

Value-Added Services in the New Swedish Electricity Market

*Lars J. Nilsson, Department of Environmental and Energy Systems Studies,
Lund University, Sweden*

ABSTRACT

The experience from electricity market reform in Sweden is reviewed and new approaches to promote improvements and investments in energy efficiency and renewable energy are discussed. On the first of January 1996 a new Swedish Electricity Act went into force, making it possible for consumers and retailers of electricity to choose between competing suppliers. Introducing competition fundamentally changes the prospects for utility driven DSM. The main motivation for utilities to continue DSM-activities in markets with competition is that there may be customer demand for such services and that DSM therefore could be used to retain customers and attract new ones. Among utilities that have actively worked to attract new customers only a few have concentrated on low-price bulk sales whereas others, although competing on price, in addition offer a variety of value-added services as part of the business strategy. Early experiences from Sweden show that there is a market for value-added services and that energy efficiency is one important component. Examples of energy efficiency products and services offered by Swedish utilities are presented here. Production specified electricity is another value-added service for which there is a beginning market. The early market experience from environmental labelling of electricity in Sweden is reviewed.

Introduction

The energy industry, in particular gas and electric utilities, has developed as state controlled or regulated monopoly enterprises in most countries. Present electricity systems are based on institution building around fossil fuels and ever larger-scale steam turbines during the last century. Efforts have historically concentrated on meeting an increasing demand for kilowatt-hours. However, during the last two decades many utilities, notably in the United States and primarily driven by regulation, have increased their efforts to help customers get more energy efficient through what has become known as demand side management (DSM) programmes. This has in most cases been in the best interest of the energy end-users who could get the same amount of energy services at a lower total cost. Least cost planning (LCP) or integrated resources planning (IRP), both of which include DSM programmes as a key element have been mandated in many parts of the United States.

While recognizing some of the difficulties, DSM programmes have become better over time and on balance been an overall success. Data for the United States provided by electric utilities indicate that utility operated DSM programmes reduced electricity use by 52 TWh and had the potential to reduce peak demand by 43 GW in 1994 (EIA 1996). In addition to the environmental and social benefits of these savings, a vast body of knowledge about different types of energy efficiency programmes and their implementation has been built up. Many utilities in North America are now responding to the prospect of increased competition by cutting what are considered non-essential expenditures, including DSM programmes (Nadel et al. 1995). Nevertheless, the knowledge gained from DSM programmes about the end-use side may prove to be a valuable asset in a more customer-oriented and competitive electricity industry.

DSM programmes are more recent in Europe and have not been as widely implemented in Europe as in the United States. By one estimate, 666 utilities in the United States spent more than 2 billion U.S. dollars on over 2,300 DSM programmes in 1992 (Levine et al. 1995). The extent of European DSM activities is not as well known and most countries have not developed any comprehensive database on DSM programmes or evaluation results (Vine 1996). A rough estimate is that about 600 utility operated DSM programmes were carried out in 1994 (UNIPED 1994). For comparison, total electricity consumption in the United States and Europe in 1993 was 3,175 and 4,081 TWh, respectively (UN 1995). One explanation for the relatively limited spread of utility DSM programmes in Europe is differences in utility culture and regulatory tradition compared to the United States. The relatively few utility DSM programmes that have been undertaken in Sweden have mostly been decided on by politicians represented in the boards of publicly owned utilities.

Electricity markets, and to some extent gas markets, are subject to reform in many countries. The reforms aim at introducing competition between suppliers and opening up markets to new entrants. An important argument for such reforms is that they will result in increased economic efficiency, more flexible contracts, and lower electricity prices. Electricity market reforms have also been facilitated by the development of new technologies, e.g., small scale power plants and information technology, which allow for more flexibility and less centralized market structures. However, separating the electricity generation and trade business from the transmission and distribution business, a key measure to introduce competition, fundamentally changes the prospects for utility driven DSM. The effect of market reform on energy efficiency and DSM is debated (see e.g., Haaland & Wilhite 1994; Hamrin et al. 1994; Prindle 1996; Swisher 1994). A 1994 review concluded that implementation of energy efficiency in Norway and United Kingdom dropped as a result of the reforms (Hamrin et al. 1994).

Methodology

The experience from the Swedish electricity market reform is reviewed and utility efforts to market energy efficiency in the competitive electricity market are discussed. In the preparation of this paper, representatives from several utilities were interviewed in order to explore their experience from the new electricity market and how they have chosen to include, or not include, energy efficiency and other value-added services in their marketing. The utilities include four of the largest generators: Vattenfall, Sydkraft, Gräninge, and Stockholm Energi; and one large municipal distributor (Göteborg Energi), that is essentially without its own generation. Discussions have also been held with representatives of several small utilities. Examples presented below are also based on marketing and information materials from several utilities.

Electricity Supply and Demand

Electricity production, in total 136 TWh in the dry year of 1996, is dominated by hydro- and nuclear power, each of which account for nearly half of the total electricity produced in a normal year. The contribution from cogeneration and condensing power generation is less than 10 percent. The contribution from wind in 1996 was about one-tenth of a percent. Between 1970 and 1985, when the 12th nuclear reactor came on-line, electricity production grew by on average 5.35 percent per year. Production and consumption has been relatively constant since 1985.

Sweden has seven relatively large generators. Electricity production for each of them in 1996 was: Vattenfall 76.9 TWh, Sydkraft 25.0 TWh, Stockholm Energi 10.4 TWh, Gullspång 9.3 TWh, Stora Kraft 5.3 TWh, Skellefteå Kraft 2.2 TWh, and Gräninge 1.8 TWh (NA 1997). There are also several hundred small producers ranging from cogeneration in industry and district heating systems to

privately owned wind-turbines and small hydro. Most areas have local distribution companies, generally owned by municipalities, that usually have no or little generation of their own. There were about 270 such utilities in 1995.

Electricity consumption in 1996 was 142.1 TWh and by different categories: Industry 51.8 TWh (including electric boilers), Service/Commercial 34.3 TWh, Residential 44.6 TWh, Electric boilers and heat pumps in district heating 1.7 TWh, and Losses 9.7 TWh (SPA 1997). A particular feature of Swedish demand is the high level of electricity used for space-heating. Large electric boilers and heat-pumps in district heating systems accounted for between 3.3 and 5.8 TWh/yr in 1992-1995. Electric space-heating in the residential and commercial sectors accounted for about 28 TWh/yr during the same time period.

The Swedish Electricity Market Reform

The electricity sector in Sweden has never been fully centralized or state owned. However, the largest electric utility, the state owned National Power Board (Statens Vattenfallsverk, now Vattenfall AB) has been responsible for the main grid (220 and 400 kV) during the post war period up until 1991. Regional grids (40-110 kV) were operated by the National Power Board and about 10 other electricity producers. In addition, there have been a large number of local distribution companies, in 1995 about 270, with concessions to deliver electricity within their service areas. Many of these also deliver district heating.

Discussion about electricity market reform started in the late 1980's. A first step towards market reform was taken in 1991 through a parliamentary decision to separate the operation of the main grid from the National Power Board and create a new business-oriented board, Swedish National Grid (Svenska Kraftnät). Swedish National Grid is responsible for operating the national grid and the international connections as of 1 January 1992. At the same time the legal status of the National Power Board was changed into a limited liability company (Vattenfall AB), which is still fully owned by the Swedish state.

The electricity market reform was prepared during 1993-95 and the new legislation came into force on 1 January 1996, making it possible for consumers and retailers of electricity to choose between competing suppliers (MIC 1996). Producers and other suppliers are free to choose their customers in the same way, with the exception that a company holding the delivery concession for an area has an obligation to serve customers who do not wish to change supplier. This exception will apply for at least 5 years from the start of the reform. Transmission and distribution remain regulated monopolies and a special Network Authority was set up at the Board for Industrial and Technical Development (NUTEK). As of 1 January 1998 the Network Authority and other parts of NUTEK are organized into the new Swedish National Energy Administration. All network operations at utilities must be unbundled from the electricity trading operations and organized in a separate company. Various provisions have also been made to protect small producers, rural customers, etc. Buyers and sellers of electricity can enter into bilateral contracts, or trade electricity by the hour on the spot-market and in a forward and futures market for longer contracts on the joint Norwegian-Swedish electricity exchange, Nord-Pool, in Oslo.

General Trends in the Electricity Market

There has been a clear trend towards increased concentration of ownership in the production of electricity during the 1990's through acquisitions and mergers. Seven companies accounted for 96 percent of the production in Sweden in 1996. For comparison, there were 10 companies accounting for

95 percent of the production in Sweden in 1990 (NA 1997). International ownership is also increasing and notably German, French, Norwegian and Finnish utilities are important shareholders in several Swedish generating companies.

Restructuring of the local distribution companies has been ongoing since the late 1950's when there were about 1,500 such utilities until the time of the market reform when there were about 270 local distributors. The reform in 1996 required unbundling of the regulated network business from the competitive electricity trade business. In 1997 there were about 250 local network companies and about 220 registered electricity trade companies. Mergers and acquisitions in both types of companies have been common and have accelerated after the reform.

The level of vertical integration has also increased through acquisitions of distribution companies by generators before and after the electricity market reform. One measure of vertical integration is the share of power which is generated and sold to end-users through the same company or through subsidiaries. By this measure, the level of vertical integration has increased from about 31 percent in 1989 to about 40 percent in 1996 (NA 1997). An important driver for this forward integration by generators is to gain direct access to end-users and thereby get a more stable customer-base.

The market is open to new entrants when there is no longer a need to own power plants or distribution networks to trade electricity. An interesting development is the entry of several oil-companies in the electricity market. These companies are primarily targetting the household sector. For example, there are ongoing discussions between the third largest generator in Sweden, Gullspång, and Preem Petroleum, to form a joint subsidiary "The Energy Store" that would sell oil, electricity, and energy services (Luthander 1998).

An unusually dry year in 1996 resulted in relatively high spot-prices at the electricity exchange Nord-Pool in Oslo during the winter of 1996/97. Spot prices were in the range of 200-300 NOK/MWh (\$25-38/MWh) during much of 1996 but fell to a level of 100-150 NOK/MWh (\$13-19/MWh) during much of 1997 as a result of increased water levels in the hydro dams (Sydkraft 1997). There have been no dramatic changes in electricity prices or network tariffs to end-users. Average prices to end-users in January 1997 were 2 to 8 percent higher than in January 1996 depending on customer segment but most of the increase is accounted for by an increase in taxes (NA 1997).

Electricity prices, exclusive of taxes, paid by industrial users who have remained with the holder of a delivery concession were 4 to 7 percent higher than those paid by users who had switched to a new supplier. A general price-levelling has also been observed. For example, the highest and lowest price excluding taxes paid by a typical electrically heated house in 1996 was 30.7 öre/kWh (3.8 cents/kWh) and 13.5 öre/kWh (1.7 cents/kWh), respectively. In 1997 the corresponding numbers were 31 öre/kWh (3.9 cents/kWh) and 20.5 öre/kWh (2.6 cents/kWh), respectively (Grue 1997).

Somewhat less than 1,000 of Swedens more than 6,000 high-voltage electricity end-users are estimated to have changed supplier during the first year of electricity market reform. The corresponding number for the approximately 5 million low-voltage customers is about 17,000, nearly all of which are understood to be relatively large consumers and not households (NA 1997).

A price-ceiling for electricity meters that can deliver the required hourly consumption data was introduced on 1 July 1997 in order to increase the mobility on the market, particularly for small customers. The maximum price to the customer including taxes is 2,500 SEK (\$312) and the cost above that is born by the distribution network company. By one estimate, perhaps 10,000 households switched supplier, or planned to, in the second half of 1997 (NA 1997). Nora Energi and Telge Energi who have actively targetted this customer segment claimed to have won between 7,000 and 10,000 new household customers each by February 1998.

Utility Strategies

Before and after January 1996 different actors on the electricity market have positioned themselves by choosing different business strategies. Many utilities, especially smaller ones, have not actively marketed themselves to attract new customers. Among the utilities that actively have worked to attract new customers, only a few have concentrated on low-price bulk sales whereas others, although competing on price, in addition offer a variety of value-added services, including energy efficiency, as part of the business strategy. Many of the customers that changed to a new supplier in 1996 did so through corporate contracts for electricity. Examples of corporations that have turned to one supplier for all their electricity needs include Volvo, IKEA, and Tetra-Laval. There are several examples where municipal distribution companies have joined forces to become larger buyers on the market. Another example is the electricity trading company Telge Kraft which is owned jointly by Astra, Scania, Ericsson and the municipal utility Telge Energi. Telge Energi's traditional service area is Södertälje where both Astra and Scania have large industrial facilities.

A generally held view is that prices offered must be competitive to retain and attract customers that may change supplier, i.e., primarily large users in industry or the service sector. Perhaps more surprising is that all five utilities consider value-added services, including energy efficiency, an important part of their business strategy. With the expected levelling of prices it will no longer be possible, or desirable, to compete solely on price. Through previous DSM efforts and the electricity market reform there is also a clear recognition that what used to be treated as "loads" are actually sales to a number of customers with different needs. The inclusion of value-added services in marketing reflects the expectation that those customer needs go beyond contracting for lowest price.

Utilities that offer value-added services are generally the larger ones. It is difficult for small distributors to maintain a broad in-house competence in the area of value-added services and for that purpose they must find partners. Gräninge, for example, has entered an agreement with a large building contractor with expertise in building energy use and efficiency. Vattenfall, for example, is offering partnerships by which distributors get access to the value-added services offered by Vattenfall. Recently, such partnerships were entered with two small Norwegian utilities.

Utilities that have focused more or less exclusively on low-price bulk sales are relatively few. Vattenfall, although offering a range of energy services, also serves several electricity intensive industries. Some of these customers are likely to remain with Vattenfall as bulk-buyers with relatively little interest in buying energy efficiency or other value-added services. The company Brukskraft was formed jointly by the municipal distribution companies in Kristinehamn, Filipstad, and Degerfors together with the steel-mill Scania Björneborg. Brukskraft is a registered trader on the electricity exchange for the purpose of buying electricity for its owners at the lowest possible price. Brukskraft has also contracted with several corporations who entered financial contracts for electricity but needed a partner for the physical trade.

The early experience from Sweden is that some customers do request various services in addition to the main product - electricity. However, the utility representatives interviewed did not yet have a clear assessment of the number of customers requesting services, or type of service requested. When asked what fraction of commercial and industrial customers that also contracted for services containing energy efficiency, estimates given by the utilities ranged from 1 to 2 percent to 10 to 20 percent. Sydkraft noted that although their concept for value-added services, the Energy-Loop, is included in only perhaps one-fifth of the contracts, these contracts accounted for perhaps 80 percent of the volume in the industrial/commercial customer segment.

Value-Added Services

Industrial and Commercial Customers

Nearly all efforts to market various energy services so far have targetted relatively large customers. The larger utilities offer a range of services or packaged products and have experts in energy efficiency and other areas on their staff. Vattenfall, for example, have several experts on electricity intensive industry processes organised in Vattenfalls Industry Programme. The role of this R&D programme is not to act as a sales-support unit. The aim is rather to build confidence and long-term partnerships with industry and develop new applications for electricity, e.g., electrothermal processes. Industry experts are primarily found in large utilities such as Vattenfall and Sydkraft. Some level of expertise on building energy use are probably found in nearly all large and many medium-sized utilities.

In general there is great flexibility in how value-added services are offered, i.e., they can be added to an electricity contract against a cost or included in the contracted electricity price. Most utilities prefer, however, to have value-added services included in the contracted electricity price. There is a range of value-added services that are offered in addition to energy efficiency. Sydkraft, for example, has organised its services in four categories: reliability and power quality, energy efficiency, environment, and administrative efficiency. In addition, Sydkraft and many other utilities offer environmentally labelled electricity.

It is often difficult to separate energy efficiency from other services. For example, administrative efficiency which may include EDI-billing (Electronic Data Interchange), monitoring and analysis of consumption, two-way communication, etc., also contribute to identifying energy efficiency opportunities. Improved reliability and power quality in industrial facilities results in less down-time and lower specific electricity consumption. Efforts to monitor energy use and improve energy efficiency facilitate the introduction of environmental management systems, such as EMAS and ISO-14000. Some specific examples of services and experiences are presented below.

Vattenfall. Vattenfall ran a large programme 1986-1992, Uppdrag-2000, to evaluate and determine the potential for electricity efficiency improvements in Sweden. The programme was controversial at the time but the in-house competence about the electricity market and energy efficiency that was developed through this programme is now considered a valuable asset. Vattenfall can offer more than 110 identified products and services, many of which include energy efficiency. In a recently launched marketing effort, Vattenfall is offering customers with a minimum total energy consumption of 1 GWh/yr an energy savings guarantee whereby customers who contract with Vattenfall for electricity for 2 to 5 years are promised a reduction in total energy costs by typically 3 to 7 percent. A very rough energy analysis and matching against a reference database gives Vattenfall a good indication of the potential savings and thus a basis for the contract. Savings are generally achieved through low-cost measures such as, maintenance, time-scheduling of air-handling and lighting, or other changes in operation.

Sydkraft. Sydkraft, like many others, has made a very clear commitment to being an energy service company that works closely with its customers, and not a supplier of bulk-electricity. Based on the observation that the result of many energy audits gets buried in desk drawers, Sydkraft has launched the concept "Energiloopen" (The Energy-Loop) for industrial and commercial customers. The first step is an energy audit where customer needs and pay-back requirements are also considered. In the following analysis, Sydkraft sits down with the customer and identifies the most interesting measures to improve reliability, and energy and administrative efficiency. In a third step a formal agreement is made where

responsibilities are divided between Sydkraft and the customer. The fourth step is implementation, which is generally the responsibility of the customer. In a fifth step the measures are evaluated and compared against predicted performance improvements.

Gräninge. Gräninge is an interesting utility in that 100 percent of its production, 2.5 TWh in a normal year, is environmentally labelled hydro electricity. Gräninge used to be predominantly a generator with less than 20 percent of the production sold directly to end-users in the concession area. Since 1990, Gräninge has integrated forward by acquiring distributors in the Stockholm area and essentially all electricity produced is now sold to contracted end-users or end-users in delivery concession areas. The overall business strategy is to add value as far as it is profitable. In an effort to build its brand-name Gräninge ran a campaign in the winter of 1996/97 on the theme "Environmentally labelled electricity: As little as possible to as many as possible" and using slogans such as "Real men refuse electric shaving machines" or "Luke-warm beer taste more." In the area of energy efficiency Gräninge is offering energy audits, the cost of which is guaranteed to be recovered in one year through low-cost and short pay-back measures. Gräninge is also working closely with the municipal authorities where they hold delivery concessions and thereby get access to government funding aimed at supporting energy efficiency to facilitate a phase-out of nuclear power.

Stockholm Energi. Stockholm Energi has marketed a concept called "Mega-Customer." In order to qualify the customer must use at least 100 MWh of electricity per year and in addition purchase one other energy carrier from Stockholm Energi (district heating, district cooling, or town-gas). A mega-customer is assigned an energy consultant and gets a free energy audit, improved information about actual energy consumption, simplified or electronic billing, a "check" that can be used to buy services from Stockholm Energi, a 10 percent discount on consulting services, free participation to courses offered by Stockholm Energi, and various information on energy.

Göteborg Energi. Göteborg Energi has been one of the most progressive utilities in the area of energy services. It was probably the first utility to offer energy service contracts through which the utility undertakes to deliver indoor climate, lighting, etc., and in essence becomes responsible for building operation and maintenance against a fixed cost to the customer. At present there are about 50 such customers. Typically these customers do not have the organisation or in-house competence to operate the relatively advanced installations that are common in commercial buildings. Göteborg Energi has access to abundant waste-heat from a refinery and from waste-water treatment. In a pilot project, heat from the district heating system is delivered to 40 single family houses without metering the heat consumption. Instead the customer pays for indoor temperature, e.g., 18, 20, or 22 degC. Metering equipment and the reading of meters is replaced by a simple orifice which puts a limit on the amount of heat delivered.

Households

A generally held view is that the electricity consumption in households is too small to carry the costs of energy audits and other efforts to improve energy efficiency. There is a strong focus on price in marketing efforts to households, primarily private house-owners with electric heating.

With the introduction of a price-ceiling for electricity meters, it became potentially economical for many small users to switch supplier. For an electrically heated house with an annual consumption of about 20,000 kWh and a 3 to 5 öre/kWh (0.4 to 0.6 cents/kWh) lower price with a new supplier, the 2,500 SEK (\$312) cost for a meter has a pay-back time of about 2.5 to 4 years. Several utilities have

also offered rebated or free meters to new customers. Different new sales channels are also tried. The Swedish Association of Private House Owners has an agreement with Nora Energi who has won about 7000 new customers. Lunds Energi launched an agreement with IKEA in February by which members of IKEA-Family can contract with Lunds Energi for electricity.

An early initiative, called "Fördel" (Advantage), that targets private house-owners with energy services was launched jointly by seven utilities in southern Sweden in September 1996. Against an annual fee of about 350 SEK (\$44) charged through the electricity bill subscribers get access to a number of services, e.g., personal energy advice over the phone, appliance repairs against fixed charges, rebates on appliances, metering equipment, and information on energy efficiency opportunities. In addition, a small part of the fee, 10 SEK (\$1.25) which is matched by 10 SEK from the utility, is placed in a fund for local environmental projects. The goal is to enroll 10 to 15 percent of the private house-owners served. As of March 1998 about 7 percent of the private house-owners served by Lunds Energi had enrolled.

Simplified billing and related services

Many utilities offer to simplify administration by lowering the frequency of invoices, putting several metered connections on the same invoice, or use electronic invoicing. For Swedish Power Support (Svensk Kraftsupport), a subsidiary of Telge Energi, this and other administrative services is their business. Swedish Power Support assist in contract negotiations, market surveys and monitoring, tariff-optimization, gathering and analysing energy use statistics, and monitoring and administration of energy bills.

Other utilities offer similar services. Birka Teknik & Miljö, a consulting company and subsidiary of Stockholm Energi AB and Finnish IVO, offer a service where electricity use is analysed and matched against the optimal tariff in order to minimize electricity costs without necessarily using less electricity. For a relatively large customer in the Stockholm area this resulted in annual savings of 223,000 SEK (\$27,900), equivalent to 32 percent of the electricity cost.

Improved billing routines can result in considerable savings to end-users. One example is a building owner in southern Sweden who received 274 invoices each year for 64 buildings with a total consumption of 1.4 GWh/yr. The estimated handling cost was 280 SEK (\$35) per invoice adding up to a total cost of 76,720 SEK (\$9,590) per year. The utility, Sydkraft in this case, is now sending 2 invoices per year, for which the handling cost for the customer is estimated to 1,400 SEK (\$175) each. The savings are equivalent to about 5 öre/kWh (0.6 cents/kWh) purchased.

Outsourcing

Entering outsourcing agreements or other types of partnerships may be an important component in utility efforts to build long-term business relationships with important customers. Many utilities in Sweden are now offering primarily industrial and commercial customers to outsource energy equipment. The Finnish utility IVO has targeted the Swedish pulp and paper industry in this area and Vattenfall has followed (IVO Group 1996). Vattenfall also markets its product "ready-to-use" electricity to industrial customers. For example, Vattenfall owns and operates transformers and other high voltage equipment at one of the automobile maker SAAB's plants.

More common than industry applications, however, is that utilities and other actors are offering end-users to outsource in the area of space heating and cooling. The basic idea is that the utility takes over the operation and maintenance, and in many cases ownership, of furnaces and boilers for space heating, or cooling equipment. The concept is marketed under many different names, e.g., local heat,

ready-to-use heat, total heat, etc. Through such contracts the utility guarantees the delivery of heating and cooling and the end-user does not have to worry about fuel-choice, repairs, future investments, etc.

Utilities have been willing to operate, or own and operate, equipment in order to provide customers with heat and hot water at the right temperature or electricity at the right voltage. However, this is where most of the utilities have drawn the line. An early exception is Göteborg Energi, see above, who in some cases has become an energy service company in the true sense, i.e., responsible for heating, ventilation, and other services. Another example is Gräninge who is operating several outdoor lighting systems, one of which is the exterior lighting of the Waxholm Fortress outside Stockholm. However, many utilities are hesitant to getting deeply involved in building energy management or industrial processes due to the perceived difficulty of defining energy services and the commercial risk involved in outsourcing agreements.

Environmental Labelling and Eco-Funds

The development of environmental labelling of electricity to accelerate the development of renewable sources of electricity is largely a consequence of the introduction of competition in the market. As is the case for energy efficiency, customers' willingness to pay will largely determine the success. The Swedish Society for Nature Conservation has developed a system for environmental labelling of electricity which in essence says that a large fraction of the existing hydro power and other renewable sources of electricity qualifies for labelling whereas nuclear, new hydro, fossil fuel based power generation does not qualify.

Labelling started in March 1996 and about 35 percent, or 22 TWh, of the potentially qualifying power production was labelled at the end of 1997 through 29 licences under this scheme. In addition, about 25 applications for labelling were submitted in late 1997. The price-premium for environmentally labelled electricity is typically between 0 and 12 öre/kWh (0 and 1.5 cents/kWh) where the high end of the spectrum is represented by wind energy to small end-users. The Society for Nature Conservation roughly estimates that about half of the labelled electricity is also sold as environmentally labelled electricity. Some utilities have resisted the Society's labelling scheme and prefer to use the concept "production-specified" electricity by which the customer is guaranteed that the electricity purchased is produced in a certain way, for example, from wind, hydro, or nuclear.

Customers' willingness to buy green electricity may also go further than demanding electricity that has been labelled according to the Association's criteria. For example, Swedish State Railways when electrifying the trains between Malmö and Ystad, a 70 km stretch in southern Sweden, demanded that the electricity supplier, Sydkraft, delivered wind energy that would meet the energy needed to operate the train on an annual basis. In addition, one wind turbine should be visible from the train. Another example is a grocery store in Nyköping served by Vattenfall who is now buying locally produced electricity from a small hydro power plant not far from the store. Such customer demands would hardly have been met in a monopoly market.

Several utilities have established eco-funds, similar to that included in the "Fördel" offer, aimed at supporting various environmental projects. One example is Vattenfall's Elvira foundation, to which customers and others can contribute through the electricity bill or otherwise and where Vattenfall contributes the same amount. Customers with Göteborg Energi can opt to contribute 1 öre/kWh (0.13 cents/kWh) of their consumption to an eco-fund which invests specifically in renewable energy which is not yet commercially competitive. As in the case of environmental labelling, what you pay for is essentially the possibility of influencing the production of electricity

Discussion

The preliminary experiences from Sweden suggest that there is a market for value-added services and that energy efficiency will be one important component. How important remains to be seen. Several utility representatives noted that the market is still very immature. Competition could, in principle, lead to higher rates of improvement in end-use efficiency than prior to the market reform. Traditional DSM, although very attractive in theory and relatively successful in the United States, has not been easily applicable and never really attempted in Sweden, mainly due to the fragmented structure of the electricity market, regulatory tradition and surplus electricity supply.

It appears that many energy efficiency services so far represent cream-skimming. Identifying 3 to 7 percent energy savings in a commercial building is perhaps not a great challenge, but realistic if only low- or zero-cost measures are included. In addition, the greater part of the savings from energy audits in buildings are typically represented by heat savings.

One utility representative made the point that utilities must educate their customers in the area of energy efficiency and thereby make it sell. In addition to what customers perceive or determine to be their needs, knowledge is an important factor. Who is representing the customer was noted by one utility representative as very important for the outcome of a contract negotiation. For example, reliability and power quality are likely to be important components in a contract if the customer representative is the electricity manager. Energy efficiency and green electricity may be important if the environmental manager is involved or if being environmentally friendly is an important part of the company's marketing strategy. A representative from the purchasing department may focus on price only.

As a result of market reform, negotiating long-term contracts for electricity often involves relatively high-level management. According to one utility representative this direct access to high-level executives is a key to the success of marketing value-added services and an important comparative advantage relative to independent ESCOs.

It is interesting to note that the major utilities in Sweden so clearly market themselves as energy service companies with a range of value-added services in their product-mix. This is very different from the situation in Norway (Haaland & Wilhite 1994) and the United Kingdom, although there are signs that customers are beginning to request value-added services after a few years of shopping around for lowest electricity price in the United Kingdom (Owen 1996). The relative absence of a market for value-added services in the United Kingdom and Norway may be a poor predictor of Swedish market behaviour due to differences in, for example, past and present national energy policy and utility culture. The rapidly increasing interest in Sweden in environmental management system, i.e., EMAS and ISO 14,000, also creates increased interest in energy management.

The extent to which households will be offered value-added services and be willing to pay for these services, including energy efficiency, is an open question. One study concludes for the United States market that some market segments, including low-income households and small businesses will not be served in competitive markets and will need various forms of regulatory and programmatic involvement to achieve their efficiency potential (Prindle 1996). The low level of utility activity in this area so far indicates that the same conclusion may be true for Sweden.

Conclusions

The electricity market reform in Sweden appears to have forced a revolutionary change in utility culture from supply-focus to being much more customer-oriented. Although competing on price, energy efficiency and other value-added services are important components in the product mix of all the larger

utilities in Sweden. There is also a strong belief among utilities that revenues from value-added services will increase as the market matures. In the area of energy-efficiency, focus so far has been on measures with low-cost and short pay-back. Whether energy-efficiency measures in the longer term will go beyond cream-skimming remains to be seen. Environmental labelling of electricity is increasing rapidly but only about 15 percent, or about 10 TWh, of the potentially qualifying power was sold as environmentally labelled electricity in early 1998.

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