Demand-Side Management at a Crossroads: Is There a Future for Electricity End-Use Efficiency in the United States?

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SYNOPSIS

The implementation of electricity conservation measures should continue to grow in the United States in spite of the uncertainty concerning utility DSM programs.

ABSTRACT

Increasing competition among U.S. electric utilities, or at least the perception that competition is coming, is threatening to disrupt utility DSM programs in the United States. A number of utilities are cutting or proposing to cut their DSM program budgets; others are shifting the focus of their DSM programs so as to minimize their impacts on electric rates. This paper argues that implementation of end-use electricity conservation measures can and should continue to grow in the United States in spite of the uncertainty concerning utility DSM programs.

In an era of stable or declining DSM program budgets, the nature of utility DSM programs is changing. Rebates are being used more sparingly and will tend to focus on one-time energy efficiency opportunities, measures that are part of comprehensive market transformation strategies, customer classes that are underserved by other energy efficiency programs, and energy efficiency measures that are difficult to promote through financing, education and standards programs. Utilities are modifying their rebate and other incentive programs in order to reduce utility costs, increase participant contributions, and increase program cost effectiveness. Also, utilities that are interested in promoting cost-effective energy savings are supporting adoption and implementation of stringent building codes and equipment efficiency standards. In summary, utilities are getting smarter about how they "do DSM."

Of course, utility DSM programs are not the only mechanism for realizing end-use efficiency improvements. Appliance and equipment efficiency standards are having a significant impact on electricity demand in the United States. Standards already adopted are expected to lower national electricity use 3% by 2000. Some energy efficiency measures, such as power-managed personal computers, "sell themselves" to a large degree. They have been widely adopted without financial incentives or much utility involvement. And energy service companies are increasing the level of efficiency improvement occurring largely through the private sector. While all of these paths to greater energy efficiency are important, there remains a key supporting and complementary role for utilities to play in promoting cost-effective electricity conservation.

1. INTRODUCTION

Increasing competition among U.S. electric utilities, or at least the perception that competition is coming, is threatening to disrupt utility DSM programs in the United States. Already a number of utilities are cutting or proposing to cut their DSM program budgets. Others are shifting the focus of their DSM programs so as to minimize their impacts on electric rates. There is growing concern that if these trends continue, they will significantly harm overall energy efficiency efforts.

Elsewhere we suggest that many utilities are overreacting to the threat of retail wheeling (Nadel et al. 1995). This paper argues that implementation of end-use electricity conservation measures can and should continue to grow in the United States in spite of the uncertainty concerning utility DSM programs. We discuss: (1) recent trends in DSM program budgets and savings targets; (2) the evolution of DSM programs towards higher impact, market transformation activities; and (3) the broader context for end-use efficiency improvements, including strategies that do not depend on utility funding.

2. RECENT TRENDS IN DSM ACTIVITIES AND PLANS

Surveys of utilities nationwide indicate that aggregate DSM program budgets and savings targets continued to increase in 1993 and 1994 (Hirst and Hadley 1994). Recent issues of trade publications such as *Demand-Side Report* and *the Electricity Daily*, however, have documented proposed or approved cuts in DSM expenditures by many utilities in 1995. In order to assess how widespread this phenomenon is, we collected data on 1994 and 1995 DSM expenditures and savings targets for utilities with some of the largest DSM programs. These utilities were selected because they were the top utilities nationwide in terms of total DSM expenditures, DSM expenditures as a percent of gross revenues, and incremental kWh savings from DSM.[1] The selected utilities and their planned changes in DSM budgets and savings targets are summarized in Table 1.

Table 1. Changes in DSM Expenditures and Savings Targets from 1994 to 1995 for 12 Utilities with Large DSM Efforts.

	Change from 1994 to 1995	
Utility	DSM Budget	Incremental kWh Savings**
NEES	+10%	+23%
Florida P&L	+8%	NA
SMUD	+4%	-16%
Seattle City Light	0%	0%
WI Elec. Power	0%	0%
NYSEG	-11%*	-17%*
PG&E	-12%*	0%*
WI Pub. Svc.	-21%	-7%
Niagara Mohawk	-29%*	-28%*
Puget P&L	-37%	-23%
Con Ed	-42%*	-40%*
So. Cal. Ed.	-61%*	-17%*

* Asterisked figures are proposed but not yet approved.
** Annual electricity savings from 1995 DSM programs compared to the same figure for 1994 programs.

Sources: Data provided by individual utilities, regulatory filings, and articles in *Demand-Side Report.*

Several trends emerge from these data:

1. Most utilities with large DSM programs in past years are scaling back their spending in 1995. However, a few utilities are holding spending steady or increasing DSM budgets slightly. New England Electric (NEES) is the only utility projecting a significant increase in incremental electricity savings in 1995.

2. Utilities with above-average electricity rates are proposing the largest budget cuts. The three utilities with the largest percentage reductions have average rates in excess of $0.10/kWh. Puget Power & Light, with a 37% DSM program reduction, has an average electricity rate of only $0.051/kWh (as of 1992), which is not high relative to average rates nationwide but is high relative to electricity rates in this utility's region.

3. In most but not all cases, cuts in energy-savings targets are less, on a percentage basis, than spending cuts. In other words, many utilities are attempting to increase the "bang per buck" of their DSM programs. This is a continuation of trends observed in 1993 and 1994 (Hirst and Hadley 1994).

[1] The utilities selected were in the top five nationwide based on 1992 data reported to the U.S. Energy Information Administration and summarized by Hirst (1994). Several utilities were in the top five on more than one of these lists, hence the total number of utilities is less than 15. Also, we did not collect data on two small utilities with high spending as a percent of gross revenues but which spent less than $10 million on DSM in 1992.

Additional research uncovered that while some utilities are proposing steep DSM cuts, regulators are not always approving these cuts. In several cases regulators are scaling back or entirely eliminating the cuts. For example, Long Island Lighting in N.Y. proposed a 66% cut, but only a 41% cut was approved. Consumers Power in Michigan requested that DSM be eliminated entirely, however the commission is requiring the utility to continue DSM in 1995 at the same spending level as in 1994 (Witte 1995).

Some utilities are increasing DSM budgets between 1994 and 1995. In addition to those utilities listed in Table 1, PacifiCorp projects a 22% increase in DSM spending. Some utilities with smaller DSM programs are still in the expansion phase. For example, Central Power & Light in Texas recently proposed a 55% increase in DSM spending in 1995, raising their DSM budget from $5.8 million to $9 million (DSR 1995). A 6% DSM budget increase has been proposed at Tampa Electric Company in Florida, where peak demand is growing rapidly.

3. NEW DIRECTIONS FOR DSM PROGRAMS

DSM programs and, more generally, improvements in energy efficiency still provide substantial benefits to consumers, the environment, and the nation. Many DSM programs are still more cost-effective than investments in new power plants, even with the relatively low marginal costs offered by state-of-the-art natural gas-fired power plants. Utilities offer a valuable service to many of their customers by providing technical and financial support for efficiency improvements, thereby increasing customer approval and loyalty. And by stimulating efficiency improvements, DSM programs reduce pollutant emissions and lead to a net increase in employment (Geller et al. 1992).

But with greater wholesale competition, and possibly retail competition looming over the electric utility industry, many utilities and regulators are looking for ways to realize the benefits of DSM programs at significantly lower program cost. In particular, utilities want to minimize the short-term adverse impact of DSM program on electricity prices. While DSM programs have generally been successful, there is still room for improvement through reducing incentive payments and "free riders," increasing the leveraging of DSM dollars, and getting more "bang for the buck."

With these objectives in mind, U.S. utilities are starting to move their DSM programs in a number of directions including:

- Focusing on new construction and equipment replacement (one-time energy efficiency opportunities);
- Fostering market transformation so that efficient equipment and designs become the norm;
- Stressing financing of energy-efficiency measures rather than rebates or giveaways;
- Supporting adoption and implementation of stringent building codes and equipment standards; and
- Experimenting with new DSM strategies, particularly strategies that may have lower rate impacts than traditional DSM programs.

Each of these strategies is discussed below. In addition, it should be acknowledged that many utilities are maintaining traditional DSM programs for certain customer classes, such as free or low-cost retrofits for low-income households (Nadel 1995).

3.1. One-Time Energy Efficiency Opportunities

At the time a home, office building or factory is constructed, customers are spending substantial amounts of money to purchase energy-consuming equipment. Many conservation measures can be installed for only the incremental cost beyond standard construction practices. To retrofit these measures later is usually much more expensive and sometimes impossible, which is why upgrading energy efficiency during construction is often referred to as a "lost opportunity" resource. Building renovations, remodeling, and situations when long-lived equipment (e.g., ballasts, motors, and cooling equipment) are being replaced are other one-time energy-efficiency opportunities.

New construction and equipment replacement offer utilities the opportunity to achieve substantial energy savings at modest cost. Perhaps the most successful residential new construction programs were those offered by the Bonneville Power Administration (BPA) during the 1983-1991 period. BPA offered two complementary programs--the Super Good Cents builder incentive program, which specified minimum efficiency criteria for a home to be classified as energy-efficient, and the Northwest Energy Code program, which encouraged municipalities to adopt local energy codes

based on the Super Good Cents standards. During the program period, more than one-third of the new homes in the region participated in these two programs. Subsequently, Washington and Oregon adopted statewide energy codes based on the Super Good Cents standards. The entire effort cost BPA over $100 million, but a comprehensive evaluation determined that BPA spent less than $0.01 per kWh saved (Schwartz 1993).

Commercial new construction programs also encourage new buildings whose efficiency significantly exceeds local building code requirements. Typically these programs have two tracks--a prescriptive track which provides rebates for common measures such as high-efficiency lighting and HVAC equipment, and a performance track that provides design assistance and custom rebates for comprehensive packages of efficiency measures that are optimized through the design process. For example, United Illuminating's Energy Blueprint program includes both prescriptive and performance tracks and estimates that 70% of new buildings built in its service area participated in the program. Commercial new construction programs such as this one have typically cost the utility $0.015-0.035 per kWh saved, approximately $0.005-0.015 less than retrofit programs that seek comprehensive efficiency improvements in existing commercial buildings (Nadel 1995).

The energy savings from new construction and equipment replacement programs are likely to be long-lived, because customers would not be investing their own money if they planned to move or cease operations soon. In addition, annual costs of lost opportunity programs are commonly less than retrofit programs because with lost opportunity programs only a portion of the customer base is eligible each year, unlike retrofit programs where virtually all customers are potential participants.

Another unique opportunity where energy efficiency can be achieved at relatively low cost is at the time when chlorofluorocarbon (CFC) refrigerant needs to be replaced in chiller systems. In this case, the opportunity is to reduce cooling loads in a building and downsize and replace the old chiller with a more efficient system, rather than just replacing the refrigerant in the old system. Currently, New England Electric System, Boston Edison Company, Potomac Electric Power Company, Portland General Electric and Commonwealth Edison Company are implementing DSM programs that take advantage of this opportunity (Robertson et al. 1994)

3.2. Market Transformation

Market transformation is a process whereby energy-efficiency innovations are introduced into the marketplace and over time penetrate a large portion of the eligible market. Instead of saving energy building by building, a market transformation approach seeks to change the entire market for particular products or services so that efficient products or services are the norm and do not need to be further promoted with utility incentives.

Utilities have played a critical role in a number of examples of successful market transformation and are increasingly employing this approach to promoting greater energy efficiency (Geller and Nadel 1994). For example, in the Pacific Northwest, BPA and other regional organizations spent ten years transforming site-built new housing (see discussion above). Also, BPA and other utilities transformed the efficiency of new manufactured housing (also known as mobile homes) in the Northwest region, saving electricity at a levelized cost of under $0.02/kWh (Lee et al. 1994).

Electronic ballasts for fluorescent lighting are another example of successful market transformation where utilities played a critical role, along with national efficiency standards. After electronic ballasts were introduced in the marketplace, utilities offered rebates and other incentives that popularized the new ballasts, helped to bring their cost down and improve their performance, and increase their market share. In 1994, the U.S. DOE proposed minimum efficiency standards that would essentially require all new fluorescent ballasts to be electronic by 1998 or 1999 (Geller and Nadel 1994). If we assume these efforts accelerated the market transformation by five years, then the levelized cost of utility and government programs in this area is only about $0.003 per kWh saved (Nadel 1995).

Refrigerators are yet another example of transforming an end-use market through the combination of utility DSM programs and national efficiency standards. In 1990, a group of utilities and efficiency advocates developed the Super Efficient Refrigerator Program (SERP) to speed up the development and commercialization of energy-efficient, CFC-free refrigerators (Feist et al. 1994). SERP consisted of a contest among refrigerator manufacturers for a $30 million prize, with the money provided by a group of 24 utilities. The utilities are providing the money to the winning manufacturer when it sells qualifying refrigerator models in the service areas of the participating utilities. In addition, refrigerator manufacturers, energy efficiency advocates, and utility and state representatives negotiated a joint recommendation for new efficiency standards. If adopted, these standards would result in 25-30% energy savings compared to the 1993 standards for most new refrigerators (AHAM 1994). This is the same level of performance and savings as provided by the winning SERP refrigerator, which influenced the standards negotiations. The U.S. DOE is very likely to accept this consensus recommendation, with the new standards taking effect in 1998 or 1999.

These examples illustrate how market transformation can produce large energy savings at a very low utility cost per unit of energy saved. However, transforming an end-use market often requires a coordinated, long-term effort and close cooperation among utilities, government agencies, and the private sector. Also, in order to appreciate the cost effectiveness of market transformation efforts, it is important to consider the indirect as well as the direct impacts of utility DSM programs. For example, the SERP program paved the way for the expected significant increase in national minimum efficiency standards for refrigerators. Fairly evaluating the impacts and cost effectiveness of DSM programs that contribute to market transformation is a challenge for utilities as well as their regulators (Prahl and Schlegel 1993).

Many utilities have become interested in developing market transformation strategies for a wide range of new or underutilized energy efficiency measures. In fact, a group of electric and gas utilities, government agencies, and public interest organizations formed the Consortium for Energy Efficiency (CEE), a non-profit organization dedicated to advancing the development, commercialization and market penetration of new, super-efficient technologies. CEE has developed programs, in which many utilities are participating, for advancing high efficiency commercial and residential air conditioners; horizontal axis, high spin speed clothes washers; and compact fluorescent lamps. Other high priority programs have been identified and are under development by CEE (Nadel and Geller 1994).

3.3. Financing Mechanisms

In order to reduce the cost and rate impacts of their DSM programs, some utilities are proposing to limit or phase out rebates in favor of straight financing or shared savings type approaches. This means helping customers finance energy efficiency improvements, but potentially with little or no incentive payment from the utility.

Some U.S. utilities have offered loan and/or shared savings programs in the past, but these programs in general were not successful in achieving high participation rates and acquiring cost-effective energy savings on a large scale. For example, in the 1980s, both Wisconsin Electric Power Co. and Puget Sound Power & Light offered customers a choice between a zero interest loan or a rebate that was approximately equivalent to the interest subsidy on the loan. In both programs, over 90% of the participating customers chose rebates instead of loans (Nadel 1990). Also, these utilities found that loans tend to be more complex and more costly to administer than rebates.

A number of utilities are experimenting with new approaches for making loan and shared- savings programs a success. One utility--Southern California Edison (SoCal Edison)--is offering commercial and industrial customers a comprehensive package of services to identify, install, finance and guarantee energy-efficiency measures. SoCal Edison requires customers to pay for most of the costs through a service charge or loan repayment. The program, known as ENVEST, is still in the pilot phase, but so far it has been particularly popular with government agencies as a means of retrofitting government buildings (ADSMP 1994). Pacific Power and Light (PP&L), based in Portland, OR, is achieving a relatively high participation rate in response to offering financing for comprehensive energy efficiency improvements in new commercial buildings. However, PP&L is subsidizing nearly 50% of the cost of this DSM program, i.e., participants' loan repayments only cover slightly more than half of PP&L's total program costs (Gordon 1995).

The shared savings approach, whereby a utility or energy service company (ESCO) finances and installs energy efficiency measures in customer facilities with the customer repaying through a fraction of the energy savings, has resulted in relatively low participation rates for a number of utilities (Nadel 1990). However, a few utilities have had success with shared savings DSM programs when ESCOs were hired through a bidding process. For example, Orange and Rockland Utilities and Long Island Lighting Co. in New York state are paying energy service companies $0.015-0.030 per kWh saved for comprehensive energy efficiency retrofits in the commercial and industrial sectors (Goldman and Kito 1994). But in general, relying on ESCOs to implement energy efficiency projects with partial support from utilities has been a relatively high-cost DSM strategy, with a total levelized cost (i.e., including utility and customer payments as well as administrative costs) of $0.054-0.08 per kWh saved (Goldman and Kito 1994).

3.4. Codes and Standards

Utilities can play a key role in encouraging development and adoption of stringent building standards through demonstrations, training of builders and code officials, and possibly providing some financial incentives for early adopters. Once the standards are in place, energy savings are realized with little or no cost and effort by the utility. The example of the Model Conservation Standards, promoted by BPA and other utilities in the Pacific Northwest, was referred to earlier. Northeast Utilities' Energy Conscious Construction program and Pacific Gas & Electric's New Construct Rebate program are additional examples of utility programs that have paved the way for implementation of more stringent building codes (Smith and Nadel 1995).

Likewise, utilities can support adoption of national equipment efficiency standards, both by promoting early adoption of highly efficient products and by participating in standards rulemakings. For example, PG&E and SoCal Edison were involved in the successful negotiations concerning the next round of efficiency standards for refrigerators and freezers.

Building retrofit ordinances are another area where utilities can play a useful role. Building retrofit ordinances require that a home or commercial building meet minimum energy efficiency standards when it is sold or renovated. Retrofit ordinances have been adopted by several local governments including San Francisco and Berkeley, CA (Egel, Cook and Knox 1990). Enforcement of retrofit ordinances can be a problem, however. Utilities can assist with inspections and enforcement, and by offering loans to building owners who need financing for retrofits.

3.5. Other New DSM Strategies

High first-cost is clearly a barrier to the adoption of certain energy-efficiency measures such as adjustable-speed motor drives and compact fluorescent lamps. Also, minimum efficiency standards are not appropriate for these products because their feasibility is application specific. Therefore, utility promotion and financial incentives are still needed in order to increase the penetration of these important energy-efficiency measures. Utilities are starting to take steps to reduce their cost per unit of energy saved while promoting these products as part of their DSM programs.

Instead of giving away compact fluorescent lamps or providing large rebates to consumers, utilities such as Northeast Utilities in New England and some small municipal utilities have successfully sold lamps to consumers at a discount or leased lamps to consumers; the consumer pays for the lamp through a small charge in their monthly utility bill. Taking into account any incentive payments as well as administrative costs, the levelized cost to the utilities for these programs was $0.02-0.03 per kWh saved (Flanigan and Weintraub 1994). Also, a number of utilities are joining together through CEE to provide incentives directly to manufacturers of compact fluorescent lamps rather than to end users, thereby lowering the amount paid per lamp and encouraging better performing products (CEE 1994). This effort is modeled on a successful DSM program operated by SoCal Edison. SoCal Edison fostered the sale of over 1.5 million CFLs through a $5 rebate per lamp, with the rebate provided directly to lamp manufacturers in order to "buy down" the wholesale price. The levelized cost for this program was only about $0.017 per kWh saved (Grimm and Granda 1994).

Other utilities are raising their minimum efficiency thresholds or requiring comprehensive retrofits in order to reduce the number of "free riders," increase program-induced energy savings, and improve the cost effectiveness of their DSM programs. For example, Sacramento Municipal Utility District is one of many utilities that periodically raise minimum efficiency requirements for its Refrigerator Rebate Program; this not only reduces free ridership but also encourages manufacturers to bring more efficient models into the marketplace (Erickson 1994).

Utilities are also finding ways to deliver DSM programs to low-income customers more efficiently. One way is to combine forces with the federally funded Weatherization Assistance Program (WAP) or with "non-traditional" partners serving low-income households (e.g., banks, low-income-housing developers, municipal governments). A coordinated effort can also enhance the quality and quantity of services provided without increasing administrative and marketing costs. For example, the Public Service Company of Colorado (PSCO), the Colorado Department of Housing (which administers WAP funds), the Colorado Office of Consumer Council, and a variety of public interest groups have combined forces. PSCO funds the most cost-effective retrofits until their program funds run out. At that point WAP funds are used to implement further retrofit measures, up to the limits on cost and cost-effectiveness for that program (Colton 1994).

Working with trade allies is another way utilities are increasing the impact and cost effectiveness of their DSM programs. BC Hydro, for example, "flipped the market" from standard efficiency motors to high efficiency motors in British Columbia. Their DSM program included communication with manufacturers, active involvement of motor dealers, and an intensive, multi-faceted marketing effort. B.C. Hydro staff regularly visited motor dealers and repair shops to promote the program and provide information and promotional material that motor dealers can use to sell high efficiency motors to their customers. Motor dealers also received an incentive for each qualifying motor sold. As a result of these efforts, vendors now routinely stock and recommend efficient motors. The levelized cost for this program was less than $0.010 per kWh saved (Flanigan and Fleming 1993).

4. LOOKING BEYOND DSM PROGRAMS

Utility DSM programs are just one strategy for promoting end-use electricity conservation. Many energy-efficient technologies are sold and installed without any utility involvement. For example, a survey of 613 building managers sponsored by **Energy User News** magazine indicated that only 26% of respondents who intended to purchase energy-efficient equipment in 1994 planned to use utility rebates as a funding strategy. In contrast, 82% of respondents planned

to use capital budgets while 55% planned to use their O&M budget (Hines 1994). There are a variety of strategies for encouraging more widespread adoption of cost-effective energy efficiency measures that do not require utility participation.

Building codes and appliance efficiency standards are two such strategies. While utility support of building codes can be very useful (see discussion above), utilities do not need to get involved in setting and enforcing minimum efficiency standards on residential appliances and other types of mass-produced equipment. The U.S. DOE takes responsibility for analyzing and setting standards according to the criteria established in the NAECA law. Efficiency standards have been adopted on a wide range of products including major home appliances, commercial lighting and HVAC equipment, and motors.

Appliance and equipment standards already adopted are expected to save about 88 TWh/yr of electricity use and avoid the need to construct about 20,000 MW of peak power plants by 2000 (Geller and McMahon 1995). For comparison, utility DSM programs are projected to lower electricity use nationwide by about 82 TWh (2.6%) as of 2000 (Hirst 1993). By 2015, the electricity savings from appliance and equipment standards already adopted are expected to grow to nearly 225 TWh/yr, with 58,000 MW of peak generating capacity avoided by that date.

Appliance and equipment standards also provide consumers with significant economic benefits since the extra first cost is usually paid back within a few years. It is estimated that consumers will realize a net savings of nearly $130 billion from standards already adopted (Geller and McMahon 1995). New standards proposed by the U.S. DOE for eight products could save an additional 37,000 MW over the long run, with net economic benefits of $66 billion (Geller 1994). And the U.S. DOE has begun considering revised standards on eight other products that could result in energy and economic savings of similar magnitude.

Equipment efficiency standards are not suitable for all types of energy-efficiency measures. The feasibility of some products, such as compact fluorescent lamps and adjustable speed motor drives, is application specific. Also, these efficiency measures have a relatively high first cost. Other efficiency measures are process oriented and require customized design and application. Still other efficiency measures involve better design, operation or maintenance. In these areas, utilities can play a critical role by providing training, technical assistance, and possibly financial incentives to consumers.

A study of the strategies that can be used to promote maximum electricity conservation in New York state highlights the complementary effect that DSM programs, market forces, and codes and standards can have (Nadel and Tress 1990). This study found that vigorous utility DSM programs could cut electricity use in the state 13.5% by 2008. At the same time, market forces, building codes, and equipment efficiency standards could cut electricity use in New York by an additional 13.6% the same year. Both DSM and these other non-utility-based strategies were needed to achieve a large fraction of the estimated 34% cost-effective electricity savings potential in New York.

In certain instances, widespread adoption of cost-effective efficiency measures can occur in the marketplace without efficiency standards or extensive DSM programs. For example, the U.S. EPA has been promoting personal computers equipped with power management capabilities through the "Energy Star" recognition program. First available on a significant scale in 1993, virtually all new personal computers are expected to have power management capability by 1996 (Geller and Nadel 1994). This feature, which cuts the energy use of PCs by 60-70%, has quickly caught on because it provides multiple benefits and is essentially zero incremental cost for consumers. Also, there are a small number of chip manufacturers for PCs who are incorporating this feature in all their products. The U.S. EPA is extending the Energy Star recognition concept to promote widespread efficiency improvements in other types of office equipment as well as in transformers and new buildings.

Energy service companies (ESCOs) offer consumers another mechanism for financing and implementing energy efficiency improvements in the marketplace, although some ESCO projects are contracted for or supported by utilities. Estimates made by the National Association of Energy Service Companies indicate that ESCOs financed the installation of about $760 million worth of energy efficiency investments in 1994, up from $390 million as of 1991 (Cudahy 1995). The ESCO market is growing about 25% per year at the present time. About 90% of these projects are being implemented in the institutional (schools, hospitals and government buildings) and commercial sectors, with most ESCO projects occurring without utility support. While ESCOs are making a significant contribution, they are having minimal impact on the residential and industrial sectors which account for over two-thirds of electricity use nationwide.

5. CONCLUSION

In an era of stable or declining DSM program budgets, the nature of utility DSM programs is changing. Rebates are being used more sparingly and are shifting towards one-time energy efficiency opportunities, measures that are part of comprehensive market transformation strategies, customer classes that are underserved by other energy efficiency programs, and energy efficiency measures that are difficult to promote through financing, education and standards programs. Utilities are modifying their rebate and other incentive programs in order to reduce utility costs, increase participant contributions, and increase program cost effectiveness. Also, utilities that are interested in promoting cost-effective energy savings are supporting adoption and implementation of stringent building codes and equipment efficiency standards. In summary, utilities are getting more "bang per buck" from their DSM programs.

Of course, utility DSM programs are not the only mechanism for realizing end-use efficiency improvements. Appliance and equipment efficiency standards are having a significant impact on electricity demand in the United States; standards already adopted are expected to cut national electricity use in 2000 by 3%. Some energy efficiency measures, such as power-managed personal computers, "sell themselves" to a large degree and have been widely adopted without financial incentives or much utility involvement. And ESCOs are increasing the level of efficiency improvement occurring largely through the private sector, although they primarily target institutional and commercial buildings.

State utility commissions oversee and regulate the DSM activities (and other aspects) of investor-owned utilities in the United States. A number of state utility commissions (e.g., commissions in New York and Michigan) have rejected utility requests to drastically cut DSM programs. Instead, these utility commissions are requiring or encouraging utilities to continue investments in cost-effective efficiency measures under an integrated resource planning framework. Some regulators are indicating that they expect cost-effective DSM programs to be part of the future resource mix under whatever type of utility industry restructuring ultimately occurs. While DSM programs and utilities in general are changing, we are optimistic that end-use energy efficiency improvements will continue to expand and will continue to be supported by many U.S. utilities.

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