

Energy Conservation in England and Wales--what has happened following privatization of the electricity sector and the lessons that may be learned by the Nordic countries

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1. SYNOPSIS

This paper examines the potential for electricity conservation in the household sector following the privatization of the British Electricity sector in 1990.

2. ABSTRACT

This paper examines energy conservation, more specifically electricity conservation in the household sector following the privatization of the 12 British electricity companies in December 1990. This privatization, the first of its kind in Europe, provides many insights for other nations, such as Norway and Sweden, who are planning to follow a similar route to restructuring their electricity sectors. In general, electricity plants have become more cost effective, mainly through reducing staff, but there have been no gains in the area of energy efficiency. The electricity companies feel that there is little justification for intervention in this sector, preferring to rely on market forces; in other words, people will save energy if it is economically wise to do so. In this paper I seek to further this discussion to determine if, in fact, electricity conservation (which was practically non-existent before the privatization) has increased, decreased or remained constant following privatization. Additionally, will the experience of Great Britain be of use in the Nordic countries? Will, for example, electricity conservation in Sweden effectively be discouraged following the privatization of the electricity sector? Qualitative research, including interviews with policy makers and leading academics in both Great Britain and Sweden, and media analyses of a major newspaper in each nation were conducted in order to answer these questions.

3. INTRODUCTION

On December 31st, 1991, Sweden privatized its electricity sector. The Swedish State Power Board became a private entity (now called Vattenfall AB) and the national grid, which was previously owned by the State Power Board, became a separate government owned company. In many respects Sweden's electricity privatization is similar to the one that occurred in Britain, the so called British Model (Tenenbaum et al. 1992). In this paper I look at the British Model and describe the lessons, specifically in the area of electricity conservation, that may be learned by Sweden and other Nordic countries that are in the process of privatizing their electricity sectors. I focus on electricity conservation because the importance it may play in Sweden's energy future: Based on a 1980 nuclear referendum, the government passed a bill calling for a phase-out of nuclear power, representing 50 percent of the electricity generated in Sweden, by 2010. Although this phase-out has been questioned, five of Sweden's twelve nuclear power plants were shut down for a period of five months due to safety problems in the fall of 1992. Electricity conservation would help to alleviate the problems caused by a phase-out of Sweden's nuclear power.

4. THE 1990 PRIVATIZATION OF THE ENGLAND AND WALES ELECTRICITY SECTORS

As a part of the government's market based approach, the electricity sector was privatized in 1990. The Central Electricity Generating Board (CEGB) were split into three generating companies, and the regional distributors, before in the public domain, were privatized; additionally, an independent national grid was formed. The three national generating companies, National Power, Powergen, and Nuclear Electricity (still owned by the government) were created to produce and sell electricity to the distribution companies, more commonly referred to as Regional Electricity Companies (RECs) through the national grid. In addition, as

an attempt to increase competition, the RECs are also allowed to produce 15 percent of the electricity they consume themselves. Most of the electricity generated by the national companies is sold to the RECs under contract. The remainder, approximately 5 percent, is sold via a national pool where electricity prices fluctuate according to supply and demand (House of Commons 1992). The electricity market is regulated by the Office of Electricity Regulation, where Steven Littlechild, often referred to as the regulator, is Director General. At present only large electricity consumers (those whose demand is more than 1 MW peak) are allowed to buy from producers different than their local electricity company. These large electricity consumers can buy electricity directly from the national pool, bypassing the RECs (Littlechild 1992a and b; Tenenbaum et al 1992). According to the Regulator's plans, competition in the electricity market will increase further in 1994, when consumers with more than 100 Kw peak demand can buy electricity from whatever supply source they choose and in 1998 when any electricity consumer may do so (Cory 1992; Littlechild 1992a and b).

4.1. Problems with the privatized electricity sector

According to the current Energy Minister, Tim Eggar, the aim of the electricity privatization and Britain's energy policy in general, is "to promote the economic development of our energy sources and to ensure that the nation's energy needs are met cost-effectively" (Eggar 1992). In this statement as well as elsewhere, there is little mention of the usefulness of energy conservation. It is too early to say conclusively what the effects of privatization has been, but there has many criticisms of the government's program (Lucas 1992). The political opposition has argued that a monopoly structure still exists in the electricity sector, and competition has not increased (Beavis and Hencke 1992). The former Energy Minister, Cecil Parkinson, admits that it was difficult to achieve perfect market conditions, and that this was due to short amount of time available to conduct the privatization (between the 1987 and the 1992 parliamentary elections)(Dispatches 1992). The case has been made that there are too few generating companies. There also should have been five or six generating companies to adequately allow competition. Additionally, a monopoly (albeit only until 1998) still exists in the distributing sector. The twelve RECs are each responsible for a certain specific region, where they own and operate the regional electricity grid.

The director of the Office of Electricity Regulation believes that the privatized electricity sector is not yet a perfect market as there is one major market failure caused by two government subsidies (Littlechild 1992a and b). Firstly, there is the so called non fossil fuel generating levy, more commonly referred to the nuclear levy, which adds 11 percent to every Kwh of electricity consumed to mainly help pay for the costs of running Britain's nuclear power plants. The second subsidy, is the government's requirement that the National Power and Powergen buy British coal which is priced above world market prices due to higher production costs compared to elsewhere. However, both of these subsidies will eventually be removed. The coal subsidy is currently being phased-out, and the non-fossil fuel levy will be abolished by 1998 (Tenenbaum et al. 1992). At the moment the coal subsidy phase-out has created many problems for the government who is on the one hand advocating a free market approach, but on the other, wants a guarantee from the generating and regional electricity companies that they will keep on buying large amounts of British coal (Smith 1993). Finally, critics argue that electricity conservation is not encouraged. The remainder of this paper will deal with electricity conservation.

4.2 Electricity conservation in the privatized electricity sector

It is debatable whether there has been any electricity conservation in the post-privatized British electricity sector. On the supply side, electricity generation has become more energy efficient, while on the demand side electricity conservation has not been encouraged. There is a strong case for encouraging electricity conservation in the UK (Grubb 1990; Grubb et al. 1991). The detrimental effects of pollution from coal fired electricity generating plants is well documented (Grubb 1990). Seventy one percent of Britain's electricity is generated from coal generated, and almost all of this in plants that have no desulfurization equipment. Promoting electricity conservation could lead to considerable local and global environmental benefits in terms of reduced SO₂ and NO_x emissions (which cause acid rain) and CO₂ emissions (which may cause global warming). The alternative of installing desulfurization equipment would be expensive and do nothing to alleviate the CO₂ emissions problem.

4.2.1 Supply side--management

The attempted introduction of competition into the nation's power generating sector has rapidly increased generating capacity and a large surplus is forecasted by the end of the decade (Jackson 1992; National Grid 1992). Currently, most of the new capacity is from gas generating plants. Gas plants have short lead-in times thereby reducing the financial risk. Gas also has the comparative advantage of being the most environmentally friendly of the fossil fuels, as it contains virtually no sulfur dioxide, and less carbon dioxide than coal. This means that the so called "dash for gas" may enable the national generating companies to meet their year 2000 emission targets without having to fit flue gas desulphurization equipment on their remaining coal plants (Littlechild 1992a). Finally, as the gas generating plants are more energy efficient than coal ones, more electricity is produced using less energy (Edge 1992).

4.2.2 Demand--side--management (DSM)

In comparison to other west European nations, domestic British electricity prices have over time been somewhat higher than those found in Sweden and Norway, but somewhat lower than those of Germany and Italy (Schipper and Meyers 1991). At the present time, domestic consumers pay no Value Added Tax (VAT) on electricity, as the government regards electricity as a necessity, not a luxury. However, energy saving devices, such as low energy light bulbs, are subject to VAT. Critics argue that this sends out the wrong signals to the market and should be adjusted (Warren 1991). However, the government's policy on this is now changing. In mid March 1993 the government announced that from April 1994 electricity and gas bills will be subject to 8 percent VAT, and from 1995 to 17.5 percent VAT (Sharrock 1993). Maybe the British government is becoming more concerned about the environment?

Post--privatization, the government came out against so called least cost planning, which would have forced utilities to consider the energy efficiency option, instead favoring a simple price mechanism of $RPI-X+Y$ (Retail Price Index minus a fixed X percentage annually to encourage unit cost reductions, plus Y, a production cost factor (Spring 1992; Weyman--Jones 1990). This formula allows no room for efficiency. Instead it encourages RECs to sell more electricity as this is the only way that they can earn revenue (Boys 1992; Grubb and Brackley 1991).

The industry regulator, Steven Littlechild, recognizes that there is a problem with the price mechanism and that something should be done about correcting it (Beavis 1991; Littlechild 1992b). However, one year after this statement nothing has happened (Papworth 1992), despite reports from Friends of the Earth showing that ten of the 12 RECs would be in favor of adding a 'E' (efficiency) factor into the price mechanism (Beavis 1992). This 'E' factor would lead to greater electricity conservation, as utilities would be compensated for installing energy saving devices in people's homes and other DSM options. Part of the reason why Littlechild has not acted on changing the pricing mechanism can be due to his willingness to "seek full consultation with the industry and its customers before making any changes in the regulatory framework" (Littlechild 1992b, p.275.).

However, other privatized energy industries in Britain are considering energy efficiency programs and these could serve as models for the electricity industry. Recently, for instance, British Gas announced that in April 1993, it plans to affix an 'E' factor to domestic gas bills. This will add only 30 pence to the average bill, but it will generate money for an Energy Savings Trust. The Trust's plans include providing grants for homeowners to replace their current gas system with new gas condensed systems (Papworth 1992). As of yet, however, there has not been an observable difference to the negative behavior of British Gas to DSM in general.

Littlechild, the electricity regulator, is concerned about the use of feedback mechanisms on electricity bills which will encourage more efficient energy use (Littlechild 1992a). Studies have shown that giving householders visible indicators of their energy consumption, through feedbacks such as more frequent meter readings, makes them more able to save energy, if they are inclined to do so for economic, environmental, or moral reasons. In other words, the feedback mechanism encourages the consumer to save (a positive incentive) and therefore he or she does it more readily (Ling and Wilhite 1992a and b; Shippee 1980). However, at the time of writing (March 1993) domestic electricity bills do not contain information

concerning how much electricity is consumed compared to the same period a year ago, as the previous billing period.

One aspect of demand-side-management that has received some government attention is public information. Preliminary studies, funded by the Department of Environment, show that environmental concern is growing among the British public, but there appears to be no linkage between energy consumption and environmental destruction (Hedges 1991), as has been seen in other nations as well (Kempton 1991; Löfstedt 1991b, 1992, 1993a, and 1993b). As a result, the Department of Environment (DOE) launched a 12 million ECU three year media campaign with newspaper and television advertisements trying to show the connection between domestic energy use and the "dangerous and ever present" greenhouse effect. DOE hopes that the scare tactics used in the advertisements will lead people to save energy; past studies, however, have shown that media campaigns have little affect in persuading people to do so (Sjöberg and Tollgerdt-Andersson 1990; Swedish State Studies 1983).

4.3. Areas related to electricity conservation

The privatization of the British electricity sector has had other effects which relate directly to electricity conservation:

4.3.1 *Research and development*

Following privatization, as a part of a massive cost cutting program, the RECs and the two large power generators have substantially reduced their budgets for research and development. Today, the electricity industry as a whole, which has sales of more than 6 billion ECU per annum has a research and development budget of only 120 million ECU (2 percent) compared to 240 million ECU under the CEGB; according to the Watts committee this is simply too little, as it is a high-tech industry which will face uncertainties in the medium to long-term (Cookson 1992). Spokespeople within the industry have defended the move by stating that much of the earlier research and development was conducted for national interest rather than to directly benefit the CEGB. Critics argue that the privatized electricity companies are simply cutting costs to increase profitability for shareholders in the short-term (Cookson 1992).

The industrial spokespeople may be at least partially correct. A large part of the CEGB research budget was used to establish scientific understanding of the acid rain phenomenon; such research would under normal circumstances not be conducted by private utilities (Boehmer-Christiansen and Skea 1991). Also the power generators are trying to avoid redundancy in research by collaborating with their American counterparts (Cookson 1991). For instance, Powergen recently paid approximately 3 million ECU to be a part of EPRI's research (Cookson 1992). That said, it is still unclear (in the authors opinion) if the British utilities will be able to remain internationally competitive in the medium to long-term if the research and development budget is not increased.

4.3.2 *Electricity prices*

Privatization has in the short-term caused real electricity prices to increase by 5 percent in Britain's domestic sector and industrial sectors (Government Statistical Service 1992). A study prepared by the Research Policy Institute shows that if pre-privatization trends had continued the average electricity price for domestic consumers would be 19 percent lower and for industry 15 percent lower, than what it is today. Electricity would be even cheaper if one accounts for the reduction in the price of British coal that has occurred over the same time period (Yarrow 1992). It is of no surprise then (especially when one considers that most RECs have cut staff by at least 10 percent since privatization) that the average pre-tax profits for the RECs for the year ending March 1992 was 41 percent higher than the previous year (Sychrava 1992). One could have hypothesized that these price increases would lead to energy conservation, but over the same two year period, electricity use has grown by 2 percent in the domestic sector (Government Statistical Service 1992).

4.3.3 Electricity production

Electricity generation in the UK is growing as the RECs and big generators build more gas generating plants ("dash for gas"). The RECs have a strict commercial interest in doing so: as they are forced to buy 85 percent of their electricity from the two large generating companies, they want to diversify supplies increasing flexibility and reducing dependency as quickly as possible. As building natural gas generating plants is the quickest and cheapest way to make them more independent, they have entered the "dash for gas" with vigor. Although some energy experts, most notably Ian Fells, see this as a big mistake (Fells 1992), the electricity regulator is not against it (Smith 1993). As a result, the privatization of the England and Wales electricity sectors may lead to an overcapacity of electricity of 20--50 percent by the mid 1990's which can in the medium--term reduce electricity prices (Christie and Bannister 1992). The immediate result of this situation is the decision of Electricity de France not to renew its UK export contracts once they expire in March 1993. In fact, the utility plans to be buying cheap British electricity by the mid-1990's to meet peak demand in France (Christie and Bannister 1992).

4.3.4 Bright spots

Some RECs, however, are engaged in consumer research. In the village of Great Gonerby, Lincolnshire, East Midlands Electricity conducted a pilot electricity conservation program with the objective of alleviating the need to upgrade the local electricity supply network. Free of charge, East Midlands installed better insulation to those with electrical heating, and gave compact fluorescent light bulbs to two thirds of the village's households. Initial results, however, showed, that although overall electricity consumption in the village was reduced, peak demand remained the same (Wise 1992). From East Midland's point of view the project did not meet the objective. However, the utility initiated a highly innovative project for an REC and increased public awareness of low energy light bulbs which are only beginning to make inroads into the British market (Wise 1992).

5. MAIN LESSONS TO BE LEARNED BY OTHER NORDIC COUNTRIES

Based on the above discussion there are several important lessons (three of which are related to electricity conservation) which could be learned by the Nordic countries when/if they privatize their electricity sectors:

- * There should be several (more than three) generating companies so as to stimulate competition.
- * The pricing system should include an "E" factor or something similar that would stimulate Demand--Side--Management. Additionally, policy options such as rewarding utility management with incentives for achieving targets should be considered.
- * Research and development within the electricity sector should not be reduced as this may lessen the chances of developing more efficient energy technologies, and better metering techniques.
- * Domestic electricity bills should come out more often and contain information on how much he/she consumes in comparison to the previous billing period, the year before etc.

5.1 Is Sweden Following Britain's Example?

Sweden's electricity generating sector, is, as before privatization, dominated by two large power generators, Vattenfall AB and Sydkraft. Although their dominance has been reduced through making the National Grid an independent public company, they still largely determine electricity prices in Sweden. Following the problems encountered in the UK, Sweden would have established a truer market had the Swedish State Power Board been separated into at least three generating companies.

The electricity price is based on the generators' operating costs as well as an interest cost on their capital.

This price does not include an "E" factor and, on the whole, the generating companies are un-interested in DSM (Bowie 1993). There are several reasons for this (NUTEK 1992): (a) There is no "E" factor in the price formula, and thus little incentive to implement DSM measures. (b) It is difficult for the generators to implement DSM measures in Sweden as the future market is so uncertain, and therefore economically risky. (c) In the past the power generating companies have on the average spent only 1 percent of their research and development budget on energy conservation programs and it may be difficult for them to change their tradition. (d) There is a surplus of electricity on the Swedish market at the moment.

As of spring 1990, VAT has been added to domestic Swedish electricity bills. Since Swedish domestic electricity prices are currently among the lowest in Europe (Schipper and Meyers 1991), the effect of the price increase (25 percent) was relatively unnoticed (Löfstedt 1993b). Domestic electricity consumption actually increased by 5 percent in 1991.

It is not known whether the utilities' research and development (R and D) budgets have increased or decreased in the brief period following privatization. Experts believe, that contrary to the British experience, the R+D budget will increase as information sharing between the utilities will decline due to the increased competition (Bowie 1993).

Domestic electricity bills are still difficult to understand and are still sent out on a quarterly basis. Although some pilot projects have been initiated (most notably in Helsingborg) with financial support from NUTEK (Sorus 1992), the power companies in general have been against introducing more informative bills for several reasons (Bowie 1993; Löfstedt 1993b): (a) The extra costs involved in doing so; it is expensive to have meters read on a more frequent basis, and one must also consider the postage and administrative costs. (b) It is difficult to modify the utilities' computers to accept the extra data incurred. (c) As there is a surplus of electricity on the market, there is no incentive to promote behavioral energy saving mechanisms.

6. SUMMARY

Sweden and the other Nordic countries could learn from the problems experienced with the privatization of the electricity sector in the UK. Up to the present, however, it is unclear if Sweden has in fact learned. In the post privatized electrical era in Sweden there is still a monopoly like structure within the power generator sector. Feedback mechanisms have not been encouraged and there is little incentive from the power generators to embark on DSM programs partially due to the pricing structure. It is hoped that other West European nations who are considering a privatization of their electricity sectors will better learn from Britain's mistakes.

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