

Metropolitan Planning Council

Drinking Water 1-2-3 Academy

Building the Foundation for Equitable Water Rates

July 23, 2019

Agenda

1 – Revenue Requirements

2 – Cost of Service Analysis

3 – Rate Design Analysis

4 – Questions

Source: American Water Works Association Manual of Practice M1:
Principles of Water Rates, Fees, and Charges

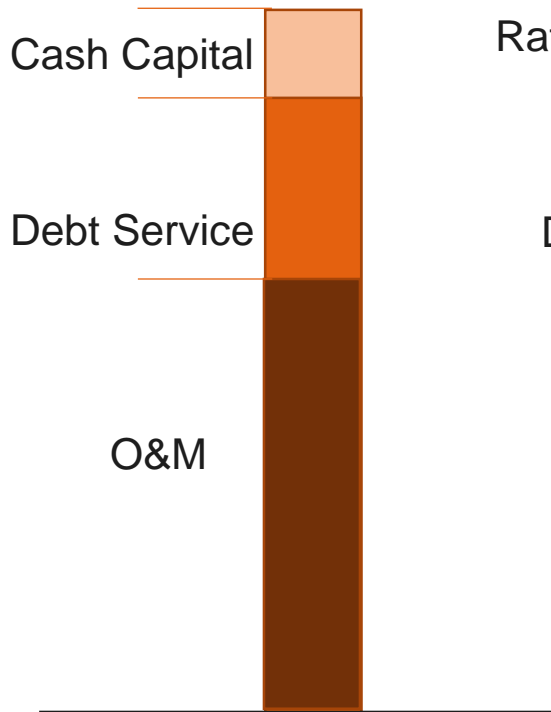
Revenue Requirements

Water Revenue Requirements

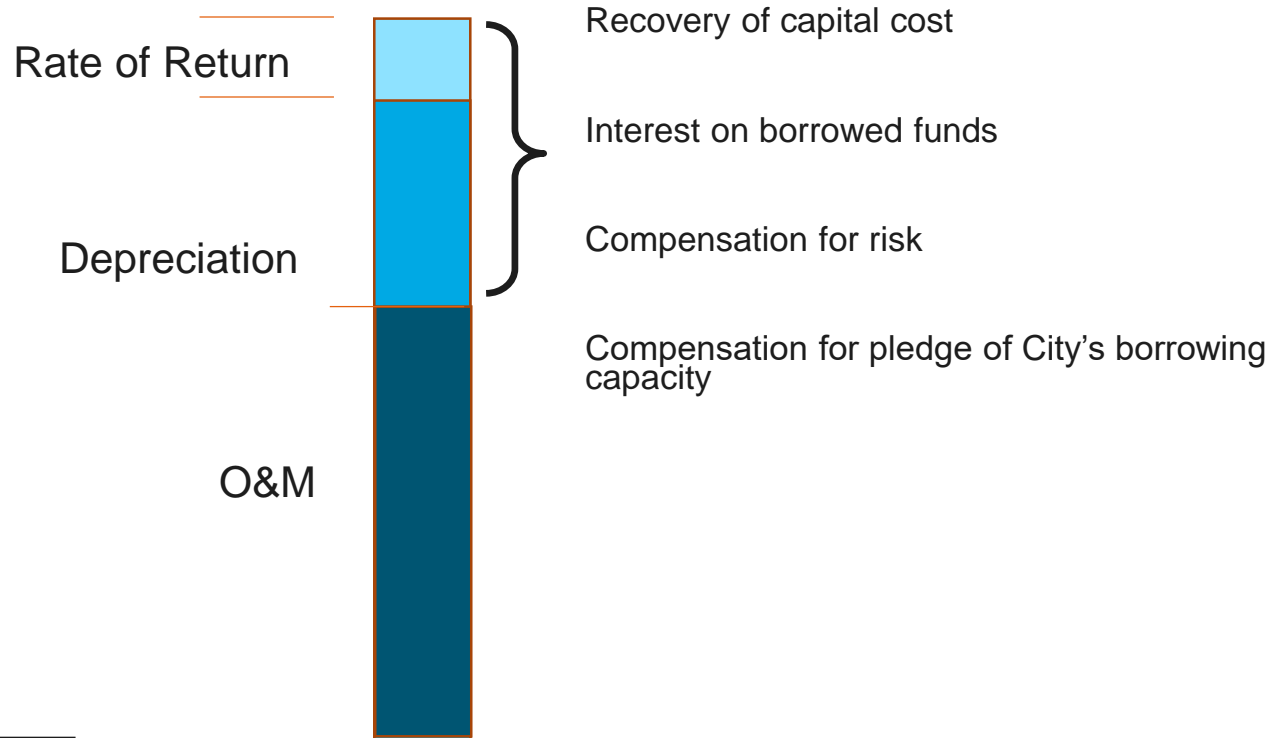
- Used to calculate sufficient funding for water utility
- Identified and performed in accordance with American Water Works Association Manual of Practice M1: Principles of Water Rates, Fees, and Charges
- Revenue Requirements
 - Operation and maintenance (O&M) expenses
 - Debt service or loan payments
 - Minor equipment or capital repair and replacement
 - Major cash funded capital
 - Transfer to/from reserves
 - Payments in lieu of taxes

Revenue Requirement Components

Cash Needs Approach



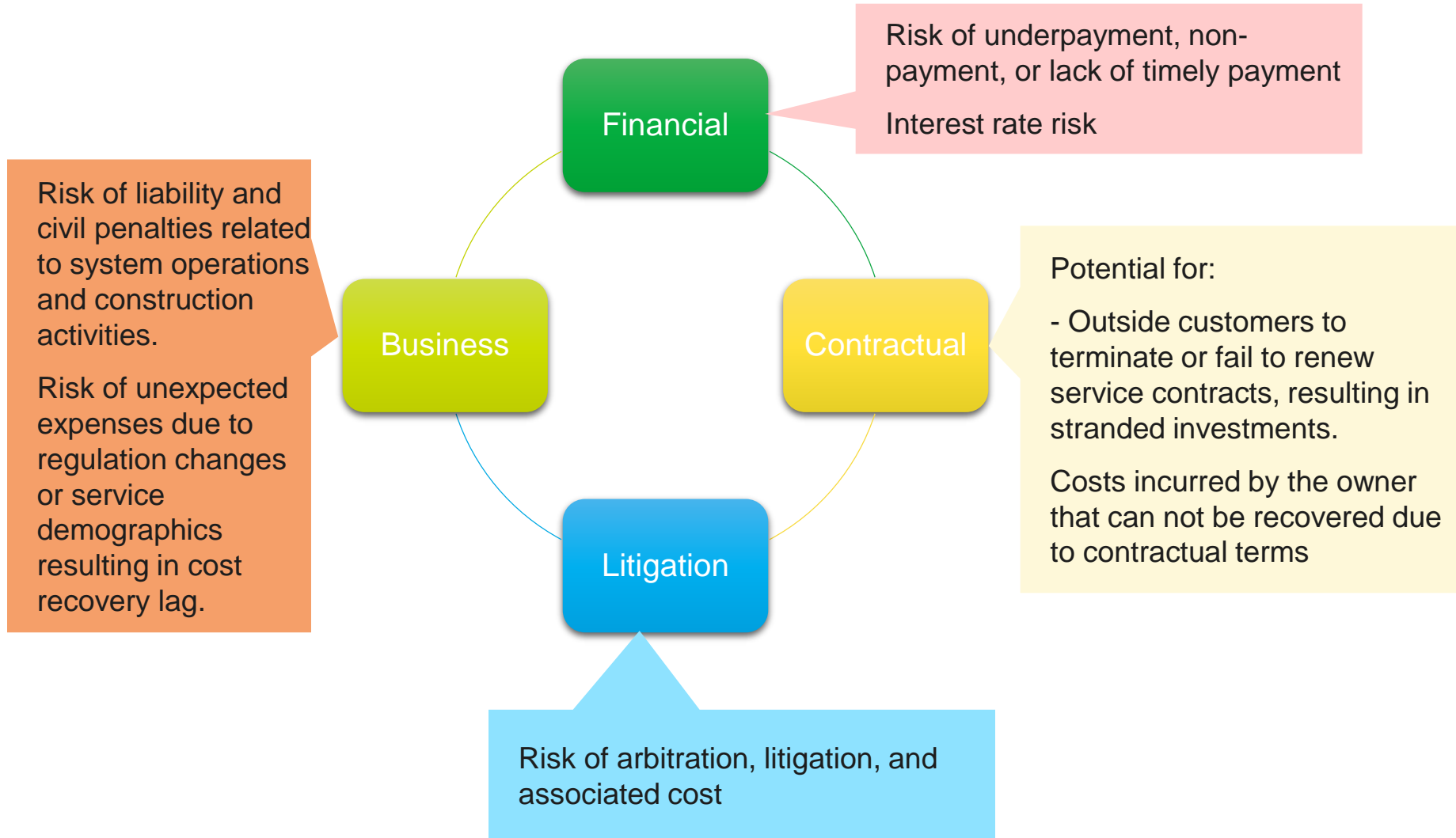
Utility Basis Approach



Why a Rate of Return?

1. Recovery of debt financing costs
2. Compensates for opportunity costs (if no debt)
3. Provides fair compensation for:
 - Use of the City's borrowing capacity
 - Ownership risks of providing service to Outside-city customers

Ownership Risks



Revenue Requirements: Case Study

- Hybrid approach was used to determine revenue requirements
- Revenue requirements for Outside-city customers was calculated with utility basis approach
- Revenue requirements for Inside-city customers developed on cash needs basis and subtracting Outside-City revenue requirements

Cash Needs Approach

O&M Expense
 + Pay-As-You-Go Capital
 + Debt Service Expense
+/-Sources (Uses) of Cash Reserves
 Annual Revenue Requirement

Utility Basis Approach

O&M Expense
 + Depreciation
 + Outside-City Rate of Return
+ Inside-City Rate of Return
 Annual Revenue Requirement

Hybrid Approach

Cash Needs Revenue Requirement = Utility Basis Revenue Requirement
 (by adjusting the inside-city rate of return)

Revenue Requirements: Case Study

Description	Actual		Projected		
	2012	2013	2014	2015	2016
Operation and Maintenance Expenses	\$ 100,033,298	\$ 99,743,967	\$ 110,628,241	\$ 115,625,339	\$ 119,208,092
Capital Expenditures					
Debt Service	\$ 65,997,292	\$ 71,244,520	\$ 79,222,875	\$ 86,301,468	\$ 97,312,802
Capital Outlay-Equipment	834,934	973,233	2,373,969	2,432,400	2,481,048
<i>Total Capital Expenditures</i>	\$ 66,832,226	\$ 72,217,754	\$ 81,596,844	\$ 88,733,868	\$ 99,793,850
Less: Revenue From Other Sources					
System Capacity Charges	\$ 3,867,888	\$ 4,763,123	\$ 4,800,000	\$ 4,848,000	\$ 4,896,480
Investment Income	1,064,763	1,241,051	1,292,000	1,304,920	1,317,969
Sewer Billing Charges	6,730,001	6,355,055	6,462,000	6,655,860	6,855,536
Penalties	2,044,188	2,063,031	2,031,000	2,051,310	2,071,823
Meter Service Fees	503,401	582,490	554,000	559,540	565,135
Debt Refinancing	3,621,455	1,882,869	343,000	-	-
Encumbrance Cancellation	-	-	5,650,111	5,902,887	6,084,457
Other	4,847,436	8,143,761	4,119,000	4,160,190	4,201,792
Uses (Deposits) of Cash Reserves	(17,635,244)	(11,742,288)	1,612,975	8,534,000	14,360,737
<i>Subtotal</i>	\$ 5,043,888	\$ 13,289,092	\$ 26,864,085	\$ 34,016,707	\$ 40,353,929
Total Rate Revenue Requirement	\$ 161,821,636	\$ 158,672,628	\$ 165,361,000	\$ 170,342,500	\$ 178,648,013
Restatement of Revenue Requirements					
Operation and Maintenance Expense	\$ 82,286,817	\$ 80,716,761	\$ 91,469,131	\$ 96,295,552	\$ 99,429,348
Capital Expense	79,534,819	77,955,867	73,891,870	74,046,948	79,218,664
Total Rate Revenue Requirement	\$ 161,821,636	\$ 158,672,628	\$ 165,361,000	\$ 170,342,500	\$ 178,648,013

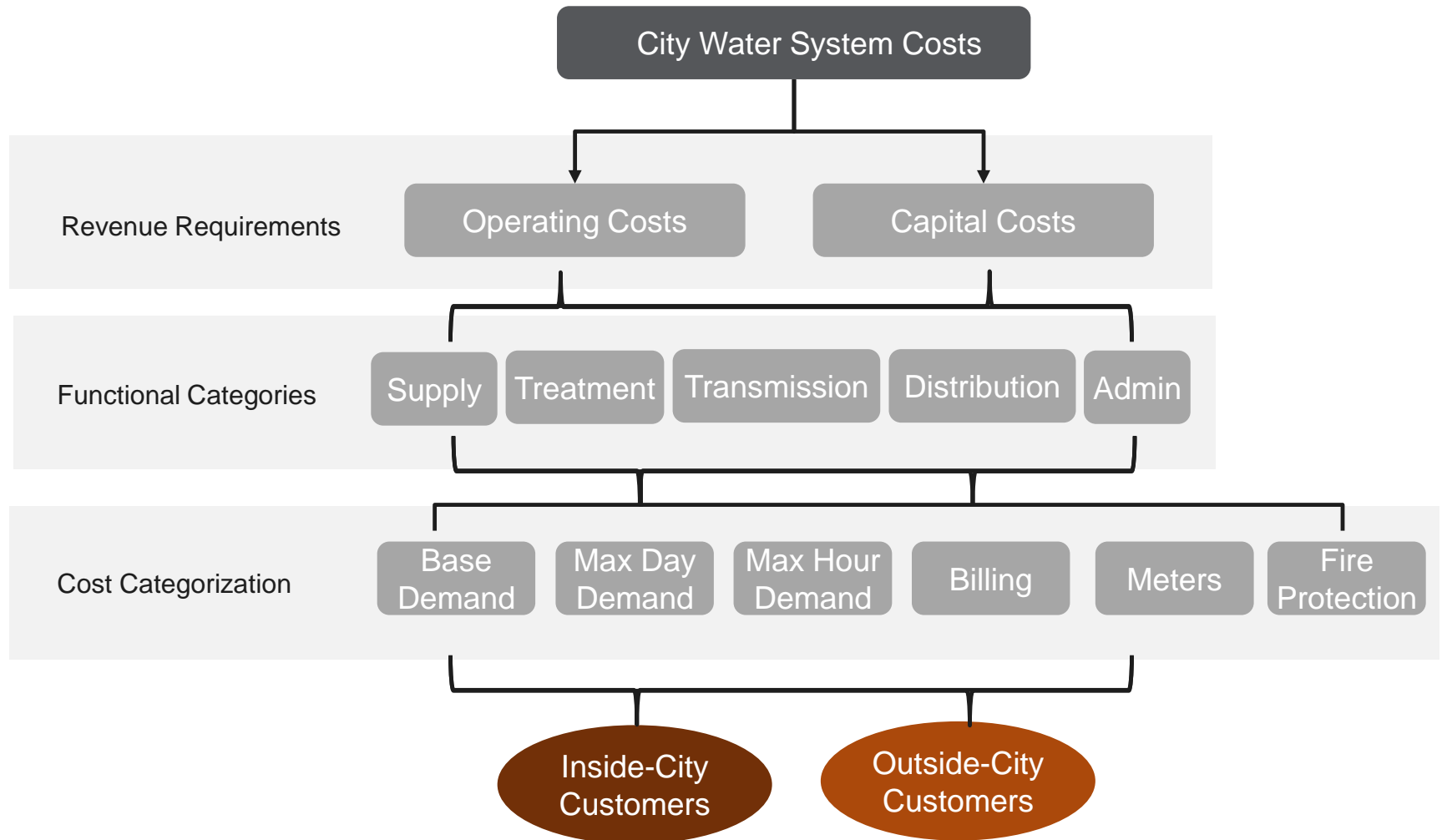
Cost of Service Analysis

Cost of Service Analysis

- The cost of service analysis step is used to allocate revenue requirements to customer classes in a fair and equitable manner.
- Two methods for assigning costs:
 1. Base-excess capacity
 2. Commodity-demand method
- Case study uses base-excess capacity method

Both distribute revenue requirements to customers based on costs incurred to meet their specific needs.

Cost Allocation Framework



Functional and Cost Category Allocation

- Functional categories are defined by type of operation within the water utility
- Cost categories identify cost drivers imposed on the system by different types of customers

Facilities are designed to meet cost drivers and expenses are linked to service requirements.

Allocation to Cost Categories

- Base Costs – Include costs associated with handling average daily water demands (i.e. costs that vary with the amount of water consumption).
- Maximum Day Extra Capacity Costs – Include costs associated with providing system capacity to meet maximum day water demands (“MDD”) in excess of average daily demands.
- Maximum Hour Extra Capacity Costs – Include costs associated with providing system capacity to meet maximum hour water demands (“MHD”).
- Customer Costs – Include costs that vary in proportion to the number or type of customers served.
- Billing Costs – Include costs associated with preparing and issuing customer bills and applying payment as it is received.
- Equivalent Meter Costs – Include costs associated with services where the costs vary by the size of the meter or service line. Examples of such costs include the cost to maintain, service, and replace water meters.
- Fire Protection Costs – Include costs related to providing fire protection to system customers. Such costs include maintaining and servicing fire hydrants in a manner sufficient to provide fire suppression capabilities throughout the City.

O&M Cost Allocation – Case Study

Functional Category	Allocation	Rationale
Source of Supply	100% Base	Source of supply facilities are designed to meet total supply requirements.
Treatment	63% Base 37% MDD	Designed to meet maximum daily demands.
Transmission / Distribution	27.9% Base (All) 15.9% MDD (All) 6.0% MHD (All) 15.3% Base (Inside) 8.7% MDD (Inside) 3.3% MHD (Inside) 10.9% Base (Outside) 6.2% MDD (Outside) 2.3% MHD (Outside) 2.6% Eq Meter 0.9% Fire Protection	Allocated based on the weighted average of transmission, distribution, pump stations, meters, and hydrant capital cost allocations.
Customer Service and Billing	100% Number of Bills	Customer service and billing is a function of the number of customers that are served and the number of bills that are issued.
Meters	75% Equivalent Meters 25% Number of Customers	Meter maintenance costs are based on the size of the meter installed and number of customers.
Administration and General	Average	Allocated based on the weighted average of all other locations.

Percentages determined from operating history or design.

Units of Service

Customer Classification	Annual Usage (CCF)	Avg Day Usage (CCF)	Max Day (MD)			Max Hour (MH)			Annual Bills	Equivalent Meters
			MD/AD Factor	Total Capacity (CCF/day)	Extra Capacity (CCF/day)	MH/MD Factor	Total Capacity (CCF/day)	Extra Capacity (CCF/day)		
Inside City										
Residential	11,712,316	32,089	3.98	127,617	95,528	5.70	182,854	55,237	586,870	150,651
Multi-Family Residential	9,132,343	25,020	3.81	95,253	70,233	5.45	136,482	41,229	50,558	42,959
Commercial ¹	5,476,212	15,003	2.46	36,965	21,962	3.29	49,287	12,322	45,343	74,264
Industrial	2,087,922	5,720	1.67	9,550	3,830	2.23	12,733	3,183	7,802	29,564
Government/Institutional	1,826,671	5,005	2.46	12,330	7,326	3.29	16,440	4,110	8,399	15,517
Exception ²	3,309,965	9,068	2.46	22,343	13,274	3.29	29,790	7,448	0	0
High Use - ANHS	1,101,500	3,018	1.30	3,935	917	1.74	5,247	1,312	34	120
High Use - OSU	474,719	1,301	1.93	2,507	1,206	2.76	3,592	1,085	34	120
Subtotal	35,121,648	96,224		310,500	214,276		436,426	125,926	699,040	313,195
Outside City										
Residential	5,137,204	14,075	4.84	68,149	54,074	6.94	97,646	29,497	249,582	69,677
Multi-Family Residential	1,097,785	3,008	3.75	11,277	8,269	5.37	16,157	4,881	15,444	8,706
Commercial ¹	2,097,934	5,748	2.74	15,757	10,009	3.66	21,010	5,252	17,894	36,669
Industrial	277,131	759	1.89	1,432	673	2.51	1,909	477	546	1,690
Government/Institutional	282,883	775	2.74	2,125	1,350	3.66	2,833	708	2,120	7,956
Exception ²	246,111	674	2.74	1,848	1,174	3.66	2,465	616	0	0
Subtotal	9,139,048	25,038		100,588	75,549		142,020	41,432	285,586	124,698

In order to distribute costs to each customer class, units of service for each one must be identified for test year.

Cost of Service – Commodity Rates

Customer Classification	Cost of Service Rate (\$ / CCF)	Outside-City Multiplier
Inside City		
Residential	\$3.09	N/A
Multi-Family Residential	\$3.02	N/A
Commercial	\$2.47	N/A
Industrial	\$2.16	N/A
Government/Institutional	\$2.47	N/A
Exception	\$2.47	N/A
High Use - Brewery	\$2.02	N/A
High Use - University	\$2.27	N/A
Subtotal		
Outside City		
Residential	\$4.63	1.50
Multi-Family Residential	\$4.05	1.34
Commercial	\$3.49	1.41
Industrial	\$3.05	1.41
Government/Institutional	\$3.49	1.41
Exception	\$3.49	1.41
Subtotal		
Master Meter	\$2.46	N/A

Rates reflect cost responsibility of each customer class.

Cost of Service – Service Charges

Quarterly Billed Customers - Per Month

Meter Size	Existing 2014 Charges			2015 COS Charges		
	Inside City	Non-Contract	Contract	Inside City	Non-Contract	Contract
5/8"	\$7.27	\$10.91	\$9.45	\$6.70	\$6.71	\$6.71
3/4"	\$7.44	\$11.16	\$9.67	\$7.59	\$7.61	\$7.61
1"	\$7.82	\$11.73	\$10.17	\$9.37	\$9.40	\$9.40
1 1/2"	\$11.32	\$16.98	\$14.72	\$13.82	\$13.87	\$13.87
2"	\$24.17	\$36.26	\$31.42	\$19.16	\$19.24	\$19.24
3"	\$30.49	\$45.74	\$39.64	\$33.40	\$33.56	\$33.56
4"	\$47.48	\$71.22	\$61.72	\$49.42	\$49.67	\$49.67
6"	\$138.67	\$208.01	\$180.27	\$93.92	\$94.42	\$94.42
8"	\$202.31	\$303.47	\$263.00	\$147.32	\$148.12	\$148.12
10"	\$345.47	\$518.21	\$449.11	\$209.62	\$210.77	\$210.77
12"	\$353.93	\$530.90	\$460.11	\$387.62	\$389.77	\$389.77
16"	\$356.07	\$534.09	\$462.88	\$387.62	\$389.77	\$389.77

Monthly Billed Customers - Per Month

Meter Size	Existing 2014 Charges			2015 COS Charges		
	Inside City	Non-Contract	Contract	Inside City	Non-Contract	Contract
5/8"	\$31.75	\$47.63	\$41.28	\$16.55	\$16.57	\$16.57
3/4"	\$32.21	\$48.32	\$41.87	\$17.44	\$17.47	\$17.47
1"	\$32.73	\$49.10	\$42.55	\$19.22	\$19.27	\$19.27
1 1/2"	\$41.62	\$62.43	\$54.11	\$23.67	\$23.77	\$23.77
2"	\$54.43	\$81.65	\$70.76	\$29.01	\$29.17	\$29.17
3"	\$70.80	\$106.20	\$92.04	\$43.25	\$43.57	\$43.57
4"	\$77.77	\$116.66	\$101.10	\$59.27	\$59.77	\$59.77
6"	\$242.74	\$364.11	\$315.56	\$103.77	\$104.77	\$104.77
8"	\$340.50	\$510.75	\$442.65	\$157.17	\$158.77	\$158.77
10"	\$375.73	\$563.60	\$488.45	\$219.47	\$221.77	\$221.77
12"	\$384.26	\$576.38	\$499.53	\$397.47	\$401.77	\$401.77
16"	\$386.35	\$579.53	\$502.26	\$397.47	\$401.77	\$401.77

Rate Design Analysis

Rate Design Objectives

Pricing objectives for the case study:

- Ensure equitable recovery of water system costs from customers
- Maintain contract and non-contract rate multipliers with Outside-city customers
- Maintain or enhance stability of water revenues

Utility rates are a function of costs and customer demands.

Rate Design Analysis

Water rate design alternatives to align existing rates and charges with cost of service results:

- Across-the-board rate increase.
- Increase billing and service charges by 15% and keep commodity rates the same for an overall increase of 3%.
- Adjust billing and service charge ratios to better align charges with cost of service results and increase them for an overall rate increase of 3%. Commodity rates would stay the same.
- Overall rate increase of 3% was applied to billing and service charges and commodity rates by limiting the increase of billing and service charges to 10%.

Rate design alternatives provide different levels of revenue stability based on how fixed charges are increased.

QUESTIONS?

Utility basis approach benefits



Utility Basis Approach recovers capital costs through depreciation and a rate of return



Commonly used to establish cost of service for outside jurisdictional customers



Has benefit of smoothing out revenue requirements and provides for compensation for borrowing capacity and risk



Rate of return recovers financing costs and can compensate for contractual, financial, litigation, and business risks

Common Methods of Determining Cost of Equity

1. Equity returns approved by Public Service Commissions
 - Ohio American Water Company (7.47% in 2014)
2. US Treasury Rate + Risk Premium
 - Treasury Rate Currently 2.52% (10-17-16)
3. Debt Interest Cost x Multiplier
 - Utility's Weighted Debt Interest Cost = 4.0%

Utility Basis Example 1

Assumptions:

City incurs \$1 million in capital cost

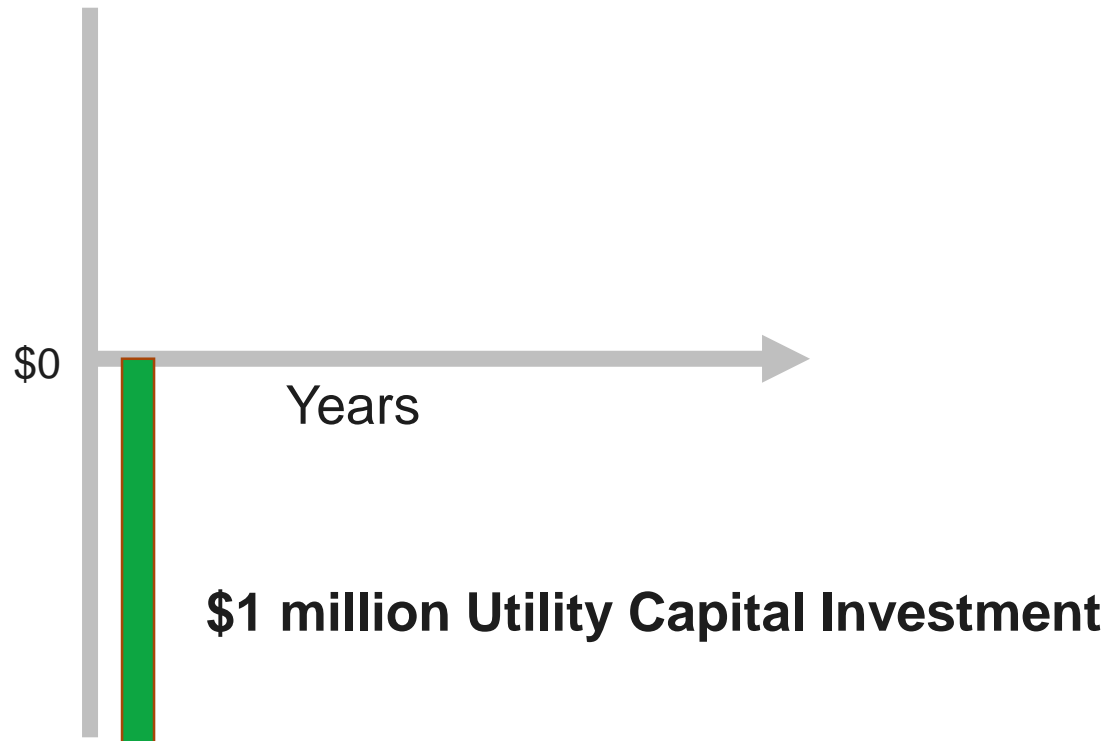
Pays for the project with cash

Capital asset has a 10-year life

Question:

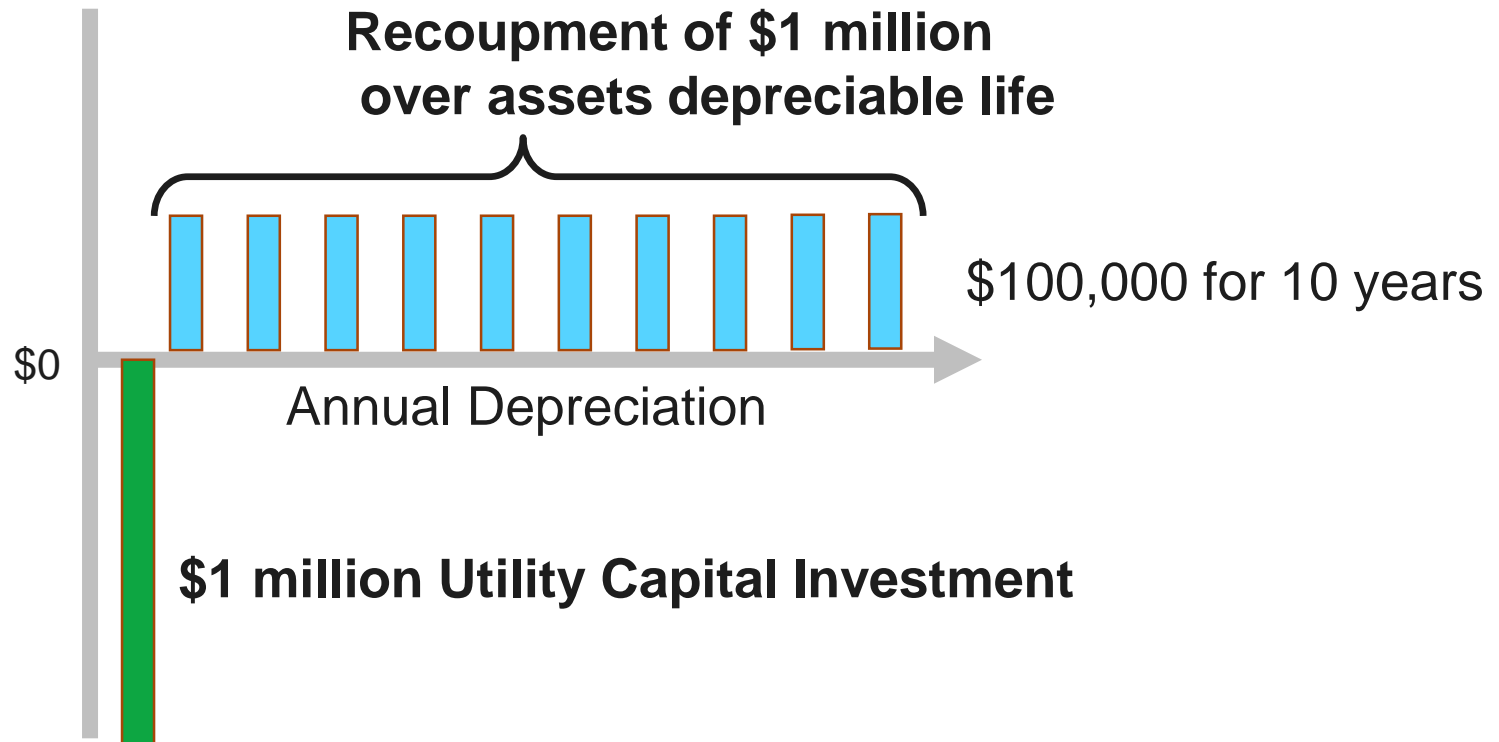
How would the recover the cost using a utility basis approach?

a. Examine the Project Cash Flow



b. Forecast Depreciation

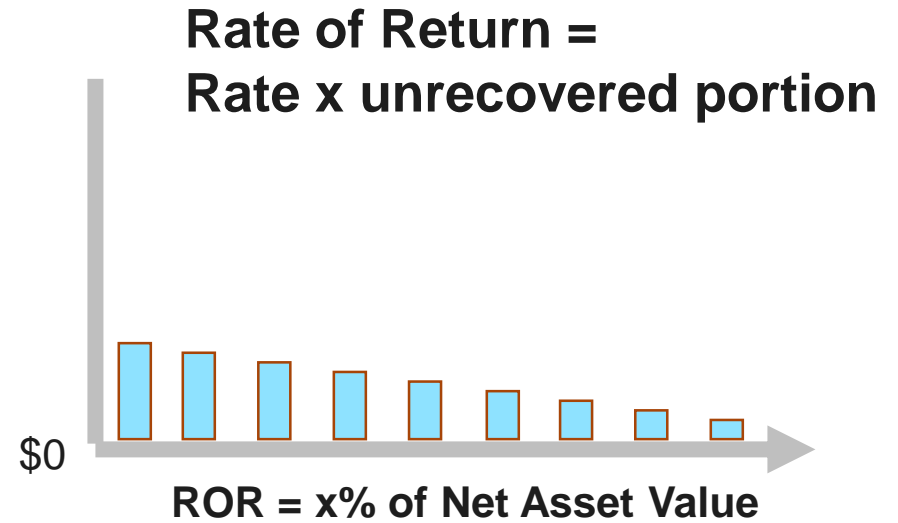
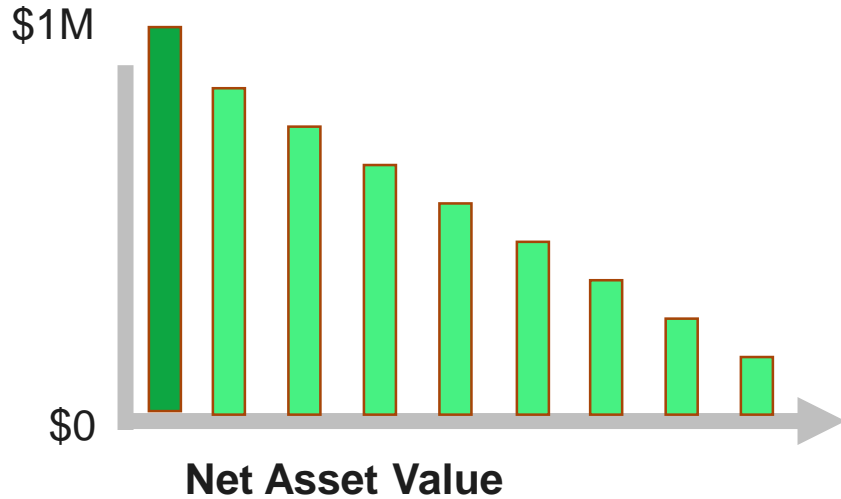
Depreciation = Return of Capital



c. Estimate Rate of Return

Rate of Return = Return on Capital

Unrecovered portion of capital



	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Net Asset Value	\$1,000,000	900,000	800,000	700,000	600,000	500,000	400,000	300,000	200,000	100,000	\$0
ROR	50,000	45,000	40,000	35,000	30,000	25,000	20,000	15,000	10,000	5,000	\$0

Assume Rate of Return = 5%

d. Examine the Total City Cash Flow

	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Capital Cost	-\$1,000,000										

Cost Recovery:

Depreciation		100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Return	50,000	45,000	40,000	35,000	30,000	25,000	20,000	15,000	10,000	5,000	\$0
Total	50,000	145,000	140,000	135,000	130,000	125,000	120,000	115,000	110,000	105,000	100,000

Cumulative	-950,000	-805,000	-665,000	-530,000	-400,000	-275,000	-155,000	-40,000	70,000	175,000	275,000
------------	----------	----------	----------	----------	----------	----------	----------	---------	--------	---------	---------

Utility Basis Example 2

Assumptions:

City incurs \$1 million in capital cost

Pays for the project with debt

Terms of debt (7 years at 3.5% interest)

Capital asset has a 10-year life

Question:

How would the recover the cost using a utility basis approach?

a. Examine the Project Cash Flow

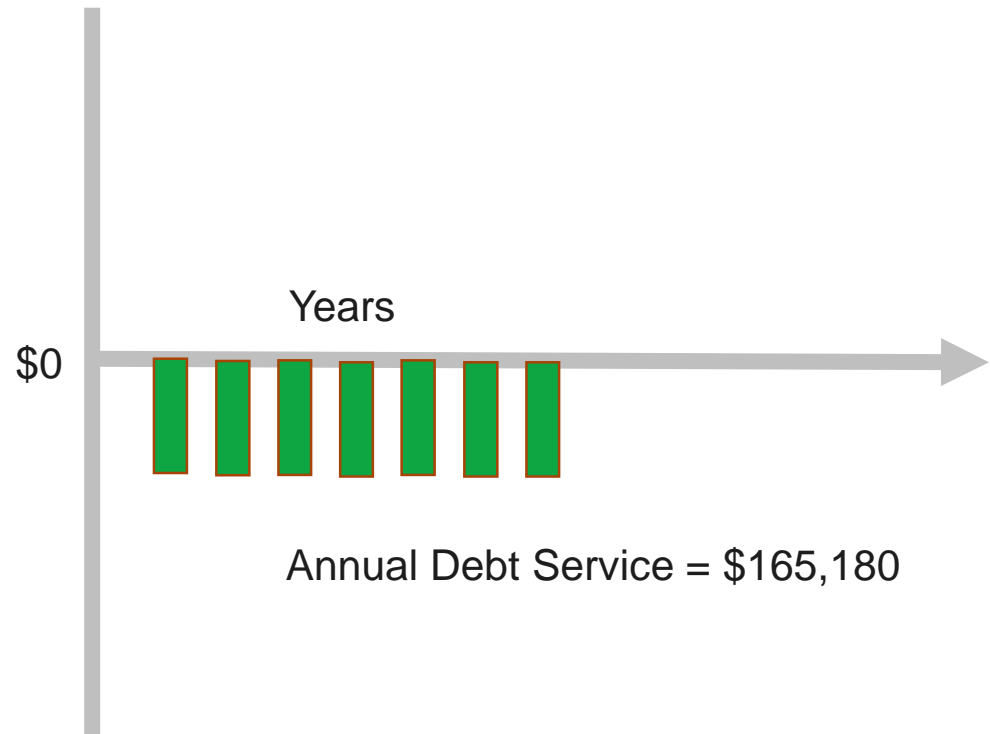
Debt Service Capital Investment

Amount Financed: \$1,000,000

Interest Rate: 3.5%

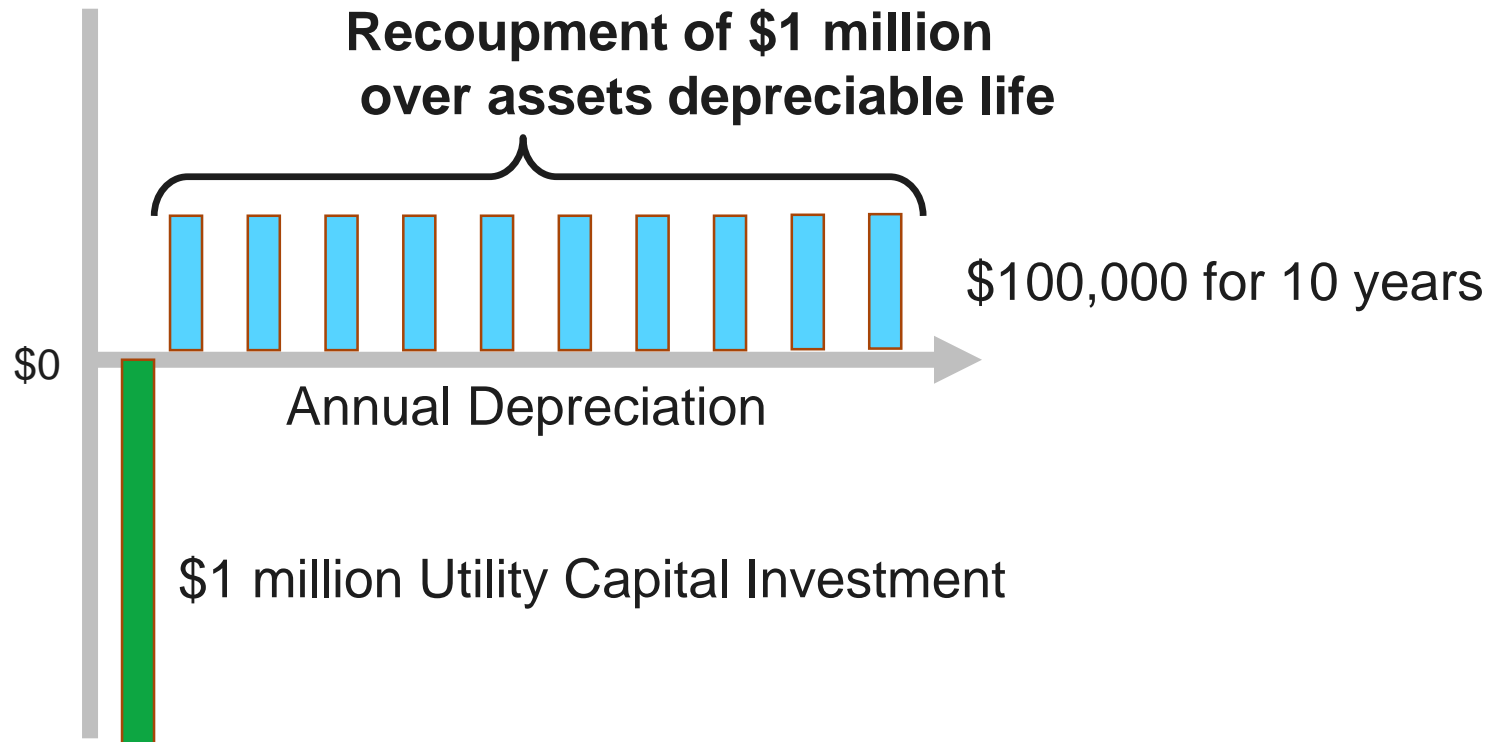
Term: 7 years

Issuance Cost = 1%



b. Forecast Depreciation

Depreciation = Return of Capital

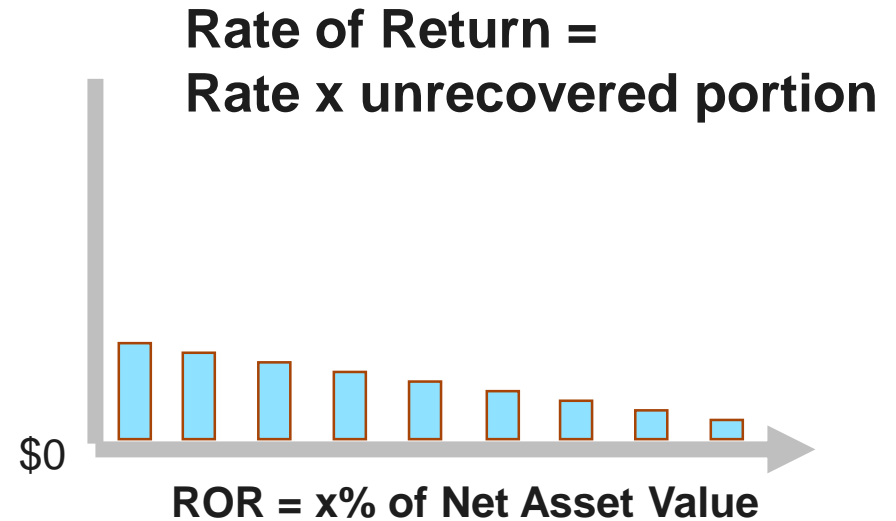
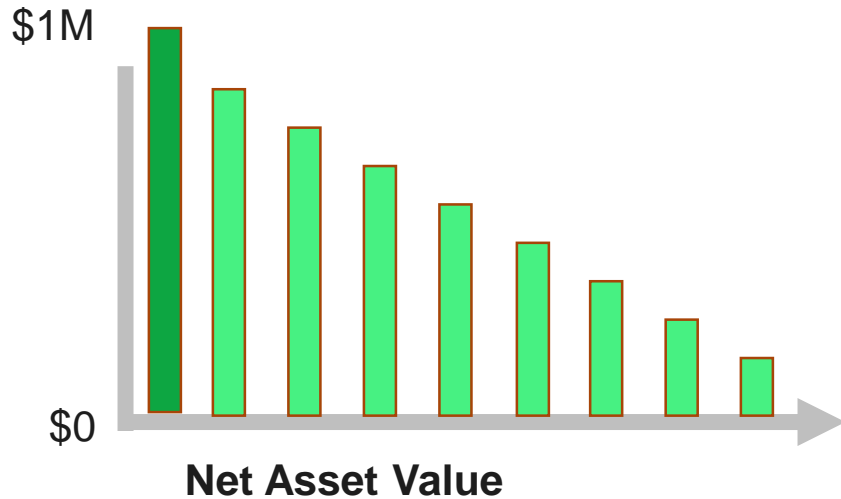


Same as Example 1 – No change

c. Estimate Rate of Return

Rate of Return = Return on Capital

Unrecovered portion of capital



	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Net Asset Value	\$1,000,000	900,000	800,000	700,000	600,000	500,000	400,000	300,000	200,000	100,000	\$0
ROR	50,000	45,000	40,000	35,000	30,000	25,000	20,000	15,000	10,000	5,000	\$0

Assume Rate of Return = 5%

Same as Example 1 – No change

d. Examine the Total City Cash Flow

	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Capital Cost		-165,180	-165,180	-165,180	-165,180	-165,180	-165,180	-165,180			

Cost Recovery:

Depreciation		100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Return	50,000	45,000	40,000	35,000	30,000	25,000	20,000	15,000	10,000	5,000	\$0
Total Revenue	50,000	145,000	140,000	135,000	130,000	125,000	120,000	115,000	110,000	105,000	100,000

Cash Flow	50,000	-20,180	-25,180	-30,180	-35,180	-40,180	-45,180	-50,180	110,000	105,000	100,000
Cumulative	50,000	29,820	4,640	-25,540	-60,720	-100,900	-146,080	-196,260	-86,260	18,740	118,740

Summary of the Utility Basis Capital Cost Recovery Approach

- Capital costs allocated based on depreciation expense and return on rate base.

Reason for Using the Utility Basis Approach

1. Results in more stable revenue requirements than the cash basis
2. Outside-city cost share less dependent on City's capital financing decisions
3. Provides mechanism to compensate City for risk and opportunity cost

