DSM and Deregulation: Experiences from Norway

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The Norwegian government put a new Energy Act into place on January 1, 1991 which has gone further than perhaps any other country in deregulating the electricity industry. The Act created a market-based system with open competition in both production and sale of electricity. The primary motivation for the deregulation was to stimulate greater efficiency in the electricity industry, which consists of a large number of utilities with monopolies in their service areas. A consequence of the deregulation has been reduced interest in DSM, both on the part of the government and the industry. In this paper, we discuss the consequences of deregulation for DSM activity in Norway. Since 1991, utilities have been more interested in capturing market shares than in encouraging DSM. New actors have appeared on the scene, traders and brokers of electricity, who have contributed to driving the price to large customers down by as much as 25%. At the same time, the small captive customers (households and small businesses), have seen their prices rise on average about 3%. DSM activity in the electric utilities has been drastically reduced, by at least 50%. Those who have formerly worked in energy conservation offices are being moved into sales and marketing offices. At the same time, the government is withdrawing from the DSM playing field. It has removed from the law the requirement that utilities adapt IRP as a planning method. It has reduced pressure on utilities to engage in DSM, opting to set up separate regional energy conservation centers to take over DSM activities. It has significantly reduced funding of its own energy conservation programs. The Norwegian consumer has been abandoned to do energy conservation without access to incentives or good information on DSM options. We argue that a healthy DSM activity in Norway will require the active re-engagement of both government and energy utilities.

Introduction

The Norwegian government put a new Energy Act into place on January 1, 1991 which has gone further than that of any other country in deregulating the electricity industry (the name “Energy” Act is a bit misleading, since the law applies primarily to the production, distribution and sale of electricity). The primary motivation for the new Act was to stimulate efficiency in energy utilities through deregulation and increased competition (most energy utilities are in reality electric utilities—a few engage in district heating). The deregulation came at a time of increasing interest in demand side management (DSM) in energy utilities. Increasing electricity demand in Norway in the 1980’s, coupled with restrictions on building new hydropower plants and a requirement in the previous energy law which made the utility responsible for delivery of every kWh demanded, lead to DSM efforts by some of the larger energy utilities.

Throughout the 1980’s, the government put pressure on all utilities to develop DSM programs. Government intervention stemmed partly from a goal of promoting a more rational use of energy resources, but also from increasing international attention on global environmental problems related to energy use. The most influential report of the 1980’s was that of the United Nations Commission chaired by the Norwegian Prime Minister, Gro Harlem Brundtland (popularly called the Brundtland report). It contended that 60% reductions in energy use in developed countries would be necessary over the next half century if we were to avoid a global climate disaster.

The Norwegian government was compelled to start looking for ways to follow up on the challenge of its own leader. This was one of the reasons why the Norwegian Ministry for Industry and Energy (NOE) mandated Integrated Resource Planning (IRP) for energy utilities in the same Energy Act in which it deregulated the industry. Thus on the one hand, the Energy Act encouraged a deregulated, market-based system with open competition and separate production and distribution utilities; and on the other hand, IRP and DSM. Within a year after the Act was in place, government officials were sending signals to

the electric utility industry that IRP was no longer deemed compatible with a deregulated electricity market (Wilhite and Ling 1992a). The government's requirement for utility IRP was removed in 1994 and the clauses pertaining to DSM weakened.

In this paper we discuss the Norwegian experiences with DSM after deregulation. We discuss developments in the electric utility industry, the government and the marketplace in the intervening three years since the Energy Act of 1991. These developments should be of interest to government authorities, utilities and consumers in the growing number of countries which are considering some form of deregulation of the electricity industry.

Background on the Norwegian Electricity Industry

The history of the Norwegian electricity supply industry is the history of hydro power development. Virtually all of Norway's electricity (99.6%) is hydro based. Over the last century, an industry has emerged which consists of 350 electricity utilities spread over the length and breadth of Norway. There is a mix of public and private utilities. Many utilities are owned by local counties. Statskraft, the Norwegian government utility, is a dominant producer, accounting for about 30% of the total production capacity. As Figure 1 shows, the majority of the utilities are small—77% have less than 10,000 customers.

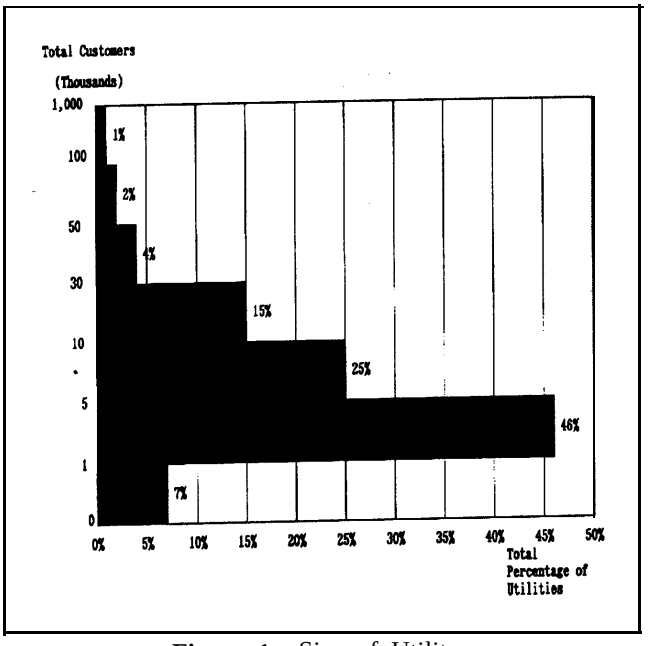

Figure 1. Size of Utilites

There are around 600 hydro power plants with a total capacity of about 27,000 MW. The annual production ranges from 90 to 125 billion kWh, depending on rainfall and climatic conditions. Only China, Japan, Brazil, Canada and the United States have greater hydropower capacity.

Norway's domestic consumption totals some 92 billion kWh per year, with a maximum load estimated at 17,900 MW. This represents the world's highest consumption of electricity per capita, more than 20,000 kWh per person (Figure 2):

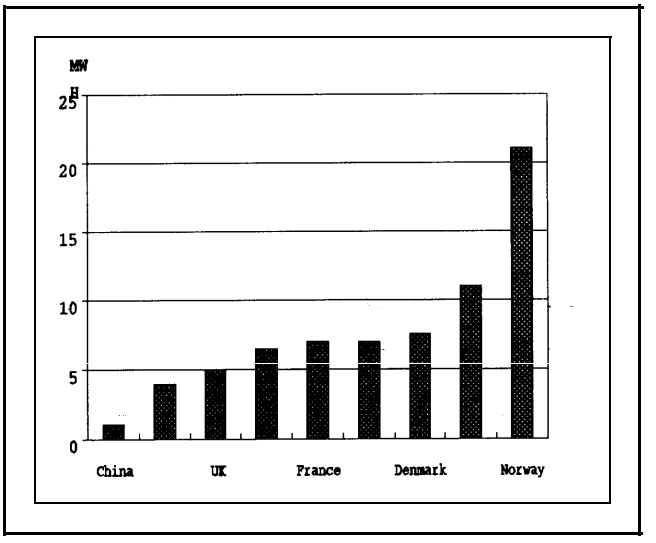

Figure 2. Comparison of Consumption of Electricity

This high consumption is due partly to an electricity intensive industry (i.e., metals and paper) and partly to a history of comparatively low prices and a cold climate. The high per capita consumption is one indication of a high energy savings potential. The last time the technical electricity savings potential was published in an official government document, the energy conservation "White Paper" of 1988, it was estimated to be 19%.

Prior to 1991, the large regional energy utilities had legal responsibility to meet the electricity demand in their region. Some of these utilities were purely production utilities which delivered to distribution utilities in a given area, and others were vertically integrated utilities which produced and distributed to end-users. Distribution utilities had monopolies on sales to customers in their respective regions. The energy utility set the price for electricity based on its "average costs". The costs given primary consideration were production costs (for those companies which owned hydro power plants) and the costs of purchasing electricity through bilateral contracts or from Statskraft. Statskraft prices were set by the Parliament.

Energy utilities were considered to be producers and deliverers of a public good. The communities which owned their utilities enforced a non-profit principle. Local politicians played a central role in energy policy. Two

ways they exercised their authority were by reducing price gaps between urban and rural areas, and between end-users. In terms of influence on the utility's approach to DSM, public ownership had both positive and negative influences. In many rural communities energy conservation was seen by politicians as a stumbling block for local industries which provided jobs and income, while in a few urban areas, environmental and consumer interests prompted politicians to press the utilities to do more energy conservation. A good example of the latter was in Oslo, where the community mandated a fund be created and used by the utility to finance energy conservation programs.

The legal responsibility to supply every kWh demanded in their region made it essential for utilities to develop prognoses for future demand. These prognoses were difficult because of, large swings in both supply and demand due to annual variations in rainfall and temperature. They tended to incorporate a healthy margin of error. This contributed to predictions throughout the 1960's, 70's and 80's that demand would outstrip supply by large amounts. The electricity industry used these prognoses as a rationale for building power plants. This production-oriented policy became controversial in the 1970's due to growing awareness of the environmental and social consequences of darning river basins. Two large projects in the 1970's, at Mardoela and Alta, led to major conflict between environmentalists and the government. By the 1980's, the Parliament enacted a protection plan for the remaining untouched valleys and river basins.

Government DSM Policy and Activity in the 1980s

Environmental considerations were one reason for the government's increasingly positive attitude to DSM in the 1980's, evidenced in regulations, policy papers and programs. Another important factor was increasing international attention to resource conservation issues. Norway's Prime Minister Brundtland was a member of a number of international commissions which called for reduced energy use in developed countries. The government increased funding to its own programs for encouraging energy conservation among end-users. In addition, it funded research on energy efficient prototypes and demonstration projects in order to speed up the diffusion of energy efficient technologies. At the same time, it pressured energy utilities to engage in DSM. Every utility was encouraged to have an "Energy Plan," which included a strategy for implementing energy conservation programs.

The government's view of its single most important DSM-related strategy for the electricity industry was vertical integration of production and distribution utilities (Borg et al. 1989). Every energy conservation "White Paper" in the 1980's encouraged utilities to vertically integrate. The thinking behind vertical integration was very similar to the logic behind IRP, namely that it would create an organizational unit for which it would pay to weigh programs to reduce demand (energy conservation and load management) against projects to build new hydropower plants. It was thought that it was more likely that utilities which had economic responsibility for both supply and demand would make such "balanced" judgments. In fact when the IRP concept arrived in Norway around 1989, IRP was translated as the "balanseprinsippet."

This goal of vertical integration was not only based on theoretical ruminations, but also on an assessment of utility DSM activity in the 1980's. It was the vertically integrated utilities which had most aggressively pursued DSM. In fact, very few distribution utilities showed any interest in DSM. DSM was perceived by them as doing nothing more than reducing sales (Ljones et al. 1991). Of course the government did not see DSM as the only reason for vertical integration. Another goal was to reduce the number of electric utilities in Norway, which was seen as important to reducing waste and inefficiency.

The New Energy Act of 1991

The New Energy Act was passed by the Parliament in the summer of 1990 and took effect January 1, 1991. The Energy Act contained several dramatic changes in the way in which electricity was distributed and sold. The most fundamental changes were increased competition and the removal of price controls. The Act established open competition in both production and sale of electricity. Administration of the transmission net was kept as a monopoly, but the regional utilities which were granted concession to operate the net were required to allow access to any party desiring to use the net to transmit power.[1]

In 1993 Statnett, a state owned company, took over the administration of the power market through a subsidiary company, Statnett Marked.[2] The market consists of a futures market, a spot market (hereafter power pool) and a regulation market, which is supposed to insure balance between production plans and offtake by customers. The most important market is the power pool. It is a day-ahead market which consists of freely-determined bids and offers for combinations of prices and quantities across five periods of each week day and three periods on week-ends.

Spot prices are set for pool participants in a given time period, and all participants are informed of the spot price for the upcoming day. Both distributors and end-users of electricity can purchase power in the pool. They can also enter into bilateral agreements at mutually agreed on prices.

The national transmission of electricity is administer by Statnett. It awards concessions to utilities for building and operating portions of the net. Prices charged to independent actors who use the net are controlled by the Norwegian Water and Power Authority (NVE). The utilities must calculate their transmission tariff based on guidelines from the authorities. NVE approves the tariffs on the basis of costs documented in the annual accounts. NVE has defined a standard for the transmission tariff based on grid voltage, the amount of kWh, the capacity in KWs and a fixed amount,. NVE is also responsible for controlling that a given utility does not cross-subsidize its production or sales of electricity from transmission fees. There is. supposed to be strict separation between a utility's net monopoly and its buying and selling of power.[2]

The government's pre-1991 goal of vertical integration of electric utilities was reversed in the Energy Act. The Act encouraged electric utilities to reorganize into separate production and distribution companies. Ironically, at the same time the government was reversing its view on vertical integration, it mandated that utilities plan according to the principles of IRP. The Energy Act sent contradictory messages to the electricity industry: on the one hand, utilities should break up into production and distribution entities and set prices as they saw fit; on the other hand, they should do integrated planning, with its implicit requirement for DSM.

Post-Energy Act DSM in Electric Utilities

The Energy Act set in motion a number of new developments in the electricity industry. In order to understand the context for developments in DSM, we first provide background on other important developments: competition among energy utilities, new actors in the market place, and price developments. We then discuss the fate of DSM and IRP.

Competition Among Energy Utilities

Most energy utilities were slow to respond to the new competitive environment. Many were awakened to the seriousness of the change when they began losing their big customers to competitors. By the summer of 1992, the competition was very tough. Large users realized that they could save significant amounts of money by shopping around for new short term contracts for power delivery. These contracts involved low risk because of a prognoses for relatively stable low prices in the power pool. The first to take advantage of this buyer's market were large private companies such as nationwide hotel and grocery chains, small public distribution utilities and government-owned companies such as the telephone company (Televerket) and the military.

Production utilities were hurt in the transition after 1991. Many had problems in renewing existing sales contracts, while at the same time the demand was down in their service areas due to mild winters in 1991/92, 1992/3. The low prices in the power pool meant that many producers had to sell electricity at considerable losses. The same was true of Statskraft, which lost 1.2 billion nkr ($147 million) in 1992 and 518 million nkr ($69 million) in 1993.

New Actors in the Market Place

There are two kinds of new actors which have made an impact on how the market for electricity works: "traders," which act as buyers and sellers of power in the same sense as established utilities; and "brokers" which bring buyers and sellers together. These new actors have a significant advantage over the established utilities—they are not bound by old and often unprofitable long-term contracts, nor are they burdened with high overhead or unwieldy organizational structures. They have been able to set up their organizations without the need for investment in other than experienced people (largely former utility employees).

In 1993 there were 10 traders operating in the market which stood for sales of around 2 billion kWh, 2% of the total electricity sales in Norway. The six brokers which were active in the same period brokered 3 billion kWh, about 3 % of the total sales. Both traders and brokers have been most active in the larger cities. It is estimated that in Oslo they controlled about 10% of the total sales. These new actors have put tremendous pressure on the established utilities, forcing the pace of competition and forcing prices down.

Price Developments

Prices in the power pool have set the standard for price developments in the other markets and for bilateral contracts. About 15% of the total sales of electricity in 1993 were accomplished through the power pool. In the summer of 1993, the average price was about 4 oere/kWh ($.005), while the winter price varied from 8-12 oere/kWh ($.01-.015). Prices in the contract market have followed prices in the power pool. Those contracts which have been renegotiated after the Energy Act went into effect have resulted in price falls of on average 25%.

Industrial clients which have renegotiated their electricity contracts have achieved prices which are 18% below the standard price, while those which have shifted to new suppliers (utilities or traders) have achieved price reductions of 26% (Johansen 1993).

The experience for residential customers and small businesses is quite different, since they are in effect captive customers of the local distribution utility. A transaction fee of 5000 nkr ($675) has made market participation prohibitive for small users (the fee was adjusted to 4000 nkr [$575] from April 1, 1994). Their kWh price has remained fairly constant, but an NVE survey has shown that the final price paid by households increased on average 3.8% from January 1992 to April 1993. These increases can be attributed to increases in government surcharges, which consist of an electricity tax and a value added tax.

Pool prices in the winter of 1993/4 have doubled from the previous winter to around 25 oere/kWh, due to a cold winter and lower precipitation that normal. At the time of the writing of this paper (March 1994), pool prices have jumped to 44 oere/kWh.[4] In one sense, the artificially higher price might stimulate energy conservation, but the incentive is offset by price instabilities of the past year, which increase the uncertainty of the profitability of energy conservation investments.

Utility DSM Activity

We discussed above the pre-1991 interest in DSM in the large energy utilities. By 1990, about 300 person-years were devoted to DSM in Norwegian energy utilities. This constitutes about 2% of the total person-years used in the industry. In the period since the Energy Act went into effect, utilities have been much more interested in selling electricity than in promoting DSM. Energy conservation staff in many utilities have been moved to marketing or sales divisions. The number of person-years dedicated to DSM in 1993 was officially around 150 person-years, a figure. which is misleadingly high, since utilities have begun to classify almost all forms for customer relations as DSM. Utility evaluations done in 1990, 1991 and 1992, all showed a waning interest in DSM (Wilhite et al. 1991; Wilhite and Ling 1991; Wilhite and Ling 1992). Oslo Energi, one of the more aggressive pursuers of DSM in the 1980's, has reduced its energy conservation staff by one third. And why not, since the utility's economic motive for DSM had been eliminated? DSM is now classified by utilities as an investment in lost sales. This is particularly true for distribution utilities, for whom reduced sales are not balanced by avoided costs of new production.

Utility Interest in IRP

The utilities which had shown an interest in IRP in the 1980's quickly lost interest after 1990, when the basic elements of the new Energy Act became known (Wilhite et al. 1991). The removal of the requirement for a utility to have the capacity to meet any future increase in demand, coupled with the deregulation of price and the break up of utilities into production and distribution units, removed the logic for utility IRP.[5] By 1992, those utilities which had attempted to adapt the IRP method to Norwegian conditions had given up.

Response of the Government

To Diminishing Energy Utility Engagement in DSM

Government actions since 1991 have exacerbated the withdrawal of energy utilities from DSM. In 1994 the clause in the Energy Act which mandated that energy utilities plan according to the principles of IRP was removed. The original paragraph (3-6) said:

> In the preparation of its energy plan, the utility applying for a concession (to either build new production or transmission facilities) must evaluate both supply and demand side alternatives . . . . The energy plan should contain a description of the planned energy conservation initiatives for both its customers and in its own facilities . . . . The costs of energy conservation initiatives should be given the same weight as the cost of new power plants or other supply-side solutions (the balance principle) (NOE 1990).

The new paragraph 3-6, published in 1994, consists of one sentence: "The utility applying for a concession is required by NVE to participate in energy planning projects in its service area." This change signaled to energy utilities that "balanced planning," with its implicit emphasis on DSM for meeting future electricity needs, was no longer necessary.

A second change in the Energy Act reinforced the changed government attitude to DSM. In the 1991 law, the paragraph laying out energy conservation requirements, 3-7, read as follows: "The utility applying for a concession must have sufficient knowledge on the energy conservation potential in its service area to be able to evaluate and put into place energy conservation initiatives as alternatives to other supply-side options." This paragraph was amended in 1994 to read "The utility applying

for a concession shall encourage effective utilization of energy resources through neutral information and advice on energy conservation to customers in its service area. " Separate guidelines specify the kinds of "neutral" information intended. The utility should be prepared to provide on request from a customer: an energy audit; an overview of available energy conservation programs; data on how a given customer's energy use compares to average use; historical energy use information. These changes imply that DSM is no longer seen by the government as a necessary part of strategic planning. Also, the kinds of initiatives that a utility is required to put into place have been reduced to information-on-request. The latest Energy Conservation White Paper (NOE 1993:33) also openly acknowledges the low government expectation for utility participation: "The utilities have only a limited economic motivation to use special policy instruments to carry out efficiency for end-users."

Finally, in a policy appraisal published by NVE in May of 1993, NVE concluded that "In the current system for production and sale of electricity, the connection between energy conservation and postponement of the building of new power plants has been weakened for the individual energy utility" and that "in today's power system energy conservation will have a limited effect in preventing the building out of even the most valued river valleys (Greve and Meland 1993)."

The government has put two policy measures into place to compensate for the waning DSM activity in energy utilities:

- the creation of a transmission tax earmarked for energy conservation information.
- the creation of independent regional energy conservation centers.

The transmission tax was established in 1993. Every kWh which passes through the distribution net will be assessed .002 nkr ($.00027). The money can be used by the energy utility "to finance the information activities laid out in the Energy Law's new paragraph 3.6. While some tax is better than no tax, the miniscule size of the tax in relation to the sales price for a kWh will not likely be enough motivate utilities to engage in DSM.

An example from Oslo illustrates the problem. In a recent study of electricity billing information conducted with a large sample of Oslo residences (1400), groups which received better information saved 10% of their electricity use as compared to a control group which received standard bills (Wilhite et al. 1993).[6] If the billing system were to be put into place in Oslo, the total savings to all Oslo residential customers would be 33.7 gWh per year, corresponding to 122 million nkr ($16 million), at a cost to the utility of only about 23.7 million nkr ($3.2 million). Since the total electricity demand in the residential sector in Oslo in 1992 was about 337 gWh, the sum of the transmission tax for that year dedicated to residential customers would have been 674,000 nkr ($91,000). According to the tax guidelines, this tax income could be used to offset the cost of the billing information, but that far from compensates for the $16 million in lost sales. Why would Oslo Energi want to do the project at all when it would result in huge losses?[7] The tax is not enough to correct the economic disincentive of doing DSM in the new deregulated environment. Since distribution utilities do not suffer the consequences of the high marginal cost of new electricity production and therefore have no incentive to reduce demand. In fact, utilities may even be tempted to divert the tax money to other activities, something which it will be difficult for the authorities to control.

The government has called for the establishment of "Regional Energy Conservation Centers" to take the place of utilities in providing DSM services. These are semi-private companies which will sell energy conservation services to consumers. The centers will receive some government support in the form of a 0.5 million nkr ($67,500) founding grant. They will have access to the transmission tax in those cases in which utilities decide to contract out their information services to the center. It is acknowledged by the government that these Regional Centers will have to secure additional income if they are to survive (only a few Centers have been planned to start-up this year and none has yet been established).

Post 1991 Changes in Government Programs

At the same time that the Ministry is lowering its DSM ambitions for utilities, it is also reducing its own engagement in energy conservation. In 1992 and 1993 it dramatically cut its energy conservation budget and its programs directed at providing energy conservation incentives to industry and other sectors (Figure 3).

In 1994, the government plans to totally eliminate its three largest energy conservation programs: subsidy programs for energy conservation projects in all end-use sectors; support for development of alternative energy; and subsidies for the development of energy efficient prototypes. The argument is that subsidies are a waste of money due to the so-called "free rider" effect: those who use energy conservation subsidies would have accomplished the projects anyway (NOE 1993). We have argued that this free rider effect has been overexaggerated in government's assessment (Haaland et al. 1993).

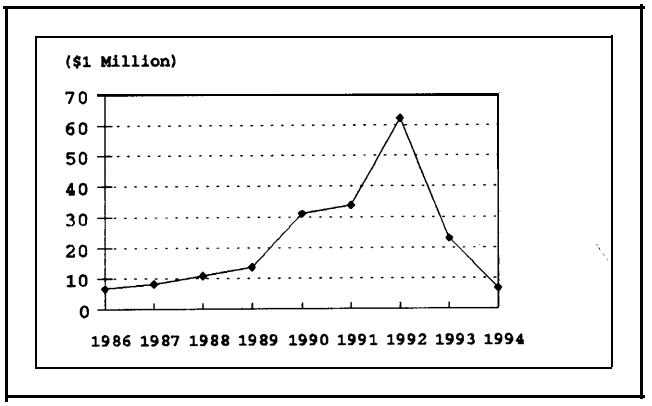

Figure 3. The Energy Conservation Budget

In the past NOE has supported programs to provide energy conservation information to consumers. In recent years much of the information activity has been accomplished by Opplysningsaksjonen for Energioekonomisering OFE), an organization created by NOE for that purpose. In 1993, OFE was converted to a private company. It still receives project funding from the government, but NOE's government support will likely decrease in the coming years.

The change in government attitude to its DSM involvement is reflected in organizational changes at both NOE and NVE since 1991. NOE's Energy Conservation Section has been eliminated-it no longer has a unit focused solely on energy conservation. The number of person-years dedicated to energy conservation have been reduced by about 50% in both NOE and NVE.

The post-Energy Act govermnent attitude is reflected most candidly in the following quote from NVE's policy analysis of 1993: "Our analysis shows that the need for government energy conservation efforts as a part of national energy policy is reduced after the new Energy Law... In a national perspective, energy conservation will be an ineffective initiative for reducing the building of power plants or reducing air pollution. A general energy conservation activity directed at the demand-side will therefore not be an effective environmental policy instrument (Greve and Meland 1993)."

There is an underlying attitude reflected in this and other recent policy documents that hydro-based electricity is environmentally benign, making electricity conservation unnecessary from an environmental point of view. There are two problems with this attitude. The first is that while hydro is clean in this sense that production does not lead to emissions or nuclear waste, power plants still have significant effects on the flora and fauna in the valleys and drainages which they affect. Avoiding new plants should still be a high environmental priority from a national point of view. Secondly, in a regional perspective, saving electricity in Norway, coupled with increased export, would make hydro-based electricity available in Europe and the former Soviet States, where it has the potential to replace environmentally problematic fossil fuel and nuclear energy production.

Would a Capacity Crunch Spur DSM in the Deregulated Market Place?

The experience after 1991 is that the Norwegian government and utilities have abandoned the energy user to make energy consumption decisions without access to incentives and programs which encourage energy efficiency. Unfortunately, 20 years of experience in promoting energy conservation shows that both the market and consumers need help if energy conservation is to happen. One reason is that the playing field is not level; i.e., while conservation always pays off for the society, for the customer a conservation purchase takes money and the payback takes time. Reduced energy operating costs will eventually pay off the investment, but experience shows that customers balk at paybacks as short as 2-3 years (Ljones 1992). They need help over that initial hump, in the form of subsidies and/or cheap loans.

Another disadvantage for the customer is that he, she or it, in the case of a commercial enterprise, do not have sufficient information to make optimal energy choices. Study after study has affirmed that people are very often not well informed about energy prices, their own energy costs, or the energy-use characteristics of the choices they are considering (i.e., the relative efficiencies of new refrigerators) (Ling and Wilhite 1992). Even in those cases where people are motivated to reduce their energy consumption, whether it be for economic, ecological or other reasons, experience shows that they often do not choose the most efficient strategies (Kempton et al. 1984; Owens and Wilhite 1988). As an example, in a Norwegian home, people tend to focus on lighting (responsible for 15% of an average home's energy use), instead of heating (responsible for 60%) (Wilhite and Ling 1992).

Finally, people are concerned about much more than price in their home energy decisions. Comfort, convenience and status are some of the other important factors which go into what is essentially a social, not a purely economic choice (Lutzenhizer 1993). Even in a world consisting of environmentally correct prices and perfect energy price information, price rises alone will never capture the huge energy conservation potential which exists in Norway's residential sector.

The economists who wrote the new Norwegian Energy Law have argued that in a competitive environment, the utility's DSM incentive will be generated by customers

who will shop for the best energy conservation services in their choice of supplier (NOE 1990; NOE 1993). Experience to date is that this is not happening. Customers are mainly shopping for the lowest price, not for energy conservation services. The fringe benefits they are most interested in are stable, long term contracts with good price conditions (Johansen 1993). We question whether higher prices would alter this situation much.

If the recent instability in price becomes the norm, this will further discourage investment in energy conservation. Price instability reduces interest in energy conservation among large users because it increases the uncertainty of the profitability of energy conservation investments. It is also a disincentive to the kind of third party investment in energy conservation envisioned for the regional centers.

Conclusions

Norwegian deregulation has removed the IRP and DSM incentives for utilities. At the same time, regulatory pressure on energy utilities to engage in DSM has been weakened and the government has reduced its own energy conservation programs directed at both consumers and R and D. After 3 years, the "invisible hand" of the market has not pushed either consumers or Energy Utilities to engage in DSM. Perhaps a dramatic rise in prices would motivate consumers, but even should that happen, their efforts would not likely be either substantial, efficient or sustained in the absence of incentives and information. In the meantime, DSM competence and infrastructure are quickly draining away.

Norway is counting on the price signal, regional energy conservation companies and a small energy conservation tax on each unit of transmitted power to drive energy conservation activity. We have reservations as to whether this strategy will make a significant impact. Our strongest doubt is that DSM can be accomplished without the participation of energy utilities. Experience in recent years in North America shows that it is possible for energy utilities to remake themselves into "energy service companies" in whose interest it is to sell DSM. But this is happening in an environment in which it is in the interest of the utility to minimize the customer's energy bill, not the energy price.

In a deregulated system, competition motivates the utility to be more efficient in production and transmission, where it realizes the economic advantages of greater efficiency, but not behind the customer's electricity meter, where it does not. Energy conservation equals lost sales in the minds of the deregulated utility executive and that will be an equation that is very difficult to change in any other way than some form for partial "re-regulation" of the demand side of the electricity industry. To date the debate in Norway has centered on how to best make the market work. It is time for a thorough government assessment of the post-Energy Act changes in DSM activity in Norway, and a serious discussion of how to make DSM work.

Endnotes

1. The Energy Act did not privatize energy utilities. The ownership mix of public and private utilities has not changed much after 1991.

2. A customer who purchases electricity from a utility other than the transmission utility serving his/her area can choose one of two ways of arranging his/her contract:
   (1) The customer can have one contract with his energy supplier which includes both the energy price and the transmission price. In this case the supplier makes a transmission contract with the local utility and the customer receives only one invoice.
   (2) The customer can make one contract with the local utility concerning the transmission price and one contract with the energy supplier. In this case the customer receives two invoices.

3. Statnett's neutrality as manager of the market is being called into question by a number of actors in the market place. There has been a debate over whether or not an independent market should be created, and in fact three competing markets are planned to be established this spring (1994).

4. This price increase is mysterious, since only 20% of the power import capacity from Sweden and Denmark, which would normally be used to offset such a high price, is being used. This has lead to speculation that the market price is being manipulated by special interests. Adding transport costs and government surcharges to a price of 44 oere/kWh yields a final price to the end-user of around 80 oere/kWh. It is hard to believe that such a price would be accepted in Norway given that the price of production is so low. Evidently the theory that the marginal price for production will be reflected in the sales price for electricity, and will thereby give the correct for DSM, is not working.

5. According to the new regulations, a distribution utility must allow anyone who applies to connect to the net and must supply them with electricity on a commercial basis (at the market price or at a mutually agreeable price). No utility, however, has responsibility for insuring that there is enough capacity to meet future demand.

6. Three experimental groups were established. One received a simplified bill at a greater frequency (6 times per year for actual use as opposed to 1), one received a more frequent bill with a graphic comparing the current and previous year's consumption, and the third received the more frequent bill, the graphic and energy savings tips.

7. Oslo Energi would nonetheless be more motivated than most distribution utilities. In 1992 the formerly vertically integrated utility was separated into production and distribution companies under a parent corporate structure. Each division is a separate fiscal unit, but DSM programs are at least still theoretically profitable for the corporation as a whole. Most Norwegian distribution utilities buy from suppliers (or the pool) and sell to customers. They achieve absolutely no economic benefits from DSM.

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