



**Oklahoma  
Corporation  
Commission**  
ENERGY•TRANSPORTATION•UTILITIES



Petroleum & Natural Gas  
Regulatory Board, India



# ***Cost of Service Studies***

***NARUC Energy Regulatory Partnership Program***

***The Petroleum and Natural Gas Regulatory Board***

***and***

***Oklahoma Corporation Commission***

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# Cost Allocation, Cost of Service Studies, and The Principles of Designing Rates

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# Overview of Presentation

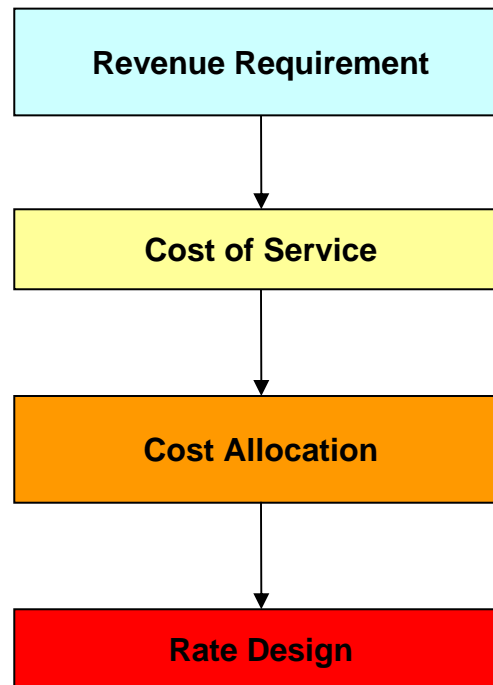
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- Review of the Rate Making Process
- Cost of Service
  - Cost of Service Studies
  - Assignment and Allocating Costs of Embedded Cost Studies
  - Examples of Allocation Factors
  - Rate Base Allocation (Revenue Allocation)
  - Principles for Developing Countries-Rate Making Objectives

# Review of Rate Making Process

## FLOW OF RATE MAKING PROCESS

- Develop Revenue Requirement (Cost Assessment) For the Test Year
- Functionalize and Classify all Cost Causation Components
- Develop and Determine Appropriate Allocation Method to Allocate Costs Across Customer Classes Based on Use of Utility Services
- Use Results as Guide Develop Rates



# Cost of Service

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- Defined as the amount of money required to fund a utility's operations, including all expense liabilities, depreciation, and a fair rate of return
- Costs can be Direct, Joint, and Common to all customer classes for use of utility services

# Cost of Service

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## HOW DOES COST OF SERVICE APPLY IN THE REGULATORY PROCESS?

- To attribute costs to different categories of customers based on how those customers cause costs to be incurred;
- To determine how costs will be recovered from customers within each customer class;
- To calculate costs of individual types of service based on the costs each service requires the utility to expend;
- To determine the revenue requirement for the monopoly services offered by a utility operating in both monopoly and competitive markets; and
- To separate costs between different regulatory jurisdictions

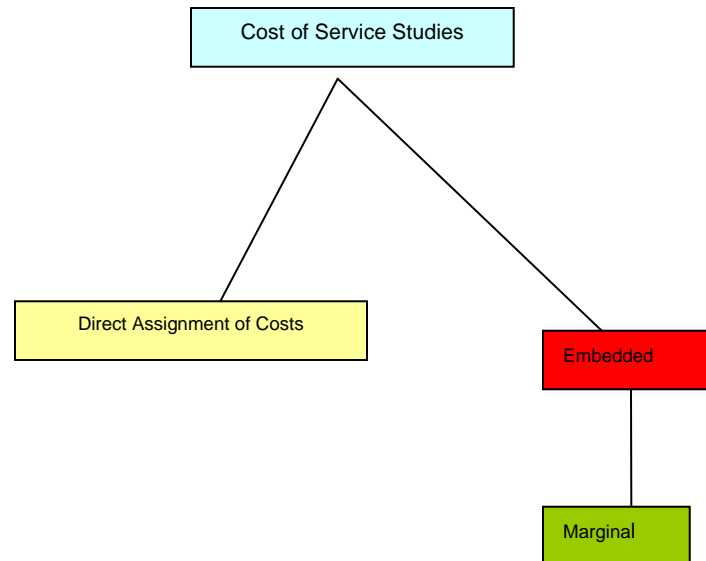
# Types of Costs

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- **DIRECT COSTS** – are costs that are clearly caused (incurred by or for) only a single class or rate tariff. An example of direct costs are meter installments. These costs are borne by a single rate class or customer and is therefore directly assigned to this customer, class, or rate tariff.
- **JOINT COSTS** – are costs that are clearly caused by two or more rate classes or schedules. These types of costs arise when two or more customer classes or rate tariff groups who share and utilize the same facilities, labor, or materials to provide service. An example would be a neighborhood distribution line.
- **COMMON COSTS** – are costs that are universal (common) to all rate classes and rate tariffs. These costs are not directly caused by any single class, but rather are common to all. Common costs are associated with and indirectly caused by all rate classes. An example would be the salary of upper management of the utility company.

# Cost of Service Studies

- Defined as a process used to assign or allocate a fair share of total cost or revenue requirement of a utility to the various customer rate classes or schedules. The output of the study results in the costs and rates return to be collected by each rate class, which is used as the basis for rate design.
- There are three different types of cost study's that can be preformed direct assignment, embedded (a.k.a. fully distributed), and marginal. The latter two cost of service study methods are commonly done using a spreadsheet model using complex computer software.



Cost of Service Studies

# Types of Cost of Service Studies

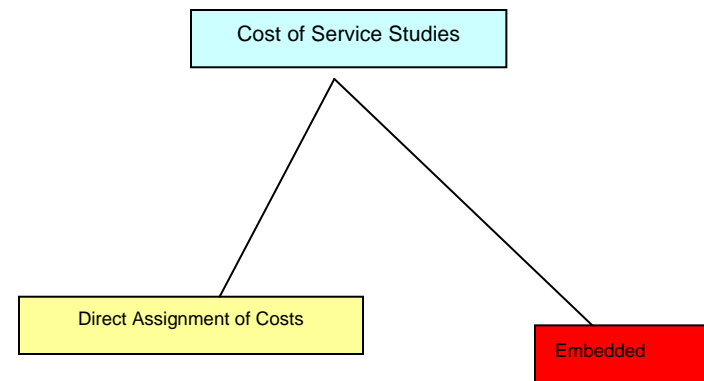
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- **Direct Assignment of Costs** - limited to only those costs that are clearly caused (incurred by or for) only a single class or rate tariff. These costs are caused by a single rate class or customer and is therefore directly assigned to this customer, class, or rate tariff.
- **Embedded Cost Studies** - uses booked or historical costs of a firm and all costs responsibilities are fully distributed by rate class.
- **Marginal Cost Studies** - Calculate the incremental cost of provided service to each customer class. Uses the last investment or forecasted investment to calculate the costs resources to be allocated to customer classes.

# Cost of Service Studies

## DIRECT ASSIGNMENT VS. COST OF SERVICE STUDIES

- Direct assignment of all costs is rarely used by utilities. If each dollar of expense and investment could be specifically assigned to a single customer group, there would be no need to allocate costs to customers and all costs could be assigned to customers that cause these costs to be incurred.
- Most utility investments serve many different customer groups which use the facilities differently and Direct Assignment is not possible. Thus, it is virtually impossible for a utility to attribute specific cost responsibility for these “common costs” and direct assignment is rarely used as for a complete service study.
- Most utilities utilize a fully embedded and allocated cost-of-service study that breaks down the complexities of all direct, joint, and common costs by function and classification of cost causation.



# Process of Assignment and Allocating Costs of Embedded Cost Studies

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Investments and Cost are broken down by costs type and then assigned or allocated

Investment and Cost of Utility	Specific to One Customer Class ( <u>D</u> irect Costs)	➔	Assigned <u>D</u> irectly to Class
	Joint or Common to Several Classes ( <u>J</u> oint and <u>C</u> ommon Costs)	➔	Allocated to <u>C</u> lasses Or Among <u>C</u> lasses

# Process of Assignment and Allocating Costs of Embedded Cost Studies

## Functionalization of Costs by Cost-Causation Components

Functionalization is the arrangement of costs according to majors functions. The purpose of Functionalization is to improve the accuracy of the cost allocation process in performing a Cost of Service Study.

<u>FUNCTION</u>	<u>COST-CAUSATION COMPONET</u>
Production, Storage and Gas Supply	<i>Demand</i> -Related
Costs: - Transmission	<i>Commodity</i> -Related and/ <i>Demand</i> - Related
- Distribution	<i>Customer</i> - Related
- Other and Customer	<i>Customer</i> - Related
Revenue	<i>Revenue</i> - Related

# Process of Assignment and Allocating Costs of Embedded Cost Studies

## Classification of Costs by Function

Classification is a second step of separating costs into groups bearing a relationship to measurable costs-defining service characteristics of the utility. Typically the classifications assignments are Commodity, Customer, Direct Assignment, and Revenue categories.

Functionalization	Classification			
<u>Functional Item</u>	<u>Commodity</u>	<u>Customer</u>	<u>Direct</u>	<u>Revenue</u>
Production & Gas Supply	●			
Transmission	●	●	●	
Distribution		●	●	
Other		●		
Revenue				●

# Process of Assignment and Allocating Costs of Embedded Cost Studies

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- Allocation is the apportionment of joint costs among two or more rate classes.
- Allocation is usually done by developing mathematical factors, via load research, that distribute costs to the customer classes according to how they cause these costs to be incurred.
- The three basic allocation factors are **CAPACITY, COMMODITY, and CUSTOMER**. These three factors are allocated on **COINCIDENT DEMAND, NON-COINCIDENT DEMAND, AND AVERAGE AND EXCESS DEMAND ALLOCATION METHODS**.

# Allocation Factors Defined

**Coincident Demand** - uses peak load responsibility that allocates capacity related costs based on customer class demands of utility services at the time the peak is Coincident to the entire system peak load.

Coincident Demand Cost Allocation		
Class of Service	Demand at Time of System Peak (Mcf/Day)	Ratio to System Peak
Residential	4,000	0.40
Commercial	2,000	0.20
Industrial	4,000	0.40
<b>System Peak Total</b>	<b>10,000</b>	<b>1.00</b>

# Allocation Factors Defined

**Non-Coincident Demand** – Is based on maximum class demands regardless of when those demands occur to the system peak. Thus, there is *no coincidence* to system peak. Thus, it is the ratio of the class maximum demands to the sum of all the class maximum demands irrespective of time of occurrence. Each Class pays part of the total capacity costs.

Non-Coincident Demand Cost Allocation		
Class of Service	Maximum Class Demand (Mcf/Day)	Ratio to Sum of Class Demands
Residential	4,500	0.375
Commercial	2,700	0.225
Industrial	4,000	0.333
Interruptible Service	800	0.067
(Non-Coincident) Total	10,000	1.00

Cost of Service Studies

# Allocation Factors Defined

**Average and Excess** – Uses two components of demand that are summed to develop ratios for class responsibility. The first component is each class’s share of the system total system **average demand** times the system load factor. The second component is each class’s share of the **excess demand** times one minus the system load factor. The **excess demand** is calculated as the excess of all the class non-coincident demands over the system average demand.

Average & Excess Demand Cost Allocation			
Class of Service	Annual Use (Mcf/Day)	System Peak (Mcf/Day)	Class Max Demand
Residential	365,000	N/A	3,000
Commercial	182,500	N/A	1,250
Industrial	146,00	N/A	1,100
Interruptible Service	219,000	N/A	3,000
(Non-Coincident) Total	10,000	4,167	8,350
Class of Service	Class Max Demand	Average Demand (Mcf/Day)	Process Demand Alloc. Basis (Mcf/Day)
Residential	3,000	1000	2,000
Commercial	1,250	500	750
Industrial	1,100	400	700
Interruptible Service	3,000	600	2400
(Non-Coincident) Total	10,000	2500	5,850
Class of Service	Average Demand (Mcf/Day)	Excess Demand (Mcf/Day)	A&E Demand (Mcf/Day)
Residential	1,000	570	1,570
Commercial	500	214	714
Industrial	400	199	599
Interruptible Service	600	684	1,284
(Non-Coincident) Total	2,500	1,667	4,167

# Revenue Allocation (Rate Base) Allocation

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- Once all costs have been fully allocated and distributed across rate classes the next step is to allocate Rate Base to determine the appropriate levels of revenues to be collected from rate classes.
- This next step serves as the basis for how rates are to be collected from rate classes. There are several principle considerations that need to be factored in the judgmental decision to who or what class is to receive a “fair” appointment of the revenue requirement.
- These principle considerations are as follows:
  - The Cost Based Standard
  - Cost Causation Principle
  - Equal Rates of Return
  - Gradualism
  - Load Research
  - Unit Cost Analysis

# Principles for Developing Countries

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- **According to James C. Bonbright in his “Principles of Public Utility Rates” Most, if not all principles, have some relevance and are fundamentally drawn from principles established over a century of regulation in different utility industries, especially by James C. Bonbright**
- **Key Principles Are:**
  - **Economic Efficiency**
  - **Fairness or Equity**
  - **Simplicity and administrative ease**
  - **Conservation of Resources**
  - **Stability and Gradualism of Rates**
  - **Social Goals**
  - **Environmental Protection**
  - **Balance of Payments to the Utility**

# QUESTIONS??

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