The 1990 power reforms in England and Wales were designed to permit the introduction of competition at both the retail and the wholesale level. Generation was both vertically separated from transmission and horizontally separated. The sector was almost completely privatized—only the nuclear capacity was left in public hands—and regulation was applied both to promote competition and to ensure that the remaining monopolies did not exploit their advantage.

The new industry structure emerged with three generating companies: National Power (52 percent of capacity at that time) and PowerGen (33 percent), which were privatized, with 60 percent of their shares sold initially, and Nuclear Electric (15 percent), which was left under public ownership. National Power’s share of capacity gave it significant market power. The national grid company—after separation from the generating companies—was transferred to joint ownership by the twelve privatized regional distribution companies. (The grid company retains control of dispatch.) Each of the twelve regional distribution companies (RECs) has two separate functions—distribution (through low-voltage wires or, more simply, grid to door) and retail supply (the sale of electricity to final customers)—and these functions must be accounted for separately. Access to the distribution operation of the RECs is regulated so that any seller of electricity has the right to “use” the associated distribution network when selling to a final customer. Until March 1995, the government retained a “golden share” in each REC, giving it the power to block any takeover or merger.

Five years have now elapsed since the reforms began—and this Note discusses some of the lessons starting to emerge.

A framework for retail competition and regulation

The reforms sought to foster retail competition by allowing an increasing number of consumers to shop around for the best service. To start this, final consumers were divided into three classes:

- **Small.** Consumers with peak demand of less than 1 megawatt (MW) are “franchise customers” who must buy from their local REC. This limit was reduced to 100 kilowatts (kW) in 1994 and is scheduled to be abolished in 1998. RECs have an obligation to serve this group of consumers at regulated prices.
- **Medium.** Consumers with peak demand of 1 to 10 MW have a “right to tariff,” but they can also purchase at unregulated prices from the “second-tier” suppliers—firms with a license to sell (mainly the other RECs and the generators). Of the approximately 4,000 customers in this class (30 percent of total demand), 40 percent were using a second-tier supplier by 1993.
- **Large.** Consumers with demand exceeding 10 MW have no right to tariff. Instead, they have to negotiate their prices with the supplier they choose.

This market structure has a mix of regulated and unregulated prices, but even the unregulated prices are subject to oversight by the regulator in his capacity as promoter of competition. The prices for supply to final consumers are controlled by the price cap formula—\( RPI - X + Y \), where \( RPI \) is the rate of inflation, \( X \) is the estimated potential productivity gain, and \( Y \) is a passsthrough factor made up of transmission charges, distribution charges, electricity purchase costs, and a fossil fuel levy that subsidizes nuclear power. The factors covered by passsthrough account for about 95 percent of the total costs of supply.
The distribution charges account for just over 20 percent of the final price. The initial distribution price caps ranged from $RPI + 0$ to $RPI + 2.5$ among the RECs, implying that the prices at vesting were seen as inadequate to cover future costs. Transmission charges, which account for about 4 percent of final prices, are regulated through a price cap for which $X$ was initially set at zero.

**Wholesale markets—the power pool**

The most innovative reform was to the pricing of power sold by the generators to the RECs or to large final users. The generators sell all power to a pool. In this power pool (operated by the national grid company), generators bid to supply various units in half-hour slots during the next twenty-four hours. Dispatch is carried out by choosing plants in merit order of these bids, up to the point at which demand is satisfied.

The price the generators receive has three components: the system marginal price (SMP), the highest price bid by dispatched plants; the capacity payment, the loss-of-load probability (LOLP) times the value of lost load (VOLL) less the SMP; and the uplift, an adjustment to cover the costs imposed by transmission constraints, standby capacity, and the like. The pool attempts to mimic an unregulated market, but in fact it includes a strong degree of regulation (especially in the setting of the VOLL). To protect themselves against the potential variability of pool prices, generators and suppliers have entered into a series of short-term “contracts for differences” that allow both parties to manage the risks caused by uncertainty about pool prices.

**Volatile pool prices**

The new structure of the generation market immediately attracted attention. Pool prices fluctuated sharply and, paradoxically, occasionally rose during times of low demand. For example, while the yearly average was about 2 pence per kilowatt-hour (kWh), the price for three half-hour slots reached 16 pence per kWh on a sunny September afternoon in 1991 and spiked to 33 pence per kWh during December.

The regulator quickly reviewed pool prices and concluded that the generators could raise prices above marginal costs in at least two ways. First, they could declare some plant unavailable and thus affect the LOLP by reducing supply relative to demand. Later, after the dispatching schedule had been determined, they might even declare this plant available. Because of the huge difference between the typical SMP and the VOLL, a small increase in the LOLP has a large effect on the pool price. Second, the generators could manipulate the uplift factor. Because of transmission constraints, certain power stations were optimal to dispatch even when their price was well above that of the marginal station bid in to meet the demand. The generators soon learned to set the bids for these stations well above costs.

To prevent the withdrawal of plant that was actually available, the regulator appointed an independent assessor. The price spikes disappeared, but big industrial users continued to complain about the general level of prices. Rather than refer the generators to the Monopolies Commission, whose decision could have involved restructuring—a decision that would have been seen as betraying the shareholders—the regulator in 1994 accepted undertakings by the generators. The generators specified that they would bid into the pool so that the pool price would average about 2.5 pence per kWh for the next two years, and that they would dispose of another 6 gigawatts (GW) of capacity within two years. The pricing agreement amounted to a 7 percent cut in real prices over the previous year. This capping of pool prices cannot be a permanent solution for a market designed to be competitive, however. The regulator probably expects that new investment will help to make the market more competitive over time.

**RECs’ profits and shifting structures**

In the past two years, the RECs have come under public attack because of their continuing high profits and the large salary increases (boosted by share options) for top executives (table 1). (Profits in generation, though substantial, have not been attacked as excessive, and
supply has been the least profitable part of the electricity business.) The RECs have been only lightly regulated, with the result that growth in their profits has averaged up to 30 percent a year. Following the first scheduled review of the price cap for distribution in 1994, the RECs had to reduce their charges by 11 to 17 percent in 1995–96, and thereafter an \( RPI - 2 \) price cap was to be used until 1999–2000.

The rapid growth in the profits of RECs made them attractive targets for takeover. In December 1994, anticipating the expiration of the government’s golden shares preventing takeovers, Trafalgar House bid £1.2 billion for Northern Electric (about four times its selling price at privatization), or £10.81 a share. Northern Electric responded by offering its shareholders a package worth £5.07 a share to reject the bid, provoking more public criticism. The temperature rose further when, in early 1995, the government sold its remaining 40 percent of shares in the two privatized generators. On the day after the sale, the regulator announced that the distribution review had not been completed and that he would be considering tightening the price caps. This announcement created a political storm, with the government being accused of insider dealing. And although new price caps were soon announced that further cut real prices over the next few years, takeover activity has continued, suggesting that investors still expect a good return from what is a low-risk business. Clearly, the government could have held out for a higher price at the time of privatization.

The RECs have made substantial new investments in generation—in a “dash for gas”—despite the overcapacity at the time of privatization. By 1993, they had interests in 5.4 GW of plant (mainly combined-cycle gas turbines) under construction or in operation. Diversifying supply has given them some protection from the market power of the generators. But because the price cap formula allows them to pass through all costs of purchasing electricity, they have a weak incentive to seek the cheapest source of supply, despite their obligation (to the regulator) to do so.

By 1995, the RECs were considering selling off the grid, suggesting that there was no great advantage in having left this vertical link at the time of privatization (generators are not allowed to own shares in it, though, to prevent anti-competitive links). Because the market value of the grid (£5 billion) appears to be considerably higher than that used at flotation (the RECs were sold for only £8 billion), the possibility of returning to final consumers part of any profits from its sale has been raised.

### An assessment

The ultimate aims of the U.K. reforms were to remove the sector from government funding and to reduce prices for consumers through the increased efficiency of private sector operation and the pressure of competition. Broadly speaking, the first objective has been accomplished, but the second objective has yet to be convincingly achieved. Many of the difficulties in achieving this second objective are related to the speed with which the restructuring and privatization had to take place. The political pressures at the time allowed a relatively short “window of opportunity,” but the desire to privatize the whole system and to introduce as much competition as possible demanded the creation of entirely new market forms for the industry. So some of the reforms are still under way. Shifting to an open power pool with continuous bidding and introducing retail competition in the second-tier market, for example, are both highly complex

### TABLE 1  PRETAX PROFITS AND REVENUE OF THE POWER SYSTEM IN ENGLAND AND WALES, 1992/93

<table>
<thead>
<tr>
<th>Company</th>
<th>Pretax profits</th>
<th>Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Power</td>
<td>580</td>
<td>4,348</td>
</tr>
<tr>
<td>PowerGen</td>
<td>425</td>
<td>3,188</td>
</tr>
<tr>
<td>Nuclear Electric</td>
<td>661</td>
<td>1,400</td>
</tr>
<tr>
<td>GridCo</td>
<td>350</td>
<td>1,396</td>
</tr>
<tr>
<td>RECs Distribution</td>
<td>1,042</td>
<td>3,751</td>
</tr>
<tr>
<td>Supply</td>
<td>—</td>
<td>13,921</td>
</tr>
</tbody>
</table>

\( a. \) The companies had small profits or losses.

reforms that take time to achieve, and the operation of these markets is still evolving.

The drop in the franchise limit to 100 kW initially created severe accounting problems because many potential customers lacked the special meters required to trace their usage through the day. Introducing retail competition in this segment of the market appears difficult if, as in England and Wales, the regulator is not given the responsibility and power to oversee expansion of this market. Metering is expensive, and the cost may not be worth it below 75 kW. Despite the vertical integration between transmission and distribution and between distribution and supply, there is no evidence that distributors hindered second-tier access to consumers in their region. This suggests that here the regulatory threat was effective—though possibly because the RECs did not wish to draw attention to their profits.

As it turns out, new investment in generation has been slow to have an effect on competition, and the dominant generators still have considerable market power. Partitioning the sector into smaller units and reducing the market share of the largest generator at the time of privatization would have helped create competition faster. Changing the structure of the industry or the general rules of the game after privatization is extremely difficult politically, because purchasers accept the terms of the privatization on the basis of the status at the time of privatization. Shareholders inevitably would claim that they had been cheated.

A striking trend in the system is the movement toward reintegration. Market forces are pushing distributors to consider merging with one another, to ward off threats of takeover from outside the industry by taking advantage of economies of scale. Vertical reintegration is also occurring as distributors purchase their own generating capacity. In addition, one of the generators is bidding to acquire a REC. The takeover movement, inevitable in mature stock markets when large profits are visible, will substantially complicate the formal regulation of the industry by making it harder for the regulator to identify the true costs of distribution. But a government cannot adopt a market-based system and then expect the structure to be set in stone.

The use of RPI–X price caps in the U.K. system has already yielded substantial experience. Price cap regulation was chosen to avoid the lack of incentive to reduce costs in a cost-plus (rate-of-return) regulation formula, and the regulatory process was designed to give the companies an assured period between regulatory reviews in which to look for cost savings greater than the X factors. But the regulator has been forced to intervene between scheduled reviews and to investigate the actual and potential returns to capital for the companies, moving the system toward the criteria used in U.S. rate-of-return regulation. The initial failure to set a reasonable price cap for the distributors has proved expensive for the consumer. Moreover, subsequent experience with setting price caps shows how difficult it is to correctly assess the level of productivity that can be obtained in the distribution sector. Prices have fallen relative to costs, but few of the efficiency gains have been passed on to consumers. Only time will tell whether this problem is transitory or reflects a basic weakness. Given the tendency toward large profits in the system, a form of regulation that provides a formula for sharing excessive profits with consumers may well emerge.

The regulator has come under enormous pressure. He has been made a scapegoat for suboptimal decisions made by the government at the time of privatization, a predicament illustrating the need for a strong and independent regulatory commission. The regulatory reviews show the difficulty of the regulator’s task. Each REC assembled its own regulatory team and produced massive documentation to support their own assessments of the desirable price caps. The relatively small size of the regulator’s office and its broad responsibilities clearly worked to the advantage of the companies.

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