Energy Efficiency Evaluation Method
Confidential Submission to the
CEA Distribution Assets Life Cycle Management Interest Group

Background
In the new re-regulated environment many utilities have lost most of their incentive to distribute power efficiently. In unregulated environments utilities would accept the costs of reducing losses since they would be sure of recovering those costs through rates. Many new regulated environments make losses a pass through cost that are separate from the rates for energy or delivery. There is often financial pressure on utilities to reduce capital costs by purchasing equipment with higher losses. This is detrimental to global energy efficiency and the regulators will clearly be examining utility practice in this area very closely.

The examination of utility practice is complicated by the differences in service areas between utilities and the differences in utility past practices. A simple comparison of losses per kW-hr or losses per customer are not valid. Losses depend on many factors. The number of customers per km of line is one obvious factor but the number of km of line per square km of service area is less obvious but even more significant. Number of customers per transformer, feeder configuration, voltage class, number of substations per square km, and underground or overhead construction all affect losses.

At the present time most regulators simply ask utilities to maintain losses at current levels, but this attitude is bound to change. The efficiency with which energy is distributed will be called into question by both regulators and customer groups. Energy efficiency of single components, such as transformers, is simple enough to evaluate, but how does a utility benchmark the efficiency of an entire system? Utilities have the opportunity now to examine the issues and present clear and fair methods for evaluating losses and determining a reasonable level of loss under different service conditions.

Objectives
1 To develop a common methodology including both engineering and financial models for utilities to use in evaluating, monitoring, benchmarking and reporting the energy efficiency of their distribution systems.

2 To summarize the sources of losses in distribution systems including typical levels and existing variations between different service areas.

3 To summarize loss reduction methods and quantify feasible loss reduction expectations.

4 To develop guidelines for efficiency evaluation methods for distribution systems and for efficiency monitoring and reporting.

Project Description
Task 1 Issue Clarification
A literature search will be conducted to clarify what issues are most important to utilities, customers and regulators. The origins of disputes, the variation in goals and directions will be identified.
Task 2     Existing Losses
The sources and relative sizes of energy inefficiency in existing distribution systems will be quantified for different types of service area and different designs of distribution systems. The historical reasons for the existing situation will be examined.

Task 3     Loss Reduction
The methods available for loss reduction will be described and evaluated based on their effectiveness, cost, and ease of implementation.

Task 4     Methodology and Guidelines
The results from tasks 1-3 will be used to develop guidelines of what should be achievable in terms of the energy efficiency of distribution systems. A defensible methodology for utilities to evaluate and benchmark the efficiency of their systems will be developed. Guidelines for increasing efficiency will also be developed. It is anticipated that this task will involve considerable discussion with CEA utilities in order to achieve excellent results.

Price Estimate and Schedule

It is expected that the work outline above would require approximately $150,000 and 12 months to complete.

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