

DSM Evaluation at Niagara Mohawk: An Integrated Approach

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Introduction

Niagara Mohawk Power Corporation has adopted an integrated approach to DSM program evaluation, in order to fully address the complexities associated with measuring the effectiveness of utility investments in demand-side resources. The company conducts integrated impact, process and market evaluations of each full-scale DSM program on an annual basis, in accordance with the evaluation guidelines set-forth by the New York State Department of Public Service. Salient features of each component are briefly summarized below.

Process Evaluation

Process evaluation examines program operations to determine the effectiveness of the company's program implementation strategy. Internal and external perspectives, including those of program designers, implementers, support staff and contractors are consolidated in the process evaluation review with a particular emphasis on program goals, delivery mechanisms and customer satisfaction. The company makes extensive use of focus groups and informal meetings to identify program issues, mail and phone surveys to quantify employee, customer and trade ally opinions, together with personal interviews to explore the staffs' experiences with the program.

The process evaluation provides an identification of program implementation barriers, recommendations to improve program operations and insight about program participants, non-participants and the reasons why the program resulted in the measured impact. Table 1 summarizes major process evaluation objectives and related information gathering techniques.

Impact Evaluation

Impact measurement forms the core of Niagara Mohawk's program evaluation efforts. The company is firmly committed to utilizing state-of-the-art impact measurement methods in pursuit of the following set of impact evaluation goals and objectives:

- Program Energy Impacts (kWh, kW, therm, BTU, avoided cost)
- Program Energy Impacts per participant (kWh, kW, therm, BTU, avoided cost per participant)
- Changes in Utility costs (\$, \$ per unit of energy, and \$ per participant)
 - Avoided Production costs
 - Avoided Capacity costs
 - Program Costs (administration, incentives, evaluation, etc.)
 - Changes in utility revenues attributable to the program
 - Other utility cost changes
- Changes in Participant costs
 - Avoided energy bills
 - Customer Investment
 - Changes in other customer costs

Impact Measurement Methodology

Niagara Mohawk utilizes several sophisticated analysis methods to measure program impacts including; (1) engineering simulation models; (2) metering estimates; (3) statistical models and; (4) hybrid models which combine engineering and statistical methodologies. The advantages and disadvantages of each methodology are summarized in Table 2. In general, the most complex (and expensive) measurement techniques yield more precise and accurate impact estimates. The company consistently strives to balance the costs of each method against the value of increased measurement accuracy.

The company is a strong proponent of conditional demand analysis methods and other statistically-based measurement methods including PRISM, a regression model using the Princeton Score Keeping Method to weather normalize electric load. One consultant under contract with Niagara Mohawk successfully applied a conditional demand model to billing data for participants (and non-participants) in Niagara's Low Cost Measures program for residential dwellings to obtain separate estimates of energy savings

Table 1. Process Evaluations

<u>Process Evaluation Objective(s)</u>	<u>Analysis Methods</u>
Review program goals and objectives	Interviews with company staff, review of company documents
Assess administrative efficiency	Examine organizational structure, computer systems and database systems
Identify effectiveness of program delivery methods and systems	Focus groups with trade allies, review of advertising materials, staff interviews
Determine customer satisfaction with the program	Customer telephone and mail surveys, focus groups and interviews

Table 2. Comparison of Models

	<u>Accuracy</u>	<u>Data Required</u>	<u>Cost</u>
Engineering Tracking Models	Low	Low	Low
Engineering Simulation Models	Varies	High	Medium
Metering Estimates	Varies	High	High
Statistical Models	Medium	Medium	Medium
Hybrid Models	High	High	Medium

attributed to water heater wraps, low flow shower heads and hot water pipe insulation. The company plans to use the PRISM model to measure the energy impacts from one of its DSM bidding programs beginning in early 1993.

The company is currently working with another consultant to implement a Hybrid statistical/engineering model to measure the impacts from the company's commercial/industrial lighting program. Engineering simulations provide initial estimates of program impacts which are then incorporated as prior information in a conditional demand model. The coefficient on the engineering savings variable provides a mean estimate of the systematic error associated with the engineering prior, while ensuring that the savings estimate is consistent with actual billed usage data. Because of the overlapping data needs of the two approaches, the marginal cost of the Hybrid approach is small.

Market Evaluation

Market evaluations examine the current market penetration of the program, potential market size of a program, and market characteristics. Estimating the market potential of each program allows the utility to determine the need for the measures offered by the program. Once the utility knows the program potential it can plan the proper level of resources to be dedicated to each program. Market penetration is one of many measures of success of a program and is calculated as the percentage of actual participants to the total number of eligible customers. Niagara Mohawk is currently investigating EPRI's MarketTrec software package as a tool for predicting technology penetration rates.

Integrated Evaluation

Niagara Mohawk combines the data and information collected in the aforementioned evaluation studies to conduct a comprehensive benefit/cost evaluation of each program. Several tests are used including the utility, ratepayer, participant and total resource cost (society) perspectives. The benefit-cost results are used in concert with other program evaluation findings to yield an integrated overall assessment of program performance. Estimates of net resources savings derived from impact

evaluation studies are used to calculate the company's DSM rate incentive. Marketing managers use evaluation findings to modify program design and implementation strategies, and/or develop new programs targeting different market segments. Resource planners adjust their resource savings assumptions for DSM, based on what is learned in the evaluation process. Finally, upper management uses evaluation results to assess the overall benefits of DSM and establish resource acquisition targets for the company's integrated electric resource plan.