



Principles of Rate Design and Tariff Structures

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This document summarizes the principles of pricing utility services and discusses some of the key factors that have an impact on tariff structures for the second price control period for T&TEC.

Summary
Document

PRINCIPLES OF RATE DESIGN

The four primary functions of rate design are:

Capital attraction	to enable utilities to provide service and to make provision for expansion and continuation of the service.
Efficiency incentive	to simulate competitive outcomes in the provision of utility services by bringing cost and price in closer alignment.
Demand control	to influence consumer behavior by eliciting demand-inhibiting choices with respect to consumption of utility services.
Compensatory income transfer	to determine a rate that is reasonable for different types of utility consumers.

OBJECTIVES OF RATE DESIGN

Utility	<ul style="list-style-type: none">•To yield a revenue requirement that is sufficient to cover operating and capital costs of the utility;•To provide predictable and stable revenues for the utility over time; and•To promote innovation in supply and demand (dynamic efficiency).
Customer	<ul style="list-style-type: none">•To apportion rates fairly to customers and customer classes;•To promote economically-efficient consumption; and•To avoid cross subsidization across customer classes.
Society	<ul style="list-style-type: none">•To reflect current and future, private and social, costs and benefits of providing service;•To encourage the efficient use of utility services in terms of quantity used and timing of use; and•To provide proper incentives for conservation, such as, investment by users in energy efficient appliances and water-saving fixtures.

COST BASIS FOR ALLOCATION AND TARIFF DESIGN

Two broad cost-based approaches have evolved for the purposes of allocating costs, and ultimately, establishing tariffs; one is a Marginal Cost approach while the other is an Embedded Cost approach. These are described below.

Allocating Cost and Establishing Tariffs

Marginal Cost Approach

- Marginal cost of a utility service refers to the increase in total cost that is imposed on the utility by a relatively small increase in its output, usually expressed as an incremental cost per unit.
- Rates based on marginal cost send signals to consumers and producers that encourage them to balance the benefits from consuming the good or service with the costs of providing same.
- Marginal cost pricing cannot guarantee that revenue will match the total costs of service provision. While marginal cost pricing can lead to an over-recovery of revenue, it is more common to be faced with the problem of under-recovery in a utility sector that operates under conditions of natural monopoly.

Embedded Cost Approach

- This approach, also known as the fully-distributed cost (FDC) approach, involves the allocation and assignment of total annual costs to broadly defined classes of customers. This approach derives the aggregate revenue that the utility requires based solely on costs of production.
- The general approach to cost apportionment is based on the principle of cost causality.
- The advantage of the embedded cost approach is that it allows the service provider to recover the fixed and common costs that may sometimes not be recovered by marginal cost pricing. On the other hand an embedded approach does not offer the same price signaling advantages that are inherent in marginal cost pricing.

TARIFF STRUCTURES

Most tariffs are a combination of a fixed charge, a minimum charge and/or a volumetric charge. These are derived from one or more methodological approaches, described below.

Linear Prices

Linear tariffs are essentially uniform or simple tariffs, where one rate applies for all units consumed regardless of type of customer.

Non-linear Prices

There are two basic types of non-linear tariff structures:

- Increasing Block Tariffs (IBTs) - Consumption is organized into 'blocks' for rate making purposes. The first block of electricity consumed is usually set as the "lifeline block" and charged at a certain rate.
- Declining block tariffs - The first block of electricity consumed is charged at a given rate and the succeeding blocks are charged at progressively lower rates. A declining block encourages an increase in consumption so that the utility can achieve economies of scale.

Multipart Tariffs

Tariffs with several billing components are called multi-part and can take on various forms. The simplest form of this method is the two-part tariff, where customers pay a fixed charge plus a volumetric charge (variable or usage charge). The volumetric portion can be flat (linear) or have a block tariff structure (non-linear).

Ramsey Prices

This is known as inverse pricing rule because prices are increased in inverse proportion to their elasticity of demand. The basis of Ramsey pricing is that pricing as close as possible to marginal cost maximizes utility profits and leads to an economically efficient outcome.

Time -Variant (Dynamic) Pricing

This pricing approach is utilized to recover the true cost of electricity at different periods during the day as well as influence consumer behavior toward shifting their demand to off-peak periods or reducing demand overall. It includes Time-of-Use rates.

Seasonal Pricing

Seasonal pricing is normally characterized by higher volumetric rates during certain months of the year (seasons), over which demand is notably higher.

SETTING TARIFFS FOR THE SECOND CONTROL PERIOD

On a periodic basis, it is prudent for the regulator to review the effectiveness of its past approach. Accordingly, there are some core issues that directly impact tariff structures and rates, which the RIC must address in its approach for the second Price Review. These are discussed further below.

Suitability of IBTs

In 2010, cumulative residential consumption of electricity below 1000kWh was 32.3% and this decreased to 20.4% by 2020, indicating a general shifting of consumption into higher tiers.

Over the period there was a significant change in cumulative consumption by customers consuming over >2000kWh moving from 35.6% in 2010 to 49.3% in 2020.

Income elasticity of electricity demand is relatively elastic in relation to demand for household appliances that consume large amounts of electricity. However, the magnitude of income elasticity requires further analysis.

The government introduced a low-income assistance programme in December 2016, which was initially intended to target 120,000 electricity customers but has actually benefitted more than 220,000 customers of T&TEC, which is more than 50% of T&TEC's residential customer base.

It is difficult to estimate the responsiveness of demand for electricity to changes in price (elasticity) when those prices have not changed for some time. Also, income levels would have allowed the purchase of more household appliances to improve quality of life and may have resulted in distortions in electricity consumption.

RIC's consideration on IBTs

The magnitude of price elasticity for electricity demand is not known at this time, therefore, caution must be adopted when considering changes to tariffs, especially without first considering the impact of moving to cost-reflective rates.

Implementation of cost-reflective rates, on the existing tariff structure will send appropriate pricing signals to customers regarding the true cost of electricity.

The RIC would have to ensure that the magnitude of the price changes, and consequently the price differential between successive blocks, impact the final bills in such a manner to achieve the desired demand response.

Stability in the tariff structure is important to influence consumer behaviour where electricity consumption is concerned. However, by adjusting the price and tariff structure to a four-tiered structure, higher consuming customers will pay a higher average tariff. The aim is to further incentivise conservation and to send a price signal that better reflects the higher long-run cost that will be incurred to procure additional electricity capacity.

Customer Classifications

The use of technical characteristics of service for identifying classes and sub-classes of customers is a simple but highly effective approach that has been traditionally used by utilities and regulators.

Creating a new name for a certain set of customers based on end-use factors, does not change the fact that the characteristics of service of these customers have to be assessed for the purposes of determining cost of service.

An administrative burden (and cost) would be imposed on the utility if new classes (or sub-classes) are introduced without a proper cost-based justification for doing so.

Feasibility of Time-of-Use (TOU) Pricing

Implementation of TOU rates is difficult when prices in the electricity sector are set on an embedded-cost basis.

Establishing time-variant pricing at this time would introduce a significant risk factor into a price-setting process that has been relatively stable.

When the cost of producing electricity does not vary by time-of-day or when there is no competition in the generation market, as is the case in the local electricity sector, TOU pricing may result in over-recovery of costs during peak periods.

T&TEC has several take-or-pay contracts with generators, therefore, there is no incentive to restrict demand (through TOU or otherwise) as T&TEC is obligated to pay for all of the contracted generation capacity.

A TOU rate structure relies heavily on the results of detailed load studies. Studies from T&TEC regarding the feasibility of TOU and their recommendations in this regard will be considered by the RIC.

Billing Frequency

The frequency of the billing cycle is an issue that may come under scrutiny during a Price Review because the frequency of revenue collection has a direct impact on the cash flow of the utility and therefore, delays in collecting rates can negatively impact the operations of the utility.

The first Price Review utilised a Revenue Cap approach and rates set by the RIC were designed with the current bi-monthly cycle for some customer classes, to return the required revenue for a two-month period at a time. Some argue that bi-monthly billing is unfair under the current IBT tariff structure, on the basis that combining their consumption over two months forces them to consume in the higher block, thereby being charged at a higher rate.

More frequent collection of revenue can positively impact the cash flow of the utility and can help low income customers better align their monthly expenditure on utilities with their earnings, which is often received monthly. Therefore, the RIC sees merit in moving the current bi-monthly billing cycles for respective customer classes to monthly cycles for the second price control period.

In deciding on appropriate tariff structures, the RIC will continue to focus on aligning the rates for all categories of consumers with the cost of supply and will be examining other options for addressing affordability and broader hardship issues more effectively.

All persons wishing to comment on the document, “Principles of Rate Design and Tariff Structures” are invited to review the main document and submit comments using any of the options provided.