Tariff Development II: Rate Design for Electric Utilities

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Overview

- Objectives of Rate Design
- Steps in Setting Rates
- Cost Allocation
- Rate Design
- Special Rate Issues
- Policy Issues for Rate-setting

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Rate Setting

- Rate setting is prospective
- Rates are set today to recover the future cost of service
- Development of the revenue requirement is largely a science
- Rate design involves significant element of art
- Rate setting may fulfill several objectives
- Cost of service practices have been in use since 1890's in US, but developments in information technology and metering may affect these practices
- Rate regulation is an act of government exercising social policy with the objective of enhancing social welfare

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Bonbright's Principles for Rates

- Principles of Public Utility Rates by James C. Bonbright
- Rate attributes: simplicity, understandability, public acceptability, and feasibility of application and interpretation
- Effectiveness of yielding total revenue requirements
- Revenue (and cash flow) stability from year to year
- Stability of rates themselves, minimal unexpected changes that are seriously adverse to existing customers
- Fairness in apportioning cost of service among different consumers
- Avoidance of "undue discrimination"
- Efficiency, promoting efficient use of energy and competing products and services

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Rate Setting Objectives

- In Texas, rates should not be:
  - Unreasonably preferential
  - Prejudicial
  - Predatory
  - Discriminatory
  - Anticompetitive
- Rates must not embody unreasonable distinctions
- Rates should be just, reasonable, sufficient, equitable, and consistent

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Steps in Setting Rates

- Establish utility's revenue requirement
- Allocate revenue requirements to customer classes
- Design rates to recover revenue requirements

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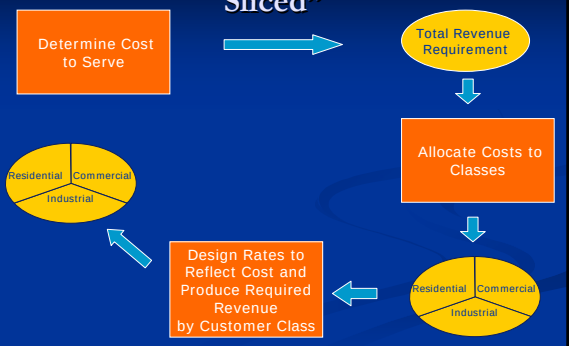
Rate Design or "How the Pie is Sliced"



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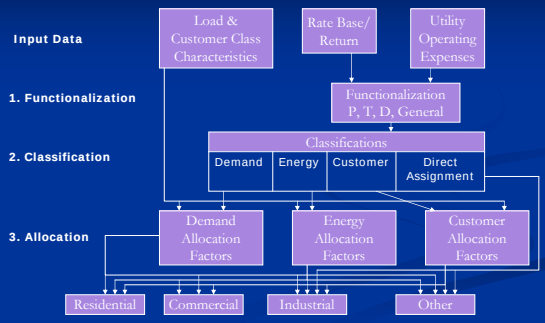
Steps in Allocating Costs



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Functionalization

- Step 1: What purpose does the cost serve for the utility?
  - Determine, for each item of rate base and expense, the functional use in the following categories:
    - Production (including purchased power)
    - Transmission
    - Distribution
    - General or Other
  - Accounting rules should be generally consistent with functions

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Classification

- Step 2: – What causes the cost to be incurred?
  - Divides the costs, according to causality, into the following components:
    - Demand (Fixed costs that vary with kW demand)
    - Energy (Variable costs that vary with kWh provided)
    - Customer (Directly related to number of customers)
      - Investment in distribution plant to establish basic service
      - Metering, accounting, billing and customer service costs

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Allocation

- Step 3: How much of the total cost should each customer class pay?
  - Once costs have been functionalized and classified they are:
    - Directly assigned to a specific class if wholly attributable to a particular customer or customer class
    - Allocated to customer classes using appropriate allocation factors
  - Objectives or criteria to assess an allocation method
    - Reflects cause (cost causation)
    - Reflects usage patterns
    - Produces stable results from year to year
    - Easy to understand by both regulators and customers
    - Accepted by regulators

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Assignment or Allocation of Costs

- Assignment or allocation of costs may be straightforward or very controversial
  - Straightforward
    - Energy costs allocated on energy consumption
    - Distribution costs are not assigned to transmission-level customers
  - Controversial
    - Allocation of investment costs of generating facilities is typically a difficult issue

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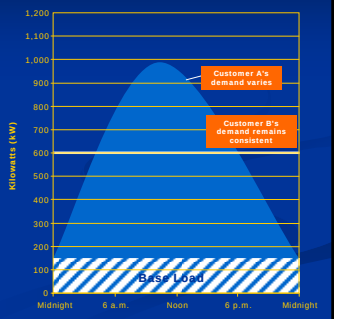
Patterns of Consumption and Allocation

- Customer A's consumption varies during the day. Peak demand is 1,000 kilowatts (kW), and energy consumption is 14,400 kWh
- Customer B's consumption is constant. Peak demand is 600 kilowatts (kW), and energy consumption is 14,400 kWh
- Impact of coincident peak allocator
  - Customer A--62.5% of costs
  - Customer B--37.5% of costs



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Are Utility Rates Cost-based?

- For some costs, there may be competing methods proposed to allocate costs
  - For demand, 3 CP vs. 4 CP vs. 12 CP
- Class cost of service study is a view of the costs required to serve each class
- Regulator may have reasons not to assign costs in accordance with study
  - Government policy objectives favor a class or an objective (electrification)
  - Changing from existing to rates based on the study may result in a significant increase for some classes

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Designing Rates

- Uniform rates applied to groups of similar customers
- Factors applied in designing rates
  - Feasibility—what can be measured
    - Demand costs for residential customers recovered through energy charge
  - Stability
    - May use ratchets to spread seasonal costs over entire year
  - Cost causation
  - Ability of customers to understand charges
  - Marginal costs
  - Rates as incentives
  - Social objectives
    - Low-cost energy blocks

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Typical Rate Designs in Texas

- Residential charges
  - Customer charge (per customer per month)
  - Energy charges (per kWh)
  - Percentage of revenue charge (taxes)
- Industrial charges
  - Customer charge (per customer per month)
  - Demand charges (per KW)
  - Energy charges (per kWh)
  - Percentage of revenue charge (taxes)

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Policy and Practical Considerations Affect Rate Design

- Residential and small commercial energy charges include demand costs and may include customer-related costs
  - Demand may not be metered
  - Social policies may favor minimum customer charge

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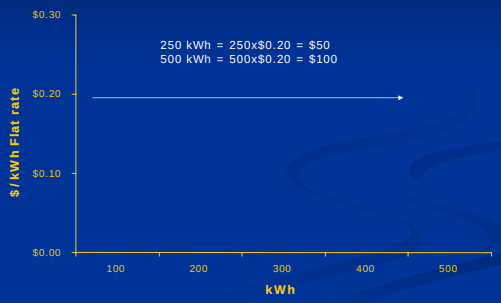
Energy Rate Designs: Flat Rate



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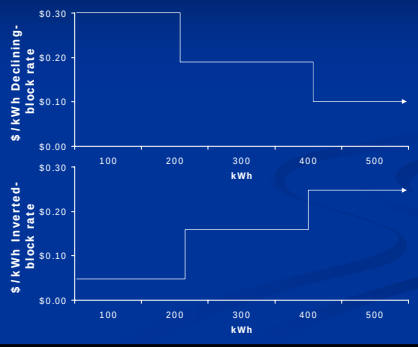
Energy Rate Designs: Declining or Inverted Block



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Rationales for Block Structures

- Declining block might be used with low customer charge to facilitate broader access to electricity
  - First block is high to recover customer and demand costs
- Declining block might be used to encourage off-peak consumption
  - Texas utilities have used it for electric heating
- Inverted block might be used to encourage conservation
- Multiple objectives can be addressed through pyramid blocks

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Concepts Relating to Demand Charges

- Demand or load:
  - Rate of consumption at a specified time or over a time
  - Demand on a utility system is the amount of energy consumed at a specific time
- Coincident peak demand (CP)
  - A customer's or customer class's demand at the time of a utility system's peak demand
  - CP may be used to allocate costs to customers
- Non-coincident peak demand (NCP)
  - A customer's or customer class's maximum demand, regardless of when the system peak occurs
  - Commercial and industrial customers may pay monthly demand charge based on their NCP
- Average demand
  - The total amount of energy consumed during a period divided by the number of hours in the period

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Rate Design for Demand Rates

- Ratchets
  - With a ratchet, customer is billed based on historical demand. Billing demand may be higher of:
    - Highest demand measured during the month
    - Some percentage (e.g. 80-85%) of the highest demand during the previous year (or in the peak season)
  - Why use ratchets?
    - Stabilizes demand costs by spreading them over the year
    - Avoids disproportionately high charges during period with very high demand
    - Provides utility better revenue stability
    - Customers probably prefer rate stability
    - Informed customers understand significance of high demand

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Special Rate Issues

- Volatile costs
- Marginal cost rates
- Extension of service
- Standby service

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Mechanisms for Volatile Costs

- Fuel and purchased power adjustments
  - Fuel or purchased power adjustment clause—utility adjusts charge monthly to reflect costs
    - May also include cost/revenue correction
  - Fixed factor—Regulator adjusts charge periodically to reflect expected costs
    - Utility files projected costs
    - Costs tied through formula to broad index, such as NYMEX
    - Interest to or from customers for imbalance in cost and revenue
    - Reconciliation of costs and revenues, review of reasonableness of costs and operating decisions

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Marginal Cost Rates

- If long-run marginal cost is below embedded cost, utility may seek discounted economic development rate
  - Rate above short-run MC (primarily fuel cost) but below embedded cost
  - To provide appropriate price signal, discounted rate should be above long-run MC
  - Utility may prefer rate below long-run MC to provide disincentive to self-generation
- What is the policy: encourage all industry, encourage industry that creates jobs, encourage or discourage self-generation

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Extension of Service

- Rates for installation of new service facilities
  - Initial charges that cover high percentage of facilities costs
  - Initial charges that cover low percentage of facilities costs but include contractual commitment to take service for period of years
  - Initial charges that cover low percentage of facilities costs with no contractual commitment
- What is the policy: encourage new service or provide assurance that utility will recover cost of new service

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Are There Broader Policy Issues for Rate-setting?

- Traditional rate-setting process is costly in time and resources, occurs relatively infrequently
  - Between rate cases, utility has incentive to reduce costs, to maximize profit, if it has a period to enjoy above-normal profit
  - Cost reductions may escape notice of regulator, without periodic monitoring
  - Without special fuel or purchased power rate, utility may bear significant risk
  - Are we entering a period of instability in commodity costs that will strain rate-setting process?
  - Does rate-setting process afford regulator opportunity to assess utility performance on other important issues, such as quality of service, energy efficiency efforts, or electrification?

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