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## Electricity Privatisation and Environmental Policy in the UK: Some Lessons for the Rest of Europe

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European University Institute, Florence

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## Abstract<sup>1</sup>

While many central European countries are considering the privatisation of public utilities such as the electricity sector, and the European Union is attempting to introduce a greater degree of competition in this sector, the UK has forged ahead with a programme of privatisation and liberalisation. This coincided with a growing concern about environmental issues. In particular the climate change issue requires changes in the electricity sector to bring about reductions in CO<sub>2</sub> emissions. At the same time, privatisation and the introduction of a degree of liberalisation can have a profound effect on both technology choice and operation of the electricity sector. There is thus a need for ever closer linkages between energy and environment policies to ensure compatibility.

This paper discusses to what extent environmental concerns have been taken into account in the privatisation process in the UK, focussing in particular on whether privatisation has been compatible with the Government's commitment to reduce CO<sub>2</sub> emissions. It looks both at the interaction of government policies in the energy and environment areas and at the activities of the electricity sector. The main point to emerge is that privatisation has been a mixed blessing in environmental terms. It has included some environmental safeguards and has had some incidental benefits but has also caused tensions with environmental objectives. The profit orientation of the privatised electricity companies combined with the lack of interest (and to some extent authority) of the regulator to compel the companies into environmental activities means that progress towards reducing the overall environmental impact of the UK electricity sector has been rather slow. The lessons for the rest of Europe are that privatisation and liberalisation *per se* are not necessarily a problem but there is a definite need for a strong commitment from both the Government and regulator to coerce and induce the privatised companies into sound environmental management.

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<sup>1</sup> This paper is mainly based on work carried out at the Science Policy Research Unit, University of Sussex and in the Division of Environmental Sciences, University of Hertfordshire. The author would like to thank Jim Skea, Sue Owens and various other people for comments on related work. Furthermore, thanks are due to all the representatives of the various electricity companies who gave their time for interviews.



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## ***Acronyms***

CCGTs	Combined Cycle Gas Turbines
CEGB	Central Electricity Generating Board
CHP	Combined Heat and Power
DGES	Director-General of Electricity Supply
DOE	Department of the Environment
EEO	Energy Efficiency Office
EST	Energy Saving Trust
EU	European Union
FFL	Fossil Fuel Levy
NFFO	Non Fossil Fuel Obligation
OFFER	Office for Electricity Regulation
REC	Regional Electricity Company
UK	United Kingdom
VAT	Value Added Tax



## 1. Introduction

During the 1980s, the UK was frequently labelled the 'dirty man' of Europe, stemming primarily from the reluctance to reduce high levels of sulphur emissions from power stations which were reputedly contributing to the destruction of Scandinavian forests and lakes. The then nationalised electricity company, the Central Electricity Generating Board (CEGB), was indeed instrumental in dissuading the Government from any rapid action in this area. In general, unlike in many other north European countries, environmental issues were low on the political agenda in the UK during this period. A change in attitude from late 1988 onwards is usually attributed to a speech by the then Prime Minister, Margaret Thatcher, on the importance of environmental protection. Simultaneously, public awareness of environmental issues was growing and with it came calls for a more pro-active environmental policy.

Climate change, together with ozone depletion, was one of the major environmental issues benefiting from this new attention. The UK Government initially set a target for the return of CO<sub>2</sub> emissions to 1990 levels by 2005. This target was brought forward to 2000 in spring 1992. As the majority of CO<sub>2</sub> emissions stem from our production and use of energy, the main adjustments are needed in the energy and transport policy areas. In the energy area, there are no quick solutions to the problem as it is difficult to reduce the dependence on fossil fuels found in most European countries. However, more efficient technologies such as combined cycle gas turbines (CCGTs), as well as a more extensive application of combined heat and power (CHP) systems, offer at least some reductions. Nuclear power is advocated by some but, while clearly advantageous in CO<sub>2</sub> terms, it remains the most controversial of all energy sources and suffers from political acceptability problems. Renewable energy has a large technical potential but currently is still rarely viable economically. It is thus generally recognised that improvements in end-use energy efficiency must be a cornerstone of any climate change response strategy. However, there is less agreement about ways to achieve this preferred outcome. Some are in favour of heavy government regulation, others advocate the use of market based instruments.

In the UK, the growing concern about climate change, and environmental issues in general, coincided with the privatisation and liberalisation<sup>1</sup> of the electricity sector. Pressure for privatisation and liberalisation in the electricity sector has indeed been growing EU wide in recent years. At EU level, proposals for the Internal Energy Market, as Collier (1994a) has shown, have

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<sup>1</sup> Privatisation and liberalisation are not necessarily the same thing. In the UK, some of the public utilities such as British Gas were privatised as monopolies whereas with electricity privatisation there has been some attempt to introduce competition as well.

given little consideration to environmental concerns. However, structure, ownership and regulatory framework are crucial determinants of the environmental performance of the sector and the UK provides an interesting case study of the problems and opportunities found in a privatised and liberalised system.

Considering the CEBG's bad environmental performance, privatisation was unlikely to be entirely negative in environmental terms. At the same time, private ownership and competition on their own were unlikely to result in substantial environmental benefits. Instead, the process opened up various possibilities for encouraging a more environmentally sound operation of the electricity sector. The main aim of this paper is to examine to what extent this opportunity has been grasped by investigating areas of conflict and compatibility both at the policy level and at the implementation stage, that is the operational level of the electricity companies.

The first section of the paper discusses how environmental concerns have slowly come to influence energy policy decision, starting with a short discussion of the development of environmental concerns. It then looks at the development of the climate change strategy, which was initiated at the same time as the privatisation of the electricity sector. The paper then investigates how two agendas have together changed the situation concerning fossil fuels, nuclear power, renewable energies and energy efficiency. Following this, the activities of the electricity sector are examined. The two main generators, National Power and PowerGen, as well as four regional electricity companies, have been chosen as case studies. The section demonstrates how short-term profit considerations have become the priority for investment in the industry, with mixed results in environmental terms. The paper then provides some concluding remarks on the areas of compatibility and conflict found. Finally, the relevance of the UK experience to other European countries is discussed.

## ***2. Towards a more pro-active environmental policy***

In comparison with for example Germany and the Netherlands, environmental concerns reached the political agenda relatively late in the UK, in the late 1980s, and were driven by the growing interest in concepts such as sustainable development and policy integration (see Collier, 1994a). During the 1980s, the UK received much criticism from abroad for its exports of sulphur emissions, in particular from Scandinavia. Air pollution had been much reduced since the adoption of the Clean Air Act in 1956, although the policy for emissions from combustion plants had been one of dispersal rather than of control. The argument of the British government and the CEBG until 1986 was that there was too much scientific uncertainty and more research was needed. The UK refused to sign the SO<sub>2</sub> protocol of the Geneva Convention on Long Range Transboundary Air Pollution and initially opposed the EU Large Combustion

Plant Directive, as well as directives on emissions from cars, before eventually accepting compromise directives. Even now, the Government restricts action on pollution from power stations and cars to the minimum requirements of the EU directives.

Criticism of the Government's environmental record by environmental organisations (see e.g. Friends of the Earth, 1989), opposition politicians and even House of Commons Committees (see e.g. House of Commons Energy Committee, 1989) was prevalent during the 1980s but the Government, for much of the time, took little notice of this criticism, as exemplified by the above described attitude to emission control. The lack of environmental concern in the early and mid-1980s, in comparison to other countries like Germany, can at least be partially blamed on the inertia inherent in the British political system, where small parties taking up new issues (such as the German 'Greens') have little influence as they have no realistic chance of gaining seats and hence do not pose a threat to established parties. Additionally, the Conservative government continuously had a large parliamentary majority during the period. However, public concern gradually increased and this, combined with international (mainly for action on global issues like ozone depletion and climate change) and EU pressures, persuaded the Government that it was time to present a more positive image on environmental issues.

Environmental concerns were subsequently given a much higher political profile. The then Secretary of State for the Environment, Nicholas Ridley (who received much criticism from environmental groups for being insensitive about environmental problems) was replaced by Chris Patten who had made his name as a concerned minister for overseas development. He gave particular prominence to sustainable development and environmental taxation through a report commissioned from Professor David Pearce and his colleagues, some of the leading academics in the environmental economics field (see Pearce et al, 1989). A comprehensive review of the UK's environment policy was also promised. For this purpose, a cabinet committee was established chaired by Margaret Thatcher herself. Its deliberations were published in September 1990, as a White Paper entitled 'Our Common Inheritance'.

The White Paper stressed the importance of integrating environmental concerns into other policy areas:

The Government needs to ensure that its policies fit together in every sector; that we are not undoing in one area what we are trying to do in another; and that policies are based on a harmonious set of principles rather than a clutter of expedients (HM Government, 1990, p.8).

The Government is convinced that economic development and environmental protection need not be irrevocably opposing principles but can complement each other. To achieve sustainable development requires the full integration of environmental considerations into economic policy decisions (HM Government, 1990, p.47).

Energy policy is obviously a crucial area for this policy integration, especially in view of the climate change issue. However, in reality, commitments on paper are not always implemented. As later sections of the paper will reveal, environmental considerations actually have had little influence on electricity privatisation, although they have had some impact on subsequent adjustments to the regulatory framework for the electricity sector. There certainly has been no full integration and one can hardly talk of a harmonious set of principles.

Overall, the White Paper was somewhat limited in scope and Hope and Owens (1991) thus describe it as little more than a state-of-the-art statement of existing measures. The Government has subsequently been producing annual update reports on the White Paper which have aimed at developing its ideas further. There have a number of developments such as a tightening of the CO<sub>2</sub> target, as well as the extension of the targets for renewables and for combined heat and power (CHP) plants (see below) which indicate that environmental considerations are having an influence on policy decisions regarding energy matters. The 1992, 1993 and 1994 White Paper updates contain separate chapters on energy and the environment, which set out the measures taken to reduce the environmental impact of energy use, although, as section 4 will show, these are by no means comprehensive.

The Government also published a sustainable development strategy in January 1994, which contains one chapter on energy supply and one on energy efficiency. According to the strategy, to achieve a sustainable framework for energy supply it is necessary:

- to ensure secure supplies of energy at competitive prices;
- to minimise adverse environmental impacts of energy use (HM Government, 1994a).

The mentioning of competitive prices in the context of sustainable development is rather peculiar and obviously reflects government priorities. It is probably no coincidence that the two are listed in this order. As will emerge more clearly through subsequent discussions, while the Government is now paying more attention to environmental concerns as previously, top priority still continues to be given to economic issues, especially liberalisation. The different policy agendas are not necessarily compatible. This may present a particular problem when it comes to the implementation of the climate change strategy

which depends crucially on emission reductions from energy production and use. The next section will briefly discuss the development and the main features of the UK climate change strategy.

### 3. *Climate change - a new challenge*

When the climate change concern first started to hit the headlines in 1988/89, the Government initially did little more than refer to the role of British scientists in developing the scientific understanding of the issue. The House of Commons Energy Committee published a report on the energy policy implications of the greenhouse effect in July 1989, heavily criticising the Government's policies especially the low priority given to energy efficiency and renewables. It called for a much higher profile and pro-active stance with a mixture of regulation, penalties and incentives (House of Commons Energy Committee, 1989).

One of the first Government activities was the publication by the Department of Energy in January 1990 of a report on energy related greenhouse gas emissions and measures to ameliorate them (Department of Energy, 1990). Environmental groups and opposition parties continued to call for action but none was taken by the Government until Margaret Thatcher, the then prime minister, announced, quite unexpectedly, in May 1990 at the opening of a new climate research centre, a target for CO<sub>2</sub> emissions. The announcement actually indicated that the UK was to cut CO<sub>2</sub> emissions by up to 30% below 1990 levels. However, it emerged that the target was based on a projected increase of CO<sub>2</sub> emissions up to 30% by 2005, so that the actual target was a 'stabilisation' of CO<sub>2</sub> emissions. The projection of a 30% increase was immediately criticised by many commentators as a gross overestimate, so that the target would effectively require very little action over the next few years. Additionally, the target attracted criticism as action was made conditional on other countries being prepared to take similar action. The Government's cautiousness has been attributed to the desire to proceed smoothly with electricity privatisation and not to alienate private motorists before the next election<sup>2</sup>. From the Government's point of view, it was thus probably sensible to opt for a rather unambitious target. However, it also reveals that privatisation was considered a priority over environmental objectives and that at the time policy integration was clearly not achieved.

New scenarios produced by the Department of Energy in 1991<sup>3</sup> indicated that a return of emissions to 1990 levels by 2000, and hence compliance with the EU target, would actually be fairly easy but the Government continued initially to

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2 *The Guardian*, 26.5.1990, p.1+2.

3 As reported in *ENDS*, December 1991, p.20.

insist on its 2005 target. Nevertheless, despite climate change hardly featuring as a topic in the election campaign of spring 1992, Major's re-elected government finally announced that it would bring forward the stabilisation target to 2000. It is not clear why the Government refused to amend the target earlier considering, as discussed above, it had become obvious that 'stabilisation' by 2000 would be relatively easy. It could certainly have saved itself considerable criticism, including that from the EU Commission.

The Government's plans for the implementation of the CO<sub>2</sub> target were first spelt out in the Environment White Paper, but no actual new measures were set out. The White Paper claimed that the Government was taking 'major initiatives' on energy efficiency but, as later sections will show, these have in fact to date been rather limited. The White Paper promised to develop the Energy Efficiency Office's (EEO) activities, to promote the wider use of CHP, seek to reduce the total energy bill for the government estate by 15% and set up a new Ministerial Committee on energy efficiency. Additionally, the White Paper stated the aim to increase renewables capacity to 1000 MW by 2000. This commitment was subsequently increased to 1500 MW in the coal White Paper in 1992. As will be discussed in more detail later, the development of renewable energy sources has clearly received a new impetus on account of environmental concerns, although the current system also has its shortcomings. Furthermore, electricity privatisation was claimed to lead to a 'very substantial' reduction in CO<sub>2</sub> emissions. As already indicated, CO<sub>2</sub> emission reductions (although not necessarily substantial ones) are indeed resulting from privatisation, but this has actually been incidental rather than planned. Besides, as will emerge during the course of this paper, privatisation has had a number of negative implications.

The two most significant policy measures to emerge subsequent to the White Paper have been the imposition of value added tax (VAT) on domestic fuel and the establishment of the Energy Savings Trust (EST), which are discussed in more detail below. A separate climate change strategy was eventually published in January 1994 and contained a strong emphasis on voluntary measures, termed the 'partnership' approach by the Government. The plans are for an overall saving of 10 million tonnes of CO<sub>2</sub> by the year 2000 (this amounts to just over 6% of the 1990 emissions), which, together with the CO<sub>2</sub> reductions that will occur on the electricity generation side through the replacement of coal-fired plant through CCGTs, is expected to achieve an emission stabilisation. The required reduction is to be achieved through various measures as listed in table 1.

*Table 1: Measures for CO<sub>2</sub> reductions in the UK*

<b>Measures</b>	<b>Emission reductions (in MtC)</b>
Energy consumption in the home (incl. VAT on domestic fuel, EST, ecolabelling, building regulations, appliance standards)	4
Energy consumption by business (incl. EEO programmes, building regulations, office machinery standards)	2.5
Energy consumption in the public sector (through target setting)	1
Transport (increased road fuel duties)	2.5
<b>Total</b>	<b>10</b>

Source: HM Government, 1994b

The imposition of VAT on domestic fuel was expected to have the single largest effect of any of the measures, namely a reduction of 1.5 million tonnes of CO<sub>2</sub>. This measure was first announced in the April 1993 budget and was to take place in two stages; the application of an 8.5% VAT rate from April 1994 and the application of the full 17% rate from April 1995. It is clear that initially, the main purpose of the tax was a reduction in the budget deficit. Then, suddenly, VAT was heralded as an environmental tax, and, as such, the UK's answer to the EU carbon/energy tax proposals<sup>4</sup>. The tax immediately attracted much criticism because of its social implications. Since then, a compensation package for low income households has been announced, yet no allowance was made for this in terms of lower reductions. Furthermore, in December 1994 the Government lost a vote in the House of Commons which means the increase to 17% will not be applied. Also, at the same time there are moves to cut electricity prices, so that consumers may only face very small increases which will give little incentive for energy efficiency. Furthermore, the EST is facing

<sup>4</sup> The UK has been one of member states most vehemently opposed to the tax proposals.

problems, as will be discussed section 4.5. By the beginning of 1995, the UK climate change strategy was thus pretty much in tatters. To some extent, especially as concerns the VAT issue, this has been due to the government's increasing inability to push its policies through parliament. However, much of it has been due to a continuing reluctance to tackle environmental issues in a systematic fashion and to give priority to economic and ideological issues. As will emerge during the rest of the paper, privatisation has been an overriding concern and has not always been complementary to the achievement of environmental goals. In order to fully understand what has happened, it is first of all important to look at the main features of electricity sector privatisation .

#### ***4. Energy policy and the electricity sector after privatisation***

##### *4.1 A policy dominated by free market ideology*

Privatisation, combined with the growing environmental pressures, has resulted substantial changes in a number of energy policy areas and the Government has had to some extent retreat from the laissez-faire approach it applied to energy policy during most of the 1980s. This stance was for example expressed by the then Energy Secretary of State, Nigel Lawson in 1982:

...I do not see the Government's task as being to try and plan the future shape of energy production and consumption. It is not even primarily to try and balance UK demand and supply for energy. Our task is rather to set a framework which will ensure that the market operates in the energy sector with a minimum distortion and that energy is produced and consumed efficiently (quoted in Roberts, Elliott and Houghton, 1991).

Such a laissez-faire attitude was in considerable contrast to other EU countries, including Germany and the Netherlands, where governments believe in substantial involvement in the energy sector, despite some interest in liberalisation. In the UK, more than a decade of government indifference towards a traditional energy policy approach finally culminated in the abolition of the Department of Energy (DEn) and with it the House of Commons Select Committee on Energy, which had been very critical of government policy in recent reports, immediately after the election of April 1992. Responsibility for most areas of energy policy now lies with the Department of Trade and Industry (DTI), although, the Energy Efficiency Office (EEO) has been attached to the Department of the Environment.

The essentially monopolistic operation of the electricity sector did not fit in well with the Thatcher government's philosophy of free market operation and greater competition. The 1983 Energy Act thus aimed at encouraging more



independent generation by obliging the existing electricity companies to buy privately produced electricity, although they only had to reimburse avoided costs and could charge a transmission fee. However, as Hammond, Helm and Thompson (1989) demonstrate, entry conditions were far from ideal as the setting of tariffs and terms of entry were left to the incumbents. Hence, independent generation did not increase and further action was deemed necessary by the Government to achieve its objectives. Additionally, the Government was pursuing a whole spate of privatisations for ideological reasons and as an electoral strategy. This has included nearly all public utility companies and in the energy sector started with British Petroleum, followed by British Gas. Electricity privatisation turned out as the most problematic of the three and has required regulatory intervention both during and since the passage of the Electricity Act. The next section will explain the new structure and some of the peculiarities of the new system which are relevant in environmental terms.

#### *4.2 The structure and regulation of the privatised electricity sector*

The electricity sector of England and Wales<sup>5</sup> had been nationalised in 1947, with a reorganisation in 1957, after which it operated in two sections. The Central Electricity Generating Board (CEGB) was responsible for electricity generation in England and Wales and operated the national grid. Electricity distribution was organised on a regional basis with 12 Area Boards receiving electricity from the national grid and distributing it through their own networks.

After the privatisation of two other partly or wholly state-owned energy concerns, British Petroleum and British Gas in the mid-1980s, the Government published a White Paper on electricity sector privatisation in February 1988. According to this, the 12 Area Boards were to stay intact, while the CEGB was to be split three ways: a company operating the national grid (subsequently named National Grid Company - NGC), owned by the 12 Area Boards (which were renamed Regional Electricity Companies - RECs); a large generator (subsequently named National Power), owning 70% of the CEGB's capacity including all nuclear plants; and a smaller generator (subsequently named PowerGen) owning 30% of the CEGB's capacity (Roberts, Elliott & Houghton, 1991). However, it soon became clear that the UK's ageing nuclear plants would be a major liability for the privatised industry, as it began to emerge that the costs of nuclear power were much higher than that of electricity generated in conventional coal-fired power stations when commercial rates of return were

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5 The discussion in this section and the rest of the chapter will essentially focus on the situation in England and Wales, as this covers the majority of UK electricity generation and use. Consideration of the situation in the whole of the UK would complicate matters unnecessarily.

applied<sup>6</sup>. But the Government wanted to maintain the share of nuclear power in electricity generation, officially as a means of preserving security of supply<sup>7</sup>, so that it decided that the RECs would have to buy 20% of their electricity from non-fossil sources. The Electricity Act, published in December 1988, thus contained a clause that the distributors would have the so-called Non-Fossil Fuel Obligation (NFFO) imposed on them<sup>8</sup>.

This still was not enough to convince potential investors and eventually the Government decided to take the nuclear plants out of privatisation and formed two state-owned companies, Nuclear Electric and Scottish Nuclear. The RECs<sup>9</sup> were sold in December 1990, the two generators National Power and PowerGen in February 1991 (with 40% remaining in government ownership) and the two Scottish Companies, renamed Scottish Power and Scottish Hydroelectric, in May 1991. NIE was privatised in 1993. Figure 1 shows the new structure of the privatised sector in England and Wales. On the generation side, in addition to the private suppliers shown, there is also Nuclear Electric supplying electricity to the National Grid company.

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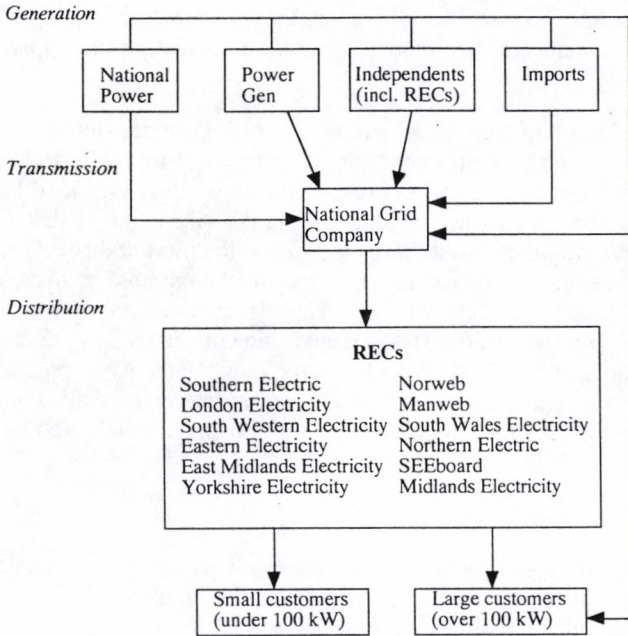
6 At the public enquiry for a PWR plant at Hinkley, the CEGB admitted that nuclear could cost up to 1.5 times as much as coal-fired generation (*Power in Europe*, 8.12.88, p.1).

7 According to a statement by Cecil Parkinson, the then Secretary of State for Energy, in January 1988 (*Power in Europe*, 21.01.88, p8).

8 This requires the RECs to purchase a specified amount of electricity from non-fossil generating capacity at a premium price. The Non-Fossil Purchasing Agency (NFPA) reimburses the RECs the difference between the pool price and the premium price. This is financed through the Fossil Fuel Levy (FFL) which consists of a premium of around 10% which is levied from all licensed suppliers for any electricity they supply excluding any non-fossil generated electricity. Companies using 51% or more of the electricity from an on-site power station are not subject to the levy provided the balance of the electricity is supplied only to licensees (*Department of Energy, NFFO - a background note, August 1991*).

9 The RECs vary considerably in size. The smallest REC is South Wales Electricity with electricity sales of just over 11,000 GWh, the largest Eastern Electricity with sales of 26,400 GWh.

Figure 1: Structure of the privatised electricity sector in England and Wales



To date, the amount of liberalisation that has resulted has been limited as National Power and PowerGen still dominate the generation side. Nevertheless, their role is slowly diminishing as the RECs and other business interests are investing in generation facilities. To overlook the activities of the privatised companies, the Electricity Act established a regulatory body, the Office for Electricity Regulation (OFFER), headed by the Director General of Electricity Supply (DGES, the current incumbent being Professor Stephen Littlechild), with some residual responsibility remaining with the Minister (originally the Secretary of State<sup>10</sup>) for Energy. OFFER is a quasi-autonomous agency with the DGES appointed by the Government and its actions defined by the Electricity Act. To comply with the Environment White Paper commitments, there was an opportunity for giving OFFER a clear environmental mandate. The Electricity Act did indeed contain some reference to the environment. The DGES has the duty to:

10 The Government abolished the Department of Energy after the 1992 elections. Responsibility for energy issues now lies primarily with the Department of Trade and Industry (DTI), although the Energy Efficiency Office was transferred to the Department of the Environment.

to take into account the effect on the physical environment of activities connected with the generation, transmission or supply of electricity.

However, this obligation is subject to the main general duties of ensuring security of supply and the promotion of competition. Environmental protection was thus established as a second tier responsibility for the DGEN and has clearly been interpreted as such since. Additionally, the Act required that electricity generators and suppliers must have regard to 'the desirability of preserving natural beauty, flora and fauna' and must (within 12 months) provide statement on how they propose to achieve this. These provisions are rather vague but could be used to justify more extensive environmental activities. Section 5 will discuss in more detail how the electricity companies have reacted to the Electricity Act requirements. In general, privatisation has had a number of environmental implications, both negative and positive, which are discussed in more detail in the following sections.

#### *4.3 Coal and the dash for gas*

The largest effect of privatisation has been on the generation side. Before privatisation, coal from British production was the dominant fuel in electricity generation and the CEBG had plans for a further expansion in coal fired capacity which would have been negative in terms of acid and CO<sub>2</sub> emissions. Both privatisation and environmental concerns have resulted in doubts over the future of British Coal. Domestic coal is relatively expensive in relation to world market prices and increasing the productivity of British coal has been a major objective during the 1980s, resulting a large number of mine closures and job losses<sup>11</sup>.

Before privatisation, British coal had a guaranteed market for a large part (75 mt) of its output through a joint understanding with the CEBG dating from 1979. However, increasing proportions of coal have been supplied at world market prices rather than at British Coal's own costs. The newly privatised generators have been keen to switch to imported coal and gas as soon as possible for cost as well as diversity considerations and in order to comply with legislation to reduce emissions of SO<sub>2</sub> and NO<sub>x</sub>. Initially, an agreement was reached to burn a set amount of British coal for the first three years after privatisation (70 mt in

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11 By 1990, 100 out of 169 pits had been closed and 140,000 jobs have been lost since the strike (Roberts et al, 1991). The Government also used the coal industry to further its political objectives, namely combating the power of the trade union movement. There was a year-long strike by British miners in 1984/85 but the uncompromising stand of the Conservative government managed to divide the miners' union, so that in the end rationalisation measures could be enforced without much opposition.

1990/91 and 91/92, falling to 65 mt in 1992/93). Subsequently, attempts went underway to reach a new agreement between the generators and British Coal which resulted in the announcement in October 1992 that 31 of British Coal's 50 deep mines would close within six months, resulting in the loss of three-quarters of the 40,000 mining jobs. This announcement created a big public outcry and forced the government to reevaluate both its policy towards coal and energy policy in general. However, by March 1994 British Coal's contracts with the electricity generators were down to 30 mt per annum and only 16 pits were still working, with a working force of 8,000<sup>12</sup>. The role of imported coal has risen, as well as that of gas in electricity generation. Despite the environmental benefits of such a move, it is clear that environmental considerations have played at best a marginal role in the Government's policy towards British Coal. The Government's main concern has been the promotion of competition. It felt that in a competitive market, the generators could not be forced to burn large amounts of expensive coal.

Natural gas is partially set to take over coal's share in electricity generation, as the generators, the RECs as well as independent generators (the latter two often in joint ventures) have all been investing in CCGTs. New CCGTs are also attractive because, depending on the level of gas prices, they can offer a cost-effective way for the generators to meet their obligations for reducing SO<sub>2</sub> and NO<sub>x</sub> emissions under the large combustion plant directive, avoiding the expensive retro-fitting of coal-fired plants with flue-gas desulphurisation units. More importantly, they offer independent generators the most economic method of entry into the system. Furthermore, the Electricity Act provided the option for the RECs to generate up to 15% of their electricity needs themselves and CCGTs are the easiest way for the RECs to achieve this.

The main problem is that the investment in new plant has proceeded without any central planning. Projections by the National Grid Company in 1992 suggested likely capacity margins of 60% by the turn of the century<sup>13</sup>. Overcapacity obviously is not economically efficient and also means that there is little incentive to promote energy efficiency. The main result has been National Power and PowerGen shutting down some of their older plant at a rapid pace. Some CCGT projects have recently been cancelled by the capacity margin projected for 2000 is still between 45 and 50%, significantly higher than the 20 to 30% normally required to ensure security of supply. The replacement of old inefficient coal-fired plant with CCGTs is beneficial in terms of CO<sub>2</sub> emissions, both on account of the greater efficiency of CCGT plants and the

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<sup>12</sup> As reported in *The Independent*, 29.6.94, p. 29.

<sup>13</sup> National Grid forecast, as quoted in *Energy Economist*, March 1992, p.7.

lower carbon content of natural gas<sup>14</sup>. However, for their full environmental benefit (especially in view of resource conservation issues), they need to be designed as combined heat and power (CHP) plants with a substantial heat load (when net efficiencies of up to 85% can be reached), which is not the case with most of the CCGTs that have been or are being build in the UK.

In the Netherlands, for example, investment in CHP was encouraged by allowing distribution companies only to invest in small-scale generating plant (50 MW maximum). As Collier (1993) has shown, they have been investing heavily in CHP and renewables whereas in England and Wales, there is no limit on the size of individual units the RECs can invest in. As a consequence, they have directed their main investment activity towards CCGTs.

There has however been investment, mainly by industrial companies, into CHP capacity (generally gas-fired), with over 1500 MW new capacity since 1990 (Department of Trade and Industry, 1993). The main incentive for this development has been the fact that companies can save the payment of the fossil fuel levy (FFL) by generating at least 51% of their energy requirements themselves. The most attractive systems for this are generally small-scale CHP systems. This development is beneficial in environmental terms but CHP systems nevertheless account for a very small part of generation capacity.

#### *4.4 Nuclear power - a victim of privatisation?*

The environmental costs and benefits of nuclear power are ambiguous and it is beyond the scope of this paper to discuss them in any detail. Obviously, no acid or CO<sub>2</sub> emissions are produced during electricity generation but nuclear opponents remain unconvinced that these benefits outweigh the potential costs. Problems include unresolved waste disposal, the risks of accidents with potentially disastrous consequences as well as nuclear proliferation and these environmental concerns have put an end to the nuclear programmes of countries such as Austria and Italy.

In the UK, nuclear power has fallen foul of the different economic requirements of a privatised system, although even before privatisation the expansion of the nuclear programme had encountered problems. The UK was the first country to build a major nuclear reactor, the 55 MW Calder Hall plant, supplying electricity to the public grid in 1956. There were plans that nuclear should be supplying half the country's electricity needs by 1975 (Foley, 1987). Since then, governments have remained committed to nuclear power despite a number of problems with the nuclear programme. However, unlike in Germany,

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14 Natural gas only contains about 60% of the carbon of hard coal and CCGTs generally operate at efficiencies of 45-50%, compared to 35-38% for a traditional coal fired station.

the problems have mainly been of a technical nature with the chosen reactor systems rather than with public opposition.

The UK eventually decided to opt for Pressurised Water Reactors (PWRs) in the late 1970s, with plans to construct 15 PWRs by the end of the century. However, planning permission for the first, Sizewell B, was only granted in 1987 after a lengthy public enquiry. Building started and there were plans for another three 1200 MW PWRs to follow. When the Government opted to privatise the electricity industry, the high costs of generation from nuclear power emerged and it was decided to keep the nuclear power stations in state ownership and to cancel the construction programme for the PWRs, with the exception of Sizewell B. Furthermore, it was decided that nuclear power would be supported through the aforementioned FFL which amounts to a major subsidy.

In the UK, nuclear power thus so far has failed the market test and it will be interesting to see whether concerns about the climate change issue can tip the balance back in favour of nuclear power. Nuclear Electric is trying to use environmental arguments to promote the case for the continuation of nuclear power but it is clear that economic issues continue to take priority within the Government's attitude to the industry. The National Audit Office (1992) has calculated that the cost of decommissioning and reprocessing spent fuel in the UK could reach £40 billion, so it is unlikely that nuclear will be seen as attractive unless some kind of severe carbon tax is introduced. A review of the nuclear option was underway at the time of writing and, while initially scheduled for completion in late 1993, still had not emerged by late-1994. It was considering both economic and waste management issues and it remains to be seen whether its outcome will change the prospects for nuclear power.

#### *4.5 Privatisation and energy efficiency - missed opportunities*

As mentioned in the introduction, there is general agreement that the promotion of end-use energy efficiency needs to be a major focus of any climate change strategy. The UK government's stance on energy efficiency has been widely criticised in recent years, not only by environmental organisations but also the House of Commons Energy and Environment Committees (see e.g. Energy Committee, 1991, Environment Committee, 1993). Cheshire (1991) for example described the Government's energy efficiency policy as a 'clutter of expedients'. In the past, economic efficiency has been the main rationale for the few instruments that were being employed, which was reflected in the practice of expressing energy savings in money terms rather than in terms of fuel saved. However, there are clear indications that the climate change issue, as well as general environmental concerns, has begun to influence policy developments, as this section will show.

During the passage of the privatisation bill, there was much lobbying by environmental groups and others to include obligations on the utilities to promote energy efficiency as it had become obvious that the new companies main interest would be in selling as much electricity as possible. This had been pointed out as early as 1988 in the Energy Committee's report on the privatisation proposals (House of Commons Energy Committee, 1988). The House of Lords subsequently attempted to introduce an amendment into the Electricity Bill to ensure the promotion of energy efficiency, for example by linking the price formula to the success of energy efficiency promotional activity (Roberts et al, 1991). However, the House of Commons did not approve this amendment. Instead, the following clauses were inserted in the Electricity Act stating that the Secretary of State and the DGES shall have the duty to:

...promote efficiency and economy on the part of persons authorised by licences to supply or transmit electricity and the efficient use of electricity supplied to consumers.

Additionally, the DGES may:

determine such standards of performance in connection with the promotion of efficient use of electricity by consumers as, in his opinion, ought to be achieved by such suppliers (Electricity Act, 1989).

Hence, the onus to ensure the promotion of energy efficiency has been placed on the regulator rather than being enshrined in the primary legislation. OFFER set such standards in 1994, requiring the RECs to save 0.675% of the GWh distributed. Such a small percentage is obviously just a token gesture. Furthermore, the reforms to the price formula which came into force in April 1994 oblige the RECs to invest in energy efficiency measures.

The Government decided to follow the practice of previous privatisations like British Telecom and British Gas and regulate the electricity companies via price regulation<sup>15</sup>. The price formula effectively meant that the RECs' revenue was directly related to the number of kWh sold to the customer. The RECs thus had no financial incentive for investing in energy efficiency measures as they were not allowed to recoup the costs from the customer. There was also much criticism about high electricity prices and excessive profits from consumer organisations and in April 1994, OFFER introduced changes to the operation of

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<sup>15</sup> Annual price increases have been limited by the formula RPI-X. This means that the RECs are allowed to charge the rate of inflation plus a factor  $x$ <sup>15</sup>. Additionally, they can pass through any other external costs, including the cost of the electricity they buy (Y).



price control. This includes an overall ceiling on revenue (with an additional allowance per customer and per kWh sold). More importantly in environmental terms, the RECs have been given a further allowance of £1 per customer which they must invest in the promotion of end-use efficiency.

While the RECs are allowed to spend the funds thus acquired themselves, most of it is expected to go to the Energy Saving Trust (EST), which was set up in May 1992 in response to the many criticisms of the Government's energy efficiency policy. The Trust has been set up as a joint partnership between the Government, British Gas, the RECs, Scottish Power and Scottish Hydro Electric. The Trust is to develop, propose and manage programmes to promote energy efficiency, initially in the form of pilot projects. For electricity, pilot schemes are in the areas of heat pump technology and domestic building insulation (Department of the Environment, 1992). To achieve its targets, the EST is expected to raise £1.5 billion over the next 6 years. The establishment of the EST has clearly been in response to environmental concerns, but by late 1994 it was facing a cash crisis as gas and electricity regulators were getting increasingly reluctant to force companies to pay into it. OFFER for example only allowed energy efficiency investments of £25 million per annum, which leaves a tremendous shortfall for the EST. Some RECs were also threatening to legally challenge the imposition of the duty to invest in energy efficiency. Furthermore, the imposition of VAT on domestic fuel may not have the desired effect on energy efficiency improvements due to uncertainties about the price elasticity of demand for electricity. Additionally, OFFER was implementing measures to bring down electricity prices for domestic consumers, so that it is likely that much of the increase under VAT will be wiped out. The UK policy on energy efficiency thus continues, for the time being, as rather weak and uncoordinated.

#### 4.6 Renewable energy - new impetus

There has been similar criticism of the policy towards renewable energies (see e.g. House of Commons Energy Committee, 1992b). During the early 1980s, the Government all but abandoned support for wave power R&D<sup>16</sup> and provided little support for other renewable sources. However, there has been a clear boost for renewable energies post-privatisation. As already mentioned above, the Government set a target of 1000 MW of new renewable electricity generating capacity by 2000 in the 1990 Environment White Paper. The target was subsequently increased to 1500 MW in 1993. Additionally, the Government began a review of its renewable energy strategy with the

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16 This decision was based on an assessment of the economics of wave power for which it was later widely acknowledged that some gross miscalculations has been made. *The Guardian*, 16.2.1990, p. 16.

establishment of a renewable energy advisory group (REAG). REAG's report was published in November 1992. It concluded that renewable sources should make a significant contribution to future energy supply in the UK and stressed their contribution to reducing environmental damage and achieving sustainable development. Furthermore, it stressed the need for government intervention in the market (Renewable Energy Advisory Group, 1992).

Renewable energy supporters were given new hope with the inclusion of renewables in the NFFO, which was originally established to protect the nuclear industry post-privatisation. After much lobbying by organisations supporting renewable energy, a separate 600 MW quota was established, to be filled in stages by 2000. While it cannot be disputed that the NFFO has considerably improved the situation concerning the development of renewable energies, it is not without its shortcomings. However, some of these have been remedied since its introduction. Initially, a main problem was the fact that the Commission of the EU ruled that the FFL, which essentially is a subsidy for nuclear, was only allowed to run until 1998. This made the economics of renewables look less favourable. Rand and Elliot (1990) for example illustrated how many of the first round of projects were withdrawn once it emerged that no longer term subsidies were available. However, the Commission has meanwhile ruled that the renewable portion of the FFL can continue after 1998. Furthermore, the initial tranches applied to existing projects as well as new projects. Mitchell and Skea (1992) found that operators of existing hydro schemes which were accepted under the NFFO were earning windfall profits for schemes which were already economically viable without subsidies.

By late 1994, three separate orders for renewable projects under the NFFO had been made. The 1990 and 1991 orders together contracted nearly 200 projects which should result in 624 MW of installed capacity, 524 MW of this new (OFFER, 1992). However, in practice, acceptance of a scheme by no means implies that it will actually get off the ground. According to OFFER (1993), 62 schemes have experienced delays in commissioning, mainly due to planning delays, especially in the case of wind power.

Despite its shortcomings, the NFFO has much improved the chances for renewables in the UK. Apart from government financial support, the new more competitive electricity sector regime has also been important in the development of renewables as for example the RECs see investment in renewables as one option to achieve more independence from the generators and to expand the unregulated side of their business. At the time of writing, a review of the Government's renewable energy strategy was underway but no details of likely changes were available.

Overall thus, there have been a number of developments post-privatisation which clear environmental benefits. They are a combination of the peculiarities of the system created through privatisation (for example resulting in CCGTs becoming the preferred generating options) and specific responses to

environmental pressures. The rest of this paper examines the progress with environmental concerns at the level of the implementing actors, namely the electricity companies.

## **5. The UK electricity sector and the environment**

Privatisation considerably changed the attitudes of the electricity companies. Management quickly adapted to the profit-orientation of the private sector. As part of this, they soon realised that projecting a more environmentally-friendly image made commercial sense, and apart from producing environmental policy statements as required by the Electricity Act, began to advertise their green credentials in the press. This was a deliberate effort to get away from the adverse publicity the CEGB had suffered from, and to project a new image. As it happened, the generation technology that became most economically attractive with privatisation, CCGTs, also brought with it environmental benefits, including the reduction of CO<sub>2</sub> emissions. The record of the new companies therefore almost immediately looked better than the CEGB's. However, at the same time, competition has made short-term profit maximisation the overriding concern of the companies. This, combined with the application of much higher discount rates than in the public sector, has made the companies reluctant to invest in renewables and other new technologies.

Profits are also the RECs main concern but legislation has obliged them to promote energy efficiency. However, initially only a limited amount of advice provision was required and, as no returns from investment in energy efficiency can be earned, the RECs had little incentive to do more. Changes in the price formula in 1994 require more active involvement in the promotion of energy efficiency but as no profit can be earned the REC's display little enthusiasm to date. They are more interested in investing in generation (especially in CCGTs and to a limited extent in renewables) as part of the unregulated side of their business.

This section examines in some detail how privatisation has affected the new companies' operation by looking at the two large generators, National Power and PowerGen and four of the RECs.

### *5.1 The electricity generators*

The two companies very quickly started to project a more environmentally friendly image, to some extent as a means of advertising their identity by doing things differently from the CEGB. Both companies produced environmental policy statements straight after privatisation and created environmental policy divisions. On PowerGen's board of directors, the Director for Corporate Services was given special responsibility for environmental affairs whereas in National Power, one director was made responsible for technology and

environment. PowerGen also established an environmental co-ordinating committee with regular monthly meetings.

Both companies have made further effort to enhance their environmental record. In 1993, both produced their first environmental performance reviews. PowerGen (1993) for example mentions its environmental compliance policy and management system which requires that:

- an environmental management programme is implemented at each site;
- each unit has to consider the impact of its activities on the environment.

National Power has, since 1993, set itself annual environmental targets and is putting into place environmental management plans at all its sites (National Power, 1994). It is beyond the scope of this paper to assess the effectiveness of these new procedures, but they are certainly a step in the right direction. Obviously, as privatised companies, profits will always be the first and foremost consideration of the generators. They claim that it is in fact this competitive environment which actively encourages environmental benefits (as stated in PowerGen, 1993, p.2), although, as already mentioned, these benefits are only relative, as well as incidental.

Both companies have started to invest in CCGTs and have been very keen to stress the environmental benefits of this investment. PowerGen has actually made a voluntary commitment to stabilise its CO<sub>2</sub> emissions but this does not require any further action by the company and is thus rather meaningless. Interest in CHP plants has also increased. The CEGB was not interested in CHP because it reduced the market for centrally dispatched electricity and there was little scope for CHP in the large plants due to the lack of markets for the heat load. Now, investment in CHP has become financially attractive for the generators as it allows expanding the unregulated side of their business. In particular PowerGen has decided to become actively involved in this new market. PowerGen offers packages from initial consultancies to installing and operating CHP plants. While there has been a lot of interest from the public sector, most were small schemes which PowerGen did not consider economically viable, hence the large generators' involvement in CHP is likely to stay relatively limited. The same applies to renewables. PowerGen has inherited a 1 MW wind turbine from the CEGB and has constructed a wind farm under the NFFO. National Power launched a joint venture with BAe and Taylor Woodrow in September 1991 to develop at least 250 MW of windpower by 2000<sup>17</sup>.

Although predominantly generators, National Power and PowerGen also sell electricity directly to a number of large industrial users, so that they have the

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17 *The Guardian*, 12.09.91, p.12.

possibility to promote end-use efficiency, albeit at present in only a small part of the end-consumer market<sup>18</sup>. End-use efficiency is a part of the package offered to the customers and apparently there is most interest in load management. But in reality there is little doubt that low prices are the decisive factor in the negotiation of contracts. One of the major problems in this area is the short-term nature of electricity contracts, which in most cases run over one year and some cases over three years. This makes it very difficult for generators to get involved in financing packages for energy efficiency equipment as the investment costs would have to be recouped within the time of the contract, otherwise the customer might move on to another supplier before the original suppliers manage to recoup their investment.

Overall thus, while National Power and PowerGen have a better environmental record than their predecessor company, their activities are obviously dominated by commercial concerns and have limited environmental benefits.

### *5.2 The Regional Electricity Companies*

In the years preceding privatisation, the old area boards were not particularly active promoters of end-use efficiency, reflecting the general lack of interest in energy efficiency in the late 1980s. The main activity was sponsoring so-called Medallion Awards for the building of new energy efficient homes and a few pilot schemes in energy labelling (e.g. by Eastern). The main purpose of the Medallion Awards, which still continue, was to encourage the use of electricity for heating. However, electric heating compares badly with gas-fired heating in CO<sub>2</sub> emission terms, hence this activity rates negatively in environmental terms.

The Electricity Act provided for the greater involvement of the RECs in energy efficiency by requiring them to produce a Code of Practice for energy efficiency. The UK RECs are actually very well placed to promote energy efficiency because, unlike any of their EU counterparts, they also sell electrical appliances. The RECs have shops in most towns and cities but in the past they have not been any better than other retailers in terms of providing efficiency advice. As already mentioned, the RECs participate in the EST and, from 1994, are obliged to invest a revenue allowance in energy efficiency. In general, the RECs are all keen to present their environmental credentials in their annual reports and a number of them have produced environmental performance reports.

Another potentially beneficial effect of privatisation is the opportunity for the RECs to get involved in a limited amount of electricity generation. If this

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18 The initial size limit of 1 MW was reduced to 100 kW in 1994 and will be abolished in 1998. Then, any electricity consumer will have a free choice amongst companies (the RECs, the generators and independents).

opportunity was used to invest in CHP and renewables, a contribution to the reduction of greenhouse gas emissions would be made. This section examines the activities of four of the RECs, with particular emphasis on the promotion of energy efficiency and interest in renewables.

*i) East Midlands Electricity* East Midlands Electricity (EME) supplies electricity to 2.2 million customers in the Midlands which amounted to 23,816 GWh of electricity in 1993/94. With over 70 shops, the company is also the biggest electrical retailer in the region. In response to environmental concerns, an environmental panel of company staff and external advisors has been set up, as well as a number of internal working groups. Additionally, individual board members have taken direct responsibility for relevant areas of environmental policy.

In accordance with the code of practice, EME has produced a range of leaflets offering advice on the efficient use of electricity in a variety of applications. These are available free from EME's shops. Prior to privatisation, EME experimented with energy labelling in its shops but this was abandoned due to a lack of interest on part of the customers. In a new attempt to promote energy efficiency, EME ran a mailshot campaign promoting compact fluorescent lamps in November 1990 and started to stock them in their shops. Additionally, EME has produced a pack for 10-12 year old school children on energy use and energy efficiency.

Interestingly, EME, as the only REC studied, has looked at the applicability of least-cost planning (LCP) to its operations and has been running a pilot scheme in the village (150 households) of Great Gonerby in Lincolnshire. There, the substation was approaching full capacity and a reduction in electricity demand through demand-side measures would ease the load and help to release more capacity for future growth. EME thus joined forces with Neighbourhood Energy Action (NEA), a national charity, and the local district council to implement a demand-side management (DSM) programme. The scheme involved energy audits of the participating households with free energy advice and the fitting of two low energy light bulbs in each house, as well as insulation and draughtproofing<sup>19</sup>. This is obviously only a very small scheme and under the current regulatory framework, LCP only has a very limited application. EME also runs an Energy Advice Centre in Coventry in conjunction with NEA.

In terms of electricity generation, EME has a 40% stake in Corby CCGT which opened in March 1994. EME was involved in a feasibility study for a CHP and district heating scheme for Leicester but this was shelved because of problems in achieving the necessary heat load. As far as renewables are concerned, EME operates a landfill gas scheme and has a stake in a windfarm in

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19 Either under the EEO's Home Energy Efficiency Scheme or funded by the district council in the council owned housing.

Wales. Otherwise, EME was very interested in the concept of energy services and has set up a subsidiary, Lincoln Green Energy, offering integrated design, management and maintenance of energy systems.

*ii) Eastern Electricity* Eastern Electricity is the biggest supplier of electricity in the UK, serving East Anglia and part of the Home Counties. In 1993/94, it distributed nearly 30 million kWh of electricity to more than three million customers. In 1990, Eastern appointed a business development manager specifically to deal with environmental issues. It then commissioned the Energy Technology Support Unit (ETSU) of the then Department of Energy to prepare a report on greenhouse gas emissions for the electricity cycle and consequently worked out the potential savings of greenhouse gases achieved by converting inefficient industrial processes to efficient electrical ones. Eastern's argument was that greenhouse gases can be reduced through increasing the use of electricity and it has been fairly high profile about its ideas, promoting them at a number of conferences. This is a good example of the use of environmental arguments for commercial reasons. Another Eastern activity has been to sponsor a post-doctoral position on energy and the environment at the University of East Anglia and in 1992 it published a corporate environmental policy. It is also aiming to comply with BS 7750 (the new British Standard for environmental management) and sponsoring local Wildlife Trusts.

Eastern runs an Industrial Energy Efficiency Centre, although the main purpose of this is to attract customers away from other fuels to using electricity in industrial applications. As concerns households, Eastern's energy efficiency activities have been rather limited. In spring 1991, it presented the local council with 300 free efficient lightbulbs to be given to elderly people joining an emergency phone service. In 1993, Eastern appointed an energy efficiency team to design efficiency programmes to spend the money generated by changes to the price control formula. At the time of writing, only one pilot project was in operation. According to Eastern's energy efficiency manager, the company's board was rather reluctant to get involved in energy efficiency as it saw no commercial benefits stemming from it. However, he was convinced there would be good commercial opportunities in energy efficiency (Dorrington, 1994). Similarly, there has been little interest in renewable energy. Eastern's only involvement has been in two plants powered by poultry litter. Eastern has a 50% stake in a 360 MW CCGT plant in Peterborough and in a 1000 MW CCGT plant in Barking.

*iii) Norweb* Norweb covers electricity supply in north-west England including the Manchester area. It supplies 2 million customers, with sales in 1993/94 of 21,857 GWh. Norweb has not produced an environmental performance review but in 1993 published a 10 point plan for environmental management. This includes for example the promotion of energy efficiency, consultation with

'appropriate' bodies and the best possible use of resources. All 10 points are rather vague but, more specifically, Norweb has pledged, as part of the 'Making a corporate commitment' campaign, to cut its own electricity consumption by 5% over 5 years to 1996.

Norweb is certainly more advanced than the other three RECs as concerns renewable energy and CHP. It commissioned a study by ETSU (published in 1989) on the potential for renewables in the Norweb area, in anticipation of the opportunities offered by the impending privatisation. The study estimated that potentially 12% (400 MW) of Norweb's electricity requirements could be available from renewable sources at a cost of 3p/kWh or less (ETSU/Norweb, 1989). After privatisation, Norweb commissioned ETSU to do a second study to review the results in view of the new situation. Meanwhile, Norweb went ahead with a number of projects. By 1994, Norweb was operating a number of landfill gas and small hydro schemes. The original ETSU study was also very positive about wind but Norweb has had serious doubts about its real potential. Apart from uncertainty about the ETSU figures, it is also reluctant to promote projects which are likely to meet environmental opposition. Apart from this, Norweb has carried out a feasibility study on wood waste and contributed to a feasibility study on a 70 MW tidal barrage.

The major reason for Norweb's interest in renewables was the potential of making profits from the unregulated side of the business. For this reason, Norweb also decided to get involved in CHP and set up Norweb Combined Power Systems to sell and operate CHP equipment. By 93/94 Norweb was generating over 38,000 MWh from renewables and CHP plants. Norweb offered a package which includes all capital investments. The customer purchases the fuel and Norweb, in return, supplies them with heat, selling the electricity for profit. The potential competition from CHP was a major factor for Norweb's involvement in this area. Hence, the company decided to provide services itself rather than totally losing out and by 93/94 had a 60% share for small scale CHP units in the under 1 MW market. Additionally, Norweb has a 20% stake in Lakeland Power's 220 MW CCGT and a 50% stake in Keadby Power's Humberside CCGT, to be commissioned in 1995.

In terms of energy efficiency, Norweb operates a labelling scheme in its shops and has a Business Efficiency Award Scheme. In 1994, it expanded its energy efficiency section from two to five people in response to the changed price formula. A number of schemes have been devised to spend the energy efficiency allowance, including subsidies for insulation and low energy lighting.

*iv) Yorkshire Electricity* Yorkshire Electricity serves nearly two million customers in the Northeast of England, including the cities of Sheffield, Leeds and Bradford. Initially, Yorkshire was rather slow in publicising its environmental credentials. The company produced a two page typed statement on its environmental policy in compliance with the Electricity Act and a



working group to deal with environmental and efficiency matters was established. Unlike other RECs, Yorkshire did not even refer to environmental concerns in its 1991 annual report. However, it then commissioned an environmental consultancy to carry out an environmental review of its distribution business in 1993 and in June 1994, Yorkshire produced an environmental performance review. Furthermore, it has implemented an environmental management system along the lines of BS 7750 although there was no mention of actually applying for the standard. A number of priority environmental effects have been identified but these are all very localised effects such as oil releases, visual intrusion from overhead lines and streetworks.

As concerns larger scale environmental effects, Yorkshire refers to its investments in wind power and gas fired generation. Yorkshire set up a joint venture with Yorkshire Water and operates two wind farms; a 9.2 MW windfarm at Ovendon Moor and a 5.9 MW site at Royd Moor. The company's main reason for investing in this project was that it is at a scale that allows it to get involved in generation without requiring the kind of expertise needed for a larger, fossil-fuelled plant. Additionally, the project was seen as beneficial for image enhancement as very little public opposition was expected. Yorkshire also holds a 75% stake in the 240 MW CCGT at Brigg on South Humber side.

As concerns the promotion of electricity efficiency, this is not even mentioned in the environmental performance report. Yorkshire did run an industrial energy efficiency centre but has closed it as part of its rationalisation drive. In response to the changed price formula, Yorkshire has appointed an energy efficiency manager and was planning one regional scheme and participation in two national schemes. At the time of writing, no details were available and the company appeared somewhat reluctant about participation, although it did see some business opportunities in the longer term. Meanwhile, Yorkshire was also involved in the sponsorship of various regional nature conservation projects.

## ***6. Privatisation and environmental policy: compatibility or conflict?***

The previous sections have shown that privatisation linked with liberalisation has fundamentally changed the operational framework, as well as the attitudes, of the UK electricity sector. Before discussing the environmental effects in more details, it is useful to consider the overall effects of privatisation and to determine some of the costs and benefits. To date, the amount of liberalisation that has resulted has been limited as National Power and PowerGen still dominate the generation side. Nevertheless, their role is slowly diminishing as the RECs and other business interests are investing in generation facilities, although this has caused the premature closure of many coal plant which in macroeconomic terms made little sense. OFFER has now ordered the two

companies to sell some of their redundant generation plant to independent generators.

The effect of privatisation on coal mining has already been mentioned in section 4.3. The privatised companies have also been engaged in large-scale rationalisation drives which has resulted in a huge number of job losses. Between the financial years 1990/91 and 1993/4 the new companies have cut jobs by 15% with further cuts announced. The largest cuts have been in PowerGen, which cut its workforce into half<sup>20</sup>. Although these cuts have mainly been achieved through voluntary redundancies, they nevertheless present a substantial job loss in an already overstretched labour market. Overall, the financial benefits of this rationalisation drive have mainly accrued to shareholders and to company directors. Profits, share prices and executive salary levels have risen tremendously after privatisation<sup>21</sup>, while electricity prices increased rather than fell. OFFER finally decided to intervene into this profits bonanza and in 1994 instituted controls on the profits both in supply and distribution, although these have been quite lenient.<sup>22</sup>

In general, there has been ample criticism of the way electricity privatisation was handled, even from bodies like the now defunct House of Commons Energy Committee whose membership was dominated by Tory MPs<sup>23</sup>. However, it can be argued that the dismantling of the old system and of the CEBG in particular was not necessarily a bad idea. The CEBG's operation in environmental and efficiency terms was far from satisfactory. Its monopoly position on the generation side encouraged large-scale generation facilities, with little interest in promoting small-scale options such as CHP and renewables. The structure was particularly suited to the expansion of nuclear power. At the same time, the area boards were not particularly active in promoting energy efficiency. Hence, privatisation offered an opportunity to bring in a new structure and to integrate environmental considerations into its development. As the author has argued in other work (Collier, 1994b), a case can also be made for keeping the electricity sector in public hands but it is beyond the scope of this paper to discuss the issue of private versus public ownership further. The

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20 As reported in *Power UK* 28/9/94 p.21.

21 For the financial year 1993/1994, for example, Southern Electric announced pre-tax profit increases of 18.5%, Seeboard of 17.5% and Midland Electricity of 17%.

22 On the distribution side one of price cuts of 11-17% have been imposed, with further annual 2% cuts until 1999/2000 (*Power in Europe*, 12.8.94, p.1).

23 This may to some extent be due to the fact that as during the 1980s, successive Tory governments had a large majority, it was actually quite safe for Tory backbenchers to criticise the Government as it had no negative consequences.

aim here is more to consider the problems that have occurred in the UK and to indicate the lessons that can be learnt from the experience.

On a superficial level, it appears that since privatisation there have been many environmentally beneficial developments, especially as concerns technology choice, the promotion of end-use efficiency and the establishment of environmental management systems. These developments have been due partially to the effects of privatisation and liberalisation *per se* and partially to the accompanying regulatory framework. A closer examination reveals that these have been often only relative improvements and to some extent incidental. Environmental concerns have initially had little influence in the privatisation process which was driven mainly by political ideology and efficiency concerns, albeit based on a definition of efficiency in purely economic terms. Thus opportunities have been missed to create a more positive institutional and regulatory framework for the electricity sector and these missed opportunities are not always easy to remedy.

Table 2 summarises the activities of the UK electricity companies which are beneficial in climate change terms and relates them to company aims and regulatory provisions.

*Table 2 Company aims, regulatory provisions and their effect on climate change relevant activities*

<b>Electricity company aims</b>	<b>Regulatory provision/ strategy</b>	<b>Effects on climate change relevant activities</b>
<b>1) Generators</b>		
Stay competitive with new entrants	liberalisation + NFFO/FFL	investment in CCGTs (**) investment in CHP (***) investment in renewables (***)
Retain existing supply business		offer some energy services directly to customers (*)
Maximise profits from coal plants	EU carbon tax proposal	opposition, offer of voluntary targets (0)
Public/shareholder relations	privatisation	environmental performance reviews (*)
<b>2) RECs</b>		
Maximise profits from regulated business i.e. expand sales	price control formula	few incentives for energy efficiency (0) encourage switch from other fuels to electricity (0)
Meet OFFER's requirements	Electricity Act provisions	Leaflets, labels, information (**) environmental policy statements (*)
	revenue allowance	energy efficiency programmes (***)
Pre-empt further legislation, public relations		Energy Savings Trust (**)
Expand unregulated business	liberalisation freedom of entry	investment in CCGTs (**) investment in CHP and energy services (***)
	NFFO/FFL	investment in renewables (***)

*Key: 0 - no benefits, \* - some benefits, \*\* - reasonably beneficial, \*\*\* - substantial benefits*

As the table shows, private ownership and liberalisation of the electricity sector have had some positive environmental effects. It has, for example,

resulted in CCGTs becoming the preferred generation technology with some environmental benefits. However, while CCGTs are more efficient than conventional coal plants, efficiency gains and CO<sub>2</sub> reductions are still relatively small unless plants are used for both heat and power generation. Under the new competitive electricity market there seems to be little chance of any large-scale CHP schemes being realised due to the large costs involved in constructing district heating networks. While smaller-scale CHP projects are becoming more popular, clearer incentives could have been created for example by restricting the RECs' involvement in electricity generation to certain options such as renewables and CHP, analogous to the situation in the Netherlands.

In the private sector short-term profit maximisation is obviously the main operational objective. Many companies have made efforts to introduce environmental management systems and to produce environmental performance reports, which constitutes a kind of self-regulation. To some extent these are public relations exercises and attempts to avoid government regulation, but they are nevertheless an improvement over the operation of the predecessor companies. But generally, there is a need for either incentives or some form of regulation, be it in terms of traditional regulatory instruments (such as standards) or economic instruments (such as taxes). Hence, while government intervention may become less in certain areas, it may have to increase in others. Even though the energy industry is more subject to market forces than before, it is still much more heavily influenced by government through the regulator than other industries.

A main problem in the UK is that while, according to the Electricity Act, OFFER is supposed to show concern for the environment, it has so far failed to enforce a more sensitive behaviour of the companies in environmental terms. One problem is that the regulator's prime duty is the promotion of competition and the maintenance of low prices, with environmental protection only a secondary responsibility. This can present dilemmas. OFFER likes to stress its belief that the development of effective competitive forces would be the best means of fostering improved energy efficiency (see OFFER, 1993), although there is no evidence for this claim. The energy efficiency allowance under the revised price formula has resulted in the RECs reluctantly designing and implementing energy efficiency programmes on a no profit basis. If OFFER had really believed in the effectiveness of competitive forces it should have forced competitive bidding procedures as exists in the US. OFFER is now forcing the companies to lower prices which is likely to have negative effects in energy efficiency terms and is also opposing any increases in the contribution to the EST. There is thus some inconsistency between the Government's environmental policy objectives and OFFER's activities. In any case, OFFER's role as a regulator is somewhat limited as it can only propose changes. According to the Electricity Act, if changes are not accepted by the companies,

they can be referred to the Monopolies and Mergers Commission, thus potentially resulting in a long drawn out process for any substantial changes.

Examples from the US show (see e.g. Hirst, Goldman and Hopkins, 1991, Kozloff and Dower, 1993, Collier, 1994a) that regulatory authorities can coerce companies through both regulation and incentives into environmentally beneficial activities. These regulators have the authority to introduce changes and are generally given an appropriate environmental mandate by state governments. However, strong regulation distorts markets even further and may interfere with liberalisation objectives, thus creating tensions. In general, there can be little argument that environmentally beneficial energy options do not come about by market forces alone. District heating for example can seldom compete with natural gas on pure cost grounds. Obviously, the introduction of environmental taxes such as an energy or carbon tax would alter the balance towards environmentally preferable options. However, the integration of external environmental costs into energy prices is still a long way from being realised and may not be a panacea anyway. In the view of the author, a certain degree of planning and government intervention in the energy systems will always be necessary to achieve environmental objectives. It is strongly argued here that liberalisation and a 'free for all' in the energy sector is unlikely to lead us to a sustainable energy future.

## **7. Conclusions - lessons for the rest of Europe**

A main conclusion to emerge from this paper is that UK electricity sector privatisation has been a rather mixed blessing in environmental terms. The benefits have been mainly incidental although recent changes in the regulatory framework have given some consideration to environmental factors. Nevertheless, it is clear overall, that the electricity sector is now a business sector just like any other sector. This is not only seen in terms of its environmental performance but also for example with the large job cutting programmes. Economists tend to consider the use of public companies for the purposes of environmental and social policy inefficient but this is obviously a question of how efficiency is being measured. In any case, it is unlikely that a reversal of privatisation in the UK electricity sector will ever take place so that the challenge is now to create the appropriate regulatory framework. There has certainly been some interest in the US experience with strong regulatory agencies both coercing and enticing companies for example to invest in energy efficiency. OFFER has rejected to go down the same path and it remains to be seen whether the energy efficiency allowance will be effective. However, the RECs are unlikely to muster any great enthusiasm for energy efficiency programmes unless they can see some real financial benefit. Competitive bidding procedures akin to the US experience may provide a way forward, together with the giving companies the possibility of earning extra profits.

As concerns more environmentally sound generation options, one big problem is that the large scale investment in CCGTs in the UK has taken place without any real planning. Ideally, the need for all new generation plant should be considered in relation to possibilities on the end-use side (i.e. integrated resource planning) and companies could be forced to additionally invest in a certain capacity of renewables or to be forced to find a heat market and at least partially operate plants as CHP plants. Again, the US experience provides some useful examples. Furthermore, in the Netherlands investment for CHP plants and renewables has been rising fast due to limiting the capacity of generating plant distribution companies are allowed to invest in. Unfortunately, such considerations were never even discussed in the UK and with all the new plant coming on stream over the next few years there will be no need for further new plant. Nevertheless, in the future it is crucial that permits for generation plant are not granted without conditions. As it is, an infrastructure has been created which is set to dominate the UK electricity sector for the next 20 or 25 years, so that in macroeconomic terms there is actually little sense in huge investments in end-use efficiency or renewables. However, OFFER prefers to leave the generation side to the market and so far has only intervened through changes in price control, thus affecting the relative attractiveness of different plant.

Overall, UK electricity privatisation has been dominated by ideological considerations and a misplaced belief in the operation of the market. Beneficiaries have been shareholders and company directors and the environment has gained little. Incidental environmental benefits, such as through the replacement of much coal-fired capacity by CCGTs, cannot conceal the fact that overall there is still little progress towards a less environmentally damaging energy system. If anything, economic disincentives have been created as for example the large-scale new investment in generation plant will work against any significant effort to improve energy efficiency. OFFER, with its quasi-autonomous status and minor responsibility for environmental protection, also has been a major obstacle. Not all the changes it has introduced have had negative environmental implications but at the same time they have produced no substantial benefits. It is difficult, under the current political and economic climate, to see opportunities for anything but very small scale adjustments. While the UK may achieve its rather unambitious CO<sub>2</sub> stabilisation target, any more significant reductions are unlikely. One can thus only hope that the sceptics of climate change are right.

In recent years, privatisation of public utility industries such as electricity has become increasingly popular in a number of countries. Especially the newly democratised countries of Central and Eastern Europe see it as the way forward. One of the big arguments for privatisation in these countries is the need to attract private sector investment as indebted governments cannot afford to make the necessary investments in new electricity generating plant. The need for investment cannot be ignored and is indeed important in environmental terms.

The lesson that can be learnt from the UK experience is that privatisation can offer some incidental environmental benefits but there is a definite need for an appropriate regulatory framework to steer development in the right direction. There needs to be planning to ensure that no overcapacities are created and that generation options are compared with possibilities for improving end-use efficiency. If a separate regulatory agency is set up in the privatisation process, this has to be given a clear environmental mandate. When privatisation is linked with liberalisation, this can be useful for allowing access to the grid and thus encouraging investment in small-scale technologies such as certain CHP systems and renewables. However, they may need to be some additional incentives such as government subsidies, which in the UK case are actually financed by a levy on electricity consumers.

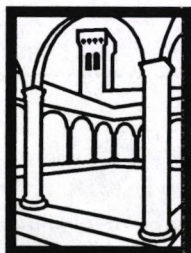
The UK system obviously has its own peculiarities and other countries might never consider certain features of this system. However, the UK experience still provides some useful lessons of the obstacles to the integration of environmental concerns into the institutional and regulatory framework for the electricity sector. These conclusions assume that environmental protection is an important issue in other countries considering privatisation. In reality, there are very few countries (if any) where the environment is really playing a central role in policy developments and where long-term considerations override short-term ones. As yet, there are a few signs of a serious pursuit of sustainable development.



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