Tariff Design

NARUC Energy Regulatory Partnership Program

The Energy Regulatory Commission of the Republic of Macedonia
and
The Vermont Public Service Board

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Rate Design

- The *structure* of prices
  - That is, the form and periodicity of prices for a firm's goods and services
    - Usage-Based
    - fixed, recurring charges
    - Installation, Hook-up and Exit Fees
- Simple Rate Designs
  - Price = Rev. Req./Customers
  - Price = Rev. Req./Sales

Objectives of Rate Design

- Revenue-Related Objectives:
  - Rates should yield the total revenue requirement
  - Rates should provide stable and predictable revenues
  - The rates themselves should be stable and predictable

Objectives of Rate Design (*continued)*

- Cost-Related Objectives
  - Rates should be set so as to promote economically-efficient consumption (static efficiency)
  - Rates should reflect the present and future private and social costs (and benefits) of providing service
  - Costs should be apportioned fairly among customers and customer classes

Objectives of Rate Design (*continued)*

- Cost-Related Objectives (cont.)
  - Undue Discrimination should be avoided
  - Rates should promote innovation in supply and demand (dynamic efficiency)
- Practical Considerations:
  - A rate design should be, to the extent possible, simple, understandable, acceptable to the public, and easily administered

Objectives of Rate Design (*continued)*

- The objectives of rate design are, in effect, the objectives of regulation
- The objectives of rate design are, sometimes, in conflict with each other

Revenue-Related Issues

- Rates set should be set so as to give a regulated firm a reasonable opportunity to
  - recover prudently incurred expenses, including investment, and
  - to earn a fair rate of return on the remaining costs (the undepreciated portion) of its prudent investment

Revenue-Related Issues *(continued)*

- Rates set in this way enable a company to cover its debt service obligation, pay dividends to shareholders, and attract new capital investment

Cost-Related Issues

- Will rates set at average cost per unit be economically efficient?
  - Average cost vs. marginal cost
    - Long run vs. short run
- Private financial vs. total social cost
  - Cost of environmental damage from electricity production and delivery
- Who pays what costs?
  - The principle of cost causation

The Price Signal

- The price of a good should reflect the full cost of the resources needed to produce the good.
- Long-run vs. short-run cost of production?

Cost Allocation

- Based on groups of customers
  - Customer classes designated according to the criterion adopted (value, cost, social objectives)
    - Residential (with or without a low income or elderly segment)
    - Commercial
    - Industrial
    - Street lighting
    - Agricultural

Allocating Costs

- Include line losses
- Types of Demand Measures
  - Individual Peak
  - Class Peak
  - Coincident Peak
    - Annual
    - Monthly
  - Average and Excess

Two Types of Cost Studies

- Embedded or Fully Allocated Cost Study
  - Uses capital and operating costs that have been historically embedded (spent, sunk, or invested)
  - Built on accounting cost data generated in the day-to-day operations of the utility
- Incremental or Marginal Cost Study
  - The cost of providing additional service
  - forward-looking study of resource costs

Embedded Cost Allocation

- Most simple design
  - $Rev Req ÷ Number of customers = Rate, billed annually, semi-annually or quarterly
  - Complexities arise due to desire to distinguish between
    - Types and amount of service
    - Types of customers

Fully Allocated Embedded Costs

- Advantages:
  - Actual costs
  - Reconciled with the revenue requirement
  - Perceived as Fair
- Disadvantages:
  - Allocating joint and common costs
  - Does not reflect current market trends
  - May produce inefficient prices

Categorize

- What are the costs of
  - Generation
  - Transmission
  - Distribution
  - Billing
- Need fairly detailed accounting for planning & rate design

Functionalize

- Energy
- Peak Demand
- Customers

Marginal Cost Pricing

- Equal to the economic costs of providing the next increment of service
  - Long-run v. Short-term
  - Advantages: forward looking, economic costs
  - Disadvantages
    - Definitions more contentious
    - Reconciliation with rev. req.
    - Requires forecasted demand and costs
    - Potential volatility

Marginal Cost Pricing

- Promotes economic efficiency
  - Exception: The problem of "second best"
- Those who cause the costs pay the costs
- No undue discrimination
- Challenge:
  - Will pricing at marginal cost cause the utility's to collect its revenue requirement? Will it over-collect, or under-collect?

Calculating Marginal Costs

- What is the appropriate increment of output, or margin, to measure?
  - Generating capacity costs: $/kw-yr
  - Energy costs: $/kwh
  - T&D costs: $/kw-yr
- Avoided costs

Marginal-Cost Pricing and the Revenue Requirement

- Reconciling marginal-cost prices with the revenue requirement
  - Relationship of the rev.req. (total cost) to marginal cost
- What kinds of pricing distortions are acceptable?
- Should the incremental costs of environmental damage be reflected in rates?

Cost Allocation

- Are all classes equally risky to serve?
- Cross-subsidies between classes
- Cross-subsidies within classes

Gradualism

- If subsidies exist, how quickly do you try to eliminate them
- Rate shock -- irate ratepayers
- Impact on low-income consumers
- Public Policy Consideration
  - Industrial development
  - Protection of residential consumers

Joint and Common Costs

- Weakness of Embedded Costs
- Unallocable Costs
  - Administrative and General Costs
- "Solutions"
  - Allocate in proportion to allocable
  - Do something reasonable
  - Consider other policy goals

Rate Averaging

- Within rate classes
- Across geographic areas: rural vs. urban
- Rate averaging vs. subsidy vs. simplicity

Social Value of Service Pricing

- Assistance to specific customer classes
  - Residential lifeline rate
  - Economic development/business retention rates
- Promote social objectives
  - Conservation/environmental considerations
  - Universal service

Designing Tariffs

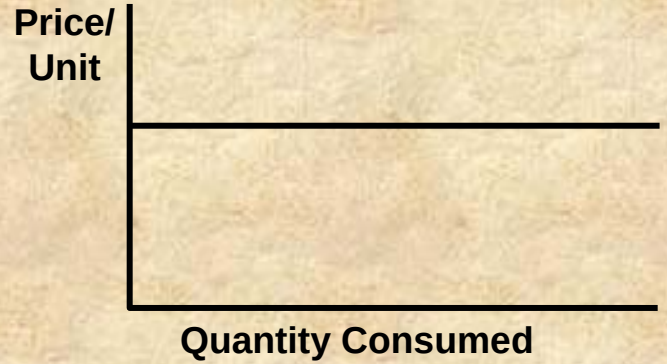
- After allocation to customer classes, the costs still must be set into tariffs
- Tariff development also considers goals of the tariffs

Primary Tariff Cost Components

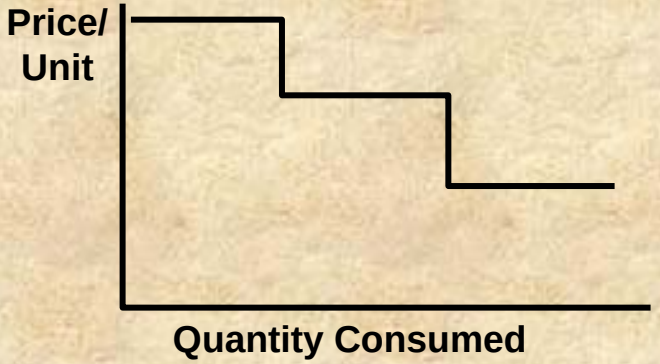
- Customer Charge – Flat rate
  - Recover fixed charges
- Usage component
- Demand component
- Interaction of these components sends price signals

Rate Forms

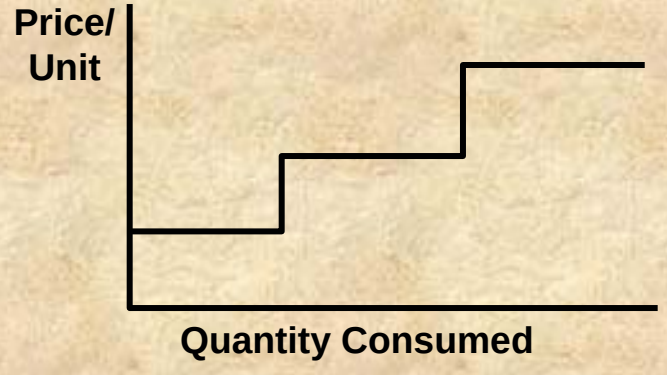
Flat Rates



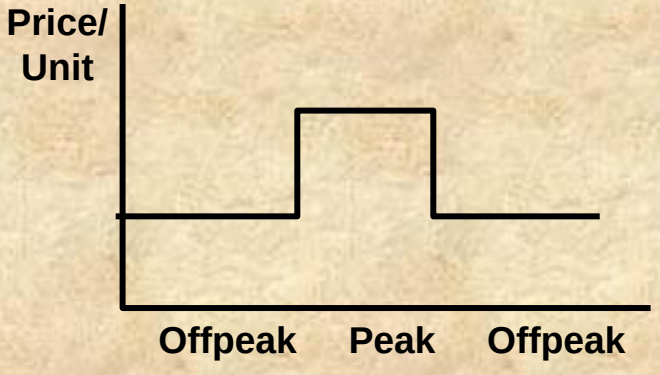
Decreasing Block Rates



Increasing Block Rates



Seasonal Rates



Usage Patterns

- Flat
- Declining Block
  - Based upon assumption that cheaper to serve large customers
  - And that marginal cost is less than average cost
  - Encourages consumption, discourages conservation, so important to ensure prices are right

Usage Patterns (cont'd)

- Inverted Block
  - Marginal cost greater than average cost
  - Discourages consumption – encourages conservation
  - Lifeline rate
- Peak/Off-peak rates
  - water heater discounts
- Seasonal rates
- Real-time pricing

Demand component

- Reflects fact that utility must have power available to serve customer
  - (i.e., capacity charges)
- Encourages reduced usage at peak periods (load shifting)

Tariff Design

- Uniform tariffs
  - Easier to administer
  - Social benefits of ensuring connectivity
  - For most customers,
  - Accompanied by line extension policies that require customer to pay much of cost of new extensions

Customer-Specific Tariffs

- Actual customer cost-based tariffs
  - More precise (assuming can identify separate costs)
  - Generally not used in Vermont and most of US (except where customer has very clear distinguishing characteristics)
  - Difficult to calculate
    - What are the cost differences in an integrated electrical system?
    - for most customers, costs outweigh benefits

Special Contracts

- Customers with unique cost causing characteristics
- Economic Development, load or job retention
- Problem: selling power below cost yields inefficient use of resources and financially weak utilities
- Where not unique or where categorization possible, tariffs preferred