

COMPARATIVE EXPERIENCE UNDER INDUSTRIAL DSM PROGRAMS

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INTRODUCTION AND SUMMARY

An important policy decision now facing state utility managers, regulators, and lawmakers is whether electric utilities should play any role in stimulating adoption of energy efficiency measures by manufacturing customers. This paper reviews the experience with such programs in New York and the current debate over the fate of these programs.

A diverse set of utility-based energy efficiency programs have been offered to manufacturing and large commercial customers in New York during the past 4 years. The programs principally include:

1. "prescriptive rebates" in which utilities cost-share acquisition of a highly prescribed list of efficient motors and equipment;
2. "custom measures" programs involving utility cost-sharing of specialized manufacturing process equipment improvements;
3. "audit and technical assistance" programs;
4. an experimental "Subscriptive Option" program, involving rate discounts from the utility, customer agreement to carry out comprehensive efficiency audits, and utility facilitated third party or ESCO financing;
5. a "reserved fund" offering that invites customers to propose efficiency projects for cost sharing by the utility from funds reserved in the customer's name for limited periods of time;
6. efficiency audit eligibility prerequisites in flexible rate discount programs to encourage customers to adopt efficiency measures.

With some exceptions, sufficient experience exists under each of these programs to assess the wisdom of policies that require or encourage utility actions to stimulate customers to adopt energy efficiency measures in manufacturing and large commercial settings. The completeness of evaluation data and analysis, however, varies between program type. Rigorous and independent evaluations have been carried out for rebate and custom measures programs operated by several utilities in New York during 1992-1993. Experience with the use of audit requirements in flexible discount rate programs, in contrast, is too recent to have been fully evaluated and it is too early for any firm conclusion whether this method can effectively stimulate customer initiated energy efficiency investments. Evaluation of the "Subscription Option" type of program will be released in the fall of 1995. It is, however, possible to make some preliminary conclusions about the success of these programs.

A comparison of the experience under the various program types demonstrates that there is significant potential for utilities to stimulate installation of efficiency measures which would not have occurred in the absence of utility

involvement. The costs of achieving energy savings under rebate and custom measures programs have been far lower than avoided energy-only generation costs (long run avoided costs). These programs also achieved significant participation from industrial customers. Experience under the audit based programs, including Niagara Mohawk's Subscription Option program, confirm the existence of persistent market barriers which prevent manufacturing and commercial customers from undertaking many energy efficiency improvements. Where the utility has no program to cost-share the adoption of the identified efficiency measures, the effect is to lose the lowest cost energy resource available to the utility to meet energy and capacity needs.

The experience strongly suggests that continuation of some form of utility-based energy efficiency programs is warranted. Restructuring proposals under consideration in New York include an array of new electric industry reconfigurations, some of which would essentially eliminate a role for utilities in industrial efficiency. If such a restructuring path is chosen, then it will be necessary to adopt other methods to stimulate conservation activity in the industrial sector in order to avoid large economic and environmental losses.

SHORT HISTORY OF UTILITY-BASED ENERGY EFFICIENCY PROGRAMS IN NEW YORK

Full scale energy efficiency programs did not begin in New York until late 1990 or 1991. As in other areas of the country, the initial programs tended to focus on energy saving opportunities in residential and commercial buildings. While some industrial customers took advantage of the lighting efficiency programs, there was an early failure in the first years to address efficiency opportunities in the industrial sector.

Interest in energy efficiency in manufacturing was raised by studies regarding energy efficiency potential in the industrial sector. A study by ACEEE, NYSERDA and the State Energy Office in 1989, involving a survey of over 70 industrial DSM programs, concluded that there is a large potential for energy savings.¹ The existence of a large energy efficiency potential in the industrial sector was supported by a Niagara Mohawk study based on audits of large customer facilities. The review of audits for about half of the SC3A customer class disclosed over 250,000 MWh of achievable DSM potential. These audits often did not focus on or include an assessment of process efficiency and the company acknowledged that the figure underestimated the total achievable DSM potential.² The record of a recent rate case demonstrates that significant market barriers exist for energy efficiency in the industrial sector. Industrial intervenors have stipulated that industrial customers use a 2-4 year payback criteria in deciding what level of DSM to undertake.

By 1992 and 1993, several utilities began to field larger programs addressing motor efficiency and custom measures approaches to manufacturing process efficiency. For example, in 1993 one utility's DSM program included \$3.5 million on a "custom measures" program directed to industrial customers. In addition, industrial customers would be served by motors and audit programs addressed to all commercial and industrial customers. The rate impact on large customers for the most developed industrial DSM offering was estimated by PSC staff for 1993 to be approximately 2 mills/kwh (total effect of DSM program costs, lost revenues, incentives and administrative costs), compared to an average rate for large customers of 7.926 cents/kwh at that time.

In 1993 and 1994, the New York Public Service Commission approved experimental industrial efficiency programs, described below, to be carried out by Niagara Mohawk and Rochester Gas and Electric Corporation. During this period the Commission also established a policy allowing utility to establish flexible rates (rate discounts) for large customers. The policy required the completion of a comprehensive and independent energy efficiency audit as an eligibility prerequisite for flexible rates. The results of the energy conservation audit are to be used by the utility to craft a least cost mix of energy efficiency programs and discounts to reduce the bills of large customers. The Commission required utilities to file quarterly reports about the effect of DSM audits on flexible rates.³

A more recent effort to assess the potential for energy efficiency in the manufacturing sector was undertaken in conjunction with the 1994 State Energy Plan. The Plan concluded that,

Substantial potential exists in the industrial sector (up to 15-20%) to improve energy efficiency, particularly in processes and operations. Such investments can lower manufacturing cost for industry and thereby improve the economic competitiveness of the State's industrial sector.⁴

The Plan established a goal of achieving a 2% annual reduction in energy efficiency in the industrial sector energy use.⁵

The New York Commission requires extensive and independent evaluation energy efficiency programs. Utilities generally take customer payback criteria into account in program design to avoid paying incentives for conservation actions that customers would have done on their own (to reduce free-ridership). Utility custom measure programs are usually designed to use incentives to bring the payback of a given DSM measure within the customer's payback criteria, using funds that would otherwise have to be spent on more expensive power plant operation costs.

Recently, the debate over utility based DSM programs for industry has shifted. Rate increases due to non-DSM factors created opportunities for self generation ("bypass") by large customers, and fueled a movement for restructuring of the electric industry. Concern by utilities over the potential for "retail wheeling" and the loss of monopoly franchise areas has led all utilities in the state to sharply reduce energy conservation budgets. Several utilities have proposed to essentially eliminate all customer incentives. The Commission and active parties in New York are no longer focused on program design issues and are instead debating whether utilities should have any role at all in industrial energy efficiency.

EXPERIENCE UNDER PRESCRIPTIVE REBATE PROGRAMS

The current debate over utility-based industrial efficiency programs should proceed from an analysis of the successes and failures of the programs to date. The first generation of industrial programs, those driven by technology specific rebates, had significant success.

The programs enjoyed widespread participation from the industrial sector and were highly cost effective. The commercial and industrial motors and adjustable speed drives program at Niagara Mohawk, for example, experienced a societal test B/C ratios of 6.09 for drives and 1.91 for motors. The programs were popular. In 1991 NMPC had participation in its base DSM programs from 86 customers out of the 300+ members of the SC3A class. In that year, it awarded \$3,076,738 in customer incentives to members of that class, and achieved substantial energy savings as a result. In 1992 and 1993 Niagara Mohawk Power Corporation ("NMPC") had 773 participants in its motors and drives program from commercial and industrial customers (not limited to SC3A).⁶

In 1993 NYSEG had over 600 commercial and industrial participants in its rebate programs.⁷ Fifteen percent of these customers installed motors or adjustable speed drives in manufacturing applications. The company's evaluation included a survey of customers and concluded that well over 90% of the participants who installed process-related high efficiency motors were "very satisfied or somewhat satisfied." Over the period 1990-1993 NYSEG achieved a very large amount (about 90%) of participation from industrial customers in its DSM programs.⁸

EXPERIENCE UNDER CUSTOM MEASURE PROGRAMS

Experience has also been positive under the second generation of DSM programs for industrial efficiency, known as "custom measures" programs. These programs were instituted to address manufacturing process efficiency which is not addressed well or at all by prescriptive rebate programs. In 1992 to 1993, 116 large customers participated in Niagara Mohawk Power Corporation's (NMPC) custom measures programs. Large industrial customers constituted 44% of the participants and provided 84% of the net program savings. The July 1994 evaluation of NMPC's 1993 custom measures program showed that the lifetime levelized cost of the custom measures program to be 2.21 cents/kwh. Long run avoided costs for Niagara Mohawk in 1994 were over 3 cents/kwh at the transmission level and almost 3.4 cents at the subtransmission level.⁹ Thus, the NMPC programs available to industrial customers are highly cost-effective.

NYSEG offers a custom measures option as part of a larger commercial and industrial DSM program. From 1992-1994 the custom measures part of the program produced combined annual energy savings of nearly 24 million kwh. Industrial customers received \$2.66 million in customer incentives from NYSEG in those years.¹⁰ Although participation rates, lifetime energy savings levels and cost of kwh saved were not available separately for the custom

measures part of the program, the overall benefit\cost effectiveness for the C&I program as a whole in 1993 was 2.32 under the total resource cost test and 1.57 under the utility cost test.

EXPERIENCE UNDER AUDIT AND TECHNICAL ASSISTANCE PROGRAMS

An alternative to rebate or incentive driven programs is for the utility to fund the cost of audits or design work needed to identify and implement an efficiency measure. Several problems inhibit an assessment of audit and technical assistance programs for manufacturing customers in New York. Programs in which the utility pays for efficiency audit and process design assistance programs in New York have generally been offered in conjunction with customer incentive programs. Therefore it is difficult to evaluate the effect of such a program if it were offered without a companion rebate program. Evaluations of the programs do, however, show substantial participation levels and that participation in an audit program often stimulated participation in separate rebate or custom measures programs.

In 1993 NMPC's Commercial and Industrial audits program had 180 participants.¹¹ Rochester Gas and Electric's (RG&E") energy audit program completed 700 audits from Oct. 1, 1992 to Dec. 31, 1993 and resulted in 1,655 efficiency measure recommendations.¹²

Another difficulty is that the type of audit typically offered to industrial customers by New York utilities was limited to lighting, HVAC and some motor applications. Comprehensive process audits were generally not done at utility expense. The ability of an audit or design assistance program to stimulate energy conservation in the industrial sector, independent of customer incentives or utility cost sharing of efficiency measures, has not been tested in New York.

Based on the experience from the Subscription option program (described below), one can infer that audits have some effect in raising awareness of conservation opportunities at some customer facilities. Where the awareness is the only or the major barrier to the adoption of a more efficient end use technologies, a utility program which offered to pay for an audit, or to pay for engineering design for a more efficient manufacturing process would likely stimulate some customers to make efficiency investments. The cost effectiveness analysis of such a program would need to be carried out over a multi-year period, since the time between initiation of an audit and the installation of efficiency measure in a manufacturing facility often covers several years.

EXPERIENCE UNDER NIAGARA MOHAWK'S SUBSCRIPTION OPTION PROGRAM

In 1993, in response to complaints by large industrial customers, the NYPSC approved an experimental program which gave certain customer classes an option to either: A) remain eligible for custom measure and rebate programs; or, B) to participate in a program in which the utility would not pay rebates, but would facilitate ESCO and third party financing for customers.¹³ Under option B, the customers would be relieved of paying for portions of the utility's DSM program costs in exchange for an agreement to carry out a comprehensive efficiency audit and to make reports to the utility about conservation measures installed. The Commission stated that it would decide whether to continue the program based on whether the option B customers were stimulated to undertake a higher level of efficiency investments than occur under alternative industrial DSM programs.

An evaluation of the program is expected in mid July 1995. Preliminary reports indicate that the utility expects to meet the energy savings goals established for the program. A report by Research Triangle Institute (RTI) has summarized the types of measures identified in the customer audits and the likelihood that the measures will be adopted by customers at their own expense.¹⁴

The RTI customer audits identified a significant amount of energy efficiency opportunities (representing some 440 gwh of energy savings and over 7.2% of the aggregate energy usage by the 117 participating customers). This is evidence which tends to rebut the claim of some industrial customer representatives that all efficiency opportunities have already been captured in the manufacturing sector.

Fifty-five percent (55%) of the measures identified in the customers' audits had paybacks of less than 3 years.¹⁵

This indicates that there was a great deal of energy efficiency opportunities that customers were not pursuing on their own or under the utility's rebate and cost-sharing programs. This supports the concept that there exist market barriers to the adoption of efficiency measures and possibly an indication that the traditional program types were not addressing those barriers effectively for many customers.

About one-third of the efficiency measures identified in the customer's audits are being pursued by customers, with the remaining 2/3's unlikely to be adopted. The Study described the barriers to implementation most frequently cited by customers in not undertaking identified efficiency measures. These included poor payback and unavailability of capital. This information would support one of two conflicting conclusions. One interpretation is that the audits had the effect of calling to the attention of managers the efficiency opportunities which they would otherwise have ignored, thereby resulting in the adoption of a selected number of measures. Another interpretation is that the efficiency measures identified for adoption are ones with low pay backs, which the customers would likely have undertaken regardless of the audit or any other utility program type. If this is correct, then the effect of the Subscription Option program is to put the utility in the position where it cannot offer customer incentives to obtain energy savings from measures with longer pay-backs.

While many of the audits were judged to have been highly comprehensive and professionally done, some clearly fell into the "poor" category, raising concerns about whether the program has underestimated energy efficiency potential in the sector.

Overall, our conclusion is that the audit requirement probably stimulated some unknown level of investment in conservation. Since it is unclear whether the Commission will continue the program, and if so whether there will be an obligation to repeat the audit in future years, we are concerned whether the program represents a one-time conservation stimulus which is unlikely to continue. If audits are not repeated, there is little reason to believe that customers will have either the incentive or the information needed to pursue additional conservation activity.

Other questions about the program may be answered by the upcoming evaluation. These include whether the utility has been successful in facilitating third party financing for customer efficiency investments and whether NMPC has been successful in stimulating customer/ESCO partnerships.

EXPERIENCE UNDER RG&E'S RESERVED FUND PROGRAM

Rochester Gas & Electric's Energy Services Program is a modified version of a custom measures type of energy conservation program. The innovation adopted by RG&E is to place a fund of money in reserve for each large customer. The fund is equivalent to the amount the customer contributes in rates to support energy conservation services of the utility. Eligible customers are encouraged to propose and implement efficiency measures independently, paying for the measures with the assistance from the RG&E fund. Eligible customers develop DSM proposals and submit them to RG&E, with necessary justification analyses, for approval. The customer's proposed plan must provide energy savings that attain a Societal Benefit/Cost Ratio of at least 1.5 and a Utility Benefit Cost Ratio of at least 1.0. Utility funding of the proposed program normally will not exceed 50% of the capital cost of the project. This limit may be waived by the Company on a project specific basis at the discretion of RG&E. The project payback period, from the customer's point of view, and before application of Company funding, must be greater than one year. The customer must agree to an RG&E provided measurement plan and installation of monitoring equipment.¹⁶

**Table 1
RG&E Energy Services Program
Budget and Goals for 1995**

<u>Budget</u>	<u>Participating Customers</u>	<u>Coincident Peak Reduction (kW)</u>		<u>Annual Energy Savings (MWh)</u>
		<u>Summer</u>	<u>Winter</u>	
\$2,354,037	72	1,236	1,013	4,087

RG&E customers have exhibited substantial interest in the Energy Services Program.¹⁷ Fifteen proposals are pending as of January 5, 1995, with planned energy savings of 2,154 mwh and a planned demand reduction of 0.337 mw summer and 0.224 mw winter. Here again, however, we are without the benefit of an evaluation of a full year of experience under the program.

EXPERIENCE UNDER AUDIT REQUIREMENTS FOR FLEXIBLE RATE DISCOUNT OFFERS

In 1994, the New York PSC issued an opinion and order setting forth rules under which utilities would be allowed to offer rate discounts to large customers, where needed to retain a customer who might close, move operations or self-generate.³ The Commission established as one of the prerequisites for receipt of a discount, the duty of the customer to undergo a comprehensive and independent energy efficiency audit. Utilities were required to file quarterly reports on the effect of DSM audits on discount rates.

To date there is little information available about the effect of the audit requirement. Quarterly reports are not useful in assessing the use of conservation in conjunction with flex rates, and are often not fully available due to trade secret and confidentiality claims. The Quarterly reports do not specifically report on whether energy conservation options were taken into account in setting flex rate discounts and in some cases the audits appear to be taking place too late to influence the size of the rate discount negotiations.

There have been, however, some examples of successful linkages between DSM and Flex rates. These are contained in reports by Rochester Gas and Electric, in which substantial energy and demand reductions have been achieved as part of a package of rate discounts and energy efficiency program participation after an audit.¹⁸

IMPLICATIONS INDUSTRY RESTRUCTURING AND FUTURE PROGRAM DESIGNS

It is useful to debate which of these approaches is best for any given utility at any given point in time, and undoubtedly there are ways to improve the program designs. But none of these programs has failed to deliver cost effective energy savings. While the programs did cause very small upward pressure on rates, there is strong evidence that large numbers of manufacturing customers enjoyed reduced bills due to these programs.

Nevertheless, some industrial customers in New York are strongly advocating for the elimination of any role by utilities in promoting energy efficiency in manufacturing. This is a position which seems largely confined to New York. Industrial customers in other parts of the nation, including California and New England are not generally calling for an end to utility based energy efficiency programs for manufacturing. In Michigan, a recent settlement between auto manufacturers and a utility specifically includes a cooperative effort to identify process energy savings and adopt efficiency measures. But in New York, which is in the midst of a highly politically charged debate over the future of the electric industry, the industries who have taken the most advantage of DSM programs, are now attacking the very concept of partnerships between utilities and industrial customers.

The current experience in New York suggests several lessons for utilities and regulators who wish to secure the benefits of energy efficiency for their customers and citizens. First, it is important to document, at an early stage, the successes and beneficiaries of utility based programs. In New York there has to date been no concerted effort to quantify the total bill savings enjoyed by the industrial sector. The programs have generally involved a mix of commercial and industrial customers, such that it is difficult to separate out the benefits that have been delivered to the industrial sector. That information can, however, be developed and used to inform the industrial sector of additional benefits from cooperative efforts between utilities and industry.

Second, utilities should adopt programs which help resolve a variety of problems facing industrial customers. Energy efficiency can often be linked with process improvements which lower pollution control or waste disposal costs and improve productivity. Utilities need program budgets large enough to bring in industry specific experts to assist with audit and process re-design work focused on those customers who are at risk for plant closure, relocation or self generation.

Third, utilities and regulators should directly link utility electro-technology programs with energy efficiency efforts. There are many situations in which electricity can be substituted for other energy sources in ways that can reduce manufacturing costs and pollution at a customer's facility. The marketing of electro-technologies and energy

efficiency technologies can be accomplished by the same staff. A department which promotes efficiency and economic new uses for electric power could achieve significant pollution reductions and economic savings without any net overall rate impacts.

Fourth, if rate impacts remain, it is vital to place them in perspective. High costs experienced in New York and other regions are the result of policy and investment decisions made well before energy efficiency programs were implemented on a large scale. Rate impacts of energy efficiency programs are almost entirely the result of those decisions and rate structures which make customers see rate increases when energy efficiency is achieved. Regulators have a duty to avoid and respond to arguments which essentially make energy efficiency the scapegoat for mistakes of the past.

Finally, all parties to the debate need to try and overcome the layers of distrust and misinformation that have historically characterized relations between utilities and industrial customers, between regulators and utilities, and between citizen groups and industry. These too are relics of a time long past. Environmentalists have embraced market based forms of pollution control; industry has made impressive progress in environmental quality; utilities are more customer oriented; and, regulators have begun to encourage collaboration as an antidote to wasteful litigation, adversarial proceedings and command. All should acknowledge that the task is complex, but that partnerships can work in this area. The growing examples of success justify renewed cooperative efforts to achieve the productivity, economic, environmental and competitiveness advantages that lie in improved energy efficiency.

REFERENCES

1. The Potential for Electricity Conservation in New York State, American Council for an Energy Efficient Economy, (1989).
2. Post Hearing Brief to Administrative Law Judge Frank Robinson In Opposition to Proposed Settlement by Pace Energy Project and NRDC, November 7, 1992.
3. Opinion No. 94-15, Opinion and Order Regarding Flexible Rates, Case 93-M-0229, Issued and effective July 11, 1994.
4. NY State Energy Plan, Vol. III Energy Efficiency Supply Assessment, October 1994, page 58.
5. NY State Energy Plan, Vol I, Summary Report, page 12.
6. Niagara Mohawk Power Corporation Annual Evaluation Reports, 1992 and 1993 Demand-Side Management Programs.
7. New York State Electric and Gas Impact Evaluations of 1993 DSM Programs, page 3-18, July 1994
8. 1995 NYSEG Rate Case 94-M-0349, transcript page 731, cross examination of Warren Smith.
9. Quarterly update, case 93-E-0175, April 4, 1995.
10. Personal communication from John Zidmal, Electric Marketing Department, New York State Gas and Electric, May 21, 1995.
11. Niagara Mohawk Power Corporation Annual Evaluation Report, 1993 Demand-Side Management Programs (July 1994) Volume I.
12. Rochester Gas & Electric Evaluation of 1993 DSM Programs (July 18, 1994) Prepared by Applied Energy Group.

13. Opinion No. 93-3, Case 92-E-0108, Opinion and Order Conditionally Approving Settlement, issued and effective 2/2/93.
14. Research Triangle Institute, Evaluation of Subscription Option Program Energy Audits, Task 1 Report: Evaluation of Energy Audits, February 1995.
15. Correspondence from Dennis Trepanier, Marketing Program Coordinator, Niagara Mohawk Power Corporation to John Kelliher Secretary, NYPSC, April 26, 1995.
16. 1995 Demand-Side Management Plan, Rochester Gas & Electric Corporation, at III.2.35 (Energy Services Program)(August 10, 1994).
17. Bi-Monthly Program Status Report to Public Service Commission-Energy Services Program, Rochester Gas & Electric Corporation (January 5, 1995).
18. RG&E reports to NYPSC from Sept. 29, 1994 and March 31, 1995.

General References

Niagara Mohawk Annual Evaluation Report 1992 Demand-Side Management Program (July 1993) Volume I, prepared by Xenergy and Research Triangle Institute.

New York State Electric and Gas, Process and Impact Evaluations of 1993 DSM Programs (July 1994), prepared by Cambridge Systematics, with Research Triangle Institute.

New York State Electric and Gas, 1993-1994 Annual Plan and Long Range Demand Side Management Plan

Rochester Gas & Electric Evaluation of 1993 DSM Programs (July 18, 1994), prepared by Applied Energy Group, Inc.

Rochester Gas & Electric 1992 Long Range Demand-Side Management Plan

Rochester Gas & Electric 1993-1994 Annual Demand-Side Management Plan

Research Triangle Institute, Evaluation of Subscription Option Program Energy Audits, Task 1 Report: Evaluation of Energy Audits, February 1995.

Bi-Monthly Program Status Report to Public Service Commission - Energy Services Program, Rochester Gas and Electric Corporation (January 5, 1995)