

Regulatory Treatment of System Losses in Jamaica: What is Fair?



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Regulatory Treatment of System Losses in Jamaica: What is Fair?



Focus of the Presentation

- A.** Examine and evaluate the Regulatory Treatment of System Losses in Jamaica.
- B.** Propose an “improved” Regulatory Mechanism, which in my opinion is more equitable than the current arrangement.
- C.** Present other regulatory structures worldwide with the aim of providing insights and establishing useful comparisons.

Introduction

Electricity System Losses

1. TECHNICAL LOSSES :- losses related to the physical characteristic and function of the electrical system

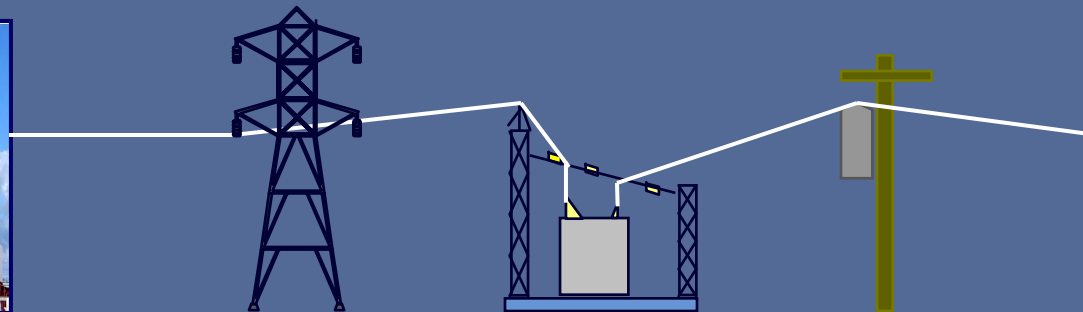
- Variable Component (function of current flow)
- Fixed Component

2. NON-TECHNICAL (COMMERCIAL) LOSSES :- losses related to unidentified and uncollected revenue (associated with inadequate or missing revenue metering, with problems with billing and/or collection systems, and/or with consumer pilferage)

Introduction

Electricity System Losses

TECHNICAL LOSSES are inevitable and natural aspects of the Electricity Utility Business

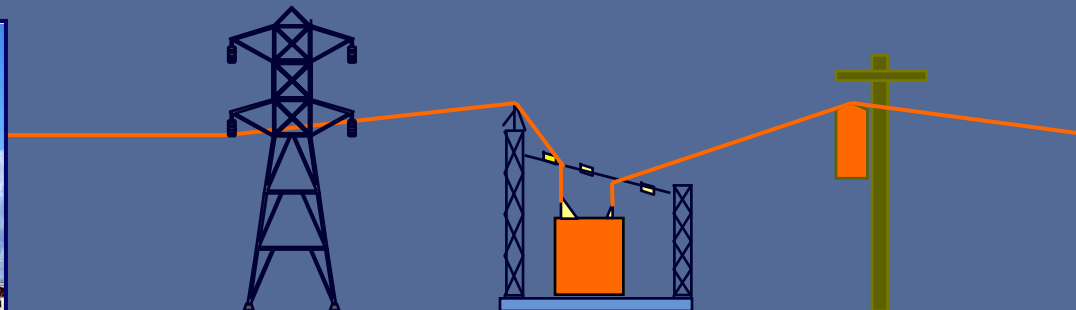


The **flow of electricity** in an integrated electric network **causes losses** in the various elements of the network.

Introduction

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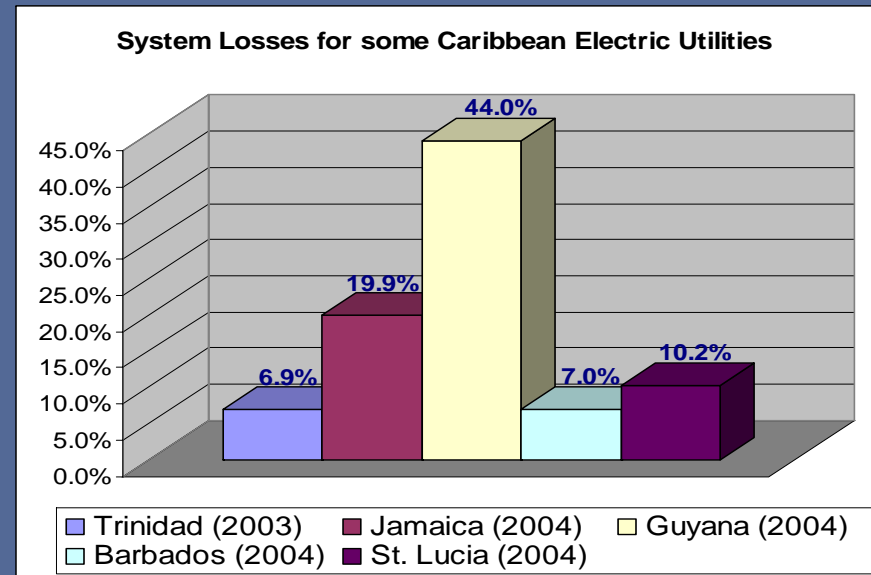


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Introduction

Electricity System Losses

- Developing countries, like Jamaica, normally have high system losses compared to developed nations.
- Non-technical losses is generally a significant portion of the system losses experienced in developing countries.



Introduction

Impacts of System Losses (The Problem):

- Increase the operating cost of electric utilities and result in higher cost of producing electricity.
- System Losses have economic, financial and social repercussions for:
 - ▶ Electric Utility
 - ▶ Customers
 - ▶ Country
- Pose a major challenge for Regulatory agencies to treat.

Regulatory Treatment of System Losses

Allocation of the costs associated with Losses:

- **On one extreme:** Utility allowed to pass through its entire losses to the customers (Not "Fair" to Customers).
 - Utility has no incentive to enact loss reduction measures.
 - Operating inefficiencies of the utility that impact system losses could be passed on to customers.
- **On the other extreme:** Utility shoulder all the responsibility of the system losses (Not "Fair" to Utility).
 - Some amount of losses are inevitable in supplying electricity, the utility should at least be allowed to recover its necessary cost in providing its service.

Regulatory Treatment of System Losses

The Role of the Regulator

Obviously, some **EQUITABLE BALANCE** must be found by the **REGULATORY AGENCY** so that the **UTILITY IS MOTIVATED TO REDUCE SYSTEM LOSSES** and there are **MUTUAL BENEFITS TO BE GAINED** by the utility and the customers **ON ACCOUNT OF LOSS REDUCTION.**

THE REGULATORY GOAL: Loss Reduction (Technical and Commercial losses)

Regulatory Treatment of System Losses (General Approches)

Regulatory Mechanisms for Reducing Losses:

- Command and control rules
- Incentive Based

PRIOR TO IMPLEMENTING EITHER MECHANISM, Regulatory Agency must first carry out the following due diligence:

- **Settle on the loss measurement method**
- **Monitor (measured or estimated) historical losses:** a statistical measure of losses provide useful info on their severity
- **Establish allowed losses level (targets):** Target could reflect what a regulatory agency considers 'reasonable' utility action over time. Ideal target for technical losses determined from economic cost/benefit study.

Regulation of System Losses in Jamaica

JPS Tariff Structure

- A Non-fuel base rate
- A Fuel base rate

Non-fuel base rate depicted by 3 principal cost causation comp.

- **Energy:-** cost which vary with (kWh) energy consumption (variable costs including variable O&M)
- **Demand:-** cost which vary with capacity (MW) requirement of customers (fixed cost of gen., xmission & distr. investments)
- **Customer:-** cost which vary as a function of the number of customers (fixed cost of meters, service lines etc.)

Regulatory Treatment of System Losses in Jamaica

Non-fuel base rate (NFBR)

- Inherent loss of **18.9%** in the energy component of the NFBR that is passed on to customers.
- Inherent loss also included in the demand component. The actual value is very difficult to compute.
- Implicit incentive for loss reduction built into the computation of the energy component of the non-fuel base tariff.

The NFBR is controlled by a Price Cap Regime. Under this regime price is fixed for (2004-2009) subject to certain adjustment.

Regulatory Treatment of System Losses in Jamaica

Illustration of Incentive in NFBR:

$$R^f = \frac{(UC^f \times S^f)}{(1 - l^f)}$$

R^f = Forecasted Revenue Requirement

UC^f = Utility's unit cost per kWh generation

S^f = Forecast Sales

l^f = Forecasted loss = 18.9%

G = System Net Generation in kWh

$$NFBR = \frac{(UC^f)}{(1 - l^f)}$$

If actual losses, l^a , are less than forecasted losses, l^f , with the utility's unit cost being unchanged, it is not difficult to see that JPS would get the following extra revenue for which there was no additional cost:

$$(l^f - l^a) \times NFBR \times G$$

Regulatory Treatment of System Losses in Jamaica

The following formula is used to compute the fuel cost that is recovered from paying customers in the **Fuel Base Rate**:

$$CF = CAF \frac{1 - L_s}{1 - L_t}$$

CF = Cost of fuel recovered from paying customers

CAF = Actual Cost of Fuel

L_s = Actual System Loss

L_t = Loss Target = 15.8%

This clearly is an incentive based mechanism for the utility to reduce system losses.

The system loss target in the fuel base rate is 15.8% and is fixed for the five-year period of the price cap regime, i.e., 2004-2009.

Evaluation of OUR's treatment of System Losses

- ✓ OUR's treatment of system losses in the non-fuel and fuel base tariffs are loss targets incentive based schemes.
- * **Combined system loss targets are used; i.e., there is no distinction between technical and non-technical losses.**
- * **The system loss targets are fixed for the price cap period (5 years).**
- * **The NFBR was designed for high anticipated losses (18.9%, loss target).** The utility stand to gain big if they reduce the losses to 'reasonable' levels while they are not penalise much for high losses (which may be only slightly greater than the target).
- * **There was no scientific method in the derivation of the fuel base target,** (the literature indicate that it is normally difficult to set 'reasonable' targets)

Regulatory treatment of System Losses in Jamaica

What is Fair?

What is Fair from an economic point of view is still a topic of much debate by economists.

- According to Bonbright et al, "The most an economist will generally say is that an allocation is "fair" if it is both efficient and equitable".

With regards to Regulatory Treatment of System Losses, Fairness (in my opinion) speaks to an arrangement:

1. Which will influence the reduction of both technical and non-technical losses to their economic optimum levels over time. (with mutual benefits)
2. Which is affordable to both the utility and the customers.

Regulatory treatment of System Losses in Jamaica (Recommendations)

- ✓ Have separate targets for technical and non-technical losses (T_t , N_t).
- ✓ Determine the economic optimum levels for technical and non-technical losses.
- ✓ Decrease both targets incrementally over time (towards the economic levels). (**For mutual benefits**)

eg.

| Year | Technical Loss Target, T_t (%) | Non-Technical Loss Target, N_t (%) |
|------|----------------------------------|--------------------------------------|
| 2004 | 9.5 | 7.0 |
| 2005 | 9.3 | 6.5 |
| 2006 | 9.1 | 6.0 |

For the Fuel Base Rate, the following formula is proposed to determine cost of fuel recovered from the customers.

$$CF = CAF \times \min \left[\frac{1 - T_s}{1 - T_t}, \frac{1 - \frac{N_s}{N_t} T_t}{1 - T_t} \right]$$

- CF = Cost of fuel recovered from paying customers
- CAF = Actual Cost of Fuel
- T_s = Actual Technical Loss
- N_s = Actual Non-Technical Loss
- $\min(a,b)$ = If $a \leq b$ then a, otherwise b

Regulatory treatment of System Losses in Jamaica (Recommendations Cnt'd)

For the NFBR the system losses target is embedded in the design (Based on forecasted losses, which was high).

- ✓ Share the benefits that the utility will attain by achieving lower losses than was designed in the NFBR (especially since the designed losses level was very high).
- ✓ And/or introduce a separate item relating to measured losses into the price control (price cap) mechanism, whereby losses are directly calculated and incorporated into the model.

Considering the current economic climate in Jamaica where high fuel price is having adverse effect on the price of electricity and economy as a whole.

- A method known as the “Regulatory Asset Scheme” (found in the literature) could also have been applied to the Jamaican context.

Regulatory treatment of System Losses in Jamaica (Recommendations Cnt'd)

Regulatory Asset Scheme

- Losses Targets are determined as usual.
- But instead of reflecting the entire loss target in the tariff, some acceptable loss level (less than target) is reflected in tariff now.
- Recovery of the remaining losses is postponed until after a transitory period (when it might be more prudent to increase the tariff).
- The cost associated with the remaining losses is included in what is called a Regulatory Asset.
- Regulatory Asset is gradually amortized and the utility earns a return on it until fully amortized.

Is this arrangement affordable to the utility?

Inter-generational Equity?

Regulatory treatment of System Losses in Other Countries

| Country | Regulatory Treatment of System Losses | |
|-----------|---|--|
| | Technical Losses | Non-technical Losses |
| USA | (Incentive Base) Loss target charged to all customers including transportation customers | Losses distinguish in two categories: <ul style="list-style-type: none"> • In the first category: are losses due to theft, metering, billing and collection system. • Second category: losses due to non-payment. <p>Losses in former category: Distribution entity totally at risk.</p> <p>Losses in other category: part subsidized by Government, other recovered from paying customers</p> |
| Argentina | Actual loss charged to all customers. | All the actual losses charged to all customers. |
| Georgia | Actual loss charged to all customers. | Utility totally responsible for losses. (Loss target = 0% charged to customers) |

Regulatory treatment of System Losses in Jamaica

Concluding Remarks

- Proposals in this presentation are preliminary, yet, they represent a useful starting point for re-examining the current regulatory treatment of losses in Jamaica to attain a more equitable arrangement.
- Although there are only a few general approaches to regulatory treatment of system losses, losses, especially commercial losses are complex and each country should have a solution tailored to its own unique situation. (The countries examined had varying approaches for dealing with losses).
- The literature has also shown that deregulation of the electric utility is a useful way of facilitating the reduction of losses and the OUR should never rule out this consideration.

Regulatory treatment of System Losses in Jamaica

Thank You For Your Attention

