

EDITORIAL: INNOVATION AND REGULATION IN ENERGY SUPPLY

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Introductory comments

The energy sector of the economy is today facing a period of considerable uncertainty and change. Whilst uncertainty and change are normal features of economic life, the level of the challenges in energy has increased substantially over recent years, largely in response to the emergence of climate change issues, but also as a result of the potential afforded by developments in information and communications technologies (ICT). Geopolitical concerns about the reliability of sources of oil and gas have also contributed.

Speaking generally about the incentives for discovery, for innovation and for adaptation in energy supply, climate change might be said to be providing the 'sticks' that are driving change – lack of progress risks the prospect of major costs being incurred in the future – and the developments in ICT can be said to be providing the 'carrots' – prospects of major efficiency gains and cost savings.

Politicisation of problems

When new, major problems arise, there can be a tendency for political systems to seek immediate 'solutions', without pause for sustained reflection – a tendency documented by the Better Regulation Commission in its report *Risk, Responsibility and Regulation*.¹ In response to the kinds of sentiments that are often expressed when such problems are discussed – 'there is a problem and something should/must be done about it' – governments often rush in where angels fear to tread, seeking plaudits for visibly 'doing something' but without paying great heed to the relative merits of the course of action adopted, relative to unexamined alternatives.

The tendency can be clearly seen in the energy sector. Climate change issues have had a greater impact on the electricity sector than on the gas sector, and in Britain the quiet success story of liberalisation of gas markets can be compared with the current situation in the electricity sector where, after a promising

start following privatisation, markets are now highly politicised. The introduction of political uncertainty into a market tends to chill investment, since it creates incentives for private investors to 'wait and see' whenever forthcoming political decisions are likely to have significant effects on returns to investment.

Politicisation is also a form of monopolisation or cartelisation – the state is characterised by its monopoly of legitimate force/coercion – which, as Adam Smith pointed out in the *Wealth of Nations*, tends to be associated with poorer managerial performance: 'Monopoly, besides, is a great enemy to good management, which can never be universally established but in consequence of that free and universal competition which forces every body to have recourse to it for the sake of self-defence.'

Calls for regulatory reform

Reflecting the above points, the four papers in this collection, based mainly on material presented during the course of the IEA's 2009 Beesley Lectures on Regulation, are concerned chiefly with the electricity sector. Each identifies major problems that are not being satisfactorily addressed by existing regulatory arrangements, and each calls for regulatory reform. Beyond this consensus at a general level, however, there are differences among the various authors as to the implications of their reasoning for the conduct of regulation and of energy policy more generally.

This is hardly surprising given the complexity of the issues. Ways forward for regulatory and energy policies in changing economic circumstances have themselves to be discovered, and the relevant discovery process is likely to be enhanced by the development of alternative, competing lines of analysis and reasoning. Before noting some of the differentiating aspects of the papers that follow, therefore, it is potentially useful to look briefly at the nature of the challenges ahead.

The implications of change, uncertainty and complexity

As John Kay² has recently reminded us, in emphasising the significance of Hayek's contribution to a long tradition in political economy³:

'If the partial genius of market economies lies in their capacity to achieve co-ordination without a co-ordinator, the greater genius lies in their ability to innovate and adapt in an environment of uncertainty and change.'

Faced with complexity, change and uncertainty, therefore, the policy implication is clear: look to markets to provide the institutional frameworks and conditions in which the relevant problems can be addressed. Equally clearly, this implication of economic reasoning runs counter to the widespread fallacy that, if there is a problem, markets must have somehow failed, and that something more is required.

The fallacy emerges easily from static equilibrium theory, which views competition chiefly in terms of the *outcomes* it tends to produce in a given state of knowledge, and hence views deviations from those outcomes as 'failures'. In contrast, when market competition is viewed as a discovery/learning/problem-solving process, problems and 'failures' become potential drivers of an expansion in knowledge. Without them, economic progress would stop.

Recognition of this old wisdom is, however, only a first (albeit critically important) step toward good economic policy. Markets, being institutions, depend upon market rules, including rules concerning their governance; and those rules affect performance. The rules themselves should be appropriately adapted to the economic context in which they operate: for example, effective market rules for the supply and distribution of books will tend to differ significantly from market rules for the supply of banking services (although there will also usually be substantial common components, such as laws governing contracts and companies).

The challenge to be faced in the energy sector is how to develop the market rule-books so that they adapt, in appropriate ways, as the economic context changes (i.e. how to achieve successful, institutional innovation). Since the rules are a 'collective good' – they are shared by all who participate in the market – we cannot rely upon the standard type of competitive process, which is characterised by the exchange of private goods, to drive progress.⁴ Thus, although there is a strong 'pull' for regulatory reform from the revolution in ICT, and a strong 'push' from the prospect of adverse climate change, regulatory reform is likely to be characterised by considerable inertia.

The inertia is not, we think, due chiefly to the collective nature of the rule-books. When the incentives for change are there, the 'spontaneous' emergence of new institutional arrangements can nowadays occur remarkably quickly, not least because of the availability of modern ICT. A number of the developments associated with the internet, for example, show the speed at which social networks, conventions and rules can be developed. Rather, the inertia tends to be associated with the bureaucratic, administrative cultures that are associated, in turn, with aspects of the market governance

of sectors such as energy, coupled with vested interests of parties who find existing rule-books particularly advantageous (despite their more general limitations).

Successful institutional innovation will not, therefore, be easy to achieve (although tinkering with institutions, to suggest that 'something is being done', is a much more straightforward task).

Retail energy markets

Lynne Kiesling's paper touches on all aspects of the electricity sector, in that the underlying conceptual framework is that of a complex, adaptive system (with domestic consumers of electricity included as part of that 'system'). The major theme, however, is the scope for increasing the responsiveness of domestic consumer behaviour to variations in the value of electricity: a message that stands somewhat in contrast to traditional approaches to the industry, which have been heavily biased toward preoccupation with supply-side factors.

The underlying factor in making such increased flexibility feasible is the development of ICT, which opens up the possibility of much greater consumer control over usage, much of which could be pre-programmed into electronic devices. Greater demand-side responsiveness is of value in virtually all circumstances, but it could be particularly significant in systems that have large components of wind and/or nuclear electricity generation, since both these technologies have inflexibilities that limit their ability to adjust output in response to changes in system conditions. Not only can greater demand responsiveness obviate requirements for large expenditures on peak generating capacity, it can also lead to lower requirements for transmission and distribution capacity. Indeed, the Olympic Peninsula experiment described by Kiesling was motivated in large part by aversion to the construction of additional electricity lines in an area of great natural beauty.

In order to respond appropriately, however, consumers must be faced with informative price signals. As Kiesling points out, traditional approaches to utility regulation have been much more concerned with providing low and stable prices to domestic consumers, and with various forms of cross-subsidisation among consumer groups, than with signalling relative scarcity: and such an approach stands in the way of increasing demand responsiveness.

In the UK, on the other hand, there has been much more progress than (on average) in the USA in establishing competitive retail markets in energy; and, whilst retail market liberalisation was controversial at its inception – some analysts argued that the value added at the retail stage meant that the transactions costs of market arrangements would be disproportionate – continuing ICT innovations give rise to much more substantial potential gains from retail competition, going well beyond possible reductions in retailing costs and narrowing of retail margins (the kinds of benefits normally assessed in narrowly focused, static analyses).

Elizabeth Hooper and Catherine Waddams Price discuss some of the tariff innovation that has occurred in the relatively short period since UK retail energy markets were deregulated, although it can be noted that these innovations fall well short

of potential future developments, for fairly obvious reasons: there is no point in developing highly sophisticated time of day tariffs, for example, if metering and control technologies do not enable the adjustments that consumers might want to make in the face of price fluctuations. The authors also point to the recent step backwards by Ofgem in seeking to impose retail tariff structures that more closely reflect the traditional preoccupations of utility pricing. This development is an illustration of the general point made above that, when government or an agency of government detects a perceived problem, there is a strong tendency for it to want to be seen to be 'doing something' to fix the problem, without adequately evaluating either the alternative courses of action or the consequences of the preferred fix. As Hooper and Waddams Price note, the Ofgem intervention in retail energy pricing can be expected to have anti-competitive effects.

In its own defence, Ofgem has pointed out that the intervention is time limited, and can be expected to end in the event that competition in the relevant markets continues to develop. Such a time-limited measure is better than a permanent intervention but, being a restriction of competition, it can itself be expected to impair market development. The episode therefore also illustrates a second of the general points raised above, the inertia of bureaucratic agencies in resisting the more rapid evolution of market institutions. Even when the general direction of travel has been toward market liberalisation – as it has been in the UK – the culture of bureaucracy finds it difficult to let go of the old ways.

Electricity generation

Energy policy at privatisation contemplated a wholesale market environment in which suppliers would be free to choose their own generating technologies – free of the sort of political influences that, in the UK, had led to an investment performance that was universally recognised to be very poor by international standards. As pointed out by David Newbery, such political forbearance is far from the case today and political preferences are once again exerting very considerable influence on generators' investment decisions.

Wind technology has been the major beneficiary of political favours, but, as Newbery notes, if immediate decarbonisation of electricity supply is the aim, there are other economic instruments available – such as cap-and-trade schemes, carbon taxes, and the like – which, *prima facie*, should be more efficient approaches than providing heavy subsidies to wind generation. We agree with Newbery, therefore, that, if there is a rationale for the subsidisation, it must lie in an attempt to promote research, development (particularly by learning-by-doing) and innovation in the associated technologies. On this basis, however, the subsidisation appears to be highly disproportionate to any likely technology benefits – offshore wind in particular is very expensive – and, beyond this objection, there is the general question as to why these particular technologies are favoured when others are not.

Hooper and Waddams Price also consider wind technology in the section of their paper on innovation and wholesale competition. Among other things, they note the relatively slow

diffusion of wind technology, compared with innovations in other markets. This is an outcome to be expected once it is noted that the adoption of wind technology is driven by subsidies, not by positive economic returns in a competitive market. Again, therefore, we see the sluggish, relatively inert aspect of public policy when it seeks to achieve preferred outcomes by intervening in market processes.

In contrast, one of the most striking pieces of evidence presented by David Newbery is the speed with which French electricity generation was decarbonised by adoption of nuclear power. That experience shows that when a centrally planned system, which substitutes for normal market processes rather than tinkering with them, has a simple target outcome in mind, it too can achieve a desired outcome very quickly. The limitations of the approach, however, are that the desired outcome needs to be clear, and that the outcome must override all other considerations/objectives. In conditions of uncertainty and conflicting policy objectives, those conditions are unlikely to be satisfied.

Newbery's focus is on nuclear power as one of a number of possible technologies capable of generating electricity with low levels of carbon emissions, not as 'the' solution; and it is in any event unlikely that the UK would seek to follow the French precedent. On this basis, his analysis might be interpreted as providing reassurance that substantial decarbonisation can, if necessary, be achieved via an existing, known technology, at costs that should not imply substantial increases in electricity prices above current levels. With greater discovery and innovation, we should be able to do better than some of Newbery's numbers might suggest, although by an amount that is inherently uncertain *ex ante*.

Networks

Some of the most difficult policy problems in the energy sector are to do with the future development and operation of networks. Networks are where the limitations of regulation meet the limitations of monopoly provision (networks have remained regulated monopolies, even in countries that have been active in pursuing market liberalisation). The potential for innovation in general, driven by innovation in retail and wholesale energy markets, will itself be heavily influenced by the development and operation of the physical networks of wires and pipes that connect suppliers and consumers. Without appropriate innovation in networks that will enable the sorts of developments in the commodity markets discussed by Kiesling, progress will inevitably be impeded.

Steve Smith's paper grapples with these difficult issues, and he is straightforwardly frank in recognising the very limited incentives for service innovation that have been provided by traditional approaches to regulation, including of the more recent RPI-X variety. That situation is unsurprising in that RPI-X regulation was explicitly designed to provide incentives for cost reduction (in which it has been highly successful), not to encourage service innovation. However, the challenge now is to develop regulation in ways that will better respond to the opportunities made possible by ICT innovations and to the pressures arising from climate change policy.

Ofgem's general review of its approach to network regulation, in the form of its RPI-X@20 project, is, therefore, particularly well timed. The various network development scenarios identified in the Ofgem LENS project illustrate the diversity of possible future developments, and the uncertainties that need to be confronted: some of the scenarios are very different from one another, even though each has some plausibility as a possible outcome.

How these insights and initiatives will be translated into administrable policy remains to be seen. Smith describes progress thus far in introducing greater incentives for innovation into existing *ex ante* price controls, but such arrangements can be expected to suffer from the knowledge problems characteristic of all *ex ante* approaches. Decisions necessarily have to be based on current information and, since a regulator exercises public monopoly power, the decisions have in some sense or other to be objectively justified. That is, in order to prevent abuses of power, regulatory agencies are precluded from proceeding on the basis of the bets and guesses that characterise the way in which participants in competitive markets operate in the face of uncertainty.

Smith also makes reference to the more radical possibility of introducing a 'prize' system for economically valuable discoveries and innovations: an approach that has been suggested in an earlier series of Beesley lectures⁵, and that, like the patent system, would allocate rewards on an *ex post* basis, and only when sufficient information has accrued to establish the value of the discovery/innovation. This would potentially provide incentives for all sorts of lines of exploration, without any requirements for an *ex ante* 'tick' from the regulator: would-be innovators would make bets with their own resources, attracted by the prospect of the rewards that would accrue in the event of success, replicating some of the discovery properties of competitive markets.

Again, however, it is a question of whether Ofgem has the capacity and the will to translate this type of idea into administrable regulation, given that extensive policy development would be required, which would necessarily compete for resources with other tasks and priorities. Notwithstanding the importance of the innovation issues, the Ofgem decision on retail energy pricing that is discussed by Hooper and Waddams points to an administrative agency that may, unfortunately, give greater priority to other, much shorter-term matters.

1. Better Regulation Commission (2006). It was not long after this challenging report that the Better Regulation Commission was abolished.
2. In an article entitled 'The Failure of Market Failure', published in *Prospect Magazine* in August 2007.
3. See, for example, F. A. Hayek (2002).
4. Although there can, of course, be competition at the institutional level. Thus, a nation offering an effective rule-book in a particular sector can attract economic activity from competing markets with less effective rule-books. For issues such as climate change, this suggests that there is merit in different nations and jurisdictions pursuing differentiated policy strategies, since such differentiation can be expected, at least up to a point, to be efficacious in promoting discovery of effective adaptations in rules.
5. George Yarrow, 'Energy Policy: A Time to Stop Pretending?', 27 September 2007, available at www.rpieurope.org.

References

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