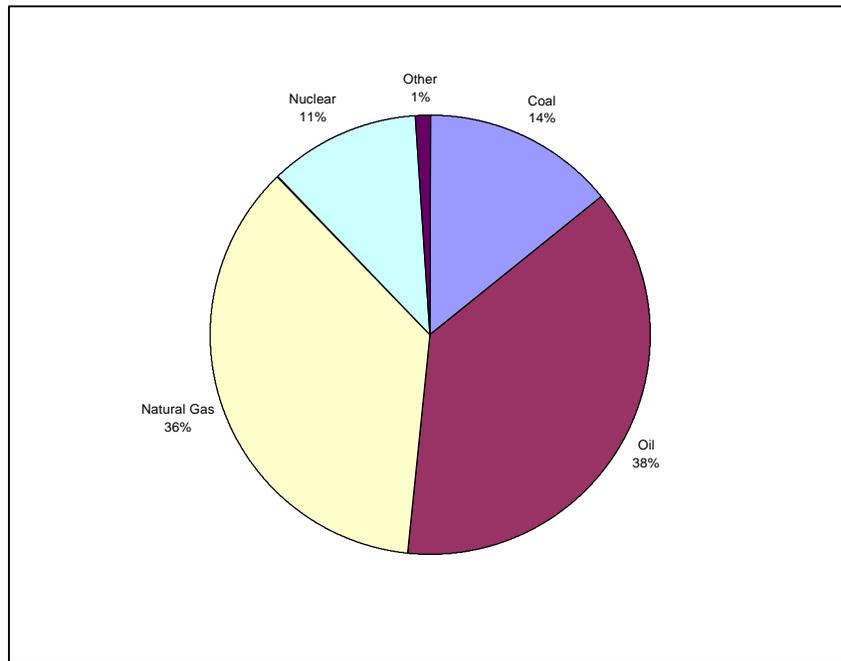


National Energy Policy and Energy Overview

Figure 5. Total Primary Energy Consumption (10 Quads), 1997ⁱ



Energy Snapshot 1997ⁱⁱ

Net Dependence on Energy Imports: 20%	Energy-Related Carbon Emissions: 155 million metric tons
Energy Consumption per Capita: 175 million Btu	Carbon Emissions per Capita: 2.7 metric tons
“Kyoto Commitment”: 12.5% reduction in greenhouse gas emissions from 1990 levels by 2008-2012	Total Primary Energy Consumption 1996: 10 quadrillion Btu

Energy Policy. The United Kingdom’s overarching energy policy objective is to ensure secure, diverse, and sustainable supplies of energy at competitive prices. The government believes that, in this regard, liberalized, competitive markets offer consumers the greatest benefit. In the government’s view, properly functioning competitive markets are more flexible and responsive than non-competitive markets, and thus contribute to the achievement of energy security and diversity.ⁱⁱⁱ

Overall, the deregulation of energy in the UK (discussed in greater detail below) has yielded net benefits for consumers, although the distribution of benefits among consumer classes has been uneven. Although residential consumers of electricity and gas have experienced lower real energy prices since privatization and deregulation, the gains to commercial and industrial consumers have been substantially greater (as much as 50-

60%).^{iv} From an environmental perspective, the liberalization of the energy industries has also yielded important benefits by creating a political and economic environment that favored natural gas over coal, the traditional foundation of the British electricity industry. The rapid “dash to gas” by electricity generating companies in the UK ultimately prompted the government to issue a temporary moratorium in 1998 (which remains in effect as of early 2000) on the construction of new gas-fired plants. Although the government has justified the gas moratorium on grounds of energy security and concerns for the country’s rising dependence on gas imports from Russia and Algeria, many analysts view this policy action primarily as an effort to stem the decline of the domestic coal industry and support both the industry and its workers.^v

The British government also believes that decisions regarding energy R&D are largely the concern of the energy industries. In fact, over the past decade, government energy R&D investments have fallen by more than 90% in real terms, as a result of a deliberate strategy on the part of the government to reduce its interventions in the marketplace and its overall budget outlays. For example, the Department of Energy, a major historic sponsor of scientific research, was dismantled in 1992.^{vi} Most of the Department’s functions were abolished, while those that were retained (such as responsibility for a downsized energy R&D portfolio) were distributed among other cabinet Departments, most notably the Department of Trade and Industry.

The dismantling of the Department of Energy and the downsizing of overall government R&D investments are parts of a liberalization and privatization process that began in the early 1980s under the Conservative government of Prime Minister Margaret Thatcher. At that time, the government set out to roll back the reach of government in the private sector, focusing its efforts on the deregulation and privatization of key industries, such as airlines, railroads, telecommunications, and energy, which had long been under government control and/or ownership. In the government’s view, the introduction of competition and free-market incentives in these industries would help to improve efficiency, provide better quality of service to consumers, and reduce associated operating costs.^{vii}

Utility Deregulation. The United Kingdom, which began the energy deregulation process with the passage of major legislation in the form of the Electricity Acts of 1983 and 1989, has been a leader among the industrialized nations, most of which have yet to implement energy restructuring to as great an extent. Deregulation of the UK’s electric utility industry was phased in gradually over the course of a decade, beginning in 1990 with the introduction of competition in, and privatization of, the electricity generation and marketing businesses, and the introduction of supplier choice for large industrial firms. In 1994, the electricity market was deregulated for small industrial and commercial industries. The deregulation of the electric utility industry was completed in 1998, when retail-level deregulation was introduced nationwide. Distribution now occurs through twelve private, regional distribution companies, which also jointly own the country’s regulated transmission grid.^{viii}

Since the late 1980s, the liberalization of the energy industries has been a primary objective of the United Kingdom's energy policy, which aims to provide a range of cost-effective energy choices to all classes of consumers. In addition to its domestic policy actions in this regard, the British government is also a strong advocate of energy liberalization throughout the European Union; in its view, the liberalization of networked energy systems across Europe will improve the overall security, flexibility, and efficiency of European energy systems and is likely to provide a wider range of energy choices and business opportunities for British consumers and industry.^{ix}

The deregulation of the United Kingdom's energy industries has realized some significant benefits. For example, deregulation has resulted in a net reduction of electricity prices in the UK. Between 1990 and 1997, average annual domestic prices for gas and electricity fell in real terms by 11% and 9%, respectively; over the same period, real industrial prices fell by 46% for gas and 21% for electricity. However, there has been a great deal of controversy surrounding the equity of the reforms, since many observers feel that large industrial consumers and industry executives have benefited at the expense of tax payers, smaller consumers, and electricity industry employees.^x

Many of the initial efficiency gains brought about through deregulation were realized by large-scale layoffs; moreover, many analysts believe that the state-owned electricity assets were sold well below their full value, depriving the treasury of significant revenues. The issue of stranded assets, particularly in the nuclear power sector, has also proven difficult to resolve. Since only the most advanced nuclear facilities were privatized successfully, questions still linger regarding the fate of older plants and plants under construction which were unable to compete in a deregulated environment. To sustain the industry during the privatization process and to address the issue of stranded costs, the government ordered regional distribution companies to purchase specified quantities of nuclear-generated electricity. In 1990, a levy of 10% of total electricity revenue was implemented to reimburse the distribution companies for the purchase of nuclear and renewably-generated electricity at higher than market rates. Thus, a portion of the nuclear industry's stranded costs was passed on to electricity consumers through this non-fossil fuel obligation (discussed in more detail below).^{xi} The non-fossil fuel obligation still provides a subsidy of approximately \$1 billion annually to the nuclear industry.^{xii}

The deregulation of the UK's natural gas industry in conjunction with electricity deregulation has had significant environmental benefits. The restructuring of the energy industries created an environment that strongly encouraged electricity generators to switch from coal to natural gas as the fuel of choice. Until the mid-1980s, electricity generators had been required to purchase set quantities of high-cost domestic coal. While coal had accounted for 66% of fuel use at UK electric utilities in 1988, by 1995 that percentage had fallen to 48%, due principally to substitution of natural gas facilitated by deregulation. Over roughly the same period, employment in Britain's coal industry fell from nearly 184,000 to 11,000. The substitution of gas for coal also helped the United Kingdom to reduce its greenhouse gas emissions and to comply with a 1988 European Community directive requiring a 60% reduction in sulfur dioxide emissions by 2003.^{xiii}

Climate Change. Another energy policy goal of the United Kingdom is to meet its commitment under the United Nations Framework Convention on Climate Change to reduce its emissions of greenhouse gas emissions to 1990 levels by the year 2000. Due in large measure to the large-scale substitution of gas for coal in the electric utility sector, the UK's carbon dioxide emissions are likely to be 4-8% below 1990 levels by 2000. With respect to other greenhouse gases, the U.K.'s methane and nitrous oxide emissions are expected to be 22% and 62% lower, respectively, than 1990 levels.^{xiv}

In 1997, at the Third Conference of the Parties to the Framework Convention on Climate Change, in Kyoto, the British government and the European Union (EU) accepted a new greenhouse gas emissions reduction target of 8% below 1990 levels within the period 2008-2012. Subsequently, the environment ministers of the EU adopted a Community Strategy on Climate Change, specifying individual EU countries' respective greenhouse gas reduction targets. Under this plan, some EU Member States will be allowed to increase their emissions over the next decade (e.g., Greece: +25%, and Spain: +15%), while other will have to reduce their emissions drastically (e.g., Germany: -21%, and Luxembourg: -28%). Under the EU's Community Strategy, the United Kingdom has agreed to a reduction target of 12.5%.^{xv} The UK's Minister for Science, Energy, and Industry, John Battle, acknowledged that "achieving this kind of target...is probably going to take some radical change in the way we regard energy and its use."^{xvi} Mr. Battle acknowledged that meeting the government's energy and environmental goals in this regard will require the development and deployment of new energy technologies, particularly offshore wind energy and bio-energy crops.^{xvii}

An important tool in the United Kingdom's efforts to reduce its overall greenhouse gas emissions is the Non-Fossil Fuel Obligation (NFFO). The NFFO, a statute imposed by the British government under the Electricity Act of 1989, empowers the Secretary of State to require that the UK's twelve regional electricity companies, which collectively form the national distribution network, secure a specified amount of generating capacity from non-fossil fuels (including nuclear and renewable energy sources) and permits a levy on electricity consumers to meet the additional costs involved. Already, 248 renewable energy projects are up and running as a result of the NFFO in England and Wales, or its equivalents: the Scottish Renewables Obligation (SRO) and the Northern Ireland NFFO. These projects cover a range of energy sources, including wind, hydro and waste.

The NFFO has been used to stimulate the market for renewable energy and to drive renewable technologies to become more competitive with conventional fossil fuel technologies. The NFFO is put out to competitive bid, aiming to place steady, downward pressure on the necessary subsidy for renewable energy. Contracts are placed by the Non-Fossil Purchasing Agency on behalf of regional electricity companies and offer long-term (up to 15 years) guaranteed purchasing arrangements designed to provide a stable framework for renewables projects. In 1990, when the first NFFO tender was made, successful wind energy projects produced electricity at approximately 14.7 cents/kWh; as of 1999, NFFO wind energy projects are producing at 4.85 cents/kWh—

just over one tenth of one cent higher than the 4.7 cent average selling price of the UK's electricity pool.^{xviii}

Through the NFFO and R&D tax credits to energy technology producers, and through modest direct support for renewable energy R&D, the government aims to reduce significantly the UK's emissions of greenhouse gases. The government's target is to reduce emissions by 20% from their 1990 levels by 2010—a goal that greatly exceeds the UK's commitment to a 12.5% reduction under the Kyoto Protocol. The task will be exceedingly difficult, given the low levels of support for energy R&D that have persisted in the UK over the past decade, and considering that several of the renewable energy projects commissioned under NFFO have experienced substantial delays in the siting and licensing process. Although 650 MW of emissions-free electricity generating capacity has been commissioned under the program, a large fraction of that capacity must clear significant hurdles before coming online.^{xix}

Energy Security. In general, the British government relies on market mechanisms to ensure that energy supply security is maintained. Yet the potential costs that a supply interruption could impose on the economy, as the oil shocks of the 1970s did, have prompted the government to take a more active role in energy security matters. In its 1997 Energy Report, for example, the government called for a number of actions to improve the country's energy security including the completion of energy liberalization and the broader development of renewable energy sources as a means of greater energy self-sufficiency.^{xx}

Diversity is a key dimension of energy security in the United Kingdom. Although the government promotes competitive markets as a means of ensuring flexibility of response and innovation in the country's energy supplies and systems, diversity also means having both a wide range of fossil fuels and technologies, and alternatives to fossil fuels. Improving the UK's energy diversity is especially important considering the country's relatively few international connections for gas and electricity, and its high level of dependency on hydrocarbon resources from the Middle East.

There has been growing concern within the government in recent years concerning the rapidly rising use of natural gas for electricity generation. Current estimates suggest that the UK may rely on imports (mainly from Russia and Algeria) for between 55% and 90% of its gas supplies by 2020. In order to forestall such developments, the government has acted to brake the rising dependence on gas by imposing a policy of stricter consents—amounting to a near moratorium—on the construction of new gas-fired power plants for the short-term, an action criticized by some observers as geared principally at preserving domestic coal industry jobs. This policy, in conjunction with the government's clean coal technology program, aim to encourage the use of domestic coal in high-efficiency combined heat and power projects viewed as furthering two energy policy goals, energy security and sustainability, simultaneously.^{xxi}

In short, the government's policy with regard to energy security has three main components. First, the promotion of competition in energy markets is viewed as having the largest potential for ensuring security by creating flexibility, innovation, and diversity among suppliers using the price signal. Second, selective support for energy R&D, for instance in the clean coal and renewable technology areas, is viewed as playing a role in energy security and diversity, despite the fact that public support for energy R&D has declined by more than 90% since 1989. Finally, policy interventions in the market, through the use of regulatory and fiscal instruments such as the NFFO, and the stricter consents policy for natural gas-fired generating capacity, are also a key part of the government's energy security strategy.^{xxii}

ⁱ Energy Information Administration, “United Kingdom: Country Analysis Brief,”

<http://www.eia.doe.gov/emeu/cabs/northsea.html>

ⁱⁱ Energy Information Administration, “United Kingdom: Country Analysis Brief,”

<http://www.eia.doe.gov/emeu/cabs/northsea.html>

ⁱⁱⁱ Department of Trade and Industry, *Conclusions of The Review of Energy Sources for Power Generation and Government Response to Fourth and Fifth Reports of Trade and Industry Committee*, p. 17.

<http://www.dti.gov.uk/public/frame1.html>

^{iv} Energy Information Administration, *Electricity Reform Abroad and U.S. Investment*, DOE/EIA-0616 (October 1997), p. 32.

^v Energy Information Administration, *Electricity Reform Abroad and U.S. Investment*, DOE/EIA-0616 (October 1997), pp.29-30.

^{vi} Personal communication with Jonathan Temple, Science and Technology Liaison, Embassy of the United Kingdom, Washington, DC.

^{vii} U.S. Department of Energy, Energy Information Administration, “Electricity Restructuring and Privatization in the United Kingdom,” *Electricity Reform Abroad and U.S. Investment* (Washington, DC: U.S. Government Printing Office 1997, pp.15-17.

^{viii} John Chesshire, “UK Electricity Supply Under Public Ownership,” in John Surrey (ed.), *The British Electricity Privatization Experiment, Privatization: The Record, The Issues, The Lessons* (London: Earthscan, 1996), p. 19; Energy Information Administration, *Electricity Reform Abroad and U.S. Investment* DOE/EIA-0616 (October 1997), pp. 13-38.

^{ix} <http://www.dti.gov.uk/public/frame1.html>

^x Department of Trade and Industry, “Regulating Energy Markets,”

<http://www.dti.gov.uk/COMMS/dtiexweb/pages/pg07d.htm>

^{xi} U.S. Department of Energy, Energy Information Administration, “Electricity Restructuring and Privatization in the United Kingdom,” *Electricity Reform Abroad and U.S. Investment* (Washington, DC: U.S. Government Printing Office 1997, pp.13-14.

^{xii} Catherine Mitchell, *Renewable Energy in the UK: Policies for the Future* (London: Council for the Protection of Rural England, 1998), as reported in Curtis Moore and Jack Ihle, “Renewable Energy Policy Outside the United States,” Renewable Energy Policy Project Issue Brief No. 14 (October 1999), pp. 12-13.

^{xiii} U.S. Department of Energy, Energy Information Administration, “Electricity Restructuring and Privatization in the United Kingdom,” *Electricity Reform Abroad and U.S. Investment* (Washington, DC: U.S. Government Printing Office 1997, 30.

^{xiv} International Energy Agency, *Energy Policies of IEA Countries: The United Kingdom 1998 Review* (Paris: OECD, 1998), p. 29. According to U.S. Department of Energy projections, however, the United Kingdom is likely to re-attain and exceed its 1990 carbon dioxide emissions level by the first Kyoto Protocol reporting period of 2008-2012. See: Energy Information Administration, *International Energy Outlook 1999* (Washington, DC: U.S. Government Printing Office 1999), p. 151.

^{xv} European Council, “Community Strategy on Climate Change, Council Conclusions,” (Brussels, 23 March 1998).

^{xvi} Department of Trade and Industry, *Shaping Change* (London: The Stationery Office Limited, 1997), quoted in: International Energy Agency, *Energy Policies of IEA Countries: The United Kingdom 1998 Review* (Paris: OECD, 1998), p. 29.

^{xvii} Department of Trade and Industry, “John Battle Launches Bidding for Fifth Non-Fossil Fuel Obligation,” Press Release, November 25, 1997, <http://www.coi.gov.uk/coi/depts/GTI/coi5019d.ok>

^{xviii} Department of Trade and Industry, *New and Renewable Energy: Prospects for the 21st Century* (London: Department of Trade and Industry, 1999), p. 22.

^{xix} Conversation with Chris Naish, AEA Technology Environment/ETSU, 28 July 1999.

^{xx} White Paper, “Conclusions of the Review of Energy Sources for Power Generation,” Presented to Parliament by the Secretary of State of Trade and Industry by Command of Her Majesty, October 1998, pp. 23-24.

^{xxi} White Paper, “Conclusions of the Review of Energy Sources for Power Generation,” Presented to Parliament by the Secretary of State of Trade and Industry by Command of Her Majesty, October 1998, pp. 23-28; Department of Trade and Industry, “The Government’s Policy for Clean Coal Technologies,”

http://www.dti.gov.uk/ent/coal/cleaner_coal/html/back.html

^{xxii} White Paper, “Conclusions of the Review of Energy Sources for Power Generation,” Presented to Parliament by the Secretary of State of Trade and Industry by Command of Her Majesty, October 1998, p. 20.