

Strategic Review of Telecommunications

Phase 2 consultation document

Annex P: Regulation of other utility sectors

Issued: 18 November 2004

Closing date for responses: 3 February 2005

Introduction

- P.1 The UK pioneered many of the regulatory reform policies that have subsequently gained widespread acceptance in other countries. In many sectors that were considered as natural monopolies many parts of their value chain have now been opened to competition. Here we attempt to draw some lessons from the regulatory experience in sectors other than telecoms. In common with telecoms, these sectors were privatised and then subjected to regulatory intervention.
- P.2 The aim of this Annex is to describe this experience in the water and sewage, electric power, gas and railways industries and draw the main lessons. Even if the telecoms' technological and economic features are different, there are important lessons to be learnt. However we need to bear in mind that the regulation in each of the sectors was tailored to the technical and economic characteristics of the industry, and that regulatory policy will necessarily reflect this.
- P.3 These industries have many features in common. They are all network industries and at least one segment of the industry shows some features of natural monopoly. However, the regulatory approach to dealing with the network natural monopoly aspects often differs.
- P.4 They also differ from telecom in an important aspect: the extent of the natural monopoly element is likely to be less extreme and perhaps less persistent in telecoms. This was reflected in the choice made in telecoms to rely more on competition and to minimise the regulatory intervention. This is not the case in other sectors – for example the water and sewage industry. This does not mean that consumers will not be able to enjoy some benefits of competition in these sectors - for example the water and sewage regulator (OFWAT) extensively relied on so-called 'yardstick' competition to deliver increased efficiency and other benefits to consumers.¹
- P.5 The scope for competition has not been the only element taken into account for choosing the appropriate regulatory framework. Other concerns such as underinvestment in the infrastructure at the time of privatisation and the existence of universal service obligations have also been taken into account. This annex also attempts to understand why a particular structure was chosen, its achievements and drawbacks.
- P.6 In first part of the annex, we present the most valuable lessons that can be drawn for telecoms regulation. This is followed by a brief description for each industry including; recent history, regulatory framework, economic features, the competition promotion and consumer protection policy and its main achievements and drawbacks.

¹ Yardstick competition is a way for the regulator to obtain information on the relative efficiency of firms subject to regulation. It is feasible in the presence of regional monopolies and aims at reducing the degree of asymmetric information faced by the regulator. In order to compare efficiency between the firms and tailor the appropriate price controls, the regulator compares the costs of all the participants in the market and draws the efficiency frontier of the industry. This is the envelope of the least costly firms' observations, once every factor outside the control of the firms, such as population density, is considered. This is then used as the relevant benchmark of which are the achievable outcomes best practices possible.

Lessons for Telecommunications

- P.7 The UK's experience in regulatory reform across a range of regulated industries provides us with some lessons for Ofcom's regulatory strategy in telecommunications. Although there are important differences in the regulatory approach for each sector due to differences in the product and industry features and legacies, there are some useful lessons.
- P.8 All sectoral regulators have had to deal with natural monopoly and market power, the scope for competition in areas where competition is feasible, and the issue of vertical integration. Partly reflecting sectoral differences, regulatory duties and potential remedies vary across regulated sectors. This is to be expected as regulation needs to adapt the conditions of the industry.

The need for promoting competition

- P.9 The experience of the gas and electricity industries shows that regulatory intervention in some circumstances might be required to promote competition. Very often, even if competitors are legally allowed to enter a market; market structure, incumbents' incentives and behaviour could significantly inhibit competition. The UK experience has shown that in some circumstances competition has to be promoted and requires determined regulatory intervention to make it happen.

Competition and regulation

- P.10 Competition brings incentives for static efficiencies, and for innovation. Moreover, it plays a crucial role in eliminating or significantly reducing the regulator's informational disadvantage. This is the reason behind every sector regulator's attempt to introduce competition when feasible, or at least to mimic it through comparisons – i.e. through yardstick competition in water and electricity distribution.
- P.11 The promotion of competition in all areas and all levels of a market may not be appropriate. There are possible costs of introducing it leading to potentially wasteful cost duplication, loss of economies of scale and, particularly important in the network industries, a loss in coordination. The latter proved important in railways but not in energy markets. In some cases, regulation of a 'natural monopoly' part of a market may be preferable.
- P.12 Telecommunications remains in a unique position compared to the other regulated sectors as to the extent and overlaps of regulation and competition. This is because the scope of competition is wider than in other sectors due to the features of the industry and the degree of technological innovation both at service and network levels. This means that, while there is no scope to promote competition in the provision of the network elements in energy, railways or water, there is in telecommunications. This explains the regulatory approach which has been adopted towards telecommunications networks where regulation coexists with some (though

insufficient) competition – and hence the attempts to promote competition in networks.

- P.13 Despite the economic benefits that competition can bring, it should be taken into account that the regulator's ability to achieve social rather than economic goals can be reduced by promoting competition. For example, "cherry picking", whereby entrants focus on large consumers or customers with the highest valuation for the product, can decrease the funds available to fund social objectives such as Universal Service Obligations.

Vertical Separation

- P.14 All the regulated sectors we have looked at were vertically integrated prior to the reforms. When reforms were introduced the degree of vertical integration that was maintained varied across sectors, although significant adjustments were made at a later stage in some cases. Vertical separation was chosen at the outset for rail and electricity. Gas and telecoms were opened up to competition but the incumbent was allowed to remain vertically integrated. However, vertical integration in gas was later abandoned by the incumbent following regulatory pressure. Water was privatised vertically integrated largely because of the lack of prospects for competition. The strategy followed in telecommunications has been to require non discriminatory access to key network bottlenecks.
- P.15 Where vertical separation between network and services has been adopted, it aimed both to facilitate regulation of the natural monopoly elements and to facilitate competition by removing the incentives for discriminatory practices by the vertically integrated incumbents.
- P.16 However, there are benefits from vertical integration which have an impact on the decision as to the optimal industry structure. In any unregulated industry, the choice between "make" or "buy" defines the scope and size of firms. Unfortunately, there is not a natural benchmark in the regulated industries which the regulator could use in order to determine the "right" shape of the industry. The choice between a national vertically integrated monopoly (water), many regional ones (electricity and water), a vertically separated structure (rail, electricity and gas) and a horizontally separated structure (water and electricity) is not straightforward.
- P.17 Each possible structure has advantages and disadvantages depending on the features of the industry. A completely separated structure can certainly reduce the risk of discrimination against competitors, but it can provoke the loss of coordination between services and infrastructure (with consequences on the incentives to invest) and loss of economies of scope. Between the two extremes there are a number of alternative solutions. Contractual relations can in part be seen as a substitute (though an imperfect one) for vertical integration. Similarly, non-discrimination rules (which vary considerably as the example of gas and telecommunications show) could address the discrimination concern while minimising some of the disbenefits from vertical separation.
- P.18 These considerations make it hard to foresee which will be the best structure for an industry. Given the large costs that a firm must incur in case of divestiture, this is likely to be the right policy only when there is convincing

evidence that non-discriminatory access to the network can not be guaranteed to competitors. It will be necessary to assess whether the range of current and potential services is particularly wide, and the risks of discriminatory behaviour particularly high.

- P.19 The experiences of rail and gas are instructive. In rail the separation of activities went to the point where Railtrack was obliged to subcontract the maintenance of its own network. Furthermore, the costs from vertical separation in terms of coordination in the supply of train services were significantly underestimated, and so were the incentives for Railtrack to invest. The proper level of vertical integration between services and tracks is still not a clear issue: it is legitimate to ask if a vertically integrated firm, at least with the passenger services, could have been more efficient to provide the service. The problem of vertical separation in rail is that it brought about a loss in benefits from integration without providing any benefit from competition – i.e. no competing passenger train services, though some competition was fostered for some other services. Recent steps proposed by the Secretary for Transport to improve rail regulation consider this assessment implicitly. Movements toward coordinated operation of services and track are also proposed.
- P.20 The evidence from the gas industry shows that when there is a vertically integrated incumbent, the risks of discriminatory behaviour are strong and can significantly hamper the development of competition. It also shows that regulatory tools to address discriminatory concerns carry some trade offs. When the non-discriminatory rules applied to the vertically integrated incumbent were significantly tightened, this significantly contributed to the firm's decision to vertically separate voluntarily.

Industry structure and regulatory framework

- P.21 The gas and electricity sectors have shown that competition can arise despite the significant problems raised by the initial regulatory design. The lesson from the gas rail industry shows that when the regulatory framework and industry structure impede the achievement of regulatory objectives, it might be better to address these fully by also altering the industry structure and arrangements.
- P.22 The gas industry's history illustrates this. Two reports by the MMC and one by the OFT were needed to arrive finally at the conclusion that the real problem was structure of the industry. When this was addressed, significant benefits followed. Perhaps the problems that emerged in railways were addressed too late.

The role of technological change

- P.23 The scope for technological change in an industry can determine if competition is feasible or not. Technological change has played a particularly important role in extending the scope for competition in telecommunications. It has also played an important role in gas where, for example, the introduction of new smaller scale gas plants has reduced the minimum efficient scale and increased competition in gas-fuelled electricity generation. Furthermore, in gas, new metering technologies have improved

the quality and detail of information regarding the gas injected and withdrawn by shippers and traders. This is an example of technological change allowing regulatory withdrawal – a feature which is likely to be particularly prevalent in telecoms.

- P.24 However, rapid technological change implies that there is increased uncertainty and difficulties in identifying and regulating those elements that show natural monopoly characteristics. While this demarcation appears relatively clear in the energy industries, it is less so in railways (due to the problem of coordination) and even less so in telecommunications. For example, the potential for competition in some parts or elements of the network appears unique to telecom. However, this is not an easy task as a rapidly changing environment increases the asymmetry of information to the disadvantage of the regulator. Technological change implies that for the remaining natural monopoly elements higher uncertainty and associated risks will have to be taken into account at the remedy level – i.e. in setting prices. However, the risk of market power being leveraged is perhaps more important if technology moves fast, as firms might be more likely to undertake anticompetitive actions in the face of emerging competitive threats.

Review of Regulatory Intervention

The gas industry

Recent history

- P.25 British Gas (BG) was created in 1972, organised as a vertically integrated firm and given a statutory monopoly for the distribution of gas in the UK. The 1982 Oil and Gas Act removed the legal monopoly status of British Gas, but no particular provision was added to promote competition.²
- P.26 In 1986 BG was privatised, its exploration and production assets vertically separated and the 1986 Gas Act created the industry's regulatory body, the Office of Gas Supply (OFGAS). However, the government decided to maintain the BG's vertically integrated gas distribution business, and no specific measures were taken to give access to competitors. As a result, the industry underwent several regulatory interventions following privatisation, aimed at opening it to competition as far as was feasible.
- P.27 The 1995 Gas Act set out a timetable for introducing competition in those parts of the value chain where it could be feasible. The aim was to complete the transition to a fully competitive gas market by 1998. It established a new licensing system and created a comprehensive code of practice for the regulation and use of the network (the Network Code).
- P.28 One of the most important changes in the industry structure took place in 1997 when BG on its own initiative decided to separate its retail activities (Centrica) from its network business (BGTransCo). The reasons for this decision were twofold. First, BG was under stringent regulatory access constraints. Compliance with these constraints would have been costly for BG and would have removed many of the benefits of vertical integration. Second, there were also strong financial reasons why a divested structure would create greater shareholder value than the continuation of a vertically-integrated structure.³
- P.29 In addition to vertical separation many recent developments have also fostered competition:
- due to technological improvements, it is now possible accurately to measure sold and bought quantities by shippers in many points of the network. This information is important in increasingly fluid wholesale markets
 - a network code has been agreed
 - a spot market for gas has been organised. The network operator, in this case BGTransCo, can sell and buy in a now anonymous market in order to balance the system. This significantly reduced prices in the balancing market.

² Although competitors' access to the Gas Distribution Network was supposed to be introduced, no such agreements were reached.

³ Long term take or pay contracts in gas supply were a feature of the market designed to provide the necessary incentives for long term investment in gas exploration and extraction. The prices in many of these contracts, with durations of often 25 years, were higher than the prices at which the competitors were able to sell in the late 1990s. On divestiture, Centrica was left with the retail supply activities of the firm and the long term contracts, whereas BGTransCo continued to manage the transport network. This arrangement allowed a better financial position to the BGTransCo and a better access to the funding markets.

P.30 Between 1997 and 1998 the gas retail market to domestic consumers was gradually opened up.. Now every consumer has the choice between different retailers. This has led to significant switching and price reductions.

Main Characteristics

P.31 The gas supply chain can be divided into four main stages:

- the production segment, consisting in gas extraction and transportation from offshore fields, is a highly competitive activity. However, traditionally gas extraction had required important investment costs - mostly sunk. To avoid a potential 'hold-up' problem⁴ the production is usually contracted on a 'take or pay' basis, with long term contracts (typically 25 years)
- the transport network is a natural monopoly, with important sunk costs, requiring regulation
- the regional and local distribution networks are also local monopolies. Price setting is facilitated by the potential for yardstick competition
- retail supply is a highly competitive activity, with few barriers to entry. Related activities, like metering, have similar features

P.32 Gas demand shows significant seasonal variations, which are dealt with by storage.⁵

Reforms and regulatory framework

P.33 Although on paper the liberalisation of gas sector occurred many years prior to privatisation, the absence of regulated access inhibited entry to the market and competition for many years.

P.34 Once the industry was privatised, competition was harmed because no special provisions were taken to open the market to other gas providers. This reflected the optimistic view that other sources of energy could constrain BG's market power. As a result BG was given a de facto monopoly with final consumers, and a monopsony in production.

P.35 Consumers were divided into two groups, those buying up to 25000 therms (called the tariff market) and the large, industrial costumers above this threshold. The tariff market was subject to RPI -X price cap scheme, with an X factor of 2%.

⁴ This occurs when a firm has to sunk costs in assets that are investment specific. For example suppose that the market for gas extraction was competitive but each firm has to make sunk investments that are specific. For example, the investment could only be recovered if gas is supplied to a particular buyer. Ex ante the market for the supply of gas is potentially competitive. However, ex post, when the investment is sunk the companies involved in gas extractions could only sell it services to a particular buyer which would then be able to exert buyer power. Vertical integration or long term contracts negotiated ex ante are a solution to the ex post buyer power.

⁵ Storage is a related activity in the gas market, not necessarily bundled with transportation. Short term variations can be addressed by storing capacity in the pipelines, and by cutting supply to big customers willing to take this risk in exchange for lower prices. Seasonal variations in demand, such as winters, are supplied by storage in natural caves or in empty gas fields.

Major Achievements and Drawbacks

Drawbacks

- P.36 The major drawback of regulatory reform in the gas sector was the poor regulatory framework established after privatisation. While the industry appears to be performing well currently, it has required a number of adjustments and reforms.

Achievements

- P.37 A competitive market was achieved. Subsequent interventions by Ofgas and the UK competition authorities were successful in smoothly⁶ opening up the market to competition and brought benefits to consumers. Throughout the 90's competition increased in every segment and retail prices dropped significantly for all consumers.⁷
- P.38 Gas supply for UK consumers remained secure, and was provided through an increasingly competitive market.⁸

Promoting Competition

- P.39 Early on after privatisation, competition authorities began to express concerns about significant market power.
- P.40 From 1987 to 1992, the only regulatory remedy imposed on BG were price caps on tariffs for consumers with volumes less than 25000 therms.⁹
- P.41 The first intervention by the competition authorities took place in 1988, when the MMC produced a report on BG's discriminatory pricing practices. At that time, BG linked its own prices to the price of alternative fuels the customer had access to. This was considered predatory against competitors offering different fuels. BG was ordered to terminate this practice, and was permitted to link its prices to non discriminatory elements such as the volume consumed. A second important consequence of the MMC intervention was the obligation on BG to allow competitors access on transparent terms. The first access agreement was concluded in February 1990. Finally, the BG's monopsony power on BG was reduced, preventing it from contracting more of the 90% production of the new gas fields.

⁶ Most of the process of opening markets to competition went smoothly, with the exception of the early opening in the southeast of England, in which consumers faced a complex switching process and there were problems with mis-selling. Waddams Price, Catherine, *Competition and Regulation in the UK Gas Industry*, Oxford Review of Economic Policy. Vol 13, No 1.

⁷ Waddams (1997) argues that opening up retail competition could have damaged some groups of consumers because cross-subsidies which previously protected these consumers from price increases have been eroded. Competition brought new price structures which rewarded high-spending consumers but could lead to price increases for those who spend less and/or are more costly to serve.

⁸ Gas reserves in Britain are sufficient to cover an extreme cold winter which has 2% probability of occurring (OFGEM, 2004). In most countries, security of supply, in particular after the oil shock in the 70's, has become an important policy issue and motivated often intrusive government interventions.

⁹ This included a complete pass through of the gas purchasing cost to consumers and efficiency gains of 2% per year were expected. Some authors (Armstrong et al, 1994) argue that this was very lenient, since it was comparable to the rate achieved under public ownership. During 1990-1991 Ofgas reviewed the tariffs for the regulated market, which had not been changed since privatisation, and significant changes were introduced. The X factor was increased from the 2% to 5%, a significant increase in an industry characterised by relatively slow technological change. In addition a new term was added to the formula: the amount of pass through of gas acquisition cost to the consumers, which was 100% before the review, was reduced and required to have a gain in 1% in annual terms. This was measured with respect to the weighted average of the acquisition prices of the existing contracts.

- P.42 The second important intervention occurred in 1991, when the OFT produced a Gas industry Review. The basic conclusion was that the measures taken as a response to the MMC report were insufficient to create a competitive environment. The 1991 review highlighted the existing obstacles for competition, in particular the lack of available sources of supply for competitors, and BG's control over transport and storage facilities. It strongly questioned the continuation of a monopoly on the tariff market, and argued in favour of a reduction of the threshold defining the non-tariff market.
- P.43 BG agreed to take some actions based on the OFT review. It was to create two separated business units, one in charge of trading and one of transport, although the separation was not as radical as the proposed one. It also accepted that it would sell part of the existing contracts production to the competitors. The threshold for the non-tariff market was reduced from 25000 to 2500 therms.
- P.44 In 1993 the MMC produced a second report on the industry. It concluded that main problem of the industry was not BG's behaviour, but its existing structure. The MMC recommended the separation of BG from its trading activities. The terms of access granted to competitors were also considered, leading to clearer and tighter access regulation. BG argued against separation because at it considered that separation would adversely affect its cost of capital.
- P.45 The Government did not adopt the vertical separation recommendation by the MMC, but ordered BG to separate completely its trading and transport operations. In April 1996, the end of the tariff market monopoly was announced and was expected to be completed by 1998.
- P.46 However, following the MMC inquiry BG voluntary decided to vertically separate and to create two new entities, Centrica and TransCo. The decision was also prompted by the tightening of the regulatory regime designed to promote greater organisational separation of trading and transport from retail operations.
- P.47 Since 1997, there has been a marked increase in the level of competition in the market and price reductions in every consumer segment. As a consequence, regulatory intervention has been less intense than in the first decade after privatisation.
- P.48 In 2002 British Gas TransCo divided its operations into twelve regional networks, each of them accountable for their performance. BG could potentially sell some parts of its regional businesses, and this poses new questions on whether the same price regulation for transport should be adapted to this new configuration.

The railways sector after privatisation

Recent history

- P.49 The British Railways Board was responsible for all aspects of the rail services in Britain from 1962. During the 1970s, this state-owned organisation was object of criticisms because of its low performance and

the high level of public subsidy it required. This was worsened by the railways' gradual loss of passenger and freight share compared to other transport modes. During the 1980s British Rail seemed to improve its performance¹⁰, but was still considered a heavy financial burden for taxpayers.

- P.50 In 1992 the government published a White Paper outlining the reform proposal that would end in privatisation. This proposal aimed at reducing subsidies and at increasing productivity through competition. Following the 1993 Railways Act the industry was separated vertically and horizontally between tracks and service operation, with Railtrack being set up to manage the infrastructure and established passenger services licensed to operators on the basis of regional franchises through a tendering process. The last years of the 1990s saw an increase in demand both for passenger and freight services, whilst fares remained almost constant in real terms.
- P.51 In October 2000, the Hatfield accident provided evidence of the poor state of the rail infrastructure, marking a period of intense instability in the industry. Firms' costs increased sharply, partly due to a tightening of safety measures which worsened the already critical coordination problems in the industry.
- P.52 The difficulties faced by Railtrack to keep financing the investments provoked a decision by the Transport Secretary to take the company into receivership in October 2002. It was replaced by Network Rail, a firm run on a commercial basis, with no shareholders and in charge of managing the network in the public interest.
- P.53 By 2004 costs stabilized¹¹ and performance partially recovered, while the subsidies to the industry increased sharply. In July 2004, the government proposed to reform the railways including the reallocation of safety issues regulation, and strengthening of the Office of the Railways Regulator (ORR). The Strategic Railways Authority (SRA) will disappear, and its responsibilities (mainly franchising) are to be taken back by the Department of Transport. Lastly Network Rail's accountability is to be increased, coordination between the train operating companies and the network operator is to be enhanced, and the emergence of joint control centres will be encouraged. Network Rail is to retain part of the maintenance activities rather than being obliged to subcontract it.¹²

Main Characteristics

- P.54 While it is clear that the track network has all the characteristics of a natural monopoly it is unclear whether the train services are also a natural monopoly. Unlike road transport, rail services require close coordination between the operating firms and the network operator. The higher the degree of coordination required for the operation, the more likely it is that the service could actually be provided more efficiently by the track operator.

¹⁰ Institute d'Economie Industrielle, *The Economics of Passenger Transport. A survey.*, IDEI 2003
http://www.idei.asso.fr/Commun/WorkingPapers/WP_theme.htm

¹¹ Winsor, Tom, *The lessons of the last five years and their importance*, ORR June 2004. <http://www.rail-reg.gov.uk/upload/pdf/frgtscpt.pdf>

¹² This was one of the alleged causes for Railtrack not having an accurate idea on the state of its network assets.

This means that there are potentially significant scope economies between services and tracks.

- P.55 The extent of feasibility for train services competition depends crucially on how costly it is to coordinate competing firms on a day to day basis. Privatisation relied on the assumption that this could be done cost effectively. Competition could also be provided by other modes of transport such as private transport and coaches. This was the basis for railway deregulation in other countries (e.g. US, Brazil and Mexico).
- P.56 Freight is a service that is considered competitive for most of the products and regions, in particular because it faces significant competition from road transport. The only exception might be the transport of high-volume, low-value products.

Reforms and regulatory framework

- P.57 British railways were reformed by separating tracks and train services. This created the first non-vertically integrated railway structure in Europe.
- P.58 The industry was vertically separated into: a network operator (Railtrack), 5 freight operators, 25 Train Operating Companies (TOCs), 3 rolling Stock companies (ROSCOs) and an array of teams in charge of works and maintenance. This separation was intended to avoid any potential preferential treatment towards the incumbent's transport division that would prejudice other potential competitors.
- P.59 Seven year franchises were allocated by auction and awarded to TOCs on the basis of the lowest subsidy required to operate the service.
- P.60 Private ownership was expected to bring increased efficiency and to reduce the need for public funding. In addition open access raised the possibility of providing services competing with the franchised one. The regulator took the decision of reducing the possibilities for cherry picking competition, at least for the first years.
- P.61 Railtrack, the network operator privatised in 1996, had to coordinate services and the maintenance, but was obliged to subcontract with suppliers in charge of renewals and design work.
- P.62 A system of financial penalties was set up to provide incentives to avoid delays and deliver operative reliability. This system proved harder to manage than expected, as the allocation of responsibilities proved time consuming and not an obvious task in a day to day operation.
- P.63 A number of entities were in charge of various regulatory aspect. The Office of Passenger Rail Franchising (OPRAF), substituted in 1997 by Strategic Rail Authority (SRA) was responsible for the allocation of the tendering of services, the minimization of service disruptions, and the enforcement of fair rates for the public. The SRA was in charge of protecting consumers and guaranteeing the use of the network in its entirety. The Office of Rail Regulator (ORR) was in charge of fostering competition, a proper regulation of Railtrack and of the ROSCOs

- P.64 As a consequence of the Hatfield accident, Network Rail is responsible for network operation. It is run on a commercial basis but does not have shareholders. This regulatory structure is still expected to change. In July 2004, the Secretary of Transport proposed a new structure for the regulation of the sector, as described above.

Major Achievements and Drawbacks

- P.65 Evaluating a sector which is far from reaching a stable regulatory and market structure is difficult. However, here we put forward some considerations.

Drawbacks

- P.66 The separation of all business units, and in particular network and passenger services, was criticised very early on.¹³ It is still unclear whether underinvestment was a direct consequence of the separation. However, it could be argued that regulation both before and after privatisation did not attach sufficient importance to the investment requirements of the sector.¹⁴ This is implicitly recognised by the Government's decision to fund the sector with £3.8 bn pounds a year, compared to the £1.8 bn during the period 1997/1998.¹⁵
- P.67 The impact on efficiency is unclear. Figures given by the Secretary for Transport (2004) show that performance suffered a slight but constant deterioration until the Hatfield accident. The positive trend since then has not reached the 1998 performance levels. Before the Hatfield tragedy, the cost of the TOCs had shown important reductions, but these savings later disappeared.
- P.68 Efficient coordination of the network operator and the TOCs has been a problem in the day to day operation. The penalty mechanism was hard to implement, and it might not have provided the correct incentives. Investment coordination also proved to be important. The lag between track upgrades and the purchase of modern trains has imposed unnecessary costs on services firms.
- P.69 The original seven year franchises have proved to be too short to promote investment by the TOCs. Their business is based in long lived assets and in most cases the cost of reselling them is too high. As the first franchises are coming to an end, a period of 20 years is already being considered.

Achievements

- P.70 The most important achievement is a reversal of the negative trend in the demand for train services. Great Britain is the only country in Europe which has succeeded in growing demand for rail.¹⁶

¹³ Bradshaw W.P. *Competition in the Railway Industry*, Oxford Review of Economic Policy, Vol. 13, No1. Spring 1997

¹⁴ Some argue (e.g. IDEI, 2003) that the problem was in the incentives provided to the network operator, emphasizing cost reduction at expense of investment.

¹⁵ The Secretary of State for Transport, *The future of Rail*, July 2004. <http://www.dft.gov.uk/railways/whitepaper>

¹⁶ Rail freight has increased by 43% since 1995's low point. Passenger transport increased by 26% since 1996/1997 (SFT, 2004).

- P.71 The underinvestment in the industry has been reversed, and the flow of resources into the sector is likely to improve the reliability of the industry as a whole.¹⁷

Promoting Competition

- P.72 The original reform of British railways was based on the idea that competition could bring costs down and improve performance. Competition in train services was thought achievable at a low cost. Nonetheless, the economies of scale of the industry and the important coordination required to operate the system efficiently made track competition hard to implement.
- P.73 There has been a change of vision regarding the best way to bring benefits to the consumers. Today, the competition “for” rather than “in” the market is expected to bring most benefits.
- P.74 The current structure of rail regulation now assigns significant powers to the regulator regarding the amount of competition a franchised firm can face while providing the passenger service. This freedom of choice is uncommon among the regulators of most industries. A case-by-case cost-benefit analysis will need to be undertaken to assess whether a new service would bring benefits.¹⁸

Electric power generation in England and Wales

Recent history

- P.75 Prior to reform, the electric power sector in England and Wales consisted of a state owned vertically integrated monopoly: the Central Electricity Generating Board (CEGB). The most important justification for such a structure was the natural monopoly character of the transmission and distribution networks. Other important considerations focused on preserving the close coordination needed between transmission and generation and efficiently locating new power plants.
- P.76 Technological changes, in particular the reduction in the optimal scale of new generation plants, opened a debate about the feasibility of introducing market mechanisms. In 1990 the sector was privatised and completely restructured in order to open up some of the vertical stages to competition. The main aspects of the reform were:
- Generation plants were allocated to two new firms (National Power and PowerGen)¹⁹
 - The National Grid Company (NGC) was set up and made responsible for the transmission network at national level

¹⁷ During the period 2000-2010, public funding will be almost double the annual level in 1998. In 2004, the government is going to invest £3.8 billion in the sector, and a similar amount is going to be invested by the private sector.

¹⁸ This is by no means an easy calculation. In the last report on the Moderation of Competition policy (May 2004), the ORR proposes a procedure through which new – not tendered - passenger services are to be authorised or not. The success of this procedure will depend on the regulator’s ability to extract good quality information, and on its ability to undertake the detailed analysis required in a transparent way. Office of the Railways Regulator, *Moderation of competition: Final conclusions*, May 2004 <http://www.rail-reg.gov.uk/upload/pdf/195.pdf>

¹⁹ Costly decommissioning of nuclear facilities made the government decide to keep the nuclear generation plants under state control.

- 12 regional electricity companies (RECs) were created..

- P.77 A wholesale market for electricity generation (the pool) was created and prices were set by the interaction of buyers and sellers. A mechanism was also created to allocate generation according to the generators' bids. This system replaced the former central allocation of generation among CEGB plants. Unfortunately, this new system suffered from important design problems, which became evident once the contracts engaging most of the firms output expired in March 1993. After this date the industry structure was further modified because of evidence of market power in the wholesale market. Regulatory intervention occurred in 1994 and 1998 forcing the largest players to divest part of their generation assets.
- P.78 Some degree of vertical integration reoccurred as generators and retail suppliers merged and most RECs are now controlled by other firms in the energy sector.

Main Characteristics

- P.79 Electricity is a non storable good, which means that demand and supply have to be instantaneously balanced to avoid important system failures and in particular outages. This implies the need for generators to be ready to respond to the requests of the system operator. This, combined with a high variability of the demand along the day and across seasons, makes the management of the network a central issue. These features together with the natural monopoly feature of transmission and distribution justify some degree of regulatory intervention.
- P.80 The nature and extent of the feasibility of competition in electricity varies along the value chain.
- P.81 Generation can be opened to competition. There are no significant economies of scale in the operation of the plants, and the minimum efficient scale (MES) is small and declining.²⁰ Similarly, retail services could be equally competitive. These consist mainly of reselling electricity to final consumers. Related services such as metering and billing are not necessarily bundled and have all the conditions to be competitively provided.
- P.82 National transmission and distribution are natural monopolies and therefore require regulation. However, there is scope for applying yardstick competition to the 12 distribution networks.
- P.83 The management of the network has to take into account the physical characteristics of electricity²¹ which make network management quite a

²⁰ The MES of the plants had reduced significantly in recent years and in particular since the appearance during the late '80s of Combined Cycle Gas Turbines (CCGTs). This has important consequences; the smaller the optimal scale of the plants, the more geographically spread generation plants will become. This will in turn reduce congestion and reshape the optimal configuration of the transmission networks.

²¹ Electricity flows along the path of least resistance, which means that that it cannot be directed from one point to another on the network. A typical transmission network is capacity-constrained in certain locations and at peak hours. To manage congestion in a cost efficient way could imply operation of inefficient plants at high demand, and to shut down low cost plants in locations with excess supply. These are decisions that have to be delegated to the system operator. The transmission lines suffer from power losses which increase with the quantity of electricity being transmitted.

complex task, involving a high degree of coordination between the generators and the system operators.

Reforms and regulatory framework

- P.84 The Government broke up the vertically integrated structure of the industry. Each activity; generation, transmission, distribution and retailing was separated, privatised and subjected to various degrees of regulation.
- P.85 Initially generation was left with the PowerGen and National Power duopoly making up most of the existing capacity, with the remainder supplied by nuclear plants which remained under state ownership.
- P.86 The National Grid Company (NGC) owned by the 12 RECs was made responsible for the operation of the network.²² The RECs were responsible for electricity distribution in their regional monopolies.
- P.87 The pool, a wholesale market whose main objective was to allocate supply according to the generators' bids, was set up. The bids were expected to reflect the cost of supply, and the quantity of electricity they could provide. The price reflected the bid from the marginal (least efficient) generator, plus a make up payment for the capacity made ready at the relevant interval of time to compensate them for their contribution to avoid blackouts. The pool was found to suffer from significant problems. In March 2001 the pool was substituted by the New Electricity Trade Agreements (NETA) and new trading rules were implemented. One of the risks avoided with this system is the possibility of the generators colluding on their bids, increasing artificially the price paid by consumers. This is achieved through the mainly confidential character of the transactions.²³
- P.88 Prices for both transmission and distribution have been regulated since the break-up of the industry. The RECs were initially given an exclusive franchise to provide the retailing services, which came to an end in 1998 when the retailing segment was increasingly opened up to competition.²⁴

Major Achievements and Drawbacks

- P.89 The CEGB was criticised for inadequate investment choices in power generation and its cost inefficiencies. There is some evidence that this was the case.²⁵
- P.90 Whilst the productive efficiency of the industry is very likely to have improved, concerns were expressed throughout the 1990s that this was not fully reflected in falling prices. Market power remained a concern especially

²² The NGC had to forecast demand for each half-hour period, and to collect the bids from the generator, setting a merit order according to which the different plants would be called.

²³ The main difference of this trading scheme is that the around 95% of the energy is traded in independent and confidential transactions; each participant is responsible for its position at the moment where transactions stop. The Balancing and Settlement Company (Elexon) is supposed to balance only the physical positions reported by the operators (instead of balancing the whole market). In practice the buying price at closure is volatile and high, which gives an incentive for the firms to minimize their short positions.

²⁴ Some consumers, mainly large business, were allowed to buy directly from the pool. At first, only costumers with peak demands greater than 1MW could have access to the wholesale market. These consumers accounted for 30% of energy consumption. In 1994, the threshold was reduced to peak demands greater than 100kW, making up to 50% of demand.

²⁵ Armstrong, M, S. Cowan and J. Vickers, *Regulatory Reform. Economic Analysis and British Experience*, MIT Press, 1994.

in generation. Initially National Power was granted 50% of the generating capacity²⁶ and a duopoly with Power Gen was created. This was not a problem for the duration of the contracts engaging the firms' output. However, once they expired, the power generators had incentives to make bids higher than their avoidable costs. Capacity payments might have been manipulated as well.²⁷ The small number of bidders and the repeated interaction among them resulted in excessive prices, in particular during the 1993 -1998 period. The market was not competitive, in particular since the rising prices in the pool contrasted with the decreasing fuel prices (45% reduction from 1989 to 1998)²⁸. During the first few years after privatisations, the firms' share prices outperformed the stock market index by 100%. This suggests that shareholders rather than consumers benefited most from cost efficiencies.

- P.91 As this became a major concern, in 1994 OFFER capped the maximum bidding price and asked National Power and PowerGen to divest 6 GW of capacity. The plants to be divested were chosen among the ones whose bids used to clear the market price. Additional divestiture was imposed in 1998, and a reform of the trading rules (NETA) was announced. As a result, the market became fairly competitive and prices have reduced considerably. Electricity prices have dropped by 40% since the NETA was introduced and the last capacity divestitures were implemented (OFGEM, 2003).
- P.92 The market power of generators might have created opportunities for inefficient entry. New firms entrants facing high margins in generation entered and built new CCGT plants. Subsidized nuclear energy and technological changes stimulated the new investments by incumbents in CCGT as well. As a result there was a drastic increase in the use of gas in electricity generation. Many argue that this, or at least its speed, was not necessarily efficient and that the "dash for gas" should have occurred at a slower pace.²⁹ Conversely some argue that new environmental restrictions on sulphur and carbon emissions would have made the switch unavoidable in any case.
- P.93 One of the areas that has been subject to criticism was the regulation of distribution. The RECs were given a time-limited exclusive franchise to provide retailing and complementary services. This, together with a lack of tight control on the distribution prices, resulted into significant gains to shareholders. As a response, the regulator reduced the distribution prices twice, giving back to the consumers £2.5 bn and £1 bn respectively in the first two price reviews.

²⁶ This was because it was thought better suited to bear the risks and costs of decommissioning the existing nuclear plants. Shortly before privatisation, the government concluded such costs would be greater than expected. Given the looming deadline, the generation plants were privatised in the original asymmetric duopoly fashion.

²⁷ Since the payments for capacity were higher as the probability of blackout increased, and this in turn depended on the capacity reported by the firms, it is likely that they under-declared the amount of plants available at any point in time. Capacity payments increased from £.47 in 1990 to £39 in 1996R. Green and D. Newberry, *Competition in the electricity Industry in England and Wales*, Oxford Review of Economic Policy, VOL 13 No1. Spring 1997

²⁸ Ex post analysis on the cost of the nuclear generation has lent support to the criticism that inadequate investment choices in power generation were made (Armstrong et al 1994). Nevertheless, the question whether operative costs were too high was more controversial, and there is no agreement. For instance, the MMC in 1991 did not find evidence supporting this criticism. Nevertheless, few would support the idea that CEGB would be more efficient than the current structure.

²⁹ There is evidence that the existing coal plants had in general lower costs, once sunk costs are taken into account, than the new plants. New investments decisions and distorted relative prices between fuels caused a drastic reduction of coal demand. British annual coal sales declined from 74m tons to 30 tons in a few years.

Water and Sewerage in England & Wales

Recent history

- P.94 The water industry in England and Wales was significantly reorganised in 1973 when independent regional authorities were created with commercial and regulatory activities within their jurisdiction.
- P.95 The sector suffered from significant underinvestment. The authorities had limits on borrowing, and any additional investments beyond this limit could therefore only be financed either by cost reductions or by increased revenues. Therefore despite price increases this was insufficient to provide the needed investment.
- P.96 The government considered that important savings could be obtained by more efficient management, and this would best be achieved by the private sector. In 1989, the government decided to privatise the whole sector without modifying its structure. This included 10 firms providing water and sewerage (WACs) and 29 “water-only” (WOCs) firms. The Office of Water Services (OFWAT) was set up, whose duty is to promote the public interest and to providing the correct economic incentives to the industry.

Main Characteristics

- P.97 The water sector is a network industry and a natural monopoly. The provision of water and sewage services involves very high sunk costs and has elements of both scale and (horizontal and vertical) scope economies. There are few activities where competition might be sustainable - metering, billing and water abstraction. Duplication of networks would be difficult and economically inefficient.
- P.98 The original high degree of vertical integration of the water reflects both the need for coordination and the degree of sunk investments. This is known as the “hold-up” problem, already mentioned for gas. Although, as in telecoms, regulatory mechanisms could be imposed to open up competition at various levels, this has not been deemed practicable or economically beneficial.
- P.99 The core activities of the water industry are subject to limited technological change. This facilitates direct regulation of prices, because it reduces the regulator’s disadvantage from asymmetry of information. The regulator can learn about the costs of the firms over time and use this data to set efficient prices. At the same time, limited technological change reduces the scope for innovation-based competitive entry into the market.
- P.100 The water industry is also subjected to significant external constraints, such as environmental regulation, not set by OFWAT, for which the investment requirements are critical to setting price controls.

Reforms and regulatory framework

- P.101 Given the characteristics of the industry, and the limited opportunities to introduce competition, the government decided at privatisation to keep the regional organisation, and to maintain the vertically integrated structure

existing at the time. OFWAT was made responsible for creating the incentives for efficient performance of the industry, but subject to the important constraint that firms should be able to finance their activities. This explicit protection was considered to be the best way to guarantee that the industry could attract sufficient investment going forward.

- P.102 The regulator has the task of setting retail prices. A price cap mechanism was chosen because it was thought to provide better incentives for cost reduction than the rate of return regulation used by US utility regulators in the past which had the drawback of not providing incentives for achieving cost efficiencies. The regional structure of the industry allowed OFWAT to rely on yardstick competition.³⁰

Major Achievements and Drawbacks

- P.103 Probably the most important achievement in the water industry has been to guarantee continued efficient investment to the industry.³¹
- P.104 Criticism has focused on the concern that average bills for non-metered consumers have increased by 30% in real terms since 1989, and the latest review points to further increases.³² Most of these increases are related to the investments needed to comply with tighter environmental regulations.

Promoting competition

- P.105 Even if yardstick competition is the most important competitive element, in some cases direct competition can take place. Examples include: new urban developments; inset appointments; common carriage; unregulated suppliers (the licences do not hold an exclusive right to provide the service. Although uncommon, consumers can choose an unregulated supplier or self-supply).
- P.106 Competition law applies to the water sector but until recently the main aspect used in practice was merger policy.
- P.107 Water companies are privately owned and this offers potential efficiency gains in management. This limited discipline has often come from the presence of takeover threats. However, this is now limited by the desire to maintain a sufficient number of regional independent companies for yardstick competition (though this discipline could come from takeovers from outside the sector).

³⁰ One of the main areas of controversy is whether yardstick competition is a valid approach to regulate the industry. This is because the biggest share of the firms' expenditures are capital, not operating costs. This means that the firms are evaluated not with respect to their performance in a day to day activity, but to capital investments which may be unique investments which are of limited use for comparative purposes.

³¹ In the period going from 1989 to 2005 the industry will undertake investments of £50bn (OFWAT, 2004). This investment will allow water companies not only to upgrade and expand existing facilities but also to meet increasingly tight regulations on drinking water quality and environmental standards. (OFWAT, *Water and Regulation: Facts and Figures*, April 2004) The achievement of environmental objectives is one of the other major successes of the industry and the regulators.

³² It is likely that these increases have a particular impact on big families with lower incomes, with obvious social consequences.