Draft

Proposed Methodology for Efficiency Benchmarking of Philippine Electric Cooperatives[1]

I. Regulatory Objectives for the Benchmarking Exercise

The benchmarking exercise is being undertaken in connection with the development of a new regulatory framework for on-grid ECs. As articulated in the issues paper promulgated by the Commission, among the objectives expected to be achieved in the design of the new regulatory framework are the following:

1. Develop a tariff setting methodology that is more responsive to the needs of the ECs given the objectives of EPIRA;
2. Encourage reforms in the structure and operations of the ECs for greater efficiency and lower costs;
3. Introduce incentives to allow efficiency gains to be shared between the EC and end-users; and
4. Ease regulatory burden and cut down regulatory lag.

In particular, benchmarking is envisioned to assist the Commission in setting expenditure ceilings or targets for the non-power costs of ECs, thus putting ECs squarely on the road to enhanced efficiency. The objective of easing regulatory burden and reducing regulatory lag is simultaneously achieved by setting expenditure targets for groups of ECs that are similarly situated based on relevant characteristics of their environment. The classification work was a prior activity to this benchmarking exercise.

This paper discusses the proposed methodology for the ECs' benchmarking exercise, which activity is intended to provide inputs in the determination of expenditure targets for distribution costs of the ECs.

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II. A Hybrid Regulatory Framework

It is recognized at the outset that Philippine ECs had been established primarily in pursuit of the total electrification objective of the country and are not profit-seeking enterprises. In fact, ECs have chosen to continue with a cash flow tariff setting framework that essentially merely reimburses the utility for its cash costs, debt service, and provides for a reinvestment fund. Nevertheless, given that the distribution business is a natural monopoly, EPIRA mandates the ERC to ensure that only reasonable and efficiently incurred costs are passed on to consumers.

Previous studies have also shown that ECs operate in environments that are significantly different from their private counterparts. As well, there is significant variation within the EC population, both with respect to their environmental characteristics and their financial and operating performance. It has also been empirically shown that the characteristics of the ECs' operating environment[2] are significant determinants of their distribution costs [Valderrama 2005]. Thus, the process of evaluating the ECs' levels of efficiency must take into account the differences in the environment in which the individual firms operate.

III. Benchmarking Efficiency: Methods and Limitations

Benchmarking is the process of comparing actual performance with an identified standard. While benchmarking is extensively used by regulators worldwide in setting tariffs for utilities, the standards used, the methods by which the standards were developed, as well as how the efficiency results are used in tariff setting differ per jurisdiction.

Insofar as standards are concerned, the benchmark may be set based on average (mean or median) performance or 'best-in-class' performance. Most jurisdictions that use the latter determine best-in-class performance using actual data from the utilities, while a number (notably Chile and Argentina) use an ideal firm as the standard of performance [Mota 2004].

[2] In particular, the studies have identified size (i.e., length of distribution line, sales in mwh, and peak demand) customer density (defined as mwh sales per circuit km of line), customer structure (defined as the ratio of mwh sales to residential customers to total mwh sales) and customer consumption (defined as mwh sales per customer) as significant determinants of distribution costs.

As regards what is benchmarked, there is a choice between partial productivity measures (e.g., mwh sales per employee, connections per circuit km of line, customers per peso of labor cost) and measures which attempt to capture total productivity (weighted value of outputs over weighted value of inputs). The productivity measure may also be either cost-based (e.g., mwh sales per peso of labor cost) or non-cost-based (e.g., mwh sales per employee).

In determining 'best-in-class' total productivity performance empirically (i.e., using actual data from the utilities), three techniques have been commonly used by regulators. These are corrected ordinary least squares (COLS), data envelopment analysis (DEA) and stochastic frontier analysis (SFA).

In DEA, efficiency is measured using linear programming. The method calculates the weights to be assigned to the different outputs and inputs used by a utility to 'optimize' its efficiency, and thereafter measures the efficiency of the rest of the utilities using these weights to determine the latter's performance relative to the first. By doing this process for each of the utilities in the sample, the method identifies the 'most efficient' utilities and bases the frontier on these firms.

COLS and SFA are regression-based techniques. In COLS, a regression of either the cost or production function is estimated using ordinary least squares analysis and then shifted to create an efficient frontier. Unlike in DEA where many firms can be on the efficient frontier, in COLS, only one firm of the sample is considered efficient, and the efficiency of the rest of the firms in the sample is measured relative to this single firm.

SFA is similar to COLS, except that the technique attempts to separate the effect of random events and data errors on efficiency. Unlike COLS and DEA in which all unexplained cost differences from the standard are attributed to inefficiency, SFA breaks down the deviations into two: the portion that is caused by randomness in the data and the portion that is attributed to inefficiency. SFA also does not rely on a single firm to create the frontier. As a parametric technique, SFA can be subjected to statistical tests to provide information on the reliability of the results.

Unfortunately, it is widely acknowledged that none of the foregoing methods is not without its defects. Among the disadvantages cited in the literature of each of the methods are the following:

1. DEA
    a. Inability to measure reliability of results
    b. Likelihood of identifying outliers as efficient
    c. All deviations from the standard are attributed to inefficiency
    d. Sensitivity to number of variables
2. COLS
    a. Relies on a single firm to set the frontier
    b. Requires assumptions regarding specifications and form of the production or cost function used in the regression analysis
    c. All deviations from the standard are attributed to inefficiency
3. SFA
    a. Requires assumptions regarding specifications and form of the production or cost function used in the regression analysis
    b. Uncertainty on whether the unexplained cost deviations are inefficiencies or not

Finally, whatever method is selected, the results are sensitive to the choice of the variables to be included in the analysis and of course, to the quality of the data that will be used.

IV. Proposed Methodology for Efficiency Benchmarking for the ECs

Cognizant of the various limitations of the benchmarking techniques discussed in the previous section, the somewhat unique nature of EC operations in the Philippines, and the fact that this is the first systematic attempt to use efficiency analysis in tariff setting for the ECs, it is proposed that the various options be explored, subject to time and resource limitations, to identify the method or technique that produces the most reasonable results to be used for the commission's purposes.

The implementation of the study is proposed, however, to be guided or governed by the following assumptions:

1. ECs will be benchmarked based on the classifications or groups that were identified in Phase 1 of this study.

2. Total productivity and cost-based efficiency measures will be used. This recognizes that partial productivity measures may not capture tradeoff effects and that costs are the parameters of interest in this study.
3. Given available data, expenditure ceilings will be explored for total distribution cost (i.e., the sum of operations and maintenance, customer accounts, and administrative and general expenses), for each of the three categories of non-power expenditures, and for total labor cost. Data from 2001-2005 show that labor cost accounts for 70 percent of the total non-power cost of the ECs (see table below).
4. To the extent possible, the same variables will be used in the models to be tested for each benchmarking technique. Regression analysis will be used to identify the significant variables for this purpose.

Breakdown of Non-Power Cost of Philippine Electric Cooperatives
2001-2005
(figures show the proportion of the identified cost to total non-power cost)

	Administrative and general expense	Customer Accounts	Operations and Maintenance	Labor cost[3]
Mean	0.449317	0.242790	0.308594	0.697120
Median	0.438672	0.241336	0.305069	0.698036
Maximum	0.772059	0.472634	0.554069	0.999269
Minimum	0.103823	0.072878	0.011874	0.376538
Std. Dev.	0.093567	0.067397	0.078668	0.102830
Observations	597	597	595	538

[3] Excludes data from four (4) ECs in which labor cost comprises more than 100% of their reported non-power cost.