

Competition in the British electricity sector: a set of practical reforms

Dieter Helm

9th February 2015

1. There has been widespread criticism of the performance of the British electricity industry over a number of years. These criticisms range across the full vertical chain. In the last couple of years the coal price has halved, and in 2014 the price of gas fell by over a quarter. The wholesale price of electricity in Britain is almost twice the level in northern Europe. Capacity margins have tightened so significantly as to require immediate short-term interventions. Retail prices have not reflected the underlying fossil fuel prices. The margins on supply have been at times higher than supermarkets and general insurance, and very significantly above the regulated supply margin in Northern Ireland. Despite multiple interventions, carbon production has stopped falling as the coal burn has at times reached forty per cent, pushing out gas. The British electricity sector is therefore failing on all three main objectives: security of supply, carbon emissions and competitive pricing.
2. In addition to these broad concerns, there have been more direct company failures. A number of companies have been fined for failures in basic customer services. OFGEM records a catalogue of failures, from the doorstep sales practices through to the apparent inability to answer telephone inquires within reasonable periods. In some cases it have proved stretching to manage this basic function within thirty minutes. The total fines to date have been in excess of £6 million.
3. In the responses to the recent sharp falls in all fossil fuel prices, one company advanced the extraordinary argument that it would not cut prices now for fear of a Labour price cap. Another claimed that it could not cut prices because it had brought forward at higher prices. In a competitive market if, in response to a sharp fall in input costs, companies

that did not reduce prices, they would hemorrhage customers. Yet switching remains at the margin, and in the electricity supply market companies discriminate against long-term loyal customers in favour of switchers.

4. These various failures have cumulated to undermine public trust in the industry, and the Competition and Markets Authority's (CMA) inquiry has been an inevitable consequence. It is extremely hard to conclude that the problems in the industry are anything other than profound and in many respects beyond the fault of particular companies. Many of these concern the underlying structure of the market.
5. This paper considers how the industry got into this mess, and in particular why the structural faults in the reform of the market at the end of the 1990s, with the introduction of NETA, set in train the processes which have in large measure caused the outcomes now witnessed across the industry, both in terms of structure and performance. NETA's flaws led to a growing number of attempts to patch up the consequences, and the current mass of "sticky plaster" policy interventions is the result. There is little evidence that these have worked and each has inevitable unanticipated consequences.
6. These problems do have solutions. This paper provides a comprehensive package of measures that would put the industry back on a sustainable basis of workable competition, in the context of significant consumer protection and the attainment of the climate change policy objectives. All are practical and evolutionary, and could be implemented quickly.

The underlying causes

7. The major reform package at the end of the 1990s, called NETA, was a profound mistake and a direct – and predictable - cause of the current difficulties. The advocates of NETA presented a critique of the design of the Pool established at privatisation, argued that companies should be free to contract bilaterally, and that in the resulting energy-only market

the companies would invest so as to ensure security of supply without additional intervention.

8. This new model was coherent, rigorous and based upon electricity morphing into a normal commodity market. It was also consistent with the programme of measures that had gradually been implemented since 1990. It was however profoundly flawed: it would not deliver sufficient investment; and it would not ensure competitive entry on the basis of a liquid and transparent market – as has turned out to be the case.
9. The model evolved as a series of deregulatory measures from privatization onwards. The industry was to be gradually transformed into a fully competitive one. The coal contracts would be broken up, the two main generators (National Power and PowerGen) would be forced to divest plant, the Regional Electricity Companies (RECs) would be encouraged to vertically integrate into new gas-fired generation, customers would be given the right to switch, and competition would be gradually driven into the networks in areas like metering and connections. NETA was the natural further step: the companies would be allowed to contract as they saw fit, free of the highly rule-driven Pool and its compulsion.

The investment failure

10. There are three fundamental reasons why the NETA-style energy-only market could not ensure security of supply. First it required two conditions are met: that prices would be allowed to go to whatever level that matched supply and demand (and could be reliably be expected to without intervention); and that monopoly profits would be allowed in order to encourage entrants, a la Schumpeter and Mises. Second, to make this work, customers (or their agents) could and would switch, and that such switching would not undermine long term contracts. Third, it required that the companies would deliberately invest to create an excess supply margin.

11. Starting with the wholesale market, there is little chance that, in a tight capacity margin situation, prices would be able to peak in an energy-only market like NETA without political and regulatory intervention. The Californian experience in 2000 of intervention is but one example of how the politics work. The problem is not so much the facts of intervention, as the credibility of the politicians and the regulators that they would not intervene. Investors rightly are and have been skeptical, and the recent proposals by the Labour Party and the earlier interventions by government ministers indicate that such skepticism is wise.
12. The *credibility problem* is one reason why NETA will not produce sufficient investment. Generators have no obligation to secure supplies, the peaks cannot be relied upon, and in any event the peaks occur in advance of the investments. Profits are maximized if all are reluctant to invest in capacity, and if there are barriers to entry this is a rational response which requires no collusion to produce the adverse outcome. It is indeed exactly what has happened: despite GDP being some 20% below the level it could have been expected to be now had the crash not happened, capacity margins are very low, and in some scenarios so low as to be approximately zero. Had demand followed the path that it would have been reasonable to predict in the middle of the last decade (a reasonable investment horizon), there would have been a very real crisis now, and even the extreme of blackouts would be a very real possibility. It would be rash to rely on more good “luck” in the future.
13. It should also be noted that this unanticipated fall in demand, together with the unanticipated fall in the fossil fuel prices, would together in a competitive market be expected to result in significant losses for the incumbents. If in such circumstances the companies were making normal profits, it would in fact be possible evidence of market power.
14. A second reason why the energy-only market will not secure supplies is what might be called the *paradox of switching*. The model discussed above requires that customers shop around. This means that generators face the competitive price, and not simply pass on their own costs or extract monopoly profits. Switching is therefore an integral part of a competitive

market. However, if customers can instantaneously switch, long-term contracts become very risky. Indeed switching in the industrial sector is what destroyed the long term gas contracts held by British Gas in the mid to late 1990s, and forced British Gas to break up and establish Centrica as a vehicle to renegotiate upstream gas contracts against the very real threat of bankruptcy. If there are upstream sunk costs, such as those in the development of North Sea gas fields, or in the building of new power stations (such as wind farms and nuclear power stations), switching will significantly raise the costs of capital. It is not an accident that these capital-intensive technologies all now require compulsory long-term contracts.

15. The third reason for the failure of the NETA model is that energy-only markets will not produce an *excess supply margin*, necessary for security of supply in the absence of widespread storage of electricity. No rational capitalist will deliberately invest to create such an excess margin, which would both lower prices and is not directly paid for. The capacity required for security of supply is not a commodity. It requires a separate capacity mechanism.
16. The last Labour Government finally grasped this in its last two years of office - that security of supply could not be guaranteed through NETA. The arguments are simple, with profound consequences. Security of supply is a *system public good*, not a marginal private good. It will not be met by the simple aggregation of the supply and investment decisions of the companies *at an optimal level*. Whilst supply will always equal demand if the price is allowed to go to whatever level is required to clear the market, this will be seriously sub-optimal in an energy-only market. But it will be even worse if the incumbents have market power, on the basis of entry barriers and inertia in switching.
17. In introducing a capacity mechanism, one of the measures in Energy Market Reform (EMR), this major flaw in the NETA market design has been recognized. However, as we shall see, there are good and bad capacity mechanisms, and the current auction design is seriously flawed.

There are lots of different ways of designing a capacity mechanism, and the current model is far from optimal.

18. A capacity mechanism is designed to address the two flaws in the NETA model – the undermining of long-term contracts, and the capacity margin. No rational capitalist will deliberately create a margin in excess of mean expected demand. Yet that is exactly what security of supply requires. It needs to be paid for, and a well-designed capacity mechanism should achieve this at least cost.
19. EMR was designed to address these flaws, by providing long-term contracts and fixing the total amount of investment. The first two bits of sticking plaster are the Feed-in-Tariffs (FiTs) and the capacity auctions. We return below to how these might be better designed and in the process increase competitive pressures.

Competition on the wholesale market

20. After investment, the second major flaw in NETA relates to its abolition of the Pool and the impact on entry and competitive pricing in the wholesale market. The confusion here is between liberalization and competition. Liberalization – in this case freeing generators and suppliers to contract as they see fit – does not necessarily increase competition, and in this case it reduced it.
21. In the Pool model, generators had to sell their power into the Pool, and anyone could buy at the Pool price. It was a compulsory market. The result was that it was liquid – indeed it could not have been more liquid – and it was transparent. The behaviours of the two big players – National Power and PowerGen – were there for all to see. Unfortunately, the regulators concluded that because abuse was transparent that therefore the problem must be the Pool itself rather than the concentration in the generation market. They set about abolishing the very market design that exposed the behavior.
22. For the generators, the abolition of the Pool was a highly desirable objective. With a Pool there is little advantage to vertical integration – the

power has to be sold in the Pool and they could not discriminate vertically. Now with the Pool gone, a new game began. Now generators could physically match their generation with supply and contract on their own terms. The result was a dash for vertical integration, and the concept of a supply-only business was replaced by the Big 6, plus a fringe of niche players.

23. Not only did NETA make vertical integration attractive from a market power perspective, but also it made it very difficult for entrants. There had been lots of these under the Pool model, notably the Regional Electricity Companies (RECs) investing in gas CCGTs. They could sell into the Pool, and contract forward on the basis of a liquid spot market (analogous to the oil companies and the oil market). Now they needed access to customers. Generation-only businesses were as a result much more risky undertakings, and although a fringe survived, several – including DRAX – flirted with bankruptcy. Supply-only businesses were more risky too, since they did not have the advantage of a physical hedge and access to the same prices and terms as the vertically integrated companies

Moving towards a more competitive market

24. On the generation side of the market, almost all investment is now on the basis of government-backed contracts. New investments have the government as the customer not the customers in the EMR framework. It is a central buyer model. The customers pay, but government decides what they will pay and for what sort of generation. New investments either have a FiT or a capacity contract.
25. Competing for these contracts can in theory be highly competitive, and it should be. The two market failures such contracts need to address are: the public good of security of supply; and the carbon emissions.
26. In principle, each market failure needs a separate policy instrument, and the obvious answers are to fix the quantity and auction it; and to set a carbon price. There would be a single capacity auction, into which all the

options could bid (demand reductions, new coal, gas, wind, solar, nuclear and so on). The firm-power contracts would be awarded to the lowest bidder, with credible penalties for non-delivery. Those technologies that are intermittent would sub-contract for back-up and hence face the full costs of the intermittency.

27. These bids would be net of the expected carbon price, either established in a permits trading regime or (better) through a carbon tax.
28. The single unified auction solves other problems too. In particular it puts entrants on the same basis as incumbents. The Big 6 have no inherent advantages. The cost of capital should be the same, as the risks are common.
29. Unfortunately the EMR capacity market is a complex mess, caused by the repeated technology-biased government choices. Instead of thinking of a capacity market as revealing the optimal investments, the government starts the other way around. It picks the winners amongst the renewables, and allocates FiTs. Thus a significant amount of the total investment is outside the capacity auctions. These are not however sterilized – they infect the capacity market too. In order to meet the intermittency and profile of investments in nuclear, the capacity market is sculpted to match the “winners” the government has already picked. The result is that there are three separate capacity auctions, rather than a single unified one – a one, three and fifteen year market. Remarkably, the prices from these three separate auctions are then suppressed in favour of a single price.
30. In the first auction for 2018, the results have been predictably extremely inefficient. The bulk of the money has gone to existing nuclear generators, who have every incentive to run as long as possible independent of the auction, and to small scale “car-park” generators, with their ancillary costs to the networks not taken into account. Only one new CCGT is contracted, and here the penalty for non-performance is only around £8 million. It is hard to think of a less efficient outcome. Customers will probably pay several hundred million pounds in excess of what it would have cost to secure supplies.

31. To compound the multiple 2018 auctions, two more short-term capacity mechanisms have been grafted onto the system as well – a strategic reserve and demand side reductions. These are not only complex in themselves, but they infect the future long-term contracts. Future bidders need to ask themselves whether these short-term mechanisms will coexist alongside the long term multiple auctions, or be abandoned on an ad hoc basis.
32. This matters for a further reason: the capacity auction bidders need to forecast the wholesale price. This in turn depends upon not only the fossil fuel prices but also the impact of the FiT contracted zero marginal cost technologies, notably nuclear, wind and solar. In order to know what to bid and when, an investor needs to forecast the fossil fuel prices, the subsequent capacity auctions, and the scale of zero marginal cost investments – as well as the regulatory and political conditions surrounding possible interventions.
33. The growth of zero marginal cost plant has quite radical consequences for the wholesale market and in turn for the companies that rely on this market. To the problems of this market in terms of liquidity and transparency are added its gradual marginalisation, with the fixed priced capacity and FiT contracts taking over. Contrary to the DECC forecasts of rising wholesale prices (until recently conveniently rising to £92 mwh – the nuclear strike price for Hinkley in its proposed FiT), the coming of more renewables and nuclear should reduce the price. Germany provides an instructive guide to what happens as the zero marginal cost plant produces a growing share of output, to the extent of producing negative wholesale prices from time to time.
34. If the government is determined to keep on picking winners, the best that can be achieved in the capacity auction is a two-stage auction. Stage one would be unconstrained – anyone can bid anything against the actual (rather than sufficient) carbon price. The system operator or DECC then considers the prices, looks at the carbon budgets produced by the Climate Change Committee, and then runs a second stage constrained auction – in the full knowledge of the costs of the additional constraints.

35. With an auctioned capacity market in place, existing incumbents would have little or no advantage. Generation would be a market that was one of workable competition – workable in the context of bidding for government determined and protected contracts. It is a procurement market, not a customer market. That still leaves the wholesale market, and this matters for several reasons. The problem of efficient dispatch remains (something NETA failed to guarantee) and the determination of the relationship between fossil fuel input costs and final prices.
36. There was, as argued above, no good reason to abolish the Pool, and this is increasingly recognized as the measures Ofgem has taken to increase transparency and liquidity have in effect gradually approximated the old Pool model. If it is liquidity that is the objective, then the Pool maximizes this. What is required is a compulsory electricity market. There is nothing necessarily uncompetitive about compulsion. On the contrary it maximizes competition. Transparency follows liquidity.
37. The return to the Pool is now quite a small incremental step given what Ofgem has already achieved. It should be done now.

The future of vertical integration

38. The development of capacity auctions, the return to the Pool and the coming of zero marginal cost generation offer profound challenges to the Big 6 vertical integrated structures. Looking forward, there are now few if any obvious advantages to vertical integration, and indeed it is interesting that in the first (flawed) capacity auction, the entrants made considerable headway. If the government is the customer, then having supply businesses is not an obvious advantage in either the capacity auctions or in competing for the final customers if there is a Pool.
39. Two more fundamental challenges need to be added. The reason the electricity industry has been vertically integrated for a century is that supply and demand has to be instantaneously matched, and the demand side is passive. Both of these conditions are on their way out.

40. On the supply side, the coming of storage options allows for a much more sophisticated market clearing process. The new forms of storage are multiple – they vary from large-scale batteries, heat storage through to electric cars.
41. On the demand side, smart technologies enable a much more active demand-side management. The use of smart meters, smart grids, GPS apps and smart white goods and heating systems, together with household-based generation and greater insulation have the potential to make the future of supply driven by broadband hubs and a host of new players. Electricity may be bundled with a host of other services, and delivered by very different future service providers. These might vary from technology companies, retail suppliers, Amazon, Google, supermarkets and so on. It is far from obvious that any of the Big 6 has a competitive advantage in this world.
42. The conclusion that arises from these considerations is that the focus should be on the design of the market in capacity and the reintroduction of the Pool, and if these reforms are implemented then vertical integration will not be a significant problem for the market in the future. It will however be a problem for the Big 6 and it may be a serious competitive handicap.

Retail supply

43. There is a choice in considering how to improve on the sorry state of the retail market. It can either push on with the existing model, or it can recognize that the retail market is never going to be fully competitive, and focus on a more workable competitive model with protection for the non-switchers.
44. Advocates of maximal switching as the “solution” to competition problems in supply rarely recognize that switching has costs as well as well as benefits, and not just direct costs to the customers.
45. Switching is great for those with the evenings off who enjoy seeking out a “bargain”. But most customers are not like that, and even those who are

suffer when the latest “bargain” turns out to be a bad deal. Do you fix going forward? What is your forecast for the oil and gas prices and for coal? Do you think Labour will fix the price anyway? What will the politicians do in a couple of years’ time? Most customers would probably be quite happy not have to choose the electrons supplier (it is an homogenous good), if they could be assured that they will pay a reasonable price for those electrons, a reasonable margin, and the supplier might actually answer the phone in 30 minutes. Indeed, on this later problem, it is switching which makes customer service much more expensive and problematic.

46. Lest this seem like complacency, and lest the experiences of shopping around for car insurance and mortgage deals seem like counter examples, it is very important to recognize that there is little product choice in electricity. The service is the on-demand supply of those electrons. A customer cannot buy green-only electrons, though they may choose to pay for extra subsidy. It is therefore unsurprising that most customers do not switch – and do not want to switch.
47. This is not going to change in the near future, and indeed if it did there would be some adverse consequences. It would make predicting demand for any supplier much more hazardous, would increase the cost of capital and hence the margins. Switching has to be paid for, as indeed it is now.
48. If there is limited switching, customers are vulnerable to being exploited. Suppliers with inert customers can be cost-plus, and they can beef up the margins. That is what happens: non-switchers pay more, the margins in supply are typically more than in general insurance and supermarkets, and much more than the regulated supply margin in Northern Ireland. Companies can refuse to pass on fossil fuel cost reductions, for the very good reason that they do not need to. Margins can go up if fossil fuel prices (and therefore wholesale prices) fall. That unsurprisingly is exactly what is happening now.
49. Recognizing reality – limited switching and margins that do not fully reflect competitive market costs – requires a response in terms of workable competition and customer protection. The reforms that have

already been suggested by Ofgem and some politicians focus on the terms offered to non-switchers, and hence the terms of default tariffs.

50. One route forward is to require all suppliers to offer a single default tariff (as well as any other tariffs they choose to offer). This default tariff needs to be transparent. It should have several standardized elements. First it should be indexed to the (exogenous) wholesale price. Second, it should add in the capacity contract (exogenous) costs and third the transmission and distribution (exogenous) costs. Fourth, it should add in the (exogenous) green taxes government requires. Fifth, it should add in the supplier's (endogenous) costs and finally the suppliers' (endogenous) margin. All the elements of this tariff should be published and all should be on every bill – regardless of whether this tariff is adopted.
51. Note several features of this proposal. It requires a simple Pool-based wholesale price to avoid any complexity around “which wholesale price?” It recognizes that apart from the wholesale price and the supplier's costs and margin, everything else is exogenous. Note too that it is up to the companies to choose the endogenous variables – but they have to make these transparent so that everyone – Ofgem, rivals and customers – can see what is going on. It will shine a very bright torch on the costs, margins and the implicit green taxes. The indexing can be corrected through a K factor on billing. This could be monthly, quarterly or annually – and in any event would be less often than petrol and diesel price adjustments.
52. The result would be a competitive market in default tariffs. All should be published on Ofgem's website.
53. This approach would not stifle competition. On the contrary any other tariff can be offered alongside the standardized tariff. Suppliers can bundle the broadband-hub services, and they can compete on their value added – the costs of the service and the margins. New tariffs can be offered based upon demand-side bidding into the capacity market, encouraging off grid generation, minimizing distribution costs, building local storage options, and moving into balancing locally through electric

transport. It would encourage innovation. In the process the existing supply model offered by the Big 6 would come under great pressure.

A comprehensive package of measures

54. This paper has set out a comprehensive package of measures to put the electricity industry on a sustainable basis, maximizing workable competition in the context of rapid and disruptive technical change. It is far from obvious that piecemeal change will additively improve competition, though a number of the measures are justified on a stand-alone basis. The highly political controversies need a permanent solution, and not just a series of *ad hoc* reforms.
55. The package is simple to state: *a Pool wholesale market; a unified capacity and FiT auction (or a two-stage auction if technology choice is to be made by government), and a default tariff.*
56. Implementation turns out to be relatively simple too. The Pool is but one stage further along the Ofgem reform path. The crucial step is compulsion. The current wholesale market could morph into this format almost immediately. Problems might come with existing contracts, but they are not overwhelming. The strike price in the CfDs that support the FiTs can be the Pool price. Existing contracts can play out. As with many such reforms it is possible to allow legacy arrangements to be sterilized. Existing contracts do not and should not in any event determine prices in competitive conditions. Prices are determined by changes in the underlying costs. Rather than create myriad and complex “transition arrangements” the better answer is to implement the Pool immediately, and then park the existing contracts in a separate box. For CfDs the strike price is in any event effectively a fixed price and the wholesale price is supposed to be the competitive price. It is not clear what role the CfDs really play – or indeed why they are necessary at all. In a unified capacity and FiT market, there would be no need for CfDs. All contracts would be fixed price, full stop. The costs of running CfDs would therefore be saved.

57. On the unified capacity market, implementation is already in the hands of the government anyway. After the first capacity auction, the next one is open to redesign, and indeed that is what will be considered every year in the run up to the next auction. Merging the three auctions into one is the first and obvious step, even if the government wishes to continue with the highly costly and inefficient quotas and technology picking which characterize the current FiT regime.
58. On supply, the default tariff is simple to construct. Most of the parameters are in place already – though a Pool-based competitive wholesale price would be a better reference. All the exogenous elements are already known, and the supply costs and margins are known to the companies. What is required is to do the indexing, and explicitly publish the other parts, including the costs of supply and the margins.
59. Companies may fear that publishing their margins separate from their costs would open them to regulatory challenge. However this is disingenuous. Suppose a company publishes a margin of say 7%. If the market is as competitive as some of the Big 6 claim, then it will quickly lose its customers to another offering a more reasonable number, such as that in Northern Ireland of less than 2%. But suppose the customers do not switch – which indeed they may not. It is a perfectly reasonable question for a regulator to ask whether this margin of 7% in the example above represents an abuse of market power. The trick is to force the companies in the default tariff to publish their margin clearly – and then justify it.
60. The proposals above are designed to create a sustainable and workable electricity market, maximizing competition whilst tackling the constraints of the security of supply and carbon market failures as efficiently – and as competitively as possible. These proposals will inevitably challenge those who benefit from the existing opaque set up. Yet many of the Big 6 realize that the current arrangements are not sustainable and have brought upon them great political interference and a loss of trust. Doing what vested interests usually do, and coming up with all sorts of “practical problems” to inhibit these reforms will however not make the problems go away.

The problems are fundamental, and they will only go away if they are tackled head on.