
Welcome

TARIFF METHODOLOGY & RATE DESIGN

A tariff is a document, approved by the responsible regulatory agency, listing the terms and conditions under which utility services will be provided to customers within a particular class. Tariff sheets typically include:

- a schedule of all the rate elements (individual prices) plus the provisions necessary for billing
- the service characteristics (e.g., voltage, single or three phase) and metering methods
- Rules and regulations, i.e., a statement of the general practices the utility follows in carrying out its business with its customers

RATE DESIGN

Role of Rates

Rates serve as the means by which the utility collects revenues and covers its allowed cost of service (including that which is required under the “fair-return standard”)

Attributes of a Sound Rate Design

- Rates should be fair, reasonable and not unduly discriminatory
  - *Based on cost*
  - *Equitable*
- Rates should be stable
- Rates should be easily understood
- Rates should not induce wasteful behavior

REVENUE REQUIREMENT

The total amount of money a utility must collect to pay all costs, including a reasonable return on investment

Cost of Service = Revenue Requirement

REVENUE REQUIREMENT

Definition

- What are the total annual revenues required by the firm to cover both its expenses and have the opportunity to earn a fair rate of return?

OR

- What are the total annual costs to provide safe and reliable service to the company's customers that the company is allowed to recover through rates? - cost of service concept

THE REVENUE REQUIREMENTS FORMULA

$$\text{Revenue Requirement, } RR = \overbrace{O + T + d}^{\text{Expenses}} + \overbrace{r \cdot \overbrace{(V - D)}^{\text{Rate Base}}}^{\text{Return Amount on Rate Base}}$$

O	= Operating Expenses (O&M/A&G)
T	= Taxes (corporate income taxes + other taxes)
d	= Annual Depreciation Expense
V	= Gross Investment
D	= Accumulated Depreciation
r	= Overall Rate of Return (weighted-average cost of capital)

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Rate Base = the net investment in facilities, equipment and other property necessary to provide utility service

Rate of Return = (r) the return earned, or allowed to be earned, on the utility's rate base (expressed as a percentage)

Return amount = $r \cdot (V - D)$ return amount on rate base

THE REVENUE REQUIREMENTS FORMULA

$$\text{Revenue Requirement, } RR = \overbrace{O + T + d}^{\text{Expenses}} + \overbrace{r \cdot (V - D)}^{\text{Return Amount on Rate Base}}$$

Amount which go towards:

1) Paying annual interest on debt (from return amount)
2) Paying out dividends to stockholders (from return amount)
3) Paying the principle on debt when loans/bonds come due (from d)
4) Replenishing stockholder equity (from d)

RR – O – T – d – interest payments = profit
(Subject to corporate income tax)

OPERATING EXPENSES (O)

Definition

- Operating expenses are the costs involved in operating and maintaining utility plant and costs involved in the provision of utility services. These operating outlays consist mainly of costs for purchased power, fuel, wages, maintenance, supplies, and other necessary expenditures.

- O&M ("Operations and Maintenance") usually refers to costs that can be directly assigned to particular operating functions (generation, transmission and distribution) of the business. Examples include fuel and direct labor costs.

- A&G ("Administrative and General") usually refers to costs that cannot be directly assigned to particular operating functions. Examples include administrative salaries (indirect labor costs) and employee benefits

TAXES (T)

The corporate income tax is a tax on profits.

Taxes other than income taxes include:

1. Property taxes
2. Payroll taxes
3. Value Added Taxes

THE CONCEPT OF DEPRECIATION (d/D)

Definition

- Depreciation is an allowance in recognition that property used in providing service wears out and eventually must be replaced. Since consumers receive the benefit of the property they should pay for the economic consumption of these capital investments.

- Depreciation measures the loss in plant value not restored by current maintenance and is the way in which the utility recovers it capital investment

- Depreciation affects the revenue requirement in two ways. It is an annual expense and is therefore included in revenue requirements (d) and its accumulation over the life of the asset (D) shows up as a deduction to the rate base.

THE CONCEPT OF DEPRECIATION

Alternatively

Annual depreciation (d) represents the “return of” the investment

r·(RB) represents the return amount or “return on” the investment

Think of a physical asset (plant or equipment) that is financed through a simple loan (a type of debt) and where the length of the loan is equal to the expected life of the asset

each year’s payment to principle is equivalent to the annual depreciation expense (d), which is the “return of” the investment

the remaining balance [(original cost = original loan amount) minus the sum of all previous years’ payments to principle] is equivalent to the net-book value of the asset, RB = V - D

the interest payments, which represents the “return on” the investment, are determined by applying the interest rate to the remaining balance, r·(RB)

THE CONCEPT OF DEPRECIATION

Now think of a physical asset (plant or equipment) that is completely equity financed (through issuing stock). Say that a Tk.100,000 piece of equipment is originally financed through the issuance of 1,000 shares of stock each originally sold for Tk.100.

Each year's return amount on the investment, $r \cdot (RB)$, represents dividend payments to the stockholders

Each year's "payment to principle" is equivalent to the annual depreciation expense (d) – i.e., the return of the investment – and needs to be collected from customers so that, though time, the original pot of Tk.100,000 can be replenished

The pot needs to be replenished because, eventually, the physical asset completely wears out and must be replaced (even if there is no growth in customers)

RATE BASE

Definition

Rate base is the value of facilities and other investments used to provide service to customers and upon which the utility is allowed an opportunity to earn a fair rate of return.

A utility's rate base is the investment upon which a utility is given an opportunity to earn its authorized rate of return.

The valuation of the utility's physical assets (plant and equipment) is by far the largest component of rate base

The principal method for valuing plant and equipment is original cost minus accumulated depreciation

RATE BASE

Rate Base Determination

Gross Plant in Service (original cost of the physical assets) (V)

less : Accumulated Depreciation (D)
equals : Net Plant in Service
plus : working capital
plus : materials and supplies
less : customer deposits
less : deferred income taxes
equals : Rate Base

RATE BASE: GROSS PLANT IN SERVICE

Categories include generation plant, transmission plant, distribution plant, general plant and intangible plant

General plant includes such things as office space, customer service buildings, company cars – hard asset that cannot be directly assigned into the generation, transmission or distribution functional categories

Intangible plant includes “soft” assets such as franchises, rights-of-way, licenses, software development, and other intangible plant necessary or valuable in the operation of a utility’s service not specifically provided for elsewhere

RATE BASE: GROSS PLANT IN SERVICE

Includes such things as turbines, generators, lines, transformers, land, buildings (structures), meters, tools, furniture, vehicles, software development, etc.

Recorded on the utility's books at original cost at the time the plant is placed into service.

To be included in rate base for rate-making purposes, must be viewed as "used and useful" in providing safe and reliable utility service

RATE BASE: CASH WORKING CAPITAL

Definition

The average amount of financial capital provided by investors (stockholders)

- over and above that required to purchase physical plant and equipment
- used to bridge the gap between the time expenditures are required to provide services and the time revenue is collected for such services (i.e., the time when expenses are paid and when revenues flow in from customers)

Many methods have been used to determine the appropriate amount of cash working capital but the amount usually equates to either:

- one-eighth (45 days worth) of a utilities annual operating expenses;
- or, the amount required as result of a lead-lag study (which measures the number of days before expenses must be paid (lead days) against days before revenues are received (lag days).

RATE BASE: MATERIALS AND SUPPLIES

Definition

The inventories of new plant materials and operating supplies purchased and stored primarily for use in construction, plant operation and plant maintenance.

These items reflect “spare parts” so to speak that can be readily used to replace parts of plant and equipment so that service can be restored in a timely fashion.

Examples include distribution poles, transformers, wire, conduit, meters, etc.

CONSTRUCTION WORK IN PROGRESS

Definition

Construction work in progress (CWIP) is the amount shown on a utility's balance sheet for construction work on plant that is not yet completed (i.e., is not plant in service) but is in process of being completed.

Depending on Commission's approach, CWIP items may or may not be included in the rate base.

CON: CWIP is neither used nor useful and therefore should not be included in rate base – wait until it's completed.

PRO: For very large construction projects, the utility needs some flow of funds for proper financing of the project; also, if we allow "a little in at a time" we can mitigate the rate shock that would result from the dumping of a huge plant addition into rate base.

RATE OF RETURN: SOURCES OF FINANCIAL CAPITAL

Financial Capital

The funds that are used to finance the purchases and/or construction of physical capital (gross plant and equipment), materials and supplies, inventories of fuel, and to provide cash working capital

RATE OF RETURN: SOURCES OF FINANCIAL CAPITAL

Investor-Provided Financial Capital

- Debt (Long-term & Short-term – liabilities that come due within a year)
- Holders of bonds receive fixed interest payments where such payments are unavoidable by the company
- Preferred stock
  - Holders of preferred stock (company ownership) receive fixed dividend payments where such payments are avoidable by the company
- Common Equity (Common stock plus retained earnings)
  - Holders of common stock (ownership) receive variable dividend payments where such payments are avoidable by the company

STANDARDS OF A FAIR RATE OF RETURN

In 1944, in FPC vs. Hope Natural Gas, the Supreme Court of USA ruled that:

> From the investor or company point of view, it is important that (just) prices are set such that there be enough revenue not only for operating expenses but also for the capital costs of the business – these include service on the debt (interest) and dividends on stock

The return to the equity/stock owners should be

> commensurate with the returns on investments in other enterprises with similar risks
>
> sufficient to assure confidence in the financial integrity of the utility so as to maintain its credit and to attract capital.

WHAT CAN TRIGGER A RATE CASE?

$RR = O + T + d + r \cdot (V - D)$

$RR = E + r \cdot (RB)$

$P \cdot Q = E + r \cdot (RB)$

Where E = Expenses;
RB = Rate Base;
P = average price; and
Q = quantity of electricity sold

During a Rate Case:

$P = [(E + r\ allowed \cdot (RB)] \div Q$ all components administratively determined

In Between Rate Cases:

$r\ actual = [P \cdot Q - E] \div (RB)$ P is fixed (from last rate case) all other components can vary with actual conditions

WHAT CAN TRIGGER A RATE CASE?

In Between Rate Cases:

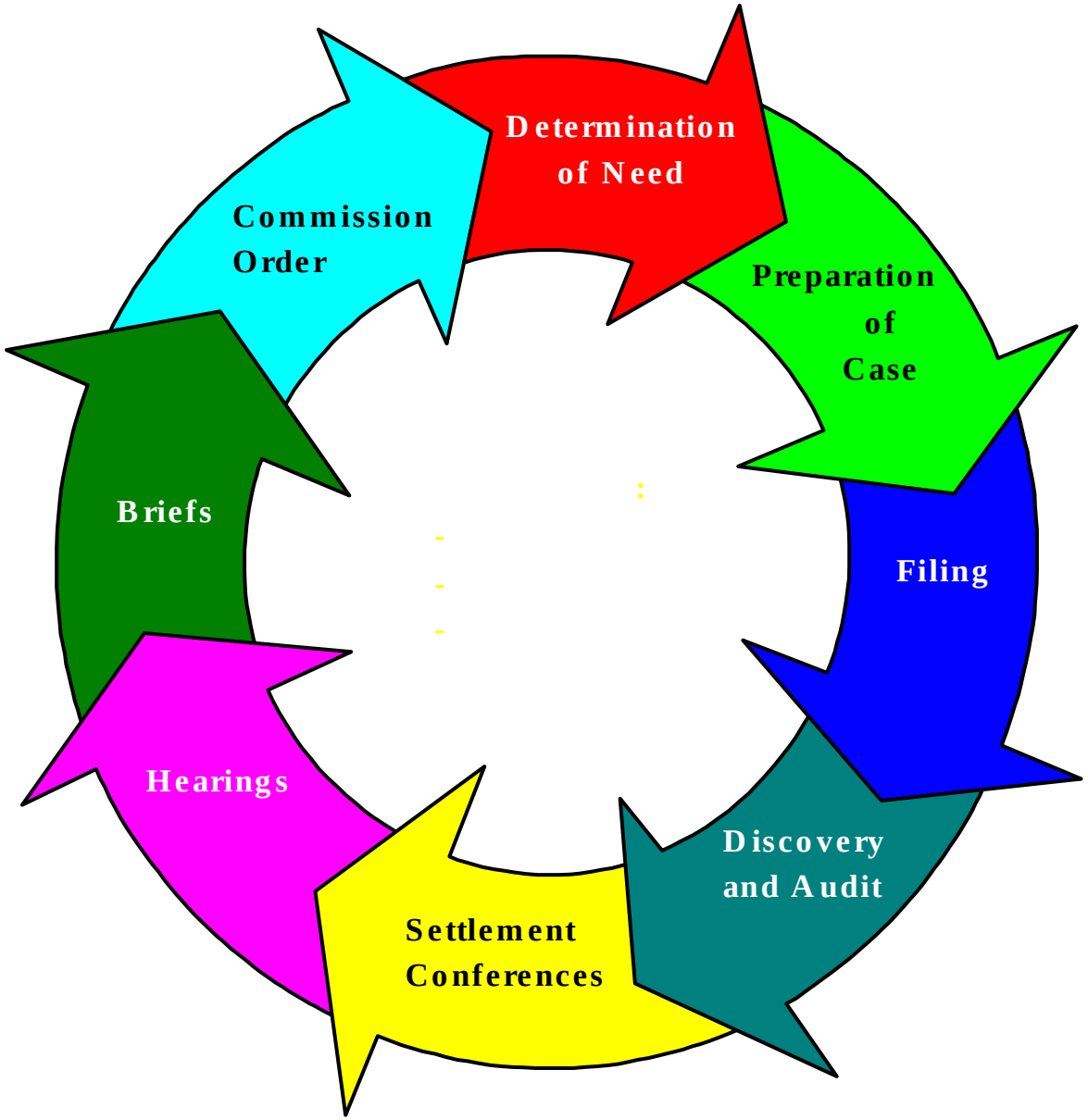
r actual = [P·Q – E] ÷ (RB) P is fixed (from last rate case) all other components can vary with actual conditions

IF either: E increases; Q decreases, or RB increases

THEN, the actual rate of return will decrease.

If it can be shown that these changes are permanent AND if the actual rate of return falls below the allowed rate of return, this may trigger a rate case (initiated by the company).

The company likely would file for an increase in prices (rates) (P); i.e., the company is asking for “rate relief.”


Determination of Need
Preparation of Case
Filing
Discovery and Audit
Settlement Conferences
Hearings
Briefs
Commission Order

STEPS

1. Are Actual Revenues Realistic?
   - Customer Levels
   - Expected Loads
2. Are Operating & Maintenance Expenses Reasonable?
   - Account by Account Analysis, e.g. Salaries,
   - Rate Case Expenses, Depreciation, Taxes, Extraordinary Expenses
3. Rate Base Analysis: Are Adjustments Reasonable?
   - Expected Capital Expenditures
   - Cash Working Capital Allowance
   - Does All Plant in Service Meet Prudence Tests?
   - Reasonableness of Depreciation Study and Impact upon Accumulated Depreciation
4. Return:
   - Is Capital Structure (Debt / Equity Ratios) Reasonable?
   - Are Cost Rates Reasonable?

OPERATING EXPENSES (O)

Regulatory Authority over Expenses

Management exercises its prerogative in incurring expenses. The commission reviews the expenses incurred by management and decide whether to allow or disallow the expense for rate-making purposes (allowed if prudent and related to the provision of safe and reliable service to customers). If prudence is challenged, the utility has the burden of proof.

- Above-the-line expense are allowed expenses and paid from regulated rates (example: fuel, property taxes and other costs prudently acquired and necessary for the provision of safe and reliable electricity service)

- Below-the-line expense are disallowed expenses and paid out of stockholder earnings (examples: lobbying expenses, most advertisement expenses and expenses associated with a unregulated service provided by the utility)


Thank you