Institutional Intent and Strategic Evolution in Electricity Markets

Derek W. Bunn

Introduction

In February 2006, the European Commission published a report on its inquiry into the functioning of the EU gas and electricity markets. Five main barriers to a fully functioning market in each were identified:

• **Market Concentration**, because of too few players
• **Vertical Foreclosure**, which shrinks the market for unbundled players
• **Lack of Integration**, between geographical markets
• **Lack of Transparency**, in the trading arrangements
• **Complexity of Price Formation**, in the market rules

It is easy to see from an economic perspective how all of these features may inhibit market development in terms of efficient entry and exit, and preclude the emergence of competitive pricing. Furthermore, these features are quite evident from even a superficial look at the market structure, trading and market mechanisms operating across Europe in 2006. Nevertheless, the simplicity of the criticism is deceptive. Parallel studies by the European Commission and most member state governments express concern about security of supply, investment adequacy, price volatility and the need to provide a long-term framework for the energy sector to meet economic, environmental and social policy goals. The policy dilemmas are apparent, and it is clear that the institutional management of the gas and electricity sectors is delicate process, as it has always been, of balancing the evolution of conflicting aspirations. At the same time as a need for competitive pricing is being determined and the virtues of a fully liberalised market, which evolves purely by market forces, is often expressed, we witness the markets being criticised for the behaviour of large incumbents having become barriers to entry, yet a succession of large mergers between major players are being approved and even encouraged by host governments.

*Market Concentration* is a structural concern insofar as oligopoly pricing can become unacceptably profitable in daily electricity markets when a small number of players learn to play an implicit repeated game. However, financial distress and bankruptcies amongst electricity generating companies are uncomfortable for regulators, not least because of their intense media attention, and governments generally prefer to see the energy needs of a country in the hands of financially robust companies able to withstand market shocks and maintain investment against temporary adverse conditions. Market concentration can

---

1 Derek Bunn is a Professor at London Business School: dbunn@london.edu. This paper is the text of the plenary presentation at “The European Electricity Market” Warsaw, 2006
often be a result of privatisation processes, where it might have been more expedient and profitable to sell companies with obvious market power. And, in terms of managing a liberalised market, it may well be easier for governments to persuade a few major players, either by threat or collusion, to adopt new policies, than to create market mechanisms for a more amorphous set of companies to follow.

*Vertical Foreclosure* is a well known theoretical result from supply chain integration, reflecting the way that companies who own both generation and retail supply businesses become less dependent upon the wholesale market, reduce its liquidity and may even increase its residual concentration, with a consequent adverse effect on wholesale prices. Ownership of both generation and retail assets is clearly an attractive business model for companies, as a corporate hedge against wholesale price volatility and in lowering the business risk of longer term cycles of value migration up or down the supply chain. Regulators have become pragmatic on this issue, not least because business ownership in the context of an active capital market, or long-term contracting in the context of a liquid forward market are not really very different in their vertical foreclosure implications.

• *Lack of Integration* between geographical markets clearly restricts trade and physical arbitrage. Greater interconnector capacity can improve system reliability and security as well as facilitate more efficient markets. Yet the physical and environmental obstacles are well known, and in a progressively unbundled and competitive market, creating harmonised economic incentives for interconnector investment has become a slow and apparently elusive process. Furthermore, the increased advocacy of local solutions to energy security, distributed generation, CHP etc, will tend to dilute the political will for major, expensive inter regional transmission projects.

• *Lack of Transparency* in the trading arrangements is in itself a controversial issue. In that openness of technical and economic data facilitates greater understanding, trust and accountability, it can improve the prospects for new entry, and reduce the trading benefits of short-term inside information. It is well known however, that substantial up to date market information can create favourable circumstances for signalling and gaming between market participants, and for that reason many regulators have been cautious about the advocating the unrestricted release of information.

• *Complexity of Price Formation* in the market rules is a consequence of seeking to create a commodity trading environment for a real-time service. Despite concern about complexity, there is increasing institutional appetite for market sophistication, not only for energy, but for transmission capacity, balancing and ancillary services, carbon permits and green certificates.

If indeed those five characteristics are “barriers to a fully functioning market”, it raises the question of what sort of market functionality is considered desirable. It could be argued that the original vision of a fully unbundled market, with many players and competitive prices close to marginal costs is now considered by governments to be a fragile ideal that leads to insecurity and disillusionment with the market, and that a new paradigm is emerging characterised by the pragmatic regulation of imperfect competition...
and substantial industry/government partnership to achieve the policy objectives of security, sustainability, and social welfare as well as the corporate need to enhance shareholder value.

A lesson that was very evident from the 15 years of liberalised experience in Britain, 1990-2005, is that electricity restructuring and market design is not a static activity. A view that, given an appropriate structure and rules, market performance would be steady and efficient is quite naïve. The corporate strategic responses to institutional changes are rapid, as companies seek to reorganise their activities to exploit market opportunities and imperfections. In the following section, some of the key aspects and drivers in the history of the British liberalised market evolution are identified to illustrate this dynamic evolution and the interaction of strategic responses to institutional changes.

Strategic Evolution in the liberalised British Market 1990-2005

The initial capacity allocation in the British electricity market was split between three companies, but only two of which, National Power (50% share) and Powergen (30% share), were dominant in price-setting. Those two held all of the fossil-fuel plant, with the third company providing baseload nuclear and essentially price-taking. Whilst it is conventionally assumed that dominant players will seek to maintain dominance, it is quite remarkable to observe how rapidly these two players actually lost market share. In Figure 1 we see the generation split in 2005 after National Power had been acquired by RWE and Powergen by E.ON. In 15 years National Power had gone from 50% to, as RWE, less than 10%. It is interesting to consider whether this rapid market share erosion and subsequent acquisition was deliberate or inevitable.

Figure 1: Generation Market Shares in 2005

2 The wholesale market only included England and Wales until 2005, thereafter Scotland as well.
To understand this evolution, the history of the first ten years needs to be reviewed. In the first year, with almost all of the energy under contract, the wholesale spot prices were close to short-run marginal cost. Thereafter, the duopoly of NP and PG steadily increased prices so that by 1994, wholesale spot prices were approaching twice marginal cost. Prices remained around this level for the remainder of the decade. Inevitably the prospect of substantial generating profits encouraged new entrants, so that both over capacity and reduced market concentration started to emerge.

The reduction in market concentration began to accelerate after 1999 when both NP and PG started to voluntarily sell power plants and purchase retail customer bases from the pre-existing distribution companies. With retail supply becoming unbundled from the regulated distribution businesses, and full residential retail deregulation happening at that time, both NP and PG sought to become vertically integrated players, balanced between

---

energy production and end-customer sales. Figure 3 shows this apparently sudden market structure change quite clearly, in terms of the sale of the key price-setting coal plant.

Figure 3: Changing Ownership of Coal Plant (from J.Bower, ibid)

When both of them completed their power station sales in 2000, we start to see a dramatic fall in wholesale electricity prices. With retail prices now longer regulated and thereby linked to the wholesale prices, and residential customers not active in searching for cheaper retail suppliers, for electricity companies balanced between generation and retail supply, the wholesale price level became less crucial as a source of profits. In fact, vertical integration of this sort immunizes wholesale price risk. A drop in wholesale prices becomes an internal transfer of profits from the generation to the retail businesses. It is evident in Figure 2 that residential retail prices remained relatively constant during 2000-2003, whilst wholesale prices dropped by about 30%. Indeed, there have been some suggestions that the newly vertically integrated players could see strategic benefits from allowing wholesale prices to decline.

With the excess capacity, and reduced concentration in the generation sector, and a lack of consumer price elasticity in the residential segment, value migrated to the least elastic part of the supply chain, ie retail. Figures 4 and 5 show this quite clearly, with the asset sales prices showing distinct, opposite trends, and the circles in the figures reflecting the relative sizes of the deals. By 2004, the retail end of the supply chain had in fact become more concentrated than generation (compare Figures 1 and 6). A new game had emerged
in the market, focused much more on building and retaining consumer value, than upon operating generating assets.

It was often suggested that the fall in British wholesale prices was due to the introduction of the New Electricity Trading Arrangements (“NETA”) in March 2001. Apart from the fact that the major drop in prices occurred in 2000, most observers now agree that a fundamental mixture of excess capacity and increasing competition, together with the strategic emergence of vertical players is a more plausible explanation.

*Figure 4: The declining value of new CCGT power stations*

Nevertheless, the change in market rules from a day ahead, uniform price, mandatory Pool, to voluntary, continuous, bilateral trading added to the strategic attractiveness of
vertical integration. A compulsory day-ahead Pool, with price set by the marginal generating set, only requires a generator to decide on a quantity and offer price each day and the Pool effectively performs central dispatching and price setting. For a new entrant with low costs, it is convenient; no substantial trading has to be done and it could even simply be a price-taker. In contrast, continuous bilateral trading, with self dispatch, is much less friendly to new entrant IPPs. Trading requires generators to find counterparties and trust them. The emergence of power exchanges, brokers and clearing services facilitates this, but having a balance of generation and retail activities within the company obviously reduces transaction costs. So, whilst it is hard to show that a market rule change, per se, from the Pool to NETA, caused prices to drop, in a more indirect way, by encouraging market participants to become vertically integrated, NETA made the wholesale price less crucial as a revenue source for several generators. Even more seriously, perhaps, is that it has made new IPP entry far less attractive.

*Figure 4: Market Share in Retail Electricity*

Of course, this value migration to retail was bad news for generation-only companies, and by 2003 almost all of these companies were in financial distress. British Energy, the large nuclear generating company had to be saved by the government; some others went bankrupt and many smaller IPP companies left the British market following distress sales of their assets. Some of these distressed generating assets were re-acquired by the previous dominant owners, at substantially lower prices than they were sold two or three years earlier. Some of these assets were actually re-acquired and temporarily withdrawn from service, which reduced the excess capacity and allowed prices to recover somewhat.

This, of course, is the typical cyclical behaviour seen in most capital-intensive industries, especially where there is extreme price sensitivity to capacity margins. Figure 6 shows the fluctuations in the reserve margin and whilst the scale of these might appear unremarkable, the lack of substantial interconnection with large neighbouring systems, the lack of consumer price elasticity, the steeply increasing marginal cost supply function
and the market power of marginal generators all conspire to create a substantial price response to reserve margin changes.

**Figure 6: Reserve Margin Fluctuations in the British Market**

These fundamentally pro-cyclical market forces driving capacity and prices have been evident in practice elsewhere, eg California and Australia, and would appear to be as intrinsic to a fully liberalized electricity market in the longer term as high frequency volatility is in the short term. Vertical integration provides a hedge to the wholesale price and in that respect is a defensible strategic and risk management response. But in so doing it reduces the essential value of the wholesale market, and may indeed drive its liquidity down to a dysfunctional level. Figure 7 illustrates this trend.

**Figure 7: The decline in liquidity in UK power (Source: Heren)**
Conclusions:

Many lessons can be taken from the British experience of electricity liberalization. In the early days of unbundling, privatization and the day-ahead Pool, it helped to demonstrate what could be possible. The market worked, value was created, the industry became more enterprising and new entrants appeared. There were some market rules that needed reform and evident market power being exercised from a highly concentrated generation sector, but in the context of the rather more serious concerns in later years, those defects were not enormously detrimental. As retail prices were progressively deregulated, so the attractiveness of vertical integration between generation and retail business increased, and through an active capital market, strategic restructuring then had a dramatic effect. Replacement of the Pool with bilateral trading was a further step in liberalization, by removing the centrally administered wholesale market, thereby creating forward electricity trading similar to other commodities. With vertical integration however, the trading and risk management needs could be increasingly met internally, with the result that the wholesale market became less crucial, and with value having substantially migrated to retail, the large electricity companies sought to become much more consumer focused. However, the residential retail market could hardly be considered a very price sensitive environment and a rather stable retail oligopoly had appeared by 2006.

The vertical business model, which emerged in the UK out of dynamic corporate strategy, is quite different from its origins in 1990 with the unbundled separation of the supply chain. In many other EU countries, liberalization is starting from that structure of large, vertical companies and all the signs are that it will become progressively more consolidated in that way. It does indeed now seem as if the original restructuring vision of liberalization through market design, with a large number of separate generating and retail supply companies responding only to market forces, is being replaced by a new pragmatic paradigm of institutional collusion between government and industry. Market concentration is convenient for policy makers and regulators, in terms of dealing directly with the main players and implementing energy policy by persuasion or threat. In terms of the fundamental tendency for cyclicality and extreme volatility, large, vertically integrated companies can moderate the consequences of these more effectively. Plants can be run at lower load factors, or even temporarily withdrawn by large players to support prices in periods of over capacity, in a way that IPPs cannot, and conversely, in periods on impending scarcity, can be persuaded to invest ahead of time, in a way that IPP financing my inhibit. This new pragmatic paradigm seems rather comfortable and it is easy to see why it is attractive both to politicians and the incumbents. The evident challenge in such a paradigm, if indeed it is taking shape, will be maintain sufficient business risk so that efficiency drivers will still motivate managers to perform competitively, even as the markets become less competitive.