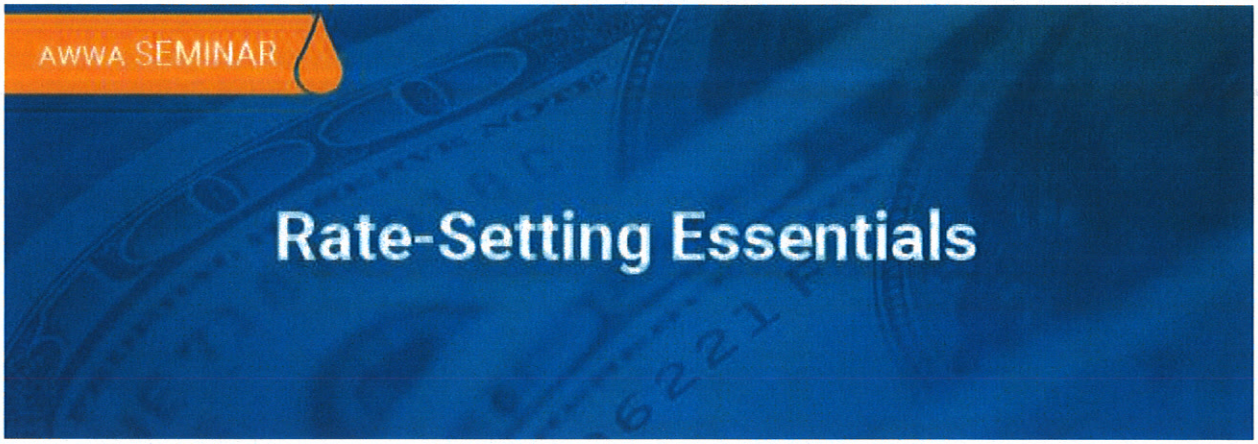

September 19, 2023

AWWA Rate Setting Seminar
August 15-17, 2023 BOSTON, MA

TRAVEL REPORT

Sept 19, 2023

AWWA RATE SETTING SEMINAR RECAP

Attached is the recap summary and Agenda for the AWWA RATE SETTING SEMINAR held in Boston, MA August 15-17, 2023.

Guam PUC has oversight of the Guam Water Authority and provides educational training for its commissioners.

AND I, Peter Montinola Commissioner of the Guam PUC, attended said seminar.

This three-day in-person Seminar provided an updated lens on how to evaluate and develop financial policies and proposed rates that are cost-based and equitable. Additionally, this Seminar shared guidance on how to effectively communicate those policies and rate impacts to customers in these current times. The program combined time-honored strategies with modern approaches to get the rate levels our utility needs to be successful, while still promoting community objectives.

The seminar agenda and presentations I attended are attached. Topics included:

- Fundamental methodologies to establish cost of service rates.
- Rate structure pricing objectives to select the right rate structure for your utility.
- Various rate structures and how they are calculated.
- Right materials to present rate study results.
- How to present your rate study effectively.
- Information in a clear and concise manner to the public.

Overall, this rate setting seminar was productive and educational.

Sincerely,

Peter Montinola – Guam PUC Commissioner

American Water Works Association

Dedicated to the World's Most Important Resource®

Rate-Setting Essentials:
Connecting Financial Planning, Cost-of-Service and Rate Design

AWWA Seminar
August 15 – 17, 2023

DAY 3

1

COURSE LEARNING OBJECTIVES

Apply	Fundamental methodologies to establish cost of service rates
Develop	Rate structure pricing objectives to select the right rate structure for your utility
Understand	Various rate structures and how they are calculated
Develop	Right material to present rate study results
Learn	How to present your rate study effectively
Communicate	Information in a clear and concise manner to the public

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TABLE OF CONTENTS

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COURSE AGENDA

DAY 3	
TIME	*Note: Times indicated are local times*
8:00 A.M. – 2:00 P.M.	Module: Wastewater Allocation and Distribution Module: Water and Wastewater Rate Design
Lunch	Working through lunch

Day

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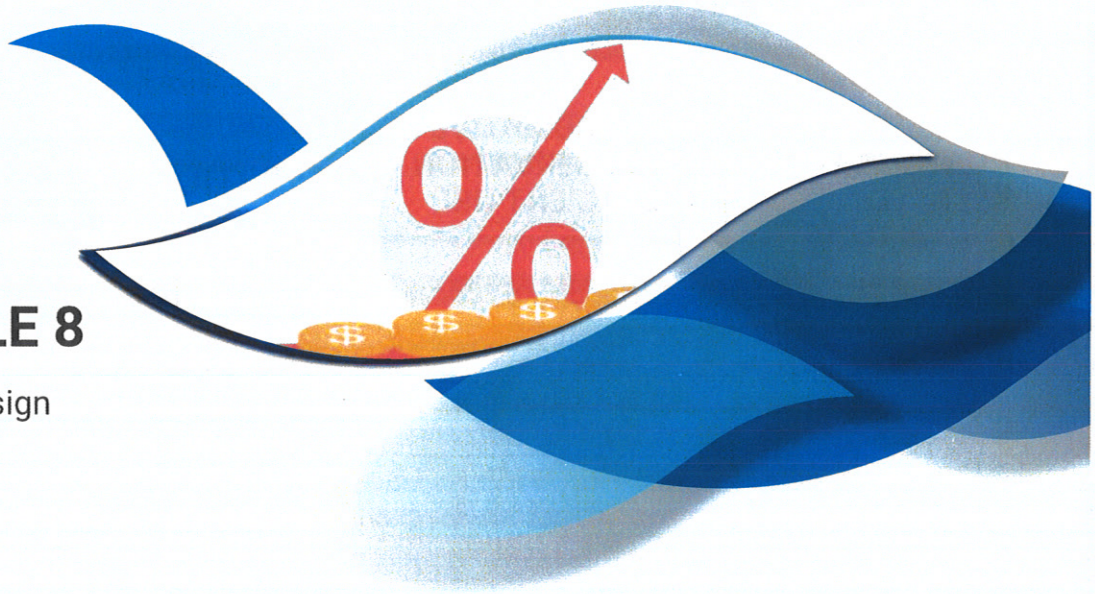
MODULE 8

Rate Design



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In this module, you will learn how to:

Develop	Proposed rates based on the results of the revenue requirement and cost of service analysis
Evaluate	Alternative rate structures
Identify	Rate design goals and objectives

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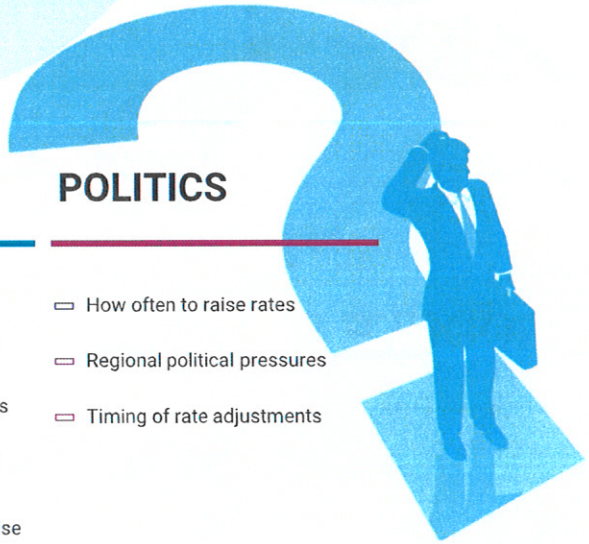
RATE DESIGN QUESTIONS TO CONSIDER DURING A COST OF SERVICE STUDY



CUSTOMER-RELATED

- One rate schedule or different rates for different classes of service
- Impacts on different income levels and customer groups
- Lifeline rates, senior discounts
- Frequency of billing
- New rate structure transition – mitigate bill impacts
- Citizens' Rate Advisory Committees (CRAC's)

CONSUMPTIVE CONSERVATION EFFICIENT USE

- Indoor vs outdoor use, conservation and seasonal rates
- Block thresholds / number of blocks
- Price elasticity – short-term vs long-term impacts
- Conservation vs marketing of water
- Financial impacts from conservation - the need to raise rates?

POLITICS

- How often to raise rates
- Regional political pressures
- Timing of rate adjustments

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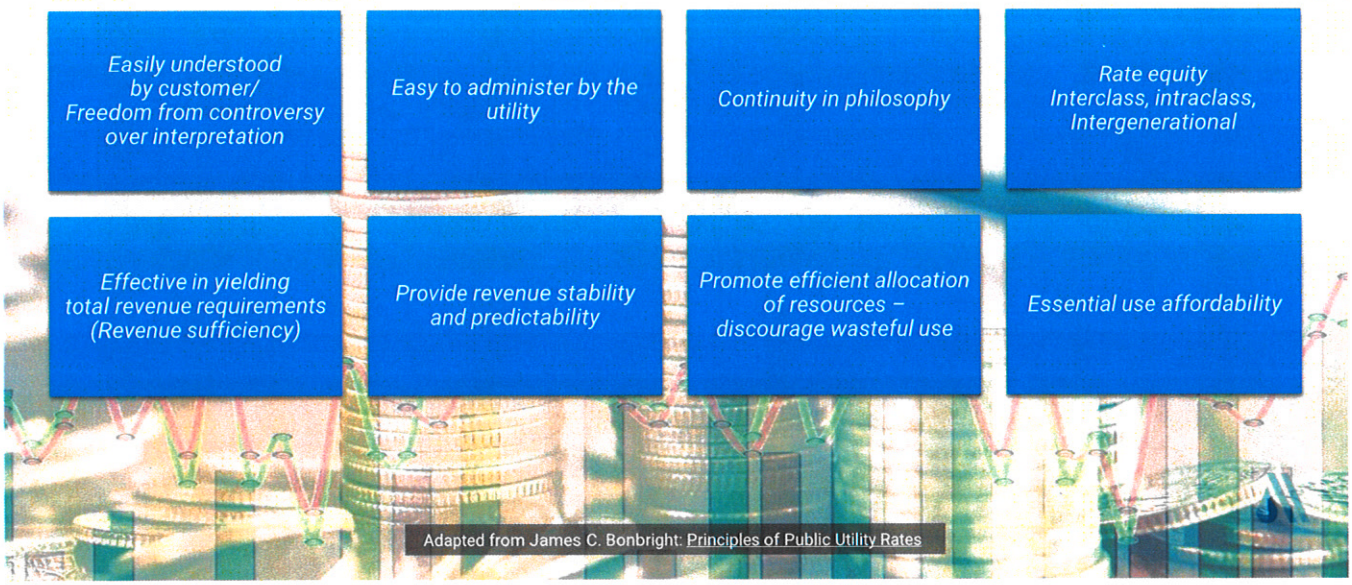
RATE DESIGN PRICING OBJECTIVES



Easily understood by customer/ Freedom from controversy over interpretation

Easy to administer by the utility

Continuity in philosophy

Rate equity Interclass, intraclass, Intergenerational

Effective in yielding total revenue requirements (Revenue sufficiency)

Provide revenue stability and predictability

Promote efficient allocation of resources – discourage wasteful use

Essential use affordability

Adapted from James C. Bonbright: Principles of Public Utility Rates

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TRADEOFFS IN DESIGNING RATES

Fixed charges vs variable charges

Customer's preferences vs utility's preferences

Customer / Commodity Rate

- Rate A = $5.00/month + $1.75 / CCF
- Rate B = $10.00/month + $1.20 / CCF

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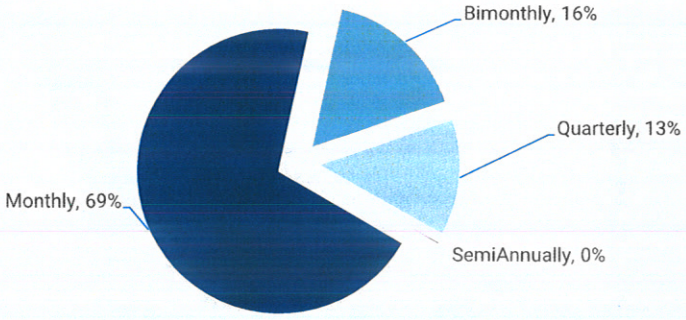
RESIDENTIAL WATER BILLING FREQUENCY

All Water Utilities
(314 Samples)



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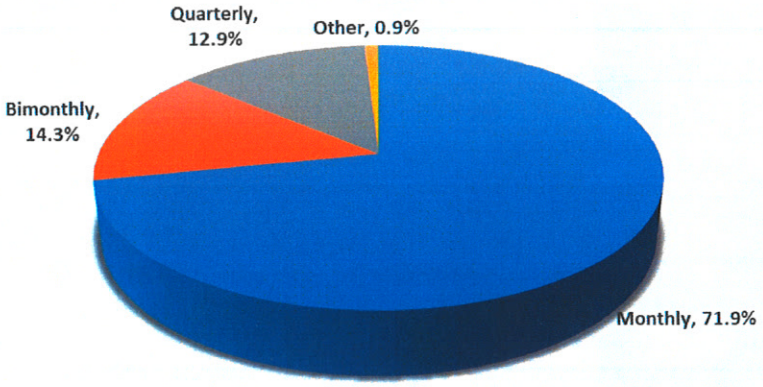
RESIDENTIAL WASTEWATER BILLING FREQUENCY



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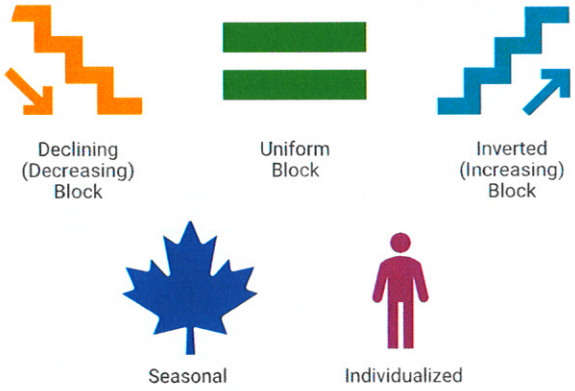
BASIC FORMULAS

Consumption Charges

Rate = Cost / Demand

Types of **consumption** charges



Formula:
Consumption-related costs / annual water consumption

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TYPES OF FIXED CHARGES

Customer (service) charge

A fixed charge per bill that is the same for all customers

Meter charge

Fixed charge per bill that varies by meter size

Readiness to service

A uniform or by meter size fixed charge that may recover additional costs above customer, billing and meter charge costs

Minimum charge

Fixed charge or a meter charge that includes a volume allowance

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EXAMPLE: FIXED CHARGES

Water and wastewater

Example: Customer Charge

Data From Exhibit 11		Residential
Customer Related Costs	$	1,623,734
Number of Customers		21,300
Bills per Year		12
Total Bills per Year		255,600
Customer Charge	$	6.35

Example: Minimum Charge

	Residential
Customer Charge	$6.35
Consumption Allowance (CCF)	3
Consumption Rate (Unifrom Block)	$1.75
Consumption Component	$5.25
Minimum Charge (incl. first 3 CCF)	$11.60

Example: Meter Charge

Meter Size	Number of Residential Customers	Equiv. Meter Factor	Number of Equivalent Meters		Monthly Meter Charge
5/8 x 3/4	7,250	1	7,250	$	3.45
3/4	10,110	1.5	15,165	$	5.18
1	2,110	2.5	5,275	$	8.63
1.5	1,050	5	5,250	$	17.27
2	780	8	6,240	$	27.63
3	-	15	-	$	51.80
4	-	25	-	$	86.34
6	-	50	-	$	172.68
8	-	80	-	$	276.29
	21,300		39,180		

5/8 X 3/4 Monthly Meter Charge = $1623734 / (39180 x 12)
Monthly Meter Charge for 3/4 inch and above = $3.45 x Equiv. Meter Factor
Equiv. Meter Factors from Section 7

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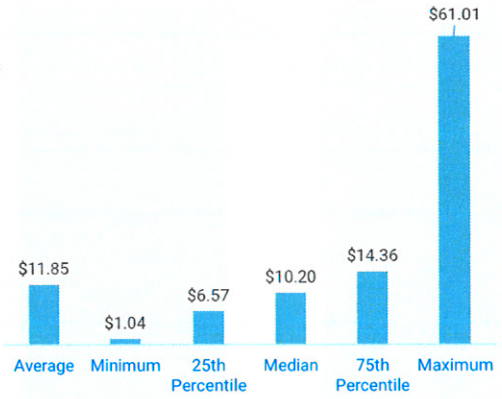
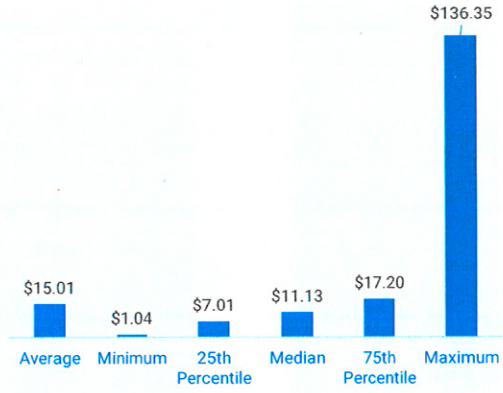
MONTHLY FIXED CHARGES

SURVEY OF 296 WATER UTILITIES: *Representing 50 states, Puerto Rico and Canada*

Residential Fixed Charges



Nonresidential Fixed Charges



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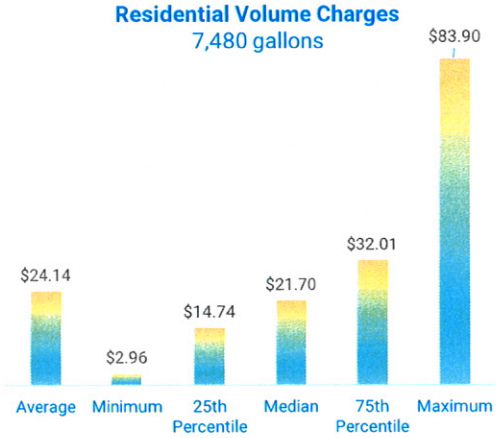
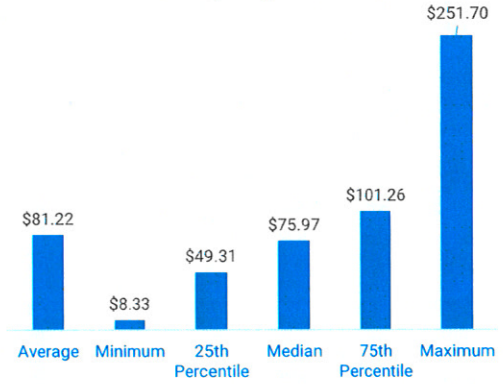
MONTHLY VOLUME CHARGES

SURVEY OF 296 WATER UTILITIES: *Representing 50 states, Puerto Rico and Canada*

Residential Volume Charges
7,480 gallons



Nonresidential Volume Charges
22,440 gallons



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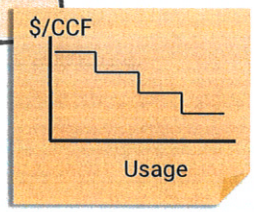
TYPES OF CONSUMPTION RATE STRUCTURES

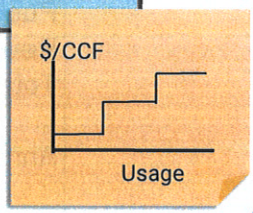
Declining (Decreasing) Block

0-10 CCF @	$1.90/CCf
11-100 CCF @	$1.80/CCF
101 – 1,000 CCF @	$1.70/CCF
> 1,001 CCF @	$1.60/CCF



Inverted (Increasing) Block

0-10 CCF @	$1.50/CCf
11- 50 CCF @	$1.75/CCF
> 51 CCF @	$2.05/CCF



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Note: May also be called a "tiered" rate structure

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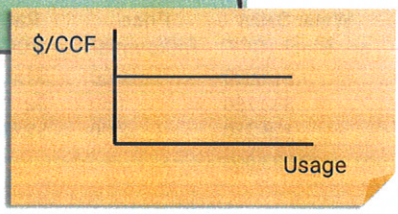
TYPES OF CONSUMPTION RATE STRUCTURES

Uniform Block

Uniform Rate

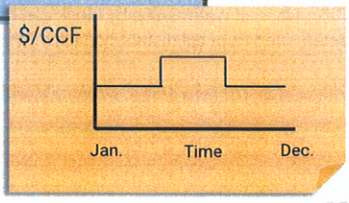
All usage: $1.75/CCF



Seasonal

Seasonal Rate

Summer	$2.10/CCF
Winter	$1.40/CCF



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EXAMPLE:
Calculation of Consumption Charge

UNIFORM RATE

Example: Residential Consumption Charge Uniform Block	
Cost Data from Exhibit 11	
Commodity	$1,216,979
Capacity	2,756,151
Public Fire	375,681
Revenue/Direct/Other	81,290
Total	$4,430,102
Annual Water Sales--CCF	2,525,000
Rate $/CCF	$1.75

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EXAMPLE:
Calculation of Consumption Charge

INCREASING BLOCK RATE

Distribution of Annual Water Sales

Consumption Blocks (CCF)	Water Sales per Block	Percent
Block 1: 0 - 10	1,515,000	60%
Block 2: 11 - 40	883,750	35%
Block 3: Over 40	126,250	5%
Total	2,525,000	100%

Calculation of water sales by block can be determined from bill distribution (see AWWA M1)

Example: Residential Consumption Charge Increasing Block				
Total Cost	**$ 4,430,102**			
	Water Sales per Block (CCF)	**Price Differential**	**Rate $/CCF**	**Revenue Per Block**
Block 1	1,515,000	1.00	$1.43	$ 2,169,846
Block 2	883,750	1.50	$2.15	$ 1,898,615
Block 3	126,250	2.00	$2.86	$ 361,641
	2,525,000			$ 4,430,102

Block 1 = Total Cost / [(Blk1 Cons)+(Blk2 Cons x Differ)+(Blk3 Cons x Differ)]
Block 2 = Block 1 Rate x Block 2 Price Differential
Block 3 = Block 1 Rate x Block 3 Price Differential

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EXAMPLE:
Calculation of Consumption Charge

BILL DISTRIBUTION - **LONG** METHOD

Monthly Billing Detail, ccf

Cust	Class	Apr	May	Jun	Jul	Aug	Sep	Total
John Doe	SFR	8	12	15	25	55	40	155

Bill Distribution Analysis

Block	Threshold	Apr	May	Jun	Jul	Aug	Sep	Total	% Dist
1	First 10 ccf	8	10	10	10	10	10	58	37.4%
2	Next 30 ccf	0	2	5	15	30	30	82	52.9%
3	Over 40 ccf	0	0	0	0	15	0	15	9.7%
	Total Use	**8**	**12**	**15**	**25**	**55**	**40**	**155**	100.0%

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EXAMPLE:
Bill Distribution – AWWA M1 Manual Appendix C

Usage Block, 1,000 gal	Number of Bills Ending in Block	Cumulative Bills Through Block	Total Use of Bills Stopping in Block, 1,000 gal	Cumulative Use of Bills Stopping in Block, 1,000 gal	Total Use to This Block of All Bills Passing Through Block, 1,000 gal	Cumulative Billed Usage, 1,000 gal	Cumulative Billed Usage, %	Cumulative Bills, %
0	6,100	300,000	–	–	–	–	0	2.0%
1	15,200	293,900	15,200	15,200	278,700	293,900	16.4%	7.1%
2	21,002	278,700	42,004	57,204	515,396	572,600	31.9%	14.1%
3	32,233	257,698	96,699	153,903	676,395	830,298	46.3%	24.8%
4	34,201	225,465	136,804	290,707	765,056	1,055,763	58.9%	36.2%
5	54,922	191,264	274,610	565,317	681,710	1,247,027	69.5%	54.6%
6	38,433	136,342	230,598	795,915	587,454	1,383,369	77.1%	67.4%
7	21,836	97,909	152,852	948,767	532,511	1,481,278	82.6%	74.6%
8	14,664	76,073	117,312	1,066,079	491,272	1,557,351	86.8%	79.5%
9	18,227	61,409	164,043	1,230,122	388,638	1,618,760	90.2%	85.6%
10	15,444	43,182	154,440	1,384,562	277,380	1,661,942	92.6%	90.8%
11	10,211	27,738	112,321	1,496,883	192,797	1,689,680	94.2%	94.2%
12	6,121	17,527	73,452	1,570,335	136,872	1,707,207	95.2%	96.2%
13	3,210	11,406	41,730	1,612,065	106,548	1,718,613	95.8%	97.3%
14	422	8,196	5,908	1,617,973	108,836	1,726,809	96.3%	97.4%
15–20	3,454	7,774	56,991	1,674,964	86,400	1,761,364	98.2%	98.6%
21–25	2,105	4,320	48,415	1,723,379	55,375	1,778,754	99.2%	99.3%
26–30	1,291	2,215	35,503	1,758,882	27,720	1,786,602	99.6%	99.7%
31–40	892	924	32,112	1,790,994	1,280	1,792,274	99.9%	100.0%
41–100	32	32	2,880	1,793,874	0	1,793,874	100.0%	100.0%
101+	–	–	–	1,793,874	0	1,793,874	100.0%	100.0%
Total	300,000					1,793,874		

Column	Description	Calculation	Value
3	Cumulative Bills Through Block	300,000 - 6,100 - 15,200 - 21,002	293,900
4	Total Use of Bills Stopping in Block	3 * 32,233	96,699
5	Cumulative Use of Bills Stopping in Block	15,200 + 42,004 + 96,699	153,903
6	Total Use to This Block of All Bills Passing Through Block	3 * 225,465	676,395
7	Cumulative Use Billed	153,903 + 676,395	830,298

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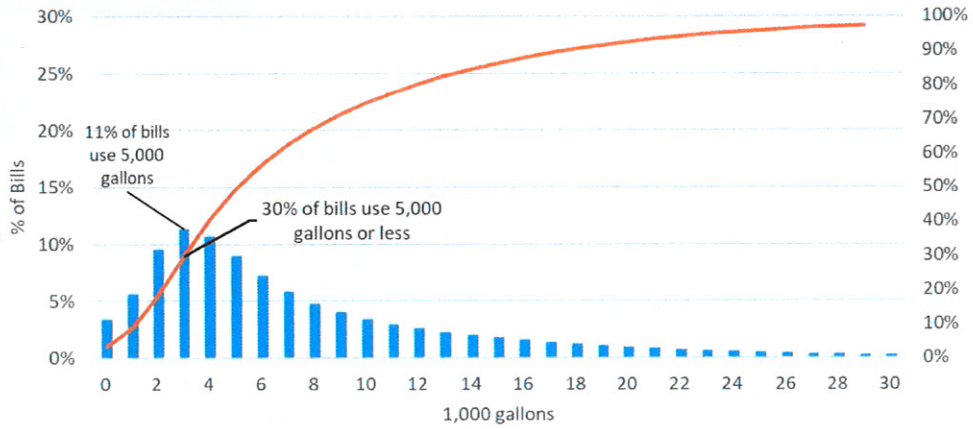
EXAMPLE: Bill Distribution – Graphical Representation



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EXAMPLE: Setting the Price Ratio by Tier

INCREASING BLOCK RATE

- Policy based: backing into a desired result
  - Based on pricing objectives
    - Conservation
    - Essential use affordability, etc
- Peak month to average month by tier
  - Calculate volume in each tier by month
  - Calculate peak month to average month ratio
  - Adjust residential units of service
    - Create individual units of service by tier based on volume billed in each tier
    - Apply peaking factors to determine peak day and peak hour demands by tier
- Individual peaking factors
  - Calculate peak month to average month on a customer-by-customer basis
  - Assign peaking factor to highest usage tier
  - Average the peak factors for each tier bucket

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PRICE RATIOS BY TIER

Item	Monthly Usage by Tier, 1000 ccf												
	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Tier 1 (0-10)	614.51	613.91	604.48	600.37	587.32	608.59	614.12	596.15	593.43	526.07	607.21	596.07	**7,162**
Tier 2 (10-20)	391.21	450.60	373.15	413.89	453.35	390.29	357.28	309.72	322.27	282.91	367.31	364.39	**4,476**
Tier 3 (20-30)	221.38	361.45	215.83	289.14	353.50	240.61	164.13	125.01	150.06	171.17	190.24	203.29	**2,686**
Tier 4 (>30)	229.41	491.39	248.20	318.77	401.29	263.71	176.00	119.64	247.89	542.26	321.19	221.36	**3,581**
Total	1,456.50	1,917.36	1,441.67	1,622.17	1,795.46	1,503.20	1,311.54	1,150.52	1,313.65	1,522.40	1,485.95	1,385.11	**17,906**

Item	Average Month	Peak Month	Peak Month: Avg Month	Peak Day to AD of MM	Est PD to AD
Tier 1 (0-10)	596.85	614.51	1.03	1.25	1.29
Tier 2 (10-20)	373.03	453.35	1.22	1.25	1.52
Tier 3 (20-30)	223.82	361.45	1.61	1.25	2.02
Tier 4 (>30)	298.43	542.26	1.82	1.25	2.27
Total					

		Base		Maximum Day			Maximum Hour			
Customer Class	Tier Thresholds	Annual Use (ccf)	Average Day Use (ccf)	Max Day Factor	Max Day Capacity (ccf/day)	Max Day Extra Capacity (ccf/day)	Max Hour Factor	Max Hour Capacity (ccf/day)	Max Hour Extra Capacity (ccf/day)	Equ M
Single Family Residential										
Tier 1	10	7,565,363	20,727	1.29	26,675	5,948	2.13	44,138	17,463	
Tier 2	20	7,202,226	19,732	1.56	30,706	10,974	2.57	50,807	20,102	
Tier 3	30	1,557,867	4,268	2.32	9,922	5,654	3.85	16,418	6,496	
Tier 4	30+	1,580,079	4,329	3.35	14,485	10,156	5.54	23,968	9,483	

PRICE RATIOS BY TIER

		Base		Maximum Day			Maximum Hour			
Customer Class	Tier Thresholds	Annual Use (ccf)	Average Day Use (ccf)	Max Day Factor	Max Day Capacity (ccf/day)	Max Day Extra Capacity (ccf/day)	Max Hour Factor	Max Hour Capacity (ccf/day)	Max Hour Extra Capacity (ccf/day)	Equ M
Single Family Residential										
Tier 1	10	7,565,363	20,727	1.29	26,675	5,948	2.13	44,138	17,463	
Tier 2	20	7,202,226	19,732	1.56	30,706	10,974	2.57	50,807	20,102	
Tier 3	30	1,557,867	4,268	2.32	9,922	5,654	3.85	16,418	6,496	
Tier 4	30+	1,580,079	4,329	3.35	14,485	10,156	5.54	23,968	9,483	

Customer Class	Tier Thresholds	Usage	Base	Max Day	Max Hour	Base	MD & MH Peaking	Total Volume Rate
Unit Cost of Service			$6.79	$527.71	$90.86			
Units			ccf	ccf/day	ccf/day			
Single Family Residential								
Tier 1	10	7,565,363	$51,376,214	$3,138,900	$1,586,775	$6.79	$0.62	$7.42
Tier 2	20	7,202,226	$48,910,159	$5,790,854	$1,826,530	$6.79	$1.06	$7.85
Tier 3	30	1,557,867	$10,579,439	$2,983,836	$590,237	$6.79	$2.29	$9.09
Tier 4	>30	1,580,079	$10,730,283	$5,359,531	$861,653	$6.79	$3.94	$10.73

PRICE RATIOS BY CUSTOMER

			Average by Tier->	1.32	1.43	1.57	1.64
				Peak Month to Average Month			
Account No	Average Month	Peak Month		in Highest Usage Tier			
				1	2	3	4
1	6.83	12.00				1.76	
2	7.17	12.00			1.67		
3	7.00	10.00			1.43		
4	7.67	11.00			1.43		
5	5.33	7.00		1.31			
6	37.00	39.00					1.05
7	32.17	49.00					1.52
8	2.83	4.00		1.41			
9	7.17	9.00			1.26		
10	3.17	4.00		1.26			
11	4.17	7.00		1.68			
12	2.67	3.00		1.13			
13	3.50	4.00		1.14			
14	6.17	8.00		1.30			
15	32.00	70.00					2.19
16	37.17	78.00					2.10
17	27.67	37.00					1.34
18	25.00	41.00					1.64
19	12.67	17.00			1.34		
20	25.33	35.00				1.38	

Item	Tier Threshold	Peak Month: Avg Month	Peak Day to AD of MM	Est PD to AD
Tier 1	10	1.32	1.25	1.65
Tier 2	20	1.43	1.25	1.78
Tier 3	30	1.57	1.25	1.96
Tier 4	>30	1.64	1.25	2.05

		Base		Maximum Day			Maximum Hour		
Customer Class	Tier Thresholds	Annual Use (ccf)	Average Day Use (ccf)	Max Day Factor	Max Day Capacity (ccf/day)	Max Day Extra Capacity (ccf/day)	Max Hour Factor	Max Hour Capacity (ccf/day)	Max Hour Extra Capacity (ccf/day)
Single Family Residential									
Tier 1	10	7,565,363	20,727	1.65	34,200	13,473	2.73	56,589	22,389
Tier 2	20	7,202,226	19,732	1.78	35,148	15,416	2.95	58,158	23,010
Tier 3	30	1,557,867	4,268	1.96	8,376	4,108	3.25	13,860	5,484
Tier 4	30+	1,580,079	4,329	2.05	8,874	4,545	3.39	14,684	5,810

PRICE RATIOS BY CUSTOMER

		Base		Maximum Day			Maximum Hour		
Customer Class	Tier Thresholds	Annual Use (ccf)	Average Day Use (ccf)	Max Day Factor	Max Day Capacity (ccf/day)	Max Day Extra Capacity (ccf/day)	Max Hour Factor	Max Hour Capacity (ccf/day)	Max Hour Extra Capacity (ccf/day)
Single Family Residential									
Tier 1	10	7,565,363	20,727	1.65	34,200	13,473	2.73	56,589	22,389
Tier 2	20	7,202,226	19,732	1.78	35,148	15,416	2.95	58,158	23,010
Tier 3	30	1,557,867	4,268	1.96	8,376	4,108	3.25	13,860	5,484
Tier 4	30+	1,580,079	4,329	2.05	8,874	4,545	3.39	14,684	5,810

Customer Class	Tier Thresholds	Usage	Base	Max Day	Max Hour	Base	MD & MH Peaking	Total Volume Rate
Unit Cost of Service			$6.79	$505.14	$89.26			
Units			ccf	ccf/day	ccf/day			
Single Family Residential								
Tier 1	10	7,565,363	$51,376,214	$6,805,508	$1,998,407	$6.79	$1.16	$7.95
Tier 2	20	7,202,226	$48,910,159	$7,787,072	$2,053,817	$6.79	$1.37	$8.16
Tier 3	30	1,557,867	$10,579,439	$2,075,145	$489,452	$6.79	$1.65	$8.44
Tier 4	>30	1,580,079	$10,730,283	$2,296,072	$518,565	$6.79	$1.78	$8.57

EXAMPLE:
Calculation of Consumption Charge

SEASONAL RATE

Distribution of Annual Water Sales (CCF)

Season	Water Sales per Block	Percent
Winter	1,010,000	40%
Summer	1,515,000	60%
Total	2,525,000	100%

Example: Residential Consumption Charge
Seasonal Rate

Total Cost $ 4,430,102

	Water Sales per Block (CCF)	Price Differential	Rate $/CCF	Revenue Per Season
Winter	1,010,000	1.00	$1.10	$ 1,107,525
Summer	1,515,000	2.00	$2.19	$ 3,322,576
	2,525,000			$ 4,430,102

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INDIVIDUALIZED CONSUMPTION RATE STRUCTURE

Customized based on individual use or other specific characteristics

Individualized AWC

Rate structure varies on specific customer characteristics

i.e. Increasing block structure with first block threshold based on average winter consumption – or indoor use

Water Budgets

Volumetric allotments for indoor and outdoor use based on customer's specific characteristics

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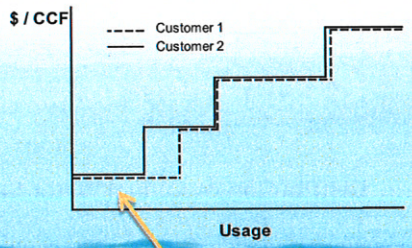
INDIVIDUALIZED CONSUMPTION RATE STRUCTURE

Indoor/outdoor use



Individualized structure charges for water based on where it is used (e.g., indoor outdoor)

Blk 1: 0 – AWC	**$1.50/CCF**
Blk 2: AWC + 20 CCF	**$1.75/CCF**
Blk 3: > AWC + 20 CCF	**$2.05/CCF**

Rate Block 1

- Based on customer's average winter consumption
- A proxy for indoor use or essential use
- Lowest block rate

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INDIVIDUALIZED CONSUMPTION RATE STRUCTURE

Sends price signal for peaking customers –
Reduces system peak demands –
Used for commercial or industrial customers –
Can be used for residential customers –

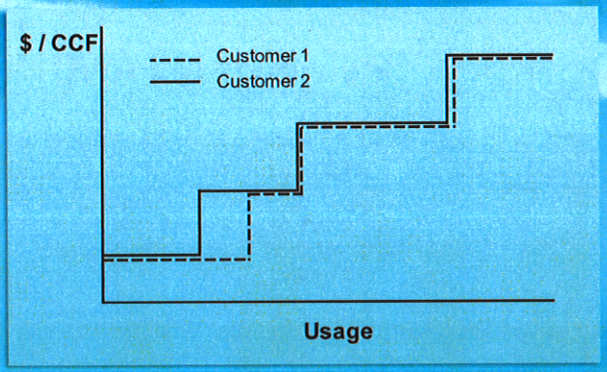
Excess use

Option 1: AWC
Individualized structure can be based on cost of AWC and peak day and peak hour demands

Blk 1: 0 – AWC	$1.50/CCF
Blk 2: 4x AWC	$1.75/CCF
Blk 3: > 4x AWC	$2.05/CCF

Option 2: Average Excess
Individualized structure can be based on cost of average monthly and peak demands

Blk 1: 0 – AMC	$1.50/CCF
Blk 2: > AMC	$2.05/CCF



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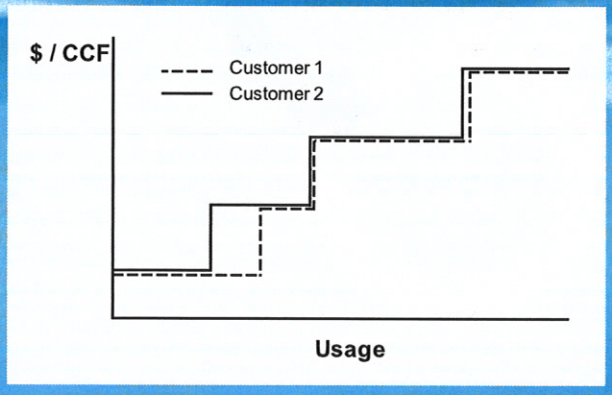
INDIVIDUALIZED CONSUMPTION RATE STRUCTURE

*Individualized structure that gives each customer an indoor and outdoor budget that can **vary by month***

WATER BUDGET	
Blk 1: 0 – 50% of budget	$1.50/CCF
Blk 2: 51 – 100% of budget	$1.75/CCF
Blk 3: 101 – 150% of budget	$2.05/CCF
Blk 4: > 150% of budget	$3.50/CCF



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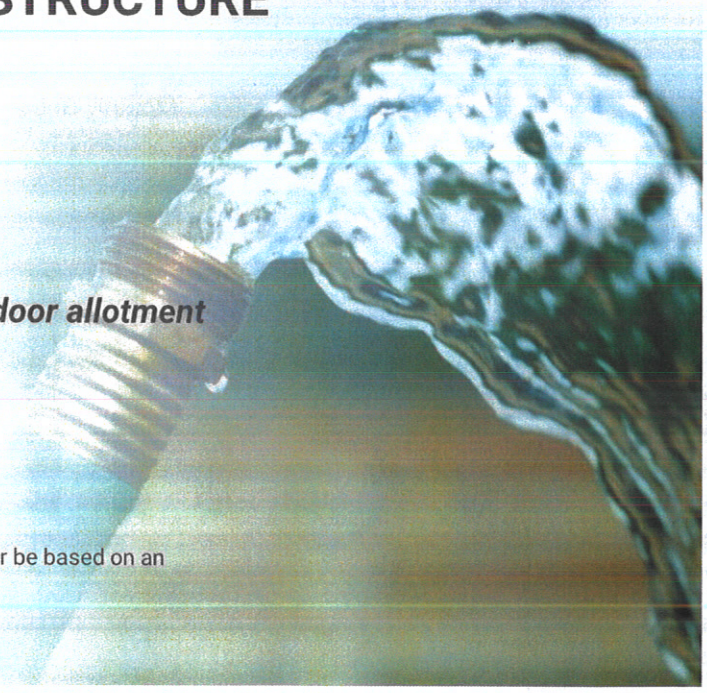
WATER BUDGET RATE STRUCTURE

Indoor budget allotment example

- Indoor use requirements
- Outdoor use requirements

Water Budget = indoor allotment + outdoor allotment



Note: Budget allotment can vary by month (billing cycle) or be based on an annual allotment

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WATER BUDGET RATE STRUCTURE

- Size of household, gallons per capita per day, billing cycle
- Average winter consumption

- Landscaped area (ft^2)
- Evapotranspiration index (ET inches)
- Crop coefficient (K_c%)
- Irrigation efficiency (%)

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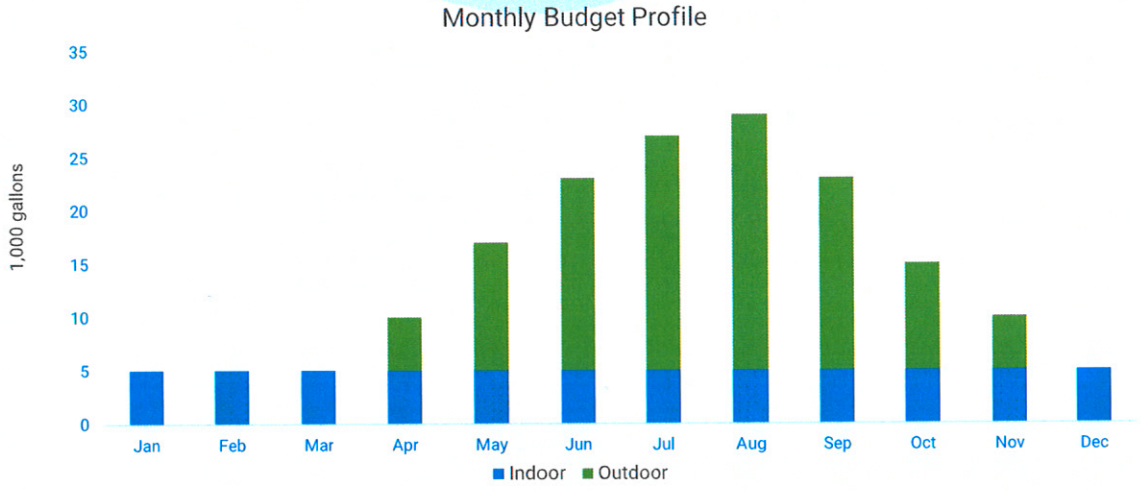
WATER BUDGETS – MONTHLY PROFILE



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EXAMPLE: Calculation of Monthly Water Budget

Water budget – monthly

Description	May	Jun	Jul
Indoor Budget (AWC), gallons	**5,000**	**5,000**	**5,000**
Outdoor Budget			
Irrigable Area = 7,000 sq ft			
Evapotranspiration (ET), inches	5.20	6.60	7.10
Crop Coefficient (K_c)	0.70	0.70	0.70
Irrigation Efficiency	0.90	0.90	0.90
Total Plant Requirement(1)	**4.04**	**5.13**	**5.52**
Conversion Factor(2)	0.62	0.62	0.62
Square Feet	7,000	7,000	7,000
Monthly Budget, gallons(3)	**17,553**	**22,279**	**23,966**
Total Monthly Budget, rounded	**23,000**	**27,000**	**29,000**
Block Thresholds			
Blk 1: 0 - 100% of budget	23,000	27,000	29,000
Blk 2: 100 - 150% of Bugdet	34,500	40,500	43,500
Blk 3: Over 150% of Budget	>34,500	>40,500	>43,500

*(1) Plant Requirement = ET * K_c * (1/Efficiency(%))*
(2) Conversion factor (acre-inches to gallons)
*(3) Plant Requirement * Conversion Factor * Square Feet*

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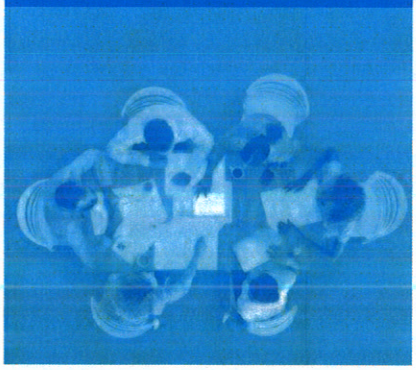
DISCUSSION



1. What are your tradeoffs?

2. What did you consider for your last study?

Type	Pros	Cons
Declining block		
Uniform rates		
Increasing block (fixed)		
Increasing block Individualized/budget		
Seasonal		
Seasonal increasing/ decreasing block		
Lifeline (special considerations)		

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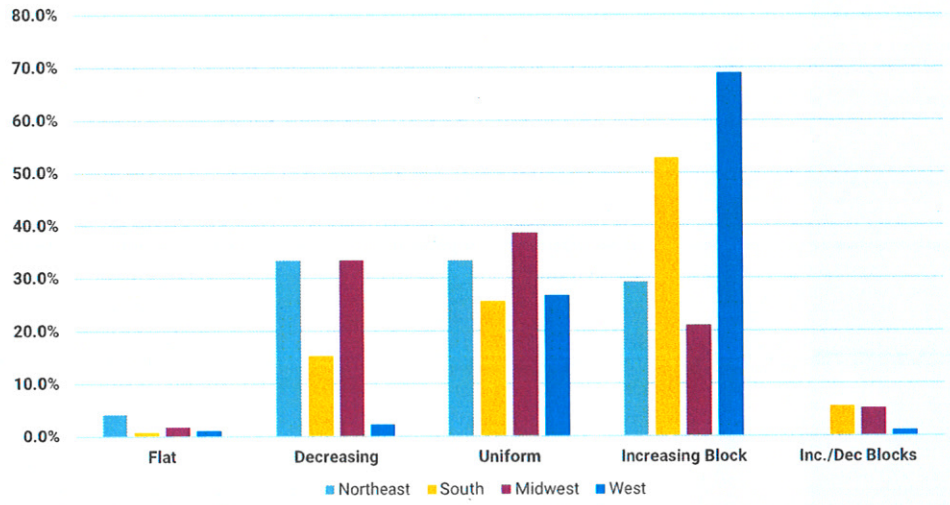
RESIDENTIAL RATE STRUCTURE COMPARISON BY REGION

SURVEY OF 296 WATER UTILITIES: *Representing 50 states, Puerto Rico and Canada*



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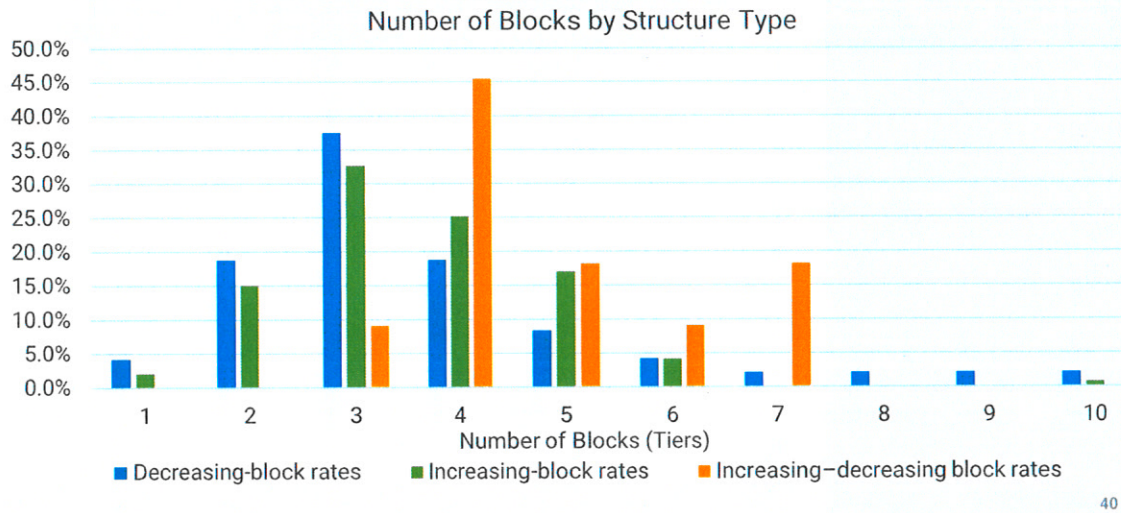
RESIDENTIAL # OF BLOCKS BY STRUCTURE COMPARISON BY REGION

SURVEY OF 296 WATER UTILITIES: *Representing 50 states, Puerto Rico and Canada*



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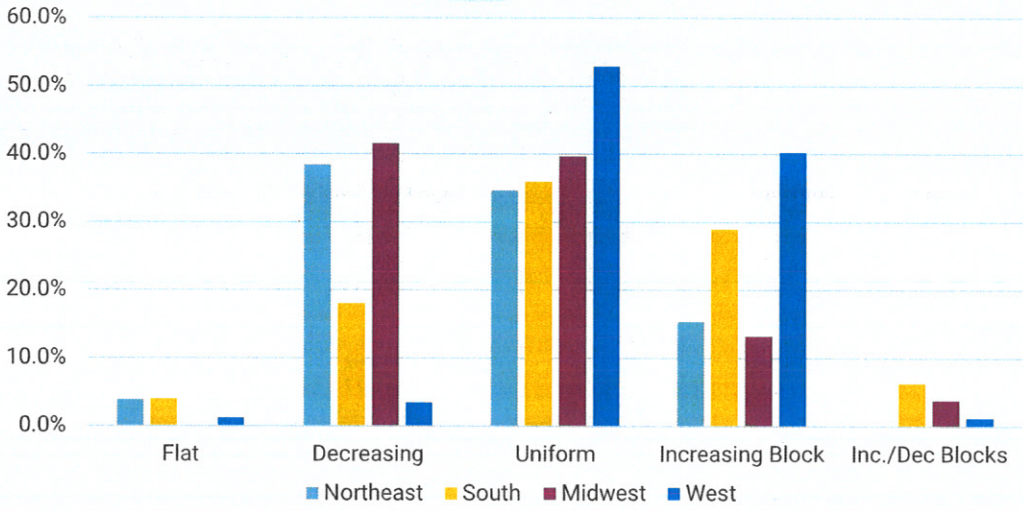
NON-RESIDENTIAL RATE STRUCTURE COMPARISON BY REGION

SURVEY OF 296 WATER UTILITIES: *Representing 50 states, Puerto Rico and Canada*



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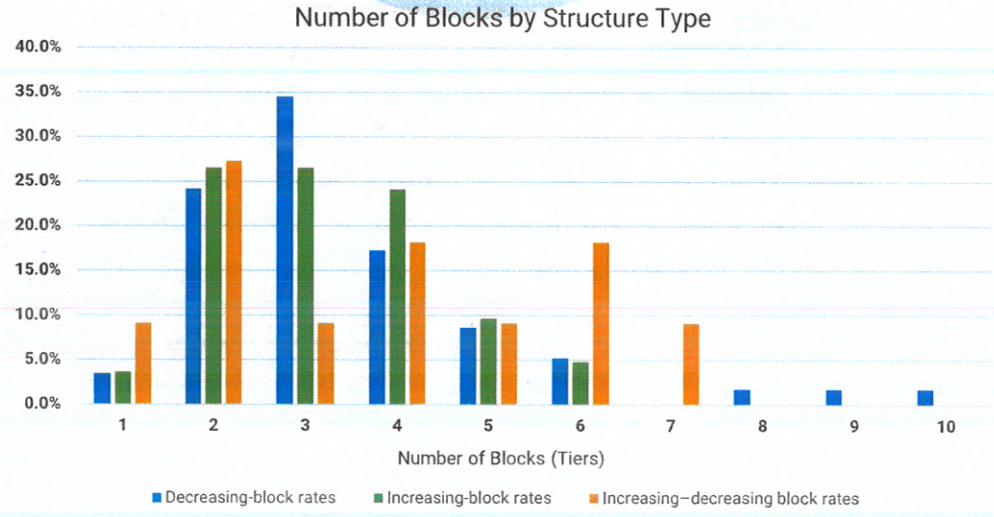
NON-RESIDENTIAL RATE STRUCTURE COMPARISON BY REGION

SURVEY OF 296 WATER UTILITIES: *Representing 50 states, Puerto Rico and Canada*



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COMPARISON OF CUSTOMER BILLS UNDER RATE STRUCTURES AND USAGE LEVELS

Comparison of Rates and Consumption Charges				
Uniform Rate	Increasing Block		Seasonal	
$1.75	Block 1: 0 - 10	$1.43	Winter	$1.10
	Block 2: 11 - 40	$2.15	Summer	$2.19
	Block 3: Over 40	$2.86		

Season / Customer	Consumption	Comparison of Consumption Charges		
Winter	(CCF)	Uniform Rate	Increasing Block	Seasonal
Small	6	$10.53	$8.59	$6.58
Medium	15	$26.32	$25.06	$16.45
Large	25	$43.86	$46.55	$27.41
Summer				
Small	12	$21.05	$18.62	$26.32
Medium	40	$70.18	$78.77	$87.72
Large	80	$140.36	$193.35	$175.45

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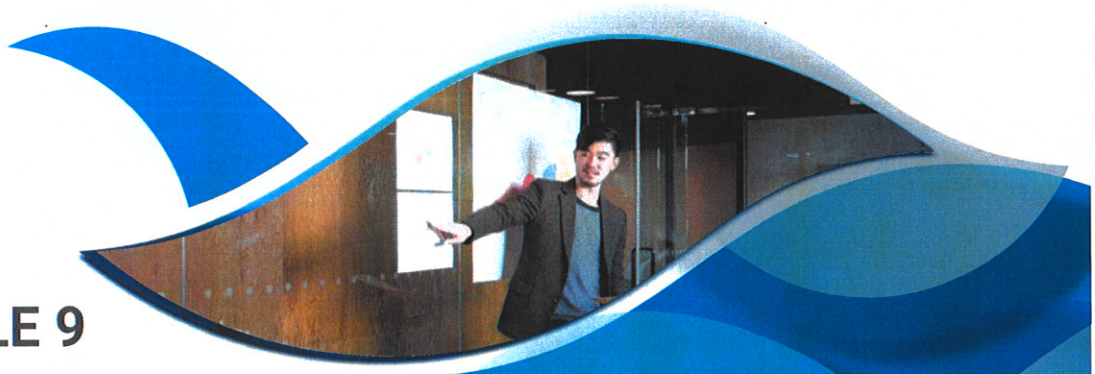

MODULE 9

How to Effectively Present Your Rate Study

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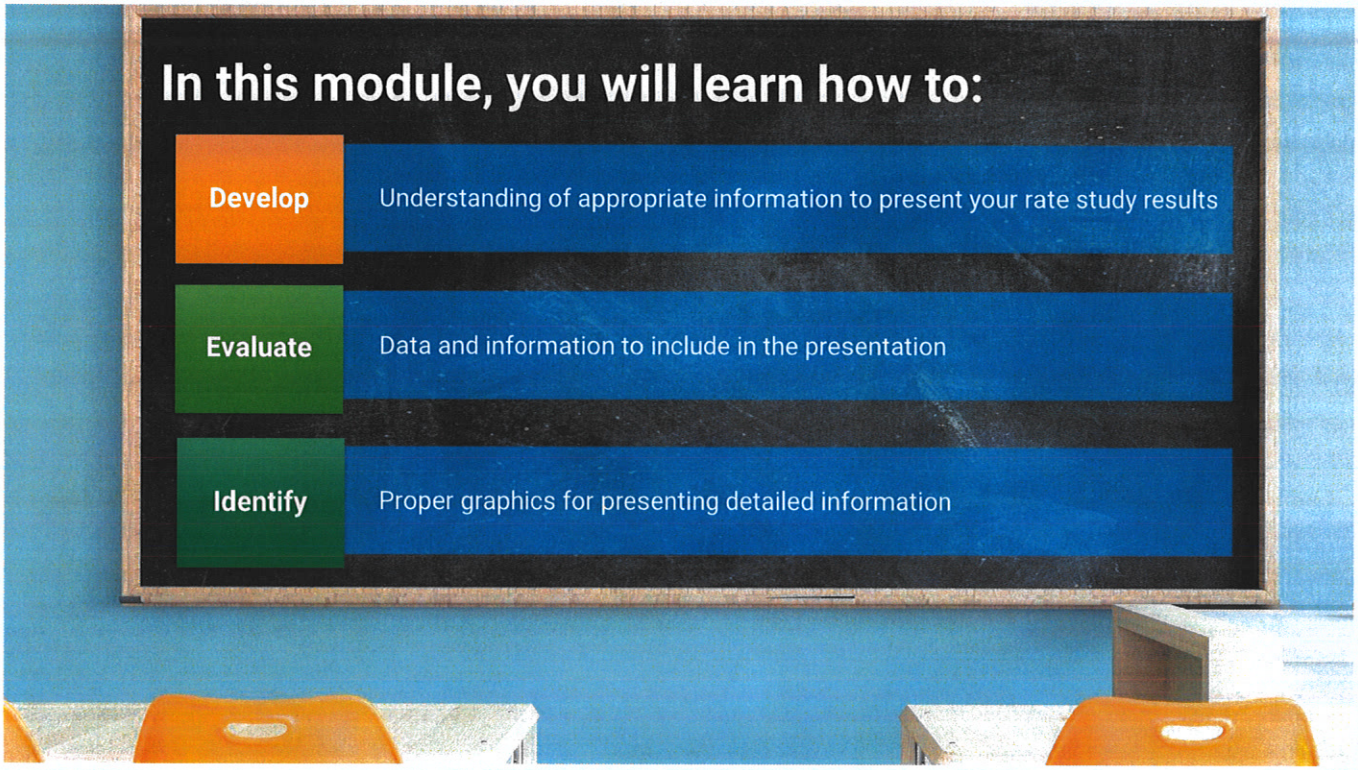

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SURVEY OF COMMUNICATION PRACTICES

What are the most difficult topics?

Issue	Freq. of Responses	% of Respondents
Rates	29	17%
Drought, Conservaiton, Supply	26	15%
Specific contaminants	22	13%
Water Quality	20	11%
Projects	19	11%
Management	19	11%
Consumer Confidence Reports	18	10%
Regulations	12	7%
Fiscal	12	7%
Pollution	10	6%
Treatment, Meters Employee Issues	< 6	<3%

Who are the tougest audiances?
(% of Respondents)

Issue	Most Difficult	Least Difficult
Residential Customers	49%	11%
Citizens' Groups	39%	9%
Media	29%	13%
Business Customers	24%	23%
Regulators	23%	37%
Elected Officials	18%	36%
Employees	6%	70%

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WHY DO SOME PRESENTATIONS FAIL?

Common mistakes

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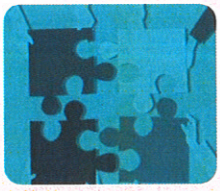
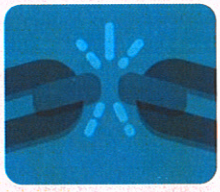
PRINCIPLES OF AUTHENTIC COMMUNICATION





Truthful

Accurate and factually correct

Fundamental

Deals with the core issues and central facts of the situation

Comprehensive

Tells the whole story, including meanings and implications of the issues

Relevant

Considers and makes connections with interested parties

Clear

Uses language that is appropriate for the audiences and avoids jargon and keeps technical terms to a minimum, or clearly explains them when needed

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HOW WELL DO UTILITIES COMMUNICATE?

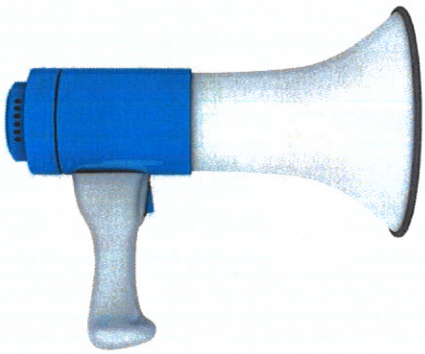
Utility communication poll:

- 42% thought their communication was clear
- 33% thought their information was accessible
- 26% thought their communication was timely

When asked – What would you do differently?

Communicate earlier

(Timeliness)



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TODD AND SHAWN'S GUIDE TO EFFECTIVE RATE PRESENTATIONS

1. **EDUCATE THE POLICYMAKER**
   Begin educating at the start of the study and continue throughout the study
2. **SIMPLE & LOGICAL HANDOUTS**
   Organized to follow the thought process of how you reached your recommendations
3. **CLEARLY STATED OBJECTIVES OF THE MEETING**
   State the policy decision needed or the policy direction required
4. **MEETING FORMAT**
   Workshops vs City Council Meetings, Public and Press
5. **ISOLATE KEY ISSUES**

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DEVELOP PRESENTATION MATERIALS FOR YOUR TARGET AUDIENCE

Typical Target Audiences

- City councils – board of directors/trustees
- Advisory committee members
- Utility customers
- Public utility commission
- Management/staff meetings

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ADVISORY COMMITTEES

- ✓ Standing committee or review a specific issue(s)
- ✓ Group Size - # of members
- ✓ Selecting the members
- ✓ Setting a specific meeting time
- ✓ Limit the number of meetings

Tips for working with advisory committees

- ✓ Consider a meeting facilitator
- ✓ Setting a clear objective for the group
- ✓ Setting clear limitations
- ✓ Educate
- ✓ Expect lots of work to make it happen!

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WORKING WITH THE PRESS & MEDIA

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PLANNING YOUR PRESENTATION

What is the key message you want to deliver?

At the same time, if applicable, what is the decision you need?

Can you provide alternatives or options for the policymaker to consider?

Going in, what are the key questions you think your target audience wants answered?

Can you anticipate any follow-up questions that may arise after your presentation?

Are you the right person to make the presentation?

Be prepared to summarize your entire presentation in 5 minutes or less!

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PRESENTATION TIPS

- Consider the style / formality of the meeting
- Remind policymakers of any discussion, direction or decisions made at previous meetings on the topic
- Brevity
- Handouts
  - Technical
  - Informational
- Use of visual/graphs
- Prepare to spend a lot of time developing content!

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SUMMARY OF THE WATER REVENUE REQUIREMENT ($000)

	CY 2009	CY 2010	CY 2011	CY 2012	CY 2013
Sources of Funds					
Rate Revenues	$33,982	$33,982	$33,982	$34,152	$34,323
Miscellaneous Revenues	$4,107	$3,719	$3,909	$3,936	$3,961
Total Source of Funds	$38,090	$37,701	$37,891	$38,088	$38,283
Application of Funds					
Total Operations & Maintenance	$25,687	$26,625	$27,596	$28,603	$29,504
Taxes and Transfers	8,767	8,747	8,757	8,801	8,845
CIP From Rates					
CIP From Rates Capital Plan	$3,225	$3,225	$3,225	$3,242	$3,258
CIP From Rates Ops. Complex	0	0	0	0	0
Total CIP from Rates	$3,225	$3,225	$3,225	$3,242	$3,258
Debt Service	$1,070	$1,147	$1,111	$1,050	$1,037
Additional Capital Improvement Funding	(660)	(1,024)	(722)	(418)	(6)
TOTAL REVENUE REQUIREMENT	**$38,090**	**$38,720**	**$39,967**	**$41,278**	**$42,639**
Balance/(Deficiency) of Funds Before Added Tax	**$0**	**($1,019)**	**($2,077)**	**($3,190)**	**($4,355)**
Plus: Additional Taxes with Rate Increase	**$0**	**$255**	**$520**	**$798**	**$1,090**
Balance/(Deficiency) of Funds With Added Tax	**$0**	**($1,274)**	**($2,596)**	**($3,988)**	**($5,445)**
Balance as a % of Rate Adjustment Required	**0.00%**	**3.75%**	**7.64%**	**11.68%**	**15.87%**
Proposed Rate Adjustment	**0.00%**	**3.75%**	**3.75%**	**3.75%**	**3.75%**

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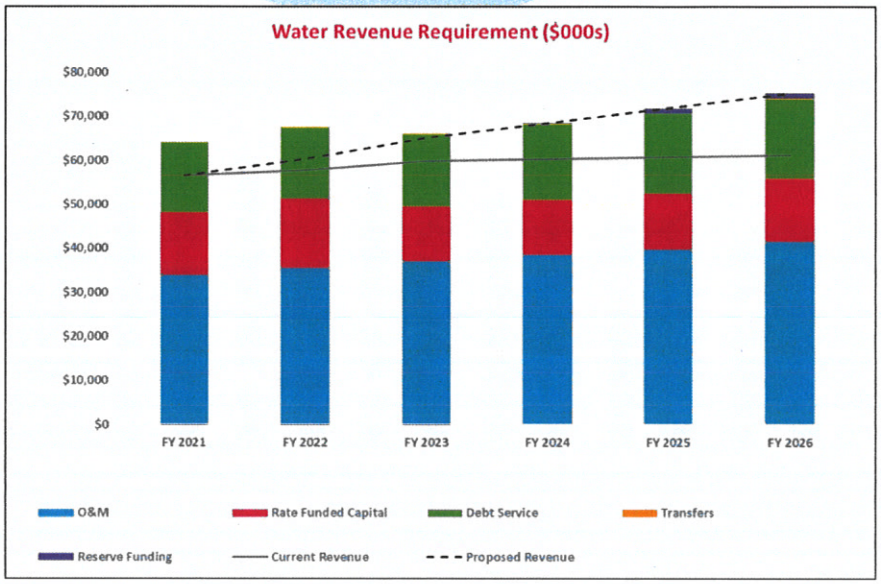
SUMMARY OF THE WATER REVENUE REQUIREMENT



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SUMMARY OF A WATER RATE TRANSITION PLAN

Year	Present Average Monthly Bill	Proposed Rate Increase	Customer Bill on Proposed Rate Increase	Monthly Bill Difference	Cumulative Bill Difference
Present					
2009	$23.93				
Projected					
2010		3.75%	$24.82	$0.90	$0.90
2011		3.75%	$25.75	$0.93	$1.83
2012		3.75%	$26.72	$0.97	$2.79
2013		3.75%	$27.72	$1.00	$3.80
2014		3.75%	$28.76	$1.04	$4.84
2015		3.75%	$29.84	$1.08	$5.91
2016		3.75%	$30.96	$1.12	$7.03
2017		3.75%	$32.12	$1.16	$8.19
2018		3.75%	$33.32	$1.20	$9.40
2019		3.75%	$34.57	$1.25	$10.65
2020		3.75%	$35.87	$1.30	$11.94

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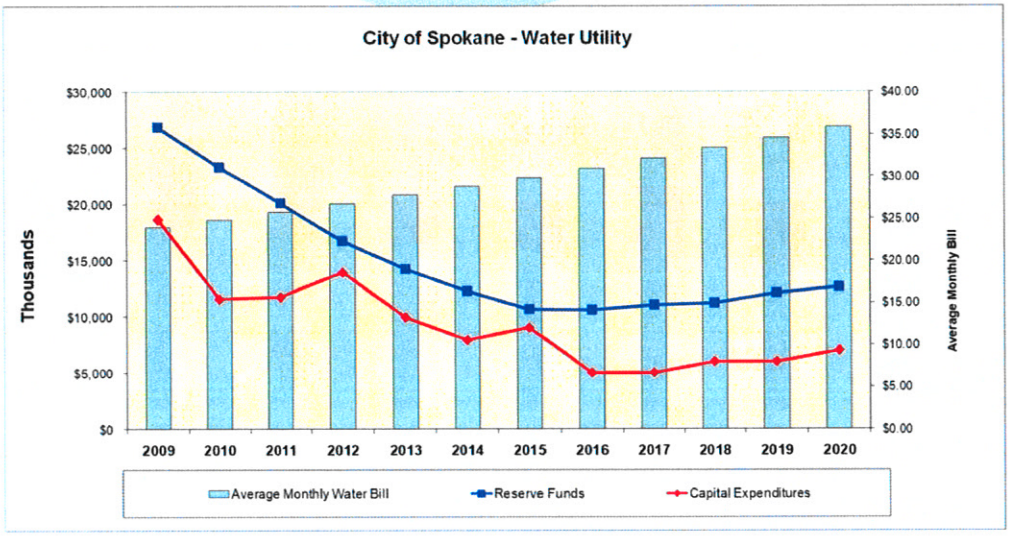
SUMMARY OF WATER CAPITAL AND RESERVE FUNDING



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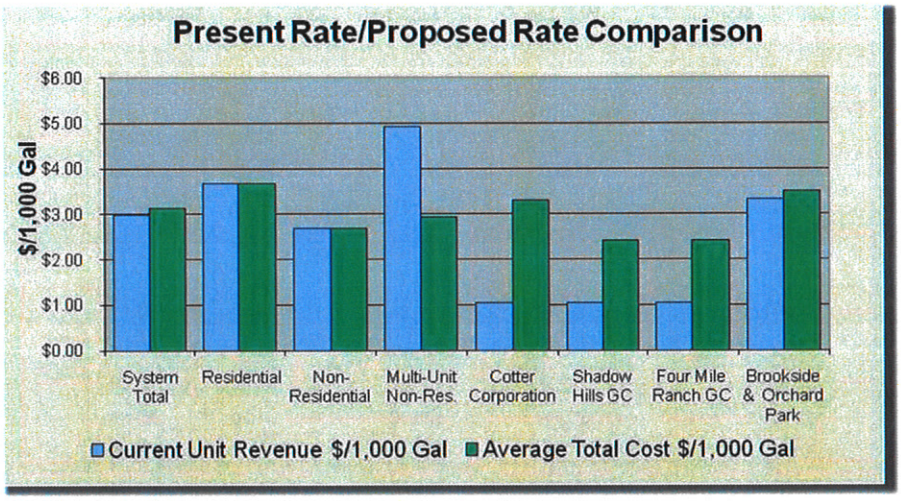
COMPARISON OF AVERAGE UNIT COSTS BY CLASS OF SERVICE



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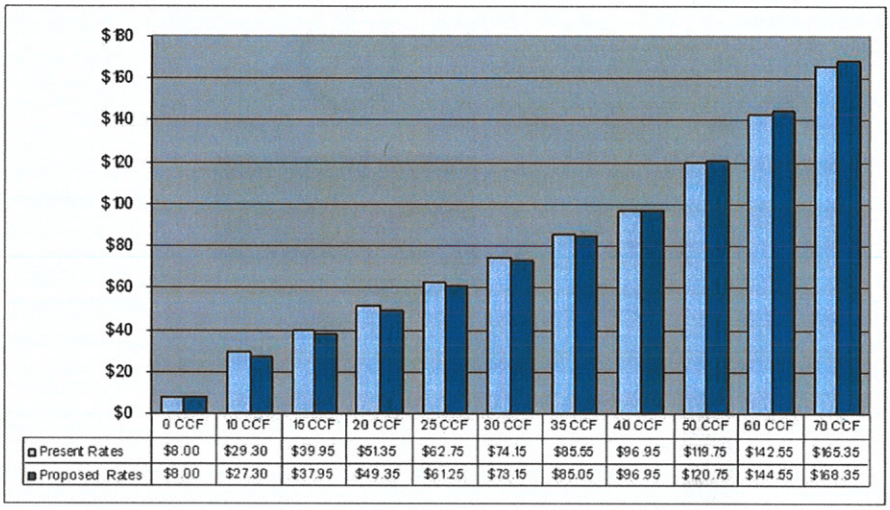
SIMPLE BILL COMPARISON

Bill Comparison at Varying Levels of Use - $/Month



	0 CCF	10 CCF	15 CCF	20 CCF	25 CCF	30 CCF	35 CCF	40 CCF	50 CCF	60 CCF	70 CCF
Present Rates	$8.00	$29.30	$39.95	$51.35	$62.75	$74.15	$85.55	$96.95	$119.75	$142.55	$165.35
Proposed Rates	$8.00	$27.30	$37.95	$49.35	$61.25	$73.15	$85.05	$96.95	$120.75	$144.55	$168.35

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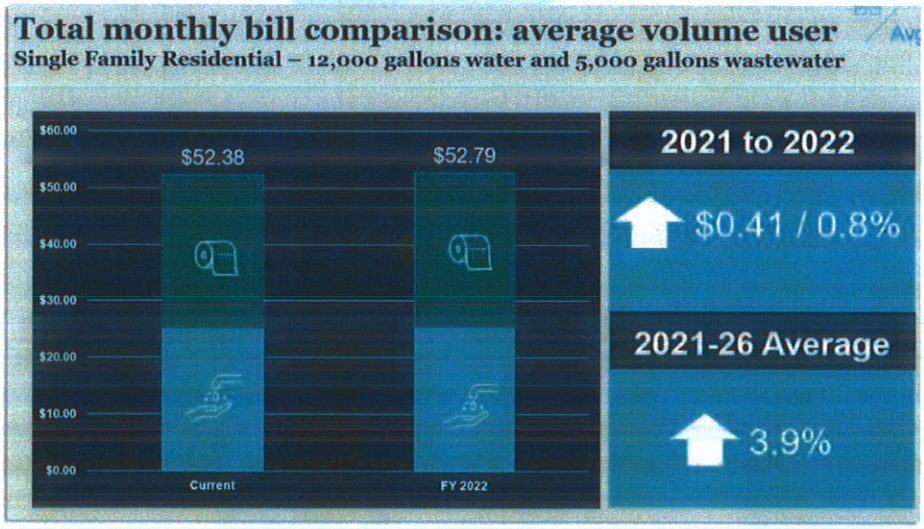
SIMPLE BILL COMPARISON



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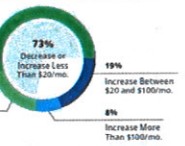
RATE INCREASE OUTREACH

The rate study determined that the District requires 2.8% more revenue each year for five years, beginning July 1, 2020 to fund operating and capital costs, maintain adequate reserve balances, and meet existing debt service obligations. The results of the rate study allowed us to develop a proposed rate structure that:

- Keeps things simple and transparent, making it easy for our customers to monitor their water use to encourage water efficiency
- Adjusts tiered volumetric rates to more accurately reflect how customers use water today, and to reinforce our commitment to conservation
- Funds critical water supply investments and infrastructure improvements to ensure water supply availability long term and prevent/reduce service disruptions and associated water loss
- Adjusts rates to be aligned with total District consumption and include drought related expenses to avoid the need for a surcharge
- Solidifies District's long-term financial plan and builds responsible reserve funds that will help maintain gradual, predictable future rate increases

MONTHLY CUSTOMER BILL IMPACTS 2020



PROPOSED TIERED VOLUMETRIC RATES	TYPICAL RESIDENTIAL CUSTOMERS	BILL IMPACT IF NEW RATES ARE ADOPTED
TIER 1: UP TO 9 HCF / $6.36/HCF CA indoor water efficiency standard for family of four	CUSTOMER 1 12 hundred cubic feet/mo.	Monthly Bill Decreases by $11.47 ↓
TIER 2: 10-35 HCF / $11.14/HCF Average summer water demand beyond indoor needs	CUSTOMER 2 23 hundred cubic feet/mo.	Monthly Bill Decreases by $13.72 ↓
TIER 3: >35 HCF / $12.31/HCF Water use beyond efficient indoor and average summer outdoor	CUSTOMER 3 36 hundred cubic feet/mo.	Monthly Bill Increases by $37.11 ↑

Note: 1 hundred cubic feet (hcf) = 748 gallons

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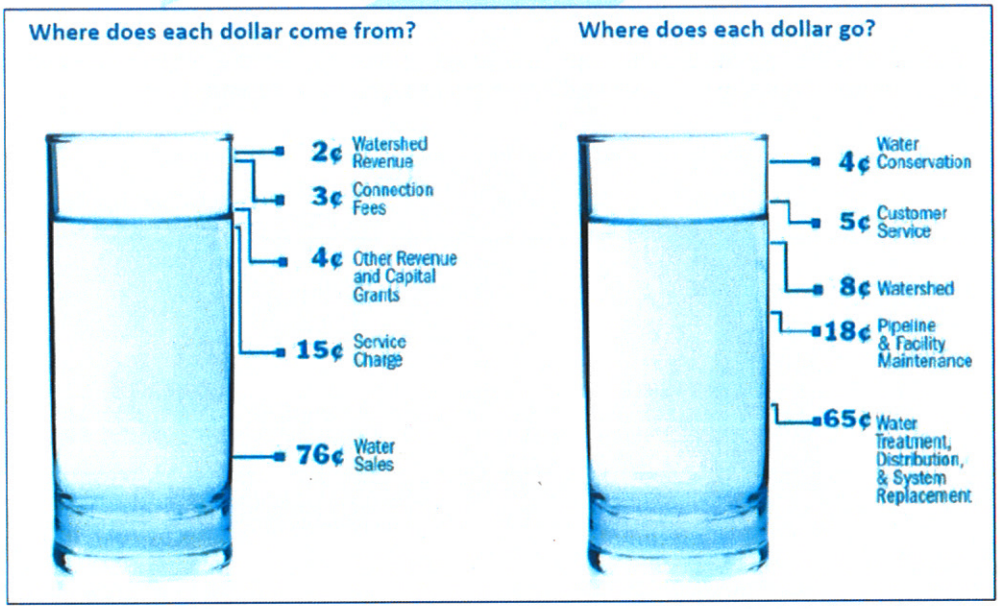
PRESENTATION OF COST OF WATER



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66

SUMMARY

Talk to your audience

Listen to questions carefully – Respond as appropriate.

Cathy phrases or analogies help

Never take a calculator or your work papers to a public hearing/meeting

Be candid/hone – but don't say "quite honestly"

Tolerate disagreement

Be as emotionally detached as possible from the final decision

Stay cool under all circumstances!

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RESOURCES

For more information, visit:

American Water Works Association (AWWA). 2017. Manual M1. Principles of Water Rates, Fees and Charges. Denver, Colo.: AWWA

Bishop, B. (2003), Water utility communication practices—what Contributes to Success?. Journal - American Water Works Association, 95: 42-51. https://doi.org/10.1002/j.1551-8833.2003.tb10268.x

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American Water Works Association

Dedicated to the World's Most Important Resource®

THANK YOU

AWWA Seminar
August 15 – 17, 2023

DAY 3

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American Water Works Association

Dedicated to the World's Most Important Resource®

Rate-Setting Essentials:
Connecting Financial Planning, Cost-of-Service and Rate Design

AWWA Seminar
August 15 – 17, 2023

DAY 1

1

INSTRUCTORS

Todd Cristiano; Senior Manager, Raftelis Financial Consultants

Todd Cristiano is a Senior Manager at Raftelis Financial Consulting. He has over 20 years' experience - 16 years as a consultant to utilities and 6 1/2 years as the Manager of Rates at Denver Water. His work includes most municipal services; water, wastewater, reclaimed water, electric and sanitation utilities across the United States. His expertise includes financial planning, cost-of-service analysis, rate design and development of impact fees for both utility and general government. Todd has a BS in Chemical Engineering from the University of Tulsa and an MBA from the University of Colorado.

Get in touch: tcristiano@raftelis.com

Shawn Koorn; Associate Vice President, HDR Engineering, Inc.

Shawn Koorn is an associate vice president with HDR Engineering Inc. specializing in the area of cost of service and rates for municipal water, wastewater, stormwater, solid waste, and electric utilities. Shawn has over 20 years of experience in providing financial planning, rate and cost of service studies, cost benefit analysis, and valuation studies for municipal utilities across the United States and Canada.

Get in touch: Shawn.Koorn@hdrinc.com

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2

COURSE LEARNING OBJECTIVES

Apply	Fundamental methodologies to establish cost of service rates
Develop	Rate structure pricing objectives to select the right rate structure for your utility
Understand	Various rate structures and how they are calculated
Develop	Right material to present rate study results
Learn	How to present your rate study effectively
Communicate	Information in a clear and concise manner to the public

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TABLE OF CONTENTS

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AWWA offers Certificates of Completion

awwa.org/credits

Questions?

Contact: educationservices@awwa.org

To earn a Certificate of Completion, you must sign-in each day.

Certificates will be processed within 60 days and are available for self-download following these five steps:

How to access your Continuing Education certificate:

1. Wait 30-60 days after a program, then visit www.awwa.org
2. Click **My Account** in upper right corner
   - Login using your Username and Password (reset if forgotten)
3. Select **'My Transcripts'** from the left-hand navigation menu
4. Click **'AWWA Certificates of Completion & Activity Transcripts'**
5. Select **'Download'** button next to program certificate

If you are having problems with login, please call 800.926.7337 or email service@awwa.org for assistance. Please read the disclaimer at www.awwa.org/credits and allow 30-60 days for certificate processing time.

It is the participant's responsibility to apply to his/her licensing agency for continuing education credit approval. AWWA does not seek specific State approval for this Seminar.

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COURSE AGENDA

Day 1

DAY 1	
TIME	*Note: Times indicated are local times and may vary slightly*
8:00 – 8:30 A.M.	Registration
8:30 A.M. – NOON	Module 1: Financial Management, Policies, and Rates Module 2: Capital Budgeting and Financing
NOON – 1:00 P.M.	Lunch (included)
1:00 – 4:30 P.M.	Module 3: Developing Your Cost of Service Study

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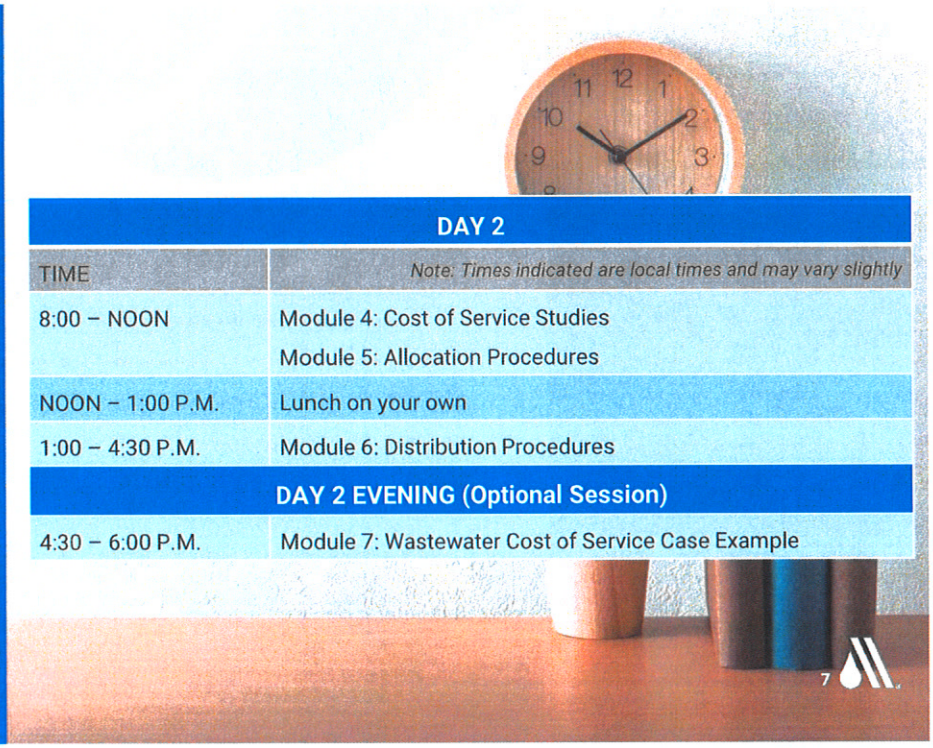
COURSE AGENDA

Day 2

DAY 2	
TIME	*Note: Times indicated are local times and may vary slightly*
8:00 – NOON	Module 4: Cost of Service Studies Module 5: Allocation Procedures
NOON – 1:00 P.M.	Lunch on your own
1:00 – 4:30 P.M.	Module 6: Distribution Procedures
DAY 2 EVENING (Optional Session)	
4:30 – 6:00 P.M.	Module 7: Wastewater Cost of Service Case Example



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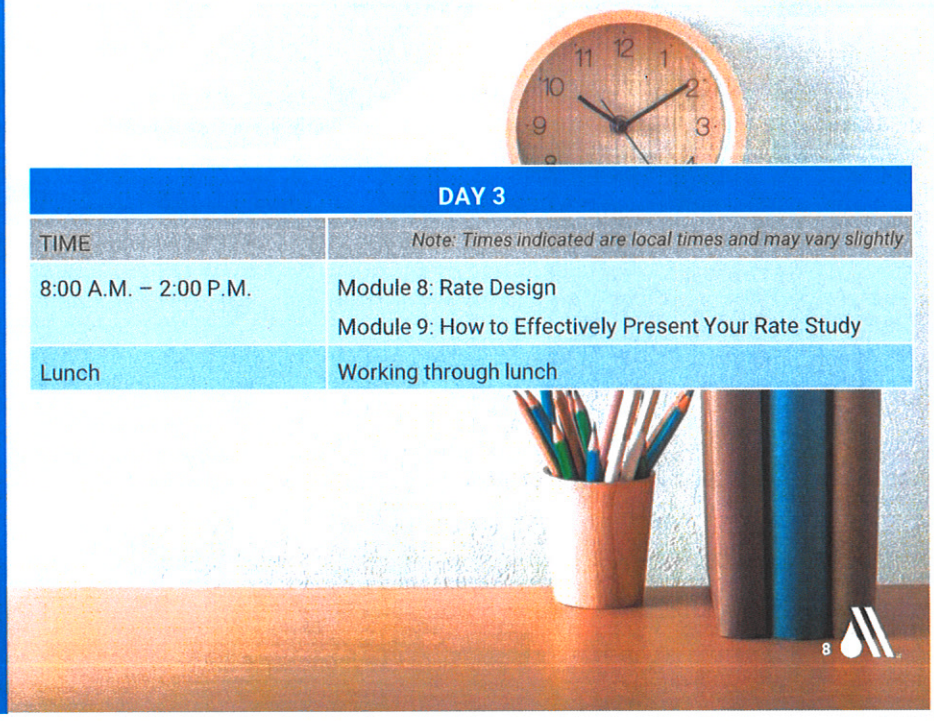
COURSE AGENDA

Day 3

DAY 3	
TIME	*Note: Times indicated are local times and may vary slightly*
8:00 A.M. – 2:00 P.M.	Module 8: Rate Design Module 9: How to Effectively Present Your Rate Study
Lunch	Working through lunch



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ICEBREAKER CHALLENGE

In small groups or around your table share...

- Your name
- Title
- Organization
- What do you want to get out of the next 3 days?

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MODULE 1

Introduction to The Water Industry:
Financial Management, Policies, and Rates

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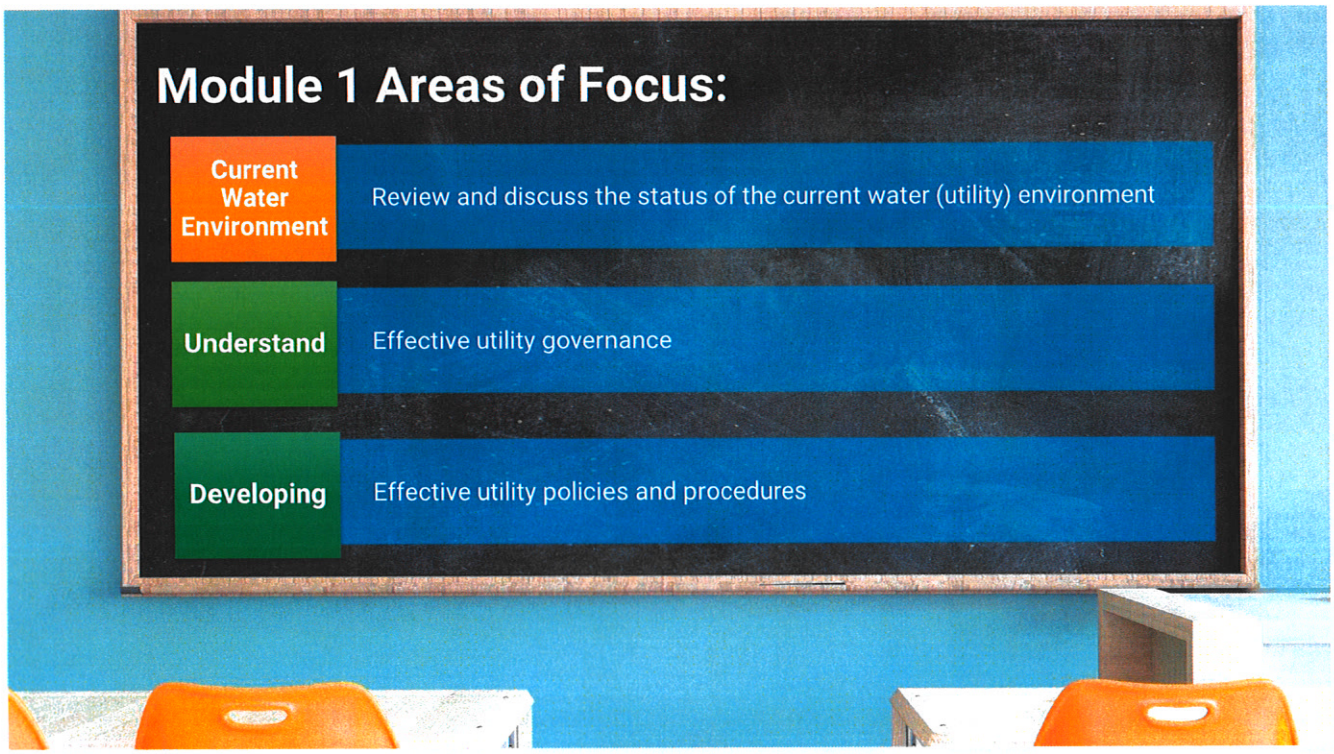

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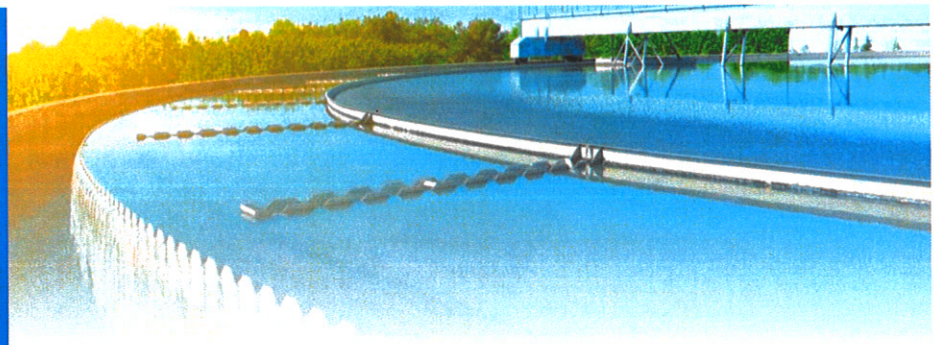
CURRENT UTILITY ENVIRONMENT



- Natural monopoly
  - Single producer can supply entire market more efficiently than two or more entities
- Provides essential services for societal and economic growth
- Capital intensive
- Regulation (rates and services)
  - Private utility: public utilities commissions
  - Public utility: city councils, boards

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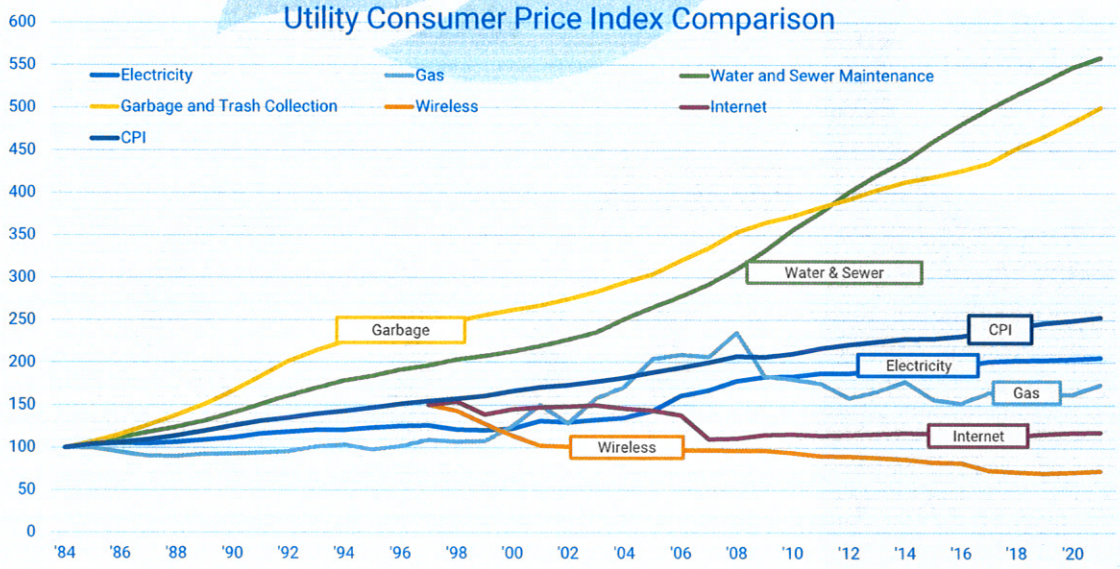
CONSUMER WATER COSTS OUTPACING INFLATION



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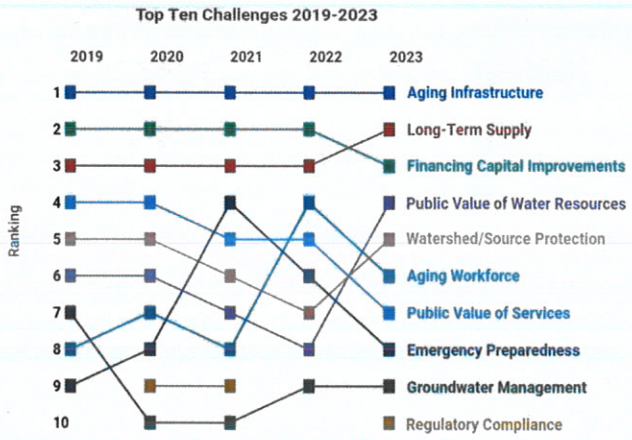
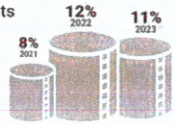
2023 STATE OF WATER INDUSTRY SURVEY REPORT
TOP TEN CHALLENGES

Challenges



Aging Infrastructure, Long-Term Supply, and **Financing Capital Improvements** have consistently been top challenges.

11% of respondents indicated their utility will be challenged to meet anticipated **Long-Term Water Supply Needs.**



40% of respondents ranked **Public Understanding of the Value of Water Resources** as critical.

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State of the Water Industry 2023

WHAT IS YOUR UTILITY DOING WITH WATER RATES?

Water Rates

Percent of utility management respondents who expect to increase water rates in the coming year:

64%	72%	78%
2021	2022	2023
$	$	$

72% of 865 executive/management and financial officers indicated that they **have conducted a water and/or wastewater rate study in the past three years.**

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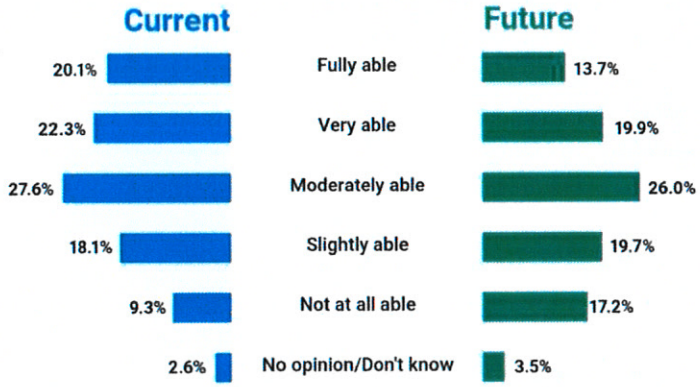
State of the Water Industry 2023

Do rates recover the full cost of service?

Figure 5. Utility ability to cover the full cost of providing services



Questions:

1. Is your utility currently able to cover the full cost of providing service, including infrastructure R&R needs, through customer rates and fees?
2. Given your utility's future infrastructure needs for R&R and expansion, do you think your utility will be able to meet the full cost of service through rates and fees?

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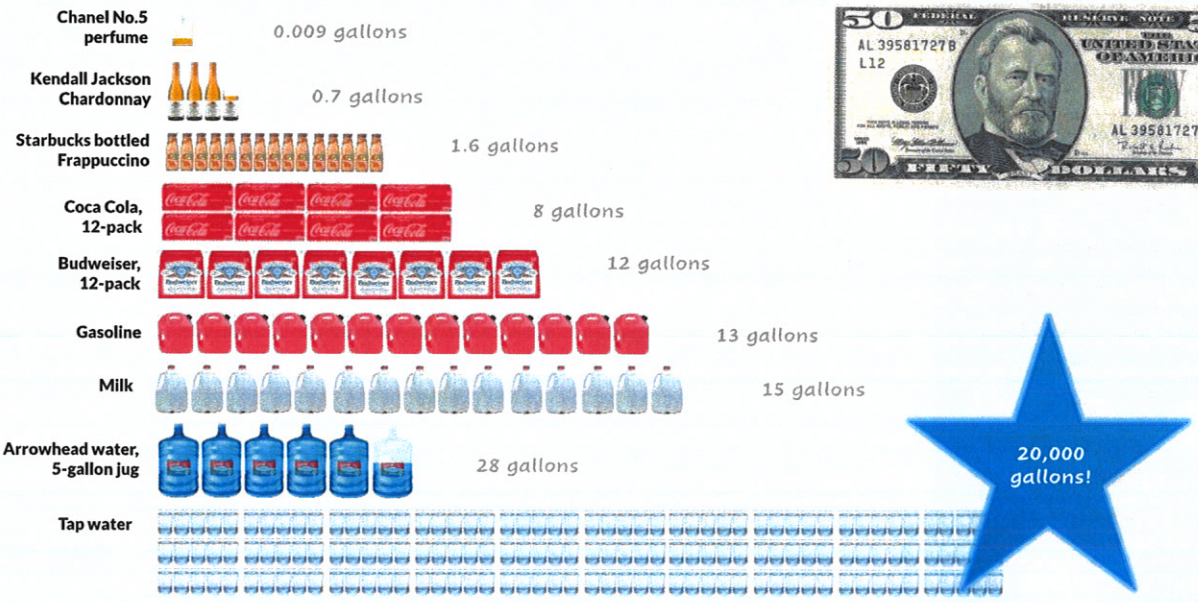
"COST" vs. "VALUE"OF WATER



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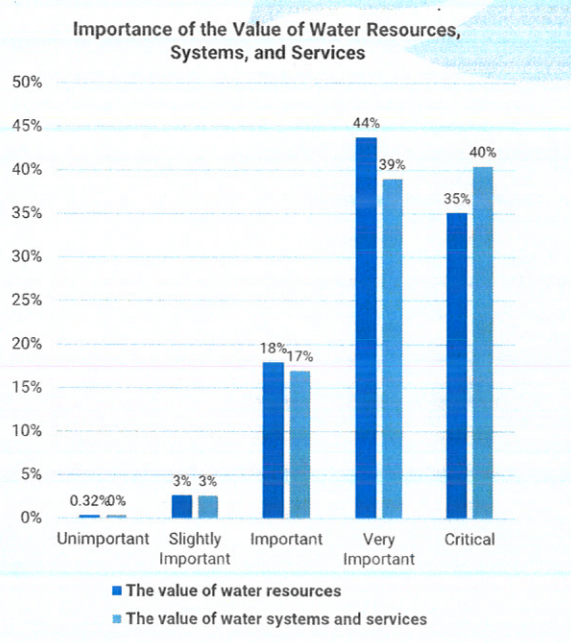
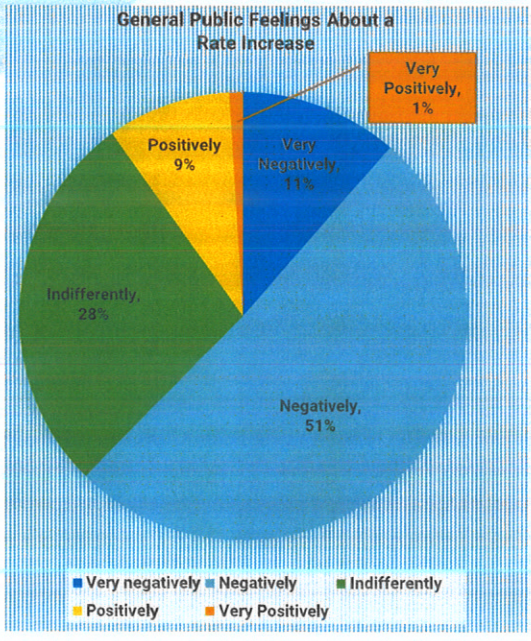
PUBLIC UNDERSTANDING OF THE VALUE OF WATER





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FUTURE EMERGING TRENDS UTILITY ENVIRONMENT

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What are the next emerging trends in the water industry?

Emerging Trends 2000s

- Affordability
- AMI
- Infrastructure R&R
- Climate change
- Drought
- Individualized rate structures
- Reuse
- Others???

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WHAT IS THE ROLE OF RATES?

Utility Financial Viability

- Pays the bills
- Revenue stability: matching inflows and outflows
- Funding the future

Customers care about

- Is the water on?
- Is it clear and does it taste good?
- Amount of their bill

Water bill (rates)

- Primary communication with customers
- Primary determinant of utility performance
- Influence consumption (how and when)
- Social goals/fairness

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WHY ARE RATE STUDIES IMPORTANT?

- Promotes Equity
- Sends Pricing Signal
- Fosters Collaboration Between Departments
- Minimizes Rate Shock
- Provides Documentation
- Ensures Financial Sufficiency and Stability

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TYPICAL RATE SETTING OBJECTIVES

- Revenue Stability
- Continuity in Rate Philosophy
- Interclass and Intraclass Equity
- Cost-based
- Peak Demand Reduction
- Essential Use Affordability
- Conservation / wise use of water
- Simplicity (administration and consumer)
- Revenue Sufficiency
- Defensible

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GOVERNANCE AND FINANCIAL POLICIES

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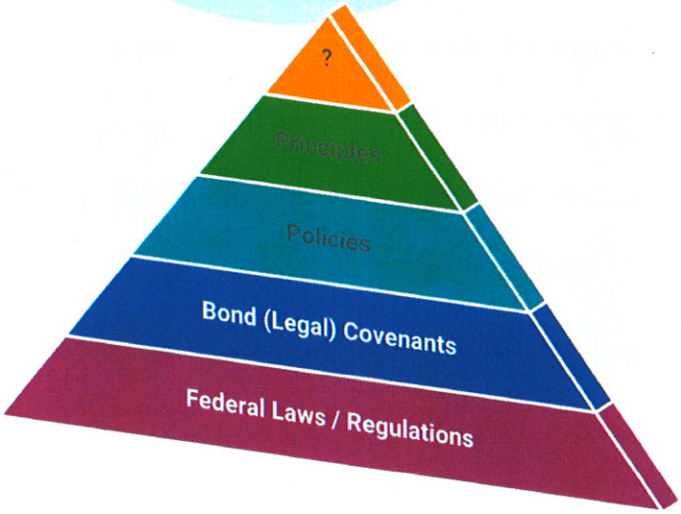
RATE-SETTING DECISION PYRAMID



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FACTORS IMPACTING THE FINANCIAL PLANNING AND RATE SETTING PROCESS

- Governance of Policy
- Financial Planning Models
- Financial Policies
- Financial Best Practices

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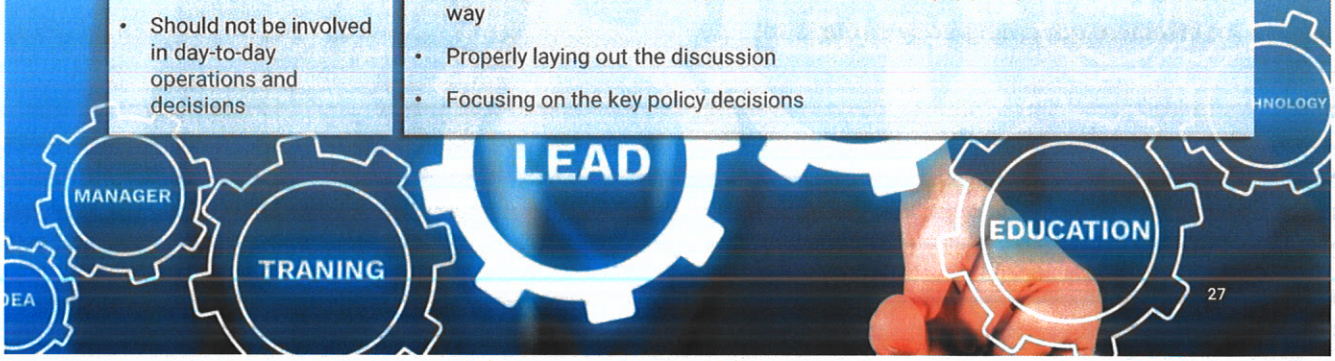
FOUNDATION OF GOVERNANCE

Policy Governance: What is it?	The Problem
• A form of leadership • Governing body provides "visionary" leadership • Should not be involved in day-to-day operations and decisions	• A governing board that doesn't understand their role – they bring to the table what they know - Micromanaging • A management team that doesn't work with their governing board in an effective way • Properly laying out the discussion • Focusing on the key policy decisions



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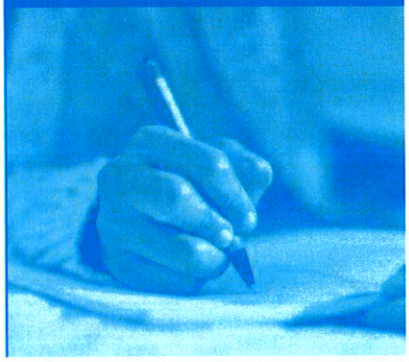
CLASS EXERCISE



What are the challenges/problems that you have faced in establishing cost-based rates at your utility (e.g. technical, managerial, public process, political, etc.)?

- Provide specifics on how your utility has dealt with those challenges in the past (successfully or unsuccessfully)
- Order these challenges from "most challenging" to "least challenging".

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GOVERNANCE MODEL STRUCTURES

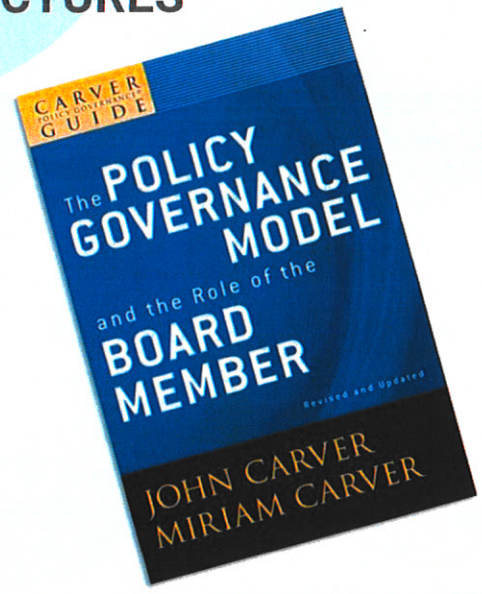
Based on the Carver Governance® Model

Governing body establishes the "ends"

Management team determines the "means"

An effective governing body's role is to:

- To see to it
- Achieve what the organization should
- Avoid what is unacceptable



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EFFECTIVE GOVERNANCE

"To see to it"

- Commitment to assure that things are done right
- Governing body must describe what is "right" or the criteria for success
  - (e.g. financial performance target levels)
- Governing body must hold parties accountable
- Governing body must monitor performance regularly

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EFFECTIVE GOVERNANCE

"Achieve what the organization should"

- Implies an understanding of providing services (benefits) to the right customers, at an appropriate cost
- Another way of describing "ends"
- Most governing boards mistakenly focus on activities as opposed to " ends"

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WHAT ARE THE "ENDS" AND THE "MEANS"?

ENDS

The results of the priorities of the organization

Example:
Targeted conservation savings (5%)

MEANS

The methods, programs, practices & conduct of the organization to achieve the "ends"

Example:
Management determines that conservation savings will be achieved via a specific program or programs

How does your governing body govern rates – means or ends?

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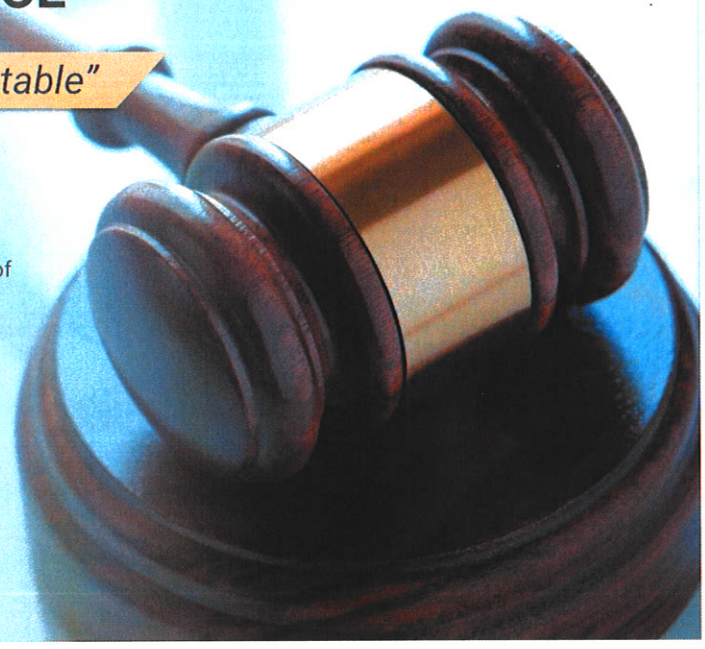
EFFECTIVE GOVERNANCE

"Avoid what is unacceptable"



- If the governing body focuses on the "ends" then the "means" is delegated to management.
- Micro-management of the "means" is a major problem of governing boards.
- Governing body should specify any "means" that are unacceptable (e.g. achieving conservation by pricing water at marginal cost).
- Management is left with a broad array of choices (means) to meet the desired "ends).

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FINANCIAL PLANNING MODELS

Financial Modeling Considerations:

Who is the end user?

How will it be maintained and how often updated?

Building the financial model:
- Layout
- Accuracy
- Size and complexity
- Inputs/outputs

Using the results:
- What do you need to know and understand?
- What results do you want to communicate and to whom?

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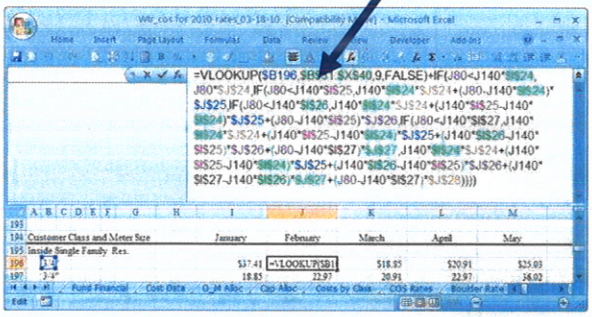
FINANCIAL PLANNING MODELS

Financial Modeling Considerations:

- ✓ Keep it simple
- ✓ Consistency
- ✓ Multi reference to root cell
- ✓ Use error checks
- ✓ Avoid constants in formulas
- ✓ Avoid ad hoc-ery
- ✓ Avoid rounding until the end

Uh, really?




```
=MIN(($U37*P37)-SUM(AD37,AR37),MAX(BF$8-SUM(BF$13:BF36),0))*IF(OR($F37=$B$319,$F37=$B$320,$F37=$B$321),0,1)
```

BF BG BH BI BJ BK BL BM BN BO BP BQ

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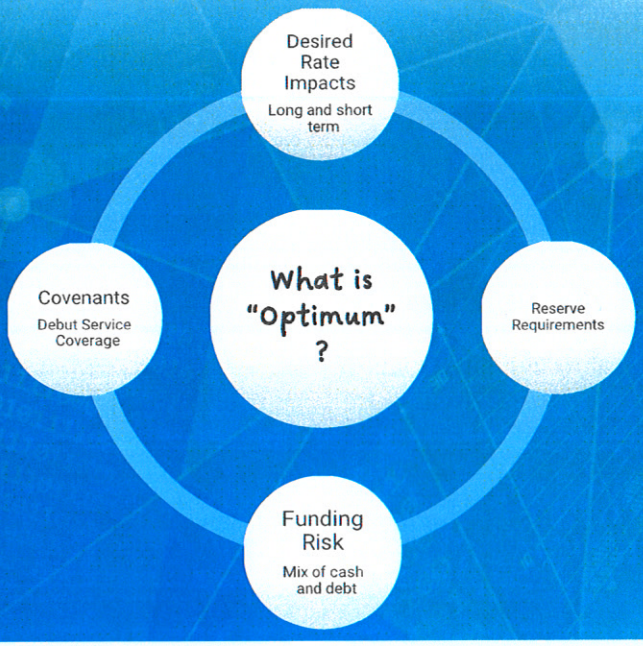
DEVELOPING THE "OPTIMAL" FINANCIAL PLAN



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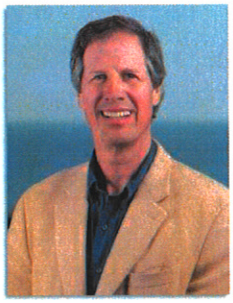
FINANCIAL POLICIES

The problem created by a lack of written policy direction:

"We've been there.....
It was called the 1960s, and it didn't work very well,"



James Salzman

Professor of Environmental Law at the University of California, Santa Barbara – when asked about if the EPA did not exist.

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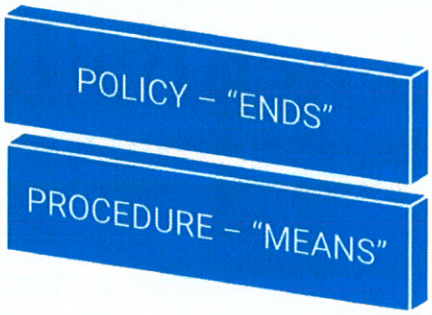
FINANCIAL POLICIES AND PROCEDURES

Policy versus a procedure:

- The need to find the proper balance between policy direction and policy (management) Flexibility
- Un-written policies are found in numerous areas of the utility: written financial/rate policies are rarely found



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CLASS EXERCISE

1. Discuss in small work groups the type of policies that your utility has in place – both written and understood
2. Discuss the advantages of each type of policy and why certain policies may be in one form instead of the other.

- See Appendix A for example financial policy
- Note:
  - Objectives of each of the global policy statements
  - General layout or approach

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FITCH BEST FINANCIAL MANAGEMENT PRACTICES

FitchRatings

System related

Debt and capital related

Finance related

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FITCH BEST FINANCIAL MANAGEMENT PRACTICES

FitchRatings

System related

- Key **management industry experience** and active participation in organizations to keep pace with sector issues, regulatory mandates, and technological advances
- **Use of professional engineers**, either within the utility or outside of it, to prepare objective reviews of system performance and needs on a regular basis and provide periodic revisions of construction cost estimates
- **Regular consultation with regional and local growth planners**, community development officials, and demographers to predict and, if possible, limit infrastructure needs related to population and business growth

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FITCH BEST FINANCIAL MANAGEMENT PRACTICES

FitchRatings

Debt and capital related

- **Prioritize capital improvement plans** that cover at least five years and consider growth, capacity, regulatory, and replacement in renewal needs
- **Debt issuance policies**, including types, terms, and suitability under specific conditions, as well as the total amount of variable rate debt deemed appropriate.
- Development of **comprehensive policies on the use of hedge agreements** and their disclosure prior to entering into such agreements

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FITCH BEST FINANCIAL MANAGEMENT PRACTICES

FitchRatings

Finance related

- **Long-term integrated financial forecasting** considers future growth and demand, expected rate increases, regulation, and infrastructure renovation and renewal needs.
- Policies to **ensure appropriate financial margins**, including debt service coverage and operating liquidity levels. Utilities with variable rate debt and swap agreements are expected to understand the implications and potential risks of such capital management strategies. In addition, those utilities should include management's rationale for the sizing of financial reserves and the adequacy of those reserves to cope with interest rate fluctuations and possible termination payments.
- **Regular financial reporting and monitoring** systems that enable policymakers access to timely information on fiscal performance relative to the budget

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RESOURCES

For more information, visit:

FitchRatings. 2020. U.S. Water and Sewer Revenue Rating Criteria: Sector Specific

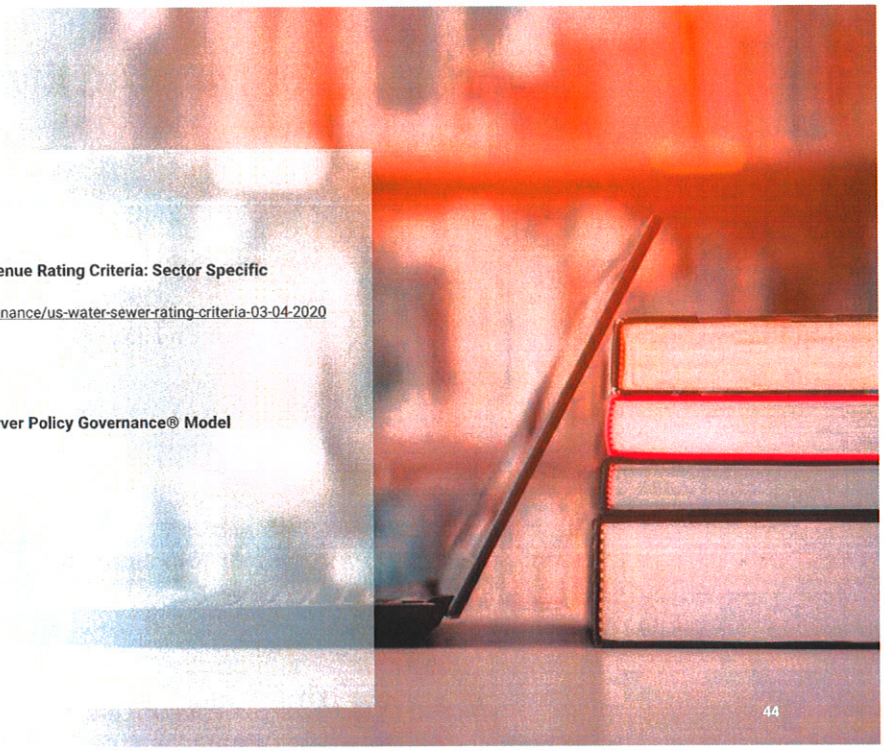
https://www.fitchratings.com/research/us-public-finance/us-water-sewer-rating-criteria-03-04-2020
(accessed October 2020)

Website: The Authoritative Website for the Carver Policy Governance® Model

http://policygovernance.com/model.htm

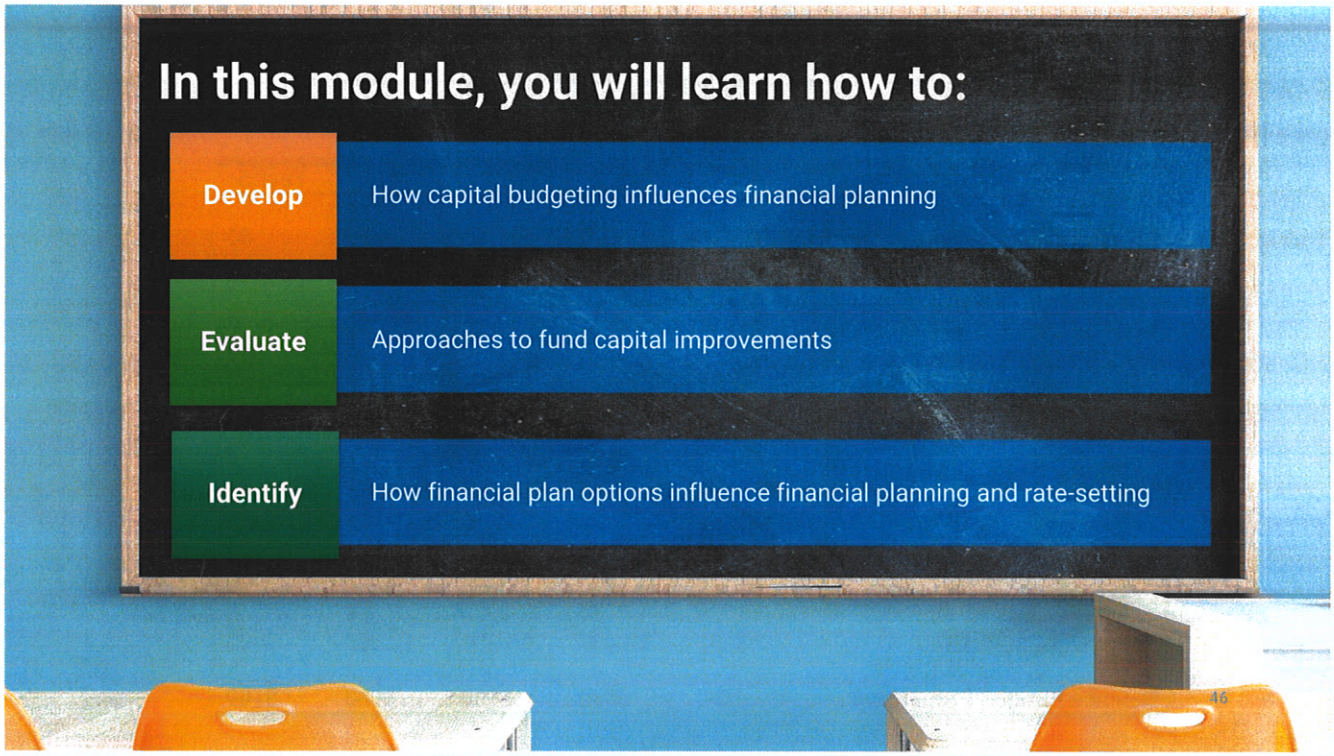
(accessed October 2020)

Garver Model Book



MODULE 2

Capital Budgeting and Financing



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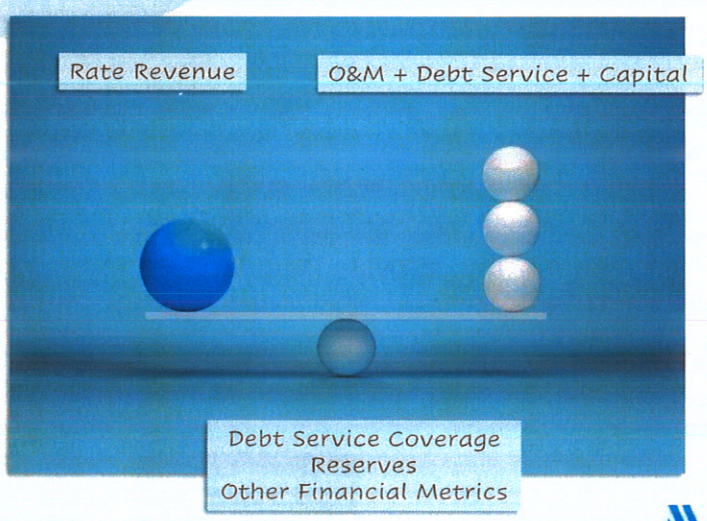
CAPITAL BUDGETING AND FINANCING

Balancing the Equation

- Capital construction and debt often drive rates
- Need for strategic capital planning
- Typical result is a financial/capital improvement plan



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BALANCING CAPITAL FUNDING SOURCES

To mitigate swings in annual expenditures

	Year 1	Year 2	Year 3	Year 4	Year 5
Water Treatment Expansion	$0	$4,500	$4,000	$0	$0
8th Street Transmission Line	0	0	2,000	0	0
Well Housing Upgrade	250	0	0	0	0
Capital Hill Reservoir	0	0	0	1,500	0
Telemetry system	0	0	0	0	300
Replacement Mains	500	500	500	500	500
Total Capital Projects	$750	$5,000	$6,500	$2,000	$800
Less: Outside Funding Sources					
Grants	$0	$500	$0	$0	$0
Capital Reserves	250	0	2,000	850	100
System Development Charges	0	1,000	1,000	500	0
Low-Interest State Loans	0	2,200	2,000	0	0
Revenue Bonds	0	750	900	0	0
Total Outside Funding	$250	$4,450	$5,900	$1,350	$100
Balance Funded From Rates	**$500**	**$550**	**$600**	**$650**	**$700**

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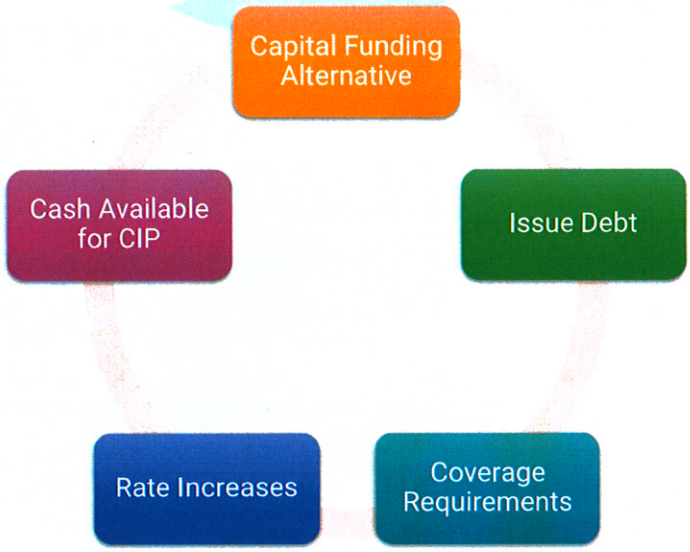
FINANCIAL PLANNING IS AN ITERATIVE PROCESS



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Bond and loan funded capital must meet specific requirements which impact cash flows [1]

Calculating Debt Service Coverage	Source of Coverage Above 1.00 DSC	DSC
+ Total Revenues		
– O&M Expenses	+ O&M Expenses	
– Taxes	+ Taxes	
= Balance Available for Debt Service	+ Debt Service	= 1.00
	+ Balance After Debt Pmt/CIP from Rates	> 1.00
	= Total Revenue Requirements	

$$\frac{\text{Balance Available for Debt Service}}{\text{Debt Service Payment}} = \text{DSC}$$

[1] - Check with your utility-specific bond issues for the calculation of debt service coverage ratios. May vary from utility to utility.

[2] DSC: Debt Service Coverage

Interrelationship Between Rate Funded Capital and Debt Service Coverage

	Example 1		Example 2		Example 3	
Description	Revenue Requirements	DSC	Revenue Requirements	DSC	Revenue Requirements	DSC
Total Revenues	$4,000,000		$4,300,000		$5,000,000	
O&M Expenses	(2,000,000)		(2,000,000)		(2,000,000)	
Taxes	(1,000,000)		(1,000,000)		(1,000,000)	
Balance Available for Debt Service	$1,000,000		$1,300,000		$2,000,000	
		1.00		1.30		2.00
Debt Service Payment	$1,000,000		$1,000,000		$1,000,000	
Funds Available for Capital	$0		$300,000		$1,000,000	

As debt service coverage ratio increases (under same debt), more net revenue is required which results in more ending cash to fund capital projects.

What capital information is helpful for cost of service analysis?

- Capital projects needed to be built
- Type of project (SOS, treatment, etc.)
- Timing, length of project
- Growth, non-growth, or regulatory
- Eligible for bond/loan funding

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TYPES OF CAPITAL PROJECTS

Renewal and Replacement

Growth-related

Legally Mandated

Why does type matter?

- Funding mechanisms may vary by type of project
- State/Fed loans
- Revenue bonds
- Certificates of Participation

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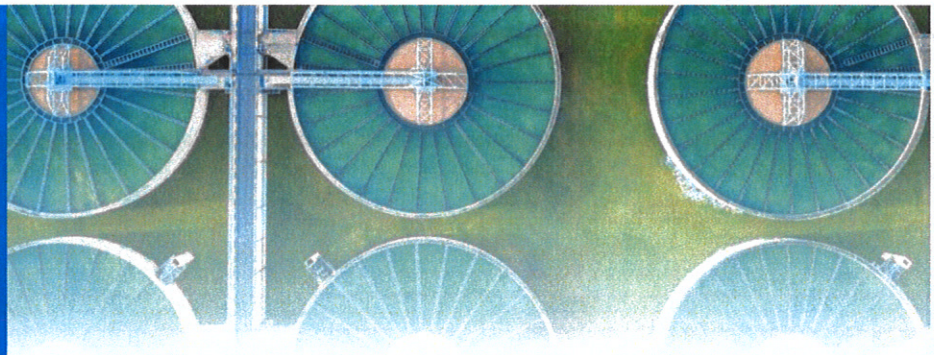
EXAMPLE OF A CAPITAL IMPROVEMENT PLAN



See Technical Appendix B

Items to note:

- ✓ Length of planning horizon
- ✓ Summary page
- ✓ Detail to help explain/justify
- ✓ Priority of projects – ability to slide projects out?

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CAPITAL PLANNING CONSIDERATIONS

Define Service Levels

- Service area boundaries / annexation
- Customer growth – extension policies to new customers (outlying area)
- Minimum service levels / regulatory requirements

Physical Facilities
(what is needed to meet service levels)

- Supply issues (short- and long-term)
- Age/condition of plant (replacement/upgrade)
- Changes in technology (e.g. meter reading)

Financial Resources
(what we care about)

- Customers' ability and willingness to pay for new facilities
- Return on investment (risk)
- Financing alternatives (impacts to rates and financial performance)

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METHODS OF FINANCING CAPITAL PROJECTS


Rates (cash flow)


Bonds/Loans


Grants


Reserves


Cousin Eddie

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EXAMPLE COVER

Official Statement (OS)

OFFICIAL STATEMENT

RATINGS: (See 'RATINGS' herein)
Fitch: "AAA (negative outlook)"
Moody's Investors Service, Inc.: "Aa1"
Standard & Poor's: "AA+ (stable outlook)"

NEW ISSUE **SERIAL BONDS**

In the opinion of Orrick, Herrington & Sutcliffe LLP, Bond Counsel to the County, based upon an analysis of existing laws, regulations, rulings and court decisions, and assuming, among other matters, the accuracy of certain representations and compliance with certain covenants, interest on the Series A Bonds is excluded from gross income for federal income tax purposes under Section 103 of the Internal Revenue Code of 1986. In the further opinion of Bond Counsel, interest on the Series A Bonds is not a specific preference item for purposes of the federal individual or corporate alternative minimum taxes, nor is it included in adjusted current earnings when calculating corporate alternative minimum taxable income. Bond Counsel is of the opinion that interest on the Series B Bonds and the Recovery Zone Bonds is not excluded from gross income for federal income tax purposes. Bond Counsel is also of the opinion that interest on the Bonds is exempt from personal income taxes imposed by the State of New York and any political subdivision thereof (including The City of New York). Bond Counsel expresses no opinion regarding any other tax consequences related to the ownership or disposition of, or the accrual or receipt of interest on, the Bonds. See "TAX MATTERS" herein.

The Bonds will NOT be designated "qualified tax-exempt obligations" pursuant to Section 265(b)(3) of the Code.

COUNTY OF ONONDAGA, NEW YORK

$31,150,000 General Obligation (Serial) Bonds, 2010 Series A (Tax-Exempt)
CUSIP BASE†: 682745

Dated: Date of Delivery **Due: June 15, 2012-2019**

(hereinafter referred to as the "Series A Bonds")
MATURITIES

Year	Amount	Interest Rate	Yield	CSP†	Year	Amount	Interest Rate	Yield	CSP†	Year	Amount	Interest Rate	Yield	CSP†
2012	$4,425,000	4.00%	0.64%	T79	2015	$5,100,000	5.00%	1.73%	U28	2018	$3,050,000	5.00%	2.71%	U51
2013	4,950,000	4.00	1.05	T87	2016	3,000,000	5.00	2.14	U36	2019	3,000,000	5.00	2.93	U69
2014	4,625,000	5.00	1.38	T95	2017	3,000,000	5.00	2.46	U44					

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EXAMPLE

Sources and Uses of Funds

SOURCES AND USES OF FUNDS

The following is a summary of the estimated sources and applications of the proceeds of the 2010 Bonds:

Sources of Funds:	
Principal Amount of 2010 Bonds	$ 5,925,000.00
Net Premium	485,629.10
Debt Service Reserve Fund	1,066,972.42
Total Sources	$ 7,477,601.52
Uses of Funds:	
Deposit to Escrow Fund	$ 4,794,346.88
Deposit to Construction Fund	2,000,000.00
Deposit to Bond Reserve Fund	590,407.55
Underwriting Discount	16,412.25
Cost of Issuance and Rounding	76,434.84
Total Applications	$ 7,447,601.52

FINANCED CAPITAL IMPROVEMENTS

$2,000,000 of the proceeds of the 2010 Bonds will be applied to capital improvements to the Water System. The capital improvements to be undertaken with proceeds of the 2010 Bonds include: roofing, siding and HVAC improvements at the Northern Concourse Facility.

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EXAMPLE

Rate Covenant and Security

SECURITY FOR THE BONDS

Pledge under the General Resolution

The Bonds are general obligations of the Authority to the payment of which the Authority has specifically pledged (i) the revenues and other moneys of the Authority derived by the Authority from the ownership and operation of the Water System, and (ii) the moneys in certain funds created under the General Resolution, as more fully set forth in the General Resolution. See "SUMMARY OF CERTAIN PROVISIONS OF THE GENERAL RESOLUTION".

Rate Covenant

The Authority has covenanted in the General Resolution to establish, maintain, revise and collect rates and charges with respect to the Water System to provide Revenues which, together with other moneys available therefor, will be sufficient to cover the Net Revenue Requirement as defined in the General Resolution. The General Resolution defines the Net Revenue Requirement to mean an amount equal to the greater of (i) the sum of the Aggregate Debt Service and the Required Deposits for such period, or (ii) 1.25 times the Aggregate Debt Service for such period. See "SUMMARY OF CERTAIN PROVISIONS OF THE GENERAL RESOLUTION".

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EXAMPLE

Establishment of the Bond Reserve

Bond Reserve Fund

The General Resolution establishes the Bond Reserve Fund (the "Reserve Fund") to be held by the Trustee as security for all Bonds Outstanding under the General Resolution. The General Resolution provides that the Reserve Requirement for any Series of Bonds is the amount required to be deposited and maintained in the Bond Reserve Fund as set forth in the Series Resolution authorizing such Series of Bonds. The 2010 Series A Resolution establishes the Reserve Requirement for the 2010 Bonds as the least of (i) the Maximum Annual Debt Service with respect to the 2010 Bonds as of their date of issue, (ii) 125% of the average annual debt service with respect to the 2010 Bonds as of their date of issue, (iii) 10% of the aggregate principal amount of the 2010 Bonds, or (iv) such lesser amount as shall be specified by the Bond Series Certificate. The Authority has established the Reserve Requirement incident to the issuance of the 2010 Bonds in the amount of $390,407.55, with $200,788.39 of that amount being funded from proceeds of the 2010 Bonds and the balance being funded from other sources. After September 15, 2015 the Reserve Requirement relating to the 2010 Bonds will decrease to $200,788.39. The Reserve Fund shall be held as a reserve for the payment of the principal of, premium, if any, and interest on all Bonds Outstanding when and if other funds on deposit in the Bond Fund are not sufficient for such purposes.

The Authority may substitute an insurance policy, surety bond, letter of credit or other form of guarantee for the moneys required to be held in the Reserve Fund as provided in the General Resolution.

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EXAMPLE

Other Legal Provisions

The Authority shall review the adequacy of fees, rates and charges at least annually. If such annual review indicates that the rates, fees and charges are, or will be, insufficient to meet the requirements of subparagraphs (a) and (b) of this Section, the Authority shall promptly take the necessary action to cure or avoid any such deficiency.

The Authority shall shut off water service to any user for non-payment of water bills and charges after said bills and charges are delinquent for a period of sixty (60) days.

The Authority shall not furnish free service to any person, firm, association, corporation (whether municipal or private), political subdivision or public or governmental agency, provided, however, that the continuation of a free service required by contract or franchise validly in force on March 28, 2001 (the date of issue of the 2001 Series A Bonds) shall not be deemed a breach of this covenant.

The Authority shall keep proper books, records and accounts (separate from all other books, records and accounts) in which complete and correct entries shall be made of its transactions relating to the Water System, the Funds established by the Resolution, and which, together with all other books and papers of the Authority, including insurance policies, shall at all

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EXAMPLE

System's Largest Users

The fifteen largest industrial customers within these areas, served directly by the Water System in order of usage, are:

Customer	Consumption (in Gallons)	% of Water Sales
Anheuser-Busch, Inc.	866,157,000	7.55%
Solvay Paperboard	628,660,000	5.48%
Crucible Steel	285,528,000	2.49%
Bristol Meyers Squibb	180,311,000	1.57%
Clinton Ditch	128,680,000	1.12%
Queensboro Farms	73,750,000	0.64%
Frazer & Jones, Co.	43,200,000	0.38%
Community General Hospital	41,890,000	0.37%
Covanta Onondaga LP	31,460,000	0.27%
Lockheed Martin	30,500,000	0.27%
Crouse Hinds	19,540,000	0.17%
Carr Street (Co-Generator)	13,870,000	0.12%
Sunoco, Inc., R&M	12,752,000	0.11%
Suburban Lodging	12,480,000	0.11%
Ameripride	11,650,000	0.10%

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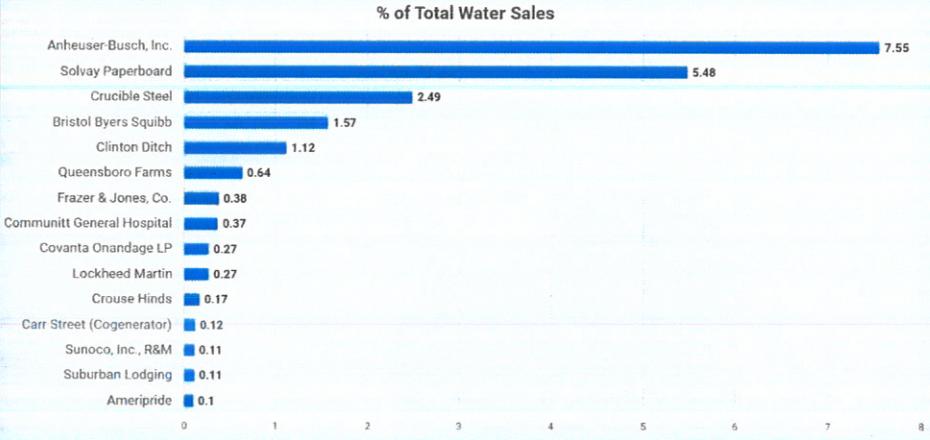
EXAMPLE

System's Largest Users

The 15 largest industrial users served by the water system



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BOND RATINGS

S&P Global

Moody's

FitchRatings

	S&P[1]	Moody's
Highest Rating	AAA	Aaa
Very Strong	AA	Aa
Strong but Susceptible	A	A
Adequate	BBB	Baa
Speculative	BB/B CCC/CC	Ba/B Caa, Ca, C
Default	D	

[1] May have a plus (+) or minus (-) with rating

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WHAT THE RATING AGENCIES EXAMINE

Adopted from "Water and Sewer Revenue Bond Rating Guidelines"

Published by FitchRatings

1. Community Characteristics
2. Customer Growth
3. Capacity Available
4. Compliance with Environmental Laws
5. Capital Demands and Debt Policies
6. Covenants
7. Charges and Rate Affordability
8. Coverage and Financial Performance
9. Cash Considerations
10. Crew/Management Team

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STANDARD &POOR'S

WATER AND WASTEWATER CRITERIA

Enterprise Risk Profile

- **Economic fundamentals** (45% of the enterprise risk profile assessment)
- **Industry risk** (20%)
- **Market position** (25%)
- **Operational management assessment** (10%)

Financial Risk Profile

- **All-in coverage** (40% of the financial risk profile assessment)
- **Liquidity and reserves** (40%)
- **Debt and liabilities** (10%)
- **Financial management assessment** (10%)

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STANDARD &POOR'S

WATER AND WASTEWATER CRITERIA

Economic fundamentals (45% of the enterprise risk profile assessment)

Economic fundamentals measure the strength of the utility's service area economy, including the utility's demographics, characteristics and trends about the customer base, and how crucial the utility's principal customers are to operating revenues.

Industry risk (20%)

The industry risk evaluation aims to evaluate the external environment in which municipal utilities operate and its relevant characteristics, including cyclicality, competitive risk, and growth environment.

Market position (25%)

The market position measures the relative affordability of utility rates given the income indicators and relative poverty of the service area, as well as comparability of rates with those of peers in the region or state.

Operational management assessment (10%)

The OMA evaluates our view of the effectiveness of utility management in ensuring that there is alignment of operational, environmental, strategic, and financial goals to support the system's success.

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STANDARD &POOR'S

WATER AND SEWER CRITERIA

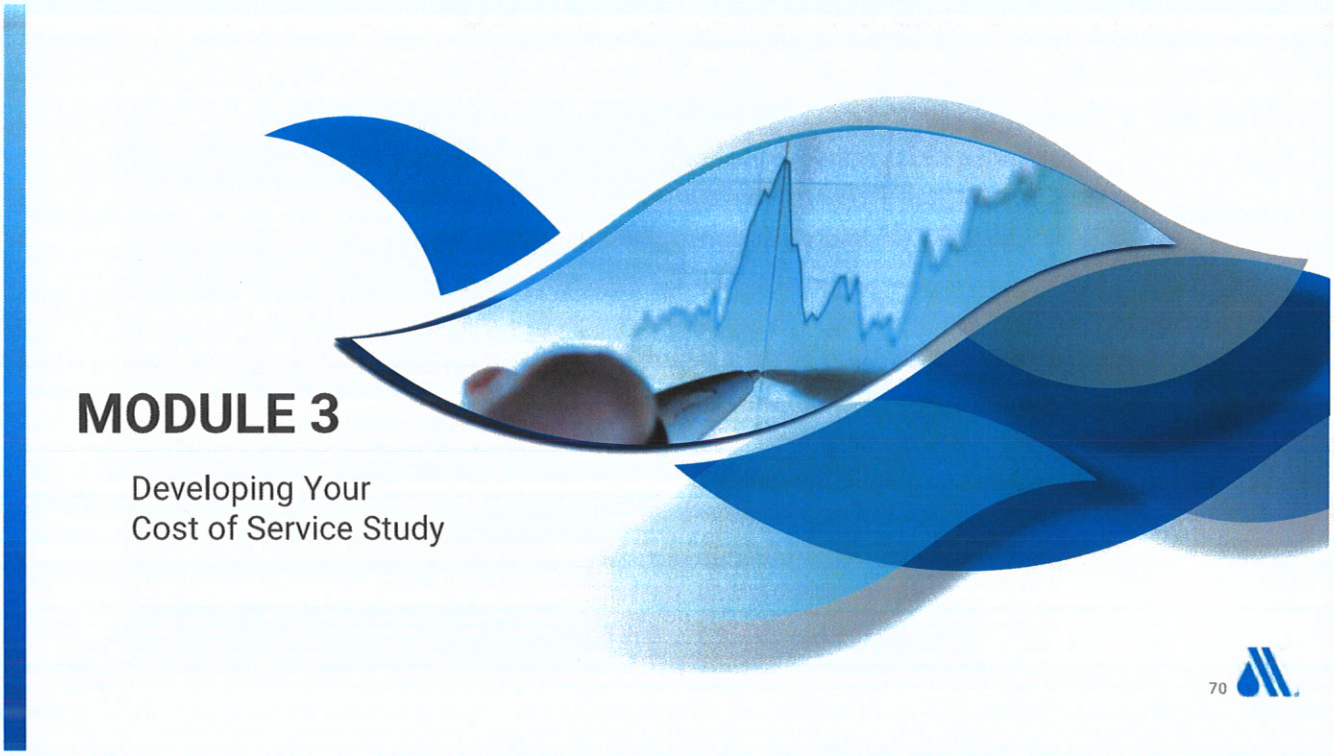
Description Of Financial Risk Profile Factors
All-In Coverage (40% of Financial Risk Profile assessment)
Analysis includes examination of historical and preferably GAAP-based results, the current financial condition of the utility, and projected scenarios for the next one to three fiscal years. The focus is on total financial capacity versus total revenue requirements.
Liquidity and Reserves (40%)
This factor incorporates all lawfully available cash reserves and external working capital or liquidity sources, including bank lines in force within the life of any short-term obligations.
Debt and Liabilities (10%)
This factor incorporates mainly quantitative, but also qualitative, analyses about not just the absolute measure of the utility's indebtedness but also the capacity to incur and support additional debt, especially in relation to maintaining any minimum financial metrics as covenanted to bondholders. Measurable liabilities such as pension and postemployment benefits can lead to adjustments to this initial factor.
Financial Management Assessment (10%)
Analysis includes an evaluation of ongoing management practices and policies that can be supportive of financial performance and continuity, as well as internal controls and reporting. Examples include establishing a minimum level of acceptable working capital, predictability of cash transfers from the utility system, and creating and perpetually updating a long-term financial forecast.

STANDARD &POOR'S

WATER AND SEWER CRITERIA

Financial Management Assessment (10%)
Analysis includes an evaluation of ongoing management practices and policies that can be supportive of financial performance and continuity, as well as internal controls and reporting. Examples include establishing a minimum level of acceptable working capital, predictability of cash transfers from the utility system, and creating and perpetually updating a long-term financial forecast.

Rate-Setting Practices Assessment	
Strong	When rate increases have been needed, the decision-making body has been supportive and timely, even to the extent that multiyear, preapproved rate increases are common, if not standard. Financial decisions are prudent, in our view, rather than simply politically expedient and that could possibly be to the detriment of the utility's near-term financial health. Periodic rate studies (internal or external) are common.
Good	Rate considerations are done on a year-to-year planning horizon rather than over a long-term time frame, but generally are apolitically approved if and when necessary.
Standard	The rate covenant and/or additional bonds test are the de facto guide as to when rate adjustments are necessary, but that is still enough for the political decision makers to agree to a rate increase.
Vulnerable	Rate increases are often in reaction to a weakened financial position, including a technical default or some other legal covenant violation, even if the recent debt service payments were made on time and in full. There is clear evidence of recent political decisions to defer or downsize needed rate increases.


MODULE 3
Developing Your
Cost of Service Study
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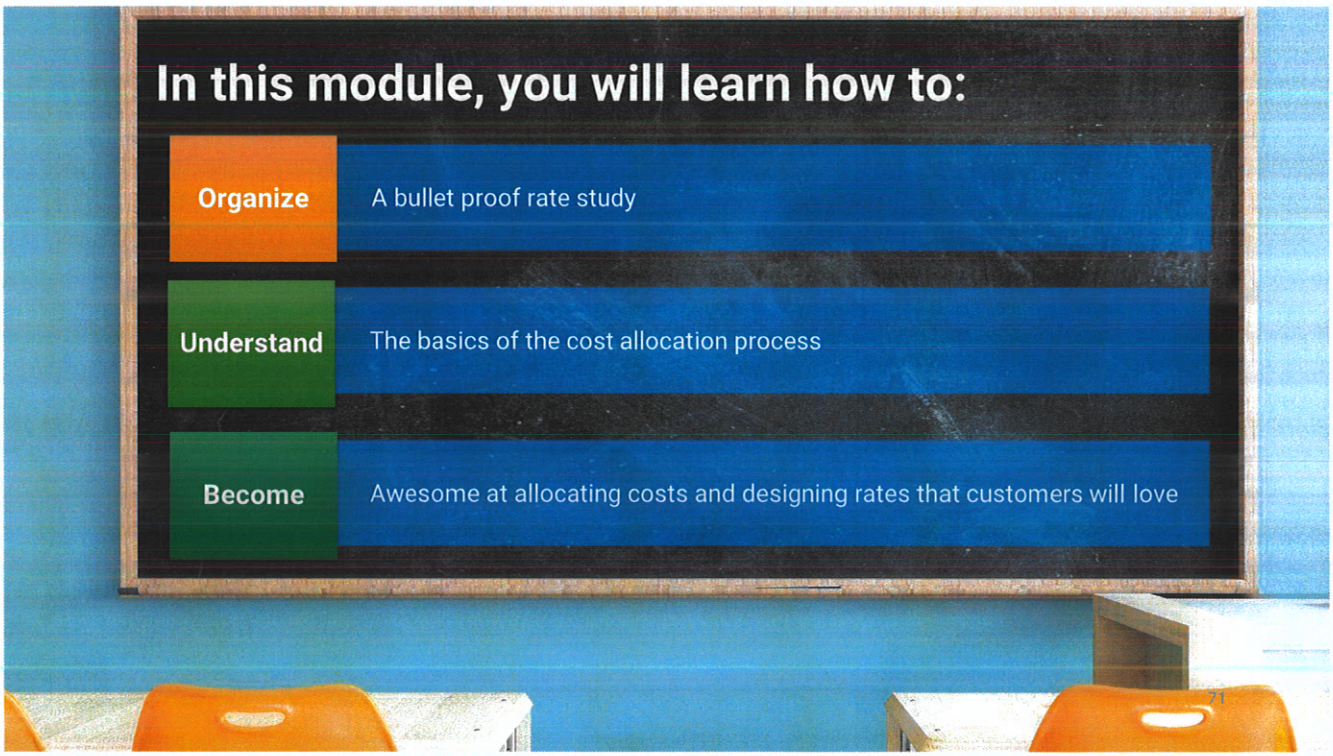
In this module, you will learn how to:
Organize
A bullet proof rate study
Understand
The basics of the cost allocation process
Become
Awesome at allocating costs and designing rates that customers will love
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WHY ARE RATE STUDIES IMPORTANT?

- Promotes Equity
- Sends Pricing Signal
- Fosters Collaboration Between Departments
- Minimizes Rate Shock
- Provides Documentation
- Ensures Financial Sufficiency and Stability

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OVERVIEW OF THE RATE-SETTING PROCESS

Revenue Requirement

Compares the revenues of the utility to its expenses to determine the overall level of rate adjustment

Cost of Service

Proportionately allocates the revenue requirements between the various customer classes of service based on their service characteristics

Rate Design

- Design rates for each class of service to meet the revenue needs of the utility, along with any other rate design goals and objectives

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10-STEP APPROACH TO CONDUCTING THE STUDY

1. Assemble the team
2. Identify management and policy objectives, and financial criteria
3. Develop financial plan, revenue requirement cash flow
4. Select test year and calculate revenue requirement
5. Functionalize the revenue requirement

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10-STEP APPROACH TO CONDUCTING THE STUDY

6. Allocate functionalized costs
7. Calculate system units of service and customer class units or service
8. Calculate unit cost of service
9. Distribute costs to customer classes
10. Compare results – class cost of service to revenue at existing rates

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Steps 1 – 4

Developing your Cost of Service Study

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1 Assemble the team

- Not a one-person job
- Need a leader and management support
- Need emphasis of importance from top management
- Expertise needed
  - ✓ Accounting / finance
  - ✓ Customer Service / billing
  - ✓ Engineering / operations
  - ✓ Field services
  - ✓ Conservation
  - ✓ Planning

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2 Identify management and policy objectives, and financial criteria

- Revenue stability and sufficiency
- Continuity in rate philosophy
- Fairness and equity
- Cost-based
- Ability to pay
- Conservation – Efficient usage
- Simplicity (administration & customer understanding)
- Feasibility
- Legally defendable

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2 Identify management and policy objectives, and financial criteria (cont'd)

Revenue requirements should be established as sufficient levels to meet the utility's financial planning criteria

- The need to develop financial policies

Financial planning considerations

- Target (minimum) debt service coverage (DSC) ratios
- Minimum capital improvement funding from rates
- Reserve levels
- Other financial metrics
  - ✓ Days cash on hand
  - ✓ Median household income
  - ✓ Debt to asset ratio

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2 Financial Planning Criteria

Relationship between rate funded capital and debt service coverage

Calculation of Revenue Requirements

\+ O&M Expenses
\+ Taxes
\+ Debt Service
\+ Rate Financed Capital
= Total Revenue Requirements

Debt Service Coverage Calculation

Total Revenues
– O&M Expenses
– Taxes
= Balance Available for Debt Service & Rate Financed Capital

$$\text{Debt Service Coverage} = \frac{\text{Balance Available for Debt Service \& Rate Funded Capital}}{\text{Debt Service Payment}} > 1.0$$

NOTE: Refer to your specific bond covenants for purposes of calculating debt service coverage ratios

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2 Financial Planning Criteria

Types of reserves and reserve levels

Operating reserves

- Minimum of 45 – 90 days of O&M

Capital reserve

- Typical year of capital projects (rate funded)
- One year depreciation expense

Emergency reserve

- Funds required until emergency funding can be arranged, or largest capital item to replace
- Rate stabilization reserve (as a % of revenue)

Bond reserve

- Established based on bond documents
- A portion of annual debt service payments

AWWA website under:
Policy & Advocacy/AWWA Policy Statements/Cash Reserves

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2 Financial Planning Criteria

Funding renewal and replacement capital projects

- Renewal and replacement projects are of an on-going nature
- A utility should fund an amount for renewal and replacement capital projects from rates
- A simple financial rule is to fund, at a minimum, an amount at least equal to annual depreciation expense – why?
- Issue of depreciation expense at original cost vs replacement cost
- If possible, targeting an amount greater than annual depreciation expense (e.g. 1.5 times annual depreciation expense)

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2 Financial Planning Criteria

Framework for evaluating capital improvement projects

	Year 1	Year 2	Year 3	Year 4	Year 5
Source of Supply Improvements	$0	$6,000	$2,000	$0	$0
Washington Reservior	0	0	2,500	0	0
Transmission Improvements	400	0	0	600	1,000
Capital Hill Reservoir	0	0	0	1,500	0
Pumping Plant Replacements	200	0	0	0	200
Replacement Mains	1,000	1,100	1,200	1,300	1,400
Total Capital Projects	$1,600	$7,100	$5,700	$3,400	$2,600
Less: Outside Funding Sources					
Grants	$0	$2,000	$0	$0	$0
Capital Reserves	100	0	700	650	100
System Development Charges	0	1,350	0	500	0
Low-Interest State Loans	0	2,000	0	0	0
Revenue Bonds	0	0	3,000	0	0
Total Outside Funding	$100	$5,350	$3,700	$1,150	$100
Balance Funded From Rates	**$1,500**	**$1,750**	**$2,000**	**$2,250**	**$2,500**

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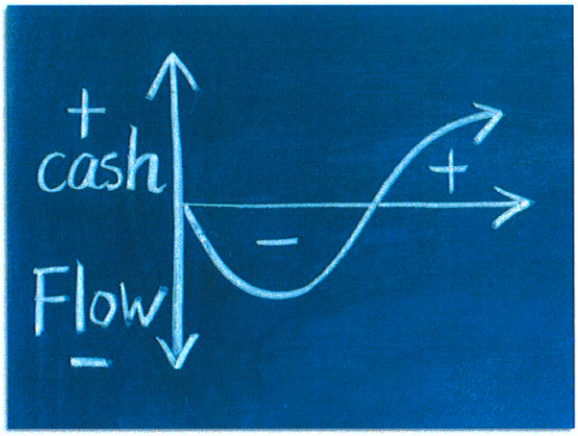
3 Develop financial plan, revenue requirement projections



Assumptions

- Inflation, growth, other escalation factors
- Financial performance measures – DSC, and reserve requirements

Historical detailed customer billing data

- Used to validate data used for sales projections
- Bill frequency analysis (if you have a tiered rate structure)

Detailed operating and capital budget

- Scissors, construction paper and glue

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3 Factors Affecting Revenue Projections

- Number of customers served
- Water use trends
- Rate Changes
- Non-recurring sales
- Weather/conservation
- Use restrictions
- Price elasticity
- Wholesale contractual terms

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3 Revenue at Existing Rates Sets the Baseline of Your Revenue Projections

Using historical detailed billing information

- By class or
- By individual customer based on the complexity of rate structure
- Identify number of customer accounts by class (and/or by meter size)
- Determine billed volume for each class
- May require bill frequency analysis if you have a tiered structure
- Or volume billed by block from billing system

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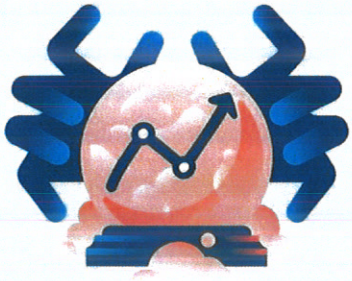
3 Calculate Revenue at Existing Rates



- Evaluate trends in historical usage and accounts
- Determine historical use per account
- Project number of accounts considering
  - Growth by customer class from master plan or community plans
- Forecast use per account considering trends in water usage habits
- Apply current rate structure to projected billed volume and accounts to develop revenue under existing rates

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3 Historical Use Per Account

Line No.	Customer Class	Historical Year	Historical Year	Use per Account
1	Commercial	907,361	15,180	59.8
2	Industrial	444,799	1,200	370.7
3	Residential - Outside City	1,047,732	35	29,935.2
4	Wholesale - Outside City	90,899	1,520	59.8
5	Private Fire	220,072	4	55,018.0
6	Public Fire	N/A	150	N/A
7	Subtotal	N/A	1	N/A
8	Total	2,710,863	18,090	

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3 Revenue at Existing Rates Projections Summary

Customer Class	Customer Growth Projected Years 1	2	3	4	5
Residential	0.99%	0.98%	0.97%	0.96%	0.95%
Commercial	0.83%	0.83%	0.82%	0.81%	0.81%
Industrial	0.00%	0.00%	0.00%	0.00%	0.00%
Residential - Outside City	0.00%	0.00%	0.00%	0.00%	0.00%
Wholesale - Outside City	0.00%	0.00%	0.00%	0.00%	0.00%
Private Fire	0.00%	0.00%	0.00%	0.00%	0.00%
Public Fire	0.00%	0.00%	0.00%	0.00%	0.00%

Line No.	Customer Class	Historical Year	Number of Customers (Average) Projected Years 1	2	3	4	5
1	Residential	15,180	15,330	15,480	15,630	15,780	15,930
2	Commercial	1,200	1,210	1,220	1,230	1,240	1,250
3	Industrial	35	35	35	35	35	35
4	Residential - Outside City	1,520	1,520	1,520	1,520	1,520	1,520
5	Wholesale - Outside City	4	4	4	4	4	4
6	Private Fire	150	150	150	150	150	150
7	Public Fire	1	1	1	1	1	1
8	Total	18,090	18,250	18,410	18,570	18,730	18,890

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3 Revenue at Existing Rates Projections Summary

Line No.	Customer Class	Water Consumption - Thousand Gallons: Historical Year	Projected Years: 1	2	3	4	5
1	Residential	907,361	916,748	926,215	935,190	944,165	953,139
2	Commercial	444,799	448,674	452,582	456,292	460,002	463,711
3	Industrial	1,047,732	1,047,732	1,047,732	1,047,732	1,047,732	1,047,732
4	Residential - Outside City	90,899	90,899	90,899	90,899	90,899	90,899
5	Wholesale - Outside City	220,072	220,072	220,072	220,072	220,072	220,072
6	Private Fire	N/A	N/A	N/A	N/A	N/A	N/A
7	Public Fire	N/A	N/A	N/A	N/A	N/A	N/A
8	Total	2,710,863	2,724,125	2,737,500	2,750,185	2,762,870	2,775,553

Line No.	Customer Class	Historical Revenue Year	Projected Years: 1	2	3	4	5
1	Residential	$4,482,000	$4,527,900	$4,573,800	$4,617,000	$4,660,200	$4,706,100
2	Commercial	1,500,000	1,521,000	1,533,000	1,545,000	1,557,000	1,569,000
3	Industrial	1,860,000	1,860,000	1,860,000	1,860,000	1,860,000	1,860,000
4	Residential - Outside City	498,000	503,100	508,200	513,000	517,800	522,900
5	Wholesale - Outside City	360,000	360,000	360,000	360,000	360,000	360,000
6	Private Fire	120,000	120,000	120,000	120,000	120,000	120,000
7	Public Fire	810,000	810,000	810,000	810,000	810,000	810,000
8	Subtotal	9,630,000	9,702,000	9,765,000	9,825,000	9,885,000	9,948,000
9	Other Operating Revenues	60,000	75,000	78,000	81,000	84,000	87,000
10	Non-Operating Income	165,000	150,000	159,000	168,000	177,000	186,000
11	Total	$9,855,000	$9,927,000	$10,002,000	$10,074,000	$10,146,000	$10,221,000

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3 Projected O&M Expenses

O&M Categories by Function

Line No.	O&M Expense Category	Historical Year	Projected Years: 1	2	3	4	5
1	Source of Supply	$249,000	$258,000	$270,000	$279,000	$291,000	$303,000
	Pumping						
2	Purchased Power	684,000	729,000	777,000	1,125,000	1,197,000	1,275,000
3	Other	534,000	555,000	579,000	600,000	624,000	651,000
	Water Treatment						
4	Chemicals	378,000	348,000	363,000	606,000	633,000	663,000
5	Other	435,000	453,000	471,000	849,000	882,000	918,000
	Transmission & Distribution						
6	Storage	72,000	75,000	78,000	81,000	84,000	87,000
7	Transmission Mains	144,000	150,000	156,000	162,000	168,000	175,200
8	Distribution Mains	216,000	225,000	234,000	243,000	252,000	262,800
9	Meters & Services	429,000	447,000	465,000	483,000	501,000	522,000
10	Hydrants	36,000	36,000	39,000	39,000	42,000	45,000
11	Other	201,000	210,000	216,000	225,000	234,000	246,000
	Customer Accounting						
12	Meter Reading & Collection	672,000	705,000	741,000	777,000	816,000	858,000
13	Uncollectable Accounts	126,000	129,000	132,000	135,000	138,000	141,000
	Administrative & General						
14	Salaries	537,000	558,000	582,000	603,000	627,000	654,000
15	Employee Benefits	492,000	513,000	531,000	672,000	699,000	726,000
16	Insurance	324,000	390,000	405,000	423,000	438,000	456,000
17	Other	738,000	768,000	798,000	828,000	864,000	897,000
18	Total O&M Expense	$6,267,000	$6,549,000	$6,837,000	$8,130,000	$8,490,000	$8,880,000

*Information applies to both Government-Owned and Investor-Owned utilities.

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3 Projected Cash Flow Analysis

Line No.			Projected Years, $ Thousands 1	2	3	4	5
	Operating Revenues						
1	Water Service - Existing Rates		$9,702	$9,765	$9,825	$9,885	$9,948
2	Year 2 - Revenue Increase	8.8%		859	865	870	875
3	Year 3 - Revenue Increase	11.5%			1,229	1,237	1,245
4	Year 4 - Revenue Increase	5.0%				600	603
5	Total Water Service Revenue		9,702	10,624	11,919	12,591	12,672
6	Other Operating Revenue		75	78	81	84	87
7	Total Operating Revenue		9,777	10,702	12,000	12,675	12,759
8	O&M Expense		(6,549)	(6,837)	(8,130)	(8,490)	(8,880)
	Debt Service						
9	Outstanding Bonds		(1,680)	(1,680)	(1,680)	(1,680)	(1,680)
10	Proposed Bonds		(450)	(900)	(900)	(900)	(900)
11	Total Debt Service		(2,130)	(2,580)	(2,580)	(2,580)	(2,580)
12	Non-Operating Revenue		150	159	168	177	186
	Other Obligations						
13	Capital Improvements		(1,118)	(1,141)	(1,344)	(1,367)	(1,390)
14	Debt Service Reserve		(90)	(180)	(180)	(180)	(180)
15	Total Other Obligations		(1,208)	(1,321)	(1,524)	(1,547)	(1,570)
16	Change in Reserves (line 10+13+14+17)		40	123	(66)	235	(86)
17	Beginning of Year Balance		2,000	2,040	2,163	2,097	2,333
18	End of Year Balance		2,040	2,163	2,097	2,333	2,247
19	Target Reserve (90 Days O&M)		1,615	1,686	2,005	2,093	2,190
20	*Over/(Under) Target Reserve (line 20 - 21)*		*425*	*477*	*93*	*239*	*57*
21	Debt Service Coverage (line 10 / line 13)		1.52	1.50	1.50	1.62	1.50
22	Target DSC		1.50	1.50	1.50	1.50	1.50
23	Annual Increase		0.0%	8.8%	11.5%	5.0%	0.0%
24	Cumulative Increase		0.0%	8.8%	21.3%	27.4%	27.4%

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4 Calculate the Revenue Requirement

Start with a test period

- A time frame of reference for collecting, estimating and projecting data
  - Historical – a recent "typical" year
  - Projected – budgeted or forecasted
  - Pro forma – historical base year with adjustments for "known and measurable changes
- Most public utilities use a projected test period and private utilities typically use a pro forma test period

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4 Calculate the Revenue Requirement

- The level of revenue required to adequately and prudently operate, maintain, and develop utility infrastructure
- For most utilities, revenue requirements are properly set when they cover costs
- Two methods – cash basis and utility basis
- Revenue requirements from rates basic equation:

Total Costs (revenue requirements)
Less: Non-rate revenues

= Revenue requirements from rates

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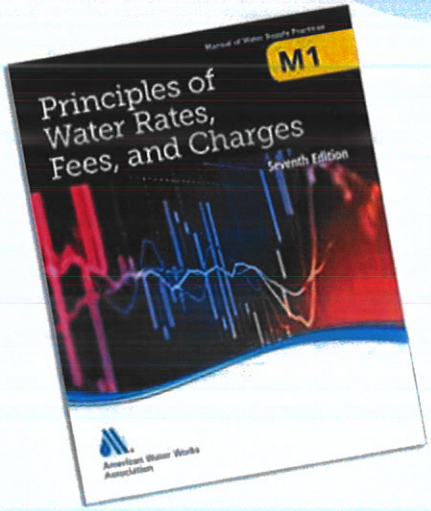
4 Selection of the Method to Accumulate Costs

AWWA Manual M1 Rates and Charges provides two methodologies:



1. **"Cash"** basis methodology
2. **"Utility / accrual"** basis methodology

The terms "cash" and "accrual" basis should not be confused with the accounting terms for revenue recognition

- Most public utilities the cash basis
- Regulated utilities use utility basis
- Some utilities use a combination

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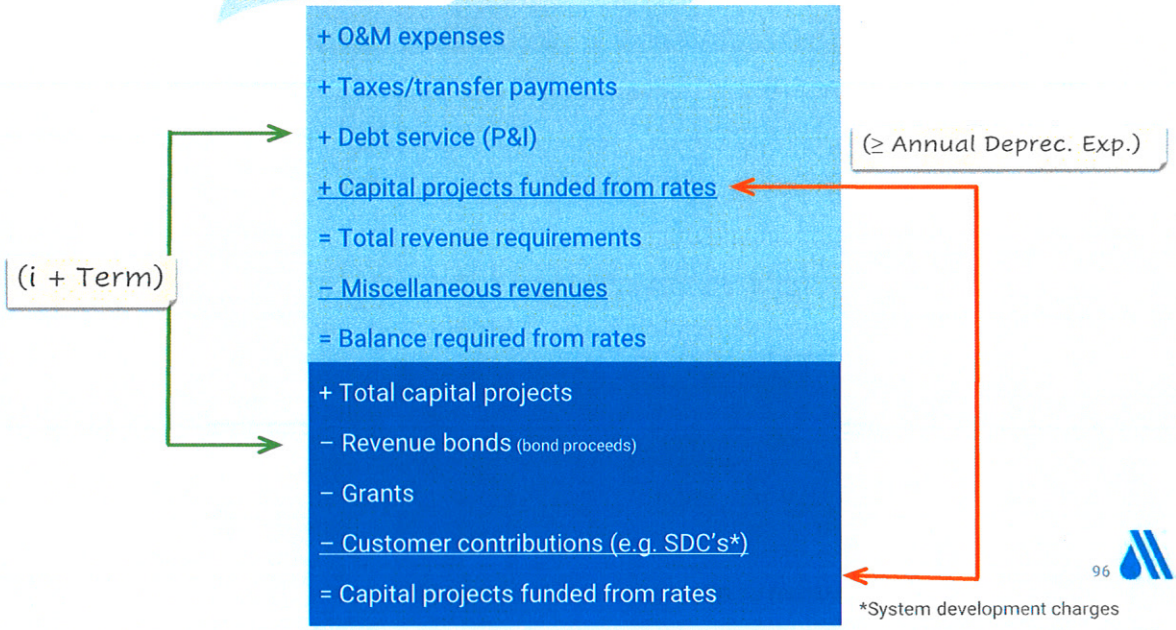
4 Revenue Requirement: "Cash Basis" Approach



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4 Comparison

Cash basis vs. utility/accrual basis

Cash Basis	Utility Basis
+ O&M expenses	+ O&M expenses
+ Taxes, transfer payments	+ Taxes, transfer payments
+ Debt service	+ Annual Depreciation Expense
+ Capital projects	+ Return on Rate Base
+/- Change in fund balance	+/- Change in fund balance
Σ = Total revenue requirements	Σ = Total revenue requirements

Typical "cash basis" situations

- ✓ Commonly used by municipal / governmental utilities
- ✓ Conforms to most cash budgets
- ✓ Revenue in = costs out
- ✓ Duty to recover costs

Typical "utility basis" situations

- ✓ Commonly used by privately owned utilities or municipal utilities with outside city or wholesale customers
- ✓ Revenue = operating costs, loss of investment and investment risk
- ✓ Earn "fair" return on investment; Duty to investors

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4 "Cash" vs. "Utility" Basis Methodology

Many utilities use both methods

- The allocation of rate base (assets) and depreciation can be less volatile from year to year than the allocation of debt service and cash financed capital.
- Utilities serving communities outside their jurisdictional boundaries often assess the suburban rates using the utility basis and thus treat the owning city as the investor.

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4 "Cash" vs. "Utility" Basis Methodology

The hybrid approach

"Utility basis with cash residual" or "utility basis with rates of return"

Example:

Utilities serving outside city customers

Revenue requirement basis

- Outside City customers: Utility basis
- Inside city customers: Cash Basis

The hybrid approach:

1. Determine the utility's total revenue requirements using the cash basis methodology
2. Determine the outside-city revenue requirement using the utility basis (earn fair return on investment to serve outside city
3. Deduct outside-city revenue requirement from total revenue requirements: the residual is recovered from inside city customers

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4 Comparison

Cash basis vs. utility basis

	Cash Basis
O&M	$3,000,000
Taxes/Transfers	50,000
Debt Service (P&I)	500,000
Capital Projects Funded from Rates	1,000,000
Revenue Requirements	$4,550,000

	Utility Basis
O&M	$3,000,000
Taxes	50,000
Depreciation Expense	900,000
Return on Rate Base (1)	600,000
Revenue Requirements	$4,550,000

(1) See following page for calculation of return on rate base.

The revenue requirement for cash basis and utility basis will typically not match.

The revenue requirement matches here for illustrative purposes

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4 "Cash" vs. "Utility" Basis Methodology

Example of return on rate-base calculations

Rate Base Calculation	
Original Cost of Plant	$40,000,000
Less: Accumulated Depreciation	18,000,000
Net Plant	$22,000,000
Plus: Working Capital	500,000
Less: Contributed Plant (net of depr.)	15,000,000
Rate Base	$7,500,000

Weighted Cost of Capital

	Amount	%	Cost	Weighted Cost
Debt	$1,500,000	20%	6.0%	1.2%
Equity	6,000,000	80%	8.5%	6.8%
	$7,500,000			8.0%

8% x $7,500,000 = $600,000

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4 "Cash" vs. "Utility" Basis Methodology

Return on rate-base components

Rate Base

- Original cost (OC) of assets
- Accumulated depreciation (AD)
- Working capital
- Construction work in progress (CWIP)
- Contributions (capital)

WACC

- Opportunity cost of invested capital
- Used to set fair and reasonable rates
- Sufficient to attract capital but not high enough to produce speculative profits
- Incorporates average interest cost on debt
- Estimated cost of equity

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4 "Cash" vs. "Utility" Basis Methodology

Weighted average cost of capital

Cost of Debt

- Total interest payments divided by book value of outstanding debt
- Should account for issuance costs, premiums or discounts at time of issue, and sinking fund or call provisions
- Premium or discounts may affect the yield to the investor

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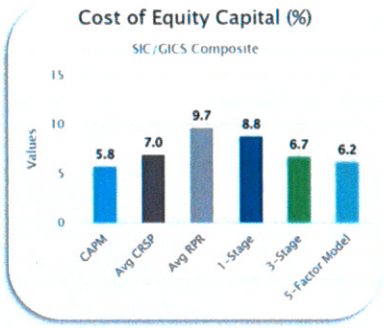
4 "Cash" vs. "Utility" Basis Methodology

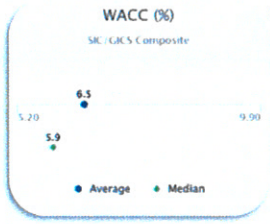
Weighted average cost of capital (cont'd.)

Cost of Equity

- Return required by shareholder for holding a company's stock
- Difficult to estimate future returns, especially with municipal utilities
- Represents the minimum acceptable return
- Cost of equity is different than return on equity
  - Cost of equity is estimated
  - Return on equity is calculated using company's equity investment (net income/net equity)

> *"The cost of equity, which is the minimum acceptable return, is a starting point...Under normal economic conditions, the fair return lies above that minimum rate"*
> (WI PUC, 2007)





*From Duff and Phelps Cost of Capital

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4 "Cash" vs. "Utility" Basis Methodology

Risk premium method to determine rate of return

Why use?

For a public utility, difficult to determine fair return on equity component.

Alternative approach is easy to understand and calculate.

Risk premium method (Cost of debt + risk premium)

- Use risk-free rate such 30-year treasury bond yield
- Add risk premium negotiated by contracting parties
  - Add defined percentage rate to the imbedded debt interest rate (typically 1% to 3%), or
  - Multiplying the imbedded cost of debt by multiplier
  - Market return (e.g. S&P 500) less risk-free rate

Caution!
A negotiated risk premium that is fixed could expose a utility to under-recovery of revenue requirements.

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4 Example Revenue Requirement

Revenue required from rates

Line No.		Projected Years 1	2	3	4	5
1	O&M Expense	$6,549	$6,837	$8,130	$8,490	$8,880
2	Taxes Other than Income					
	Debt Service					
3	Outstanding Bonds	1,680	1,680	1,680	1,680	1,680
4	Proposed Bonds	450	900	900	900	900
5	Total Debt Service	2,130	2,580	2,580	2,580	2,580
	Other Obligations					
6	Rate-funded Capital Improvements	1,118	1,141	1,344	1,367	1,390
7	Debt Service Reserve	90	180	180	180	180
8	Total Other Obligations	1,208	1,321	1,524	1,547	1,570
	Non-Rate Revenue					
9	Other Operating Revenue	(75)	(78)	(81)	(84)	(87)
10	Non-Operating Revenue	(150)	(159)	(168)	(177)	(186)
11	Total Non-Rate Revenues	(225)	(237)	(249)	(261)	(273)
12	Change in Reserves	40	123	(66)	235	(86)
13	Total User Charge Revenue Requirements	$9,702	$10,624	$11,919	$12,591	$12,672

* Information is for Government-Owned Utility with Cash Basis

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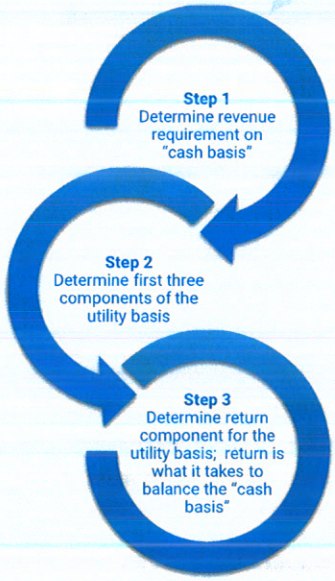
4 "Cash" vs. "Utility" Basis Methodology

Another alternative to determine rate of return



Cash Basis		Utility Basis	
O&M	$3,000,000	O&M	$3,000,000
Taxes/Transfers	50,000	Taxes	50,000
Debt Service	500,000	Deprec. Exp.	900,000
CIP from Rates	1,000,000	Return	600,000
Total	$4,550,000	Total	$4,550,000

Example: These values will not typically match!

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Introduction

Cost of Service Basics

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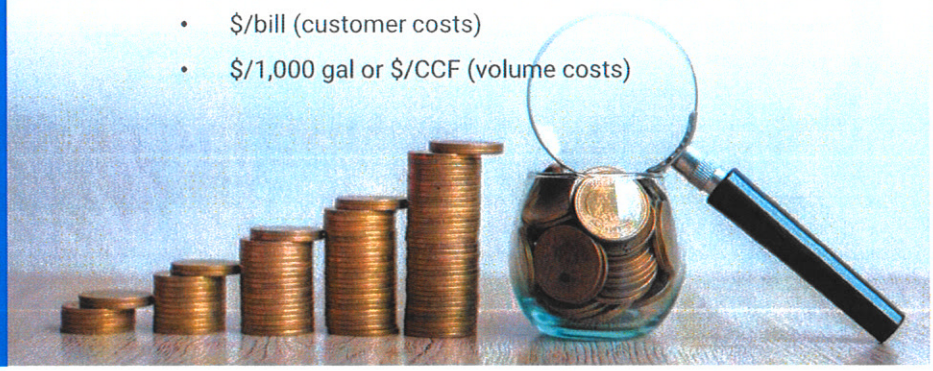
COST OF SERVICE

Cost of service is a method to equitably allocate the revenue requirements of the utility between the various customer classes of service (e.g. residential, commercial etc.)

The cost of service provides two key pieces of information:

1. Allocated total costs to each class of service
2. Average unit costs
   - $/bill (customer costs)
   - $/1,000 gal or $/CCF (volume costs)



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COST OF SERVICE

Do cost differences exist to serve the various customer classes of service?

Costs of operating the utility are not accounted for on a customer class-by-class basis.

Example: the utility repairs a main, not a residential main

- Many costs are incurred for the joint benefit of all customer, while other costs may benefit only certain specific customers
- Not all customers consume water in the same manner (pattern) or require the same facilities to be served.

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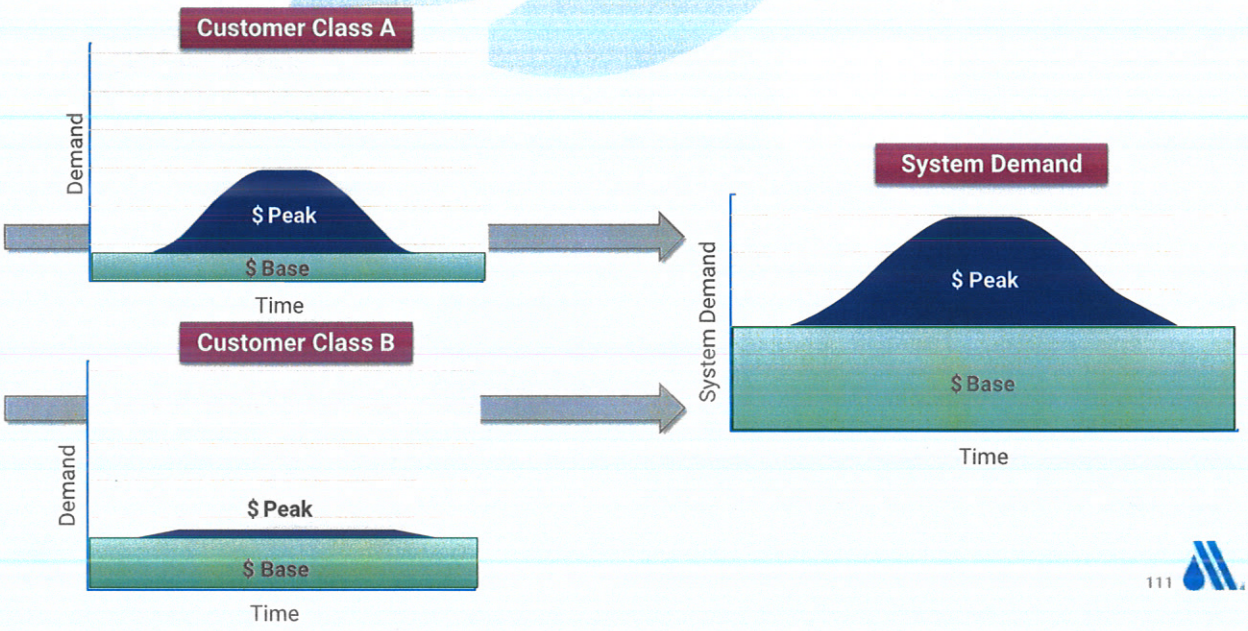
THOSE WHO CAUSE THE COST, PAY THE COST



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BENEFITS OF COST OF SERVICE PROCESS

- Done correctly, produces a proportionate distribution of costs between classes
- Avoids interclass subsidies
- Rates equal cost of service provided
- Can provide an accurate "price signal"
- Legally defendable

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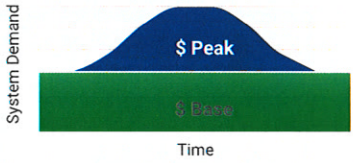
BASIC STEPS TO COST-BASED RATE SETTING

O&M
+ Taxes/transfers
+ Debt service
+ Cash financed capital
= **Revenue Requirements**

1. Revenue Requirements – How much?



2. Classify facility to system costs
3. Allocate to customer classes
4. Design Rates

	Residential	Other	Total
Base	% $ Base	% $ Base	$ Base
Peak	% $ Peak	% $ Peak	$ Peak
Total	Residential Cost of Service	Other Cost of Service	Revenue Requirements

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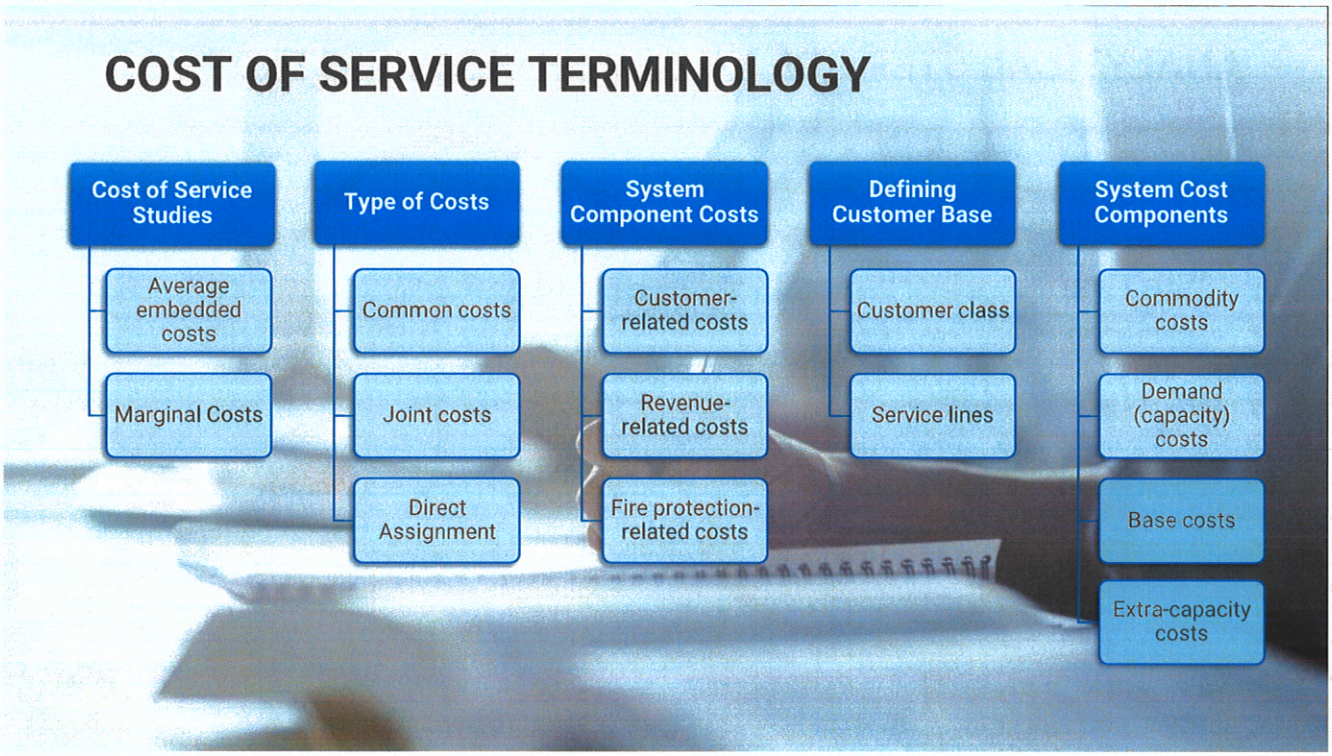
COST OF SERVICE TERMINOLOGY
Cost of Service Studies
Average embedded costs
Marginal Costs
Type of Costs
Common costs
Joint costs
Direct Assignment
System Component Costs
Customer-related costs
Revenue-related costs
Fire protection-related costs
Defining Customer Base
Customer class
Service lines
System Cost Components
Commodity costs
Demand (capacity) costs
Base costs
Extra-capacity costs

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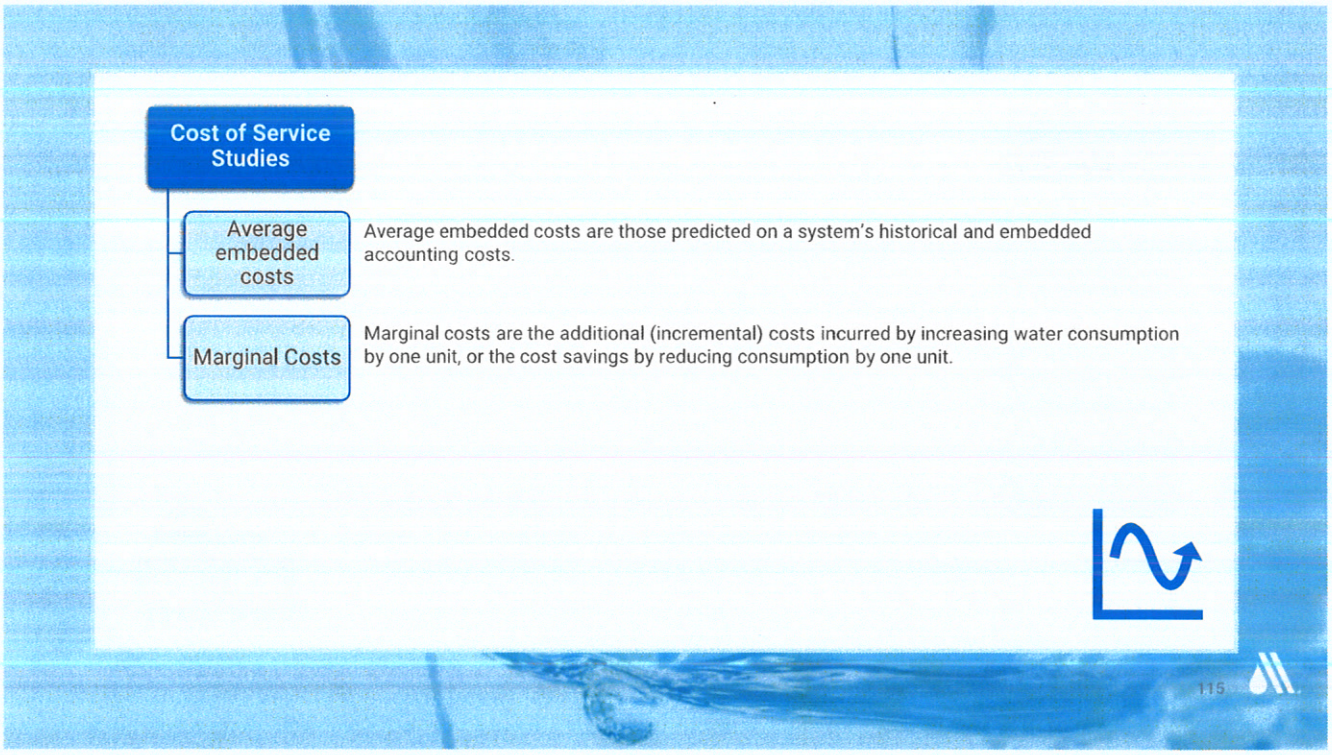
Cost of Service Studies
Average embedded costs
Average embedded costs are those predicted on a system's historical and embedded accounting costs.
Marginal Costs
Marginal costs are the additional (incremental) costs incurred by increasing water consumption by one unit, or the cost savings by reducing consumption by one unit.
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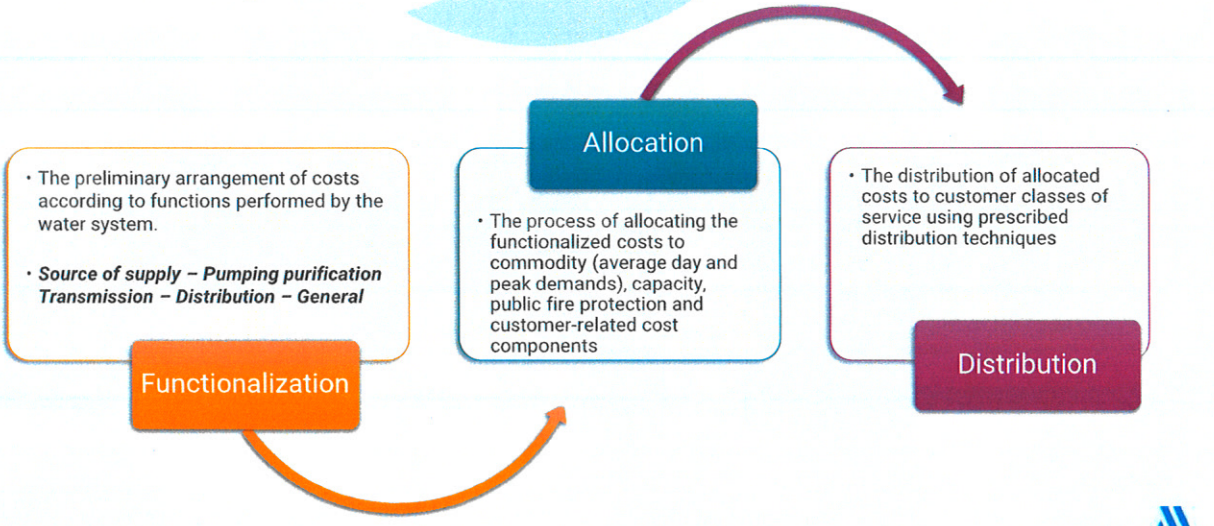
ANALYTICAL STEPS OF A COST OF SERVICE STUDY



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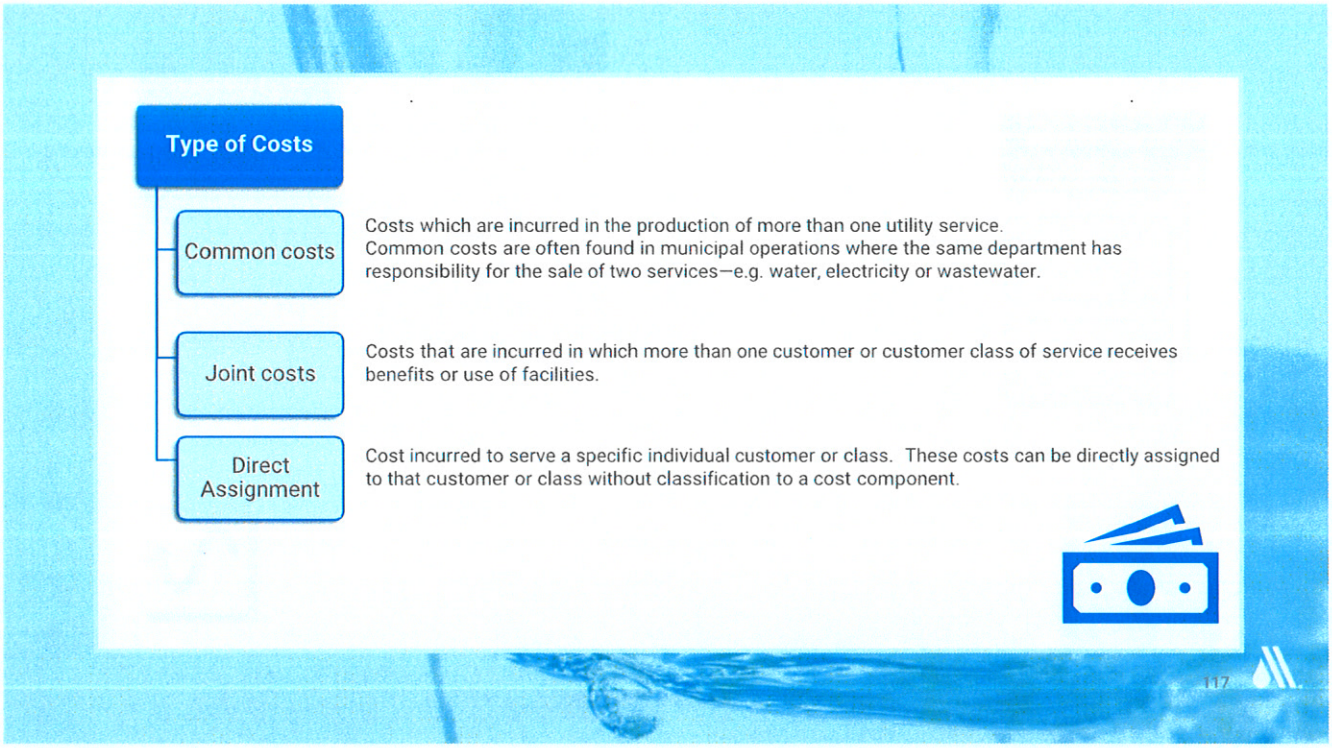

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System Component Costs

- **Customer-related costs** — Costs associated with having a customer on the water system. These costs vary with the addition or deletion of customers on the system.
- **Revenue-related costs** — Costs that vary based upon the amount of revenue received by the utility.
- **Fire protection-related costs** — Costs related to the public fire protection function. May also be related to the private fire protection function.

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Defining Customer Base

- **Customer class** — (Or "class of service") A group of customers having homogeneous (similar) usage characteristics or facility requirements (e.g., residential, commercial, etc.)
- **Service lines** — The levels at which water may be delivered and received by customers of the water system

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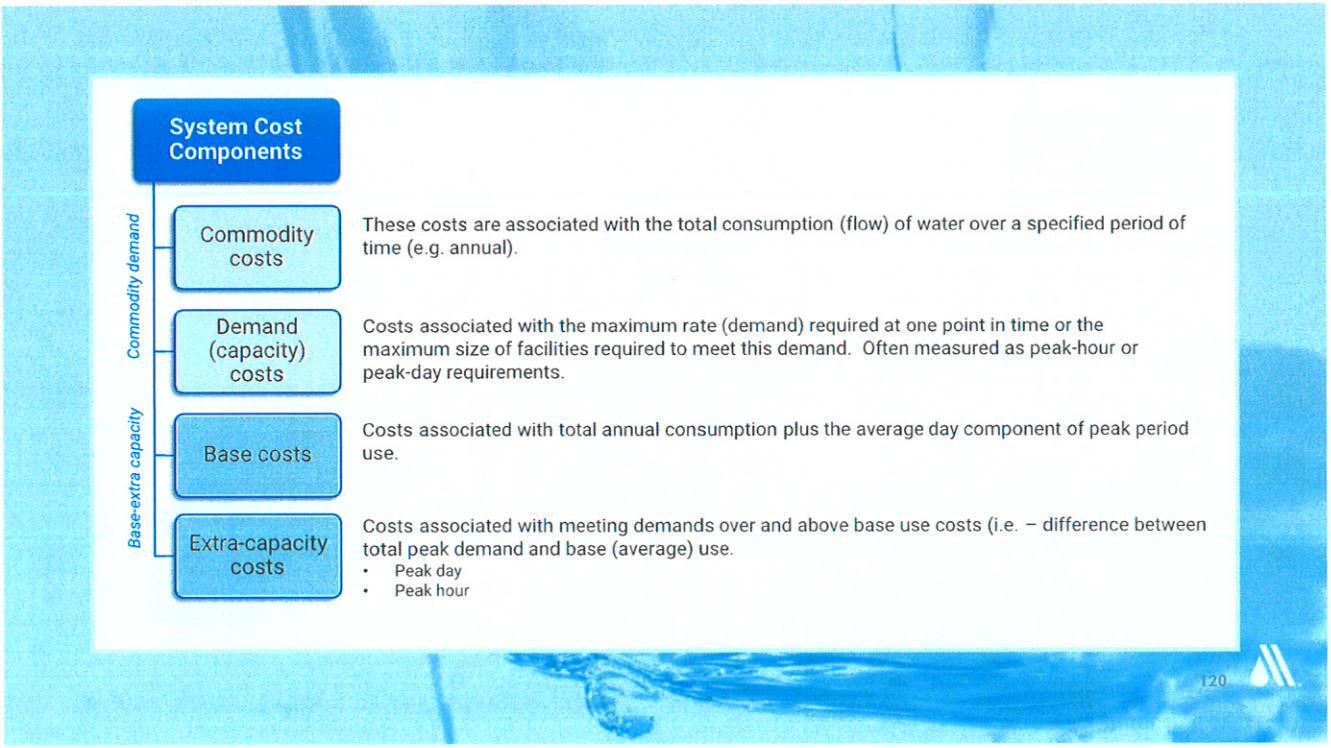
System Cost Components
Commodity demand
Base-extra capacity
Commodity costs
These costs are associated with the total consumption (flow) of water over a specified period of time (e.g. annual).
Demand (capacity) costs
Costs associated with the maximum rate (demand) required at one point in time or the maximum size of facilities required to meet this demand. Often measured as peak-hour or peak-day requirements.
Base costs
Costs associated with total annual consumption plus the average day component of peak period use.
Extra-capacity costs
Costs associated with meeting demands over and above base use costs (i.e. – difference between total peak demand and base (average) use.
• Peak day
• Peak hour
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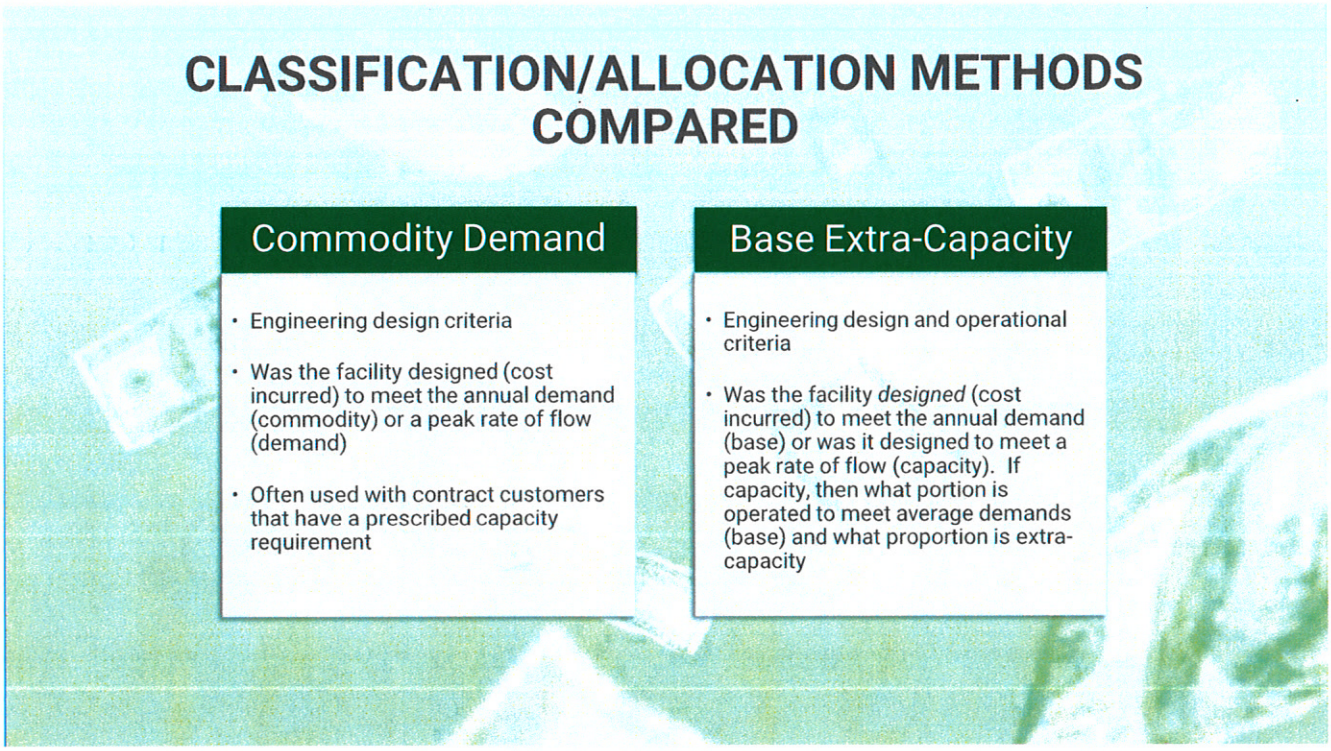
CLASSIFICATION/ALLOCATION METHODS COMPARED
Commodity Demand
• Engineering design criteria
• Was the facility designed (cost incurred) to meet the annual demand (commodity) or a peak rate of flow (demand)
• Often used with contract customers that have a prescribed capacity requirement
Base Extra-Capacity
• Engineering design and operational criteria
• Was the facility *designed* (cost incurred) to meet the annual demand (base) or was it designed to meet a peak rate of flow (capacity). If capacity, then what portion is operated to meet average demands (base) and what proportion is extra-capacity

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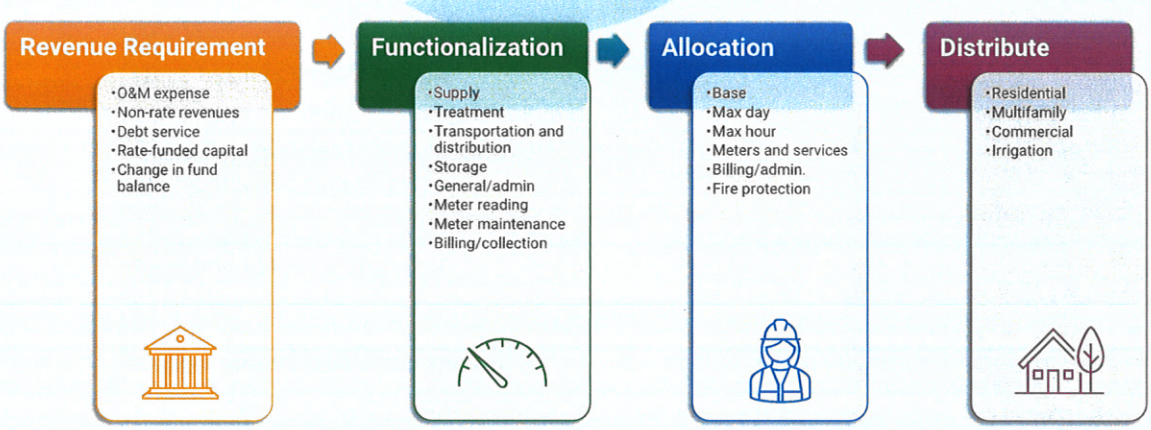
WATER COST OF SERVICE OVERVIEW



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Steps 5–10

Completing Your Cost of Service Study

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10-STEP APPROACH TO CONDUCTING THE STUDY

Steps 5 – 10

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5 Functionalize the revenue requirement

6 Allocate functionalized costs

7 Calculate system units of service and customer class units or service

8 Calculate unit cost of service

9 Distribute costs to customer classes

10 Compare results – class cost of service to revenue at existing rates

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5 Functionalize the revenue requirement

Components used in the functionalization

Cash Basis

- Operation and maintenance expenses by account number or by functional area
- Taxes or transfer payments
- Debt service
- Capital improvements financed with rate revenues and other operating revenues
- List of dedicated facilities for direct assignment costs
- Original cost of plant in service by account detail for allocating capital

Utility Basis

- Operation and maintenance expense by account number
- Taxes of transfer payments
- Depreciation expense by plant account
- Weighted average cost of capital (rate of return)
- List of dedicated facilities for direct assignment costs
- Original cost of plant in service by account detail
- Accumulated depreciation by account
- Working capital
- Contribution in aid of construction

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5 Functionalize the revenue requirement

Functionalization of Expenses and Investment

(Consistent with the National Association of Regulatory Utility Commissioners (NARUC) Uniform System of Accounts)

Asset Account Number	Item	Expense Account Number
310's	Source & Supply	600–617
320's	Pumping—Electric & Hydraulic	620–633
330's	Purification/Treatment	640–652
340's	Transmission—Reservoirs, Mains, Services, Meters, Hydrants, and Fountains	660–678
350's	Distribution—Reservoirs, Mains, Services, Meters, Hydrants, and Fountains	660–678
390's	Customers Service/Accounting Administration and General	901–910 920–932

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6 Allocation considerations

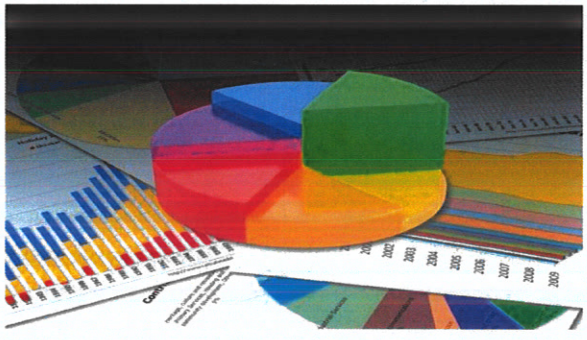
Allocation:

The process of allocating capital investment and expenses to capacity, commodity and customer-related cost components.

Cost causation

- Why did you build the plant? Why did you incur the expense?
- What determines the need for additions?
- How did you determine the size?

How is the asset designed and/or used?



Methodologies

- Based-extra capacity method
- Commodity method
- Combined method

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6 Allocation of system investment (assets)

Type of Asset	Base	Peak Day	Peak Hour	Customer Meters and Services	Billing	Fire Protection
Source of Supply						
Treatment						
Distribution System						
Transmission Mains						
Distribution Mains						
Storage						
Pumping						
Meters						
Hydrants						
General Plant						

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6 Allocation of system investment (assets)

Use these percentages to allocate capital revenue requirement

Line No.	Rate Base Component	Total	Base	Extra Capacity Maximum Day*	Extra Capacity Maximum Hour **	Customer Meters, and Services	Customer Billing and Collection	Direct Fire Protection Service
	Intangible							
1	Organization	$18,000	$9,000	$3,000	$3,000	$3,000		
	Source of Supply							
2	Land	1,269,000	1,269,000					
3	Reservoir	1,221,000	1,221,000					
	Pumping							
4	Land	69,000	44,850	24,150				
5	Structures	1,107,000	719,550	387,450				
6	Electrical Pumping Equipment	1,128,000	733,200	394,800				
7	Other Pumping Equipment	471,000	306,150	164,850				
	Water Treatment							
8	Structures	1,278,000	830,700	447,300				
9	Water Treatment Plant	11,496,000	7,472,400	4,023,600				
	Transmission & Distribution							
10	Land	105,000	42,000	42,000	21,000			
11	Structures	144,000	57,600	57,600	28,800			
12	Distribution Storage	3,060,000	1,224,000	1,224,000	612,000			
13	Transmission Mains	7,010,000	4,556,500	2,453,500				
14	Distribution Mains	10,516,000	4,732,200	2,629,000	3,154,800			
15	Services	6,792,000				6,792,000		
16	Meters	2,988,000				2,988,000		
17	Hydrants	1,212,000						1,212,000
	General							
18	Land	12,000	5,585	2,851	919	2,353	0	292
19	Structures	570,000	265,302	135,418	43,645	111,786	0	13,849
20	Other Pumping Equipment	387,000	180,126	91,942	29,632	75,897	0	9,403
21	Net Plant in Service	50,853,000	23,669,164	12,081,461	3,893,796	9,973,035	0	1,235,543
	Plus							
22	Materials & Supplies	873,000	406,332	207,404	66,845	171,208	0	21,211
23	Cash Working Capital	855,000	397,954	203,128	65,467	167,678	0	20,773
24	Construction Work in Progress	312,000	143,520	78,000	90,480			
	Less							
25	Contributions and Advances	(4,335,000)				(4,335,000)		
26	**Test-year Rate Base**	$49,559,000	$24,616,969	$12,569,993	$4,116,588	$5,976,922	$0	$1,277,527
27	Percent of Total (Used to Allocate Cap	100.0%	50.7%	25.9%	8.5%	12.3%	0.0%	2.6%

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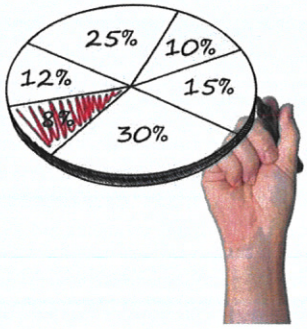
6 Allocation of system investment (assets)



Line No.	Base Extra Capacity Capital Allocators	Base	Max Day	Max Hour	Meters, and Services	Billing and Collection	Direct Fire
1	Intangible Plant	50.0%	16.7%	16.7%	16.7%		
2	Source of Supply (All)	100.0%					
3	Pumping (All)	65.0%	35.0%				
4	Water Treatment (All)	65.0%	35.0%				
5	Distribution Storage (Land, Structures, Storage)	40.0%	40.0%	20.0%			
6	Transmission Mains	65.0%	35.0%				
7	Distribution Mains	45.0%	25.0%	30.0%			
8	Services & Meters				100.0%		
9	Hydrants						100.0%
10	General Land, Structures, Other Pumping, Materials & Supplies, Cash Working Capital	46.5%	23.8%	7.7%	19.6%	0.0%	2.4%
11	Construction Work in Progress	46.0%	25.0%	29.0%			
12	Contributions and Advances				100.0%		

Use these percentages to allocate capital revenue requirement

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6 Allocation of expenses

Type of Expense	Base	Peak Day	Peak Hour	Customer Meters and Services	Billing	Fire Protection
Source of Supply						
Treatment						
Chemicals						
Utilities						
All Other Treatment						
Distribution System						
Transmission Mains						
Distribution Mains						
Storage						
Pumping						
Electricity						
All Other Pumping						
Meters						
Hydrants						
General Administration						
Customer Service						
General Maintenance Exp						
Transfers to General Fund						

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6 Base-Extra Capacity O&M Allocators

Line No.	Base Extra Capacity O&M Allocators	Base	Max Day	Max Hour	Meters, and Services	Billing and Collection	Direct Fire
1	Source of Supply	100.00%					
2	Pumping Power	90.00%	10.00%				
3	Pumping Other	65.00%	35.00%				
4	Treatment (Chemicals)	100.00%					
5	Treatment (Other)	65.00%	35.00%				
6	Distribution Storage	10.00%		90.00%			
7	Transmission Mains	65.00%	35.00%				
8	Distribution Mains	45.00%	25.00%	30.00%			
9	Services & Meters				100.00%		
10	Hydrants						100.00%
11	Transmission & Distribution Other	19.00%	10.00%	19.00%	48.00%		4.00%
12	Meter Reading & Collection					100.00%	
13	Administrative / General & Uncollectable	37.18%	15.46%	5.58%	17.50%	22.81%	1.47%

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6 Example of allocated O&M expenses

Line No.	Item	Total	Base	Extra Capacity Maximum Day*	Extra Capacity Maximum Hour **	Customer Costs Meters, and Services	Customer Costs Billing and Collection	Direct Fire Protection Service
1	Source of Supply	$270,000	$270,000					
	Pumping							
2	Purchased Power	777,000	699,300	77,700				
3	Other	579,000	376,350	202,650				
	Water Treatment							
4	Chemicals	363,000	363,000					
5	Other	471,000	306,150	164,850				
	Transmission & Distribution							
6	Storage	78,000	7,800		70,200			
7	Transmission Mains	156,000	101,400	54,600				
8	Distribution Mains	234,000	105,300	58,500	70,200			
9	Meters & Services	465,000				465,000		
10	Hydrants	39,000						39,000
11	Other	216,000	41,040	21,600	41,040	103,680		8,640
	Customer Accounting							
12	Meter Reading & Collection	741,000					741,000	
13	Uncollectable Accounts	132,000	49,080	20,403	7,372	23,104	30,105	1,936
	Administrative & General							
14	Salaries	582,000	216,399	89,960	32,502	101,869	132,737	8,534
15	Employee Benefits	531,000	197,436	82,077	29,654	92,942	121,105	7,786
16	Insurance	405,000	150,587	62,601	22,617	70,888	92,368	5,939
17	Other	798,000	296,712	123,347	44,564	139,676	182,000	11,701
18	Total O&M Expenses	$6,837,000	$3,180,553	$958,289	$318,148	$997,159	$1,299,316	$83,535
19	Non-Rate Revenue	(78,000)	(29,000)	(12,000)	(4,000)	(14,000)	(18,000)	(1,000)

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6 Base-Extra Capacity Capital Allocators

Line No.	Base Extra Capacity Capital Allocators	Base	Max Day	Max Hour	Meters, and Services	Billing and Collection	Direct Fire
1	Intangible Plant	50.0%	16.7%	16.7%	16.7%		
2	Source of Supply (All)	100.0%					
3	Pumping (All)	65.0%	35.0%				
4	Water Treatment (All)	65.0%	35.0%				
5	Distribution Storage (Land, Structures, Storage)	40.0%	40.0%	20.0%			
6	Transmission Mains	65.0%	35.0%				
7	Distribution Mains	45.0%	25.0%	30.0%			
8	Services & Meters				100.0%		
9	Hydrants						100.0%
10	General Land, Structures, Other Pumping, Materials & Supplies, Cash Working Capital	46.5%	23.8%	7.7%	19.6%	0.0%	2.4%
11	Construction Work in Progress	46.0%	25.0%	29.0%			
12	Contributions and Advances				100.0%		

6 Example of allocated Capital expenditures

Line No.	Rate Base Component	Total	Base	Extra Capacity Maximum Day*	Extra Capacity Maximum Hour **	Customer Meters, and Services	Customer Billing and Collection	Direct Fire Protection Service
	Intangible							
1	Organization	$18,000	$9,000	$3,000	$3,000	$3,000		
	Source of Supply							
2	Land	1,269,000	1,269,000					
3	Reservoir	1,221,000	1,221,000					
	Pumping							
4	Land	69,000	44,850	24,150				
5	Structures	1,107,000	719,550	387,450				
6	Electrical Pumping Equipment	1,128,000	733,200	394,800				
7	Other Pumping Equipment	471,000	306,150	164,850				
	Water Treatment							
8	Structures	1,278,000	830,700	447,300				
9	Water Treatment Plant	11,495,000	7,472,400	4,023,600				
	Transmission & Distribution							
10	Land	105,000	42,000	42,000	21,000			
11	Structures	144,000	57,600	57,600	28,800			
12	Distribution Storage	3,060,000	1,224,000	1,224,000	612,000			
13	Transmission Mains	7,010,000	4,556,500	2,453,500				
14	Distribution Mains	10,516,000	4,732,200	2,629,000	3,154,800			
15	Services	6,792,000				6,792,000		
16	Meters	2,988,000				2,988,000		
17	Hydrants	1,212,000						1,212,000
	General							
18	Land	12,000	5,585	2,851	919	2,353	0	292
19	Structures	570,000	265,302	135,418	43,645	111,786	0	13,849
20	Other Pumping Equipment	387,000	180,126	91,942	29,632	75,897	0	9,403
21	Net Plant in Service	50,853,000	23,669,164	12,081,461	3,893,796	9,973,035	0	1,235,543
	Plus							
22	Materials & Supplies	873,000	406,332	207,404	66,845	171,208	0	21,211
23	Cash Working Capital	855,000	397,954	203,128	65,467	167,678	0	20,773
24	Construction Work in Progress	312,000	143,520	78,000	90,480			
	Less							
25	Contributions and Advances	(4,335,000)				(4,335,000)		
26	**Test-year Rate Base**	$48,558,000	$24,616,969	$12,569,993	$4,116,588	$5,975,922	$0	$1,277,527
27	Percent of Total (Used to Allocate Cap	100.0%	50.7%	25.9%	8.5%	12.3%	0.0%	2.6%

* Maximum-day demand in excess of average-day demand
** Maximum-hour demand in excess of maximum-day demand

7 Allocation considerations

Objective:
Distribute costs on a "fair and equitable" basis to each class of service

Capacity
- Peak hour contribution by class
- Peak day contribution by class

Commodity (Average day/base demand)
- Sales with line loss responsibility by class

DISTRIBUTION FACTORS COMPONENTS
(also called "units of service")

Customer
- Actual number of customers by class of service
- Customers per class, weighted for customer accounting, meter reading
- Number of meters by size, by class of service

Public Fire Protection
- Peak flow requirements for various fire events (rate x duration)

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7 Distribution factors/units of service

Line No.	Customer Class	Base Units: Annual Use 1,000 gal	Base Units: Average Rate 1,000 gpd	Maximum Day Units: Peaking Factor %	Maximum Day Units: Total Capacity 1,000 gpd	Maximum Day Units: Extra Capacity 1,000 gpd	Maximum Hour Units: Peaking Factor %	Maximum Hour Units: Total Capacity 1,000 gpd	Maximum Hour Units: Extra Capacity 1,000 gpd	Customer Units: Equivalent Meters & Services	Customer Units: Bills
	Inside-City:										
	Retail Service										
1	Residential	926,215	2,538	191	4,835	2,297	275	6,970	2,135	15,652	185,760
2	Commercial	452,582	1,240	184	2,283	1,043	265	3,291	1,008	1,758	14,640
3	Industrial	1,047,732	2,870	145	4,150	1,279	208	5,982	1,832	251	420
4	Fire Protection				840	840		5,040	4,200		
5	Total Inside City	2,426,529	6,648		12,108	5,460		21,283	9,175	17,661	200,820
	Outside City:										
6	Residential	90,899	249	226	564	315	327	813	249	1,580	18,240
7	Wholesale - Outside City	220,072	603	235	1,418	815	392	2,363	945	34	48
8	Total	2,737,500	7,500		14,090	6,590		24,460	10,370	19,275	219,108

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8 Distribute costs to classes of service

- Using allocated revenue requirement, calculate unit cost of service for each cost component (base, max day, max hour, billing, etc.)
- Multiply unit cost by class units of service to develop class cost of service
- Process is same for cash basis or utility basis

END RESULT: *Determines the cost of providing service to each customer class*

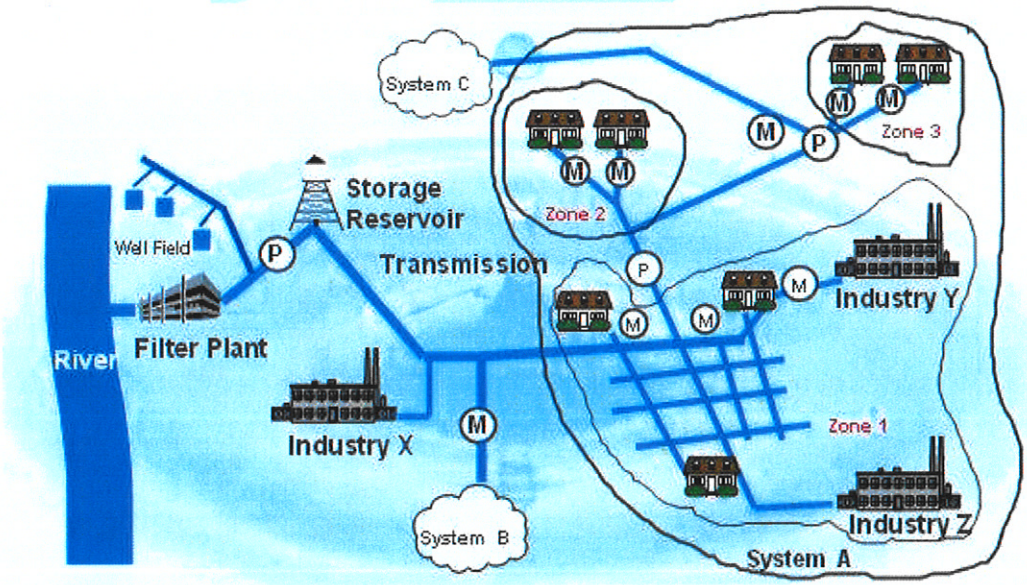
8 Allocated revenue requirement

Line No.	Item	Total	Base	Extra Capacity Maximum Day*	Extra Capacity Maximum Hour **	Customer Costs Meters, and Services	Customer Costs Billing and Collection	Direct Fire Protection Service	Allocation Basis
	Allocated Revenue Requirement								
1	O&M Expenses	$6,837	$3,181	$958	$318	$997	$1,299	$84	O&M
2	Debt Service	2,760	1,273	684	238	482	0	84	Capital
3	Capital	1,141	578	295	97	140	0	30	Capital
4	Total	$10,738	$5,032	$1,937	$653	$1,619	$1,299	$197	
	Adjustments								
5	Operating Revenue	($78)	($29)	($12)	($4)	($14)	($18)	($1)	Administrative
6	Non-Rate Revenue	(159)	($59)	($25)	($9)	($28)	($36)	($2)	Capital
7	Change in Fund Balance	123	63	32	10	15	0	3	Capital
8	Total Adjustments	($114)	($26)	($5)	($3)	($26)	($54)	($0)	
9	**Net Allocated Rev Req**	**$10,624**	**$5,006**	**$1,933**	**$650**	**$1,593**	**$1,245**	**$197**	

8 Distribution of costs to customer classes

Line No.	Customer Class	Total	Base	Max Day Extra	Max Hour Extra	Equivalent Meters	Bills	Fire Protection	Comment
			$/kgal	$/1,000 gpd	$/1,000 gpd	$/Eq Meter	$/bill		
1	Allocated Rev Req	$10,624,320	$5,006,481	$1,932,780	$649,881	$1,593,053	$1,245,263	$196,862	
2	Units of Service		2,737,500	6,590	10,370	19,275	219,108		
3	*Unit Cost of Service*		*$1.83*	*$293.30*	*$62.67*	*$82.65*	*$5.68*		
	Inside City								
	Residential								
4	Units of Service		926,215	2,297	2,135	15,652	185,760		
5	Cost of Service	$4,850,850	$1,693,909	$673,794	$133,795	$1,293,617	$1,055,735		Line 4 x Line 3
	Commercial								
6	Units of Service		452,582	1,043	1,008	1,758	14,640		
7	Cost of Service	$1,425,351	$827,705	$305,964	$63,181	$145,296	$83,204		Line 6 x Line 3
	Industrial								
8	Units of Service		1,047,732	1,279	1,832	251	420		
9	Cost of Service	$2,429,376	$1,916,147	$375,256	$114,841	$20,745	$2,387		Line 8 x Line 3
	Fire Protection								
10	Units of Service		-	840	4,200	-	-		
11	Cost of Service	$509,587	$0	$246,369	$263,218	0	$0		Line 10 x Line 3 + Line 1
	Outside City								
	Residential								
12	Units of Service		90,899	315	249	1,580	18,240		
13	Cost of Servie	$705,359	$166,241	$92,398	$15,609	$130,585	$103,664	$196,862	Line 12 * Line 3
	Wholesale								
14	Units of Service		220,072	815	945	34	48		
15	Cost of Service	$703,797	$402,478	$238,999	$59,237	$2,810	$273		Line 14 * Line 3
16	**Total Cost of Service**	**$10,624,320**	**$5,006,481**	**$1,932,780**	**$649,881**	**$1,593,053**	**$1,245,263**		

WATER SYSTEM NETWORK



9 Summarize results

Compare test year cost of service to revenue at existing rates

Line No	Customer Class	Year 2 COS	Yr 2 @ Existing	Change - $	Change - %
1	Residential	$4,850,850	$4,573,800	$277,050	6.1%
2	Commercial	1,425,351	1,533,000	(107,649)	-7.0%
3	Industrial	2,429,376	1,860,000	569,376	30.6%
4	Fire Protection	509,587	930,000	(420,413)	-45.2%
5	Residential	705,359	508,200	197,159	38.8%
6	Wholesale	703,797	360,000	343,797	95.5%
7	**Total**	**$10,624,320**	**$9,765,000**	**$859,320**	**8.8%**

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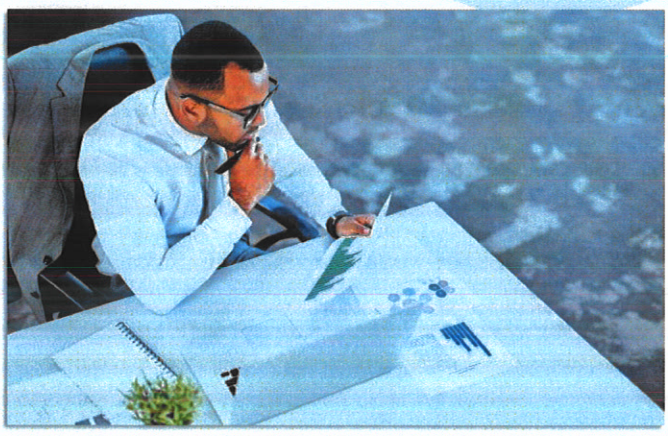
10 Design new rates to recover class cost responsibility

Calculation of average unit costs



- Final analytical step of the cost of service is to calculate average unit costs
- Classified costs are divided by appropriate billing units to produce an average unit cost
- Average unit costs are used as a starting point for rate design

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10 Example

Table of average unit costs - Cost-based rates

Line No	Customer Class	Base Unit Rate	Capacity Unit Rate	Total Volume Rate	$ per Bill	$ per Equiv Meter
		$ per Kgal	*$ per Kgal*	*$ per Kgal*	*$ per Bill*	*$ per Eq. Mtr/yr*
1	Residential	$1.83	$0.87	$2.70	$5.68	$82.65
2	Commercial	1.83	0.82	2.64	5.68	82.65
3	Industrial	1.83	0.47	2.30	5.68	82.65
4	Fire Protection					10.21
5	Residential Outside	1.83	1.19	3.02	5.68	82.65
6	Wholesale	1.83	1.36	3.18	5.68	82.65

[a] Fire protection allocated across all equivalent meters

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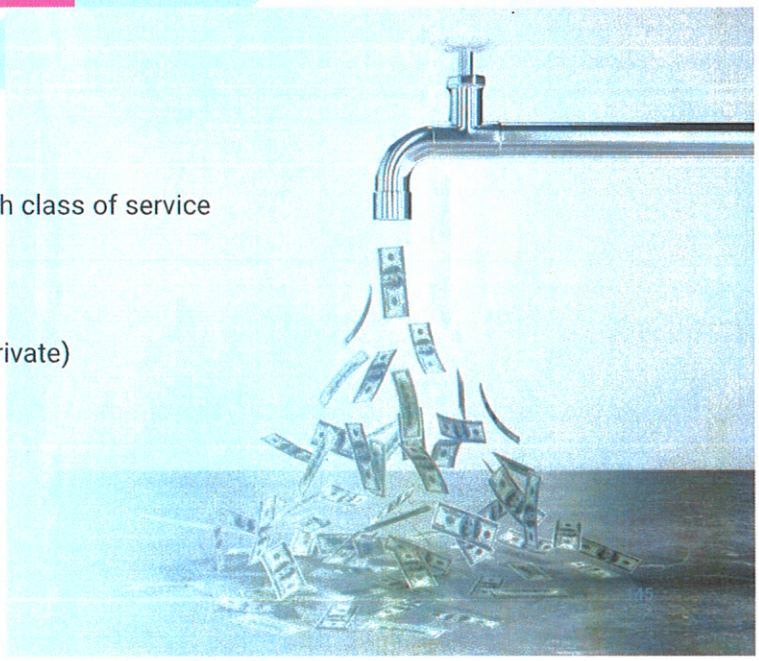
10 Design new rates to meet class revenue responsibility

Table of average unit costs - Cost-based rates

Cost of service is the basis for:

- Revenue levels collected from each class of service
- Fixed meter or customer charges
- Variable charges
- Fire protection rates (public and private)



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AWWA Rate Setting Seminar
August 15 – 17, 2023

DAY 1

146

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Rate-Setting Essentials:
Connecting Financial Planning, Cost-of-Service and Rate Design

AWWA Seminar
August 15 – 17, 2023

DAY 2

1

COURSE LEARNING OBJECTIVES

Apply	Fundamental methodologies to establish cost of service rates
Develop	Rate structure pricing objectives to select the right rate structure for your utility
Understand	Various rate structures and how they are calculated
Develop	Right material to present rate study results
Learn	How to present your rate study effectively
Communicate	Information in a clear and concise manner to the public

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TABLE OF CONTENTS

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COURSE AGENDA

Day 2

DAY 2	
TIME	*Note: Times indicated are local times*
8:00 – NOON	Module: Water Cost of Service Case Study Module: Water Allocation Procedures
NOON – 1:00 P.M.	Lunch on your own
1:00 – 3:30 P.M.	Module: Water Distribution Procedures
3:30 – 4:30 P.M.	Module: Wastewater Cost of Service Case Study
DAY 2 EVENING (Optional Session)	
4:30 – 6:00 P.M.	Fundamentals of System Development Charges

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MODULE 4

Cost of Service Studies

5

In this module, you will learn how to:

Develop	An understanding of allocation and distribution approaches
Evaluate	Appropriate approach for distributing costs
Identify	Cost of service differences and interpretation of results

6

TERMINOLOGY REVIEW

Commodity-Demand Method:

The method of cost allocation in which the annual cost of service by functional cost category is allocated to the components of commodity, demand, customer, and direct fire protection costs

Commodity Costs (Variable Costs)

- These costs are associated with the total consumption (flow) of water over a specified period of time (e.g., annual)

Demand (Capacity) Costs

- Costs associated with the maximum rate (demand) required at one point in time or the maximum size of facilities required to meet this demand. Often measured as peak-hour or peak-day requirements

Peaking Demands

Base-Extra Capacity Method:

The method of cost allocation in which the annual costs of service by functional cost category are allocated to the cost components of base, extra capacity, customer, and direct fire protection costs.

Base Costs

- Costs associated with total annual consumption plus the average day component of peak period use

Extra-Capacity Costs

- Costs associated with meeting demands over and above base use costs (i.e. – difference between total peak demand and base (average) use

peaking demands

7

ANALYTICAL STEPS OF A COST OF SERVICE STUDY

Functionalization

- The preliminary arrangement of costs according to functions performed by the water system.
- ***Source of supply – Pumping purification Transmission – Distribution – General***

Allocation

- The process of allocating the functionalized costs to commodity (average day and peak demands), capacity, public fire protection and customer-related cost components

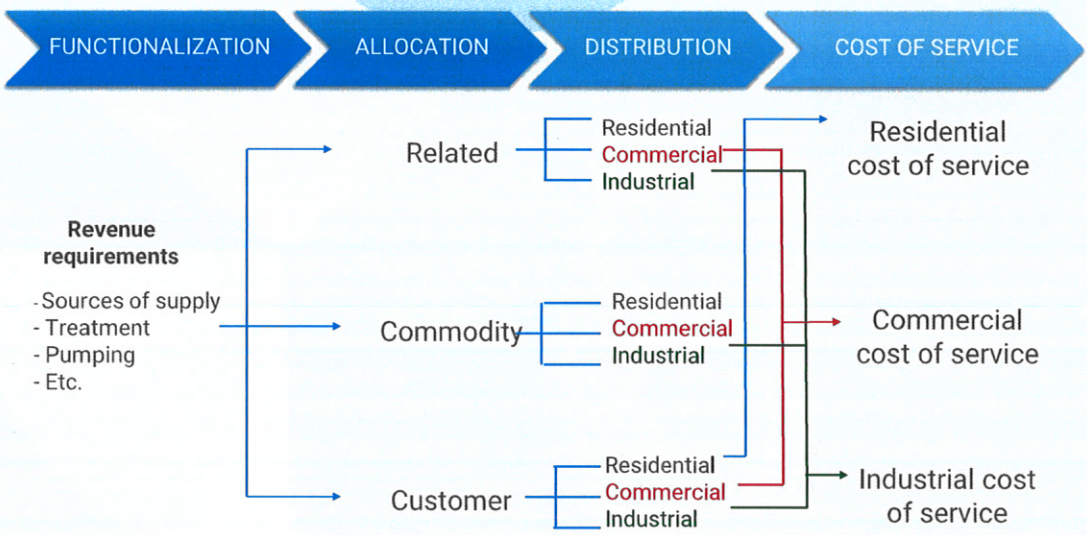
Distribution

- The distribution of allocated costs to customer classes of service using prescribed distribution techniques

8

8

WATER COST OF SERVICE ANALYSIS OVERVIEW



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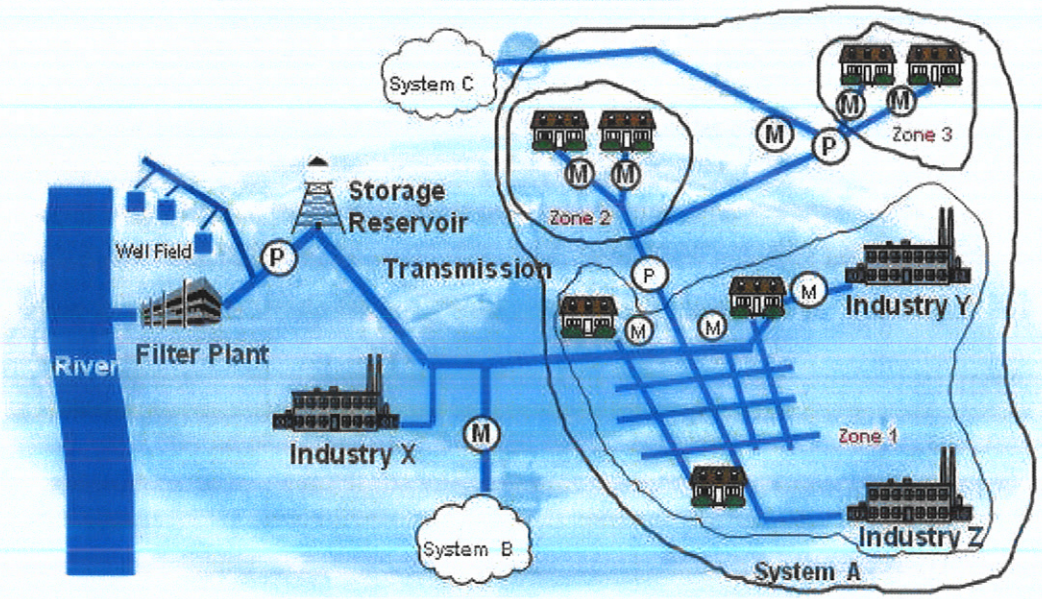
WATER SYSTEM NETWORK



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10

CASE EXAMPLE

- Developed on a "cash" and "utility" basis
- Intended to demonstrate basic mechanics of the study
- Numbers and assumptions are for example only
- **Typical approach used –** Specifics of allocation and distribution techniques will be discussed after case study (e.g., allocation split of reservoirs (60%/40%) (sections 6 and 7)

11

First, let's discuss...

Cash Basis

12

1 FUNCTIONALIZATION AND ALLOCATION OF RATE BASE

Exhibit 1
Functionalization and Allocation of Plant In-Serivce (Rate Base)

Page 1 of 2

Acct. No.	Account Description	Total Rate Base	Commodity (COM)	Capacity (CAP)	Actual Customer (AC)	Weighted for: Customer Accounting (WCA)	Meters & Services (WCMS)	Pub. Fire Protection (PFP)	Revenue Related (RR)	Direct Assignment (DA)	Basis of Allocation
	Intangible Plant										
301.0	Organization	$20,000	$5,245	$9,220	$2,050	$0	$1,407	$1,928	$0	$150	As Factor "ST&D"
302.0	Franchises and Consents	45,324	11,886	20,894	4,646	0	3,189	4,369	0	341	As Factor "ST&D"
	Total Intangible Plant	$65,324	$17,131	$30,113	$6,697	$0	$4,596	$6,296	$0	$491	
	Source of Supply										
310.0	Land and Land Rights	$125,496	$81,572	$43,924	$0	$0	$0	$0	$0	$0	65% COM 35% CAP
311.0	Structures & Improvements	448,764	291,697	157,067	0	0	0	0	0	0	65% COM 35% CAP
312.0	Collecting & Impounding Reservoirs	890,765	578,997	311,768	0	0	0	0	0	0	65% COM 35% CAP
314.0	Wells and Springs	559,324	363,561	195,763	0	0	0	0	0	0	65% COM 35% CAP
315.0	Infiltration Galleries & Tunnels	247,383	160,799	86,584	0	0	0	0	0	0	65% COM 35% CAP
317.0	Other Water Source Plant	164,790	107,114	57,677	0	0	0	0	0	0	65% COM 35% CAP
	Total Source of Supply	$2,436,522	$1,583,739	$852,783	$0	$0	$0	$0	$0	$0	
	Water Treatment										
331.0	Structures & Improvements	$2,485,983	$1,615,889	$870,094	$0	$0	$0	$0	$0	$0	65% COM 35% CAP
332.0	Water Treatment Equipment	3,548,700	2,306,655	1,242,045	0	0	0	0	0	0	65% COM 35% CAP
	Total Water Treatment	$6,034,683	$3,922,544	$2,112,139	$0	$0	$0	$0	$0	$0	
	Transmission & Distribution										
340.0	Land and Land Rights	$291,710	$0	$156,369	$50,129	$0	$34,406	$47,131	$0	$3,675	As Other Trans. & Dist. Plant
341.0	Structures - Transmission	1,277,714	0	1,127,714	0	0	0	0	0	150,000	100% CAP D.A - Municipal
342.0	Distribution Reservoirs	2,270,403	0	1,929,843	0	0	0	340,560	0	0	85% CAP 15% PFP
343.0	Distribution Mains	6,394,213	0	3,324,991	2,046,148	0	0	1,023,074	0	0	52% CAP 32% AC 16% PFP
345.0	Services	648,671	0	0	0	0	648,671	0	0	0	100% WCMS
346.0	Meters	755,678	0	0	0	0	755,678	0	0	0	100% WCMS
348.0	Hydrants	560,139	0	0	0	0	0	560,139	0	0	100% PFP
349.0	Other Distribution Plant	327,140	0	175,361	56,218	0	38,585	52,856	0	4,121	As Other Trans. & Dist. Plant
	Total Trans. & Distribution	$12,525,668	$0	$6,714,277	$2,152,496	$0	$1,477,339	$2,023,761	$0	$157,796	
	Total Supply, Treat., & T&D Plant	$20,996,873	$5,506,283	$9,679,198	$2,152,496	$0	$1,477,339	$2,023,761	$0	$157,796	
	% Total Supply, Treat., & T&D Plant	100.0%	26.2%	46.1%	10.3%	0.0%	7.0%	9.6%	0.0%	0.8%	Factor "ST&D"

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1 FUNCTIONALIZATION AND ALLOCATION OF RATE BASE

Exhibit 1
Functionalization and Allocation of Plant In-Serivce (Rate Base)

Page 2 of 2

Acct. No.	Account Description	Total Rate Base	Commodity (COM)	Capacity (CAP)	Actual Customer (AC)	Weighted for: Customer Accounting (WCA)	Meters & Services (WCMS)	Pub. Fire Protection (PFP)	Revenue Related (RR)	Direct Assignment (DA)	Basis of Allocation
	General Plant										
390.0	Structures	$2,225,480	$583,617	$1,025,908	$228,145	$0	$156,585	$214,500	$0	$16,725	As Factor "ST&D"
391.0	Office Equipment	455,599	119,478	210,023	46,706	0	32,056	43,912	0	3,424	As Factor "ST&D"
393.0	Stores Equipment	211,016	55,337	97,275	21,632	0	14,847	20,339	0	1,586	As Factor "ST&D"
394.0	Tools & Shop Equipment	1,826,222	478,914	841,857	187,215	0	128,493	176,018	0	13,724	As Factor "ST&D"
395.0	Lab Equipment	206,694	54,204	95,282	21,189	0	14,543	19,922	0	1,553	As Factor "ST&D"
397.0	Communication Equipment	238,333	62,501	109,867	24,433	0	16,769	22,971	0	1,791	As Factor "ST&D"
398.0	Misc. Equipment	412,152	108,084	189.995	42,252	0	28,999	39,725	0	3,097	As Factor "ST&D"
	Total General Plant	$5,575,496	$1,462,135	$2,570,208	$571,572	$0	$392,292	$537,388	$0	$41,901	
	TOTAL PLANT IN SERVICE	$26,637,693	$6,985,549	$12,279,520	$2,730,764	$0	$1,874,227	$2,567,445	$0	$200,188	Factor "Plant in Service"
	% OF TOTAL PLANT IN SERV.	100.00%	26.22%	46.10%	10.25%	0.00%	7.04%	9.64%	0.00%	0.75%	
	Less: Accumulated Depreciation										
	Intangible Plant	($37,267)	($9,773)	($17,179)	($3,820)	$0	($2,622)	($3,592)	$0	($280)	As Intangible Plant
	Source of Supply Plant	(1,225,453)	(796,544)	(428,909)	0	0	0	0	0	0	As Source of Supply Plant
	Water Treatment Plant	(2,706,336)	(1,759,118)	(947,218)	0	0	0	0	0	0	As Water Treatment Plant
	Trans. & Distribution Plant	(6,506,407)	0	(3,487,703)	(1,118,105)	0	(767,398)	(1,051,234)	0	(81,967)	As T&D Plant
	General Plant	(2,629,889)	(689,670)	(1,212,334)	(269,603)	0	(185,039)	(253,479)	0	(19,764)	As General Plant
	Total Accumulated Depr.	($13,105,352)	($3,255,106)	($6,093,343)	($1,391,529)	$0	($955,059)	($1,308,305)	$0	($102,011)	
	Less: Contributions in Aid										
	- Distribution Mains	($3,656,455)	$0	($1,901,357)	($1,170,066)	$0	$0	($585,033)	$0	$0	As Distribution Mains
	- Meters & Services	(411,234)	0	0	0	0	(411,234)	0	0	0	As Meters & Services
	Total Contributions in Aid	($4,067,689)	$0	($1,901,357)	($1,170,066)	$0	($411,234)	($585,033)	$0	$0	
	Plus: Working Capital										
	- Materials & Supplies	$475,000	$124,565	$218,967	$48,695	$0	$33,421	$45,782	$0	$3,570	As Plant in Service
	- Prepayments	152,000	39,861	70,069	15,582	0	10,695	14,650	0	1,142	As Plant in Service
	- 1/8 O&M	465,814	133,707	183,491	21,992	57,227	36,750	28,547	0	4,099	as O&M Exp.
	Total Working Capital	$1,092,814	$298,133	$472,527	$86,269	$57,227	$80,866	$88,980	$0	$8,811	
	TOTAL RATE BASE	$10,557,466	$4,028,576	$4,757,348	$255,439	$57,227	$588,800	$763,087	$0	$106,988	
	% TOTAL RATE BASE	100.0%	38.2%	45.1%	2.4%	0.5%	5.6%	7.2%	0.0%	1.0%	Factor " Rate Base"

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2 FUNCTIONALIZATION AND ALLOCATION OF THE NET REVENUE REQUIREMENTS (Cash Basis)

Exhibit 2
Functionalization and Allocation Net Revenue Requirements

Page 1 of 3

Acct. No.	Account Description	Total Expenses	Commodity (COM)	Capacity (CAP)	Weighted for: Actual Customer (AC)	Customer Accounting (WCA)	Meters & Services (WCMS)	Fire Protection (FP)	Revenue Related (RR)	Direct Assign (DA)	Basis of Allocation
	SOURCE OF SUPPLY										
601.0	Operating Labor & Expense	$322,000	$209,300	$112,700	$0	$0	$0	$0	$0	$0	As Source of Supply Plant
602.0	Operating Supply & Expense	182,000	118,300	63,700	0	0	0	0	0	0	As Source of Supply Plant
603.0	Electricity	125,400	125,400	0	0	0	0	0	0	0	100% - COM
604.0	Maintenance Labor	215,200	139,880	75,320	0	0	0	0	0	0	As Source of Supply Plant
605.0	Maintenance of Source Plant	198,000	128,700	69,300	0	0	0	0	0	0	As Source of Supply Plant
	Total Source of Supply Expense	$1,042,600	$721,580	$321,020	$0	$0	$0	$0	$0	$0	
	TREATMENT EXPENSE										
630.0	Operation Labor	$515,000	$334,750	$180,250	$0	$0	$0	$0	$0	$0	As Treatment Plant
631.0	Chemicals	165,100	165,100	0	0	0	0	0	0	0	100% - COM
632.0	Operating Supply & Expenses	122,000	79,300	42,700	0	0	0	0	0	0	As Treatment Plant
634.0	Maintenance Labor	227,000	147,550	79,450	0	0	0	0	0	0	As Treatment Plant
635.0	Maintenance of Treatment Plant	241,300	156,845	84,455	0	0	0	0	0	0	As Treatment Plant
	Total Treatment Expense	$1,270,400	$883,545	$386,855	$0	$0	$0	$0	$0	$0	
	TRANSMISSION EXPENSE										
640.0	Operation Labor	$181,000	$0	$181,000	$0	$0	$0	$0	$0	$0	As Trans. Plant
641.0	Operating Supplies & Expense	123,000	0	123,000	0	0	0	0	0	0	As Trans. Plant
642.0	Maintenance labor	92,000	0	92,000	0	0	0	0	0	0	As Trans. Plant
643.0	Maintenance Supply & Expense	33,500	0	33,500	0	0	0	0	0	0	As Trans. Plant
	Total Transmission Expense	$429,500	$0	$429,500	$0	$0	$0	$0	$0	$0	
	DISTRIBUTION EXPENSE										
650.0	Maint. Of Transmission Lines	$353,000	$0	$311,559	$0	$0	$0	$0	$0	$41,441	As Plant Account #341.0
660.0	Operation Labor	444,000	0	238,002	76,300	0	52,368	71,737	0	5,593	As Total T&D Plant
661.0	Operating Supplies & Expense	74,000	0	39,667	12,717	0	8,728	11,956	0	932	As Total T&D Plant
672.0	Maint. Of Distribution Reservoirs	232,000	0	197,200	0	0	0	34,800	0	0	As Plant Account #342.0
673.0	Maint. Of Distribution Mains	485,000	0	252,200	155,200	0	0	77,600	0	0	As Plant Account #343.0
675.0	Maint. Of Services	144,000	0	0	0	0	144,000	0	0	0	As Plant Account #345.0
676.0	Maint. Of Meters	225,000	0	0	0	0	225,000	0	0	0	As Plant Account #346.0
677.0	Maint. Of Hydrants	138,000	0	0	0	0	0	138,000	0	0	As Plant Account #348.0
678.0	Maint. Of Other Plant	54,000	0	26,771	6,295	0	11,086	8,611	0	1,236	As O&M Acct. #650.0-677.0
	Total Distribution Expense	$2,149,000	$0	$1,065,400	$250,511	$0	$441,181	$342,704	$0	$49,203	

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2 FUNCTIONALIZATION AND ALLOCATION OF THE NET REVENUE REQUIREMENTS (Cash Basis)

Exhibit 2
Functionalization and Allocation Net Revenue Requirements

Page 2 of 3

Acct. No.	Account Description	Total Expenses	Commodity (COM)	Capacity (CAP)	Weighted for: Actual Customer (AC)	Customer Accounting (WCA)	Meters & Services (WCMS)	Fire Protection (FP)	Revenue Related (RR)	Direct Assign (DA)	Basis of Allocation
	CUSTOMER ACCOUNTING										
902.0	Meter Reading	$432,000	$0	$0	$0	$432,000	$0	$0	$0	$0	100% - WCA
903.0	Accounting & Collection	255,000	0	0	0	255,000	0	0	0	0	100% - WCA
904.0	Uncollectible Accounts	13,500	0	0	13,500	0	0	0	0	0	100% - AC
	Total Customer Acct Expense	$700,500	$0	$0	$13,500	$687,000	$0	$0	$0	$0	
	TOTAL O&M & Cust. Acct. Exp.	$5,592,000	$1,605,125	$2,202,775	$264,011	$687,000	$441,181	$342,704	$0	$49,203	
	% TOTAL O&M & Cust. Acct. Exp.	100.00%	28.70%	39.39%	4.72%	12.29%	7.89%	6.13%	0.00%	0.88%	Factor "O&M"
	ADMN. & GENERAL EXPENSES										
920.0	Admin. & Gen. Salaries	$582,000	$167,057	$229,259	$27,478	$71,501	$45,917	$35,668	$0	$5,121	Factor O&M
921.0	Office Supplies Expense	231,000	66,306	90,994	10,906	28,379	18,225	14,157	0	2,033	Factor O&M
923.0	Outside Services	232,000	66,593	91,388	10,953	28,502	18,304	14,218	0	2,041	Factor O&M
924.0	Property Insurance	144,800	55,254	65,249	3,503	785	8,076	10,466	0	1,467	As Rate Base
925.0	Employee Pensions & Benefits	462,600	132,784	182,225	21,840	56,832	36,497	28,350	0	4,070	Factor O&M
926.0	Regulatory Commercial Expense	52,000	14,926	20,484	2,455	6,388	4,103	3,187	0	458	Factor O&M
930.0	Misc. General Expense	162,000	46,500	63,814	7,648	19,902	12,781	9,928	0	1,425	Factor O&M
932.0	Misc. General Plant Expense	131,000	37,602	51,603	6,185	16,094	10,335	8,028	0	1,153	Factor O&M
	Total Admin. & General Exp.	$1,997,400	$587,023	$795,017	$90,969	$228,384	$154,237	$124,002	$0	$17,768	
	TOTAL OPER. & MAINT. EXP.	$7,589,400	$2,192,148	$2,997,791	$354,981	$915,384	$595,418	$466,706	$0	$66,971	
	TAXES										
408.1	State Taxes	$185,000	$0	$0	$0	$0	$0	$0	$185,000	$0	100% - RR
408.2	City Taxes	124,000	0	0	0	0	0	0	124,000	0	100% - RR
408.3	Social Security Taxes	134,500	38,607	52,982	6,350	16,524	10,611	8,243	0	1,183	Factor O&M
	Total Taxes	$443,500	$38,607	$52,982	$6,350	$16,524	$10,611	$8,243	$309,000	$1,183	
	DEBT SERVICE										
	1992 Revenue Bond	$117,800	$76,570	$41,230	$0	$0	$0	$0	$0	$0	As Treatment Plant
	2002 Revenue Bond	226,300	0	192,355	0	0	0	33,945	0	0	As Distribution Reservoirs
	Total Debt Service	$344,100	$76,570	$233,585	$0	$0	$0	$33,945	$0	$0	

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2 FUNCTIONALIZATION AND ALLOCATION OF THE NET REVENUE REQUIREMENTS (Cash Basis)

Exhibit 2
Functionalization and Allocation Net Revenue Requirements

Page 3 of 3

Acct. No.	Account Description	Total Expenses	Commodity (COM)	Capacity (CAP)	Actual Customer (AC)	Weighted for: Customer Accounting (WCA)	Weighted for: Meters & Services (WCMS)	Fire Protection (FP)	Revenue Related (RR)	Direct Assign (DA)	Basis of Allocation
	CASH FINANCED CAPITAL ADDITIONS										
	Source of Supply Improvements	$155,000	$100,750	$54,250	$0	$0	$0	$0	$0	$0	As Source of Supply Plant
	Transmission Improvements	160,000	0	160,000	0	0	0	0	0	0	As Trans. Plant
	Distribution Mains	750,000	0	390,000	240,000	0	0	120,000	0	0	As Dist. Mains
	Distribution Reservoirs	325,000	0	276,250	0	0	0	48,750	0	0	As Dist. Reservoirs
	General Plant Improvements	80,000	20,979	36,879	8,201	0	5,629	7,711	0	601	As General Plant
	Other Misc. Improvements	30,000	7,867	13,829	3,075	0	2,111	2,892	0	225	As General Plant
	Total Capital Additions	$1,500,000	$129,597	$931,208	$251,277	$0	$7,740	$179,352	$0	$827	
	TOTAL REVENUE REQUIRMENT	$9,877,000	$2,436,922	$4,215,566	$612,607	$931,908	$613,769	$688,246	$309,000	$68,982	
	Less: Miscellaneous Revenue										
	Other Operating Revenues	(114,500)	$0	$0	$0	$0	$0	$0	($114,500)	$0	100% RR
	Interest Income	(183,000)	(69,830)	(82,462)	(4,428)	(992)	(10,206)	(13,227)	0	(1,854)	As Rate Base
	Miscellaneous Revnues	(61,000)	0	0	0	0	0	0	(61,000)	0	100% RR
	Jobbing Income - Net	(7,500)	(1,669)	(5,091)	0	0	0	(740)	0	0	As Debt Service
	Total Misc. Revenues	($366,000)	($71,499)	($87,554)	($4,428)	($992)	($10,206)	($13,967)	($175,500)	($1,854)	
	TOTAL NET REV. REQUIRMENT	$9,511,000	$2,365,422	$4,128,012	$608,180	$930,916	$603,563	$674,279	$133,500	$67,127	

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3 COMMODITY DISTRIBUTION FACTOR

Exhibit 3
Development of Commodity Distribution Factor

Customer Class	Metered Water Sales (CCF)	Plus: % Losses	Total CCF at the Source	% of Total
Residential	2,525,000	6.0%	2,676,500	51.45%
Commercial	1,107,800	6.0%	1,174,268	22.57%
Municipal	398,700	6.0%	422,622	8.12%
Industrial	876,300	6.0%	928,878	17.86%
TOTAL	4,907,800		5,202,268	100.0%
DISTRIBUTION FACTOR				(COMM-1)

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4 CAPACITY DISTRIBUTION FACTOR

Exhibit 4
Development of Capacity Distribution Factor

Customer Class	Total CCF at the Source	Average Day Use in MGD	Peaking Factor	Peak Day Use (MGD)	% of Total
Residential	2,676,500	5.485	3.00	16.455	66.77%
Commercial	1,174,268	2.406	1.90	4.572	18.55%
Municipal	422,622	0.866	1.65	1.429	5.80%
Industrial	928,878	1.904	1.15	2.189	8.88%
TOTAL	5,202,268			24.645	100.0%
Actual Peak Day (measured)				*24.700*	
DISTRIBUTION FACTOR				**(CAP-1)**	

Note: 748 Gallons = 1 CCF
Average Day in MGD Conversion + Annual CCF*748/1,000,000/365

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5 CUSTOMER DISTRIBUTION FACTOR

Exhibit 5
Development of Customer Distribution Factor

Customer Class	Average Number of Customers	% of Total	Customer Accounting Weighting Factor	Customers Weighted for Cust. Accounting	% of Total	Meters & Services Weighting Factor	Weighted Customer	% of Total
Residential	21,300	83.47%	1.0	21,300	76.94%	$125.00	$2,662,500	66.24%
Commercial	4,210	16.50%	1.5	6,315	22.81%	320.00	1,347,200	33.52%
Municipal	5	0.02%	1.5	8	0.03%	455.00	2,275	0.06%
Industrial	2	0.01%	30.0	60	0.22%	3,850.00	7,700	0.19%
TOTAL	25,517	100.0%		27,683	100.0%		$4,019,675	100.0%
DISTRIBUTION FACTOR		**(CUST-1)**			**(CUST-2)**			**(CUST-3)**

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6 PUBLIC FIRE PROTECTION DISTRIBUTION FACTOR

Exhibit 6
Development of Public Fire Protection Distribution Factor

Customer Class	Number of Units	Public Fire Protection Requirements (Gallons/Minute)	Duration (Minutes)	Total FP Requirement (MG)	% of Total
Residential	21,300	1,250 Gallons/Min	60 Minutes	1,598	55.72%
Commercial	4,210	2,500 Gallons/Min	120 Minutes	1,263	44.05%
Municipal	2	3,000 Gallons/Min	120 Minutes	1	0.03%
Industrial	5	5,000 Gallons/Min	240 Minutes	6	0.21%
TOTAL	25,517			2,867	100.0%
DISTRIBUTION FACTOR					**(PFP-1)**

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7 REVENUE RELATED DISTRIBUTION FACTOR

Exhibit 7
Development of Revenue Related Allocation Factor

Customer Class	Revenues at Present Rates	% of Total
Residential	$5,265,000	60.89%
Commercial	1,995,850	23.08%
Municipal	480,700	5.56%
Industrial	905,000	10.47%
TOTAL	$8,646,550	100.0%
DISTRIBUTION FACTOR		**(REV-1)**

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8 DISTRIBUTION OF RATE BASE (PLANT)

Exhibit 8
Distribution of Plant in Service (Rate Base)

Cost Component	Total	Residential	Commercial	Municipal	Industrial	Basis of Distribution
Commodity Related	$4,028,576	$2,072,651	$909,340	$327,274	$719,312	COMM-1
Capacity Related	$4,757,348	$3,176,340	$882,591	$275,851	$422,566	CAP-1
Customer Related						
- Actual Customer	$255,439	$213,225	$42,144	$50	$20	CUST-1
- Weighted for:						
Customer Accounting	57,227	44,033	13,055	16	124	CUST-2
Meters & Services	588,800	390,002	197,337	333	1,128	CUST-3
Total Customer Related	901,467	647,260	252,537	399	1,272	
Public Fire Protection	$763,087	$425,161	$336,137	$192	$1,597	PFP-1
Revenue Related	$0	$0	$0	$0	$0	RR-1
Direct Assignment	$106,988	$0	$0	$106,988	$0	Dir. Assign.
Total Rate Base	$10,557,466	$6,321,411	$2,380,604	$710,703	$1,144,748	

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9 DISTRIBUTION OF THE NET REVENUE REQUIREMENTS (Cash Basis)

Exhibit 9
Distribution of Net Revenue Requirements (Cash Basis)

Cost Component	Total	Residential	Commercial	Municipal	Industrial	Basis of Distribution
Commodity Related	$2,365,422	$1,216,979	$533,929	$192,162	$422,352	COMM-1
Capacity Related	$4,128,012	$2,756,151	$765,835	$239,359	$366,666	CAP-1
Customer Related						
- Actual Customer	$608,180	$507,670	$100,342	$119	$48	CUST-1
- Weighted for:						
Customer Accounting	930,916	716,283	212,363	252	2,018	CUST-2
Meters & Services	603,563	399,780	202,285	342	1,156	CUST-3
Total Customer Related	$2,142,659	$1,623,734	$514,990	$713	$3,222	
Fire Protection Related	$674,279	$375,681	$297,018	$169	$1,411	PFP-1
Revenue Related	$133,500	$81,290	$30,815	$7,422	$13,973	RR-1
Direct Assignment	$67,127	$0	$0	$67,127	$0	Dir. Assign.
Total Net Revenue Requirements	$9,511,000	$6,053,836	$2,142,587	$506,953	$807,624	

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10 SUMMARY OF THE "CASH BASIS" COST OF SERVICE STUDY

Exhibit 10
Summary of Average Embedded Water Cost of Service Study
(Cash Basis)

Description	Total	Residential	Commercial	Municipal	Industrial	Source
Revenues at Present Rates	$8,646,550	$5,265,000	$1,995,850	$480,700	$905,000	Exhibit 7
Less:						
Allocated Revenue Requirement	$9,511,000	$6,053,836	$2,142,587	$506,953	$807,624	Exhibit 9
Balance/(Deficiency) of Funds	($864,450)	($788,836)	($146,737)	($26,253)	$97,376	
% Change Over Present Rates	10.0%	15.0%	7.4%	5.5%	-10.8%	

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11 AVERAGE UNIT COSTS (Cash Basis)

Exhibit 11
Development of Average Unit Costs (Cash Basis)

Cost Component	Total	Residential	Commercial	Municipal	Industrial	Source
Distributed Commodity Costs -	$2,365,422	$1,216,979	$533,929	$192,162	$422,352	Exhibit 9
Commodity Costs - $/CCF	$0.48	$0.48	$0.48	$0.48	$0.48	
Distributed Capacity Costs -	$4,128,012	$2,756,151	$765,835	$239,359	$366,666	Exhibit 9
Capacity Costs - $/CCF	$0.84	$1.09	$0.69	$0.60	$0.42	
Distributed Public Fire Prot. Costs -	$674,279	$375,681	$297,018	$169	$1,411	Exhibit 9
Public Fire Protection - $/CCF	$0.14	$0.15	$0.27	$0.00	$0.00	
Distributed Revenue/Direct/Other -	$200,627	$81,290	$30,815	$74,549	$13,973	Exhibit 9
Revenue/Direct/Other - $/CCF	$0.04	$0.03	$0.03	$0.19	$0.02	
Total Cost - $/CCF	**$1.50**	**$1.75**	**$1.47**	**$1.27**	**$0.92**	
Distributed Customer Costs -	$2,142,659	$1,623,734	$514,990	$713	$3,222	Exhibit 9
Customer Costs - $/Cust./Mth	**$7.00**	**$6.35**	**$10.19**	**$11.88**	**$134.23**	
Basic Data:						
Annual Water Flow - CCF	4,907,800	2,525,000	1,107,800	398,700	876,300	Exhibit 3
Number of Customers	25,517	21,300	4,210	5	2	Exhibit 5

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AVERAGE UNIT COSTS – TIER EXAMPLE

		Single Family				
		0 - 16	*16 +*	Multi-Family	Commercial	Irrigation
Consumption Related	***$ / CCF***					
Commodity	$2.77	$2.77	$2.77	$2.77	$2.77	$2.77
Capacity	1.56	1.32	2.15	1.36	1.37	1.68
RR/FP/DA - $/CCF	0.00	0.00	0.00	0.00	0.00	0.00
	$4.33	**$4.09**	**$4.92**	**$4.13**	**$4.14**	**$4.45**
Customer Related	***$ / Eqiv. Mtr. / Mo***					
Actual Customer	$0.41					
Cust. Acctg.	0.00					
Meters & Services	74.67					
	$75.08					
Basic Data						
Consumption	538,022	188,724	116,887	66,550	92,018	73,844
# of Equiv. Meters	3,211	1,774		522	602	313
# of Meters	2,158	1,469		377	230	82
# of Living Units	2,319	1,469		538	230	82

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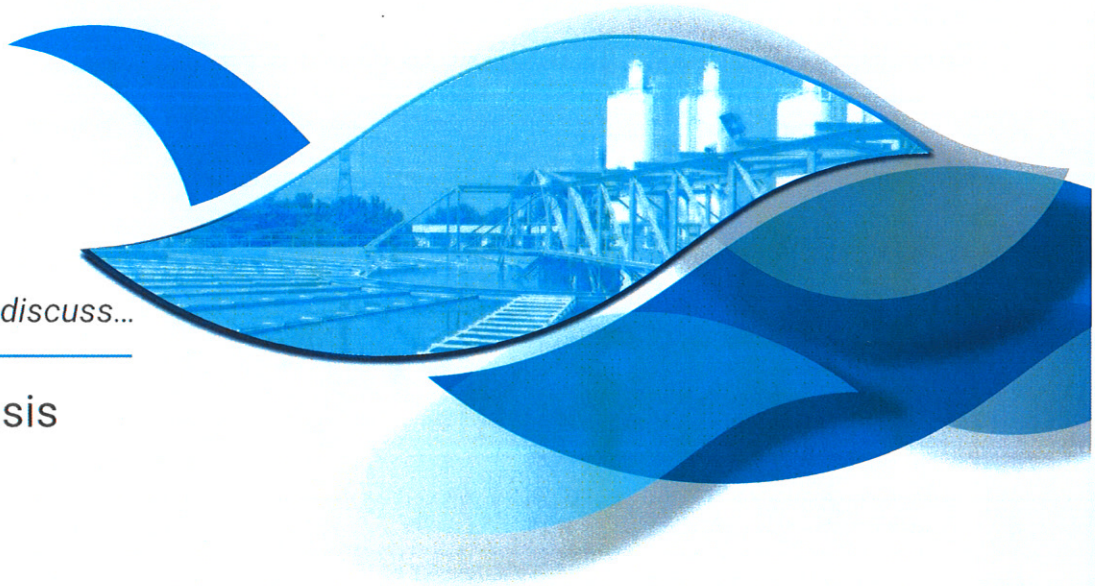

And now to discuss…

Utility Basis

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12 FUNCTIONALIZATION AND ALLOCATION OF THE NET REVENUE REQUIREMENTS (Utility Basis)

Exhibit 12
Functionalization and Allocation of Net Revenue Requirements
(Utility Basis)

Account Description	Total Expenses	Commodity (COM)	Capacity (CAP)	Actual Customer (AC)	Weighted for: Customer Accounting (WCA)	Weighted for: Meters & Services (WCMS)	Fire Protection (FP)	Revenue Related (RR)	Direct Assign (DA)	*Basis of Allocation*
Total Operation & Maint. Exp.	$7,589,400	$2,192,148	$2,997,791	$354,981	$915,384	$595,418	$466,706	$0	$66,971	From "Cash Basis" Example: Exh. 2
Total Taxes	$443,500	$38,607	$52,982	$6,350	$16,524	$10,611	$8,243	$309,000	$1,183	From "Cash Basis" Example: Exh. 2
Depreciation Expense										
Source of Supply Plant	37,650	24,473	13,178	0	0	0	0	0	0	As Source of Supply Plant
Water Treatment Plant	7,500	4,875	2,625	0	0	0	0	0	0	As Water Treatment Plant
Trans. & Distribution Plant	305,480	0	163,750	52,496	0	36,030	49,356	0	3,848	As T&D Plant
General Plant	55,300	14,502	25,492	5,669	0	3,891	5,330	0	416	As General Plant
Total Depreciation Expense	405,930	43,850	205,045	58,165	0	39,921	54,686	0	4,264	
TOTAL REQUIR. BEFORE RETURN	$8,438,830	$2,274,604	$3,255,817	$419,495	$931,908	$645,950	$529,635	$309,000	$72,419	

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13 DISTRIBUTION OF RATE BASE (Plant)

Exhibit 13
Distribution of Rate Base
(Utility Basis)

Cost Component	Total [1]	Residential	Commercial	Muncipal	Industrial	Basis of Distribution
Commodity Related	$4,028,576	$2,072,651	$909,340	$327,274	$719,312	COMM-1
Capacity Related	$4,757,348	$3,176,340	$882,591	$275,851	$422,566	CAP-1
Customer Related						
- Actual Customer	$255,439	$213,225	$42,144	$50	$20	CUST-1
- Weighted for:						
Customer Accounting	57,227	44,033	13,055	16	124	CUST-2
Meters & Services	588,800	390,002	197,337	333	1,128	CUST-3
Total Customer Related	$901,467	$647,260	$252,537	$399	$1,272	
Public Fire Protection	$763,087	$425,161	$336,137	$192	$1,597	PFP-1
Revenue Related	$0	$0	$0	$0	$0	RR-1
Direct Assignment	$106,988	$0	$0	$106,988	$0	Dir. Assign.
Total Net Rev. Requirements	$10,557,466	$6,321,411	$2,380,604	$710,703	$1,144,748	

[1] Total in column ties to bottom line of Exhibit 1.

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14 DISTRIBUTION OF THE NET REQUIREMENTS (Utility Basis)

Exhibit 14
Distribution of the Net Revenue Requirements (Utility Basis)

Cost Component	Total [1]	Residential	Commercial	Municipal	Industrial	Basis of Distribution
Commodity Related	$2,274,604	$1,170,255	$513,429	$184,784	$406,136	COMM-1
Capacity Related	$3,255,817	$2,173,813	$604,024	$188,786	$289,195	CAP-1
Customer Related						
- Actual Customer	$419,495	$350,169	$69,212	$82	$33	CUST-1
- Weighted for:						
Customer Accounting	$931,908	717,047	212,589	252	2,020	CUST-2
Meters & Services	$645,950	427,856	216,491	366	1,237	CUST-3
Total Customer Related	$1,997,354	$1,495,071	$498,292	$700	$3,290	
Fire Protection Related	$529,635	$295,092	$233,302	$133	$1,108	PFP-1
Revenue Related	$309,000	$188,154	$71,325	$17,179	$32,342	RR-1
Direct Assignment	$72,419	$0	$0	$72,419	$0	Dir. Assign.
Total Net Revenue Requirements	$8,438,830	$5,322,385	$1,920,373	$464,001	$732,071	

[1] Total to be distributed ties to bottom line of Exhibit 12.

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15 SUMMARY OF THE "UTILITY BASIS" – Cost of Service Study

Exhibit 15
Summary of Average Embedded Water Cost of Service Study *(Utility Basis)*

Description	Total	Residential	Commercial	Municipal	Industrial	Source
Revenues at Present Rates	$8,646,550	$5,265,000	$1,995,850	$480,700	$905,000	Exhibit 7
Less:						
Allocated Revenue Requirement	$8,438,830	$5,322,385	$1,920,373	$464,001	$732,071	Exhibit 14
Net Income	$207,720	($57,385)	$75,477	$16,699	$172,929	
Rate Base	$10,557,466	$6,321,411	$2,380,604	$710,703	$1,144,748	Exhibit 13
Present Return on Rate Base	2.0%	-0.9%	3.2%	2.3%	15.1%	
Proposed Return Component	$1,072,170	$641,975	$241,764	$72,176	$116,256	
Proposed Rate of Return	10.2%	10.2%	10.2%	10.2%	10.2%	
Proposed Rate Revenues	$9,511,000	$5,964,360	$2,162,137	$536,177	$848,327	
Balance/(Deficiency) of Funds	($864,450)	($699,360)	($166,287)	($55,477)	$56,673	
% Change Over Present Rates	10.0%	13.3%	8.3%	11.5%	-6.3%	

NOTE: In this example, the proposed rate of return is set at the level required to balance to the cash basis revenue requirements.

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AVERAGE UNIT COSTS (Utility Basis)

Cost Component	Total	Residential	Commercial	Muncipal	Industrial	Source
Distributed Commodity Costs -	$2,274,604	$1,170,255	$513,429	$184,784	$406,136	Exhibit 14
Commodity Costs - $/CCF	$0.46	$0.46	$0.46	$0.46	$0.46	
Distributed Capacity Costs -	$3,255,817	$2,173,813	$604,024	$188,786	$289,195	Exhibit 14
Capacity Costs - $/CCF	$0.66	$0.86	$0.55	$0.47	$0.33	
Distributed Public Fire Prot. Costs -	$529,635	$295,092	$233,302	$133	$1,108	Exhibit 14
Public Fire Protection - $/CCF	$0.11	$0.12	$0.21	$0.00	$0.00	
Distributed Revenue/Direct/Other -	$381,419	$188,154	$71,325	$89,598	$32,342	Exhibit 14
Revenue/Direct/Other - $/CCF	$0.08	$0.07	$0.06	$0.22	$0.04	
Distributed Return Component -	$1,072,170	$641,975	$241,764	$72,176	$116,256	Exhibit 15
Return Component - $/CCF	$0.22	$0.25	$0.22	$0.18	$0.13	
Total Cost - $/CCF	**$1.53**	**$1.77**	**$1.50**	**$1.34**	**$0.96**	
Distributed Customer Costs -	$1,997,354	$1,495,071	$498,292	$700	$3,290	Exhibit 14
Customer Costs - $/Cust./Mth	**$6.52**	**$5.85**	**$9.86**	**$11.67**	**$137.09**	
Basic Data:						
Annual Water Flow - CCF	4,907,800	2,525,000	1,107,800	398,700	876,300	Exhibit 3
Number of Customers	25,517	21,300	4,210	5	2	Exhibit 5

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COMPARISON OF THE COST ALLOCATION METHODS

	Total	Residential	Commercial	Municipal	Industrial	Source
Cash Basis -						
Allocated Revenue Requirements	$9,511,000	$6,053,836	$2,142,587	$506,953	$807,624	Exhibit 10
% Change Over Present Rate Levels	10.0%	15.0%	7.4%	5.5%	-10.8%	
Average Unit Costs -						
$/Customer/Month	$7.00	$6.35	$10.19	$11.88	$134.23	Exhibit 11
$/CCF	$1.50	$1.75	$1.47	$1.27	$0.92	
Utility Basis -						
Allocated Revenue Requirements	$9,511,000	$5,964,360	$2,162,137	$536,177	$848,327	Exhibit 15
% Change Over Present Rate Levels	10.0%	13.3%	8.3%	11.5%	-6.3%	
Average Unit Costs -						
$/Customer/Month	$6.52	$5.85	$9.86	$11.67	$137.09	Exhibit 16
$/CCF	$1.53	$1.77	$1.50	$1.34	$0.96	

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WHAT TO DO???

What if the numbers look funky?

- ✓ Have you done the "dumb test?"
- ✓ Do you show them to anyone, let alone the City Council?
- ✓ Must the city follow the cost of service results in establishing rates?
- ✓ What are the possible ramifications?

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LEGAL CONSIDERATIONS

Basic tent of municipal rate setting

- Rates established in a lawful manner by a municipality of municipality authority are presumed to be reasonable, fair and lawful
- Those challenging rates bear a heavy burden to prove that the rates re unjustly discriminatory

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THE THREE BIG LEGAL WORDS

1. Arbitrary
   - Lack of process or analysis
2. Capricious
   - Unpredictable
3. Discriminatory
   - Unjust and unreasonable

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RATES, FEES AND THE LEGAL ENVIRONMENT

Discriminatory Fees

- Discrimination must 'draw an unfair line or strike an unfair balance between those in like circumstances having equal right and privileges".
- Courts have not developed a clear, definitive definition
- Liberty Rice Mill, Inc v. City of Kaplan

"I must admit that I possess no instinct by which to know the **'reasonable'** from the **'unreasonable'** in process and must seek some conscious design for decision"

Supreme Court Justice Jackson, 1944

In dissent on Federal Power Com'n V. Hope Natural Gas Co., (1944) No. 34, s. 602

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MODULE 5

Allocation Procedures

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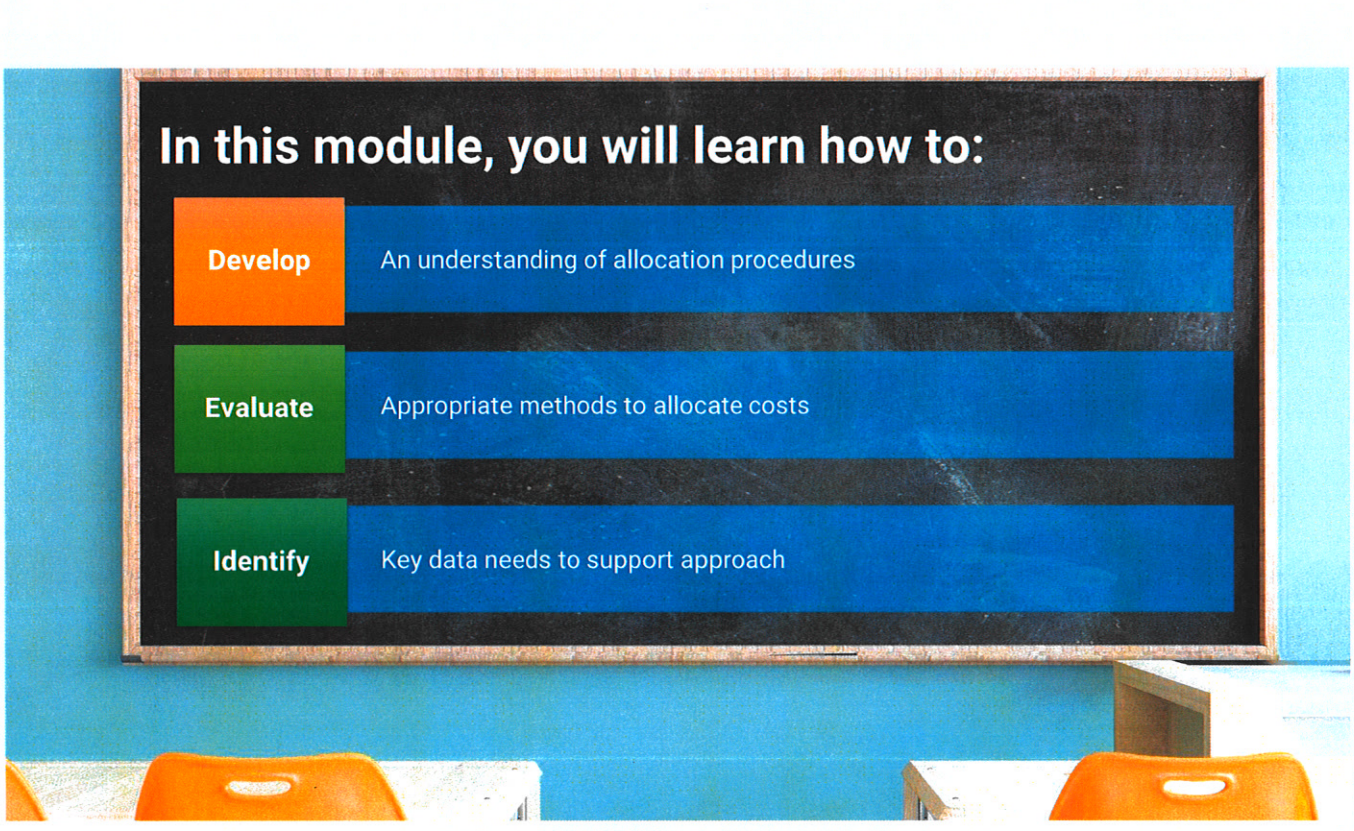

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ALLOCATION PROCEDURES

Divide cost between:

- ***Commodity – Capacity – Customer – Public Fire Protection***

Why was the cost incurred?
How was it sized?
How is it used?

Allocations must be defendable and reasonable

Data constraints – make assumptions where necessary

Consider time required to gather data vs. sensitivity of data (assumption) with the analysis

Refine data over time

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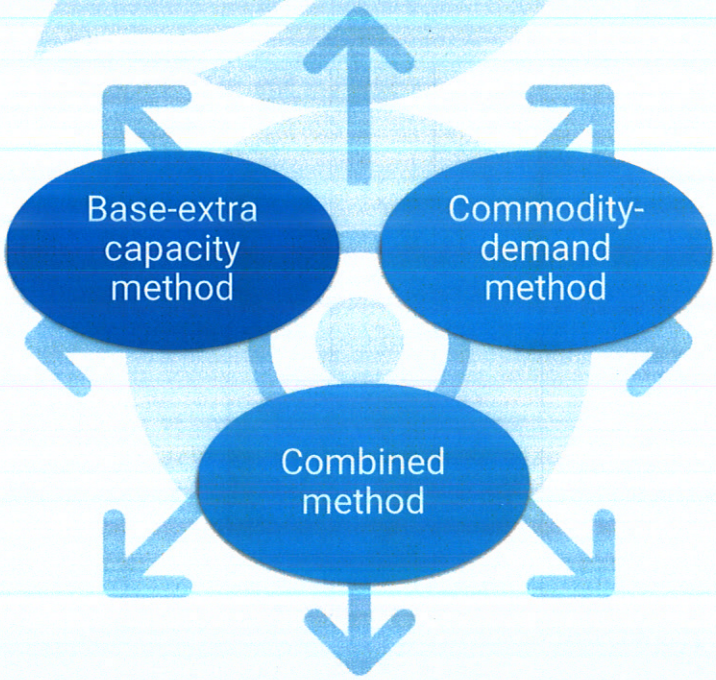
METHODS OF ALLOCATION



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BASE-EXTRA CAPACITY METHOD

Item Description	Base	Extra Capacity		Customer Related		Direct Fire Prot.
		Max Day	Max Hour	Meters & Services	Billing & Collecting	
1. **Source of Supply**	X					
Pumping						
2. Purchased Power	X	X				
3. Other	X	X				
Water Treatment						
4. Chemicals	X					
5. Other	X	X				
Transmission and Distribution						
6. Mains	X	X	X			
7. Storage (Reservoirs)	X		X			
8. Meters and Services				X		
9. Hydrants						X
10. Other	X	X	X	X		X
Customer Accounting						
11. Meter Reading & Collection					X	
12. Uncollectable Accounts	X	X	X	X	X	X
Administrative & General						
13. Salaries	X	X	X	X	X	X
14. Employee Benefits	X	X	X	X	X	X
15. Insurance	X	X	X	X	X	
16. Other	X	X	X	X	X	X

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COMMODITY- DEMAND METHOD

Item Description	Commodity	Demand		Customer Related		Direct Fire Prot.
		Max Day	Max Hour	Meters & Services	Billing & Collecting	
1. **Source of Supply**	X					
Pumping						
2. Purchased Power	X	X				
3. Other		X				
Water Treatment						
4. Chemicals	X					
5. Other		X				
Transmission and Distribution						
6. Mains		X	X			
7. Storage (Reservoirs)			X			
8. Meters and Services				X		
9. Hydrants						X
10. Other	X	X	X	X		X
Customer Accounting						
11. Meter Reading & Collection					X	
12. Uncollectable Accounts	X	X	X	X	X	X
Administrative & General						
13. Salaries	X	X	X	X	X	X
14. Employee Benefits	X	X	X	X	X	X
15. Insurance	X	X	X	X	X	
16. Other	X	X	X	X	X	X

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COMBINED METHOD

	Item Description	Commodity	Capacity	Customer Related		Public Fire Protection	Direct Assign.
				Actual	Weighted		
1.	**Source of Supply**	X	X				
	Pumping						
2.	Purchased Power	X					
3.	Other	X	X				
	Water Treatment						
4.	Chemicals	X					
5.	Other	X	X				
	Transmission and Distribution						
6.	Mains		X	X		X	
7.	Storage (Reservoirs)		X			X	
8.	Meters and Services				X		
9.	Hydrants					X	
10.	Other	X	X	X	X	X	
	Customer Accounting						
11.	Meter Reading & Collection				X		
12.	Uncollectable Accounts						X
	Administrative & General						
13.	Salaries	X	X	X	X	X	X
14.	Employee Benefits	X	X	X	X	X	X
15.	Insurance	X	X	X	X	X	X
16.	Other	X	X	X	X	X	X

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ALLOCATION PROCEDURES

Source of supply

- Generally provides two cost components
  - ✓ Capacity
  - ✓ Commodity
- Classification must consider how or why the cost was incurred or sized

Examples of Methods to Classify

METHOD 1:
Average day to peak day use

Average day = 7.5 MGD
Peak day = 12.7 MGD

Therefore:
59% = commodity (7.5 MGD / 12.7 MGD)
41% = capacity (peak day)

METHOD 2:
Specific use of the facilities

Individual wells used only for peak use = 100% capacity-related

Supply providing year-round base load use = 100% commodity-related

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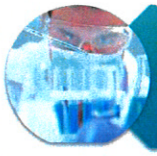
ALLOCATION PROCEDURES

Transmission

- Generally sized to meet peak requirements



Purification (Treatment)

- Chemicals
- Plant and other expenses may be split between commodity and capacity

Pumping

- Generally sized to meet peak flow requirements
- Electricity – 100% commodity-related

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ALLOCATION PROCEDURES

Distribution storage (reservoirs)

- Provides two components to the system
  - ✓ Capacity
  - ✓ Fire flow

Example:	**Fire flow requirements to total storage capacity**
Assume fire flow requirements equal to 4,000 gpm flow and 180 minutes duration	4,000 gpm x 180 minutes = 720,000 gallons
System has 12 MGD total Storage	0.72 MG / 12 MG total storage capacity = 6.0% public fire protection and 94% peak day capacity

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ALLOCATION PROCEDURES

DISTRIBUTION MAINS

- Consider 3 cost components:
  - Customer
  - Capacity
  - Fire Protection
- Minimum system theory
- Data requirements

METERS & SERVICES

- Generally, customer-related
- Weighted approach to classify and allocate equitably
- May use a minimum-size approach to classify between customer and capacity

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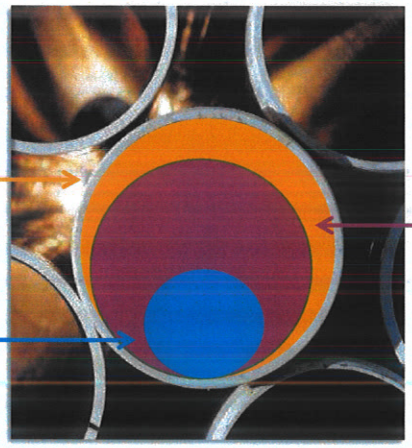
THEORY OF THE MINIMUM SYSTEM ANALYSIS

Distribution Mains

"We have to have a distribution system in place, ready to deliver water, regardless of whether the customer consumes water"



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EXAMPLE: *Distribution Main Analysis*

ASSUME:

- 2 " main is smallest installed (minimum size)
- 6" main is required for peak domestic flows
- Larger mains are required to meet fire flow requirements

PIPE SIZE	LINEAR FEET	INSTALLED COST $/LF	REPLACEMENT COST
2"	2,700	$ 8.00	$ 21,600
3"	11,400	12.00	136,800
4"	323,600	16.00	5,177,600
6"	566,139	20.00	11,322,780
8"	154,800	28.00	4,334,400
10"	95,900	32.00	3,068,800
12"	33,400	40.00	1,336,000
Total	**1,187,939**		**$25,397,980**

***Customer* % =** *$ for 2" equivalent = 1,187,939 LF x $8.00/LF = $ 9,503,512*

$9,503,512 / $25,397,980 = 37.4% customer component

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EXAMPLE: *Distribution Main Analysis (cont'd)*

CAPACITY COMPONENT =

Capacity % = $\frac{[(2" - 6" \text{ Costs}) + \text{equivalent } 6" \text{ cost for larger mains})] - \text{Customer component}}{\text{Total replacement cost}}$

$ for 2" – 6" = $21,600 + $136,800 + $5,177,600 + $11,322,780 = $16,658,780

Equivalent for 8" – 12" = ((154,800 + 95,900 + 33,400 LF) * $20.00/LF)

Equivalent for 8" – 12" = $5,682,000

Capacity % = $\frac{\$16,648,780 + \$5,682,000 - \$9,503,512}{\$25,397,980} = 50.5\%$

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EXAMPLE: *Distribution Main Analysis (cont'd)*

Fire protection component =

1 – (customer % + capacity %)

1 – (0.374 + 0.505) = 12.1%

fire protection component

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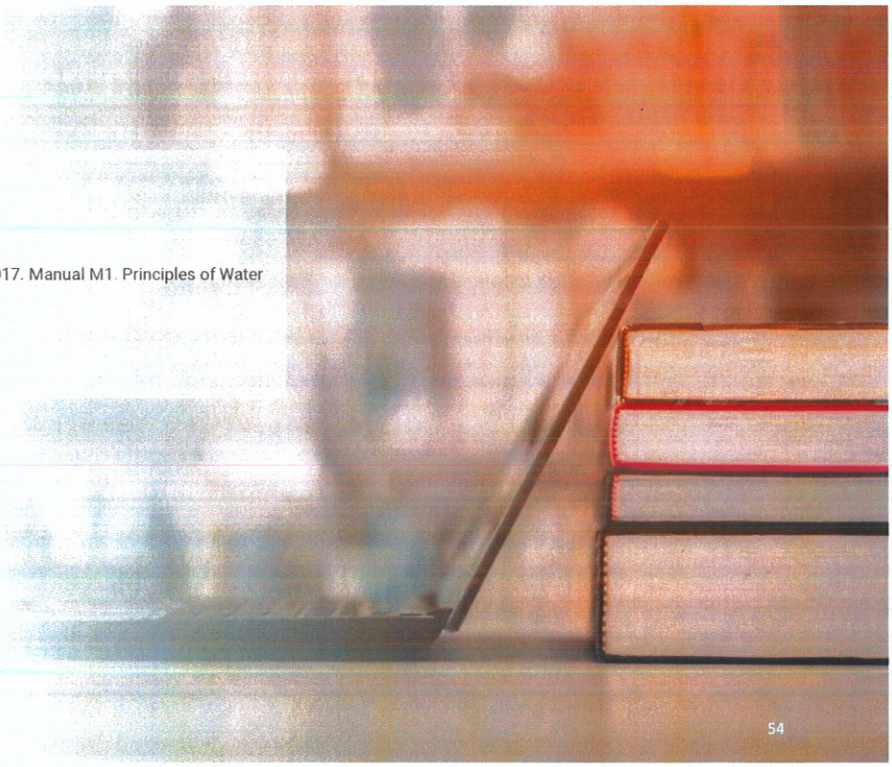
RESOURCES

For more information, visit:

American Water Works Association (AWWA). 2017. Manual M1. Principles of Water Rates, Fees and Charges. Denver, Colo.: AWWA



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MODULE 6

Distribution Procedures

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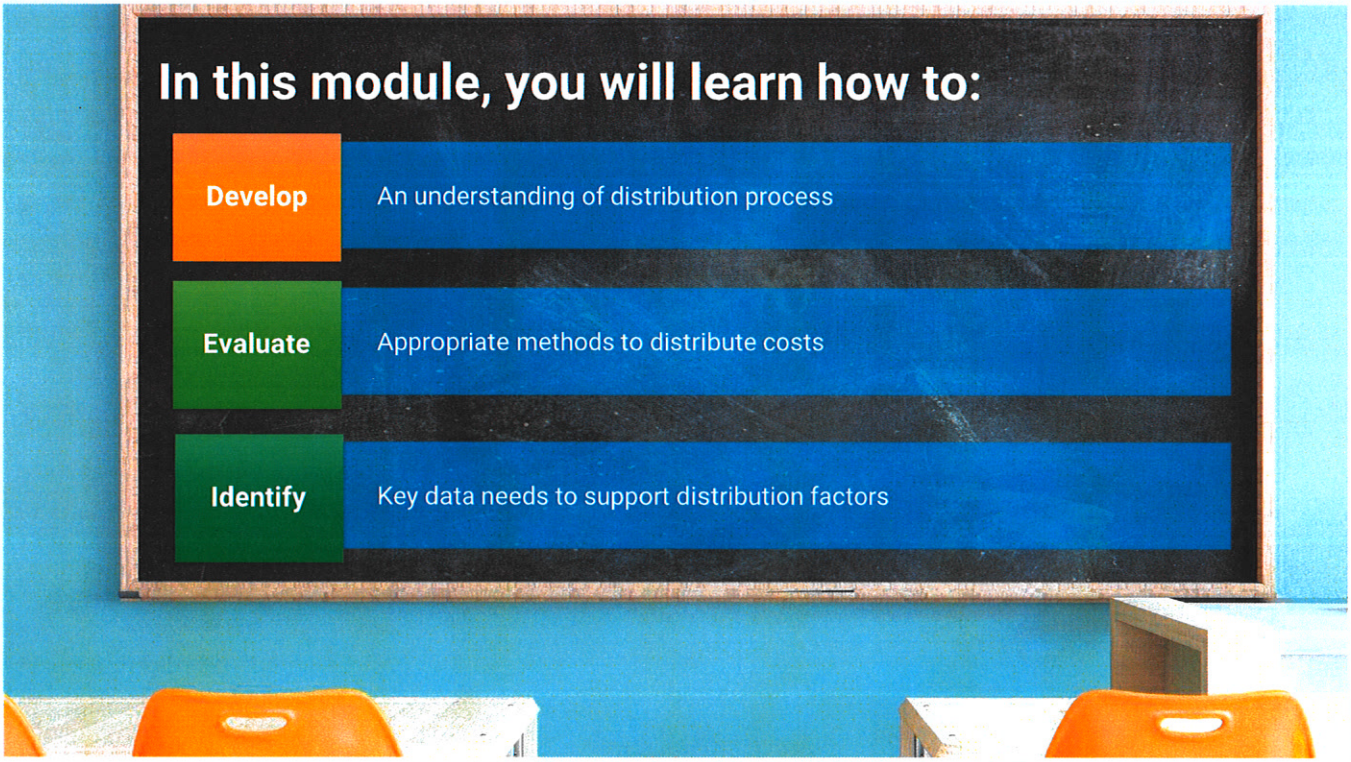

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OVERVIEW

Distribution procedures and methodologies

Distribution methods should equitably distribute the allocated costs for:

- Commodity
- Capacity
- Customer
- Fire Protection

Develop distribution factor for each cost allocator used in your study, except direct assignment

There are alternative techniques and approaches to distributing costs

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OVERVIEW

Distribution procedures and methodologies

Allocation / distribution methods

- Commodity/demand – assignment to either commodity or demand
- Base/extra capacity
  - Base/maximum = % to base (commodity)
  - Extra/maximum = % to extra (capacity)
- Other (e.g., combined approach)

Which method to use?

- Nature of system costs – planning considerations
- System constraints
- Data available

**See AWWA M-1 Manual for examples of the approaches*

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DEVELOPING COMMODITY OR BASE DISTRIBUTION FACTORS

- Commodity or base costs are related to total flow
- Method should equitably distribute allocated costs
- Sales at the meter + adjustment for losses = sales at the source

Up Next:
Considerations for developing base distribution factors

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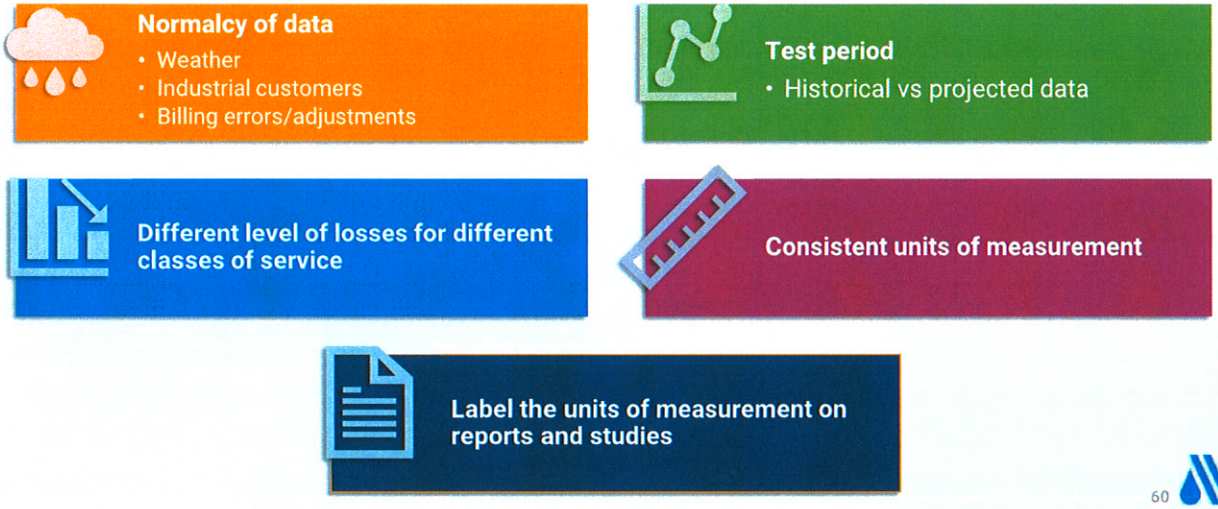
CONSIDERATIONS WHEN DEVELOPING BASE DISTRIBUTION FACTORS



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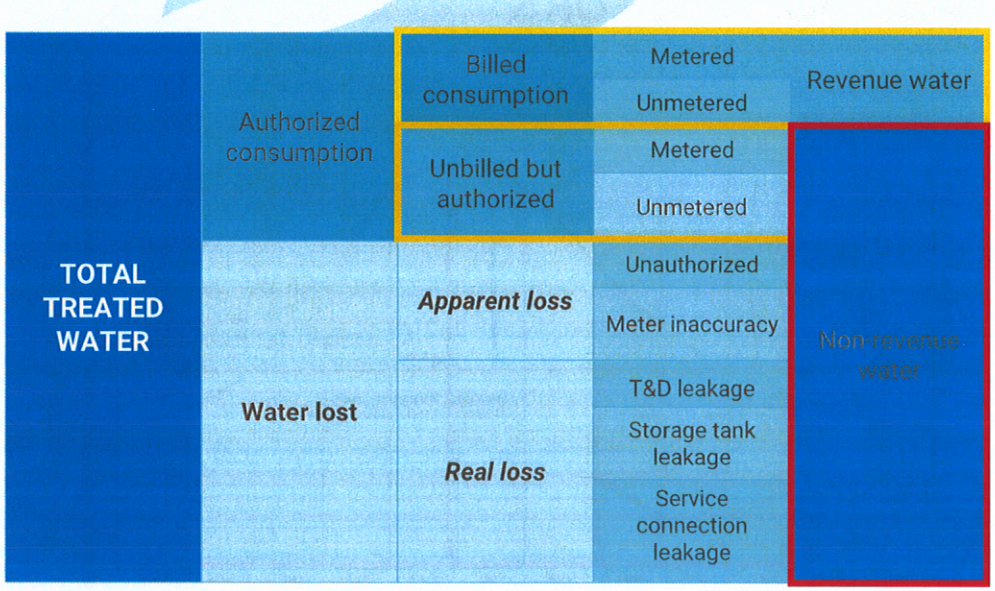
TRACKING WATER LOSSES - *Where does the water go?*



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DEVELOPING DEMAND DISTRIBUTION FACTORS

- Demand or extra-capacity is related to peak period (contribution)
- Need to define the peak period cost (e.g. peak day, peak hour, peak season)
- Defining peak distribution under the methodology selected

Base-extra capacity method

Commodity-demand method

Combined method

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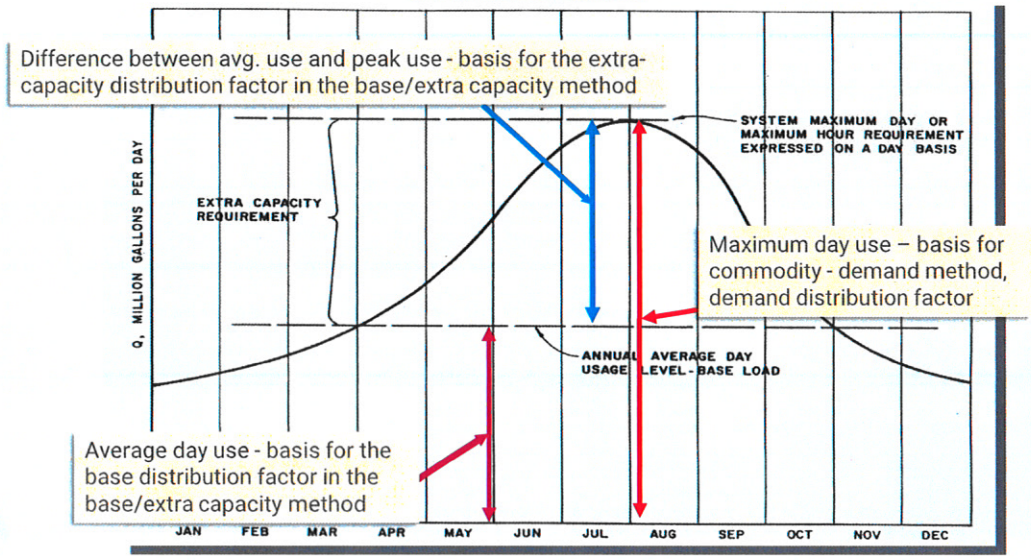
DEFINING DEMAND USE FOR PURPOSES OF DISTRIBUTION FACTORS



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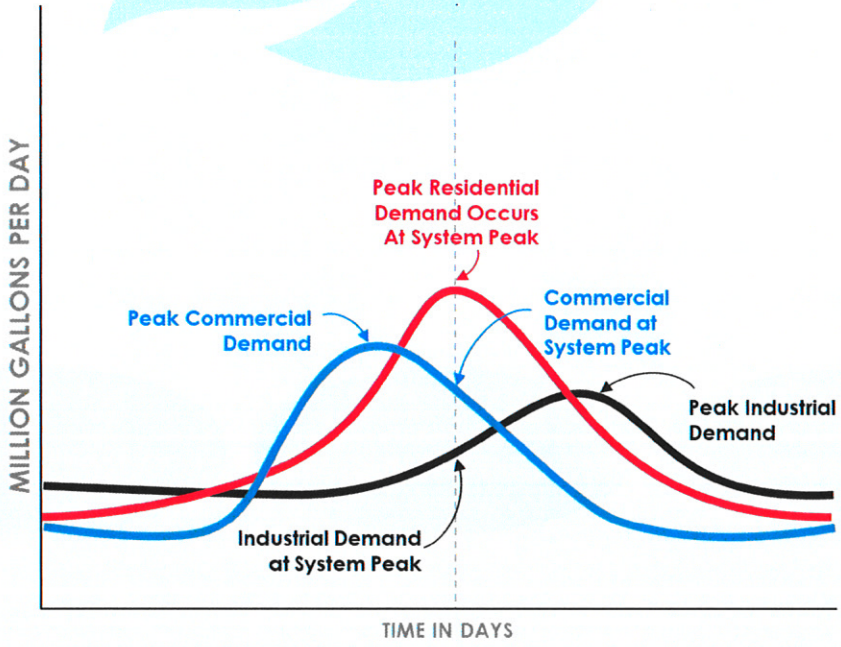
CUSTOMER CLASS DISTRIBUTION FACTORS



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DEVELOPING DEMAND DISTRIBUTION FACTORS

CONSIDERATIONS

Availability of data

- *Sample metering*
- *Demand meters*
- *Borrowed data*
- *Literature review*
- *Billing records*

Use at the **time of the peak** vs **potential to peak**

Contract maximums for industrial customers

TECHNIQUES

Average to peak (day) [peaking factors]

Meter size

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ALTERNATIVE METHOD OF DEVELOPING THE CAPACITY DISTRIBUTION FACTOR

Meter Size	5/8 x 3/4"	3/4"	1"	1-1/2"	2"	3"	4"	6"	8"	Total Actual Meters	Total Weighted Meters	% of Total
GPM Flow [1]	20	30	50	100	160	300	500	1,000	1,600			
Capacity Rating Factor	1.00	1.50	2.50	5.00	8.00	15.00	25.00	50.00	80.00			
Residential												
- Actual Meters	5,168	465	65	10	0	0	0	0	0	5,708		
- Weighted Meters	5,168	698	163	50	0	0	0	0	0		6,079	54.00%
Commercial												
- Actual Meters	2,523	550	123	130	55	0	4	0	0	3,385		
- Weighted Meters	2,523	825	308	650	440	0	100	0	0		4,846	43.10%
Industrial												
- Actual Meters	0	0	0	0	0	2	4	2	0	8		
- Weighted Meters	0	0	0	0	0	30	100	100	0		230	2.00%
Municipal												
- Actual Meters	10	5	15	3	0	2	0	0	0	35		
- Weighted Meters	10	8	38	15	0	30	0	0	0		101	0.90%
Total										9,136	11,256	100.00%

(CAP-1)

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DEVELOPING CUSTOMER DISTRIBUTION FACTORS

Customer distribution factors

Actual vs. weighted

Types of weighted costs
- Customer accountability / billing / meter reading
- Meters and services (capital costs)

Weighting factors
- Level of effort
- Actual costs (e.g., meters)
- "Hassle factor"

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DISTRIBUTION OF FIRE PROTECTION COSTS

Public fire protection
- Consideration of fire flow requirements by class of service
- Stated in gallons / minute (gpm)
- Duration (minutes)
- Insurance services organization (ISO) flow requirements
- Weighted approach

Private fire protection as a class of service

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PRIVATE FIRE PROTECTION

Typically charges for "stand-by" capacity

Charges basis: line size or number of sprinkler heads

Maine PUC established a curve of number of customers and PFP revenue

- In 1987, stated PFP revenues should fall between 6% and 30%

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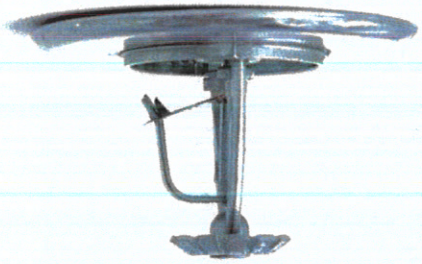
PRIVATE FIRE PROTECTION

Key Issues / Arguments



- Is there really a cost associated with "stand-by" capacity?
- Has the customer already paid for that capacity via another charge?
- For the customer, insurance saving off-setting PFP cost
- PFP is required by code
- PFP quickly suppresses the fire, thereby saving significant amounts of water that would have been used without PFP
  - Decreases fire fighting hazards
- Cost-based vs market (value)-based rates

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PUBLIC VS. PRIVATE FIRE PROTECTION PRORATED COSTS

Equivalent Connection Method

	Total	Public	Private	
Costs to be prorated	$176,000	$116,746	$59,254	Alloc. Factor FP-1
Direct Costs - Hydrants	43,000	43,000	---	Direct
Direct Costs - Private Firelines	28,000	---	28,000	Direct
	$247,000	$159,746	$87,254	

	Number	Size Factor	Equiv. 6" Connections	Allocation
Public Fire Hydrants (6" Mains)				
Area A	576	1.00	576	
Area B	355	1.00	355	
Area C	788	1.00	788	
	1,719		1,719	66.3%
Private Fire Services				
4" Service	257	0.44	113	
6" Service	553	1.00	553	
8" Service	120	1.72	206	
	930		872	33.7%
Total Equivalent 6" Connections			2,591	100.0%
ALLOCATION FACTOR				**(FP-1)**

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DEVELOPING FIRE PROTECTION RATES

Public charge per connection

$/Hydrant = $92.93 / year

($159,746 / 1,719 hydrants)

Private charge per connection

4" service	$44.00 / year
6" service	$100.01 / year

(Total private costs/total equivalent connection)

8" service	$172.01 / year

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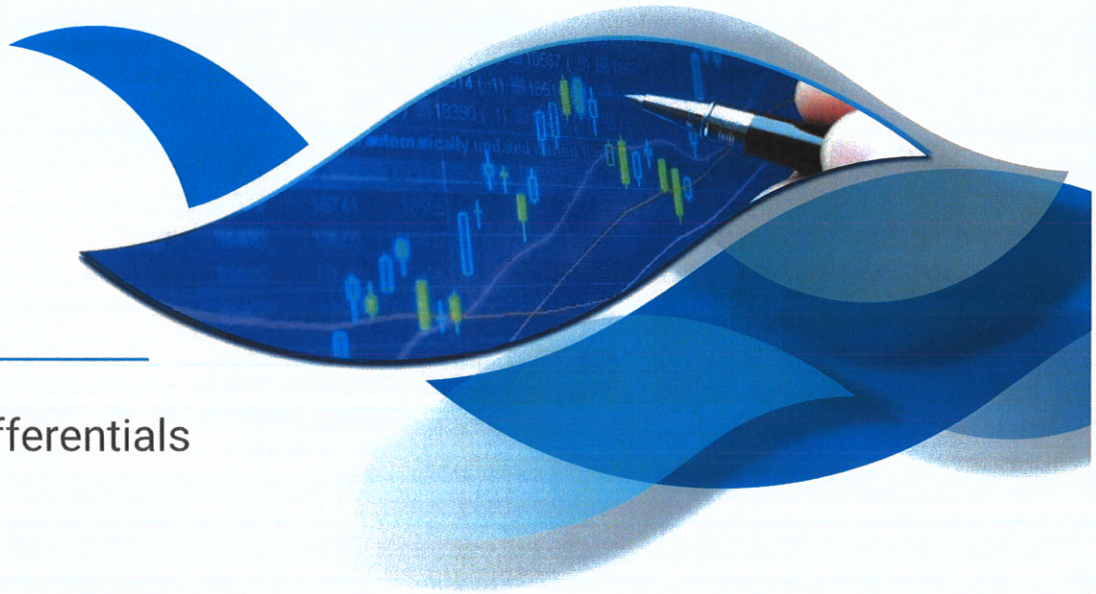

Rate Differentials

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RATE DIFFERENTIALS

For Inside vs. Outside City Customers

Typical range of differentials – 0% to 100%

Basis

- Ownership
- Risk
- Fair return on investment
- Other??

Cost allocation Issue: Can you demonstrate a 50% or 100% cost differential between inside and outside customers?

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RATE DIFFERENTIALS APPROACH – IGNORE THE ISSUE

Some utilities maintain the current rate differential and do no allocate costs to inside vs outside city within the cost- of-service study

Rate differential is addressed (maintained in the rate design process

WARNING!
If challenged, you may need to prove cost-basis for the differential

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RATE DIFFERENTIALS

Calculating Unit Costs with a Differential (Cash Basis)

Line No	Description		Average Day 1,000 gal	Max Day Xtra-Cap gpd	Max Hour Xtra-Cap gpd	Meter Cost	# Bills
1	**Allocated Revenue Requirement**	**$64,672,296**	**$36,345,960**	**$14,684,787**	**$11,411,269**	**$712,063**	**$1,518,216**
2	Inside-City		21,476,153	25,182	81,448	113,774	1,024,345
3	Outside-City		2,000,000	4,000	1,000	5,000	11,604
4	**Total Units of Service**		**23,476,153**	**29,182**	**82,448**	**118,774**	**1,035,949**
	Unit Costs of Service						
5	Inside City Unit Costs		$1.50	$477.06	$137.74	$5.90	$1.46
6	Outside City Unit Costs		$2.10	$667.89	$192.83	$8.25	$2.04
7	Outside-City Differential	1.4					
	Cost Recovery						
8	Inside City Unit Costs		$32,153,834	$12,013,241	$11,218,438	$670,792	$1,494,514
9	Outside City Unit Costs		$4,192,126	$2,671,547	$192,831	$41,271	$23,702
10	Total Allocated Revenue Requirement		**$36,345,960**	**$14,684,787**	**$11,411,269**	**$712,063**	**$1,518,216**
11	Total Allocated Revenue Requirement from Line 1		**$36,345,960**	**$14,684,787**	**$11,411,269**	**$712,063**	**$1,518,216**
12	*Over/(Under) under recovery of revenue requirement*		*$0*	*$0*	*$0*	*$0*	*$0*

Inside City Unit Costs = Line 1/(Line 2 + 1.4 * Line 3)
Outside City Unit Costs = Line 5 * 1.4

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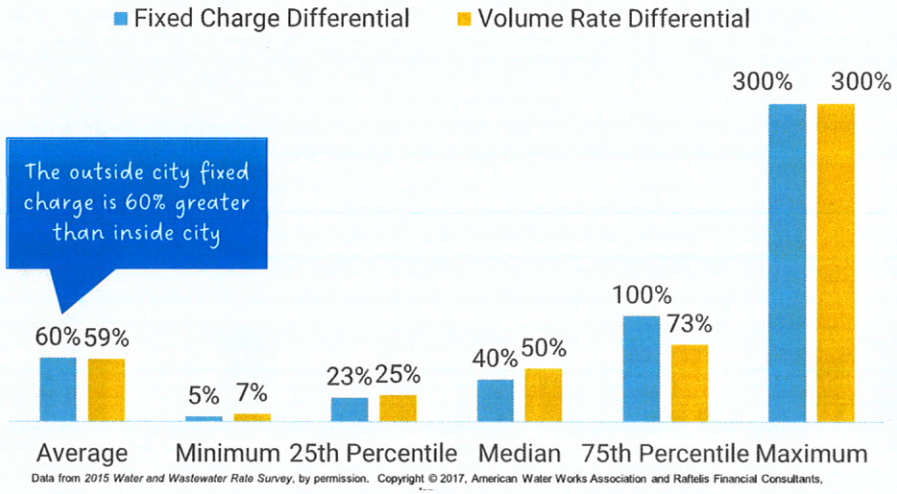
RATE DIFFERENTIALS

Survey: *Fixed Charge and Volume Charge Differentials for Outside City Customers*



Data from *2015 Water and Wastewater Rate Survey*, by permission. Copyright © 2017, American Water Works Association and Raftelis Financial Consultants.

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RATE DIFFERENTIALS: Rate of Return Approach

Technically correct approach

- Differential is not necessarily in a fixed percentage
- Inside City customers earn a "fair" return on their investment form Outside customers
  - Use weighted cost of capital approach for Outside city customers
- Inside City, customers pay the difference between the total revenue requirements and the amount paid by the outside City customers

Approach may also be used for wholesale rate setting

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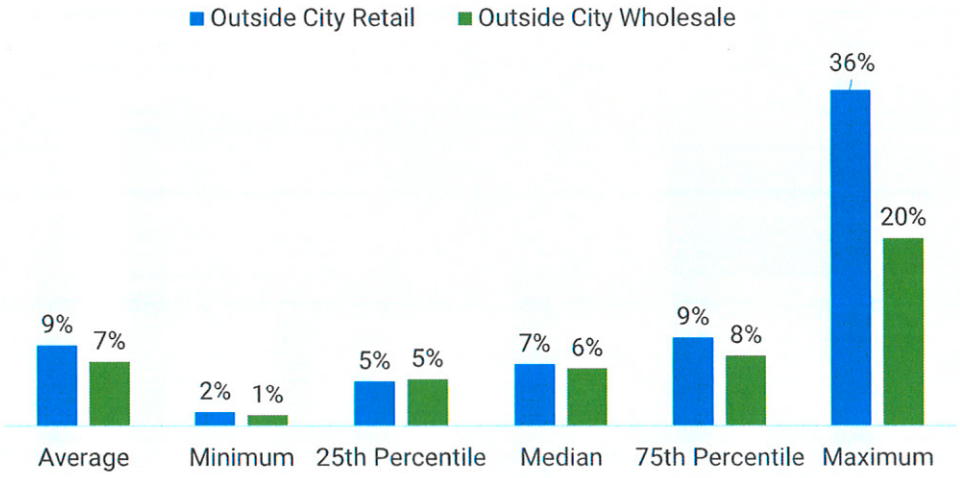
SURVEY: Rate of Return for Outside City Customers Using The Utility Basis



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CALCULATION

Inside vs. Outside City Rate of Return

Line No.	Description	Total	Inside City Residential	Inside City Commercial	Outside City Residential	Outside City Commercial	Notes
1	Revenues at Present Rates	$11,717,400	$7,530,000	$2,327,000	$1,540,000	$320,400	
	Less:						
2	Allocated Revenue Requirement	$7,439,000	$4,875,000	$1,385,000	$1,020,000	$159,000	O&M, Taxes, Deprec.
3	Net Income	$4,278,400	$2,655,000	$942,000	$520,000	$161,400	L.1 - L.2
4	Rate Base	$79,150,000	$53,550,000	$16,800,000	$6,900,000	$1,900,000	From COSA
5	Present Return on Rate Base	5.4%	5.0%	5.6%	7.5%	8.5%	L.3 / L.4
6	Proposed Rate of Return	**7.00%**	**6.5%**	**6.5%**	**11.0%**	**11.0%**	Cost of Capital Analysis
7	Proposed Return Component	$5,540,750	$3,480,750	$1,092,000	$759,000	$209,000	L.4 x L.6
8	Proposed Rate Revenues	$12,979,750	$8,355,750	$2,477,000	$1,779,000	$368,000	L.2 + L.7
9	Balance/(Deficiency) of Funds	($1,262,350)	($825,750)	($150,000)	($239,000)	($47,600)	L.1 - L.8
10	% Change Over Present Rates	10.8%	11.0%	6.4%	15.5%	14.9%	L.9 / L.1

Step 1 - Calculate overall required return from revenue requirements

Step 3 – Rate of return for inside city must balance to overall needs

Step 2 – Calculate a "fair" rate of return for Outside City based upon weighted cost of capital

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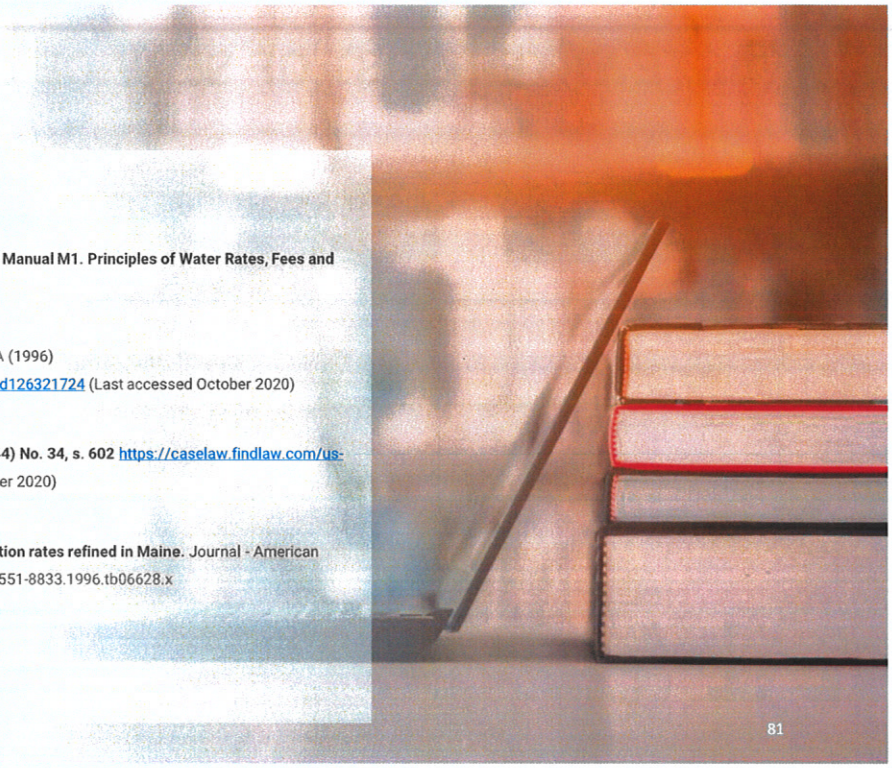
RESOURCES



For more information, visit:

American Water Works Association (AWWA). 2017. Manual M1. Principles of Water Rates, Fees and Charges. 7th ed. Denver, Colo.: AWWA.

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Federal Power Com'n V. Hope Natural Gas Co., (1944) No. 34, s. 602 https://caselaw.findlaw.com/us-supreme-court/320/591.html (Last accessed October 2020)

Woodcock, C.P. and Lamie, N.R. (1996), Fire protection rates refined in Maine. Journal - American Water Works Association, 88: 53-59. doi:10.1002/j.1551-8833.1996.tb06628.x

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MODULE 7

Wastewater Cost of Service
Case Example

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WASTEWATER COST OF SERVICE TERMINOLOGY

Functionalization

Arrangement of costs according to functions performed by the wastewater system

Allocation

The process of allocating the functionalized costs to volume, strength, and customer-related cost components

Distribution

The distribution of allocated costs to customer classes of service using prescribed distribution techniques

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WASTEWATER VS. WATER

Water allocations are based on demand profiles	Wastewater allocations are based on flow and strength of wastewater

- While water has water losses, wastewater has infiltration and inflow
- Basis for billing wastewater flows

  Average winter consumption (AWC);

  e.g., Average of December – February water usage

  - Actual water usage
  - Actual water usage adjusted for a return factor

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PRIMARY DIFFERENCES BETWEEN WATER AND WASTEWATER ALLOCATIONS

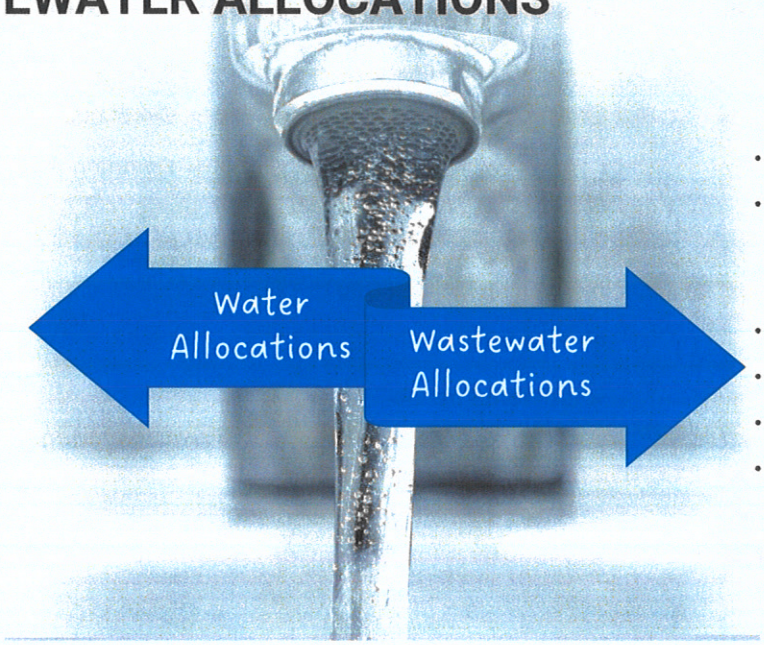
Average day

Maximum day

Maximum hour

Customer

- *Equiv. meters*
- *Bills*



- *Contributed flow*
- *Biochemical oxygen demand (BOD) / Chemical oxygen demand (COD)*
- *Suspended solids (TSS)*
- *Total Kjeldahl Nitrogen (TKN)*
- *Phosphorus (P)*
- *Customer costs (billing)*

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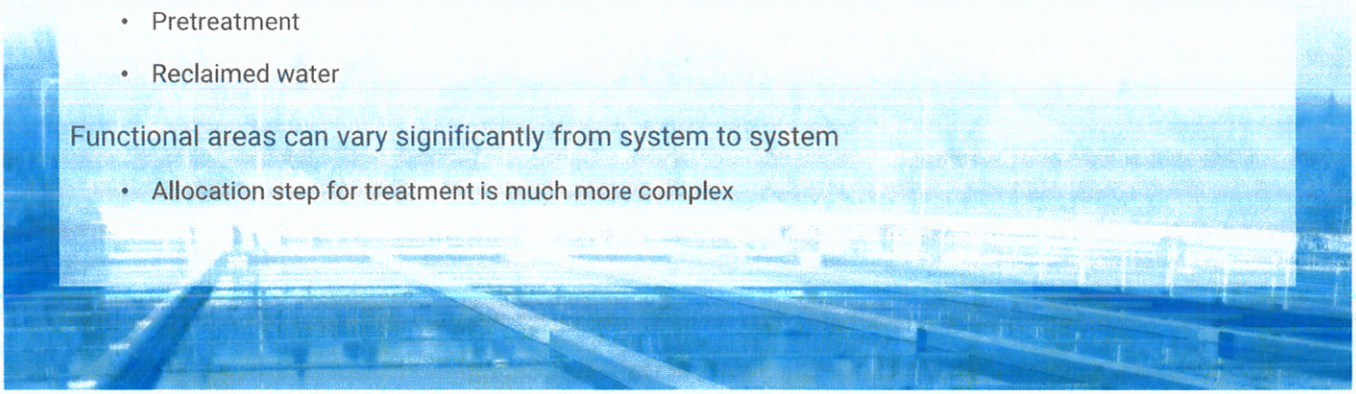
WASTEWATER FUNCTIONALIZATION

Wastewater functional area examples

- Collection system
- Lift stations
- Treatment (aeration basins, clarifiers, headworks, activated sludge, nitrification, disinfection etc.)
- Pretreatment
- Reclaimed water

Functional areas can vary significantly from system to system

- Allocation step for treatment is much more complex



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COST ALLOCATION

The key service operational and service elements (cost allocations) of a wastewater utility

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Typical components:

- Contributed flow [1]
- Capacity
- Biochemical oxygen demand
- Total suspended solids
- Total Kjeldahl nitrogen
- Pretreatment
- Customer-related
- Reclaimed water

Refining components:

- Indirect costs
- Direct cost assignment
- Common-to-all
- Specific to a service or customer type

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WASTEWATER COST CAUSATIVE FACTORS

- Costs are allocated to cost components based on the factor which predominately influences the size and cost of the facility
  - Measurable design criterion
  - Operational and service purpose
- Serves as the basis for allocating to cost components
- Requires engineering knowledge of facilities as well as system operations

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WASTEWATER COST CAUSATIVE FACTORS CRITERION

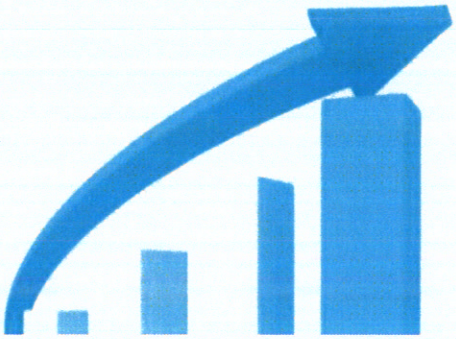
- Infiltration/Inflow
- Wastewater volume
- Peak wastewater flow
- Strength (BOD, TSS, TKN, P)

Collection system

- ✓ Length of mains
- ✓ Acreage
- ✓ Density

Customer

- ✓ Billing



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WASTEWATER ALLOCATION METHODOLOGIES

Design Basis Allocation	Functional Basis Allocation
Costs are allocated based on the parameter in which the facility was designed	Costs are allocated based on the function that the facility provides within the system.
Theory: utilities incur costs and provide service on the same basis as facilities are designed	Theory: function of various cost centers or activities should be basis for cost allocation
Example: Primary clarifier is designed to meet flow capacity. Costs are allocated to the flow cost component	**Example:** Primary clarifier operates to settle TSS so costs are allocated to the TSS cost component

It is common to see a combination of these methodologies

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FUNCTIONAL VS. DESIGN COST ALLOCATION

Facility	Functional	Design
Primary treatment	Flow	Flow
Primary sludge pump station	TSS	Flow
Trickling filters	BOD	BOD
Secondary clarifiers	Flow	TSS/BOD
Dissolved air flotation	TSS	TSS/BOD
Disinfection	Flow	Flow

Source: Water Environment Federation, Financing and Charges for Wastewater Systems, Manual of Practice No. 27

COMPARISON OF DESIGN AND FUNCTIONAL BASIS SUMMARY REVENUE REQUIREMENT ALLOCATION

Allocation of Revenue Requirement Using Design Basis, $ millions

Line No	Description	Total	Volume	Capacity	TSS	BOD	TKN	Billing	Customer	Industrial Surcharge
1	Net Operation and Maintenance Expense	$18.251	$1.153	$7.100	$2.349	$3.256	$1.327	$1.304	$1.103	$0.659
2	Net Capital Costs	$10.585	$1.064	$4.011	$1.811	$2.573	$0.779	$0.069	$0.278	$0.000
3	**Total Revenue Requirement**	**$28.836**	**$2.217**	**$11.111**	**$4.160**	**$5.829**	**$2.106**	**$1.373**	**$1.381**	**$0.659**
	Units		Ccf	Ccf/day	lb	lb	lb	Bills	Customers	Bills
4	*Units of Service, millions*		*15.740000*	*0.096575*	*28.567210*	*22.727210*	*3.112210*	*0.026413*	*0.063250*	*0.000828*
5	Unit Cost of Service		**$0.141**	**$115.050**	**$0.146**	**$0.256**	**$0.677**	**$51.982**	**$21.834**	**$795.894**

Allocation of Revenue Requirement Using Functional Basis, $ millions

Line No	Description	Total	Volume	Capacity	TSS	BOD	TKN	Billing	Customer	Industrial Surcharge
1	Net Operation and Maintenance Expense	$18.251	8.752	N/A	2.684	2.873	0.831	1.366	1.093	0.652
2	Net Capital Costs	$10.585	3.554	N/A	2.428	3.558	0.698	0.069	0.278	
3	**Total Revenue Requirement**	**$28.836**	**$12.306**	**$0.000**	**$5.112**	**$6.431**	**$1.529**	**$1.435**	**$1.371**	**$0.652**
	Units, millions		Ccf	Ccf/day	lb	lb	lb	Bills	Customers	Bills
4	*Units of Service*		*15.740000*	*0.096575*	*28.567210*	*22.727210*	*3.112210*	*0.026413*	*0.063250*	*0.000828*
5	Unit Cost of Service		**$0.782**	**$0.000**	**$0.179**	**$0.283**	**$0.491**	**$54.330**	**$21.676**	**$787.440**

Source: Water Environment Federation, Financing and Charges for Wastewater Systems, Manual of Practice No. 27

COMPARISON OF DESIGN AND FUNCTIONAL BASIS REVENUE REQUIREMENT ALLOCATION

Comparison of Design Basis and Functional Basis Cost of Service, $ millions

Line No	Description	Design Basis	Functional Basis
1	Residential	$13.477	$12.462
2	Commercial	$5.089	$5.311
3	Industrial	$3.636	$3.931
4	Surcharge	$2.832	$3.034
5	Standardized Strength	$3.802	$4.098
6	**Total Cost of Service**	**$28.836**	**$28.836**

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Source: Water Environment Federation, Financing and Charges for Wastewater Systems, Manual of Practice No. 27

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WASTEWATER

Case Example

- Developed on a cash basis
- Intended to demonstrate basic mechanics of the study
- Numbers and assumptions are for example only
- Typical approach used – combination of design and functional basis
- Tables may look a little different than the water cost of service
- Other items included in example
  - ✓ Inside and outside City rate differential
  - ✓ Common-to-all; specific to: allocations
  - ✓ Infiltration/Inflow costs
  - ✓ Wholesale customer

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WASTEWATER REVENUE REQUIREMENT

Table WW-1

Line No.	Description	Operating Expenses $	Capital Costs $	Total $
	Revenue Requirement			
1	Operation and Maintenance Expenses	6,628,617		6,628,617
2	Debt Service		3,300,588	3,300,588
3	Transfer To Capital Improvement Fund		2,700,000	2,700,000
4	Transfer to Capital Construction Fund		1,300,000	1,300,000
5	**Total Revenue Requirement**	**6,628,617**	**7,300,588**	**13,929,205**
	Revenue Requirement Adjustments			
6	Biosolids/Land Lease			(99,054)
7	Cogeneration			(99,507)
8	Other Miscellaneous Revenue			(253,347)
9	Interest Income			(74,644)
10	Operating Reserve Increase / (Decrease)			(762,967)
11	**Total Adjustment**			**(1,289,519)**
12	**Subtotal**			**12,639,686**
13	**Total Net Revenue Requirement**			**12,639,686**

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FUNCTIONALIZATION AND ALLOCATION OF CAPITAL AND DEBT

Table WW-2

Not all customers are served by the City's collection system

Line No.	Description	Total	Common to All Strength: Volume	BOD	TSS	FOG	TKN	Phosphorus	Common Customers Served by the Collection System
1	**Collection System**	100.0%							100.0%
	Treatment Plant								
2	Aeration Basins	100.0%		55.0%			35.0%	10.0%	
3	Airport Farm	100.0%		25.0%	25.0%		25.0%	25.0%	
4	Aeration Lift Station	100.0%	100.0%						
5	Blower Building	100.0%		55.0%			35.0%	10.0%	
6	Biosolids Land Development	100.0%		25.0%	25.0%		25.0%	25.0%	
7	UV Building	100.0%	100.0%						
8	Co-Generation Building	100.0%		50.0%	50.0%				
9	UV Room	100.0%	100.0%						
10	DAF #1 and #2 -WAS Thickener	100.0%			100.0%				
11	Digester Control Building	100.0%		25.0%	25.0%		25.0%	25.0%	
12	Headworks	100.0%	100.0%						
13	Outfall	100.0%	100.0%						
14	Phosphorus Removal Project	100.0%						100.0%	
15	Primary Clarifiers	100.0%			100.0%				
16	Primary Digesters	100.0%		25.0%	25.0%		25.0%	25.0%	
17	Primary Pump House	100.0%	100.0%						
18	RAS Pump House	100.0%	100.0%						
19	Raw Sludge Pump House	100.0%			100.0%				
20	Secondary Clarifiers	100.0%		25.0%	25.0%		25.0%	25.0%	
21	Sludge Lagoon	100.0%		25.0%	25.0%		25.0%	25.0%	
22	Sludge Storage Tank	100.0%		25.0%	25.0%		25.0%	25.0%	
23	**General Plant**	**100.0%**	**7.6%**	**8.0%**	**9.5%**		**5.7%**	**33.8%**	**35.5%**
24	**General Plant - Treatment**	**100.0%**	**11.7%**	**12.3%**	**14.7%**		**8.8%**	**52.4%**	**0.0%**

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FUNCTIONALIZATION AND ALLOCATION OF CAPITAL AND DEBT

Table WW-3

Line No.	Description	Original Cost Assets	Common to All Strength: Volume	BOD	TSS	TKN	Phosphorus	Common to Customers Served by the Collection System
		$	$	$	$	$	$	$
1	**Collection System**	**29,382,375**						29,382,375
	Treatment Plant							
2	Aeration Basins	6,625,842	0	3,644,213		2,319,045	662,584	
3	Airport Farm	17,686	0	4,422	4,422	4,422	4,422	
4	Aeration Lift Station	10,294	10,294					
5	Blower Building	1,470,060	0	808,533		514,521	147,006	
6	Biosolids Land Development	1,155,191	0	288,798	288,798	288,798	288,798	
7	UV Building	204,813	204,813					
8	Co-Generation Building	563,179	0	281,590	281,590			
9	UV Room	893,334	893,334					
10	DAF #1 and #2 -WAS Thickener	2,061,897	0		2,061,897			
11	Digester Control Building	177,626	0	44,407	44,407	44,407	44,407	
12	Headworks	2,593,056	2,593,056					
13	Outfall	532,875	532,875					
14	Phosphorus Removal Project	25,349,015	0				25,349,015	
15	Primary Clarifiers	2,695,022	0		2,695,022			
16	Primary Digesters	4,640,879	0	1,160,220	1,160,220	1,160,220	1,160,220	
17	Primary Pump House	355,491	355,491					
18	RAS Pump House	124,465	124,465					
19	Raw Sludge Pump House	970,384	0		970,384			
20	Secondary Clarifiers	298,067	0	74,517	74,517	74,517	74,517	
21	Sludge Lagoon	900,087	0	225,022	225,022	225,022	225,022	
22	Sludge Storage Tank	283,570	0	70,892	70,892	70,892	70,892	
23	Land	1,546,217	1,546,217					
24	**Total Treatment Plant**	***53,469,051***	***6,260,546***	***6,602,612***	***7,877,170***	***4,701,842***	***28,026,881***	***0***
25	**General Plant**	**1,006,101**	**76,025**	**80,178**	**95,656**	**57,097**	**340,343**	**356,803**
26	**General Plant - Treatment**	**7,979,846**	**934,338**	**985,389**	**1,175,607**	**701,714**	**4,182,797**	**0**
27	**Total System Assets**	***91,837,373***	***7,270,909***	***7,668,180***	***9,148,433***	***5,460,653***	***32,550,021***	***29,739,178***
28	*Percent of Total*	*100.0%*	*7.9%*	*8.3%*	*10.0%*	*5.9%*	*35.4%*	*32.4%*
29	Debt Service Allocations		*11.7%*	*12.3%*	*14.7%*	*8.8%*	*52.4%*	
30	**Debt Service**	**3,300,588**	**386,457**	**407,572**	**486,249**	**290,240**	**1,730,069**	
31	**Other Capital Costs**	***4,000,000***	***316,686***	***333,990***	***398,462***	***237,840***	***1,417,724***	***1,295,297***
32	**Annual Capital Costs**	***7,300,588***	***703,143***	***741,562***	***884,712***	***528,080***	***3,147,794***	***1,295,297***

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FUNCTIONALIZATION OF OPERATION AND MAINTENANCE EXPENSE

O&M has already been functionalized

Table WW-4

Line No	Description	Total	Common to All Strength: Volume	BOD	TSS	FOG	TKN	Phosphorus	Customer	Collection	Indirect All Other
1	Flow	0	100.0%								
2	All WWTP	1,992,426	20.0%	20.0%	20.0%		20.0%	20.0%			
4	Organic	1,255,657		25.0%	25.0%		25.0%	25.0%			
5	Customer	1,236,832							100.0%		
6	Indirect All	192,474									100.0%
7	Indirect WWTP	0									
8	Collection	1,307,362	20.0%							80.0%	
9	Indirect WWTP/Collection	0									
10	Utilities	643,866	50.0%	27.5%	0.0%		17.5%	5.0%			
11	Not Used	0									
		6,628,617	981,891	889,463	712,399	0	825,076	744,593	1,236,832	1,045,890	192,474
12	Allocation of WWTP/Collec WWTP/Collec	100.0%	18.9%	17.1%	13.7%	0.0%	15.9%	14.3%		20.1%	
		0	0	0	0	0	0	0	0	0	0
13	Allocation of Indirect All Other	100.0%	15.3%	13.8%	11.1%	0.0%	12.8%	11.6%	19.2%	16.3%	
		192,474	29,364	26,600	21,304	0	24,674	22,267	36,988	31,278	
14	**Total Reallocated O&M**	**6,628,617**	**1,011,254**	**916,062**	**733,704**	**0**	**849,750**	**766,860**	**1,273,820**	**1,077,167**	
			15.3%	**13.8%**	**11.1%**	**0.0%**	**12.8%**	**11.6%**	**19.2%**	**16.3%**	

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UNITS OF SERVICE

Wastewater volumes consist of two components

- Customer contributed
- Infiltration and inflow

Contributed flow

- Estimated billable flow returned to the treatment plant

Infiltration

- Flow entering the collection system through high groundwater or precipitation

Inflow

- Precipitation that enters the collection system through direct connections such as catch basins, roof drains, foundation drains, manhole covers

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UNITS OF SERVICE: *Strength Components*

Biochemical oxygen demand

- The amount of dissolved oxygen that must be present in water in order for microorganisms to decompose the organic matter in the water, used as a measure of the degree of pollution

Total suspended solids

- Total suspended solids is the dry-weight of suspended particles, that are not dissolved

Total Kjeldhal Nitrogen

- Total concentration of organic nitrogen and ammonia. A test performed that is made up of both organic nitrogen and ammonia

Total phosphorus

- Measure of phosphorus in wastewater

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ESTIMATED UNITS OF SERVICE

Table WW-5

Line No.	Customer Class	Wastewater Volume Billed 1,000 gal	Wastewater Volume Infiltration/ Inflow 1,000 gal	Wastewater Volume Total 1,000 gal	Contributed Wastewater Strength BOD Strength mg/L	Contributed Wastewater Strength BOD Contribution lbs	Contributed Wastewater Strength TSS Strength mg/L	Contributed Wastewater Strength TSS Contribution lbs
	Inside City							
1	Single Family	817,398	42,525	859,923	197	1,345,703	263	1,789,802
2	Multifamily	314,446	9,309	323,755	197	517,680	263	688,521
3	Nonresidential	337,471	8,850	346,321	197	555,587	263	738,938
4	Circuit Breaker	35,502	1,980	37,482	197	58,448	263	77,736
5	Large Industrial Customer	211,724	3,907	215,630	300	529,568	214	377,913
6	Rocky Mtn Malting	163,502	3,010	166,512	877	1,195,885	161	219,541
7	Septic Haulers	1,034	-	1,034	7,000	60,345	15,000	129,311
8	**Total Inside City**	**1,881,077**	**69,580**	**1,950,657**	**272**	**4,263,216**	**256**	**4,021,762**
	Outside							
9	Single Family	24,451	515	24,966	197	40,254	263	53,539
10	Agricultural Company	1,704	33	1,738	197	2,806	263	3,732
10	City of Lakewood Wholesale	418,259	-	418,259	197	688,590	263	915,834
11	**Totsl Outside City**	**444,414**	**548**	**444,963**	197	**731,651**	263	**973,105**
12	**Total System**	**2,325,491**	**70,128**	**2,395,619**	**250**	**4,994,866**	**250**	**4,994,866**

ESTIMATED UNITS OF SERVICE

(Cont'd)

Table WW-5 (continued)

Line No.	Customer Class	Wastewater Volume Billed 1,000 gal	Wastewater Volume Infiltration/ Inflow 1,000 gal	Wastewater Volume Total 1,000 gal	Contributed Wastewater Strength TKN Strength mg/L	Contributed Wastewater Strength TKN Contribution lbs	Contributed Wastewater Strength Phosphorus Strength mg/L	Contributed Wastewater Strength Phosphorus Contribution lbs	Bills
	Inside City								
1	Single Family	817,398	42,525	859,923	30	202,538	8	53,946	163,480
2	Multifamily	314,446	9,309	323,755	30	77,915	8	20,752	20,963
3	Nonresidential	337,471	8,850	346,321	30	83,620	8	22,272	15,711
4	Circuit Breaker	35,502	1,980	37,482	30	8,797	8	2,343	7,889
5	Large Industrial Customer	211,724	3,907	215,630	34	60,432	9	15,139	72
6	Rocky Mtn Malting	163,502	3,010	166,512	35	47,726	12	16,363	12
7	Septic Haulers	1,034	-	1,034	30	259	8	69	40
8	**Total Inside City**	**1,881,077**	**69,580**	**1,950,657**	31	**481,287**	8	**130,885**	**208,167**
	Outside								
9	Single Family	24,451	515	24,966	30	6,059	8	1,614	388
10	Agricultural Company	1,704	33	1,738	30	422	8	112	12
10	City of Lakewood Wholesale	418,259	-	418,259	30	103,638	8	27,604	24
11	**Totsl Outside City**	**444,414**	**548**	**444,963**	30	**110,119**	8	**29,330**	**424**
12	**Total System**	**2,325,491**	**70,128**	**2,395,619**	30	**591,406**	8	**160,215**	**208,591**

INFILTRATION AND INFLOW

Table WW-6

Line No.	Customer Class	Contributed Wastewater Volume	I/I Volume 50.0% Customer Related	I/I Volume 50.0% Volume Related	I/I Volume Total	Total Treated Volume	Percent I/I
		1,000 gal	1,000 gal	1,000 gal	1,000 gal	1,000 gal	
	Inside City						
1	Single Family	817,398	27,489	15,036	42,525	859,923	4.9%
2	Multifamily	314,446	3,525	5,784	9,309	323,755	2.9%
3	Nonresidential	337,471	2,642	6,208	8,850	346,321	2.6%
4	Circuit Breaker	35,502	1,327	653	1,980	37,482	5.3%
5	Large Industrial Customer	211,724	12	3,895	3,907	215,630	1.8%
6	Rocky Mtn Malting	163,502	2	3,008	3,010	166,512	1.8%
7	Septic Haulers	1,034	0	0	0	1,034	0.0%
8	**Total Inside City**	**1,881,077**	**34,997**	**34,583**	**69,580**	**1,950,657**	**3.6%**
	Outside						
9	Single Family	24,451	65	450	515	24,966	2.1%
10	Agricultural Company	1,704	2	31	33	1,738	1.9%
11	City of Lakewood Wholesale	418,259	0	0	0	418,259	0.0%
12	**Totsl Outside City**	**444,414**	**67**	**481**	**548**	**444,963**	**0.1%**
13	**Total System**	**2,325,491**	**35,064**	**35,064**	**70,128**	**2,395,619**	**2.9%**

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CALCULATING THE STRENGTH MASS BALANCE FOR SYSTEM

1. Determine total system influent flow and loadings
2. Identify high strength customers and associated strength levels in mg/l
3. Calculate total contributed pounds from each high strength with known strength concentrations
4. Determine pounds for all other 'regular' strength customers

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MASS BALANCE EXAMPLE

Calculating Pounds of BOD

Calculate septic hauler pounds

- Total contributed flow: 1.034 kgal (.001034 mg)
- BOD concentration: 7,000 mg/l
- Total pounds:
  - Flow (mg) x Concentration (mg/l) x 8.3456 (lb/gal)
  - 0.001034 mg x 7,000 x 8.3456 (lb/gal) = 60,345 lbs

Important conversion:

- 8.3456 lbs per gallon of water
- mg: million gallons
- mg/l: milligrams per liter

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MASS BALANCE EXAMPLE

Calculating Concentration of BOD

Calculate Rocky Mountain Malting Concentration

- Total contributed flow (mg): 0.163502
- Total pounds (lbs): 1,195,885
- BOD concentration (mg/l):
  - lbs / [Flow (mg) * 8.3456 lbs/gal]
  - 1,195,885 / (0.163502 * 8.34) = 887 mg/l

Important conversion:

- 8.3456 lbs per gallon of water
- mg: million gallons
- mg/l: milligrams per liter

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HIGH STRENGTH CATEGORIES

Classification	BOD, mg/l	TSS mg/l
Residential	175 – 250	175 – 250
Auto Steam Cleaning	1,150	1,250
Bakery, Wholesale	1,000	600
Bars – No Dining	200	200
Car Wash	20	150
Retail	150	150
Hospital	250	100
Hotel w/Dining	500	600
Hotel/Motel w/o Dining	310	120
Industrial Laundry	670	680
Laundromat	150	110
Laundry Commercial	450	240
Restaurant	1,000	600

California State Water Resources Control Board, 1988

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ALLOCATED REVENUE REQUIREMENT

Table WW-8

Line No.	Description		Total	Common to All						Common to Customers Served by the Collection System
				Volume	Strength BOD	Strength TSS	Strength TKN	Strength Phosphorus	Customer	
			$	$	$	$	$	$	$	$
	Revenue Requirements									
1	Operation and Maintenance Expenses		6,628,617	1,011,254	916,062	733,704	849,750	766,860	1,273,820	1,077,167
2	Capital Costs		7,300,588	703,143	741,562	884,712	528,080	3,147,794	0	1,295,297
3	**Total Revenue Requirements**		**13,929,205**	**1,714,397**	**1,657,624**	**1,618,415**	**1,377,830**	**3,914,654**	**1,273,820**	**2,372,465**
4	*% Allocation of Gross Revenue Requirement*			*12.3%*	*11.9%*	*11.6%*	*9.9%*	*28.1%*	*9.1%*	*17.0%*
	Adjustments to Revenue Requirement									
5	Biosolids/Land Lease		(99,054)	-	(24,764)	(24,764)	(24,764)	(24,764)	-	-
6	Cogeneration		(99,507)	-	(49,753)	(49,753)	-	-	-	-
7	Other Non-Rate Revenue	(Allocated based on Line 4)	(253,347)	(31,182)	(30,149)	(29,436)	(25,060)	(71,200)	(23,168)	(43,151)
8	Interest Income	(Allocated based on Line 4)	(74,644)	(9,187)	(8,883)	(8,673)	(7,384)	(20,978)	(6,826)	(12,714)
9	Change in Fund Balance	(Allocated based on Line 4)	(762,967)	(93,905)	(90,796)	(88,648)	(75,470)	(214,424)	(69,773)	(129,951)
10	**Total Adjustments**		**(1,289,519)**	**(134,274)**	**(204,345)**	**(201,274)**	**(132,677)**	**(331,366)**	**(99,768)**	**(185,815)**
11	**Total Allocated Revenue Requirement**		**12,639,686**	**1,580,123**	**1,453,279**	**1,417,142**	**1,245,152**	**3,583,288**	**1,174,052**	**2,186,649**
12	*Percent of Total*			*12.50%*	*11.50%*	*11.21%*	*9.85%*	*28.35%*	*9.29%*	*17.30%*

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DEVELOPMENT OF UNIT COST OF SERVICE

Table WW-8 (continued)

Line No.	Description			Total	Common to All: Volume	Common to All: Strength BOD	Common to All: Strength TSS	Common to All: Strength TKN	Common to All: Strength Phosphorus	Common to All: Customer	Common to Customers Served by the Collection System
				$	$	$	$	$	$	$	$
1	**Total Allocated Revenue Requirement**			12,639,686	1,580,123	1,453,279	1,417,142	1,245,152	3,583,288	1,174,052	2,186,649
	Units of Service										
	Units				Billed + I&I 1,000 gal	lbs	lbs	lbs	lbs	Bills	Billed + I&I 1,000 gal
	Values										
2	Inside City				1,912,141	4,144,423	3,814,715	472,231	128,473	200,238	1,912,141
3	Inside City - Low Income				37,482	58,448	77,736	8,797	2,343	7,889	37,482
4	Inside City - Septic Haulers				1,034	60,345	129,311	259	69	40	
5	Lakewood Wholesale				418,259	688,590	915,834	103,638	27,604	24	
6	Outside City				24,966	40,254	53,539	6,059	1,614	388	
7	Outside City - Industrial				1,738	2,806	3,732	422	112	12	
8	**Total Units of Service**				2,395,619	4,994,866	4,994,866	591,406	160,215	208,591	1,949,623
			Differential		Billed + I&I 1,000 gal	lbs	lbs	lbs	lbs	Bills	Billed + I&I 1,000 gal
	Adjusted Units of Service										
9	Inside City				1,912,141	4,144,423	3,814,715	472,231	128,473	200,238	1,912,141
10	Inside City - Low Income	(Line 3 x 70%)	70%	70%	26,237	40,913	54,415	6,158	1,640	5,523	26,237
11	Inside City - Septic Haulers				1,034	60,345	129,311	259	69	40	0
12	Lakewood Wholesale	(Line 5 x 105%)	105%	105%	439,172	723,020	961,625	108,820	28,984	25	0
14	Outside City	(Line 6 x 120%)	120%	120%	29,959	48,305	64,246	7,270	1,936	465	0
15	Outside City - Industrial	(Line 7 x 120%)	120%	120%	2,085	3,367	4,479	507	135	14	0
16	**Total Adjusted Units of Service**				2,410,629	5,020,374	5,028,792	595,245	161,238	206,305	1,938,378
	Inside City, $ per Unit										
17	Inside City				0.6555	0.2895	0.2818	2.0918	22.2236	5.6909	1.1281
18	Inside City - Low Income				0.4588	0.2026	0.1973	1.4643	15.5565	3.9836	0.7897
	Outside City, $ per Unit										
19	Outside City				0.7866	0.3474	0.3382	2.5102	26.6684	6.8290	1.3537
20	Lakewood Wholesale				0.6883	0.3040	0.2959	2.1964	23.3348	5.9754	1.1845

DISTRIBUTION OF COSTS TO CUSTOMER CLASSES (inside city)

Table WW-9

Line No.	Description		Total	Common to All: Volume	Common to All: Strength BOD	Common to All: Strength TSS	Common to All: Strength TKN	Common to All: Strength Phosphorus	Common to All: Customer	Common to Customers Served by the Collection System
			$	$	$	$	$	$	$	$
	Unit Costs of Service - $/unit									
1	Inside City			0.6555	0.2895	0.2818	2.0918	22.2236	5.6909	1.1281
2	Inside City - Low Income	(Line 1 x 70%)		0.4588	0.2026	0.1973	1.4643	15.5565	3.9836	0.7897
3	Outside City	(Line 1 x 120%)		0.7866	0.3474	0.3382	2.5102	26.6684	6.8290	1.3537
4	Lakewood Wholesale	(Line 1 x 105%)		0.6883	0.3040	0.2959	2.1964	23.3348	5.9754	1.1845
	Inside City									
	Single Family									
5	Units			859,923	1,345,703	1,789,802	202,538	53,946	163,480	859,923
6	Cost of Service - $	(Line 5 x Line 1)	4,980,540	563,664	389,549	504,376	423,676	1,198,873	930,338	970,064
	Multifamily									
7	Units			323,755	517,680	688,521	77,915	20,752	20,963	323,755
8	Cost of Service - $	(Line 7 x Line 1)	1,664,802	212,216	149,856	194,029	162,985	461,196	119,298	365,222
	Nonresidential									
9	Units			346,321	555,587	738,938	83,620	22,272	15,711	346,321
10	Cost of Service - $	(Line 9 x Line 1)	1,746,045	227,007	160,829	208,237	174,919	494,967	89,409	390,678
	Inside City - Low Income									
11	Units			37,482	58,448	77,736	8,797	2,343	7,889	37,482
12	Cost of Service - $	(Line 11 x Line 2)	154,732	17,198	11,843	15,335	12,881	36,449	31,428	29,598
	Large Industrial Customer									
13	Units			215,630	529,568	377,913	60,432	15,139	72	215,630
14	Cost of Service - $	(Line 13 x Line 1)	1,107,664	141,342	153,297	106,498	126,415	336,454	410	243,249
	Rocky Mtn Malting									
15	Units			166,512	1,195,885	219,541	47,726	16,363	12	166,512
16	Cost of Service - $	(Line 15 x Line 1)	1,168,589	109,145	346,180	61,868	99,835	363,652	68	187,839
	Septic Haulers									
17	Units			1,034	60,345	129,311	259	69	40	0
18	Cost of Service - $	(Line 17x Line 1)	56,888	678	17,468	36,441	541	1,533	228	0
19	**Total Inside City**		10,879,258	1,271,249	1,229,024	1,126,783	1,001,251	2,893,123	1,171,178	2,186,649

DISTRIBUTION OF COSTS TO CUSTOMER CLASSES
outside city

Table WW-9 (continued)

Line No.	Description		Total	Common to All Strength: Volume	BOD	TSS	TKN	Phosphorus	Customer	Common to Customers Served by the Collection System
			$	$	$	$	$	$	$	$
	Unit Costs of Service - $/unit									
20	Outside City	(Line 20 x 120%)		0.7866	0.3474	0.3382	2.5102	26.6684	6.8290	1.3537
21	Lakewood Wholesale	(Line 20 x 105%)		0.6883	0.3040	0.2959	2.1964	23.3348	5.9754	1.1845
	Outside City									
	Single Family									
22	Units			24,966	40,254	53,539	6,059	1,614	388	0
23	Cost of Service - $	(Line 20 x Line 22)	112,617	19,638	13,983	18,105	15,208	43,034	2,649	0
	Agricultural Company									
24	Units			1,738	2,806	3,732	422	112	12	0
25	Cost of Service - $	(Line 20 x Line 24)	7,746	1,367	975	1,262	1,060	3,000	82	0
	Lakewood Wholesale									
26	Units			418,259	688,590	915,834	103,638	27,604	24	0
27	Cost of Service - $	(Line 21 x Line 26)	1,640,065	287,869	209,297	270,991	227,633	644,131	143	0
28	**Total Outside City**		**1,760,428**	**308,874**	**224,255**	**290,359**	**243,901**	**690,165**	**2,874**	**0**
29	**Total System**		**12,639,686**	**1,580,123**	**1,453,279**	**1,417,142**	**1,245,152**	**3,583,288**	**1,174,052**	**2,186,649**

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COMPARISON OF COST OF SERVICE TO REVENUE UNDER EXISTING RATES

Table WW-10

Line No.	Customer Class	Cost of Service	Revenue Under Existing Rates	Indicated Adjustment
		$	$	%
	Inside City			
1	Single Family	4,980,540	5,125,086	-2.8%
2	Multifamily	1,664,802	1,577,471	5.5%
3	Nonresidential	1,746,045	1,650,560	5.8%
4	Inside City - Low Income	154,732	173,170	-10.6%
5	Large Industrial Customer	1,107,664	909,666	21.8%
6	Rocky Mtn Malting	1,168,589	990,083	18.0%
7	Septic Haulers	56,888	87,861	-35.3%
8	**Total Inside City**	**10,879,258**	**10,513,897**	**3.5%**
	Outside City			
9	Single Family	112,617	138,585	-18.7%
10	Agricultural Company	7,746	7,931	-2.3%
11	Lakewood Wholesale	1,640,065	1,611,128	1.8%
12	**Total Outside City**	**1,760,428**	**1,757,643**	**0.2%**
13	**Total System**	**12,639,686**	**12,271,540**	**3.0%**

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DEVELOPMENT OF MONTHLY SERVICE

Table WW-11

Line No	Description		Units
	MONTHLY SERVICE CHARGE		
1	Total Customer Costs	$1,174,052	From Unit Cost of Service Table WW-8, Line 1, Customer Costs
2	Bills	$206,229	From Table WW-5, Units of Service, Line 12 (Ex. Wholesale and septic)
3	Monthly Service Charge	$5.69	$ per bill
4	Customer-Related I&I Costs	$0.11	Volume Rate, $ per 1,000 gallons * Customer-Related I&I Flow/(Total Bills Less Wholesale and Septic)
5	Total Service Charge	$5.80	

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DEVELOPMENT OF VOLUME RATE

Table WW-12

Line No	Customer Class	(a) Cost of Service $	(b) Bills $	(c) Monthly Service Charge $	(d)=(c)*(b) Service Charge Revenue $	(e)=(a)-(d) Volume Rate Revenue $	(f) Billed Billable Volume 1,000 gallons	(g)=(e)/(f) Volume Rate $ per Kgal
1	Single Family	4,980,540	163,480	5.80	948,814	4,031,726	817,398	4.93
2	Multifamily	1,664,802	20,963	5.80	121,667	1,543,135	314,446	4.91
3	Nonresidential	1,746,045	15,711	5.80	91,184	1,654,860	337,471	4.90
4	Inside City - Low Income	154,732	7,889	5.80	45,788	108,943	35,502	3.07
5	Large Industrial Customer	1,107,664	72	5.80	418	1,107,246	211,724	5.23
6	Rocky Mtn Malting	1,168,589	12	5.80	70	1,168,519	163,502	7.15
7	Septic Haulers	56,888	40	5.80	232	56,656	1,034	54.81
8	**Total Inside City**	**10,879,258**	**208,167**		**1,208,173**	**9,671,085**	**1,881,077**	**5.14**
	Outside City							
9	Single Family	112,617	388	5.80	2,251	110,366	24,451	4.51
10	Agricultural Company	7,746	12	5.80	70	7,676	1,704	4.50
11	Lakewood Wholesal	1,640,065	24	5.80	139	1,639,925	418,259	3.92
12	**Total Outside City**	**1,760,428**	**424**		**2,460**	**1,757,968**	**444,414**	**3.96**
13	**Total System**	**12,639,686**			**1,210,633**	**11,429,053**	**2,325,491**	**4.91**

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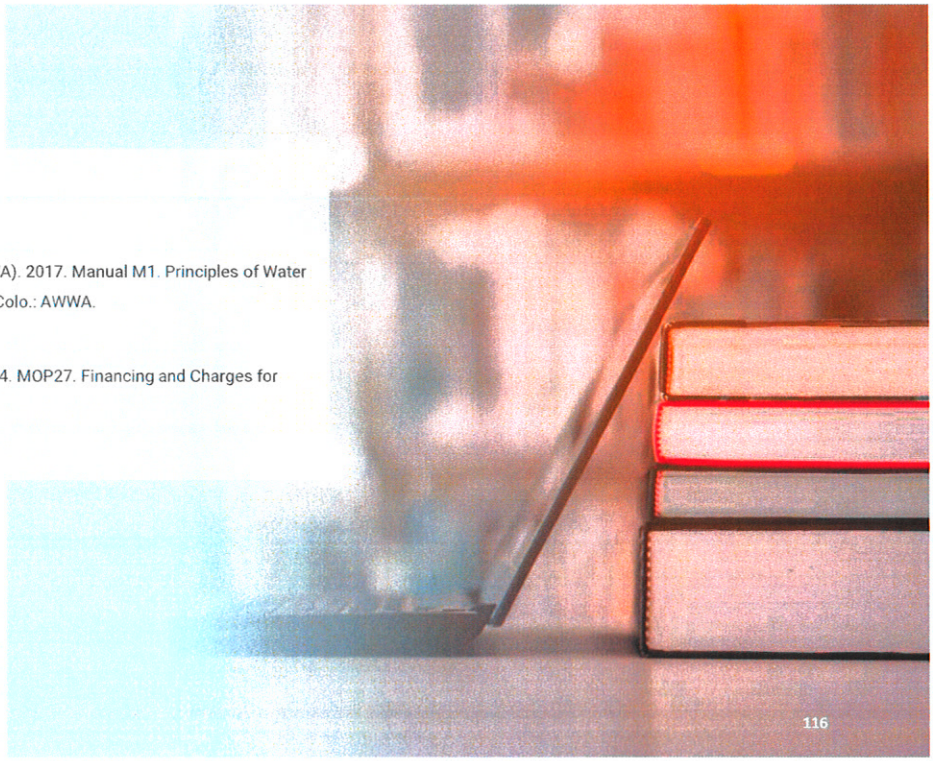
RESOURCES

For more information, visit:

American Water Works Association (AWWA). 2017. Manual M1. Principles of Water Rates, Fees and Charges. 7th ed. Denver, Colo.: AWWA.

Water Environment Federation (WEF). 2014. MOP27. Financing and Charges for Wastewater Systems.



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August 15 – 17, 2023

DAY 2

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