

THE U.K. ELECTRICITY MARKET

**A Special Seminar of the
Harvard Electricity Policy Group
Wednesday, September 16, 1993**

Rapporteur's Report

**Harvard Electricity Policy Group
Special Seminar on the U.K. Electricity Market
Taubman Center, 5th Floor
Kennedy School of Government, Harvard University
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INTRODUCTION

Dr. Eileen Marshall, Director of Regulation and Business Affairs, for the Office of Electricity Regulation, (OFFER), the featured speaker, and Professor Colin Robinson of the University of Surrey joined the Harvard Electricity Policy Group's Special Seminar on the U.K. electricity market. Professor William Hogan stressed that the Group can benefit from studying the experience developing in the United Kingdom with the introduction of competition into the electricity industry?² The emphasis of discussion was on the lessons that can be abstracted from this experience which travel well across the Atlantic. While the special circumstances surrounding the industry's privatization were naturally specific to the United Kingdom, the experience with the subsequent operation of the electricity market is relevant to a host of questions faced by the U.S. industry and its regulators today.

DISCUSSION

Approximately four years have elapsed since the beginning of the restructuring of the electricity supply industry in England and Wales. The new arrangement – a fairly radical re-regulation of the industry — involves three new elements. First, OFFER was established to provide independent regulatory oversight of the industry. The next element was industry restructuring, whereby the functions of generation, high-voltage transmission, distribution, and supply to customers were separated out and treated as four distinct businesses. The third element of re-regulation was the privatization of the national utility: apart from the two nuclear companies all companies in the industry — the national grid company, the regional companies, and the new generators and suppliers — are private firms.

¹Steve Anderson served as rapporteur for the Seminar. This report summarizes the discussion, 'capturing the main points. Although the report attempts to present all the main ideas, not everything is included and no individual participant is responsible for the ideas presented.

²Two background papers on this topic were distributed in advance as one basis for discussion: 1) "Competition, monopoly and regulation in the electricity utility industry" by Professor S.C. Littlechild, Director General of Electricity Supply, and 2) "Pool Price Statement" (July 1993), Office of Electricity Regulation.

An important feature of the restructuring was the introduction of competition into generation and into supply.³ The promotion of such competition was facilitated by open and equal access to both the National grid and the local distribution systems and also by the creation of the electricity Pool in England and Wales, in which virtually all generation is traded.

Prior to restructuring, the functions of generation and transmission were carried out by the Central Electricity Generating Board (CEGB) as a combined operation. Upon Vesting, generation was institutionally separated from the grid. This was felt by many to be important because, in previous efforts to introduce competition,⁴ very little competitive generation actually appeared on the market. A major reason for the failure of these efforts, according to some observers, was the housing of both the generation and transmission functions within CEGB, an arrangement which provided CEGB with little incentive to purchase power from outside sources. Originally, generation in England and Wales was to be provided by two companies, National Power and PowerGen, having 70% and 30% shares of generating capacity, respectively. This division reflected the fact that at the time it was expected that nuclear capacity would also be privatized: National Power would have to be a fairly large company in order to be able to accommodate the nuclear capacity.

In 1989 (before Vesting), nuclear capacity was withdrawn from those assets to be privatized. It was felt that a company having nuclear power capacity could not be floated without the government having to assume a lot of the decommissioning costs, in particular. So, the nuclear companies were retained in the public sector.

By the time of the so-called Vesting day, March 31, 1990, the overriding desire of the government was to get the whole of the restructuring and privatization accomplished within the period of that government. Therefore, despite the fact that the nuclear stations were withdrawn from the privatization package, the sizes of National Power and PowerGen were not rethought, either in terms of their relative sizes or in terms of a further division of either company. Thus, privatization produced a duopoly in the generation sector, with National Power and PowerGen taking nearly 80% of the generation market, and Nuclear Electric accounting for most of the rest. Some generation was also accessed via interconnectors with France and Scotland.

One of OFFER's main duties is the promotion of competition in generation. Its licensing policy has been to provide a license to any operator able to credibly establish that their project was a viable project. OFFER's licensing policy has not been used in any way to create barriers to entry through, for instance, denial of licenses to gas-based generation or to projects in certain locations. In

³In the UK system, the "supply" function to final customers is considered distinct from the operation of the distribution wires.

⁴Specifically, encouraging the creation of independent generators which could sell to the CEGB.

theory, generation isn't regulated. In practice, however, OFFER has been drawn into monitoring the major generators, especially National Power and PowerGen, because of the market power that they tended to have both in the Pool and in contract markets.

The National Grid Company (NGC) was given responsibility for transmission separated off from the CEEGB generation arm. NGC was considered to be important in the context of restructuring. It was charged under the Electricity Act with the duty of running an efficient and economical system and to facilitate competition in generation and supply. In addition, it is intended that NGC be neutral, in the sense that it is not allowed to trade any energy. NGC does own the two pumped storage facilities (about 2 MW in capacity), which are quite important in balancing the system, and more recently in setting system marginal price in the Pool. Apart from these, NGC is not permitted to own any generation.

NGC is owned by the twelve regional electricity companies (RECs). One main argument was that, prior to Vesting, there was considerable uncertainty as to what the assets of the grid were worth. Given that the experience with CEEGB's joint ownership of transmission and generation wasn't a very happy one, the alternative, in order to avoid a separate flotation, was to give the ownership to the RECs, which is what was ultimately done. The Articles of Association of NGC are such, however, that they limit the RECs' influence on the grid. Ultimately, because of the joint grid ownership among the RECs, capital markets do not have a very clear "fix" on the grid's asset value. Thus, there may not be the same sort of capital market pressure on the grid as with the other companies.

NGC's transmission business is price controlled with price cap regulation, set initially at vesting for a three-year period (until March 1993); the cap was reset recently. One of the features of the present arrangement in England and Wales is that the grid's transmission business is responsible

for constructing and maintaining the grid. In contrast, the costs of operating the grid (constrained costs, reactive power, etc.) are all passed through the Pool! And so there is a division between the cost of building and maintaining the grid within the transmission business and the cost of operating the grid which is met through the Pool.

As far as distribution is concerned, there is a distribution system within each of the twelve regional companies. As with the grid, they provide open and equal access to their systems, and they mustn't discriminate among companies (including, in particular, their own companies) in terms of what they charge. The distributors must publish a statement of charges subject to OFFER approval. These provisions are the same as those which apply to the National Grid. The use of the distribution systems is subject to a price control of RPI-X; i.e., increasing at the rate of the retail price under "RPI" minus the "X" efficiency factor. Price controls were set by the government at Vesting at

⁵See page 5 below for an explanation of Pool structure and operation.

different levels for different companies for a period of five years, the longest period for the initial price controls. This has been a rather contentious price control, because the "X"s that were set gave the distribution companies sizeable profits. As a result, some users have sought to have the price control review conducted sooner than originally planned in 1995. OFFER has considered this question repeatedly in the past, and was conscious of the fact that the essence of price cap regulation is to provide the companies with a stable environment which would ultimately benefit customers. Thus, conducting the price control review sooner than scheduled would likely engender the view among the regional companies and their shareholders that the regulatory regime wasn't stable, which could raise the companies' cost of capital and thereby harm customers in the end. For this reason, the review which is now underway, has not been conducted sooner than planned.

The idea of competition in supply was a relatively late development in industry restructuring. It was phased in such that only large customers (> 1 MW maximum demand) were able to choose from competing suppliers at the time of Vesting. A second phase of competitive market access will be introduced in April 1994, when all customers with maximum demand over 100 kW may choose from competing suppliers. In April 1998, all customers will be able to choose from competing suppliers. The people who compete as suppliers, under so-called second-tier supply licenses, include the regional companies operating outside of their own area and the generators National Power and PowerGen. Some of the largest customers have taken out licenses to supply themselves. More recently, some independent suppliers have come into the market (mostly companies which are trading other commodities).

It was difficult at the time of Vesting to work out how to regulate the franchise supply market without regulating the competitive market. The initial supply price controls, which were set at Vesting for four years, therefore covered the whole of the supply market. In a very recent review of the supply price controls, OFFER has decided to remove regulation from the competitive market so that, by next April, the only part of the supply market which will be regulated is the franchise market (domestic and commercial customers with demands less than 1000 kW). For all customers, of course, the transmission and distribution elements of price remain controlled.

Another provision introduced with the new arrangements at Vesting is the Fossil Fuel Levy. Faced with the prospect of privatization, analysts looked more closely into the cost of nuclear power; prior to this step, the costs had always been embedded in CEGB's total portfolio. This cost turned out to be high, and nuclear was thus removed from privatization plans. Given, however, that the Government wanted the diversity of supply offered by nuclear power, the additional cost of nuclear power would be met by a new Fossil Fuel Levy so that nuclear could remain on the system. The nuclear company thereby receives substantial extra revenue which amounts to about 80% over and above Pool prices. This year, about 95% of the Levy supports nuclear capacity, and the remaining 5% supports renewables. This support is presently due to be removed by 1998, although support for renewables is now to continue beyond this date. The other effect of removing nuclear from the

privatization was a moratorium on new nuclear build. There was also to be government review in 1994 to see whether or not Nuclear Electric would be allowed to build more stations. (In the meantime, the government has brought this review forward to later this year.)

The other Important innovation introduced in restructuring is the Pool. The Pool has two elements to it. NGC, the grid operator, is responsible — through the Pool — for ensuring that demand is met by available generation at all times. NGC is responsible for dispatching generation in least cost merit order. The other side of the Pool is the settlement arrangement, whereby generators are paid and suppliers charged on a half-hour by half-hour basis. The Pool is basically run by an executive committee of ten people. According to the settlement agreements (voluminous and complex documents amounting to some 3000 pages!) by which the Pool is run, the committee is charged with balancing the interests of present and prospective pool members and customers. Five generators and five suppliers comprise this committee. OFFER's position vis-à-vis the Pool is somewhat ambiguous; it has observer status on this committee. OFFER has to approve any formal changes in the Pool agreement. If an appeal against a decision of the executive committee is brought by any Pool member, then OFFER hears the appeal. OFFER can also make proposals to the Pool which they have to answer in writing. If the Pool refused to make a change which OFFER considered important, then OFFER's only formal recourse would be a reference to the Monopolies and Mergers Commission.

The Pool price has four elements to it. First, there is the system marginal price (SMP), the energy element of the Pool price. It is set half-hour by half-hour so that one day consists of forty-eight half-hours. Each generation source bids in its availability and its price by 10 a.m. one day ahead. The bids are then ranked by NGC using the GOAL program. NGC forecasts demand and sets supply against this forecasted demand; the set which is at the margin is called the marginal set, which determines the price for everybody. So, even if a generator bids in very low (even zero), it gets the system marginal price.

The second element of the Pool price is called the capacity element. The basis of this element is that, if a plant is not called upon very often (i.e., has a very low load factor), it might be quite difficult to receive adequate remuneration through the marginal price. The capacity element is worked out by NGC according to a complex formula; the basic idea, however, is that if supply is tight relative to demand, there is some probability of losing load (the loss of load probability), which is also worked out by NGC. This probability is then multiplied by the value of lost load (set at Vesting at £2/kWh, inflated). When availability is tight in the Pool, generators receive the capacity element. Because of the way it is calculated, the capacity element is very volatile; it is very sensitive to small shifts in supply and demand.

The third element of Pool prices is what has come to be known as "uplift," comprising payments to generators for other services, e.g., reactive power, frequency control, scheduled reserve,

availability and constraint payments. If generators bid availability a day ahead, and they're not scheduled either for demand or for reserve, then they still will get payment for that availability. But the availability payment is tied to the capacity element, such that the availability payment is only high when the capacity element is high. Uplift includes operational payments covering the costs of constraining plants on and off the system due to transmission constraints. So, "uplift" has many different elements within it.

The fourth element of Pool prices is transmission losses. These are not actually calculated within any other prices. They are deemed to be the difference between a generator's metered payment at a grid supply point and supplier's metered payment. Suppliers' take at these grid supply points is pro rated up to account for these losses.

A few problems have been encountered in the Pool (reference Figure 1 from the OFFER Pool Price Statement July, 1993). Initially, after the Pool was established, the Pool price was very low. At Vesting, National Power and PowerGen had government contracts in place that covered virtually all of their generation. Those contracts were with the Regional Electricity Companies for a three-year period. So, these generators had their income needs satisfied and they were not relying on the Pool price for their income to any substantial extent. At the same time, the generators were given a substantial amount of British coal to burn and that meant that they were competing with each other to burn their coal. Prices were driven down to low levels. Some independent generators complained to OFFER that this price was giving a false message to the market. Once the generators had been privatized they began to look more closely at their pricing.

The first main problem that OFFER was asked to look at was a problem in the late summer/autumn of 1991. At that time, there was a big increase in the capacity payment and in uplift. What was happening was that PowerGen declared their plants with low availability initially, when the Pool price was set (thus eliciting high capacity payments). Once the Pool price had been set, they redeclared their availability to a higher level. Through this method, they received availability payments.

Following an OFFER investigation, a new license condition was adopted for the generators who now have to provide half-yearly statements of their expected availability, a reconciliation statement, and a good explanation as to why the two have differed if they have. The same license condition sought to encourage the generators, in effect, to test the sales market for any plant that they might want to close.

In the summer of last year, the system marginal price began to increase quite substantially. Capacity payments hadn't featured in the Pool for some time. The generators raised their SMP bids instead. OFFER investigated this and found that the two major generators together have market power such as they can move the price if they chose.

OFFER developed a rule of thumb for gauging the appropriateness of the Pool price based on avoidable costs. At this point, pool prices weren't above avoidable costs. Then, around April of this year, SMP increased very significantly, even to a level above avoidable costs. There was no reason in this case to say that price was justified on the avoidable costs basis. OFFER is now looking at the profit margins of the two generators to assess whether they are unacceptably high. One of the main results of the July 1993 Pool price statement was that OFFER has undertaken to consider by the end of the year whether to refer the major generators or the structure of the generation market to the Monopolies and Mergers Commission.

Uplift also features in OFFER's investigation. The first increase in uplift occurred much the same time as the capacity problem. OFFER prepared a special report on that experience, which found that the generators were giving the grid notice that they wanted to close some plants, the closure of which would necessitate grid reinforcement. This meant that these same plants would be constrained on the system while the reinforcement took place. When a plant is constrained on the system, it is paid its bid price, not SMP. Bid prices were very high; Powergen received exceptional profits from the closure of two of its stations. As a result of that, the generators voluntarily put into practice the idea of relating their constrained-on bids to cost.

Additionally, constrained-off stations have become a potential problem. The grid is doing quite a lot of reinforcement work between North and South: a lot of the U.K.'s generation is in the North of the country and a lot of demand is in the South. New generators are coming on line in the North. As a result, NGC is having to constrain off stations. When a station is constrained off, it gets the difference between its bid price and SMP. Some stations which have been constrained off are actually bidding zero or close to zero in the Pool. So they are getting high constrained off payments. Consequently, OFFER requested that NGC and the Pool review whether or not paying constrained off on this basis is appropriate.

At Vesting, National Power and PowerGen had about 80% of the market between them. Since then, they have closed some capacity (still retaining a large capacity market share). Nuclear Electric, in particular, has increased output from its power stations significantly, as have the interconnected Scottish companies. Some new independents are already on the system. So, in terms of output, National Power and PowerGen are losing market share, not yet significantly, but the loss is likely to continue. One forecast is that by next year, Nuclear Electric, in term of output, might actually overtake PowerGen. What's happening is that the power coming over the interconnector, the nuclear and the new gas-fired stations are all coming in as baseload stations. They bid into the Pool very low and they get called first. The coal-fired and oil-fired capacity of National Power and PowerGen are being pushed up the merit order, and thus their load factors are dropping. What this also means is that National Power and PowerGen, even though it looks as if there is increasing competition in generation (as indeed in one sense there is), are retaining the power of being able to

set the marginal price. Simply, it is their plants which tend to be at the margin. This is one of the conundrums in the U.K. system.

As far as the supply market is concerned, competition was allowed at first for customers greater than 1 MW maximum demand, later for those above 0.1 MW and later on, for everyone. The phased introduction was put into place by the government at Vesting. The phase-in was partly due to the fact that the support for the British Coal industry was achieved through contracts between generators and the regional companies who then needed to be assured of a supply market. New 5- year contracts have been in place since April of this year, containing a much reduced level of support for British Coal.

Competitive suppliers cannot supply customers below the franchise limit. The customers might want to aggregate themselves into larger blocks. One of the more esoteric things that OFFER had to do was to determine what the boundary was. It is defined fairly strictly in terms of maximum demand at a single premises.

One of the biggest potential problems in the competitive supply market has been the substantial metering costs associated with going to a competitive second tier supplier. When a customer wants to take supply from a competitive supplier, it has to have a half hour meter in place and a communication link to allow the Pool to read the data every day half hour by half hour. Initially, those metering costs were very significant. The regional companies had a monopoly over the meters and the collection of data through the Pool. Even if the larger customers (> 1 MW) could cope with the high prices there was no way that the smaller 100 kW customers could pay. One of the things that has been occupying OFFER's time a great deal over the last few months is to try to get these metering costs down, so that metering does not present a barrier to entry in the competitive supply market. Competition has also been opened up in metering by allowing new operators into the market. OFFER recently issued a metering statement for the 100W market which sets out the position.

Competition in supply in the over 1 MW market has actually been very active, even though the product offered cannot be very differentiated. A lot of large industrial customers have taken Pool price contracts. Last year, there were about 1000 direct customers, this year there are about 1500. Because of this change to Pool price contracts, there has been a great deal of interest created in the Pool price, which is variable every half hour. The price is known at four o'clock a day in advance and is published, in the *Financial Times*. So, before a production day starts, large industrial customers can check the price and load manage against it.

Metering costs should not now present a barrier to entry for the next tranche of (100 kW) customers who are entering the competitive supply market in April 1994. The lowest electricity bill faced by such customers is about fifteen thousand pounds a year, the average age is quite a lot higher.

There has to be a substantial re-think about the following tranche of the supply market however. In 1998, all customers including small domestic customers can enter the competitive supply market. By then, either the metering costs have got to come down much more substantially, or they are going to have to be spread out over a much longer period. Or, there is going to have to be a change in the requirement of half-hour metering. A willingness to forgo exact metering in favor of some risk-sharing arrangement could avoid the large metering costs. OFFER has yet to address this issue and industry has yet to address it.

The drop in metering costs for the 100 kW market was due to both a real cost decrease (i.e., an improvement of technology) and to prices more closely reflecting real costs. There are two elements in the metering charges: the data collection charge and the charge for the communication link. The big innovation there is the possibility that one might communicate through radio rather than telephone. On the metering side, the meters required for the 100 kW market are not quite as sophisticated as those for higher demands. Also manufacturers have worked to get metering costs down, so the cost of the product has fallen. The rents to installers have also been squeezed down.

To evaluate the overall effectiveness of restructuring, two aspects are important: the prices people pay and the cost of production. In terms of prices, there is some justification for thinking that customers have not yet really seen the full beneficial effect of privatization. For domestic customers, for instance, there was written into the overall price control at vesting a 3% real price increase initially. The people who have benefitted are the medium-sized customers larger than 1 MW who were not that energy intensive. They saw substantial reductions in real electricity prices as soon as they were able to take competitive supply. National Power and PowerGen both entered this market in a very big way. The Department of Trade and Industry's survey showed as of March of this year that on average those customers were paying less in real terms for electricity than before Vesting.

Those who have lost out most are those energy intensive users who had a very favorable deal under the nationalized system. They apparently had their electricity priced on the basis of marginal cost and also on the basis that it was not generated from expensive British coal, but from cheap world market coal. The new system doesn't allow or provide the incentive for discrimination between customers except in terms of the cost of service. Many of these industrial customers have met really quite substantial price increases. ICI, for instance, often quotes price rises of up to 40%, which is a real problem for ICI, especially having gone through an economic recession.

In terms of costs, the biggest shakeout has been in the generation sector; it has been really quite dramatic. Both National Power and PowerGen have shed over half of their staff, and there are still more savings to come. Nuclear Electric has faced similar pressures since they compete with the other two firms and because of the upcoming review of nuclear generation at the end of this year; they want to show that they operate efficiently within the market. There have also been

reorganizations and staff cuts within NGC. It can be argued that there have been fewer gains in the regional companies, as yet. They generally enjoy high profits from price controls.

There is a limit on regional companies' self-generation of 15% of their demand. There has been some controversy over their entry into the generation market. Not so much concerning their entry, per se, because. National Power and PowerGen, of course, have been allowed to enter the supply market. The controversy centers on whether or not there has been a "dash for gas," whether the amount of this new gas generation is really efficient. Many have asked whether the British coal industry has been unnecessarily decimated by the new gas-fired generation. In addition to the cap on their own generation, the regional companies have a provision in their license that requires them to purchase economically. Their contracts were reviewed by OFFER on this basis around the end of last year. The result was that, in terms of what was on offer for the regional companies, the prices which they were paying for new generation were not at all out of line.

It is easier to understand electricity regulation in the context of British privatization as a whole. Most of the privatization schemes, including in energy, have resulted, initially, in not a great deal of liberalization of the market. The way it has worked is that the regulators have been given pro-competition duties and asked to manage the transition to a more competitive market. That's why OFFER has a good deal of involvement in generation, there was a need to oversee the transition to a more competitive market.

The position of the gas industry was somewhat similar. There was a dispute between the gas industry regulator and British Gas, which was privatized more or less as a monopoly. Eventually, this was resolved by two inquiries by the Monopolies and Mergers Commission (MMC). If the MMC recommendations are accepted, this could result in a very competitive market in gas in Britain.

It may be that, in the end, the electricity industry will also be subject to a monopolies inquiry. Alternatively, the companies, realizing that they are in danger of a monopolies investigation, could simply conduct themselves so as to avoid one.

When one looks at the character and variability of the supply contracts between industrial customers and suppliers, one sees some differentiation among them. The contracts are, for the most part, however, of similar duration. Customers, on the whole, don't seem to want contracts longer than one year. There is thus substantial recontracting for new supplies around April of each year. This is very much a customer-driven phenomenon; certainly, some of the suppliers are trying to sell longer contracts. The differentiation that has been occurring is in terms of how close the contract is to a fixed price contract. Initially, the situation was clear cut; there were only fixed-price contracts and Pool price contracts; now there is a wider variety of contracts. Some of them, typically, fix prices at certain times when industrial customers want them fixed, either at a particular time of day or month or a part of the year. The other thing that suppliers use to differentiate their product is to

offer energy management services and forecasting services (including uplift forecasts). Another very popular service is "triad spotting." This refers to the process whereby the National Grid charges for its transmission on the basis of demand measured in three different half-hour periods during the year, typically three periods in the winter separated by 10 days. If their customers are not taking demand at those times, then they do not pay grid charges. So, there is really a very big incentive to spot when those periods are going to occur. Suppliers have been trying to do so for their customers. Demand is affected very much by these so-called triad warnings. It was estimated that, last winter, there was 1.5 GW of load shed on this basis. In sum, competitive suppliers are differentiating according to the product and according to the additional services offered.

Introducing more competition into generation is obviously an important issue. There is quite a lot of independent generation coming forward. There is about 8 GW under construction or planned, basically baseload. Those generators have got contracts with the regional companies and their main concern would be to make sure that the plants are run; therefore, they will be bidding low into the Pool to ensure that they will be running baseload. Therefore, the crucial thing is to get competition into the mid-merit and the peaking plants. When the new license condition was introduced last year, it allowed OFFER to appoint an assessor to see if a plant closure is "reasonable" and solicit comments from others who might be interested in purchasing the plant. If the generators do not sell plant, the most OFFER can do, ultimately, is to refer a case to the MMC. It can then recommend a divestment.

There is nothing in the Pool to keep people from low bidding. Some of the generators, especially the new ones, don't have the manpower to be figuring out bids. They just want to get on the system. The fact that they then do not set Pool prices is simply a byproduct of their low bid. Where low bids in the Pool have become an issue is where these companies' plants have been constrained off and received high payments. This includes the nuclear plants: they are bidding very low — close to zero.

It has been claimed that large industrial customers in the U.K. find it difficult to negotiate contracts. One of the reasons they are only going for one-year contracts is that they think they will be able to negotiate better contracts over time. Some feel that if the generator knew that it would only be paid what it bid, it would give a real motivation to the generator to negotiate some of the other kinds of contracts and it would develop a more vibrant contract market along with the spot market -- the two would work hand in hand. As long as the generator knows that it's going to get paid the full price no matter what it bids, it can remove the motivation to try to negotiate any other longer-term kinds of contracts.

One would undoubtedly change the structure of bids if people were paid their bids. If there were much more diversity in terms of ownership of the plants, it is possible that some generators may have an incentive to sell contracts below Pool prices. They may very much value the hedge that their

generation would get. In that sense, they would be risk-averse and they would will be willing to sell part of their output below the Pool price. If the big customers are allowed to take electricity at cheaper than Pool price, then an argument could be made that domestic customers should be able to do so, as well. In principle, they could aggregate their loads through their suppliers, i.e., the regional companies.

It was commented on regarding the closures that have taken place, that power generators were maybe refusing to sell these plants to people who were making positive bids. In this situation, the price level ought to be irrelevant. Any number greater than zero would be evidence of some market power. The only plants which should be closed are plants that have zero or negative value; it would make no sense for them to refuse to take \$100 unless they are exercising market power.

Much of the 7 MW or so of plant that has been closed so far really is plant that people may well not have wanted to buy. Future closures may be more attractive to prospective purchasers. The test is whether or not a deal can be struck soon.

An issue not yet addressed in the discussion is the extent to which environmental goals have shaped or constrained the development of the system. A more specific consideration would be whether there are incentives built into the system to substitute energy efficiency improvements for additional generation investment. If these incentives do exist, it is also important to ask if anybody has taken advantage of them,.

Environmentally, the most significant new development in the system is that all new capacity built has been gas. The ban on using gas in power stations was lifted at about the same time as Vesting. So a gas build was inevitable. With their gas build, the two large power generators are quite well within present EC environmental requirements and are likely to remain so for some time. If the negotiations going on in Europe at the moment come up with tighter regulations, that could well have quite a big impact on the companies. They may have to retrofit far more of their coal plants, or close them down and build more gas.

In terms of energy efficiency, because the utilities are not integrated as they are in the U.S., the least-cost planning idea is not practiced. Regarding the new supply price control in the franchise market, the regional companies have been allowed to add in £1/customer-year to their business costs to be spent on energy efficiency, with special emphasis on the homes of low-income customers. The other way in which efficiency has been accommodated is that the form of the supply price control was, at one time, based on unit supply. This has since changed in that it is now largely based on given revenue. Profits are thus not tied to sales volumes to the same extent as under the previous rules.

Turning again to the generation side, it was mentioned that one instrument at OFFER's disposal in encouraging more competition was the threat of referring the generating companies to the Monopolies and Mergers Commission. Other means by which to bolster competition in the marketplace would be useful. One of the areas which OFFER has been working on for quite some time is to get the demand side into the Pool. Then, you would actually have the demand curve alongside the supply curve. One consequence of this would be that it should provide demand side competition in setting the marginal price. This could actually be quite an effective way of introducing competition for the marginal plant. Some of the major customers (amongst others) have been pressing for some demand-side changes in the Pool. There are some schemes which have been proposed for the current winter. However, they do not fully integrate the demand curve into the Pool.

"Demand side" in this context could mean bringing in demand a day ahead so that bids are actually taken at the same time as the generators' bids; in this way, the demand would actually be factored into the setting of the price. Schemes that have been put forward so far do assume the dispatchability of demand along with the necessary associated metering, etc. Hence, those interested in participating were large companies.

Given supply bids a day ahead on availability and price, and demand bids where one commits to take certain quantities at various prices, you can actually put the two schedules together and work out the market price on this basis. It would be quite a radical change compared to the way the Pool works now. People are getting much more interested in such schemes, but if this concept came about in its quite radical form, then it would probably take some time to be introduced.

The potential for a futures market has always been a question of great interest, not least because of the liquidity it offers. In the past, several firms have looked at the market and have turned away. However, at present, there are a couple of financial firms in the market. One of the prerequisites for a futures market is a competitive primary market. If that isn't there, it is much more difficult to get the futures market off the ground.

Economic incentives and scheduling reserves are the major instruments available to the Pool to gain the cooperation of the generators and large industrial customers, as necessary, to change their Plans on short notice to respond to extraordinary circumstances. When NGC sets its demand forecast, it schedules against the biggest credible failure on the system. There's also payment for "just being there," whether or not one is called upon for the Pool; the amount can be substantial. The idea of managing the system with very tight capacity constraints hasn't yet arisen. If that did occur, of course, the capacity payment would increase, and this would bring more capacity on line.

The concern to ensure that critical capacity shortages did not arise was built into the design of the Pool rules. That concern has diminished in light of NGC's experience since Vesting. Whether or not this concern will recur is another matter. In the U.K. most of the supply interruptions have never been due to generation problem. They practically always concern the distribution or transmission systems. There is a false presumption that insecurity in supply is about generation.

As for reliability and increased competition in supply, this has been dealt with in various ways. One way is that the regional companies have the duty to be supplier of last resort: they have to provide supply to anyone who requests it, irrespective of whether or not that customer had been being supplied by someone else, e.g., &-competitive supplier. This is met by the obligation on the regional companies to buy out of the Pool up to the value of lost load, now at £2.4/kWh, which is a high price.

To clarify the pricing policies in the new system, tariffs paid by franchise customers of the regional companies are subject to price controls involving control on transmission, distribution and supply charges and the pass-through of generation costs. To the extent that longer-term contracts are in place with generators, franchise customers are not affected by present Pool prices. At the moment, National Power and PowerGen have five-year contracts with the regional companies; also, the regional companies have got other contracts with their own independent generation. These together cover quite a large percentage of the franchise market. Almost all independent power is being built on long-term contracts. Fifteen-year contracts were initially required by the financial institutions who were largely financing the projects.

The customers operating in the competitive supply market can buy from either their local regional companies or any second-tier supplier; that contract can either be a fixed price contract, a Pool price-based contract, or something in between.

The Fossil Fuel Levy was basically set with contracts at Vesting. For example, nuclear had a contract which lasted from 1990 to 1998. The amount of subsidy going to nuclear is more or less set on that eight-year scale. The subsidy is quite substantial, giving nuclear nearly twice as much as the Pool price. It represents a levy on all supply this year of 10% of the bill. Last year, the levy amounted to £1.3 billion, which basically went to nuclear, with a nominal amount going to renewable generators. To set the levy, OFFER looks at how much is needed to be collected, and then at a forecast of total leviable sales. One divided by the other yields the levy rate. If there is undercollection for a given year, it can be corrected the next year. Support for nuclear is due to end in 1998, while support for renewables has been extended beyond 1998. Whether or not the nuclear element of the levy continues beyond 1998 will depend on the government's review of nuclear power.

The subsidy is only to Nuclear Electric and to renewable generators within England and Wales. Scotland has its own arrangement. Non-fossil electricity imported into England and Wales does not get support from the levy but it does tend to go at a premium price because it is not leviable.

Both of the major generators are very keen to expand overseas. In fact, National Power recently signed an agreement in principle to buy the generation assets of a U.S. independent power producer. Another option is to diversify into other energy industries. The regional companies and the generators have begun to go into gas contracts.

There are features of the UK system which could usefully be emulated as the US moves toward greater competition. The separation of certain businesses is very important. In particular, the neutrality of the National Grid is vital.

It would have been helpful to have had transmission charges in place from the outset which reflected costs. The initial transmission charge structure was not cost-reflective. OFM only approved the form of the charges statement, with the understanding that the grid would review the structure of its charges to make them more cost-effective, which they have done. There is quite a significant differential now between charges in the North and the South. (Indeed, there are negative charges for generation in the South.) So, there are regional differentiations in charges. Because there were winners and losers, it was very difficult to actually get that system in place.

It might also be more efficient to avoid having a fragmented structure (as the U.K. has now) whereby grid construction and maintenance is the responsibility of NGC's transmission business and grid operation is run by the Pool.

The Pool has worked very well in terms of getting plant scheduled and dispatched and hence 'keeping the lights on.' However, the half-hour by half-hour settlement system is actually quite expensive to run. One of the things that, if possible, one might like to introduce, is to give generators and suppliers an option, an institutional choice, as to whether or not they settle through the Pool or some other way. In that way, at least you can introduce pressures to keep the costs of settlement down. The Pool is exceptionally complex. The generators' bids, for instance, consist of five elements. In some ways, such a provision was meant to make the Pool more transparent. It has actually made the bids much less transparent, because it's difficult to work out what is really happening. It would therefore be helpful to reduce the complexity of the Pool. As mentioned before, getting the demand side into the Pool would also be quite important.

Figure 1 : Average Pool Price by Component

