THE IMPACT OF ENERGY SECTOR RESTRUCTURING ON ENERGY CONSUMPTION AND THE ENVIRONMENT: INTERNATIONAL EXPERIENCES

Steven M. Nadel

January, 1996

American Council for an Energy-Efficient Economy
1001 Connecticut Avenue, NW, Suite 801, Washington, DC 20036 (202)429-8873
2140 Shattuck Avenue, Suite 202, Berkeley, CA 94704 (510)549-9914
Please contact the Berkeley office for ordering information.

INTRODUCTION

In many countries of the world energy utilities and energy regulation are being reorganized in order to make markets more competitive and thereby introduce the discipline of the market. This reorganization goes by different names in different places, hence in the United States and Europe terms such as "deregulation," "restructuring," and "introducing competition" are widely used while in Australia "micro-economic reform" is common.

The advantages and disadvantages of energy sector reform have been widely discussed in other forums. The purpose of this paper is to discuss the impact of these reforms on the environment in general, and on efforts to promote increased energy efficiency in particular. This paper focuses on three situations in which reforms have already been introduced and the impact of the reforms is starting to become apparent. These situations are natural gas deregulation in the United States, electric utility restructuring in Norway, and electric and gas utility restructuring in the United Kingdom. In addition, this paper also discusses electric utility restructuring in the United States—a process that is now underway, with impacts that are starting to emerge.

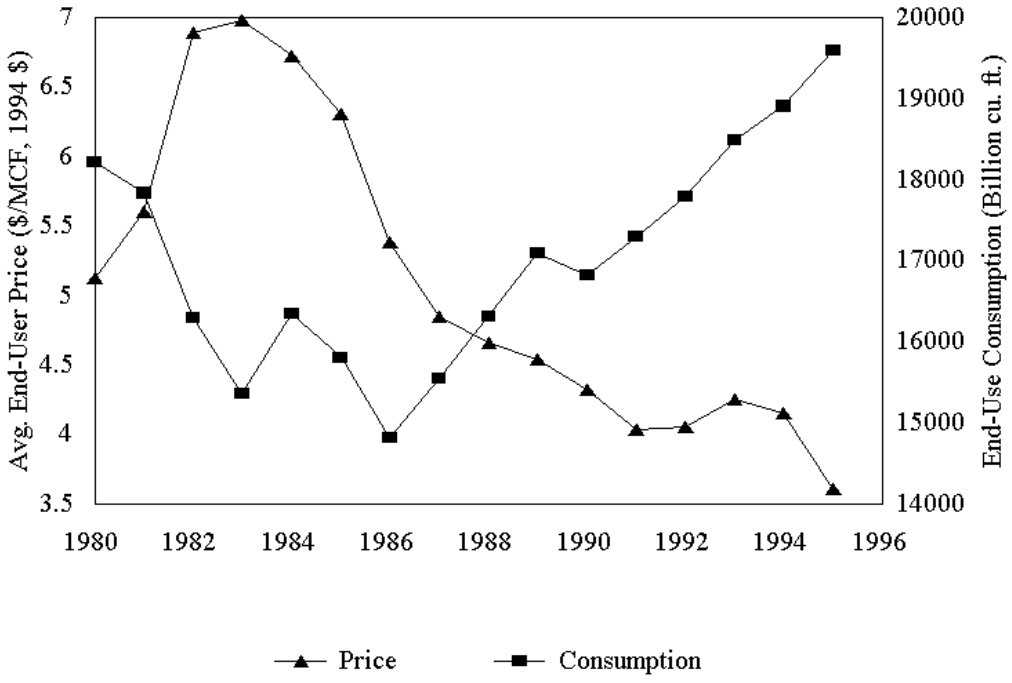
U.S. NATURAL GAS INDUSTRY DEREGULATION

In the United States the natural gas industry has historically had three independent components—producers who found and extracted natural gas deposits; local distribution companies (LDCs) that sold and distributed gas within a local service territory; and pipelines that bought the gas from producers and transported and sold the gas to LDCs. During 1984-1993, the Federal Energy Regulatory Commission (FERC) issued a series of rules that largely deregulated the interstate sale and transmission of natural gas. Under the new system, LDCs and end-users can purchase gas directly from producers and pipelines must transport this gas to local delivery points on a nondiscriminatory basis. As a result, LDCs and large end-users can purchase gas from a wide variety of producers, from the pipeline company or companies that serve their region, or from newly emerged gas marketers who act as brokers and purchase gas and transportation services on behalf of their clients. Also, with deregulation, pipeline companies can bypass LDCs and serve customers directly. In addition, the deregulation rules gradually decontrolled wellhead gas prices, permitting prices to rise in some cases and fall in other cases (Braswell et al. 1995).

Following deregulation most LDCs began purchasing at least a portion of their gas directly from producers. Many large industrial and commercial customers also began purchasing gas from sources besides their local distribution company (with the local distribution company obliged to transport the gas at a reasonable cost to the

customer site). Competition among gas producers and distributors is extensive. As a result, prices to end-users have come down significantly, dropping by an average of approximately 45 percent in real terms (inflation adjusted) from 1984-1995 (although other factors, such as declines in international oil prices, have also contributed to the price drop). During the past ten years natural gas use in the United States has grown 33 percent and natural gas has increased its share of total U.S. energy consumption by 12 percent (from 22.5 percent to 25.2 percent) due to such factors as lower gas prices and increased environmental regulations that favor natural gas use over more polluting fuels such as oil and coal (EIA 1995a).[1] These trends are illustrated in Figure 1.

Figure 1. U.S. End-Use Natural Gas Consumption and Price by Year



From an environmental perspective there have been both positive and negative impacts from deregulation. On the positive side, natural gas makes up a larger share of total energy supply, while the share of oil and coal has declined (by 9 percent and 2 percent respectively) (EIA 1995a). As a result, air pollution is down relative to what would have happened if the different fossil fuels retained their mid-1980s market shares. On the negative side, with lower energy prices, combined with other

[1] 1995 figures are based on the first nine months of the year.

factors, energy use is up. During 1986-1990, U.S. natural gas use grew by an average 3.6 percent annually, up from the 2.9 percent average annual *decline* in gas use during 1980-1985 (EIA 1995a). Increased energy use results in more pollution, erasing much of the environmental gains from the increased share of natural gas in the U.S. energy market.

Another negative impact of deregulation is that it has probably made energy efficiency programs less appealing to LDCs. In the United States many electric utilities offer programs to assist their customers in improving the efficiency of electricity use. These programs were starting to spread to gas utilities when the final FERC gas deregulation rule was issued in 1993. This 1993 rule made it easier for gas marketers to offer gas services to LDC customers. In order to lower prices and better compete with these marketers, some LDCs have reduced funding for energy efficiency programs. In addition, the 1993 rule also changed the nature of gas pricing to LDCs; with the new pricing system, gas on peak demand days (cold winter days) is much more expensive than gas during other time periods (Feingold & Little 1994). With this pricing structure, utilities tend to be more interested in load management programs, such as interruptible gas service, than in energy efficiency programs that reduce loads during off-peak periods as well as on-peak periods. Thus, since 1993 very few LDCs have expanded their energy efficiency programs and many LDCs have scaled their programs back.

On the other hand, with LDCs now driven more by a competitive market, and off-peak gas very attractively priced, gas utilities are increasingly seeking to market gas services to electric utility customers by promoting gas air conditioning, space heating, and water heating systems. From an energy efficiency standpoint, on a whole-systems basis (i.e., counting energy losses in electricity generation) current gas space- and water-heating technologies tend to be more efficient than electric space and water heating, but current electric air conditioning technologies are more efficient than gas air conditioning. Thus, expanded gas marketing is a mixed blessing for the environment.

Some observers have suggested that in a deregulated energy market private energy service companies may offer energy efficiency services to customers and fill in for reduced energy efficiency programs offered by utilities. This has not yet occurred in the United States for the most part. Energy service companies have been effective at serving government and other institutional customers, but have had very little success reaching industrial, commercial, and residential customers (Nadel & Geller 1995).

NORWEGIAN ELECTRIC INDUSTRY RESTRUCTURING

In Norway a new Energy Act took effect on January 1, 1991, that has dramatically affected the Norwegian electric industry. Prior to 1991 public and private regional utilities served as monopoly electricity providers in their regions and had legal responsibility to meet the electricity demand. Some of these regional utilities provided generation, transmission, and distribution services while others operated power plants and sold power to local distribution companies. The Energy Act changed this by establishing open competition in both production and sale of electricity. Administration of the transmission system remained a monopoly but transmission system operators were required to allow access to any party desiring to use the system to transmit power. The Act encouraged electric utilities to reorganize into separate production and distribution companies. Energy prices are significantly affected by a power pool in which suppliers and purchasers determine market-clearing prices through a bid/offer system that is conducted daily to determine prices for the next day. In addition to purchasing through the pool, power purchasers can continue to buy from their local utility or they can enter into bilateral contracts with power sellers (Haaland & Wilhite 1994). This latter route is becoming increasingly important, particularly for customers who want to lock in prices for the medium and long term through the use of long-term contracts (Moen 1995; York 1995).

By the summer of 1992 competition for large customers was very tough. Large users realized they could save substantial amounts of money by shopping around for new short-term power contracts, either by dealing directly with utilities or by working through power traders (which buy and sell power in a similar fashion to established utilities) or power brokers (who bring buyers and sellers together). It was a buyers' market as there was a surplus of power available in the country. As a result, by 1993 electricity prices for industrial customers had fallen by 18-26 percent, although some of these price reductions were due to surplus capacity attributable to warmer-than-average winters in 1991/92 and 1992/93. Prices for residential customers and small businesses remained stable as these customers continue to be served by their local distribution company (Haaland & Wilhite 1994). In 1994 and 1995, due to colder winter weather, electricity prices rose somewhat from their 1993 low (Haaland & Wilhite 1994; Moen 1995).

Restructuring and lower electricity prices may be contributing to increased electricity consumption in Norway. In 1995 electricity consumption was approximately 110 TWh (Moen 1995), up 14 percent from 1990 levels. By way of comparison, electricity use grew by only 2 percent in the 1985-1990 period (EIA 1995b).

In Norway, 99.6 percent of electric generation capacity is hydro based (Haaland & Wilhite 1994) and thus air pollution from power generation is essentially zero. Due to a surplus of capacity, little new capacity is under construction. However, there is substantial additional potential for hydroelectric and gas power plants in Norway, a

potential that could be tapped to sell power to neighboring countries, possibly displacing some fossil-fuel power in these countries (York 1995).

One other notable impact of the Norwegian reforms is that utility energy efficiency programs have withered in the post-1991 period. During the 1980s the Norwegian government encouraged utilities to operate energy efficiency programs and by 1990 about 300 person-years of effort were devoted by utilities to these programs. Since the Energy Act went into effect, and utilities are no longer required to have the capacity to meet any future increase in demand, utilities have been much more interested in selling electricity than in promoting energy efficiency and many energy efficiency staff have been moved to marketing or sales positions. Utility evaluations published in 1991 and 1992 all showed waning interest in energy efficiency programs (Haaland & Wilhite 1994). To date, no significant private energy efficiency services market has developed to fill this gap (York 1995).

In order to compensate for the reduced energy efficiency activity the government has initiated two related programs: (1) a small transmission tax ($0.00027/kWh) earmarked for energy conservation information; and (2) the creation and partial funding of independent regional energy conservation centers to provide energy efficiency services. These new programs are still being set up and their impact cannot yet be assessed (Haaland & Wilhite 1994; York 1995).

BRITISH RESTRUCTURING OF THE ELECTRICITY AND NATURAL GAS INDUSTRIES

In the United Kingdom natural gas and electric services have historically been supplied by government-owned monopolies. Beginning in 1988 for natural gas and around 1990 for electricity, the British government introduced competition into these markets by allowing alternate suppliers to enter the gas supply and electric generation markets and by allowing large customers to purchase directly from alternative suppliers. For both gas and electric services, open access is being gradually provided to all customers, beginning with the largest customers and proceeding progressively to the smallest customers in 1998. In addition, concurrent with the opening up of the electricity market, the government has privatized large portions of the electricity industry, establishing 2 large newly privatized generation companies and 12 privatized regional electricity companies (RECs). Both the gas and electric transmission systems remain monopolies.

As in Norway, in the United Kingdom there is an electricity pool with a day-ahead spot market pricing system complemented with extensive use of bilateral contracts. The restructured system is subject to regulation by the Office of Gas Regulation (OFGAS) and the Office of Electricity Regulation (OFFER). OFFER has developed pricing formulas for generation and distribution; both are based on a price cap tied

to inflation and are adjusted for productivity improvements. Profits for RECs are tied to their ability to operate at costs below the price caps. One mechanism for doing this is to promote electricity sales—profits increase as long as the marginal cost of electricity supply is less than the price cap (Hewitt & Cohen 1994; Mickle 1994; York & Cohen 1994).

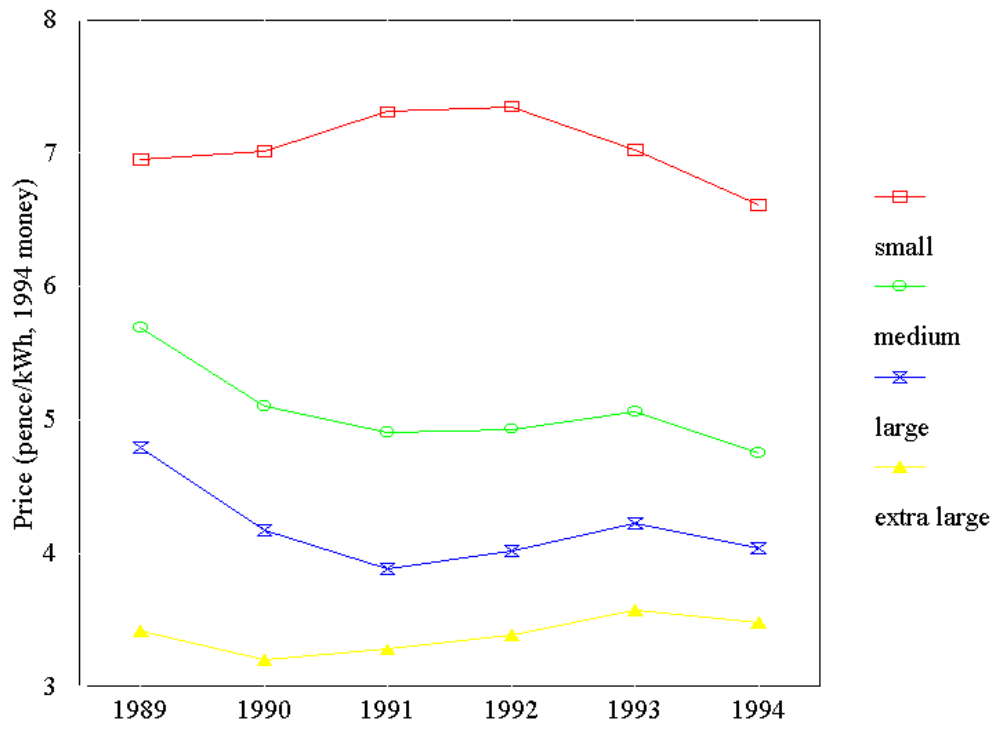
With restructuring, competition has been introduced into the gas and electricity industries. By December, 1992, for firm gas, and October, 1993, for electricity, alternate suppliers had captured approximately 50 percent of the sales from the large customer classes originally granted open access (Mickle 1994). For medium and moderately large customer classes (annual electricity use of 880-150,000 MWh), electricity prices have fallen by an average of approximately 16 percent in real terms over the 1989-1994 period. On the other hand, electricity prices for small customers have fallen only 5 percent while very large customers have actually seen a small (2 percent) price increase because prior to restructuring major energy users received large subsidies paid for by other consumer classes (Coates 1995). These trends are shown in Figure 2.

These lower prices combined with aggressive marketing by utilities and alternative power suppliers appear to have increased energy use. Over the 1988-1993 period natural gas use increased 21 percent, while gross domestic product (GDP) grew by only 2 percent. Similarly, during 1990-1993, electricity use grew by 3.4 percent while GDP declined by 0.3 percent.

During the post-restructuring period, use of natural gas has increased significantly, with the natural gas proportion of total energy use increasing by 16 percent from 22.3 percent in 1988 to 25.8 percent in 1993 (EIA 1995b). This trend also applies to the electricity sector. In 1990, the United Kingdom had approximately 35,000 MW of conventional coal-fired generating capacity, 12,000 MW of oil-fired capacity, 11,000 MW of nuclear capacity and only 6,000 MW of other capacity including gas and mixed-fuel plants (Electric Association 1995). Since restructuring approximately 7,000 MW of new generating capacity has been started, almost all of it gas fired (Dunn 1995).

Unlike Norway, there was very little utility activity in the energy efficiency arena prior to the introduction of competition. Some energy efficiency advocates did recommend
that energy efficiency be built into the new structure, but OFFER believed that market

Figure 2. U.K. Electricity Prices by Year



forces would meet demands that arose and hence no special provisions for energy efficiency were adopted. By 1992 it was apparent that the marketplace was not yielding either demand for or investments in energy efficiency. Since the British government had just signed the Rio Accord and agreed to reduce carbon dioxide emissions, political pressure grew to involve the electric utility industry in the carbon dioxide reduction plan. As a result, the Energy Saving Trust (EST) was established in 1992 to advise OFFER on matters relating to energy efficiency and to design and oversee energy efficiency programs. The EST helped OFFER to set a mandatory efficiency target for each REC and to develop three different approaches RECs can use to meet these targets: (1) participate in national programs planned by EST and administered nationally; (2) offer "framework" programs in which RECs operate programs based on EST concepts and guidelines; and (3) offer regional programs developed and implemented by individual RECs. These programs are funded by a small wires charge of $1.60 per year for small customers served directly by RECs. Approximately 80 percent of the funds are going to regional programs developed and implemented by individual RECs. EST programs began in late 1993 and RECs began offering programs in 1994. As of early 1995 over 70 REC schemes have been submitted for review by EST and OFFER. Many of these programs are just getting underway and it is too early to assess their effectiveness. In addition, in 1995 OFFER adopted several proposals to base a portion of REC revenues on number of

customers served, decreasing the contribution of electricity sales to REC revenue and profit. It is too early to access the impact of these changes on REC interest in energy-saving programs (Holt 1995).

While the EST and RECs are beginning to offer some energy efficiency programs to franchise customers who purchase electricity from RECs, for customers who purchase electricity from alternate suppliers no such programs are offered. While some RECs have established companies that offer energy efficiency services for a fee, and some independent energy service companies are also in existence, demand for these services has been limited. Numerous studies have documented that nonfranchise customers primarily choose electricity suppliers based on price, and not on additional services. Furthermore, nonfranchise contracts are typically only for one year; by the time the payback for energy efficiency savings kicks in, the customer might have found a new supplier (Holt 1995, Mickle 1994).

U.S. RESTRUCTURING OF ELECTRIC UTILITIES

In the United States restructuring of the electric utility industry to increase competition at the wholesale and/or retail levels is now being extensively debated. As of January 1, 1996, two states (Michigan and New Hampshire) have decided to proceed with limited experiments in which selected customers can purchase electricity from any provider and three additional states (California, Massachusetts and Rhode Island) have decided to proceed with full-scale restructuring of the electric utility industry. The first of Michigan and New Hampshire's experiments is scheduled to begin in April, 1996. In the states planning full-scale restructuring, current schedules call for allowing some customers to begin choosing electricity providers in approximately 1998. Thus, results from these reforms will not be available for several years.

However, some results are available for two more limited reforms introduced in the late 1980s and early 1990s. These reforms involve increased competition in the development of power plants and removing regulatory disincentives to utility-sponsored energy efficiency programs. In addition, the widespread perception that restructuring is imminent has already had some impacts that are worth summarizing.

Historically, generating stations in the United States were built by vertically integrated utilities that generate, transmit, and distribute electric power. In the 1980s a series of state and federal laws and regulations were enacted that permitted nonutility generators to build power plants and sell the power generated to local utilities and, in some cases, to nonlocal utilities. In addition, many states and utilities set up bidding systems in

which independent power plant developers competed to supply power to utilities. The result of these reforms is that in the 1990s nonutility capacity additions are projected to exceed utility capacity additions (EIA 1995c).

These reforms, combined with a number of other factors (such as slower growth in electricity demand, regulatory cost disallowances for large, expensive new power plants, passage of major strengthening amendments to the nation's principal air pollution law, increased availability of natural gas to utilities, lower natural gas prices, and technological advances that dramatically increased the efficiency of state-of-the-art gas-fired power plants) have also changed the types of new power plants that are built. Whereas large coal and nuclear plants predominated in the 1970s and early 1980s, by the 1990s the emphasis was on small, modular, high-efficiency, gas-fired power plants. For example, in 1992 coal accounted for 41 percent of U.S. installed generating capacity and gas and oil together accounted for an additional 31 percent of capacity. During the 1990-2000 period current estimates are that approximately 60 percent of capacity additions will be gas fired and less than 15 percent coal fired (EIA 1995c). This shift to improved efficiency gas-fired power plants has substantial environmental benefits. For example, while a typical new coal plant in the United States emits 0.23 kg of carbon per kWh generated, a state-of-the-art gas plant can emit as little as 0.09 tons of carbon per kWh.

In addition, the price of power generated by these new plants (including capital and operating costs) are often much lower than power from plants built 10-20 years ago, providing the potential for lower electricity rates in the future as the older, more expensive plants are depreciated. For example, the price of power from many of these new state-of-the-art gas plants is typically on the order of $0.04 per kWh (Baxter & Hirst 1995), less than half the typical price of power produced by the 1980s generation of nuclear power plants. As a result, the U.S. Energy Information Administration is projecting that electricity prices in 2000 will be 2 percent lower in real terms than in 1993 (EIA 1995c).

In the 1980s, government regulators and some utilities also became interested in using energy efficiency and load-management programs (collectively labeled "demand-side management"-DSM) to reduce the need for new power plants and the electricity bills of average consumers. However, many utilities were reluctant to implement these programs because these programs reduced electricity sales and, under then prevailing regulatory systems, reduced sales generally mean reduced profits. To address this problem, many state regulatory commissions adopted regulatory reforms to (1) reimburse utilities for revenues lost through energy efficiency programs, (2) decouple profits from sales, and/or (3) provide utilities with a share of the societal benefits achieved from the successful implementation of DSM programs. The details of these reforms are described elsewhere (see for example Nadel, Reid & Wolcott 1992). Evaluations on the impact of these reforms have found that these reforms generally had the desired impact—utilities affected by these

reforms have increased spending and savings from DSM programs (Baxter 1995; Nadel & Jordan 1992; Schweitzer & Young 1994).

The energy savings and environmental benefits of DSM programs in the United States have been substantial. Data provided by electric utilities indicate that in 1993 utility-operated DSM programs reduced electricity use by 44 billion kWh and reduced peak electrical demand by 40,000 MW (Hadley & Hirst 1995). If we multiply these electricity savings by the average carbon emissions in the United States from power generation (DOE 1994), then utility DSM programs reduced U.S. carbon emissions by about 7.6 million metric tons in 1993, about 0.6 percent of U.S. carbon emissions in 1993. While only some of these benefits are due to regulatory reform, the environmental benefits of regulatory reform have been substantial.

While DSM programs have had substantial energy-saving, environmental, and monetary benefits (e.g., the typical program has a benefit-cost ratio of approximately 2:1 [Nadel et al. 1994]), many of these benefits are at risk as restructuring of the electric utility industry takes place. Many utilities in the United States are responding to the threat of restructuring by cutting many expenses they consider to be nonessential. Among the areas receiving large cutbacks are utility DSM programs. An early 1995 survey of leading utilities found that while a few utilities were increasing DSM spending and savings targets, many more were reducing their spending and savings targets (Nadel, Geller & Pye 1995). This trend is likely to continue in the future.

Conclusions

The four case studies discussed above all provide useful insights into the impact of utility restructuring. While most of the reforms are still relatively new and thus their impacts have not fully evolved, and while many factors have coincided with the reforms that make it difficult to attribute causality, several trends are remarkably consistent across each of the case studies and worth bearing in mind as deregulation and restructuring are considered in other countries and regions. These trends are:

(1) Restructuring can lead to lower energy prices for consumers, particularly large consumers.

(2) Restructuring, combined with many other factors, can lead to increased use of natural gas relative to other energy sources. Since natural gas is less polluting than other fossil fuels, environmental benefits result.

(3) Lower energy prices in turn may lead to increased energy use, and to the added environmental impacts of increased energy use.

(4) In many cases energy efficiency initiatives have been scaled back following restructuring. In none of the case studies have utility or market-driven energy efficiency investments flourished following restructuring.

(5) In order to promote energy-saving investments, government action is needed, such as imposing a small transmission or distribution charge to fund public-benefit energy-saving programs (as in Norway and the United Kingdom) and/or to remove financial disinventives to utility pursuit of energy efficiency improvements (as in the United Kingdom and the United States).

ACKNOWLEDGMENTS

This study was funded by The Energy Foundation and the Joyce Mertz-Gilmore Foundation. Extensive assistance researching the material in this paper was provided by ACEEE Research Associate Miriam Pye. In addition, I would like to thank Ed Holt, Dan York, Jan Moen, Linda Taylor, Jan Hamrin, Tim Woolf, and David Moskovitz for contributing useful information for this paper. Thanks also go to Dan York and Ed Holt for helpful comments on the review draft.

REFERENCES

Baxter, Lester W. 1995. *Assessment of Net Lost Revenue Adjustment Mechanisms for Utility DSM Programs.* ORNL/CON-408. Oak Ridge, Tenn.: Oak Ridge National Laboratory.

Baxter, Lester W. and Eric Hirst. 1995. *Estimating Potential Stranded Commitments for U.S. Investor-Owned Electric Utilities*. ORNL/CON-406. Oak Ridge, Tenn.: Oak Ridge National Laboratory.

Braswell, Michael, Cynthia Cordova, Carol Mulholland, Roseann Ursino, and Susan Nathan. 1994. "DSM Lessons Learned in the Competitive Gas Industry." In *Proceedings: Delivering Customer Value, 7th National Demand-Side Management Conference,* 92-97. Pleasant Hill, Calif.: Electric Power Research Institute.

Coates, Simon. 1995. Memo to J. Sole' and A. Cohen dated June 23, 1995. ILEX Associates: Oxford, England.

DOE (U.S. Department of Energy). 1994. *The Climate Change Action Plan: Technical Supplement.* Washington, D.C.: U.S. Department of Energy.

Dunn, William. (Kema ECC, Inc.). 1995. Personal communication. Fairfax, Va.

EIA (Energy Information Administration). 1995a. *Monthly Energy Review: December 1995.* DOE/EIA-0035(95/11). Washington, D.C.: U.S. Department of Energy, Energy Information Administration.

EIA (Energy Information Administration). 1995b. *International Energy Annual 1993.* DOE/EIA-0219(93). Washington, D.C.: U.S. Department of Energy, Energy Information Administration.

EIA (Energy Information Adminstration). 1995c. *Annual Energy Outlook 1995.* DOE/EIA-0383(95). Washington, D.C.: U.S. Department of Energy, Energy Information Administration.

Electric Association. 1995. *UK Electricity '94.* London, England: Electric Association.

Feingold, Russell A. and John W. Little. 1994. "DSM Program Selection Under Order No. 636: Effect of Changing Gas Avoided Costs." In *Proceedings of the Fifth National Conference on Integrated Resource Planning,* 168-192. Washington, D.C.: National Association of Regulatory Utility Commissioners.

Haaland, Hans Otto and Harold Wilhite. 1994. "DSM and Deregulation: Experience from Norway." In *Proceedings of the ACEEE 1994 Summer Study on Energy Efficiency in Buildings*, 6:101-6:110. Washington, D.C.: American Council for an Energy-Efficient Economy.

Hadley, Stanley and Eric Hirst. 1995. *Utility DSM Programs from 1989 Through 1998: Continuation or Cross Roads?* ORNL/CON-405. Oak Ridge, Tenn.: Oak Ridge National Laboratory.

Hewitt, David C. and Armond Cohen. 1994 "Residential DSM Program Design in the United Kingdom." In *Proceedings of the ACEEE 1994 Summer Study on Energy Efficiency in Buildings*, 4:93-4:100. Washington, D.C.: American Council for an Energy-Efficient Economy.

Holt, Ed. 1995. *Energy Efficiency in a Restructured UK Electric Industry.* Gardiner, Maine: The Regulatory Assistance Project.

Mickle, Craig. 1994. "Energy Efficiency in the Competitive UK Supply Market." In *Proceedings of the Fifth National Conference on Integrated Resource Planning*, 626-635. Washington, D.C.: National Association of Regulatory Utility Commissioners.

Moen, Jan. 1995. *Regulation and Competition Without Privatization: Experiences from the Norwegian Electric Supply Industry*. Oslo, Norway: NVE Norwegian Water Resources and Energy Administration.

Nadel, Steven, and Howard Geller. 1995. *Utility DSM: What Have We Learned, Where Are We Going?* Washington, D.C.: American Council for an Energy-Efficient Economy.

Nadel, Steven, Howard Geller, and Miriam Pye. 1995. *DSM Under Attack: Are Utilities Overreacting to the Threat of Retail Wheeling?* Washington, D.C.: American Council for an Energy-Efficient Economy.

Nadel, Steven, and Jennifer Jordan. 1992. "Does the Rat Smell the Cheese? A Preliminary Evaluation of Financial Incentives Provided to Utilities." In *Regulatory Incentives for Demand-Side Management.* Washington, D.C.: American Council for an Energy-Efficient Economy.

Nadel, Steven, Jennifer Jordan, Christopher Holmes, and Kevin Neal. 1994. *Using DSM to Help Meet Clean Air Act Targets: A Case Study of PSI Energy.* Washington, D.C.: American Council for an Energy-Efficient Economy.

Nadel, Steven, Michael Reid, and David Wolcott. 1992. *Regulatory Incentives for Demand-Side Management.* Washington, D.C.: American Council for an Energy-Efficient Economy.

Schweitzer, Martin and Timothy R. Young. 1994. *State Regulation and Its Effects on Electric-Utility Use of DSM Resources.* ORNL/CON-391. Oak Ridge, Tenn.: Oak Ridge National Laboratory.

York, Dan W. (MSB Energy Associates). 1995. Personal communication. Middleton, Wis.

York, Dan W., and Armond Cohen. 1994. "Utility Deregulation and Retail Wheeling: The Stakes for IRP and DSM." In *Proceedings of the ACEEE 1994 Summer Study on Energy Efficiency in Buildings,* 6:262-6:271. Washington, D.C.: American Council for an Energy-Efficient Economy.