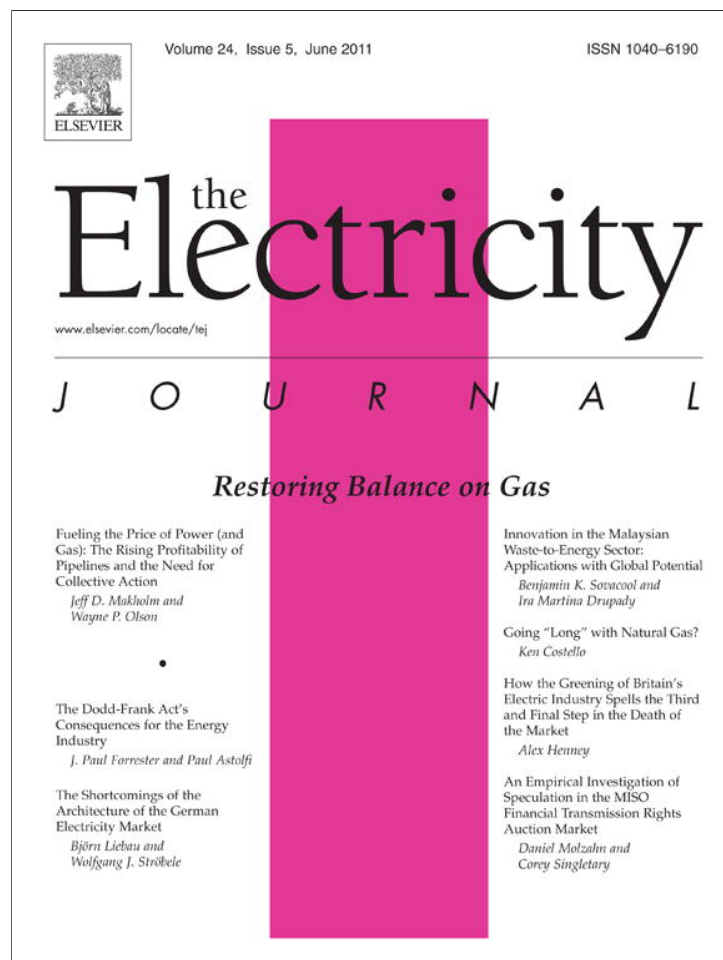


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How the Greening of Britain's Electric Industry Spells the Third and Final Step in the Death of the Market

The wasteful and fruitless creation of the New Electricity Trading Arrangements proved to be the first step in the demise of the market, and the formation of the oligopoly was the second. Now the greening scheme hatched by former Prime Minister Blair, with its impossible and expensive ambitions for 2020, represents the death knell.

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A fool is a man who never tried an experiment in his life.
– Charles Darwin

I. Introduction

Twenty-four years ago this past March I published the monograph *Privatise Power*, which advocated splitting up the Central Electricity Generation Board (CEGB), the monopoly public generation (58 GW) and transmission company that supplied England and Wales, to

create a competitive power market. I argued for 10 generating companies; to keep the nuclear plants in public ownership; to separate transmission, and to create a pool spot market that was based on a transmutation of the traditional U.S.-style split savings cooperative pool into a competitive pool with a marginal price. The publication was timed just before the election in June 1987, which the Conservative party under Margaret Thatcher won. My ideas found favor with

then-Secretary of State Cecil Parkinson, and in October I put together a paper "The Operation of a Power Market," which had some part in convincing the government that a competitive market would not lose the merit order (as the CEGB claimed).

In February 1988 the government determined to split the industry but, in the first of a series of political errors that have bedeviled the restructuring, determined to privatize the nuclear plants, including the pressurized-water reactor (PWR) that was under construction. The CEGB, with the complicity of the Department of Energy, had long lied about the cheap cost of nuclear power, and Mrs. Thatcher by that time thought she could not only walk on water but also on radionucleides. This decision led to the CEGB being split into only two generators, including one called Big G – which became National Power – which at 40 GW was supposed to be large enough to handle the operational risks of the idiosyncratic British-designed reactors, and the construction risks of the PWR. But while governments can fool themselves and manipulate public funny money, that political nonsense does not work when writing prospectuses for flotation. So given the ill-judged manner in which the government attempted to privatize the nuclear plants – I had proposed a leasing arrangement which could have been viable – the attempt predictably hit the buffers, and the nuclear plants were withdrawn

from the privatization scheme. The industry was restructured on April 1, 1990, complete with a Pool; the distributors and National Grid were privatized in November 1990, and the two major generators, National Power (29 GW) and PowerGen (16 GW) in February 1991.

I had three purposes in writing my latest book, *The British Electric Industry 1990–2010: The Rise and Demise of Competition*. First, to

The CEGB, with the complicity of the Department of Energy, had long lied about the cheap cost of nuclear power.

record an interesting episode of industrial history – what has happened over two decades could not have been envisaged in 1990. Second, to identify the successes and failures in the hope (probably vain) that we can learn from them. And third, to look at where we may be going. The book covers all aspects of the electric industry: the wholesale market with the wasteful and fruitless creation of the New Electricity Trading Arrangements, which proved to be the first step in the demise of the market; the nuclear roller coaster; the corporate whirligig that led to the formation of the oligopoly, which proved to be the second step

in the demise of the market; how smart metering is being provided unsmartly and expensively; the initial failure of effective network regulation followed by a slow learning process to innovative approaches (from which the U.S. could perhaps learn); and the greening of the electric industry with impossible and expensive ambitions for 2020, which is the death knell of the market. At the request of the editors of *The Electricity Journal*, I offer a summary here of the demise of the market.

II. From Duopoly to Competition to Oligopoly

The gods of the market tumbled, and their smooth-tongued wizards withdrew.

– Mark Twain

The nuclear fiasco left a legacy of a duopoly of price-setting generators which disfigured the operation of the market for a decade, during which time the regulator fought a battle with them. Along the way there was an unsuccessful enforced divestment of 6 GW of plant in 1996 to Eastern Electricity (which in due course became TXU Europe) to create a triopoly and the beginning of vertical integration. The divestment resulted in prices *increasing*, and the price-setting umbrella of the duopoly/triopoly encouraged many (mostly U.S.) developers to build merchant gas plant in the belief that the umbrella was a permanent fixture.

In 1997 a Labour Party government came to power. It wrongly believed that the Pool was the reason why so much gas plant was being developed that replaced generation from (expensive) British deep-mined coal, which disemployed British miners who were part of Labour's traditional political support. The government and regulator claimed that there was a problem of market power due to the Pool's uniform price auction (the mechanism used in all other electric markets in the world), rather than due to the industrial structure. So they set to work to replace the Pool with the New Electricity Trading Arrangements (NETA), which was an energy-only market based on bilateral trading and inducing parties to balance their positions by introducing a "Balancing Mechanism" (in place of the U.S.-style real-time pricing market). The Balancing Mechanism had two cash-out prices – one for parties who at "gate closure" an hour before run time were short,

and another price for parties who were long – with a significant spread between them. As I pointed out at the time, there was no theoretical or empirical justification for the belief that a uniform price auction *per se* was the cause of the exercise of the market power, but governmental/regulatory decision-making is not necessarily determined by reason and facts – often naïve ideology prevails. As well as bringing lower prices NETA was also supposed to lead to a more liquid contract market and various other desirable outcomes such as more transparency and more demand-side response.

While NETA was being developed the regulator had another push to get National Power and PowerGen to divest a further 4 GW. They saw the writing on the wall with the significant quantity of plant coming on stream, and divested 13 GW and got the government's agreement that they could buy local distributors and so vertically

integrate. They kept prices high long enough to flog off their plant at top dollar, mainly to U.S. companies. Then, with surplus plant and fragmented ownership, the price collapsed and for three years we had a competitive commodity market, but at the bottom of its cycle, as shown in **Figure 1**.

Many companies caught a cold – if not pneumonia. Thus AES, which had bought the 4 GW Drax coal plant, walked away from it and left it to the banks. Edison bought two coal plants for £1.3 billion; sold them to AEP for £650 million; who in turn sold them to Scottish and Southern for £350 million; and TXU Europe which had splashed money around Europe and developed an "asset light" philosophy similar to Enron, had sold off assets and signed 11 power-purchase agreements that were out of the money. It went into administration in November 2002, and TXU Corp. recorded a loss of \$4.2 billion in 2002. And British Energy – the eventually

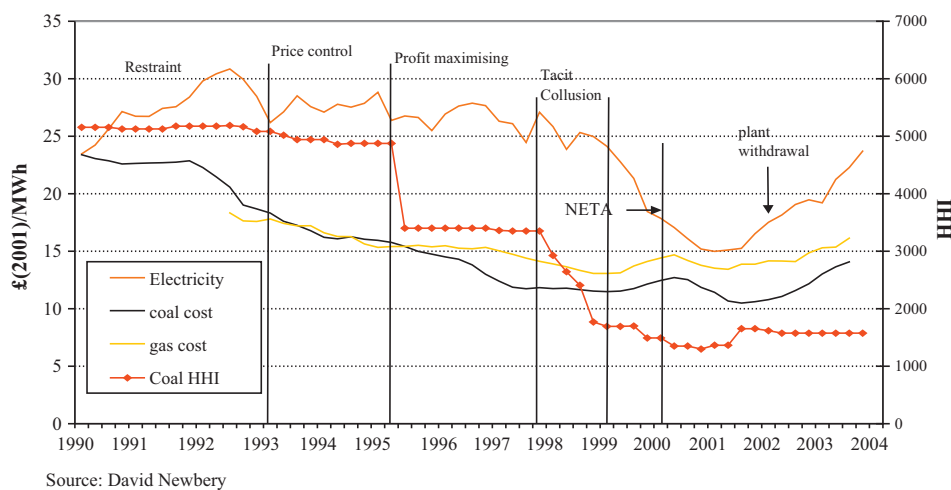
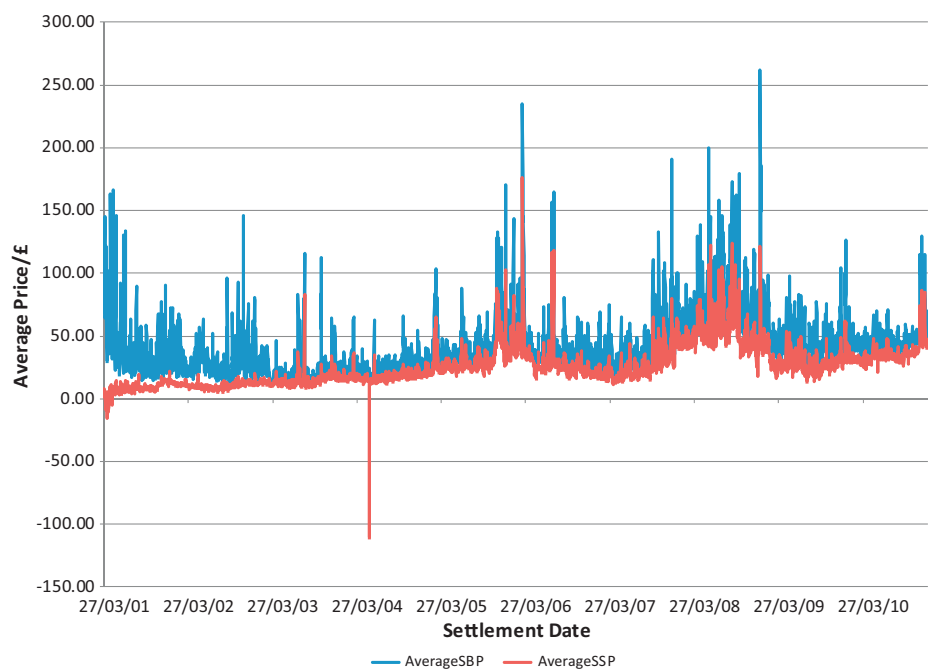


Figure 1: Electricity, Coal and Gas prices and the HHI for Coal Plant



Source: Elexon

Figure 2: Spread Between Average Daily SBP and SSP – 2002–07

privatized nuclear company – went into structured insolvency.

NETA was an economic abortion which achieved none of the clearly stated objectives the government and regulator set out. The prices in the Balancing Mechanism were not only penal, they were capricious, as shown in **Figure 2**.

This behavior placed a high premium on vertical integration and size and hit small non-vertically integrated retailers and generators hard.

Consequently the industry consolidated in the early years of the last decade into an oligopoly of six companies, as large continental companies – Electricité de France, E.On, RWE, and Iberdrola – stepped in while U.S. companies withdrew, generally to lick their financial wounds. The behavior of the Balancing Mechanism also kept

paper traders out of the prompt market, and consolidation reduced the scope for trading, so liquidity in the contract market was reduced.

If NETA was the first step in the demise of the market, the actions of the government and regulator in allowing the consolidation of the industry was the second step, and Tony Blair's mission to take a lead in saving the planet would be the third.

III. The Greening of the Electric Industry

Most schemes of political improvement are laughable.

– Samuel Johnson

A manifesto commitment of the Labour Party for the 1997 election was, "We will put concern for the environment at the heart of policy-making." Blair rapidly got in on

the act, setting up a Royal Commission on "Energy – The Changing Climate," which reported in 2002, and the "Stern Review: The Economics of Climate Change," which was hawked around the world in 2007. In between he wrote the foreword to several government papers, and actively supported – perhaps he thought he was leading – two major European initiatives.

The European Emissions Trading Scheme was based on U.S. NO_x and SO_x cap-and-trade schemes, and was introduced after the failure of an attempt to introduce a Europe-wide carbon tax, which many states regarded as an infringement of their sovereignty. The Emissions Trading Scheme was introduced on a pilot basis over the period 2005–08, and more seriously for the second period 2008–12. It did not achieve its objective of

inducing much – if any – discernable investment in greenery in the power sector in Europe because the price of carbon was both too low and too volatile. It was, nonetheless, a good try. But ironically, the attempt to introduce a carbon trading market rather than a carbon tax helped undermine the electricity market.

The second initiative is the so called 20/20/20 project in the European Union according to which by 2020 there should be a 20 percent reduction in energy consumption, and 20 percent of total energy consumed in the economy as a whole (i.e., including transport and heating) should come from renewable resources. Blair winged it, and in May 2007, without taking advice from either relevant political colleagues or civil service advisors, he committed the UK legally to achieving 15 percent renewables in the total national energy mix (up from a mere 1.5 percent in 2005) under what became the Renewables Directive 2009/28/EC. This target has been translated into 30 percent renewables electricity production. To achieve this the government has legislated the general European aspiration to largely decarbonize the electric industry by 2030, which requires even more renewables and some nuclear power stations. Since the UK had almost the lowest level of renewables in the European Union, the 2020 target has had three major consequences.

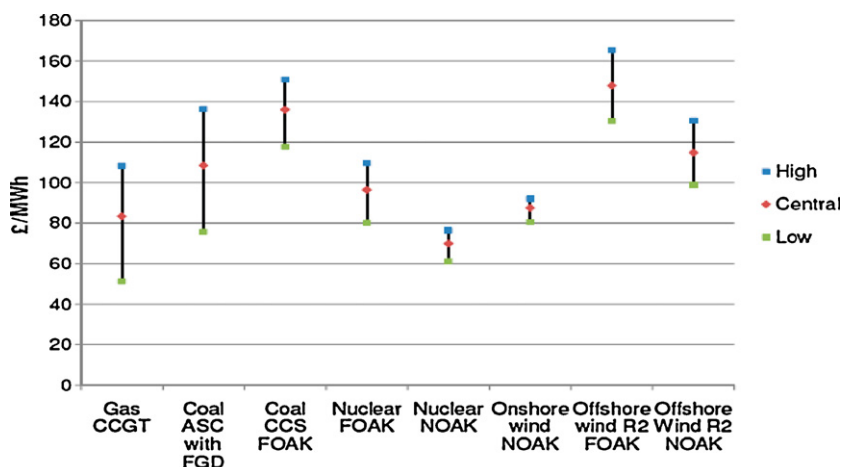
It commits the UK to spend about a quarter of the total

expenditure required in Europe to meet the target. And that is supposing other countries take it seriously (the proposition that the Mediterranean countries and East European countries take Directives seriously, let alone one that imposes such a financially onerous obligation when they are bust, is open to question).

The main renewables resource in the UK is wind, and since we are a small and generally overcrowded island, much of the resource is supposed to come from offshore windmills. But they are phenomenally expensive, costing (according to estimates provided for the government) \$5,000/kW to produce with a load factor of at best 35 percent¹ at about \$250/MWh; they make nuclear plants look cheap, as suggested in Figure 3. The cost of the windmills is only part of the story: the wind is not near the main load, and so in addition to very expensive offshore transmission the on-shore transmission system will have to

be significantly strengthened. The (fairly) story is that the rate of capital expenditure by the electric industry will have to double over this decade to deliver \$160 billion of transmission and generation by 2020.

The renewables effort not only undermines the Emissions Trading Scheme because it floods the “market” with subsidized product, it also undermines the electricity market. The electricity market is undermined in two ways. First, the achievement of targets for over-market and heavily subsidized wind and nuclear power plants replaces the market investment mechanism with de facto central planning. The traditional investment market, which allowed participants the freedom to put up their money (always into CCGTs) and to compete and prosper or otherwise depending on the market, is replaced by a politicized process where developers of renewables compete to lobby to get their



Source: DECC based on Mott MacDonald 2010

Figure 3: Levelized Costs of Generation Technologies

Table 1: The Reducing Load Factors of Thermal Plant (%)

	2010	2020	2030
CCGT – older	28	4	1
CCGT – newer	73	57	36
Coal	57	50	28

Source: [1].

hands in customers' pockets. In the case of the nuclear plants (subject to the impact of the recent Fukushima disaster) the British government is currently in begging mode and EdF has it over a barrel. Second, it extends further to impact on the gas plants that are required to back up the windmills. Simulation studies by consultant Pöyry of a future with a significant level of wind power not surprisingly reveals very volatile prices; prices in general are lowered; and also dispatch is driven (inversely) by wind (Figure 4).

The running regime of CCGTs and coal plants is highly irregular as they are "squeezed" into intermittent

patterns, with more starts per year; and thermal plant load factors are much lower, as indicated in Table 1.

The commercial risk of operating a thermal plant in a windy market will be much greater than currently, and consequently the cost of capital required for developing plant will increase. To the financial risk must be added political risks, as to how the government will change the trading arrangements. The government is undertaking an exercise which it calls the Energy Market Review [2] that aims to replace the investment market with new generation mainly driven by contracts supplemented by capacity payments for thermal back-up plants. And it is providing a carbon floor price, which seems to have little point beyond knocking coal plant off the system and providing a windfall gain to the existing nuclear plants. If Blair had resisted the impossible targets which led to planning, but

argued for a high carbon tax and let generation technologies take their course, we might still have an electricity market.

Few believe the government's target is achievable. Citi Investment Research & Analysis estimates that across the five major European markets (UK, Germany, France, Spain, Italy) the utility sector needs to spend about €940 billion this decade to meet requirements for asset renewal and replacement and to meet environmental objectives [3]. The level of spend required to meet targets represents at peak about a third of total European corporate capex. The UK should spend about a third of the total (€320 billion), of which 70 percent is environmental capex reflecting the very high cost of offshore windmills. Citi points out that over the period March 2009 to September 2010 the utility sector underperformed European stock markets by 30 percent. Thus while capex could be funded by raising debt for half of the decade,

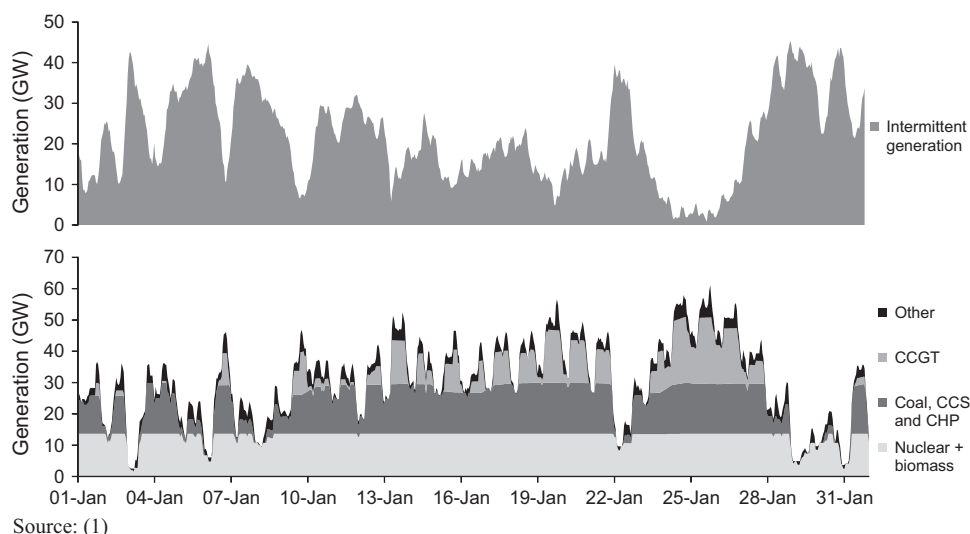


Figure 4: British Market in January 2030 with 2000 Weather

beyond that, unless the financial performance of the utility sector improves from higher prices then Citi assumes “unless the cost of equity falls substantially in the coming years, it seems to us that it is very unlikely that utilities will be willing or able to bridge the financing gap through selling equity.” On its assumptions Citi forecasts a capex underspend of €285 billion of which €135 billion will be in the UK. The report concludes:

In our view...

- Even if – the utility companies had the appetite to spend €938 billion they don't have the organizational capacity to do so
- Even if – they had the organizational capacity to spend the money the supply chain couldn't provide the equipment
- Even if – the supply chain could provide the equipment the utility companies don't have the balance sheet to finance the investment

- Even if – the utilities companies could raise the equity they wouldn't be able to afford the cost

- Even if – the utilities could finance the investment, the consumer wouldn't be able to afford their bills.

When the costs – which are currently hidden as a stealth tax on bills – mount, and people realize the futility of our puny unilateral efforts to impact on climate change while China and India pump out ever increasing volumes of CO₂ from coal plant, the wheels will likely come off the green venture.

* * *

The experience of the last two decades is of a bold experiment that went off the rails in part due to technical mistakes and latterly because of an attempt to show leadership in mitigating climate change, which may eventually be regarded as an expensive and pointless exercise given that China and

India will be increasing generation from coal. In a decade or so will someone write “The British electric industry – 2011 to 2020: the rise and demise of greenery”? What goes around, comes around!■

References

- [1] *Impact of Intermittency: How Wind Variability Could Change the Shape of the British and Irish Electricity Markets*, Summary Report, Pöyry, July 2009, at <http://www.Pöyry.com/linked/group/study>.
- [2] *Electric Market Reform Consultation Document*, DECC, Cm 7983, Dec. 2010, at <http://www.decc.gov.uk/assets/decc/consultations/emr/1041-electricity-market-reform-condoc.pdf>.
- [3] *The €1trn Euro Decade Revisited: Costs up, Risks up, but Governments Are Still in Denial*, Citi Investment Research and Analysis, Sept. 29, 2010.

Endnote:

1. The actual for 6 off-shore wind farms for 2009 was 29.4%.



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