



**ENERGY
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Energy Industry Fundamentals

Natural Gas Rate Structures

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History of Natural Gas Utilities

- Earliest utilities were gas companies that formed in the mid- to late-19th century
 - “City-gas” was manufactured locally and delivered in cast iron pipes
 - Natural gas from geologic formations and transmitted through high-pressure steel pipes became available after World War II



History of Natural Gas Utilities

- Early utilities evolved independently
 - Each set its own rates
 - A very large amount of capital was needed for these enterprises
 - Because of the large costs for capital, it wasn't sensible to have more than one utility supplying service in the same geographic area (a franchise)
 - But the public would not tolerate uncontrolled monopolies with unregulated pricing power
 - Today's regulatory system evolved to protect customers from pricing power and utilities from financial risk of competition within a franchise area

Utilities are Regulated Monopolies

- **Utilities Have Exclusive Operating Territories**

Natural gas utilities are authorized to provide service in a specific geographic area, under an exclusive franchise

- **Utilities Have Market Power**

These companies commonly have market power or operate as monopolies because it may not be cost-effective to have more than one distribution system in the ground to serve a market or community

Utilities are Regulated Monopolies

- **Regulation Serves as a Substitute for Competition**

The difference between utility rate setting and price setting for other goods and services is that with competitive markets, prices result from the interaction of supply by many firms and demand from many customers. Since there is only one firm supplying natural gas service in a regulated monopoly, regulation serves as a substitute for the competitive market.

- **Public Authorities Regulate Utilities**

In return for an exclusive franchise, and in recognition of its market power, utilities accept regulation by a state authority responsible for ensuring that the public receives good and reliable service at a fair price.

Basics of Utility Regulation

- The traditional public utility paradigm imposes duties, and grants rights to natural gas utilities.

Duties:

- An obligation to provide service to customers
- Charge fair and reasonable rates
- No undue preference or discrimination between customers
- Render safe, adequate service

Basics of Utility Regulation

- The traditional public utility paradigm imposes duties and grants rights to natural gas utilities.

Rights:

- Render service in franchise area free from competition from other gas utilities
- Charge fair and reasonable rates that provide an opportunity to recover costs and earn a profit
- May classify services
- May impose reasonable conditions of service
- May acquire plant and property to serve

Regulatory Authorities

- State regulatory authorities operate pursuant to the laws of their states. They are required to ensure that consumers receive adequate and reliable services at reasonable rates while, at the same time, ensure that a utility has an opportunity to earn a return on its investment that is sufficient to maintain its credit and enable it to continue raising the capital necessary to provide satisfactory service in the future.
- Each regulatory authority, usually known as a public utility commission or public service commission, establishes its own regulations. Utilities that operate in multiple states/provinces must abide by more than one set of regulations.

Ratemaking Process

- Ratemaking is the process by which a utility, its customers, and the utility's regulatory authority determine a fair price for the utility's services
- A well designed rate reflects the input of all stakeholders, the importance of many factors, the balancing of numerous objectives, and the recognition that methods of cost recovery and other factors change over time

Ratemaking Objectives

- There are several objectives in ratemaking
- Sometimes these objectives conflict and regulators must strike a balance among them
- Among the most common objectives are:
 - **Achieve Revenue Requirement**
 - **Fairness**
 - **Maximize Asset Efficiency**

Ratemaking Objectives

- **Achieve Revenue Requirement**

- The principal objective is to achieve the revenue requirement, i.e., establish rates that permit the utility a reasonable opportunity to recover its costs and provide a profit to investors.

- **Fairness**

- Rates should be fair, meaning that each class of customer pays a rate that recovers the costs of providing service for that class. No class should subsidize another class.

- **Maximize Asset Efficiency**

- Rates that maximize asset efficiency signal management when to invest in more utility assets. Rates that are too high will lead to inefficient and wasteful investment, while rates that are too low will result in underinvestment of needed assets.

Ratemaking Objectives

- **Social Goals**

- Rates may seek to advance the welfare of a particular group in society. Offering a discount to one customer class means that another customer class has to pay more to make up for the discount
- This objective conflicts with the goal of fairness.

- **Simplicity and Ease of Administration**

- Rates should be simple and easy for the customer to understand, and they should be easy and not overly costly to administer

Ratemaking Objectives

- **Incentivize Behavior**

- Rates may seek to provide incentives for desired public behavior, such as shifting use to off-peak periods

- **Achieve Balance of Factors**

- Rates may seek to balance a range of regulatory and economic factors rather than having one overriding objective

Balance Among Objectives

- Balance among objectives is essential in ratemaking. In seeking to balance objectives, utilities consider a number of factors:
 - **Economic Factors**
 - **Regulatory Factors**
 - **Historical Factors**
 - **Social and Political Factors**



Balance Among Objectives

- **Economic Factors**

- Cost of service, value of service, competitor prices, availability of supply and pipeline capacity, price differences and discrimination, return and revenue stability

- **Regulatory Factors**

- Intervener interests, precedent

- **Historical Factors**

- Rate continuity, rate perspective

- **Social and Political Factors**

- Customer acceptance, public relations, economic conditions of service territory, social obligations to particular customer groups, political attention and involvement

Rates are Periodically Adjusted

- As with all businesses, a utility must continually monitor its financial position. If there have been major changes in the utility's costs or in sales that make increased revenues necessary, or if rates are no longer adequate to cover costs and earn a fair profit for shareholders, the utility must petition the regulatory authority in a general rate case request for permission to change its rates and charges

Preparing a Rate Case

- Most rate cases are straightforward proceedings based on hard economic data taken chiefly from the company's books
- These book figures represent costs that have been experienced
- They may be checked easily, since all utilities are required to keep their books in accordance with a uniform system of accounts



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Test Year

- The utility must base its general rate case on a “test year” – normally the previous year
- This is a specific 12-month period in which expenses actually experienced are documented and used to demonstrate the company’s need for an adjustment in its rates
- These basic cost data may be adjusted to reflect normal operating conditions and to reflect changes in revenues, wages, fuel costs, or other items

Adjustments to Basic Cost Data

■ Annualization

When the utility's book figures for a cost or revenue item are not representative because they were experienced over just a portion of the test year, the data must be annualized.

- For example, labor rates increased during the test year but were not in effect for the whole year. Going forward, the cost of the new labor rates must be included in rates.

■ Normalization

Normalization is when a cost or revenue item is adjusted to that which it would have been had weather or other events during the test year been representative of what normally occurs.

- Revenues from weather that is warmer or colder than normal must be normalized when establishing the utility's rates.
- The costs of one-time, non-recurring events such as storm damage to the utility's facilities must be normalized.

Cost of Service Study

- Ratemaking begins with a cost of service (COS) study, a detailed analysis of the costs (either historical or forecasted) of serving a utility's customers.
- 3 major areas of costs to determine rates are rate base, expenses, and return.
- Rate base and expenses are measurable items taken from the utilities' books of account and are reviewed with care by regulators charged with approving utility rates.
- Return is not a measurable item found in the utility's accounts, but a cost that requires judgement and expertise to derive.

Cost of Service – Rate Base

- Rate base is the amount of money the utility has invested in facilities and equipment to ensure the provision of safe and reliable service to customers.
 - Land
 - Buildings
 - Pipes
 - Other facilities and equipment
 - Valves
 - Compressors
 - Service vehicles
- Rate base is also called investment base
- Rate base is reduced by accumulated depreciation. Accumulated depreciation is the total depreciation on an asset accumulated up to a certain date. Accumulated depreciation represents the expired value of the asset.

Cost of Service - Expenses

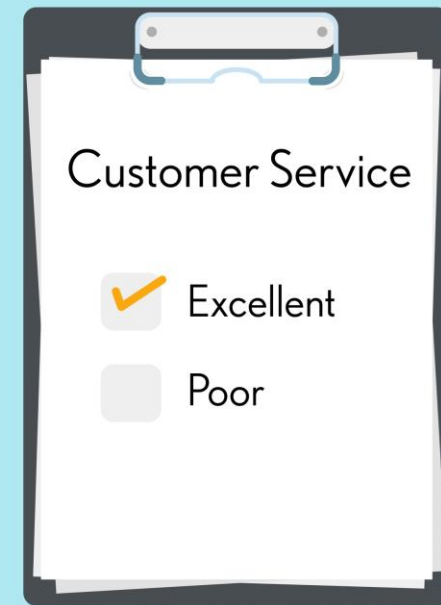
- Expenses include:
 - Operating and maintenance costs
 - Administrative and general expenses such as labor, accounting, and legal
 - Taxes
 - Depreciation – the portion of an asset that is deemed to have been consumed or expired in a period, and thus has become an expense. Depreciation expense is not the same as accumulated depreciation



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Cost of Service - Return

- Regulated utilities incentive for providing good service to customers is that they are allowed to earn a sufficient profit to enable them to cover their cost of capital, including a fair return for their investors
- In regulated utilities, profit is known as “return”



Profits from Distribution – Not Sales

- Utilities earn money from delivery service, not the sale of gas. Utilities do not “mark-up” or earn any kind of profit from the sale of the natural gas commodity itself
- Utilities recover the expense they incurred in purchasing natural gas commodity from suppliers and marketers of natural gas by passing through those costs dollar for dollar to customers

Rate of Return

- Rate of return is expressed as a percentage, and when multiplied times rate base (less accumulated depreciation), determines the allowed return (profit)
- Rate of return is similar to the interest earned on bonds and savings accounts
- Rate of return is established through a cost of capital study and a risk analysis that is submitted by the utility and approved by the regulator



No Guarantee of Profit

- The regulatory authority does not guarantee the utility a profit. The commission allows the utility to set rates such that it has the **opportunity** to earn as a profit an amount of money equal to a percentage of the amount of money invested in the facilities used and useful in providing service to the utility's customers.

No Guarantee of Profit

- If conditions are such that the utility fails to achieve the authorized rate of return, the utility may not adjust rates to make up for the unearned profit. The utility may go to the commission and request a new rate case, but it may not recover what it failed to earn in a time past.

“Used and Useful” and “ Prudence”

- Two fairness concepts that underlie utility regulation are “used and useful” and “prudent investment.” Regulators demand that all investments a utility makes in property are prudent and are for facilities that will be useful in serving the customers.
- The used and useful principle requires utility assets to be physically used (in service) and useful (not obsolete or superfluous) to current ratepayers before those ratepayers can be asked to pay the costs associated with them.

“Used and Useful” and “ Prudence”

- The test for prudence is focused on the time in which the costs were incurred. If utility investments and expenses were reasonable at the time they were incurred, and given the circumstances and what was known or knowable at the time, they are deemed to be prudent.
- Only those costs that were prudently incurred may be included in rates.

Capital

- Capital is the cash or goods used to generate income for a business
- Natural gas utilities are highly capital intensive, meaning that a large capital investment is needed relative to the amount of income expected from providing service to customers.
- Capital may be equity capital or debt capital

Equity Capital

- Equity capital is contributed by owners of the company's stock
- Equity is contributed in two ways:
 - New Shareholders' Stock
 - Retained Earnings



Equity Capital

- **New Shareholders' Stock**

Shareholders contribute capital to the company when they buy a new issue of the utility's stock. The money a utility raises from selling new stock will normally go directly into building new facilities.

- **Retained Earnings**

Shareholders also contribute equity through retained earnings. The profits earned by a utility are either paid out to shareholders as dividends on their stock or are retained by the utility to buy new facilities and equipment.

Debt Capital

■ Debt

- Debt is borrowed money and is part of the utility's overall capital used to make investments in rate base
- Utilities borrow short-term from banks and long-term by selling bonds to the public
- Most utility debt is long-term

Debt Capital

■ Bonds

- Mortgage bonds are debt secured by the utility's property
- Mortgage bonds are like a home mortgage where the debt is used to buy a house secured by the house
- Debenture bonds are secured by the general credit-worthiness of the utility rather than by specific properties

Two Kinds of Rate of Return

- In utility ratemaking, two kinds of rates of return are important
 - Rate of Return on Rate Base or Total Return
 - Rate of Return on Equity



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Two Kinds of Rate of Return

- **Rate of Return on Rate Base or Total Return**

Rate of return on rate base (ROR) or total return, is the broader measure of a utility's rate of return. ROR is determined by separating the utility's capital into equity and debt and applying a rate to each component.

- **Rate of Return on Equity**

The rate of return on equity (ROE) is the return allowed on shareholders' investments and retained earnings. Because the ROE relates directly to the interest of shareholders, this is the profitability figure that's most important to shareholders and to the investment community.

Determination of the Rate of Return

- Most regulatory authorities determine what constitutes a fair rate of return by looking to the financial marketplace
- Utilities are allowed a return that is comparable with that being offered by other investments of similar riskiness in the market
- Utility bonds are not risk free, and utilities are allowed to earn an interest rate on utility bonds several percentage points above current U.S. Treasury notes, which are a risk free investment

Determination of the Rate of Return

- The return earned on utility equity must have a premium of several percentage points above the current cost of utility bonds, since equity investments are riskier than holding debt
- As a result, utilities must pay the market rate for both debt and equity capital, in competition with investments in other businesses of similar risk

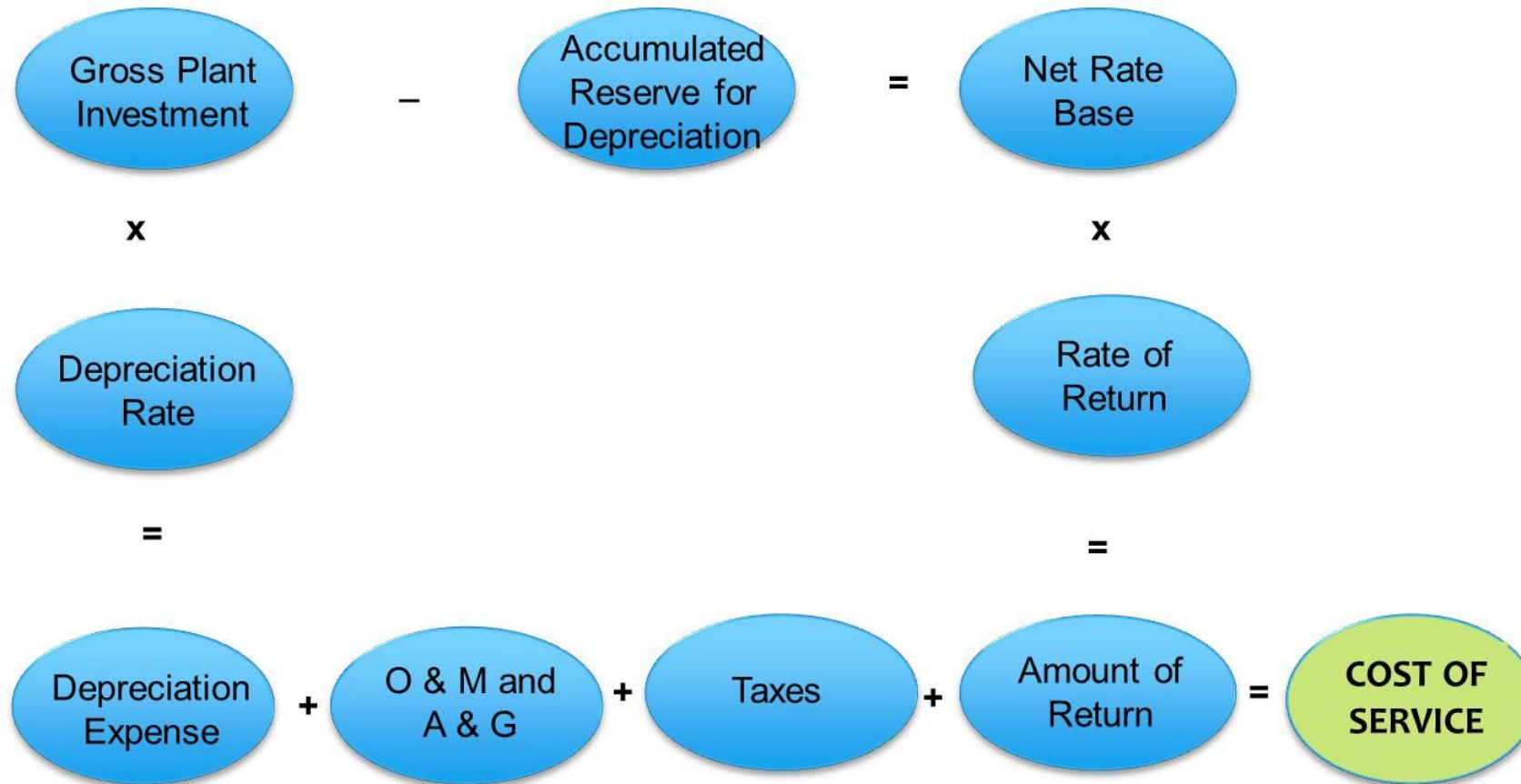
Supreme Court Guidance on ROR

- Regulatory authorities are guided by ground rules set forth by the U.S. Supreme Court in the 1920s and 30s.
 - *“The utility is entitled to rates that will permit it to earn a return on the value of its property which it employs for the convenience of the public equal to that generally being made at the same time and in the same general part of the country on investments in other business undertakings which are attended by corresponding risks and uncertainties;*
 - *It has no right to profits such as are realized or anticipated in highly profitable enterprises or speculative ventures;*
 - *The return should be reasonably sufficient to assure confidence in the financial soundness of the utility, should be adequate, under efficient and economical management, to maintain and support its credit and enable it to raise money necessary to the proper discharge of its public duties;*
 - *A rate of return may be reasonable at one time, and become too high or too low by changes affecting opportunities for investment, the money market, and business conditions generally.”*

Cost of Capital

- Cost of capital is based on the capital structure of the utility and the market cost of each of the capital components at the time of the rate case
- Capital structure means the relative proportions of each of the types of capital – equity and debt
- A common proportion is between 55% and 65% equity and between 35% and 45% debt
- The market cost of each capital component is applied to each component to derive the weighted average cost of capital

Cost of Service Model



Principles of Cost Allocation

- After the cost of service has been established, total costs are allocated to certain classes or groups of customers
- The underlying principle of cost allocation is that because various classes of customers are responsible for the incurrence of specific utility costs, only the responsible customers should pay for the identified costs

Principles of Cost Allocation

- Utilities are usually considered to have three classes of customers – residential, commercial, industrial; and customers within a class have similar load and service characteristics
- In determining the rates each class will pay, utilities and regulatory authorities seek to reflect in rates the differing costs of serving the different classes of customers
- The standard rule of cost allocation is to prevent undue discrimination or preference among the customer classes

Large Customer Pay Less

- Large industrial customers have relatively stable demand for gas and take gas in consistently large amounts
- Small residential customers are generally widely dispersed and use relatively small amounts of gas but need peak amounts on extremely cold days
- Because they are less expensive to serve, large customers usually pay lower rates for each **unit** of gas than do smaller residential customers

Allocations within Classes

Rate Design

- Once allocation of costs **AMONG** classes is accomplished, allocation of costs **WITHIN** classes is performed, usually based on the amount of gas a particular customer uses. This allocation of costs within classes is called rate design.
- Rate design reflects current political and social ideals, as well as economic realities, and, therefore, it changes over time
- No undue discrimination within the class is allowed, but differentiation within the class is OK

Forecasting Future Sales

- Unlike historical investment and expense costs taken from the utility's accounts, future sales must be forecast in order to determine a volumetric amount of gas sales over which to spread the total costs of service
- This forecast is inherently an estimate and not a firm figure
- Forecasting future gas sales is an essential part of the ratemaking process
- Because of the lag between preparing a rate filing and receiving rate relief, utilities can rarely rely on historical data alone

Heating Degree Days

- The gas forecast depends on how much heat is needed to heat homes and businesses in a service territory
- Gas utilities use the heating degree day (HDD), a measurement designed to reflect the demand for energy needed to heat a building
- HDDs are defined relative to a base temperature, usually 65 degrees F, and measure the extent to which the daily mean outdoor temperature falls below the reference temperature

Heating Degree Days

- HDDs are added over periods of time to provide estimates of heating requirements in the utility's service territory
- For example, the annual HDDs for New York City is approximately 5000 HDDs, whereas the amount for Los Angeles is only 500 HDDs



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Heating Degree Days

- Most utilities use an average of the heating degree days experienced in their service territory over the most recent 30 years to set rates
- Heating degree days have decreased in all areas of the country over the last 40 years, meaning the cost of service must be recovered over fewer gas sales



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Gas Cost Recovery & WACOG

- Utilities pass through to customers the average cost of all the gas they purchase
- This is called the WACOG, for weighted average cost of gas, and it changes with each new portion of gas supply purchased for the utility
- The WACOG is recovered from customers through the use of a tracking mechanism known as the Purchased Gas Adjustment (PGA)
- Gas cost recovery takes place through the PGA and not as part of the cost of service

Revenue Requirement

- The total utility revenue requirement is equal to the cost of service plus gas commodity costs
- Revenue requirement represents the amount the utility will have to collect from anticipated sales in order to pay expenses and earn its allowed rate of return
- Revenue requirement = cost of service + purchased gas adjustment

PGA – The Purchased Gas Adjustment

Utilities Don't Earn Money from Sales of Gas

- **Gas Costs are Passed Through in the PGA**
 - Utility paid \$4 per thousand cubic feet (Mcf) to acquire natural gas
 - Customer usage of 10 Mcf
 - Customer billed \$40 for gas usage
- **PGA is Adjusted Frequently**
 - Monthly, quarterly, and annually are most common adjustment periods
 - Most utilities true-up over- and under-collections at year end
 - Not all utilities earn interest on the under-collected portion
- **Possible to Lose Money on the PGA**
 - If gas costs rise between time utility paid its supplier and time utility recovers from customer, and;
 - If utility does not recover interest on the PGA balance, then;
 - The utility actually loses money

Traditional Rate Design Philosophy

- **Costs Are Recovered Volumetrically**

- Most costs are recovered based on energy consumption rather than on a per customer basis

- **Costs Are Pro-Rated Per Unit of Gas Sold**

- Each unit of gas is assigned a pro-rata share of the cost of service and customers pay a volumetric unit charge, not a per customer unit charge

Traditional Rate Design Philosophy

- **Rates Acknowledge Forecast Errors**

- Because costs are recovered based on actual sales that rarely meet forecasted sales, the utility will either over- or under-recover its costs, AND, the customer will either over- or under-pay the true cost of the service received

- **Implications for Utilities and Regulators**

- Utilities strive to increase sales in order to increase profits
- Customer energy efficiency leads to lower utility profits

Varieties of Rate Designs

Volumetric Rates:

- The cost of service is apportioned based on the total volume of service received by the customer. This was the most common type of utility rate design for many years.

Flat Rates:

- The cost of service is apportioned based on the number of customers who take service under the rate schedule.

Demand Rates:

- Costs are recovered based on the peak volume of service received by the customer over a period of time, e.g., monthly.

Mixed Rates:

- Aspects of more than one rate design are used. Many LDCs now use this type of rate design.

Rate Design is Based on *Service Distinctions*

- Regulatory authorities allow rates to vary within classes based on distinctions in the service rendered
- The two most common types of service distinctions are the type of service and the quality of the service provided to the customer

Distinctions Based on Type of Service

Sales Service

- **Bundled Natural Gas Sales and Distribution Service**
- Prior to the 1980s, nearly all natural gas sold to customers was sold as a bundled product of natural gas commodity and natural gas delivery service
- Utilities owned the gas commodity and passed through the commodity cost in the PGA
- In addition, utilities recovered the cost of service for the distribution service they provided to customers
- Today, most residential customers and many commercial customers take sales service from the utility

Distinctions Based on Type of Service

Transportation Service

- **Unbundled Transportation Service**
- Customers who wish to purchase their natural gas commodity from a third party supplier or marketer take transportation service from the utility, which delivers but does not buy the gas
- The administrative costs of acquiring and managing gas supply are removed from the transportation cost of service, while the operational costs of balancing and aggregating supplies (if applicable) are added

Distinctions Based on Type of Service

Transportation Service

- **Unbundled Transportation Service – continued**
- Balancing and aggregating costs may be high enough to make transportation service uneconomic for smaller users
- The customer class that makes the greatest use of transportation service is the industrial class

Distinctions Based on *Quality of Service*

- **Firm Service**
- Firm service comes with the utility's commitment to provide all the natural gas demanded by the customer, even at times of peak usage and strained capacity

Distinctions Based on *Quality of Service*

- **Interruptible Service**
- Interruptible service is a lesser quality service that may be cut off at the utility's discretion. For this lesser service, the customer pays a reduced rate. Unlike residential customers, many industrial and some commercial customers have the ability to shut down operations or switch to an alternate fuel during times that the utility would be strained to serve all customers equally. By interrupting these customers, the utility is able to serve its residential and smaller commercial customers without having to invest in additional facilities that might be used only during extremely peak times. In return for maintaining an ability and willingness to be temporarily shut down, interruptible customers pay a lower rate based on the quality of the service they receive.

Unit Charges & Block Structure

■ Unit Charges

Once the cost of service study is complete, the costs are allocated to the various classes, the sales and customer counts are forecast, and the rate design chosen, the various unit charges and fees can be determined.

■ Blocks

Rates can be designed with different unit charges for two or more successive blocks of use. Declining block rates price successive blocks of natural gas use at increasingly lower per-unit prices. The more energy a customer uses, the lower the average price.

■ Block Structure Shown on Bills

When more than one block is used, the unit charge of each block and the amount of usage within each block is shown on the bill.

Examples of Charges & Fees

■ Distribution Charge

- Recovers cost of delivering natural gas through the utility's distribution system
- Is a volumetric charge and varies with amount of gas taken by the customer
- Part of the cost of service

■ Customer or Service Charge

- Usually a flat amount per month that does not vary with amount of gas customers purchase
- Because the utility has some costs that it incurs each month whether it sells any gas or not, most utilities are allowed to recover a portion of the cost of service through this fee

Examples of Charges & Fees

- **Re-connect Fee**

- Part of the COS charged only to those who disconnect (for whatever reason) and then re-connect to the utility

- **Bounced Check Fee**

- Part of the COS charged only to those whose payments are returned for insufficient funds

- **PGA Charge**

- Volumetric charge for the amount of gas sold
 - Not part of the distribution COS
 - Only sales customers charged

Charges & Fees

Costs per Year

- Residential Cost of Service, Fees and Charges
 - \$107 – Distribution Charge
 - \$ 40 – Monthly Customer Charge
 - \$ 2 – Bounced Check Fee
 - \$ 1 – Re-connect Fee
 - ***\$150 – Total Residential Class Cost of Service***

New Approaches to Rate Design

- Numerous nontraditional approaches to rate design have become common in the last two decades. Examples include:
 - Lifeline rates, with costs disproportionately reduced for small users
 - Flexible rates in the industrial and commercial markets to encourage economic development in underdeveloped regions
 - Rates to encourage increased use of natural gas as a vehicle fuel

New Approaches to Rate Design

- The most successful recent innovation in rate design has involved the increased use of tracking mechanisms to flow through in rates contemporaneous changes in expenses or revenues experienced by the utility



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Innovative Rate Design:

Non-volumetric Rates and Cost

- **Non-volumetric Rates** – Distribution costs are assigned per customer or on some other basis that is not tied to volumes of energy consumed
- **Cost Trackers** – Some or all of the rate is based on actual costs rather than estimated and forecast costs
 - **All states** use a Purchased Gas Adjustment (PGA) charge. Canadian utilities track and recover their commodity costs in a similar manner.
 - **Most states** use Lost and Unaccounted For (LUAF) trackers

What are Tracking Mechanisms?

Why Are They Used?

- Trackers are ***approved in rate cases*** for specific future events, durations, and amounts
- Two types: cost trackers and revenue trackers
- Trackers allow utilities to recover or rebate between rate cases the adjustments ***prospectively approved in the rate case***
- Expedited rate cases provide benefits to customers and companies
 - No over/under recoveries
 - Expensive, time-consuming rate cases are avoided

Non-Volumetric Rates

Revenue Trackers and Flat Rate Designs

- Revenue Decoupling
- Weather Normalization (partial decoupling)
- Rate Stabilization Tariffs
- Flat Monthly Fee and Variants

Cost of Trackers

- **Purchased Gas Cost Tracker (PGA)**
 - All states plus Canada
- **Lost and Unaccounted For Gas Tracker (LUAF)**
 - Most states
- **Bad Debt Cost Tracker**
- **Infrastructure Investment Cost Tracker**
- **Pension Trackers**

The Tariff & Its Components

- The utility's tariff consists of all its rate schedules and riders, plus the related rules and regulations
- A rate, together with its specific technical conditions, is known as a rate schedule
- Rate schedule provisions apply to a specific class of service
- A rider is a provision that supplements or modifies a rate schedule or offers special terms of service under certain conditions. The PGA is documented within a rate rider.
- The General Terms and Conditions describe the LDC's policies and practices in rendering service

Summary

- Utility rates are regulated by a public authority
- Three steps in designing rates:
 - Cost of service study identifies expenses, rate base, and return
 - Cost allocation assigns cost of service to classes of customers based on the load and service characteristics of customers
 - Rate design chooses how the costs for each class will be recovered from the customers in each class

Summary

- Gas costs are passed through dollar for dollar and no profit is earned on gas sales
- Profit is earned on dollars prudently invested in facilities and equipment used and useful in providing safe and reliable service to customers



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Thank You



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