

Freer Electricity Markets in the UK: A Progress Report

David M Newbery*
Department of Applied Economics
Cambridge, UK
6 May 1998

My purpose is to give a brief progress report on electricity markets in the UK, which I shall interpret more narrowly as England and Wales, where the key bulk electricity market, the Pool, is located. I shall argue that the English experiment has been very positive, and certainly very instructive, but is now at risk from old-style energy policy. The story begins when the state-owned Central Electricity Generating Board - the CEGB - was divided into four public limited companies: National Grid, PowerGen, National Power, and Nuclear Electric, on March 31st 1990. The twelve Regional Electricity Companies (RECs), who owned the local distribution assets, were given shares in National Grid and were sold to the public in December 1990.

Sixty per cent of National Power and PowerGen were sold to the public in March 1991, and the remaining 40% was sold in February 1995. The modern nuclear stations were finally removed from public ownership and privatised in June 1996. Let me start by listing the headline consequences, before attempting to account for them. In the five years after 1990:

- labour productivity in the former CEGB doubled
- nuclear output increased 28% overall with no increase in capacity, and nearly 50% from the more modern Advanced Gas-cooled Reactors
- gas-fired generation rose from almost nothing to 15% of output, and to 30% in 1997
- new entrants accounted for over half of new capacity
- fossil fuel cost/kWh fell 45% in real terms
- nuclear fuel cost/kWh fell 60% in real terms
- coal prices fell 20% in real terms
- British coal sales fell from 74 million tonnes to 30 million tonnes per year

* Keynote address given to the 21st IAEE Annual International Conference *Experimenting with Freer Markets* in Quebec City, May 15, 1998. Support from the British Economic and Social Research Council under the project R000 23 6828 is gratefully acknowledged.

- CO /kWh fell 28%, and SO and NO fell by over 40%

These gains were impressive, though not all this news was viewed as unambiguously good. The dash for gas and the switch from coal more than halved the size of the remaining deep coal mining industry. At privatisation, about three-quarters of electricity was coal-generated, and electricity took over three-quarters of British coal output. To ensure a smooth transition past the next general election, the generators were sold with three-year take-or-pay coal contracts at above world market prices. When these came up for renewal towards the end of 1992 they were seen to be uneconomic and the industry chose gas rather than expensive British coal. This accelerated the decline of the coal labour force, which had fallen from nearly 200,000 at the time of the 1984-5 coal miners' strike to about 70,000 by 1990. By 1993 the number had fallen to 20,000 and is now down to about 5,000.

The impending collapse of the coal market in 1992 led to a Parliamentary inquiry, during which the industry was put under considerable pressure to sign 5-year coal contracts, again at above world prices. The RECs signed 5-year coal-backed contracts with the generators and were allowed to pass through the extra costs to the captive domestic customers. The new coal contracts made it possible for the Government to privatise the coal industry for an acceptable price. The contracts were timed to expire when the domestic franchise ended in 1998, and matured at the end of March this year. Again, coal demand is falling, but this time the Labour Party is in power, a traditional supporter of coal miners. Their knee-jerk response was to prohibit any further gas-fired generation until the issue of coal is resolved in the now traditional inquiry.

I have spent some time on the coal issue because it symbolises the front line in the dispute between market forces and what is often called 'energy policy', which is code for government intervention in the energy markets. The case I wish to put is that competition is the key to improving the efficiency of the electricity industry, in part because it makes it more difficult for government or bureaucrats to intervene. Unfortunately, it does not reduce the temptation to intervene, and the longer run question is whether electricity and energy can actually be depoliticised. If not, can government policy be efficiently matched to the market, or is the only stable equilibrium a cartelized structure with inefficient regulation and political intervention?

But first, I need to defend the claim that competitive market

forces are the prime mover driving efficiency gains. The Conservative Government certainly believed that privatisation rather than competition, was the key, and sold British Telecom and British gas as *de facto* monopolies. Public opinion was hostile to selling public monopolies as private monopolies, and so the Government decided to unbundle the electricity industry and create rather modest competition in generation. The Minister thought that two companies met the requirements for competition and proposed one large company with all the nuclear assets, and one small company with only 40% of the fossil assets. It was only when the nuclear stations were withdrawn as unsalable that the number rose to three generation companies. Effectively, though, we had a duopoly because Nuclear Electric bids a zero price to ensure that it runs continuously and so never sets the price of electricity in the pool (which is set by the most expensive station called on to generate).

So what is the evidence that competition rather than privatisation is the source of the benefits? First, the productivity gains were shared by all three generating companies, even though Nuclear Electric remained state owned until 1996. Every power station has to bid into the Electricity Pool each day, and the resulting revenue provides a daily measure of performance which concentrates the minds of station operators wonderfully. The demonstrated threat of entry by independent power producers meant each station had to compete against the cost of combined cycle gas generation to survive. The entry price of gas generation was falling with improvements in technology and declining gas prices - both the result of competition in those two markets. We visited the largest coal power station in the UK, Drax, with 4000 MW capacity. With unchanged equipment except for new Flue Gas Desulphurisation, which needed an extra 50 workers, they had halved their labour force from 1200 to 600, in order to remain profitable at the gas entry price.

Second, the wires businesses of the RECs retained their franchise monopoly, and did not experience any appreciable change in efficiency growth until the Government's golden share expired and they could be taken over on the stock exchange. Competition in the capital market squeezed out considerable productivity improvements, so that US companies are now paying lavish premia to learn how to operate in the competitive UK market. We see the same effect of competition with British Telecom. In the first six years after privatisation BT competed with the tiny company, Mercury, protected from further entry in a cosy duopoly. Productivity growth was unchanged from before privatisation,

until the Duopoly review abolished protection against entry in 1991. Rapid entry occurred and BT responded with aggressive productivity improvements which finally marked a step change from past trends.

Third, competition in supply - that is, in the retailing function - was originally intended for large customers, but at relatively late in 1989 it was proposed to extend it to all consumers by 1998. Customer choice is critical in forcing the generators to adopt least cost fuel choices. A franchise monopoly gives the Government the means to influence fuel choices because the generators can be bought off in return for passing the extra cost through to the captive consumers. Initially only some 5,000 large sites with a demand above 1 MW could buy directly from the pool, and they accounted for about 30% of total supply. In 1994 50,000 customers with demand above 100 kW could buy direct, bringing the competitive share up to about a half. The plan is to allow the remaining 20 million consumers to choose their supplier starting later this year. The fact that half the market could choose their supplier forced the generators to halve their original coal contracts. However, the continuing domestic franchise allowed the remaining coal to be sold at above world prices, and kept domestic prices 9% higher than they will be when these contracts end. It is hard to believe that any REC will sign an uncompetitive contract in future once they have to compete for customers.

Finally, nuclear power was tested by the market and found wanting. Margaret Thatcher as Prime Minister was one of the principle architects of privatisation. She was particularly keen to find a way of countervailing against the power of the coal miners. In 1974 a coal miners' strike had brought down the Conservative Government and returned a Labour Government to power. In 1984 the coal miners went on strike again, this time for nearly a year, with the stated aim of bringing down the Thatcher Government. Not surprisingly, Margaret Thatcher was very keen on the planned nuclear power station programme. The first of what was originally intended to be 10 PWRs was already under construction, and the whole privatisation was structured to make nuclear power viable. We had the non-fossil fuel obligation to force RECs to buy nuclear power, and a fossil fuel levy to accumulate a fund to pay for decommissioning liabilities. Nuclear Electric continued to argue that although the first station was uneconomically expensive, future PWRs would be cheaper and justified by their additional contribution to fuel diversity, reduced green house gas emission, and promoting export sales of the technology. The market signalled otherwise, and when the modern nuclear stations

were privatised in 1996, Nuclear Electric abandoned any intention of building more nuclear plant.

The market thus replaced policy makers in determining our fuel mix, and allowed us to stop the expensive British coal and nuclear options. So far, so good - but can one put a figure on what these dramatic changes were worth to the country? Michael Pollitt and I have estimated the costs and benefits of restructuring and privatising the CEGB, and we find that even if there are no further improvements, and ignoring the considerable environmental benefits, the gains to date are equivalent to a permanent cost reduction of about 5% of generation costs (Newbery and Pollitt, 1997). In present value terms that is equivalent to about 40% on the current cost value of the assets concerned, and about 100% on the privatisation sales price. Environmental benefits might double this figure.

We also tried to estimate who gained and who lost, though this involves more crystal ball gazing. Our best estimate is that the Government (that is, the taxpayers) lost about £4 billion (US\$6 billion) in present value terms, discounting lost revenues at 6% to 1996, after allowing for the sales receipts of about £10 billion (US\$16 billion). Consumers lost between £1 billion and £6 billion (US\$2-10 billion) (also in present discounted value), depending how rapidly future prices fall back to their trend level. Shareholders gained a profit stream worth about £24 billion (US\$38 billion), discounting at 6%, for a share purchase cost of £10 billion (US\$16 billion). In short, the overall cost reductions were not huge - at 5% for ever - but then the industry was moderately well operated before privatisation. All the gains were reaped by shareholders, and the reason is that the price of electricity did not fall anything like as much as the cost of fuel or the reduction in other non-fuel costs, which also fell significantly.

Could we have avoided these adverse distributional outcomes? Almost certainly, though it would have been politically difficult. The most obvious criticism is that the industry was not made sufficiently competitive at privatisation. Richard Green and I published an article in the *JPE* in 1992 arguing that dividing the fossil plant among five generating companies would have eliminated most market power, lowered prices, and delayed some of the entry of gas generation (Green and Newbery, 1992). Later gas turbines had higher efficiency, and should have been better located nearer to demand centres, as the early locational price signals were poorly designed. When in Australia the State of Victoria decided to restructure its industry, it divided the generating plant between five companies and the result was intensely

competitive.

More competition in the pool might have avoided criticisms of manipulation, though it would probably not have led to less volatile prices, which are as much of a feature of competitive commodity markets as manipulated markets. If there had been more generators, and if the supply businesses had been separated from the wires business, as is now proposed, there would have been less objection to vertical integration between supply and generation, perhaps allowing a more rapid move to retail competition. More competition would have encouraged a more active contract market, and might have produced a liquid futures market instead of an illiquid forward market. But it would have taken longer to design, and, given the hostility of the opposition Labour party, was not feasible within the lifetime of the Government.

One should not underestimate the forces acting to resist competition. Governments do not like it because it lowers the privatisation receipts, and reduces their power to intervene. Abuse of market power is an excellent reason for political or regulatory guidance, while cartels allow the exercise of covert tax powers. The government can persuade those with market power to burn more British coal, or collect money for energy efficiency, or cross-subsidise favoured consumer groups, because it can always threaten an anti-trust suit if they do not comply. The companies have of course been trying to reduce competitive pressure - by mergers, vertical integration, and making entry more difficult through particular forms of pool reform.

Looking around the world, one can see that competition is a fragile plant. Argentina sets an admirable example, but Chile, who started restructuring before the UK, has problems of market dominance and vertical integration. The Netherlands decided to amalgamate its four generation companies into one large company to create a national champion. Spain also encouraged horizontal integration rather than maximising competition. The United States, where privatisation is not an issue, takes competition very seriously, but that is less obviously true north of the border. It seems to be particularly hard to persuade governments of the merits of competition when privatising, perhaps because they mainly listen to the industry, which is keen to retain market power. The threat is that if the lights go off, the government will be held responsible, whereas if the prices do not fall as rapidly as they might, then who is to notice?

The English experience suggests that this is wrong, for several

reasons. First, most privatisations in mature markets start with excess capacity and considerable slack, in a period of falling energy prices, so the risks of the lights going out are small, and the potential price reductions are well worth having. Second, share buyers will anticipate that the market will become, or be made, competitive later, so they will not pay the monopoly price anyway. Better therefore to lock in competition early if it is to be sold for effectively a competitive price. Third, high profits are politically unattractive - in Britain they gave the Labour Party elected in 1997 the excuse to impose a retrospective windfall tax - arguing that the original sales price had been too low given the subsequent profits earned. Finally, it is easier and cheaper to introduce competition into generation than into domestic supply, and it may make the latter step less urgent, and possibly not necessary at all.

What other lessons can we draw from the British experiment? It is too soon to say how domestic competition will work in electricity. We can look at evidence from the domestic gas market, which was gradually opened up from April 1996. Until then, British gas was vertically integrated and signed long-term contracts for beach deliveries of gas, which it transported and sold to its 18 million customers. The gas industry has been gradually unbundled, a spot market has emerged, and the spot price of gas is about half the old contract price. New gas is therefore cheaper and new suppliers can offer considerable discounts on the British Gas price, effectively stranding the old contracts. About 30% of customers switch in response to a price reduction which is about £50 (US\$80) per year or 15% of the annual gas bill. British Gas is increasingly responding to competition as it loses market share and is allowed to regionally differentiate its prices.

In electricity, the regulator will cap prices sold by RECs to their incumbent domestic customers and this regulated ceiling will fall by about 9%. It is difficult to see how new suppliers can offer much larger reductions than that as margins are only about 2-3%. It may be that bundling gas and electricity together will allow more aggressive competition between suppliers, but at some stage the regulator will need to decide whether to deregulate supply completely. If about one-half to two thirds of customers are reluctant to switch, then incumbent RECs and Centrica (British Gas) may be left with a comfortable quasi-monopoly position, much as the high street banks have in Britain.

Let me conclude by discussing the latest threat to competition -

the Labour Government's response to the end of the coal contracts. At present the main way of enforcing competition is through the threat of entry, for this encourages the major price-setting generators to offer contracts at slightly below the entry price, and to bid to keep the average Pool price also slightly below the entry price. The Labour Government wants to encourage these generators to continue buying expensive British coal. It has banned new gas-fired entry, and is rumoured to propose extending this ban for five years (*Financial Times*, 12 May 1998). Without this competitive threat, the generators will be free to raise prices, possibly by more than is necessary to cover the extra cost of coal. We have some experience of the likely result, because in 1994 the regulator reached an agreement with the National Power and PowerGen to bid so as to keep their annual average price below a cap (until they had divested 6,000 MW of fossil plant). They were able to do this to within less than 1% despite the most volatile prices ever. Last year (April 1997- March 1998) the system marginal price in the pool, which is supposed to reflect the marginal energy cost, increased by about £600 million (\$1000 million) compared to the year before, although fuel prices fell. Perhaps coincidentally, this was exactly equal to the windfall tax on the generators. The regulator has argued in his submission to the Government's review of energy resources for power stations that the moratorium might cost customers an extra £750 million (US\$ 1,200 million) per year without the disciplining effect of entry threats. If that happened, then electricity consumers might be paying about £150,000 (US\$ 240,000) *per year* for each mining job saved, which looks like a bad deal, and makes meeting our Kyoto global warming target even harder.

It seems perverse to privatise and restructure the electricity supply industry and then use inefficient and blunt instruments to achieve the old political goals that might more efficiently be deployed within a publicly owned vertically integrated industry. Next to that, giving regulators reasons to intervene by creating uncompetitive markets may not be so bad, but may not be so good either. I conclude that the price of an efficient and competitive electricity industry is eternal vigilance by the competition authorities, which is greatly simplified by an initially pro-competitive restructuring.

References

- Green, R. and D. Newbery (1992) 'Competition in the British Electricity Spot Market', *Journal of Political Economy* 100: 929-53.
- Newbery, D.M. and M.G. Pollitt (1997) 'The Restructuring and

Privatisation of the CEGB- Was it worth it', *Journal of Industrial Economics*, XLV (3), 269-303