

Rate Design Part I: Design Goals & Principles

(including Class Cost of Service Studies & Principles for Developing Countries)



NARUC Energy Regulatory Partnership Program

*The Georgian National Energy and Water Regulatory Commission
and*

The Vermont Public Service Board

by

Pam Stonier

Vermont Public Service Board

June 29, 2009



Overview

- ❖ *Goals & Principles of Rate Design*
- ❖ *Defining and Balancing the Essential Factors
(economic, social, regulatory, etc.)*
- ❖ *Class Cost of Service Studies*
- ❖ *Principles for Developing Countries*



Goals & Principles of Rate Design

- ❖ Question: What is rate design?
- ❖ Answer: 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 = Revenue Requirement/Customers
 - Price = Revenue Requirement/Sales



Goals & Principles of Rate Design

(cont'd)

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



Goals & Principles of Rate Design

(cont'd)

❖ 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



Goals & Principles of Rate Design

(cont'd)

- ❖ **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



Goals & Principles of Rate Design

(cont'd)

- ❖ **Cost-related objectives: (cont'd)**
 - 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



Goals & Principles of Rate Design

(cont'd)

❖ Revenue-related issues:

- Rates 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



Goals & Principles of Rate Design

(cont'd)

❖ Revenue-related issues: (cont'd)

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



Goals & Principles of Rate Design

(cont'd)

❖ 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



Goals & Principles of Rate Design

(cont'd)

❖ Summary:

- Set economically efficient and fair prices, while simultaneously giving the regulated utility a reasonable opportunity to recover legitimate costs.
- Provide rate stability, predictability while authorizing a rate of return sufficient to allow the company to compete with other investment opportunities of similar risk.
- Rates should be simple, understandable, publicly acceptable and easily administered.



Defining and Balancing Essential Factors

(economic, social, regulatory, etc.)

❖ Economic regulation:

- The explicit public or governmental intervention into a market to achieve a public policy or social objective that the market fails to accomplish on its own



Defining and Balancing Essential Factors

(economic, social, regulatory, etc.) cont'd

- ❖ Objectives of economic regulation
 - Economic efficiency
 - Fair prices, to consumers, producers and regulated entity
 - Reasonable service, with non-discriminatory access
 - Adequate quality and reliability
 - Other policy consideration (social objectives)



Defining and Balancing Essential Factors

(economic, social, regulatory, etc.) cont'd

❖ Goals of economic regulation

- Attracting Investment
- Supporting Privatization
- Rights and obligations must be clear and enforceable
- Transparent and predictable regulatory process and outcomes
- Clear franchises
- Enable fair competition where possible



Defining and Balancing Essential Factors

(economic, social, regulatory, etc.) cont'd

- ❖ Rationale for economic and price regulation
 - Product is considered essential
 - Product is most efficiently provided by a single supplier
 - Natural monopoly
 - Other market failures
 - ◆ External (environmental) costs not fully reflected in costs
 - ◆ Consumer Protection
 - ◆ Collusion (antitrust concerns)
 - ◆ Excessive market power
 - ◆ Discriminatory Pricing
 - Economic Efficiency
 - Other Policy Considerations
 - Information Asymmetry



Defining and Balancing Essential Factors

(economic, social, regulatory, etc.) cont'd

❖ Rationales for regulation

- **Concept of businesses “affected by the public interest”**
 - ◆ Natural monopoly – single firm can produce a desired level of output necessary at a lower cost than any output combination of more than one firm
 - ◆ Increasing economies of scale
- **Causes of natural monopoly**
 - ◆ Technologies
 - ◆ Capital intensity
 - ◆ High ratio of fixed costs to total costs



Class Cost of Service Studies

- ❖ Two types of class cost of service studies
 - **Embedded or fully allocated class cost of service study**
 - ◆ Uses capital and operating costs that have been historically embedded (spent, sunk, or invested)
 - ◆ Build on accounting cost data generated in the day-to-day operations of the utility
 - **Incremental or marginal class cost of service study**
 - ◆ The cost of providing additional service
 - ◆ Forward-looking study of resource costs



Class Cost of Service Studies (cont'd)

- ❖ Steps in an embedded or fully allocated class cost of service study:
 - Functionalization
The process of dividing the total revenue requirement into functional components of electric operation of the company:
 - ◆ Production
 - Generation and/or purchased power
 - ◆ Transmission
 - High-voltage transmission lines
 - Substations and lower-voltage transmission lines



Class Cost of Service Studies (cont'd)

- ❖ Steps in an embedded or full allocated class cost of service study: (cont'd)
 - Functionalization (cont'd)
 - ◆ Distribution
 - Distribution substations
 - Primary distribution lines
 - Line transformers
 - Secondary distribution lines
 - Meters, service drops, metering services
 - Customer services
 - Direct assignment, e.g., street light
 - ◆ General (which are later functionalized into the prior three categories)
 - General plant and administrative and general



Class Cost of Service Studies (cont'd)

- ❖ Steps in an embedded or fully allocated class cost of service study: (cont'd)
 - Classification
The process of separating the functionalized costs into classification categories based on cost of the components of utility service being provided (“cost causation”):
 - ◆ Demand-related costs
 - Costs that vary with the kW of instantaneous demand imposed on the system
 - ◆ Energy-related costs
 - Costs that vary with the kWh of energy that the company generates and/or purchases on behalf of its customers
 - ◆ Customer-related costs
 - Costs that vary with the number of customers that the company serves



Class Cost of Service Studies (cont'd)

- ❖ Steps in an embedded or fully allocated class cost of service study: (cont'd)
 - Allocation
The process of assigning costs to the different customer classes:
 - ◆ Customer class categories are based on such things as:
 - size of load
 - voltage level at which the customer is served, and
 - other service characteristics such as whether a residential customer is all-electric or not, or whether or not the customer has a demand meter
 - ◆ The primary customer class categories are Industrial (large and small), Commercial (large and small), and Residential
 - ◆ Allocation produces a set of percentages that sum to 100% of costs across all classification categories



Class Cost of Service Studies (cont'd)

- ❖ Incremental or marginal class cost of service study
 - **Marginal costs (long run)**
 - ◆ In designing the rates, Vermont generally looks at both the embedded (accounting) costs and the marginal (forward looking) costs
 - ◆ Economic efficiency is a forward looking concept and therefore centers on long term marginal costs
 - ◆ Neither embedded nor incremental/marginal cost of service study approaches are strictly applied, but utilities and regulators generally try to move toward a forward looking marginal cost approach to rate design gradually over time (rate and revenue stability, predictability, accounting cost recovery and the variability of forward looking marginal costs of offsetting concerns).



Class Cost of Service Studies (cont'd)

- ❖ Incremental or marginal class cost of service study (cont'd)
 - **Market cost pricing**
 - ◆ The regional wholesale markets set the shorter term prices for energy through the regional Locational Marginal Price (“LMP”)
 - ◆ Vermont utilities purchase electricity at the margin from this regional market
 - ◆ Currently very few Vermont utility customers see a short term market-based rate. The issue of market-based pricing through dynamic pricing arrangements is currently the subject of a Public Service Board proceeding.
 - ◆ Included within the scope of the investigation is the advanced time-of-use metering necessary to implement dynamic pricing



Class Cost of Service Studies (cont'd)

- ❖ Incremental or marginal class cost of service study (cont'd)
 - **Opportunity Costs**
 - ◆ Relates to the concept of marginal costs ...,
 - ◆ The Marginal Opportunity Cost (“MOC”) combines the concept of Opportunity Cost (next best use of resource being committed) and Marginal Cost (forward looking cost of next unit purchased)
 - ◆ MOC generally includes marginal costs of production, plus externalities and depletion costs (to the extent not fully accounted for in market costs).



Class Cost of Service Studies (cont'd)

- ❖ **Class cost of service allocation**
 - The process of allocating costs to different customer classes will be addressed in the next presentation:

“Rate Design Part II: How We Do It”



Principles for Developing Countries

❖ Source of key principles:

- Most fundamental principles are drawn from principles established over a century of regulation in different utility industries.
- James C. Bonbright, former professor emeritus of finance at Columbia University and a former trustee and chairman of the New York State Power Authority, was a significant contributor to the development of principles across utility industries that are relevant to both developed and developing nations.

The Bonbright Center was established in 1992 to further understanding of regulatory and business issues. It is a useful resource and can be reached at this link:

http://www.terry.uga.edu/exec_ed/bonbright/



Principles for Developing Countries

(cont'd)

❖ **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



Principles for Developing Countries (cont'd)

- ❖ Key principles include the following:
 - **Economic efficiency**
 - ◆ Rates set to recognize all costs and encourage efficient consumption or consumption patterns that do not strain infrastructure or resources
 - **Economic fairness**
 - ◆ Rates set to ensure that all classes of customers pay fair proportion of embedded and forward looking costs
 - ◆ Rates set to ensure that all competitors of market or competitive services receive comparable treatment for bottleneck facilities



Principles for Developing Countries (cont'd)

- ❖ Key principles include the following: (cont'd)
 - Revenue adequacy
 - ◆ Rates adequate for monopoly utilities to recover costs and maintain their ongoing existence for the benefit of future ratepayers
 - Acceptable rates
 - ◆ Rates acceptable to those being billed for service that requires gradual movement toward goals or principles (can be a tension between this principle and other principles)



Principles for Developing Countries (cont'd)

- ❖ Contemporary questions for developing countries include the following:
 - Is your load shape data accurate?
 - Is your utility keeping books and records that include a common chart of accounts?
 - What happens if the original amounts on the books don't reflect what it really cost to build the facility?
 - Are your billing determinants accurate?
 - ◆ How accurate are the meters?
 - ◆ Are you accounting for all system losses?
(e.g., stolen power, stranded costs, shared/rigged meters)