15%</td>
<td>20%</td>
<td>25%</td>
<td>0% 8% 12% 17% 21%</td>
</tr>
<tr>
<td>CII</td>
<td>0%</td>
<td>0%</td>
<td>10%</td>
<td>20%</td>
<td>25%</td>
<td>0% 0% 8% 17% 21%</td>
</tr>
<tr>
<td>Landscape</td>
<td>0%</td>
<td>0%</td>
<td>10%</td>
<td>20%</td>
<td>25%</td>
<td>0% 0% 8% 17% 21%</td>
</tr>
<tr>
<td>Not in use</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0% 0% 0% 0% 0%</td>
</tr>
<tr>
<td>Not in use</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0% 0% 0% 0% 0%</td>
</tr>
</tbody>
</table>

### Enter Expected Compliance %

<table>
<thead>
<tr>
<th>Customer Class</th>
<th>Stage 0</th>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
<th>Stage 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100%</td>
<td>80%</td>
<td>80%</td>
<td>85%</td>
<td>85%</td>
</tr>
</tbody>
</table>
## Designing Drought Rates

### 2. Rate Performance by Drought/Shortage Stage

The tables in this section hold two sets of rates. Your proposed rates are carried over from Step 3. These cannot be modified on this worksheet. They provide the point of reference for calculating the revenue impacts of drought stages. The Stage rates are the rates that would apply for a given drought/shortage stage. To see how your Proposed rates would perform in a drought stage, click the Reset Drought Stage Rates to Proposed Rates. This will copy your Proposed rates into the tables for the Stage Rates. You can then use the Select Drought Stage drop-down list to cycle through the drought stages and see how your sales revenue would be impacted by each stage. Impacts to annual sales volume and revenue for each Customer Class are summarized to the right of the rate tables. You can adjust the Stage Rates to see how your annual sales volume and revenue would respond. You can adjust the size or number of blocks as well as the rates for each block. You can use trial and error to find rates appropriate to each drought/shortage stage, or you can use Excel’s goal-seek or solver functionality to do this.

Section 3 provides a calculator that can quickly identify rates for a given drought/shortage stage that are revenue neutral.

### Rate Design Tables

<table>
<thead>
<tr>
<th>Single Family</th>
<th>Off Peak Season</th>
<th>Stage 2 Rates</th>
<th>Peak Season</th>
<th>Stage 2 Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Proposed Rates</td>
<td></td>
<td></td>
<td>Stage 2 Rates</td>
</tr>
<tr>
<td></td>
<td>Block (CCF)</td>
<td>Rate ($/CCF)</td>
<td>Block (CCF)</td>
<td>Rate ($/CCF)</td>
</tr>
<tr>
<td>Block 1</td>
<td>5</td>
<td>$2.50</td>
<td>5</td>
<td>$2.50</td>
</tr>
<tr>
<td>Block 2</td>
<td>10</td>
<td>$2.50</td>
<td>10</td>
<td>$2.50</td>
</tr>
<tr>
<td>Block 3</td>
<td>15</td>
<td>$2.50</td>
<td>15</td>
<td>$2.50</td>
</tr>
<tr>
<td>Block 4</td>
<td>15</td>
<td>$2.50</td>
<td>15</td>
<td>$2.50</td>
</tr>
<tr>
<td>Block 5</td>
<td>15</td>
<td>$2.50</td>
<td>15</td>
<td>$2.50</td>
</tr>
</tbody>
</table>

### Rate Performance Indicators

#### Drought Stage Selector

#### Impact of Drought Stage Rates Relative to Proposed Rates

<table>
<thead>
<tr>
<th>Annual Sales Volume</th>
<th>Annual Service &amp; Volume Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>[% Change]</td>
<td>[% Change]</td>
</tr>
<tr>
<td>Proposed</td>
<td>Stage 2</td>
</tr>
<tr>
<td>$8,913,705</td>
<td>$7,844,060</td>
</tr>
<tr>
<td>$12,263</td>
<td>$12,263</td>
</tr>
<tr>
<td>$27,744</td>
<td>$24,415</td>
</tr>
<tr>
<td>$40,007</td>
<td>$36,678</td>
</tr>
</tbody>
</table>

### Annual Sales Volume

<table>
<thead>
<tr>
<th>Service &amp; Volume Revenue (Thou.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>[% Change]</td>
</tr>
<tr>
<td>Proposed</td>
</tr>
<tr>
<td>$12,263</td>
</tr>
<tr>
<td>$27,744</td>
</tr>
<tr>
<td>$40,007</td>
</tr>
</tbody>
</table>
Are Future Sales and Revenue Uncertain?
Do Drought Restrictions affect Sales?

1991: End of 5-Year Drought
Examining Exceedence Probabilities

4. Determine Sales Revenue Exceedence Probability

<table>
<thead>
<tr>
<th></th>
<th>Under Current Rates</th>
<th>Under Proposed Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target Amount</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Thou.$)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>First Year Revenue</td>
<td>$71,000</td>
<td>$71,000</td>
</tr>
<tr>
<td>3-Year Cumulative Revenue</td>
<td>$215,000</td>
<td>$215,000</td>
</tr>
<tr>
<td>5-Year Cumulative Revenue</td>
<td>$360,000</td>
<td>$360,000</td>
</tr>
</tbody>
</table>

User sets revenue targets

Model calculates likelihood of meeting or exceeding target

- Year 1 Revenue
  - Under Current Rates: Target Exceedence Probability: 43%
  - Under Proposed Rates: Target Exceedence Probability: 66%

- 3-Yr Cumulative Revenue
  - Under Current Rates: Target Exceedence Probability: 21%
  - Under Proposed Rates: Target Exceedence Probability: 52%

- 5-Yr Cumulative Revenue
  - Under Current Rates: Target Exceedence Probability: 20%
  - Under Proposed Rates: Target Exceedence Probability: 61%
Managing Weather Risk

 Wide swings in revenue between wet years and dry years
 Need to explore market-based financial tools for managing weather risk (insurance, derivatives)
 Example: municipal snow removal insurance
 AWE published white paper in July, 2014
 Posted at www.a4we.org
Financial Instruments to Manage Revenue Risk

A new white paper explores opportunities for utilities to use financial instruments - such as derivatives, insurance and bonds - to manage weather-related revenue risk in an increasingly volatile climate.

Rates. Revenue. Resources.

Financing Sustainable Water is an initiative of the Alliance for Water Efficiency. It was created to provide practical information to guide utilities from development through implementation of rate structures that balance revenue management, resource efficiency and fiscal sustainability. This website will be updated frequently with new content and we encourage visitors to return often for additional information and resources. The Alliance serves as a North American advocate for water efficient products and programs, and provides information and assistance on water conservation efforts. Learn More

WATER MANAGERS
Find guidance on sustainable financial management

ELECTED OFFICIALS
Support your utility through smart management practices

CONCERNED CITIZENS
Learn how you can help create a sustainable water future

MEDIA
Get facts on today’s water challenges and solutions
Resource Search

AWE strives to provide the best and most recent resources on water conservation and efficiency. Search through our collection and discover the wealth of reports, case studies, tools, and more related to Financing Sustainable Water. Resources can be searched by any of the categories below or by entering a term in the “Keyword Search” field. If you do not find what you’re looking for, please contact us.

Case Study: Los Angeles Department of Water & Power Achieves Demand Management Goals with Unique Volumetric Rate Structure and Long-Term Planning
What’s Next?

- Launch August 2014, webinar available online
- New Case Studies and Tools coming
  - Effectiveness of budget-based rates
  - Probability management and financial planning
- Model Video Tutorials
- Customizable customer messaging
- Animated “Cost of Water” video
- Partnering with pilot utilities
- Visit www.FinancingSustainableWater.org
Training Opportunities

- Hands-on training on the model
- Texas Workshops:
  - Houston Nov 12
  - Dallas Nov 13
  - Register at [www.TexasWater.org](http://www.TexasWater.org)
- CUWCC Rates Workshops, Jan 2015
- Utility Management Conference Workshop in Austin, February 2015
- Talk to us about training in your area. Email [megan@a4we.org](mailto:megan@a4we.org)