Analysis of Rate Elements in a Regulatory Price Review

Revenue Requirements, Rate Base and Cost of Capital – Analysis and Process

By the Office of Accounting & Finance
New York State Department of Public Service

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Presentation Outline

- Revenue Requirements
- Rate Base (Regulatory Asset Base)
- Rate of Return / Cost of Capital

Revenue Requirement Definition

- A utility revenue requirement is the sum of all costs incurred by a utility to provide safe and adequate service to its customers during a period of time, typically a one-year period.
- These include all operating expenses a utility incurs plus a return on the assets used to provide this service.
- Also known as “Cost of Service”

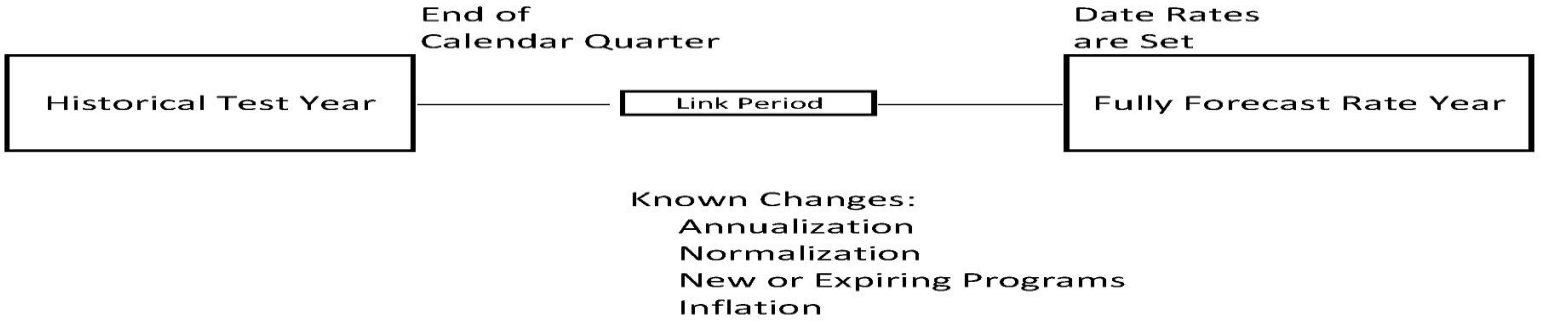
Example of Utility Cost of Service Revenue Requirement Schedule

ABC UTILITY COMPANY
Cost of Service Exhibit
Year ended December 31, 1989
($000's)

	Twelve Months ended 12/31/1989	Company Adjust.	Ref.	Test Yr. As Adjusted	Addition. Revenue Required	As Finally Adjusted
Operating Revenues:						
SC-1 Residential	$54,397	$1,050	(1)	$55,447	$21,427	$76,874
SC-2 Commercial/Indust.	70,285			70,285	27,161	97,446
Total SC-1 & SC-2	124,682	1,050		125,732	48,588	174,320
Other Sales	10,171			10,171		10,171
Rents and Miscellaneous	216			216		216
Total Operating Revenues	135,069	1,050		136,119	48,588	184,707
Operating Expenses:						
Engine Fuel	23,630			23,630		23,630
Station Service Fuel	15,753			15,753		15,753
Purchased Power	7,876			7,876		7,876
Payroll	3,556	181	(2)	3,737		3,737
Fringe Benefits	750	66	(3)	816		816
Materials & Supplies	5,035			5,035		5,035
Postage	73	7	(4)	80		80
Reg. Comm. Expense	146	25	(5)	171		171
Pension costs	738	30	(6)	768		768
Depreciation expense	8,750	1,000	(7)	9,750		9,750
Taxes - other	14,780	730	(8)	15,510	1,944	17,454
Donations and Advert.	30	(10)	(9)	20	165	185
Other Expenses	17,000	(75)	(10)	16,925	15	16,940
Total Operating Expenses	98,117	1,954		100,071	2,123	102,194
Operating Income Before FIT	36,952	(904)		36,048	46,465	82,513
FIT - Current	9,402	(500)	0	8,902	15,798	24,700
Provision for Def. FIT	3,000	1,000	(12)	4,000		4,000
FIT. def. pr. yrs.-cr.	(500)			(500)		(500)
ITC adjustments-net	100			100		100
Total FIT	12,002	500		12,502	15,798	28,300
Net Operating Income	$24,950	($1,404)		$23,546	$30,667	$54,213
Total Rate Base	$479,916	$19,279		$499,195	$0	$499,195
Rate of Return	5.20%			4.72%		10.86%

Timeline of Revenue Requirement Data

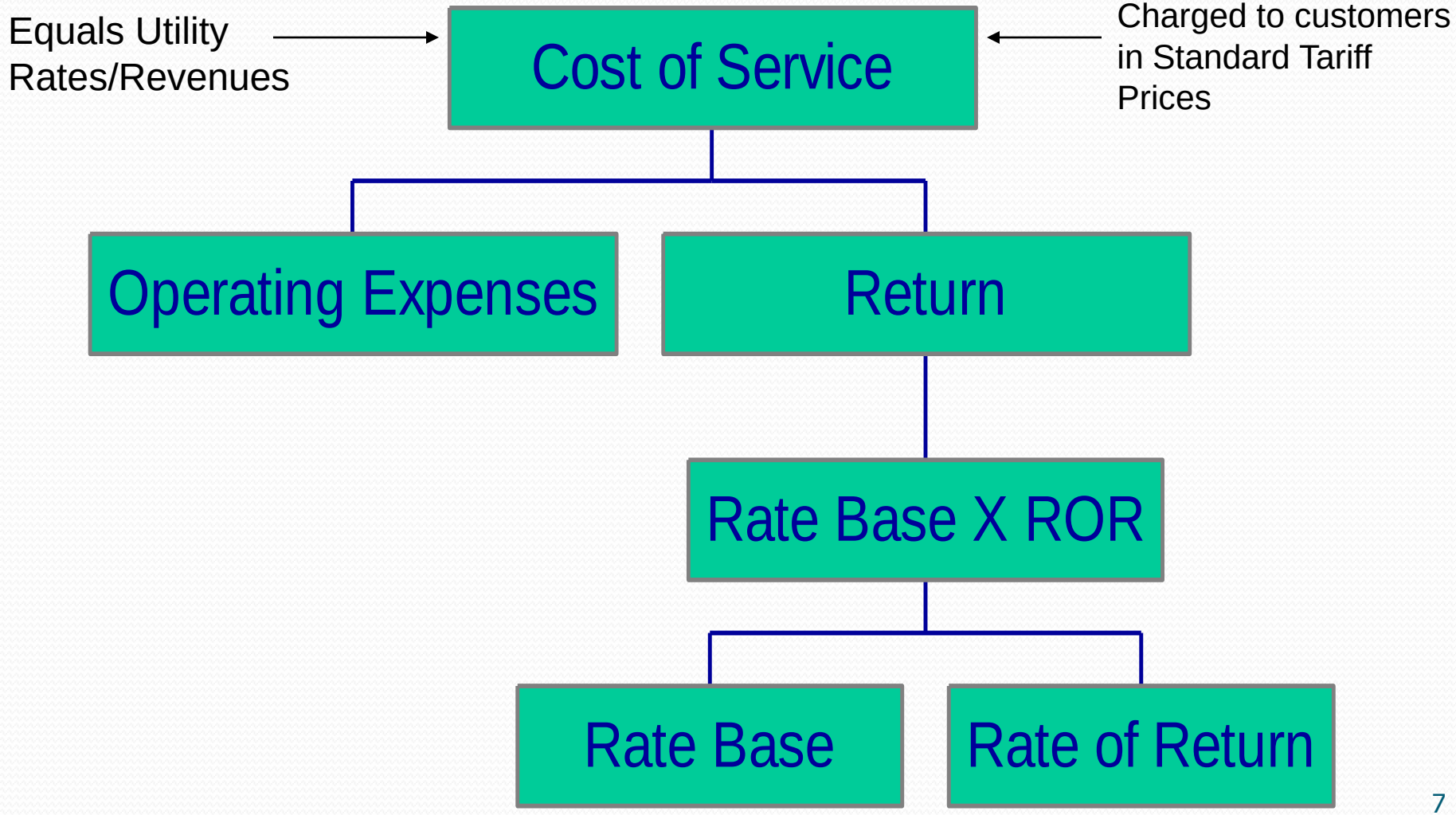
- New York uses a fully forecast rate year to determine revenue requirements and set utility tariff schedules. Other states use a historical test year.



Formation of the Revenue Requirement

- Utility rate tariffs have both “Operating Components” and “Capital Components
- The Operating Component includes the annual Operation and Maintenance Expenses, Taxes, Fuel and Purchased Power Costs and Administrative Expenses
- The Capital Component includes the Return on Equity, the Interest on Debt and the Depreciation Expense

Illustration of the Relationship of the Cost of Service to Utility Rates



Operation & Maintenance Expense

- Labor and Fringe Benefits
- Advertising
- Insurance
- Conservation
- Research and Development
- Purchased Power, Gas or Water
- Fuel Adjustment
- Legal Costs
- Repairs and Maintenance (e.g., tree trimming)
- Mandated program costs

Projected O&M Expenses

- Historical Level from "Test year" is adjusted in several ways:
  - Known Changes
  - Annualization of part year changes
  - Normalization of unusual events
  - Forecasts of new or expiring programs
  - Inflation

Return

Costs Related to the Return Of and On Investments in Utility Plants.

- Depreciation on Utility Plant Investment
- Taxes
- Rate Base
- Cost of Capital to Finance Investment

Depreciation Expense

- Depreciation Expense is the way the return of investment is captured in rates.
- The assets in which a company invests are brand new only on the day they are bought. After that they begin to age and their value to the company declines.
- Depreciation: the annual cost associated with the diminution in the usefulness of an asset over time.
- Typically depreciation is calculated by dividing the original cost of an asset by its expected useful life. The Commission uses the straight line depreciation method.
- Utility assets, particularly pipes and wires, have long useful lives (30-50 years).

Taxes

- Federal and State Income Taxes
- Revenue Taxes apply to utility bills
  - Gross Earnings
  - Gross Income (similar to Gross Earnings but at a different rate)
  - Local Metropolitan Transit Authority taxes to help fund mass transit in NYC
  - Corporate Surcharge
- Payroll Taxes
  - Social Security Taxes
  - Unemployment Insurance
- Property Taxes

Rate Base (Regulatory Asset Base)

- Utility Plant
  - Original Cost Limitation
  - Used and Useful
- Accumulated Depreciation Offset
- Phase-Ins of large additions
- Deferred Debits/Credits – Prior year costs or benefits
- Customer Advances for Construction
- Deferred Income Taxes Offset
- Working Capital
- Earnings Base vs. Capitalization

Rate Base (Regulatory Asset Base)

Rate Base =

A. Original Cost of Utility Plant
B. Less Accumulated Depreciation
C. Plus Deferred Debits
D. Less Deferred Credits
E. Less Customer Advances for Construction
F. Plus Working Capital
G. Less Earnings Base versus Capitalization Adjustment if a Utility's Outstanding Securities are less than the Rate Base Calculated through Step F

Original Cost Limitation

- The Commission requires that plant accounts be stated at the cost incurred by the person who first devoted the property to utility service
- In the case of a new plant, original and historic costs are the same
- However, the definitions may vary in the instance of plant acquired as an operating unit; this plant must be booked at the original cost to the operating unit less accumulated depreciation

Used and Useful

- Plant that is included in rate base should both be completed and be necessary to provide service. This is generally referred to as “in-service”.
- Plant which is far in excess of the customers’ needs or is non-utility in nature is usually not part of rate base.
- Failed investments in plant for projects which were not completed are examined in detail to determine if the management acted appropriately in making the initial investment and, if so, rate recovery can be granted as an exception to the used and useful rule.

Accumulated Depreciation Offset

- Accumulated depreciation is deducted from plant in service for developing rate base
- It is proper to remove accumulated depreciation from rate base because:
- Depreciation expense is already recovered in the revenue requirement and represents investment returned to the company
- Rate base represents the net book value (original cost less accumulated depreciation) of the company's investments

Phase In of Large Additions

- Phased in plans are used when the plant addition to rate base and the associated depreciation would greatly increase rates to customers
- To avoid this rate shock, the Commission can set rates based upon a gradual addition of depreciation and plant to rate base
  - Typically, the utility would accrue a carrying charge to be recovered in the future on the portion of plant that was not added to rate base.

Deferred Debits and Credits

- These generally represent timing differences related to current period expenses where:
  - Customers provided funds to the utility in advance of their need (deferred credits which reduces rate base)
    - Examples include: gas supplier refunds, property tax refunds.
  - The utility expended funds in advance of collection from customers (deferred debit which increase rate base)
    - Examples include: storm restoration costs, environmental clean-up costs.

Customer Advances For Construction

- Some utility customers may require service be installed in a distant location that exceeds the standard distances stated in their tariffs
- Under such circumstances the utility generally obtains contributions in cash, services, or property to offset this excess cost
- Plant accounts to which the contribution relates are reduced by the amount of the customer contribution

Working Capital

- Working capital represents the utility's investment of funds in short-term assets that are necessary for the day to day operation of the business.
  - Examples of working capital are inventories, prepayments, and a working capital allowance
- Working capital represents the amount of money a company needs to hold it over between point in time bills are paid and cash actually received from customers for service.
- The cash working capital element represents the lag in funds associated with the timing difference between when you must pay bills for your company and when the revenues actually come in.
  - Most invoices are due and paid by the utility within two weeks of receipt
  - Customer bills for service are based on meter reads made at the end of the month and bills are mailed out the next month. Customers then have 30 days to pay their bills. This creates a lag and that must be financed by the utility.
- The FERC formula is used in New York for calculating the working capital allowance. Under this method, electric and water companies are allowed 45 days of operating expenses, exclusive of fuel, purchased power/water, and taxes.

Earnings Base v. Capitalization

- Rate base is adjusted for the difference between Earnings Base (rate base plus construction work in progress) and the utility's capitalization
- The adjustment is made to assure that a utility's rates are servicing no more than the capital costs of the utility
  - Difference between earnings base and capitalization is usually attributed to cost free capital supporting rate base (e.g., accounts payable)

Rate of Return / Cost of Capital

- General Overview
- Capital Structure
  - Debt Ratio, Equity Ratio, or Gearing
- Cost of Debt
- Cost of Equity
  - How to measure

Key Ratemaking Concept

- Rates are typically set to recover a utility's costs.
- The return a utility pays to investors to entice them to provide capital to finance utility plant is a utility cost. It is known as the Cost of Capital or Rate of Return.
- The Cost of Capital is measured as a percentage and it is multiplied by the dollar amount of rate base to determine the amount of dollars a utility has to collect in its revenue requirement to recover its Cost of Capital.

Fair Rate of Return Theory

- A return is provided on rate base
- The return covers debt costs (which are generally known) and the cost of equity
- The Cost of Equity or Return on Equity (ROE) is set considering returns available from investments with comparable risks
- Return sufficient to attract new capital
- Return sufficient to maintain creditworthiness (goal is a low “A”/ high “BBB” Bond Rating)

Weighted Average Cost of Capital (WACC)

RATE OF RETURN MATRIX-Pro Forma				
Type	**Dollars**	**Percent**	**Cost**	**Weighted**
Debt	$ 550	55.0%	**6.50%**	3.58%
Equity	$ 450	45.0%	**9.50%**	4.28%
Total	**$ 1,000**	**100.0%**		**7.85%**

- A weighting of costs is made based on the appropriate utility capital structure.
- The cost of debt (Rd) can usually be determined with more precision.
- The cost of equity (Re) must be estimated using various financial models designed to measure the return on equity that investors require on the stock of a particular company.

Ways to Determine Capital Structure

- Actual utility balances forecast for the rate year.
- Actual parent capital structure forecast for the rate year.
- Adjusted parent capital structure.
  - Non-regulated investments
- Hypothetical
- Preference is to use the actual capital structure if there isn't double leverage, the utility is reasonably financed and ring–fenced from the parent. But this can be difficult or controversial.

Gearing Used in Ratemaking

- Capital Structure becomes controversial when a utility has a high equity ratio relative to its peers
  - The cost of equity is usually higher than the cost of debt, thus higher equity ratios will tend to drive up the cost of capital and rates to customers.

- Capital Structure becomes controversial when the utility is the subsidiary of a holding company that invests proceeds from debt issues as "equity" in the subsidiary
  - Unless caught by regulators the holding company would get a 9.5% return on debt which only costs them 6.5%.

- Capital Structure becomes controversial when a utility's financial position is used to finance competitive operations with high amounts of debt.
  - The Commission imputes lower equity ratios to utilities when their competitive operations are financed with more debt than the regulated operations.

Characteristics of Debt

- Debt is a contractual agreement between the utility and the lender. The interest rate on debt is readily identifiable and is usually a fixed rate for the life of the debt.
  - Mechanisms are typically used to true-up for changes in interest rate conditions for utilities with variable rate debt.
  - Debt interest is generally tax deductible for the utility
- Holders of debt have first priority over other investors in the event of a utility bankruptcy.
- Prior to the 1980s most utility debt was secured by a pledge of utility property (mortgage debt). Reliance on mortgage debt has decreased and utilities increasingly use unsecured debt.
  - Avoid mortgage recording taxes
  - Avoid restrictive and out of date mortgage covenants

Calculating the Cost of Debt (Rd)

Outstanding Debt	Dollars	Percent	Interest Rate	Weighted Rate
Series A	$ 150	27.27%	8.00%	2.18%
Series B	$ 150	27.27%	5.00%	1.36%
Series C	$ 125	22.73%	7.00%	1.59%
Series D	$ 125	22.73%	6.00%	1.36%
total	$ 550	100.00%		**6.50%**

- Most large utilities have many debt series as well as bank debt.
- All outstanding debt is identified and included in a cost of debt matrix very similar to the cost of capital matrix
- The specific interest rate on each series of debt is weighted by the proportion of debt from that series to total debt.
- The weighted interest rates are summed to derive the cost of debt.
- Debt issuance expenses are typically added into this calculation. This typically adds less than 25 basis points (.25%) to the overall cost of debt.

Properties of Common Equity

- Net income after all expenses, taxes, and interest have been paid belongs to common equity holders.
- The Board of Directors determines the amount of net income retained/reinvested in the business and the amount of net income paid to stockholders as a dividend.
  - Utilities typically pay a high percentage of net income as dividends (high dividend payout ratio)
  - Clientele Effect: Many utility investors desire high current income and see utility stocks as an alternative to fixed income securities (debt interest rate versus utility dividend yield).
- Dividends divided by stock price is known as the dividend yield.

Measuring the Cost of Equity

- There is no contractual or stated rate of return on common equity.
- Unlike debt which has a fixed contractual rate, the return that investors desire on common equity will vary with market conditions.
- Thus, the cost of equity for a utility must be estimated.
  - Over the years financial experts have developed and relied mainly on three types of approaches.
    - Comparable Earnings
    - Discounted Cash Flow (DCF)
    - Interest Rate Spread Studies
  - In New York, we rely on a combination of the DCF (weighted 2/3) and an interest rate spread analysis known as the Capital Asset Pricing Model (CAPM-weighted 1/3) .

What is the Discounted Cash Flow (DCF) Model?

- Stock prices accurately reflect the expectations of investors.
- Stock prices reflect the expected after tax cash flows that investors expect from the stock.
- Cash flows to stockholders who hold a stock for the long term come primarily in the form of dividends.
- The DCF model is premised on the concept that the current stock price will reflect the present value of all future dividends over the life of the stock. The discount rate that equates all future dividends with the current stock price is the Cost of Equity.

What is the Discounted Cash Flow (DCF) Model?

- DCF Formula:
  - $P= D_1/(1+R) + D_2/(1+R)^2 + D_3/(1+R)^3 + \ldots + D_\infty/(1+R)^\infty$
  - Where:
  - P=Current stock price
  - D_n=Dividend in year n
  - R=Discount rate=cost of equity
- Long Form can be simplified by assuming that D grows at a constant rate in future. Gordon Growth Model.

  $R=(D_1/P) + G$

  Where: G=Constant growth rate in future dividends

Applying the DCF

- The simplified DCF model was used by the Commission for many years as its primary method of determining the cost of equity.
  - Assumption of constant dividend growth proved unrealistic
    - Changing dividend payout ratios
    - Changing allowed returns on equity

- Long form model is now used.
  - Future dividend streams required by model are estimated based on data from Wall Street firms (mainly Value Line).
  - The current stock price is generally a 6 month average (longer term average reduces chances of estimate being subject to short term vagaries of the stock market).
  - Computer models solve for the rate that equates future dividends to the current price.

DCF

- Very basic approach that draws on fundamental concepts accepted by most experts.
- Most controversial aspect of applying the DCF is determining what growth rates should be used to develop the long run stream of future dividends.

What is the Capital Asset Pricing Model

- CAPM developed in 1960s is premised on the concept that investors behave logically and will always make investments that provide the highest expected return for a given level of risk.

- Implicit in this idea is the concept that because investors are always looking for the best combination of risk and return, they will diversify away as much risk as possible from an investment in a particular company.

- Thus, investors need to be compensated only for the risks in a stock that cannot be eliminated through diversification.

What is the Capital Asset Pricing Model

- CAPM FORMULA:
  - $R = R_f + [B*(R_m-R_f)]$
  - Where:
  - R_f = Risk free rate
  - R_m = Return on the market
  - B = Beta
- The CAPM is an interest rate spread study.
  - The term (R_m-R_f) reflects the basis point spread between Treasury bonds and the return on the market (Market Risk Premium).
  - If a stock has the same risk as the market, its beta is 1.0 and the entire Market Risk Premium is added to the risk free rate to develop the CAPM cost of equity.
  - If a stock has less risk than the market, the beta is less than 1.0 and some amount smaller than the Market Risk Premium will be added to the risk free rate to develop a lower cost of equity.
  - Betas over one add amounts to the risk free rate that exceed the Market Risk Premium. Thus the cost of equity for such companies is higher than the market return.

CAPM

- CAPM generally accepted as legitimate approach for estimating the cost of equity.
- Disagreements frequently arise regarding:
  - Appropriate level of return on market (70-80 year averages are higher than recent results)
  - Precise level of risk free rate (T-bonds used in NY to address this issue)
- Variants of CAPM with more than one Beta may be more accurate but are either unwieldy or unworkable to apply.
- Because of potential difficulties, we typically give 1/3 weight to CAPM and 2/3 to DCF.