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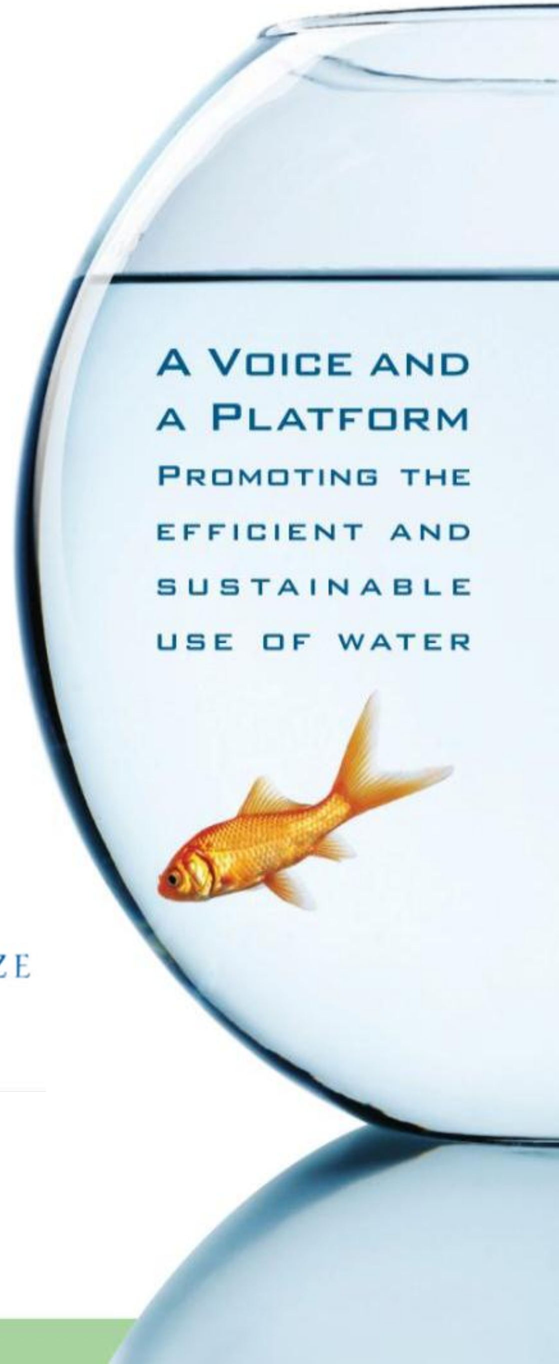
Flexible Rates: Planning for a Revenue-Stable Water-Efficient Future

Mary Ann Dickinson
Thomas Chesnutt

Water Smart Innovations Conference
October 9, 2014

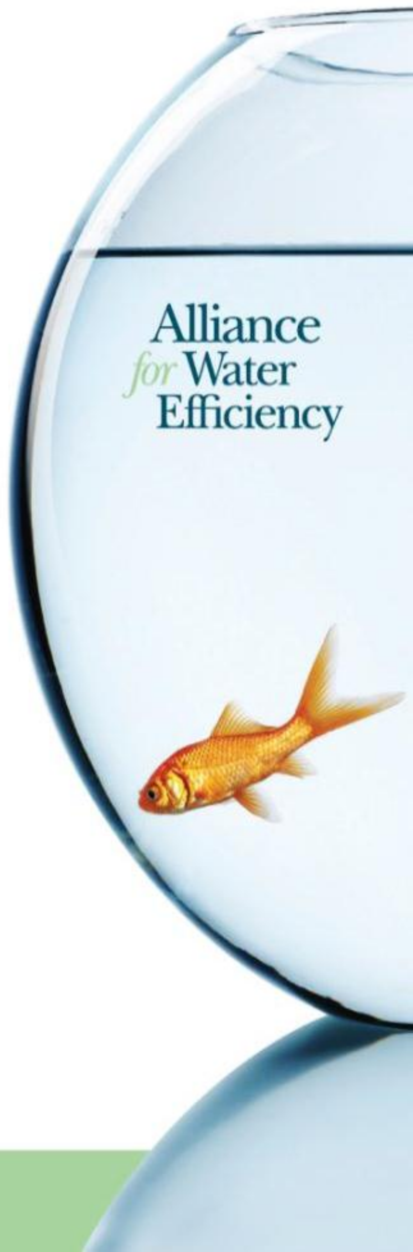
2014 AWARD WINNER
UNITED STATES WATER PRIZE



Alliance for Water Efficiency

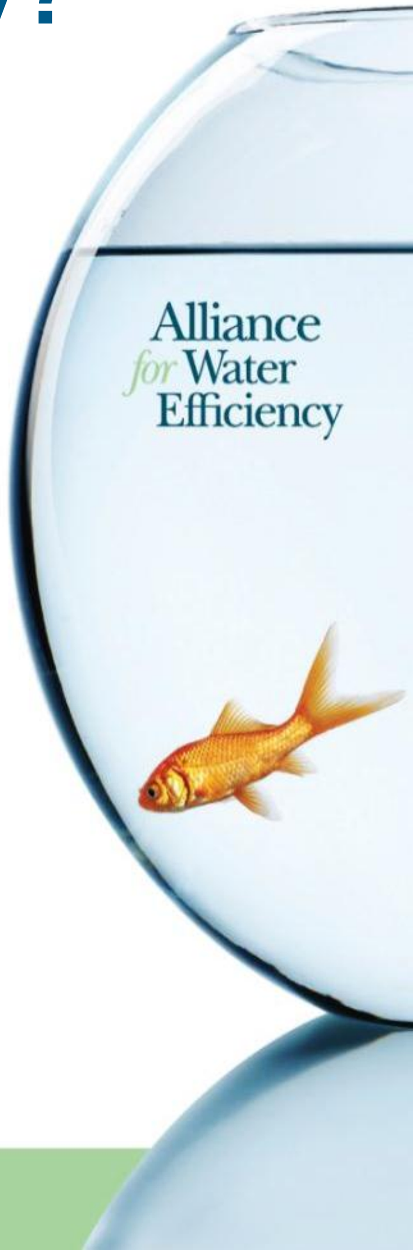
Coping with Conservation

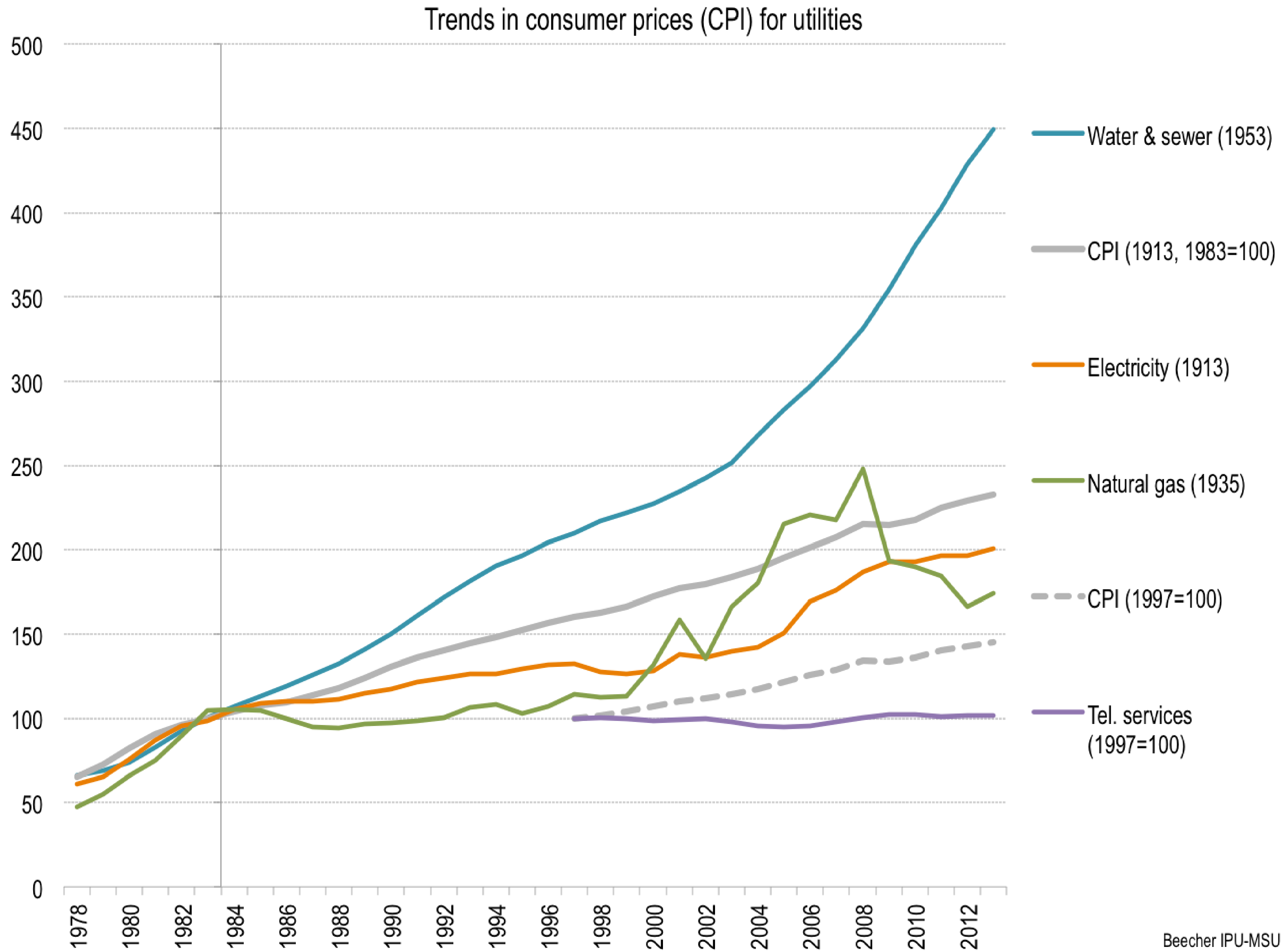
- Lowered demand means reduced sales revenue
- Reduced sales revenue can mean not fully collecting fixed costs
  - ✓ Short-run variable costs (water, pumping energy, chemicals)
  - ✓ Long-run capacity costs (supply, transmission, storage, treatment)
- Revenue stability therefore becomes an issue



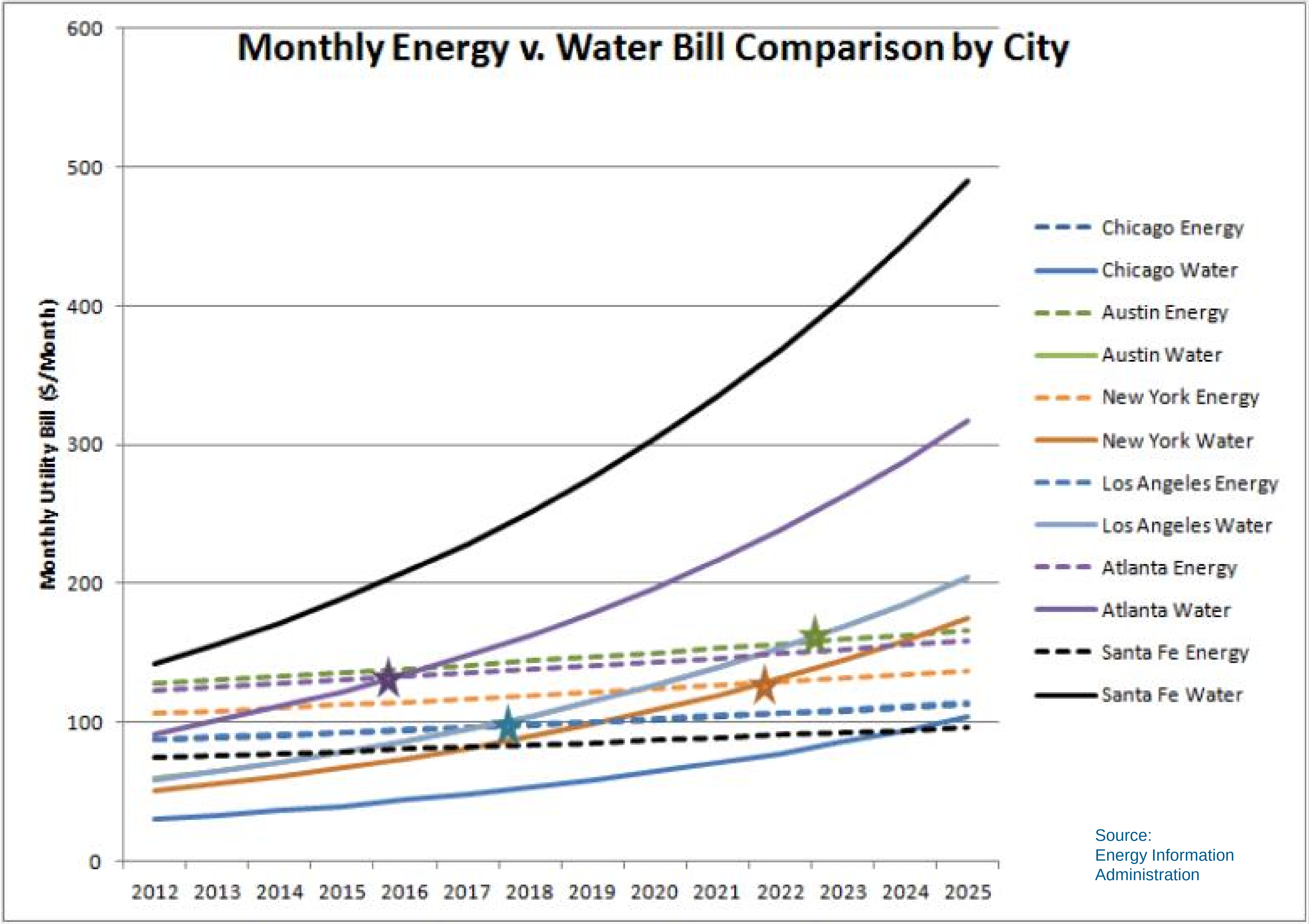
What Affects Revenue Stability?

- 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





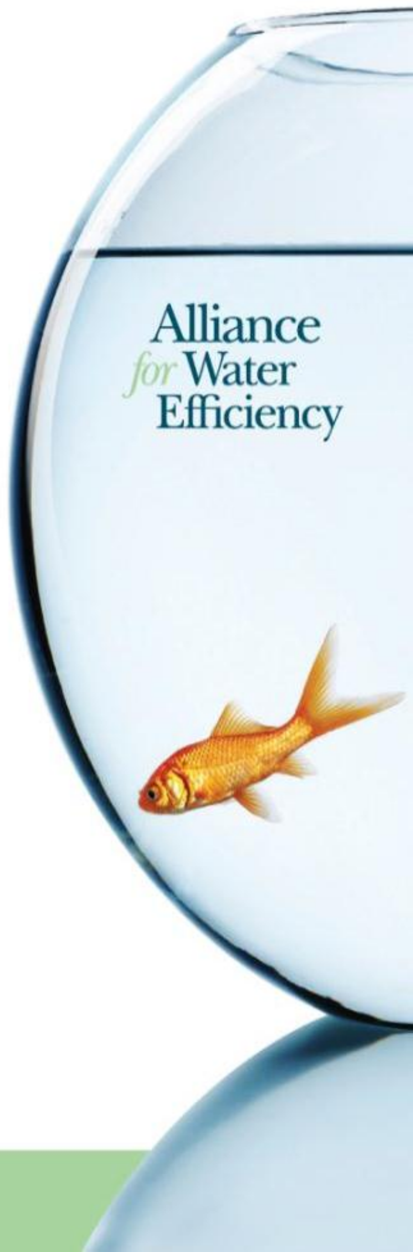
Trends in consumer prices (CPI) for utilities
500
450
400
350
300
250
200
150
100
50
0
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
Water & sewer (1953)
CPI (1913, 1983=100)
Electricity (1913)
Natural gas (1935)
CPI (1997=100)
Tel. services (1997=100)
Beecher IPU-MSU

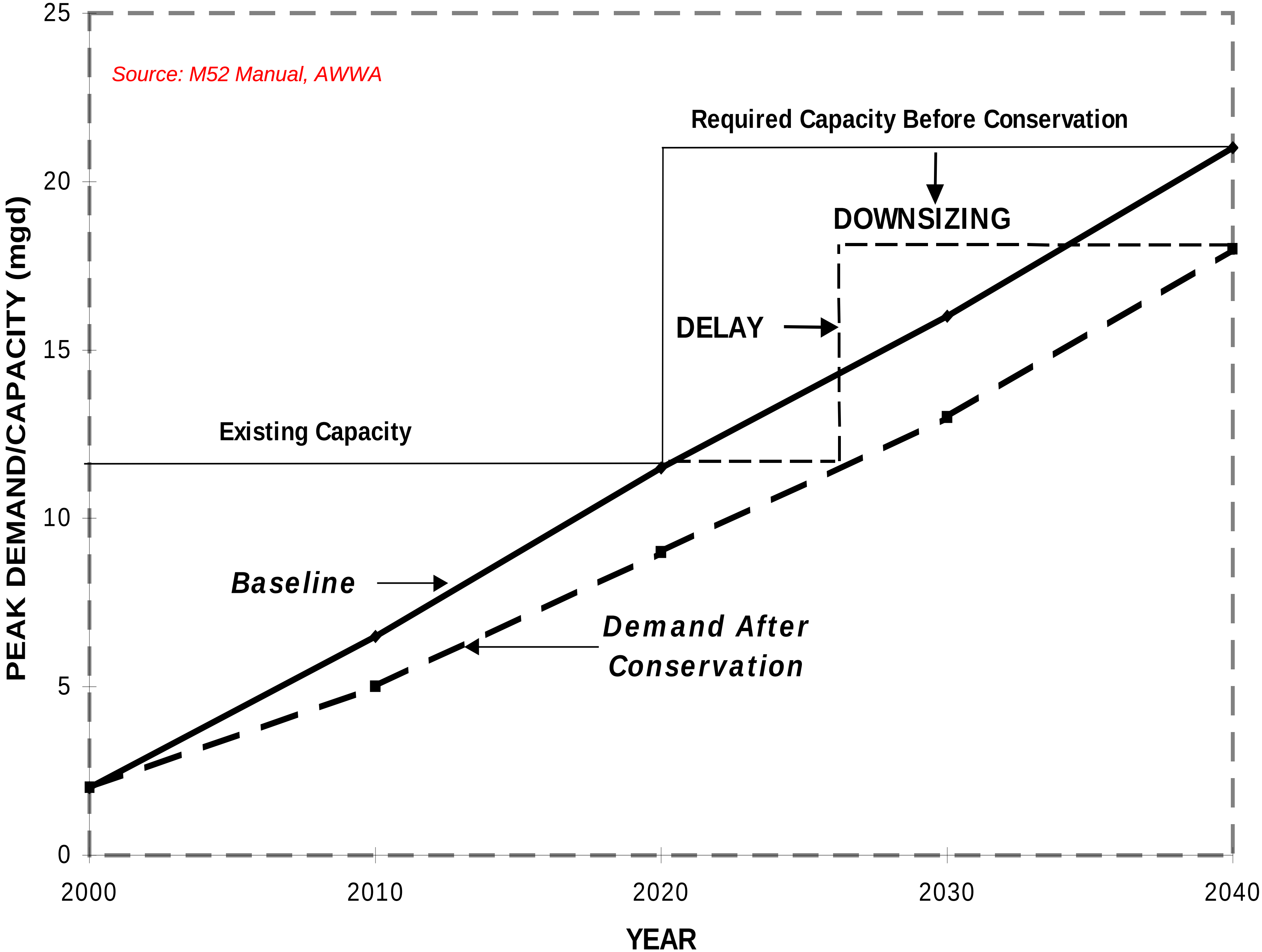

Monthly Energy v. Water Bill Comparison by City
Monthly Utility Bill ($/Month)
600
500
400
300
200
100
0
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
Chicago Energy
Chicago Water
Austin Energy
Austin Water
New York Energy
New York Water
Los Angeles Energy
Los Angeles Water
Atlanta Energy
Atlanta Water
Santa Fe Energy
Santa Fe Water
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




Source: M52 Manual, AWWA
Required Capacity Before Conservation
DOWNSIZING
DELAY
Existing Capacity
Baseline
Demand After Conservation
PEAK DEMAND/CAPACITY (mgd)
YEAR
0
5
10
15
20
25
2000
2010
2020
2030
2040

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q

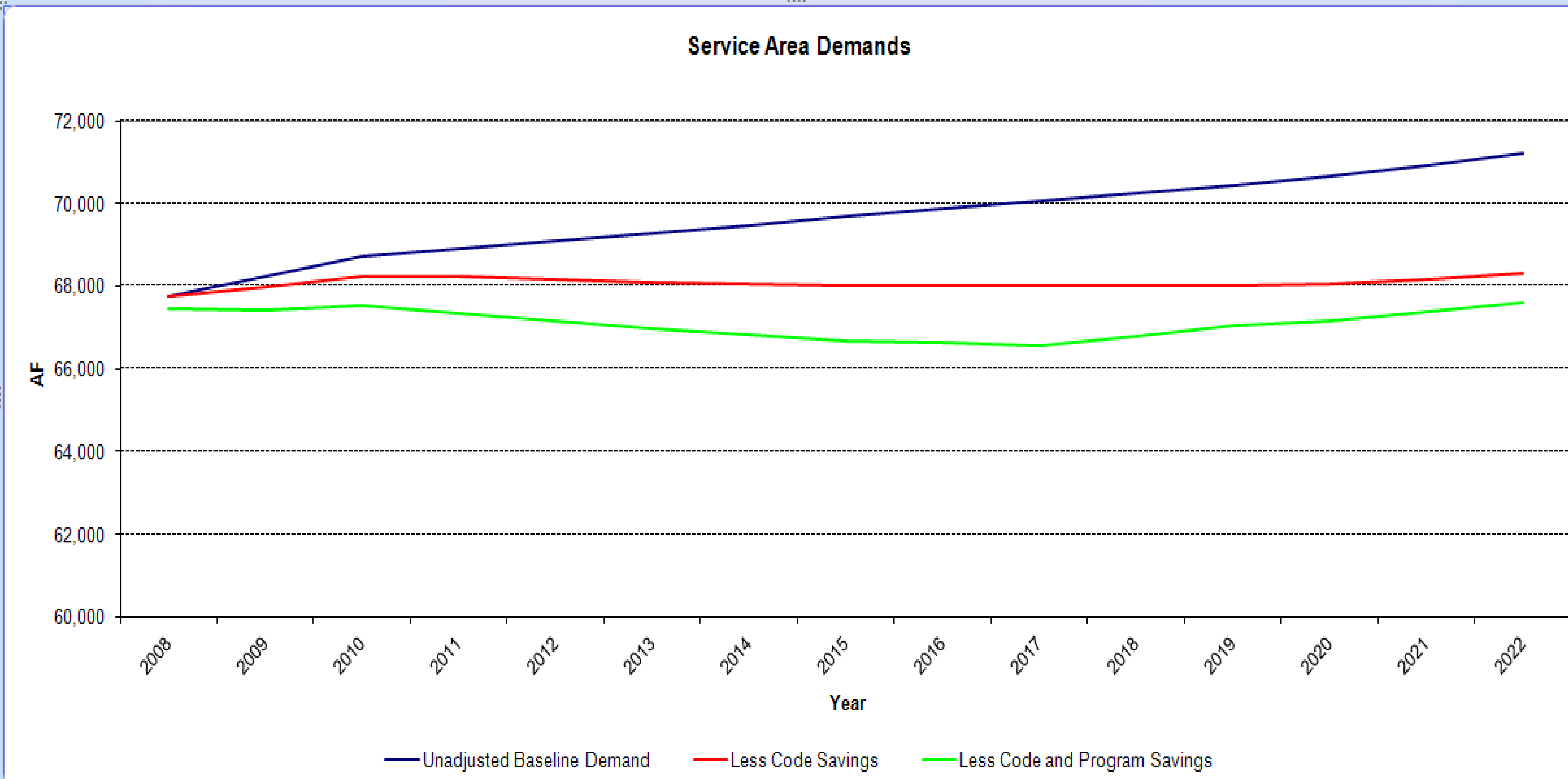
Year forecasted peak season demand equals existing peak season delivery capacity		Deferred Expansion (Years)	Deferred Capacity (MGD)	Benefit of Deferred Expansion ($)	Avoided Capacity (MGD)	Benefit of Avoided Expansion ($)
Baseline Demands	**2014**	N/A	N/A	N/A	N/A	N/A
Baseline - Code Savings	**2025**	**11**	5.8	$9,764,491	0.0	$0
Baseline - Code Savings - Program Savings	**2027**	**13**	5.8	$11,231,717	0.0	$0

Select Chart to View

Service Area Demands

No. of Years to Display 15 yrs

Chart Explanations



6. GHG Module Inputs | Activity Savings Profiles | **Water Savings Summary** | Utility Costs and Benefits | Utility Revenues and Rates | Customer C

AWE CONSERVATION TRACKING TOOL: UTILITY REVENUES & RATES WORKSHEET

Last Loaded Scenario: "City of Beltway" loaded on 7/24/2014 2:45:10 PM

Return to Navigation Sheet

Report Error

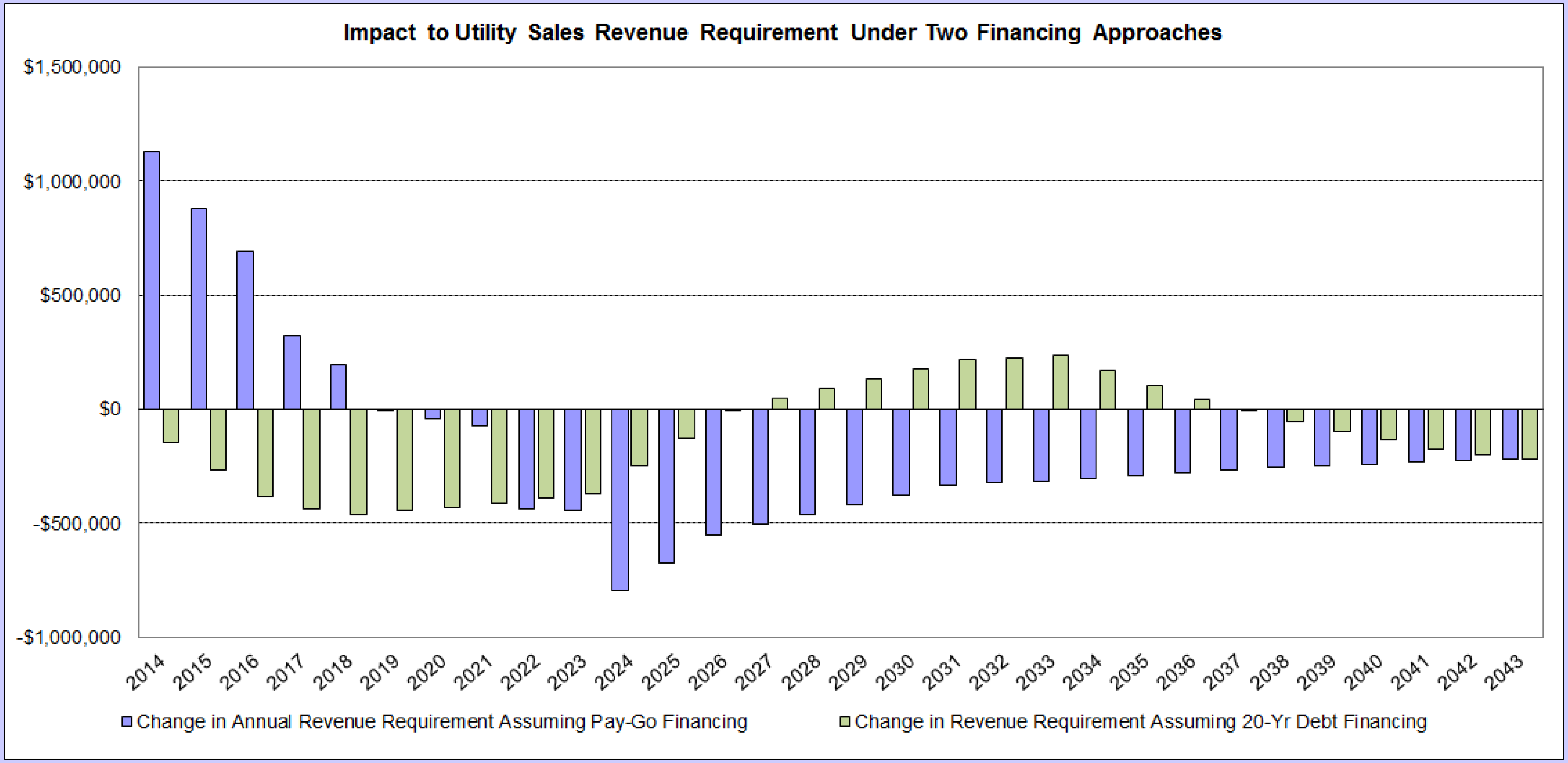
Utility Revenue Requirement and Rate Impacts

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

Select Impact Chart to View

Revenue Requirement

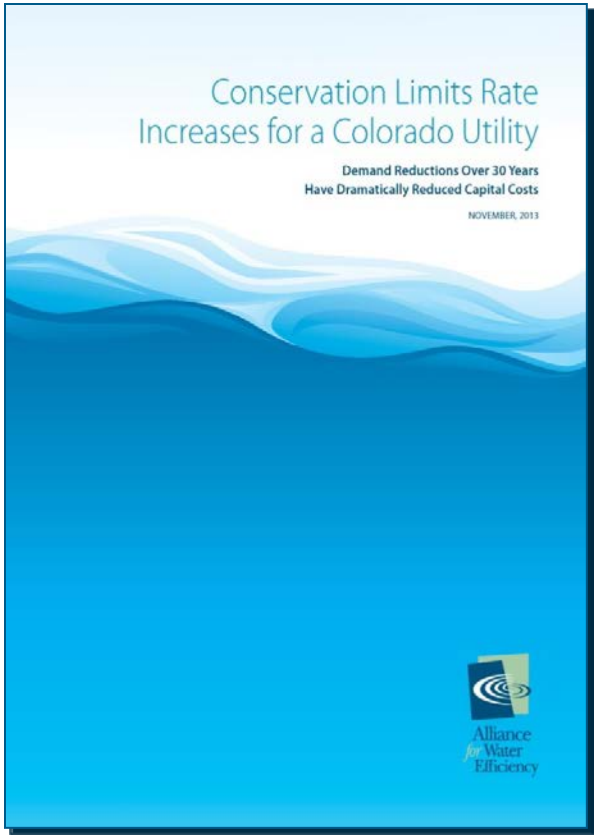
Chart Explanations



4. Define Activities | 5. Enter Annual Activity | 6. GHG Module Inputs | Activity Savings Profiles | Water Savings Summary | Utility Costs and Benefits | Utility Revenue

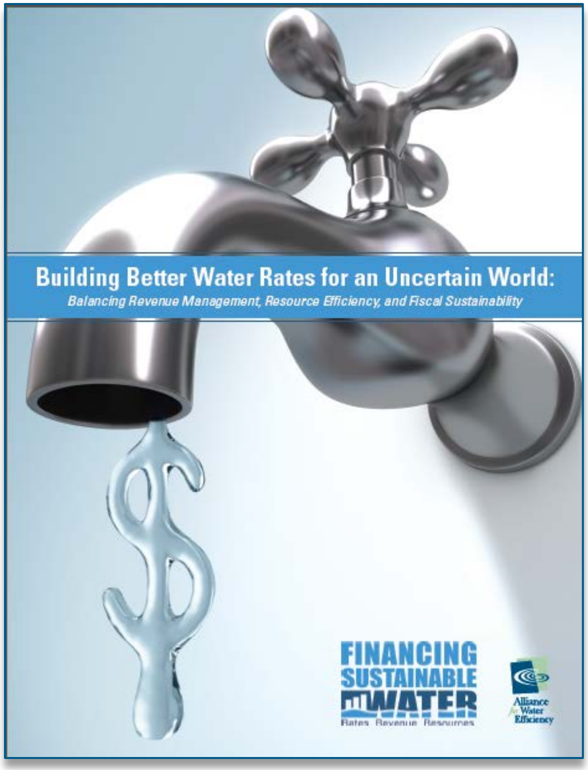
Westminster's Story

- 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**

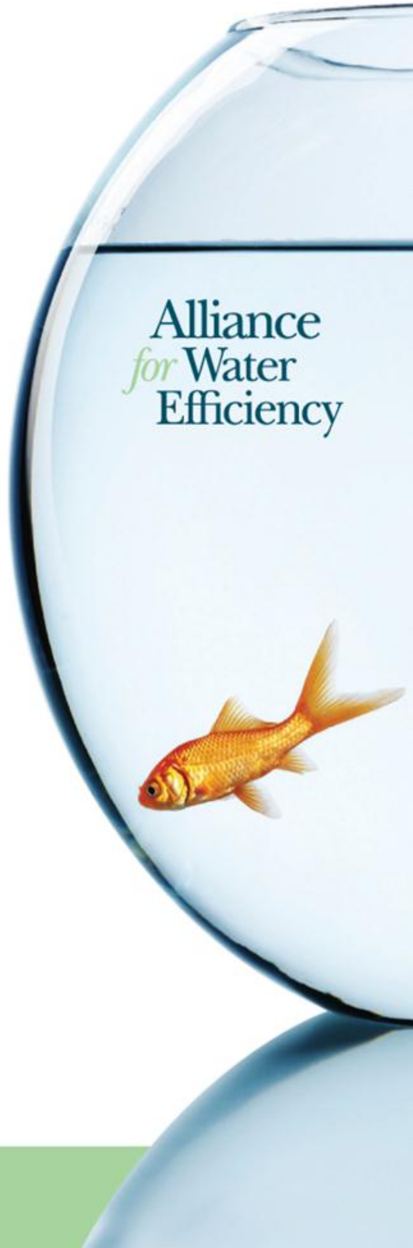


Financing Sustainable Water

- 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

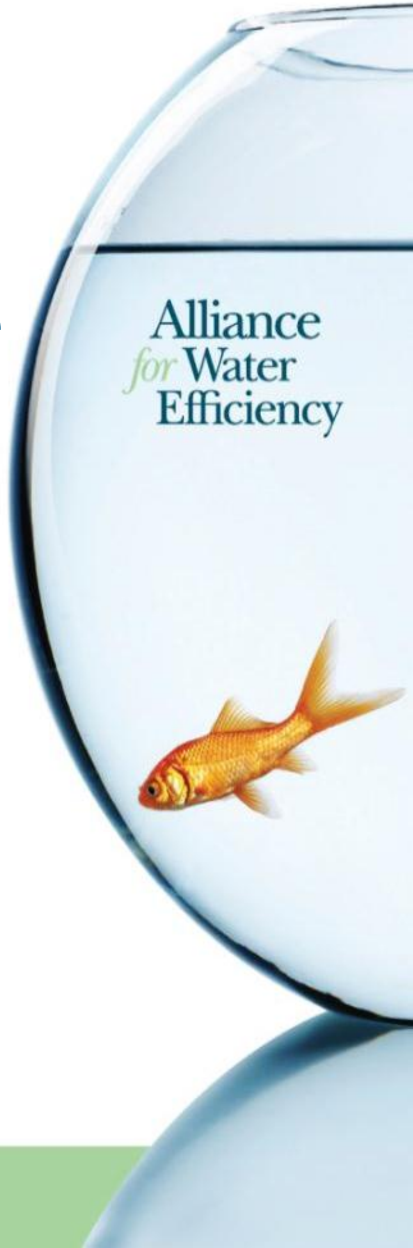


AWE Handbook Contents



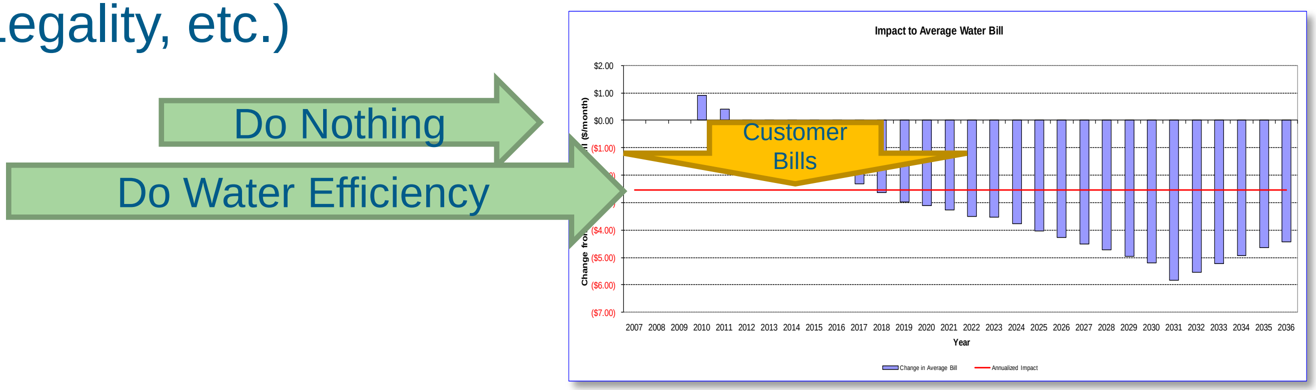
Key Concepts

- 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

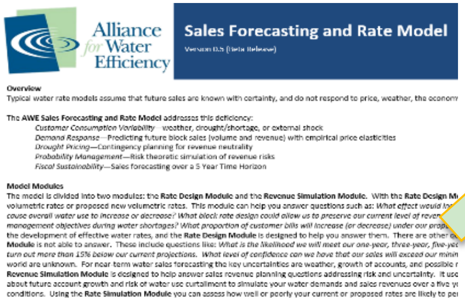
Embedding water rate setting within Financial Management:

- Water Rate Setting is not a theoretical exercise
- Water Rate Setting occurs within Financial Planning
- Water Rate Setting can be guided by Financial Policies

See Rothstein and Galardi, (2012) *Financing Water Utilities' Sustainability Initiatives: Challenging Institutionalized Governance and Market Failures*.

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.



Alliance for Water Efficiency

Sales Forecasting and Rate Model

Version 0.5 (Beta Release)

Overview

Typical water rate models assume that future sales are known with certainty, and do not respond to price, weather, the econom

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 M** volumetric rates or proposed new volumetric rates. This module can help you answer questions such as: *What effect would lo cause overall water use to increase or decrease? What block rate design could allow us to preserve our current level of reven management objectives during water shortages? What proportion of customer bills will increase (or decrease) under our prop* the development of effective water rates, and the **Rate Design Module** is designed to help you answer them. There are other q **Module** is not able to answer. These include questions like: *What is the likelihood we will meet our one-year, three-year, five-ye turn out more than 15% below our current projections. What level of confidence can we have that our sales will exceed our minin* world are unknown. For near-term water sales forecasting the key uncertainties are weather, growth of accounts, and possible r **Revenue Simulation Module** is designed to help answer sales revenue planning questions addressing risk and uncertainty. It use about future account growth and risk of water use curtailment to simulate your water demands and sales revenues over a five y conditions. Using the **Rate Simulation Module** you can assess how well or poorly your current or proposed rates are likely to pe

Long Term Risk: Average Outcomes vs. Likely Outcomes

FLAW OF AVERAGES

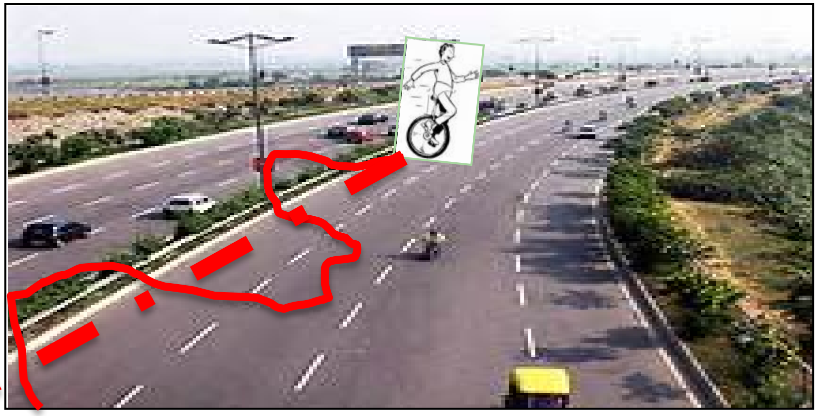
Fact 1 – Planning for the future is rife with uncertainties.

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: ProbabilityManagment.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

Print this page

Tags: AWWA, California, climatechange, consumer, drought, waterbills, waterconservation, waterrates

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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 Beteille, pedestrianphotographer.com

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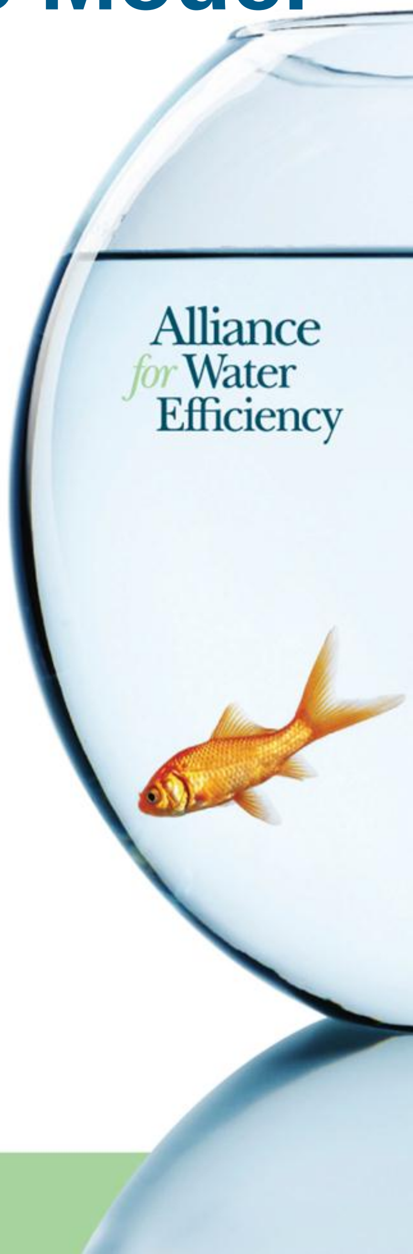
AWE Sales Forecasting and Rate Model

- 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?



Bill Impacts Screenshot

Affordability Indicator

Avg and median bill impacts

Bill Impact Histograms

3. Bill impacts of Proposed rates

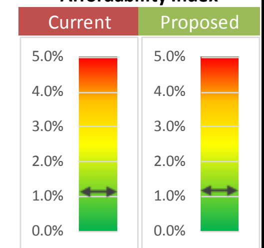
Under your Proposed rates, the volume charge may go up for some customers and down or stay the same for others. The Bill Impacts Table shows the percentage of bills that will go ... he same, or go up -- and by how much. Charts showing the distribution of bill impacts for each customer class are provided on the Bill Impacts worksheet.

% Change in Average and Median Annual Water Service Cost by Customer Class

Customer Class	Average Annual Water Service Cost			Median Annual Water Service Cost		
	Current	Proposed	% Change	Current	Proposed	% Change
Single Family	$777	$804	3.4%	$650	$672	3.3%
Multi Family	$4,254	$4,294	0.9%	$1,930	$1,942	0.6%
CII	$3,323	$3,382	1.8%	$1,481	$1,504	1.5%
Landscape	$5,599	$6,007	7.3%	$2,503	$2,720	8.7%
Not in use						
Not in use						

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

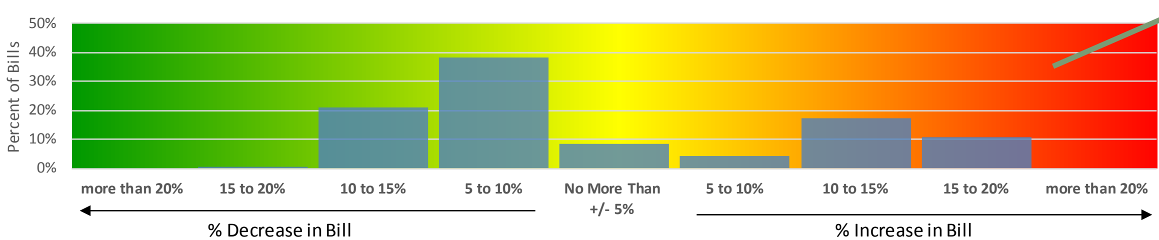
Affordability Index



Bill Impacts Table

Customer Class	% of bills decreasing by				No More Than	% of bills increasing by			
	more than 20%	15 to 20%	10 to 15%	5 to 10%	+/- 5%	5 to 10%	10 to 15%	15 to 20%	more than 20%
Single Family	0%	0%	21%	38%	9%	4%	17%	11%	0%
Multi Family	0%	1%	38%	25%	4%	4%	18%	12%	0%
CII	0%	0%	25%	20%	28%	7%	9%	10%	0%
Landscape	0%	0%	26%	12%	33%	2%	6%	20%	0%
Not in use									
Not in use									

Single Family Customer Class Bill Impact Histogram



Specifying Curtailment Levels

Requested curtailment level by stage

1. Specify Curtailment Levels for Drought/Shortage Stages

1. Enter the Customer Class curtailment levels for each stage. If y[illegible]ver 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 comp[illegible]e can vary by stage. For example, stages with voluntary curtailment may have lower compliance than stages where curtailment is mandatory and enforced. The exp[illegible]tailment level for a stage is the product of the stage's curtailment level and the expected compliance rate.

	Drought/Shortage Stage Cust[illegible] Class Curtailment Levels Table					Expected Curtailment				
Customer Class	**Stage 0**	**Stage 1**	**[illegible]e 2**	**Stage 3**	**Stage 4**	**Stage 0**	**Stage 1**	**Stage 2**	**Stage 3**	**Stage 4**
Single Family	0%	10%	[illegible]5%	20%	25%	0%	8%	12%	17%	21%
Multi Family	0%	10%	15%	20%	25%	0%	8%	12%	17%	21%
CII	0%	0%	10%	20%	25%	0%	0%	8%	17%	21%
Landscape	0%	0%	10%	20%	25%	0%	0%	8%	17%	21%
Not in use	0%					0%	0%	0%	0%	0%
Not in use	0%					0%	0%	0%	0%	0%
Enter Expected Compliance %	100%	80%	80%	85%	85%					

Expected compliance rate

Expected curtailment

Designing Drought Rates

Rate Design Tables

Rate Performance Indicators

Drought Stage Selector

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 ... 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 ... ught/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 rat... 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 b... age. 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 sale... ne 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/sh... 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 re... ue neutral.

Select Drought Stage: Stage 2

Single Family

	Off Peak Season				Peak Season			
	Proposed Rates		Stage 2 Rates		Proposed Rates		Stage 2 Rates	
	Block (CCF)	Rate ($/CCF)	Block (CCF)	Rate ($/CCF)	Block (CCF)	Rate ($/CCF)	Block (CCF)	Rate ($/CCF)
Block 1	5	$2.50	5	$2.50	5	$3.75	5	$3.75
Block 2	10	$2.50	10	$2.50	10	$3.75	10	$3.75
Block 3	15	$2.50	15	$2.50	15	$3.75	15	$3.75
Block 4	15	$2.50	15	$2.50	15	$3.75	15	$3.75
Block 5	15	$2.50	15	$2.50	15	$3.75	15	$3.75

Rate Performance by Customer Class

Annual Sales Volume

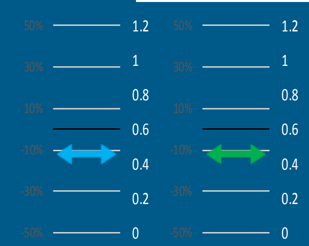
	Proposed	Stage 2	% Change
CCF	8,913,705	7,844,060	-12.0%

Annual Sales Revenue (Thou. $)

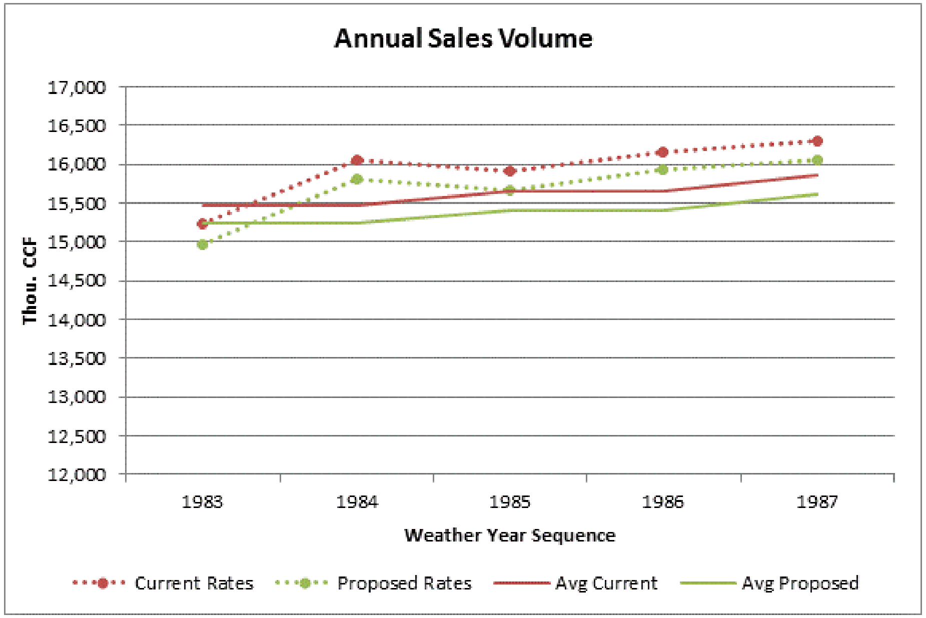
	Proposed	Stage 2	% Change
Service	$12,263	$12,263	0.0%
Volume	$27,744	$24,415	-12.0%
Total	$40,007	$36,678	-8.3%

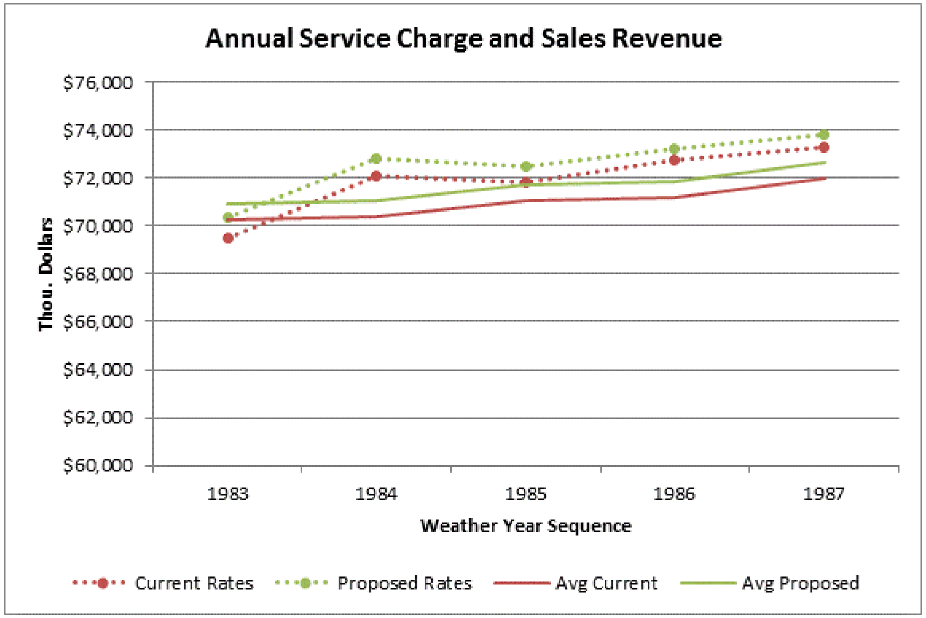
Impact of Drought Stage Rates Relative to Proposed Rates

Annual Sales Volume (% Change)	Annual Service & Volume Revenue (% Change)

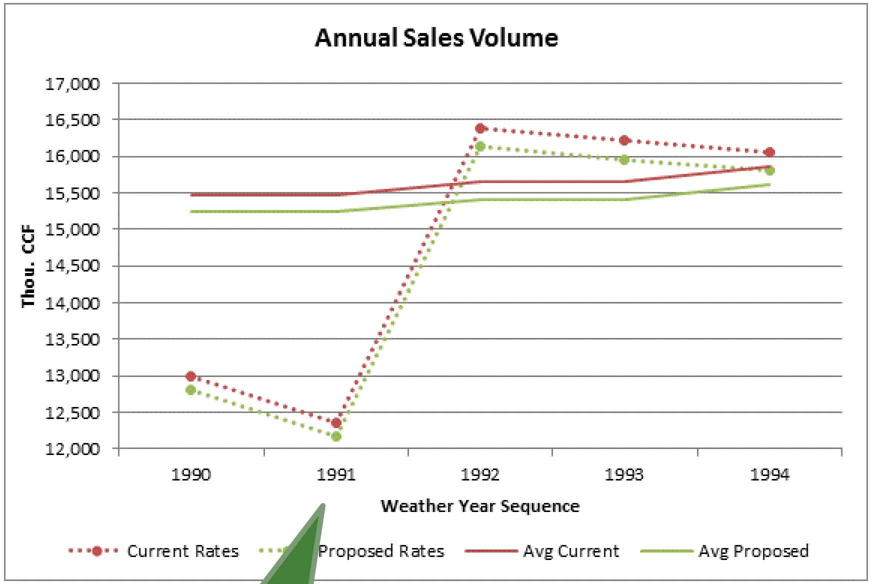


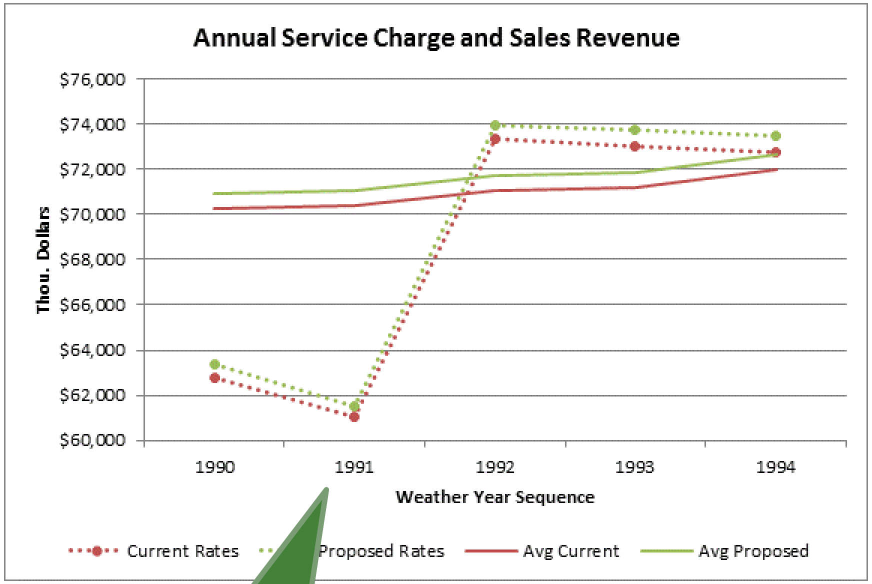
Are Future Sales and Revenue Uncertain?





Do Drought Restrictions affect Sales?



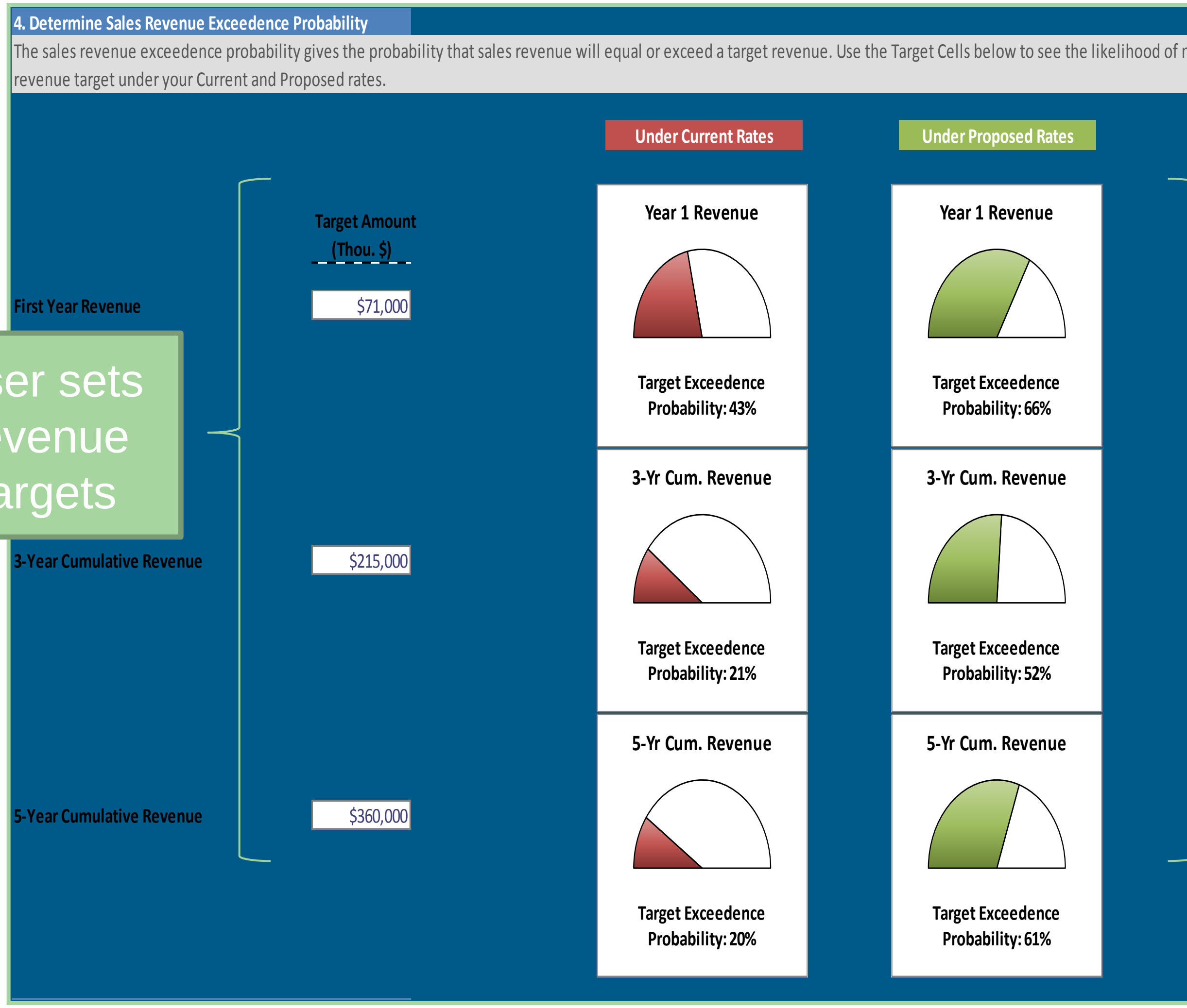


1991: End of 5- Year Drought

1991: End of 5- Year Drought

Examining Exceedence Probabilities

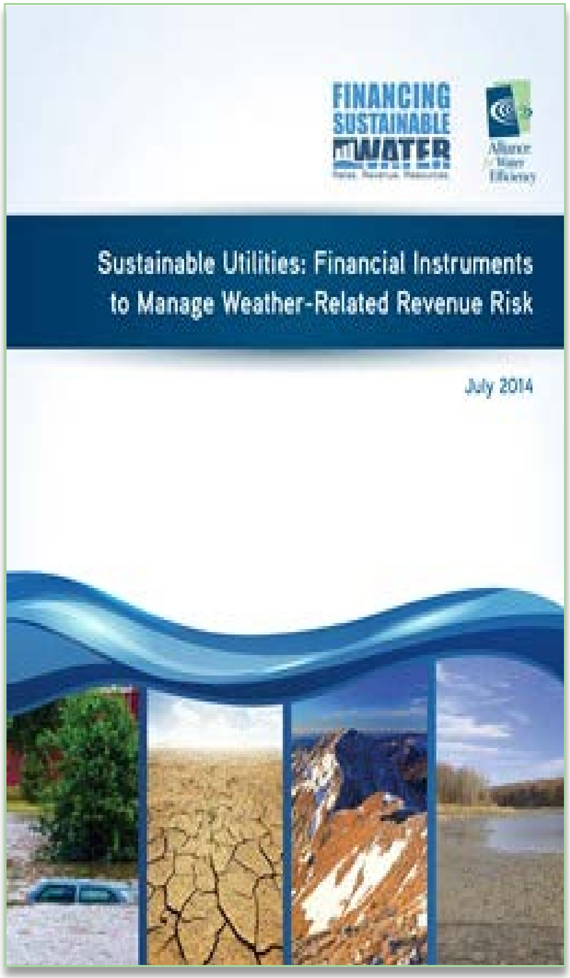
User sets revenue targets



Model calculates likelihood of meeting or exceeding target

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**



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FINANCING SUSTAINABLE WATER
Rates. Revenue. Resources.

A project of the Alliance for Water Efficiency

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RATES HANDBOOK
Building Better Rates for an Uncertain World

RATE MODEL
Sales Forecasting and Rate Model

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- Case Study: Cobb County
  Public Engagement Success
- Report: Westminster, CO
  Conservation Lowers Rates

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 you not find what you're looking for, please contact us.

Topic

- Any -

- Any -
Affordability
Alternative Rates (Budget-based, Marginal Cost, etc.)
Billing
Communications
Cost of Service/Costing Methods
Demand Forecasting
Equity
Financial Planning
Implementation
Rate Design
Rate Structures
Rate Surveys
Regulations/Policy
Revenue Management and Stability
Revenue/Cost Recovery Mechanisms
Sales/Revenue Forecasting
Stormwater
Wastewater/Sewer
Water Use Efficiency and Conservation

User Audience

- Any -

Search Reset

nts Efficiency-Oriented Rate Structure and Educates Customers through Targeted and Strategic

/ater Research Foundation

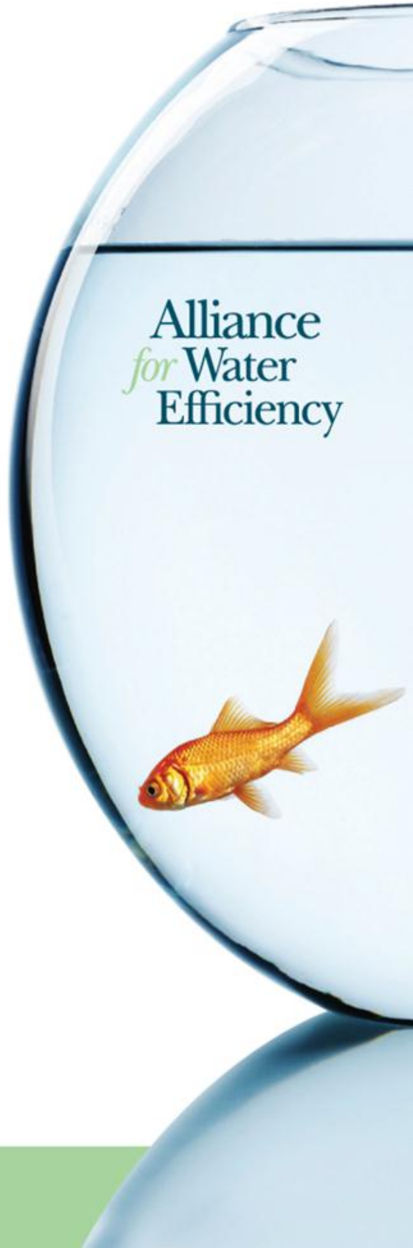
-based, Marginal Cost, etc.), Communications, Implementation, Rate Design, Rate

Read More...

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

What's Next?

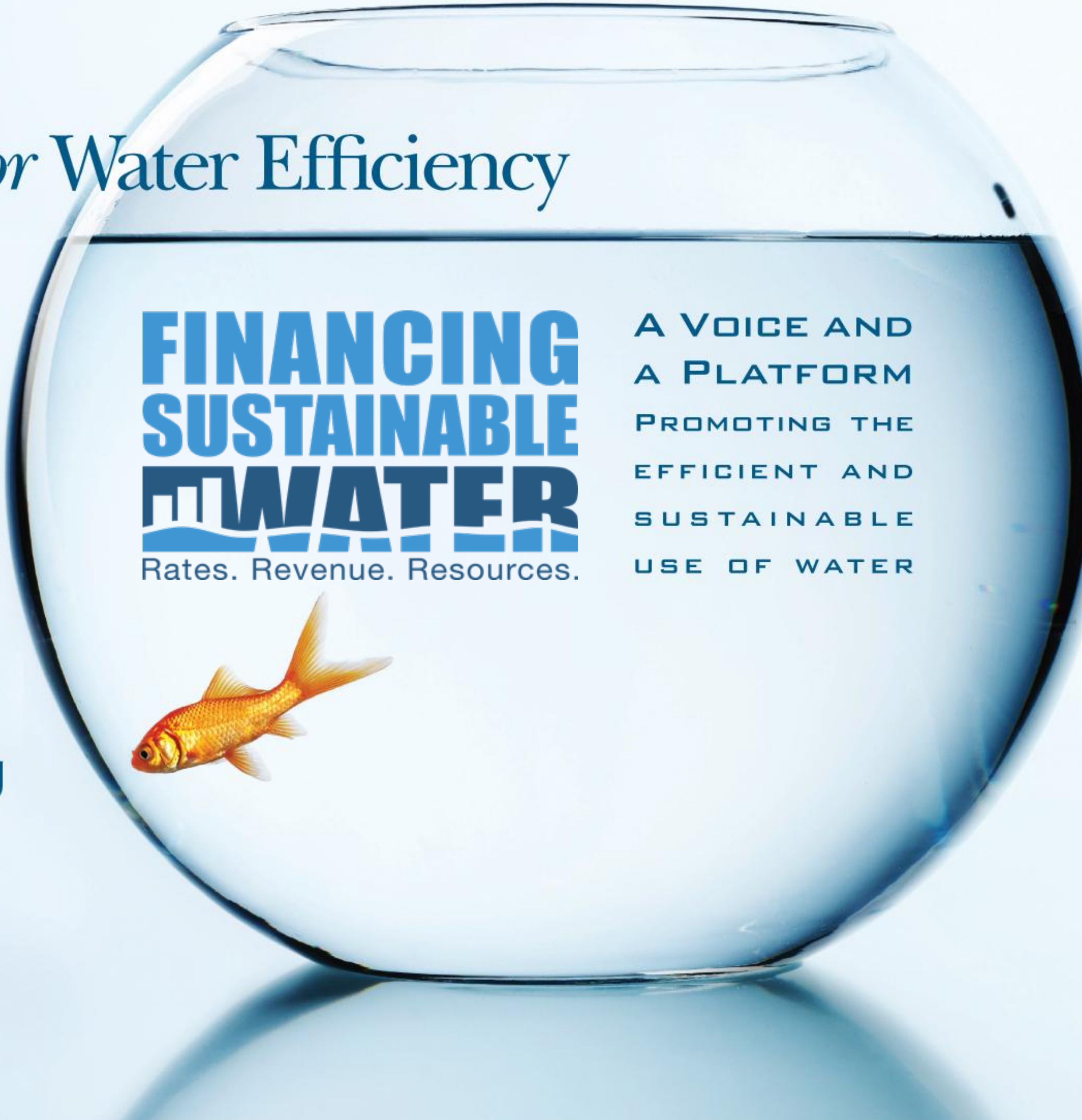
- Launch August 2014, webinar available online
- New Case Studies and Tools coming
  - ✓ Effectiveness of budget-based rates
  - ✓ Probability management and financial planning
- Model Video Tutorials
- Customizable customer messaging
- Animated "Cost of Water" video
- Partnering with pilot utilities
- 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**
- 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**

Alliance *for* Water Efficiency



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