Tapping Our Hidden Reserves: America's Exemplary Natural Gas Energy Efficiency Programs

Dan York and Martin Kushler, American Council for an Energy-Efficient Economy

ABSTRACT

Interest in energy efficiency has been growing rapidly as one strategy to help consumers manage soaring natural gas costs and provide relief to constrained supply and delivery systems. Utilities and states that had allowed energy efficiency efforts to languish during the 1990s are showing renewed interest. In response to these developments, ACEEE initiated a research project in 2003 to identify and profile exemplary natural gas energy efficiency programs.

We present key results from that project in this paper, including highlights and data from the case studies. We also summarize our observations on common attributes and key elements of over 30 successful programs profiled in this project, which cover all customer classes.

Another aspect of the research project was to examine the extent of regulatory and policy support for natural gas efficiency programs across the United States. We surveyed all 50 states on this issue and we present the summary highlights in this paper.

We found that while there are many good models of natural gas efficiency programs worthy of emulation by others, such programs tend to be concentrated in a relatively small number of states. Natural gas customers in most states, unfortunately, do not have access to such programs, thereby limiting their ability to reduce their energy costs through improved efficiency. There clearly is a lot of room for expanding natural gas programs to reach more customers, especially in light of continuing high natural gas prices and possible supply constraints.

Background

The outlook for natural gas prices and supplies has changed dramatically over the past couple of years. A recent report to Energy Secretary Spencer Abraham prepared by the National Petroleum Council (NPC 2003) observed that "there has been a fundamental shift in the natural gas supply-demand balance that has resulted in higher prices and volatility in recent years" (p.16) and concludes that natural gas prices could average between $5 and $7 per 1,000 cubic feet for years to come without significant advances in energy efficiency.

In a response to the National Petroleum Council's report, Energy Secretary Spencer Abraham observed, "What this report makes unmistakably clear is that major challenges face us with respect to natural gas. Increasing demand for natural gas, coupled with decreasing domestic supply, will mean price volatility and a potentially serious drag on the nation's economy" (Reuters 2003). Federal Reserve Board Chairman Alan Greenspan echoed these concerns in testimony to Congress in the summer of 2003.

Addressing these problems by increasing supplies is not a realistic solution in the short term due to the length of time necessary for exploration and development of new supply sources. Demand-side approaches, by contrast, provide an attractive alternative to address the problems created for consumers by constrained supplies and high prices. As the National Petroleum Council concluded in its report, in the very near term, reducing demand is the primary means to

keep the market in balance because of the lead times required to bring new supply to market (NPC 2003).

Recent research by Elliott et al. (2003) clearly demonstrated the important role of reducing natural gas demand through energy efficiency, as well as increased use of renewable energy. Not only could such efforts yield immediate cost savings to consumers from reduced natural gas use, but reducing natural gas demand also would have significant beneficial effects on market prices. The research suggested that nationwide efforts in just 12 months could reduce natural gas consumption by 1.9% from the base case and could reduce electricity consumption by 2.2%. Such reductions could in turn lead to a 20% reduction in wholesale natural gas prices. National retail savings to residential, commercial, and industrial consumers would exceed $75 billion dollars for the five year period, 2004–2008.

From a policy perspective, those encouraging modeling results highlight the need to document the fact that there are existing energy efficiency programs available to provide a practical means for achieving those natural gas savings. One of the primary purposes of our research was to help provide that documentation.

Research Objectives and Methodology

Using energy efficiency to reduce natural gas demand is clearly a concrete step that can be taken immediately to combat the problems looming with the price and supplies of natural gas for both the near and long term. Consequently, interest in natural gas energy efficiency has been growing rapidly. Utilities and states that had allowed energy efficiency efforts to diminish and even vanish entirely during the 1990s because of industry restructuring and low natural gas prices are showing renewed interest in energy efficiency. In response to these developments, ACEEE launched an expedited project in the summer of 2003 to identify and profile exemplary natural gas energy efficiency programs. The goal was to provide practical and successful program models to emulate for those states and utilities that wish to initiate or expand their natural gas energy efficiency efforts.

This research project had two primary objectives:

1. Provide a catalog and detailed description of the best programs available for saving natural gas through energy efficiency improvements.
2. Provide a review and summary of specific policy and regulatory mechanisms currently being used by state policymakers and regulators to encourage and support efforts by natural gas utilities to provide energy efficiency services to their customers.

Our overall objective was to create a reference guide to assist regulators, policymakers, and other decision-makers in developing appropriate programs and policies to build up and implement natural gas efficiency programs. Our research consisted of the following principal data collection methods:

- A screening survey of all 50 states
- Interviews with national experts
- A public solicitation of program nominations
- Review of appropriate policy and program documentation

- Interviews with representatives of programs selected for the "best practices" catalog and from states with noteworthy policy/regulatory mechanisms for supporting natural gas efficiency programs

Research Results

The focus of this paper is primarily on summarizing the results of our search for exemplary natural gas energy efficiency programs. However, below we summarize briefly other aspects of the research to provide a context for the exemplary programs we identified and profiled in the overall research project.

Screening Survey Results

In our 50-state screening survey we found that less than half of the states have utility ratepayer-funded energy efficiency programs for natural gas. Out of the 51 respondents to the survey, 22 confirmed that they currently have utility-funded natural gas efficiency programs in their states.[1] In 19 of those 22 states, the utility companies have the primary role in administering the natural gas efficiency programs. In the remaining three states (Illinois, New York,[2] and Wisconsin) the programs are funded through utility rates but are administered by a state agency. In states where natural gas efficiency programs are not offered by utilities or a state agency, there is some amount of interest in developing such programs, with four states reporting that such discussions were underway.

Legislative and Regulatory Mechanisms

Over two decades of experience with utility energy efficiency programs—both electricity and natural gas—has shown the importance of appropriate legislative and/or regulatory requirements and funding mechanisms to achieve successful programs (e.g., see Cowart 2001; Kushler & Suozzo 1999; and Kushler & Witte 2001). Consequently, an important element of our research was to identify and describe the legislative/regulatory foundations underlying exemplary energy efficiency programs that are being successfully delivered in the field today.

We examined in detail the legislative and regulatory frameworks in place for eight states and one Canadian province. Table 1 presents summary information on these states and province. We chose these nine jurisdictions because they are the leading areas identified in this study in terms of utility natural gas energy efficiency efforts. We found significant similarities and patterns in these selected jurisdictions. First, seven of the nine jurisdictions have some type of legal requirement for utility funding of natural gas energy efficiency programs, and the other two have strong regulatory encouragement for such programs. All nine jurisdictions have some type of explicit mechanism in place to assure cost-recovery for natural gas energy efficiency program expenditures.

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[1] These states are: Arizona, California, Florida, Idaho, Illinois, Iowa, Maryland, Massachusetts, Minnesota, Montana, Nevada, New Hampshire, New Jersey, New York, North Carolina, Oregon, Pennsylvania, South Carolina, Vermont, Washington, West Virginia, and Wisconsin.

[2] Technically, NYSERDA in New York operates electric energy efficiency programs. However, its energy efficiency programs are operated in a fuel-neutral manner, and as a result, some programs have significant natural gas savings as well.

Table 1. Summary of Legislative and Regulatory Mechanisms

State	Legal Requirement	Cost-Recovery	Shareholder Incentives	Lost-Revenue Recovery	Other Mechanisms
CA	Yes (required by statute)	Yes (gas public purpose surcharge)	No	No	Also a system benefits charge for low-income energy efficiency programs.
MA	No (encouraged by regulators)	Yes ("conservation charges" approved in company-specific regulatory cases)	Yes (some gas utilities do have incentive mechanisms)	Yes (most utilities have some recovery mechanism)	Statute requires statewide energy audit program; funded by small customer charge, administered by state.
MN	Yes (required by statute)	Yes (gas utilities required to spend 0.5% of revenues)	Yes (commission-approved mechanism)	No (used to, was replaced by incentive mechanism)	No
NJ	Yes (required by statute)	Yes ("societal benefits charge" on customer bills)	No (used to, no current mechanism)	No (no current authorization)	No
Ontario, Canada	Yes (Ontario Energy Board order)	Yes (included in rates, also has a "DSM Variance Account" to reconcile over- and under-spending on energy efficiency by utility)	Yes (one major utility has a shared savings mechanism [SSM] with + and – incentives)	Yes (a lost revenue adjustment mechanism)	No
OR	Somewhat (weatherization is required, other efforts encouraged by regulators)	Yes (largest gas utility has a commission-approved surcharge for energy efficiency, funds are transferred to a state agency)	No	N/A (used to have one, now the largest gas utility has decoupling)	Utilities required by statute to provide weatherization programs.
WA	No (encouraged by regulators)	Yes (covered in utility-specific regulatory orders)	No	No	Commission requires "least cost planning," comparing energy efficiency to gas purchasing options.
VT	Yes (required by statue and regulatory orders)	Yes (included in rates and reviewed in rate cases)	No	Yes (net lost revenues are eligible for recovery in rates cases)	The electricity energy "efficiency utility" in VT operates programs that also produce gas savings.
WI	Yes (required by statute)	Yes (some funding amounts must be transferred by utilities to the state public benefits program)	N/A (programs are administered by a state agency)	No	Statute allows utility to spend more on energy efficiency beyond the minimum it must send to the state, if it wishes.

These two key features (i.e., a legislative/regulatory requirement for funding and a mechanism for cost-recovery) have been characterized elsewhere (e.g., Kushler & Witte 2001) as crucial threshold conditions for significant utility energy efficiency efforts to occur. Our own research for this project supports this characterization.

Beyond those two key threshold conditions, our observations regarding other regulatory mechanisms are somewhat mixed. Three of the nine jurisdictions have some type of utility shareholder incentive mechanism and two of those also have a lost revenue recovery mechanism (plus one other jurisdiction has a decoupling mechanism). While we received some good anecdotal feedback about the usefulness and desirability of those mechanisms, their presence in only a minority of these leading jurisdictions suggests that they are enhancements rather than minimum threshold conditions for achieving successful natural gas energy efficiency programs.

Exemplary Natural Gas Efficiency Programs

Natural gas efficiency programs and activities have often been overshadowed in recent times by developments in electricity markets and associated efficiency programs. This has been particularly true as restructuring of electricity markets has dominated much of the regulatory and policymaking activity throughout much of the 1990s. One of the main objectives of this project was to bring natural gas efficiency programs out of the shadows and spotlight their importance and success. We sought to identify and profile examples of outstanding natural gas efficiency programs—programs in place that are highly successful in improving the energy efficiency of customer end-uses.

Approach

In the late summer and early fall of 2003, ACEEE issued a widespread "call for nominations" for exemplary natural gas efficiency programs via a number of channels, including:

- Program contacts from our prior best practices project—completed early in 2003, this project (York & Kushler 2003) included some programs that provided both electricity and natural gas efficiency, although most programs were electricity only.
- Contacts with other organizations involved with energy efficiency programs and issues, for example, the Consortium for Energy Efficiency's Natural Gas Committee.
- Contacts from participants in ACEEE events, such as the National Conference on Energy Efficiency as a Resource, held in June 2003.
- Contacts with energy efficiency program experts.
- Contacts made with regulatory staff as part of our survey work to identify states where natural gas efficiency programs are offered.

Our objective was pragmatic—to identify a set of programs that would serve as excellent models for other states and utilities to emulate if they were interested in initiating or expanding their natural gas efficiency efforts. Within this overarching objective, our search for exemplary programs was guided by other concerns and objectives. These included a desire to include:

- Programs that address the primary consumer end-uses of natural gas: (1) space and water heating for buildings (residential and commercial); and (2) process heating for industry.
- Programs illustrative of different types of organizations that fund, administer, and implement such programs (e.g., investor-owned utilities, municipal utilities, and state agencies involved in administering public benefits energy efficiency programs).
- Both long-established and relatively new programs.
- Variety in the approaches and services offered to yield improved efficiency of natural gas end-uses.

Through both external nominations and internal recommendations, we identified a set of candidate programs that appeared to meet the above objectives. Our next step was to acquire basic information on each program, some of which was included in these initial nominations and recommendations. We supplemented this self-reported information with other independent sources, such as evaluation reports or surveys with recognized experts familiar with best practices.

ACEEE staff made the final selections of programs to recognize as exemplary. We considered several factors in our selections, including:

- *Positive Energy Savings Impact.* Demonstrated ability of the program to deliver substantial immediate or near-term therm savings from energy efficiency. Programs could be noteworthy due to overall total magnitude of impact (i.e., very large programs) or in terms of amount of impact per dollar spent (i.e., very cost-effective programs).
- *Replicability.* Programs that are well documented and have characteristics amenable to easily replicating the program design in other settings.
- *Qualitative Assessment.* Achievements of the program in terms of noteworthy program implementation performance, customer participation, participant satisfaction, stakeholder support, etc. also were factors considered.

Results

From our set of nominations we selected a total of 29 programs to profile as representative of exemplary natural gas efficiency programs. In the process of making these individual program selections, we also selected five "special case studies" as noteworthy examples of comprehensive program portfolios and multi-party collaboratives. Together this set of 34 profiles paints a comprehensive picture of the types of energy efficiency programs available to assist natural gas customers, from low-income, single-family households to large industrial facilities. The full project report (Kushler, York, & Witte 2003) lists these programs and provides profiles of each of them.

Below we present summary observations on the programs we selected to profile in this project. These observations provide some highlights and details of the comprehensive picture created by this set of program of the state of natural gas efficiency programs in the United States.

Targeted end-uses and technologies. Residential natural gas efficiency programs target the two primary natural gas end-uses: space and water heating. Technologies and measures for improving space heating efficiency include weatherization, installation of energy-efficient

windows, duct sealing/insulating, high-efficiency furnaces and boilers, and improved controls, such as with set-back thermostats.

Residential water heating efficiency improvements either address hot water supply or domestic uses of hot water. Hot water supply efficiency measures include installation of energy-efficient water heaters, adding insulation to existing water heaters that are under-insulated, adding insulation to hot water supply pipes, and reducing set-points of water heaters. End-use measures to reduce demand for domestic hot water include resource-efficient clothes washers, energy-efficient dishwashers, faucet aerators, and low-flow showerheads.

Commercial/industrial (C/I) natural gas efficiency programs also target space heating and water heating. However, C/I programs also address process energy use, which can be the dominant end-use of energy for many C/I customers. The primary technologies for space heating are more efficient boilers and HVAC equipment, including control systems. In new construction, measures include efficient building envelopes and related means to reduce space heating demand. Improving energy efficiency for process energy use also may involve improved efficiency of boilers and control equipment. Measures might also be promoted to reduce energy losses associated with end-uses, such as gas-saving commercial kitchen exhaust hoods.

Program types. Space heating of homes is clearly the dominant residential end-use of natural gas. Programs to reduce natural gas use through improved efficiency fall into three categories:

1. Services to reduce heat losses through the building envelope.
2. Marketing and incentives to promote the purchase and installation of more efficient heating supply, delivery, and control systems.
3. Marketing, incentives, and training to increase the number of new homes constructed that are more energy efficient than "standard" construction.

Home weatherization programs clearly fall into the first category, and such programs exist both for low-income households and as fee-based services within the markets for home heating products and services. Our profiles include examples of each of these types of programs.

Marketing and rebate programs for energy-efficient residential heating technologies—primarily high-efficiency furnaces—are common program approaches. We found numerous programs that provide direct financial incentives (rebates) to encourage customers to purchase energy-efficient furnaces and boilers. Marketing is important to these rebate programs to increase demand for these products and services. We also found training programs for both sales and technical staff often associated with these programs. Sales staff need to understand the benefits of the energy-efficient technologies and technical staff (such as equipment contractors) need training to be able to install and set up the equipment properly so that the intended performance is achieved.

Residential new construction programs address "whole house" energy efficiency—building envelope, space heating systems, water heating, appliances, and lighting. Use of ENERGY STAR® for branding homes that meet the program's standards is a common feature of new homes programs.

We found that successful C/I programs share many traits with successful residential programs. C/I programs target similar end-uses, including: (1) efficiency improvements and upgrades of space and water heating systems; and (2) whole building energy efficiency for new construction. Additionally, there are C/I programs that address process heating efficiency. C/I

programs typically blend technical assistance with financial incentives. They also often include training, which may be for building owners and operators, as well as equipment suppliers and contractors.

Company/organization types. Restructuring of energy industries—both electricity and natural gas—has given rise to new organizations to provide services that often had been provided by a single entity—the "traditional" vertically integrated, regulated utility. As such services have been "unbundled" and opened up to new providers, one such service that has undergone extensive change in many jurisdictions is provision of energy efficiency programs. This transformation continues. The organizations involved with the set of programs that we selected offers a snapshot of the growing diversity of organizations involved with natural gas efficiency programs. These include investor-owned utilities, municipal utilities, large integrated energy companies with multiple local distribution companies, government agencies, nonprofit organizations, multi-party collaboratives, energy efficiency "utilities," and private contractors. Of these types of organizations, investor-owned utilities constitute the single largest category within our set, with about half of the programs. State public benefits programs and the organizations that administer and implement programs are the next largest category, with about one-fifth of the programs. The remainder are scattered among other primary organization types.

Approaches and services provided. Energy efficiency programs have evolved considerably over the past two decades. Such evolution reflects better and more complete understanding of customer needs and motivations. The natural gas efficiency programs we selected and profiled in this project illustrate this evolution. Better integration of services is one such trend. We found that integrated packages of services are common among all types of leading natural gas efficiency programs—from those serving low-income residential households to those serving large industrial customers. The integrated package of services may include marketing and consumer education, technical assistance (audits, economic/technical analysis of efficiency options, design recommendations, etc.), financial incentives (principally rebates or financing), and follow-up quality assurance and verification of results. Integration of services within a single program is common, but we also noted that leading organizations integrate services across their entire portfolio of programs as well.

Another common feature is "customer friendliness"—programs that make it easy for customers to access and receive program services. The best programs tend to have a single point of contact with customers, who in turn may access other program services and expertise as needed. Customers only work with a single person or a small, well-coordinated team to access the full range of products and services available, rather than having to contact one person for one service and another for a different service. Taking this "one-stop-shopping" approach for customer participation reduces barriers to program participation.

Types of services reflect customer needs and market conditions. Most residential programs tend towards a prescriptive approach to services, including financial incentive amounts, but programs that offer some degree of technical assistance may provide some flexibility for adapting to unique circumstances. For marketing and incentive programs, such as promotion of energy-efficient furnaces, generally the programs are entirely prescriptive; to get financial incentives, customers must purchase one of a set of qualified units. This makes sense for such "mass market" products that service a common niche among targeted customers.

C/I programs typically are more flexible and customized, particularly as a function of the size of the customer's demand. Small C/I programs tend to be more prescriptive, like residential "mass market" programs, while programs targeting larger C/I customers tend to offer more custom options (such as incentives paid on the basis of an established $/therm savings). Flexible, customized approaches are especially important for larger customers, who tend to have more unique needs than smaller customers.

Customer rebates are alive and well in natural gas efficiency programs serving all types of customers. Financial incentives are a common feature to affect customer purchase decisions—both for residential and commercial/industrial customers. High-efficiency technologies for natural gas applications—furnaces, boilers, process equipment, controls, etc.—generally still carry a price premium over other technologies. While customers may recognize the long-term value of investing in the more efficient technologies, program experience is that financial incentives—principally rebates, although some below-market financing is also used—are still necessary to get customers to purchase these technologies. As the markets for such technologies develop and mature, incentive levels may be reduced or even eliminated entirely. The efficiency of qualifying technologies and units also may be periodically ratcheted upward as "standard" equipment itself becomes more efficient, which may occur through adoption of standards or market forces.

Another sign of the evolution of energy efficiency programs is the prevalence of strategic partnerships and collaborations, which can improve program effectiveness and leverage resources. The most successful programs effectively work with key market actors—for example, distributors, local suppliers/retailers, contractors, manufacturers, and allied organizations, such as government agencies, nonprofit service organizations, and trade groups. By combining resources and working toward common objectives, the programs increase their ability to reach and serve customers, which yields greater program impacts and success.

Supporting services also appear to be a key ingredient of the most successful programs. Training and education are prominent elements of many of the exemplary programs we identified. Such programs offer training and education for suppliers, retailers, and contractors—even for programs primarily offering financial incentives as their key service. Training and education are critical to increase awareness and acceptance of energy-efficient technologies and to ensure that such technologies are correctly selected and installed. Retailers and contractors also need to be able to inform and even instruct customers on proper use of the technologies.

Evaluation. Many of the programs selected and profiled in this study have evolved over many years. Such program evolution has often been driven by program evaluation, which managers have used to assess program performance and make improvements. A best practice and characteristic of many of the programs included in this study is the strategic and integral use of evaluation to obtain key measures of program effectiveness and impacts. Such feedback allows managers to adapt and improve program services, leading to more effective programs. However, as important as evaluation is to effective programs, the level, rigor, and consistency of evaluation performed on the set of programs in this study varies considerably. This became evident as we tried to gather data on program impacts and cost effectiveness, as we discuss in the next section.

Program budgets, savings, and cost-effectiveness. This project attempted to gather data from the programs selected on three key quantitative variables: (1) funding/spending; (2) savings impacts; and (3) cost-effectiveness. As a general caveat, there is a great deal of inconsistency

across the programs in terms of how these data are defined and reported, as well as reporting the data at all. It was beyond the scope of our project to independently assess and confirm the accuracy and consistency of the reported data. We relied on the self-reported data from our program contacts and reference materials. A clear improvement for many programs and the industry in general would be to increase the level, rigor, and consistency of evaluation. Despite these caveats and limitations on our data set, we believe that the data reveal some important information about natural gas efficiency programs. Table 2 presents these data.

Table 2. Program Spending, Savings and Cost-Effectiveness

	Minimum	Maximum	Mean	Median	Total
Annual program spending: all programs* (n = 32)	$79,036	$35,835,000	$3,733,428	$953,640	$131,222,815
Annualized 1st year savings: all programs* (therms)	24,910	10,000,000	1,345,081	567,824	44,767,409
• Savings: residential programs (n = 20)	24,910	7,004,880	824,862	267,353	16,497,247
• Savings: C/I programs (n = 10)	25,384	10,000,000	2,385,518	1,337,382	23,855,180
Cost-effectiveness					
• Cost of conserved energy: 1st year $/therm (n = 8)	1.53	6.70	3.63	2.59	
• Cost of conserved energy: lifetime $/therm (n = 7)	0.07	0.80	0.38	0.28	
• Benefit/cost ratio (n = 9)	1.08	5.05	1.98	1.42	

*****_All programs_ data include two portfolios of multiple programs

Total spending on the set of programs we selected and profiled was about $131 million (for the latest year budget available, generally 2003, although in some cases these were 2002 values). The range of annual program budgets was from about $80,000 to almost $36 million. The median value for the set of programs was $954,000 and the mean was $3.7 million (based on 32 programs for which annual budget data were available). Clearly, natural gas programs represent a significant amount of spending and associated activity as this is only a selected subset of all natural gas programs across the country. We have no data available for annual spending on all natural gas efficiency programs in the United States.

The programs in our set are achieving significant levels of natural gas savings—approximately 45 million therms per year. The range of annualized savings (not lifetime) is about 25,000 to 10 million therms, with a mean of 1.3 million therms and median of 568 thousand therms. For the 20 residential programs in our data set, the range of annual savings is 25,000 to 7 million therms, with a mean of 825 thousand therms and a median of 267 thousand therms. For the ten individual commercial/industrial programs in our data set, the range is 25,000 to 10 million; with a mean of 2.4 million therms and median of 1.3 million therms.

Information on cost-effectiveness is also inconsistently reported across the states. We were able to obtain reported estimates of cost-effectiveness in terms of the "cost of conserved energy" for a total of 15 programs and reported estimates of benefit-to-cost ratios for a total of nine programs. We report these data with the caveat that they are based on often-differing methodologies and assumptions across the states (e.g., some programs report their costs for annualized first-year savings while other programs report costs for lifetime savings), and that in this project we did not attempt to reconcile these inconsistencies or conduct our own cost-

effectiveness analysis. We encourage the industry to improve the analysis and reporting of benefit-cost ratios and other measures of program performance and cost-effectiveness.

From the reported results available, the programs in our data set do generally appear to be cost-effective. For those programs reporting costs per annual first-year savings, the range of values is $1.53 to $6.70/therm; with a mean of $3.63 and a median of $2.59. For those programs reporting costs per lifetime savings, the range of values is $0.07 to $0.80/therm, with a mean of $0.38 and a median of $0.28. Benefit-cost ratios range from 1.08 to 5.05, with a mean of 1.98 and a median of 1.42. We report these data with the caveat that they merely illustrate reported results from a limited set of programs. A further caveat is that cost-effectiveness values often are highly correlated to the type of program by customer segment and technology; combining and reporting these data from different program types can mask important distinctions and characteristics of the programs. With such a limited data set, we did not disaggregate these data according to customer segment (residential or C/I).

Lessons learned. Our review and analysis of programs selected and profiled in this study revealed numerous general lessons learned, including:

- Some newly created programs, as well as existing programs that were significantly "made-over," have achieved rapid success in the market.
- Some organizations have achieved success with a single program, while other organizations have achieved success with a comprehensive portfolio of programs and services. In the latter case, there likely are significant cross-over benefits from individual programs within the portfolio as customers have a greater number of options to meet their specific needs.
- A factor in the success of long-standing programs is that they have had time to develop, mature, and earn consumer confidence.
- Incentive levels need to be periodically evaluated, both from the perspective of changing avoided costs, but also relative to market conditions (including penetration rates and measure costs).
- The best programs work as a catalyst within the target markets by working with existing market participants to make them successful according to their own specific objectives.
- Regulatory support is a crucial factor in the success of natural gas energy efficiency programs, but is not the only motivation for regulated companies to offer programs. In many of the programs we profile, the companies also see value in helping their customers better manage costs and receive other benefits from energy-efficient technologies. In some cases, the companies themselves sought regulatory support of their programs in order to make them viable. To the extent that policy/regulatory interests and utility self-interest can be aligned, energy efficiency programs have a better chance of flourishing.

This research was largely qualitative. Rufo et al. (2004) described a major research effort that takes this kind of qualitative analysis a step further. They decomposed a large set of best practice programs to evaluate the key components and sub-components of such programs—those elements that distinguish the programs as using best practices. The next logical stop would be to examine how the various best program practices would lead to quantitative results in terms of program performance. Better understanding of best practices and their impacts on program savings and cost-effectiveness is critical to estimate accurately the magnitude of energy

efficiency "resources" that can be captured by programs. Numerous states are examining and estimating this resource potential, as exemplified by recent studies of the energy efficiency resource potential in California (Coito & Rufo 2003; Rufo & Coito 2003).

Conclusions

Natural gas efficiency programs are alive and well, although they are not nearly as prevalent as electric energy efficiency programs. Many of the programs we identified in our research have been in place for years, quietly and consistently assisting customers to achieve greater efficiency in their natural gas end-uses.

Our research for this study clearly shows that there are a number of excellent programs being provided to natural gas customers to reduce their use of natural gas through efficiency improvements. Programs exist for all types of customers and for all principal natural gas end-use technologies. Some organizations offer comprehensive portfolios of services, while others may offer a single focused program.

It was beyond the scope of this project to determine how best practices affect program results and cost-effectiveness. However, we believe emulation of the best practices we identified and described in this study greatly increases the probability of achieving similar success in new programs, as well as modifications of existing programs.

While we found many good models of natural gas efficiency programs worthy of emulation by others, we also found that such programs tend to be concentrated in a relatively small number of states. Natural gas customers in most states, unfortunately, do not have access to such programs, thereby limiting their ability to reduce their energy costs through improved efficiency. This lack of energy efficiency programs also seriously hinders the ability of states and utilities to respond to the problem of higher natural gas market prices.

The fact that natural gas efficiency programs tend to be concentrated in a relatively few states and regions means that there is a lot of room for expansion of such efforts, especially in light of continuing high natural gas prices and possible supply constraints. There is also room to expand programs that include both natural gas and electricity energy efficiency as a way to capture more energy savings and increase program cost-effectiveness through such combined efforts.

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