

ENERGY PRICES

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Energy prices have risen between 10% and 50% over the last year with Consumer Focus estimating the current average annual domestic energy bill to be over £1,300. With the percentage of households in fuel poverty having increased from 13% to 25% over the last 5 years and fuel prices predicted to continue to rise, energy prices have been a subject of recent interest.

This briefing provides an overview of recent trends in energy prices and highlights the key factors influencing the general price of energy and the price of oil, domestic gas and electricity. It then considers the key impacts that changing energy prices have on consumers, producers and the environment before summarising the key policy levers available to the EU, the UK and Scottish Governments.



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KEY POINTS

- In recent years energy prices have risen much faster than the general rate of price inflation. The increase has applied to all forms of energy including electricity, gas, heating oil, petrol, diesel or aviation fuel. This has put pressure on household budgets, added to business costs and triggered high levels of inflation.
- Energy prices are likely to remain high. Although oil prices have dropped with the recent economic downturn the International Energy Agency predicts that oil will rebound to more than \$100 a barrel as soon as the world economy recovers.
- The majority of energy consumed in Scotland is currently sourced from oil, gas and coal.
- In addition to cost and price, energy sources have externalities associated with them – that is a cost which does not necessarily impact on the user e.g. environmental implications.
- Key factors influencing the general price of energy include:
 - Increasing global demand for energy
 - Political instability
 - The decline in the value of Sterling
 - The price of oil
 - The cost of reconciling the environmental impacts of traditional energy use
 - The cost of developing and rolling out new and renewable technologies
- Key factors influencing the price of oil include:
 - Factors affecting demand
 - Economic growth, particularly in developing economies
 - Lack of flexibility of demand in the short-run
 - The exchange rate between the Dollar and Sterling
 - Speculation
 - Factors affecting supply
 - Lack of flexibility of supply in short-run
 - Protection of national resources
 - Dwindling reserves and the cost related to new extraction
 - Political instability
- Key factors influencing the price of gas include:
 - Increasing reliance on imports
 - Lack of storage capacity
 - The price of oil
 - Lack of competition
- The number of households in fuel poverty in Scotland has been rising consistently since 2002. In 2007, an estimated 24.6% of all households were classified as fuel poor compared to 13% in 2002. There are three main factors which influence whether or not a household is in fuel poverty; low household income, fuel costs and energy efficiency.
- While much of energy policy is reserved to the UK Government, the Scottish Government's principal powers concern measures to promote energy efficiency, the development of renewables and new energy technologies, and the consenting of new power stations and overhead electricity lines.

BACKGROUND

Since the industrial revolution, energy has been, for the most part, a ‘paid for’ commodity. Energy prices in recent years have risen much faster than the general rate of price inflation. The increase has applied to all forms of energy including electricity, gas, heating oil, petrol, diesel or aviation fuel. This has put pressure on household budgets, added to business costs and triggered changes to the Consumer Price Index, which peaked at 5.2% in September 2008 (well above the target of 2%) largely as a result of the rising price of electricity, gas and other fuels (Office for National Statistics (ONS), 2008a).

RECENT TRENDS IN ENERGY PRICES

In recent years energy prices have been rising over and above the rate of inflation. Table 1 below shows that while the Retail Price Index (RPI) rose 4.2% over the last year, energy prices increased between 10% (petrol) and 52% (gas). Over the last 5 years, while the RPI rose 19.2%, energy prices increased between 40% (petrol) and 148% (gas).

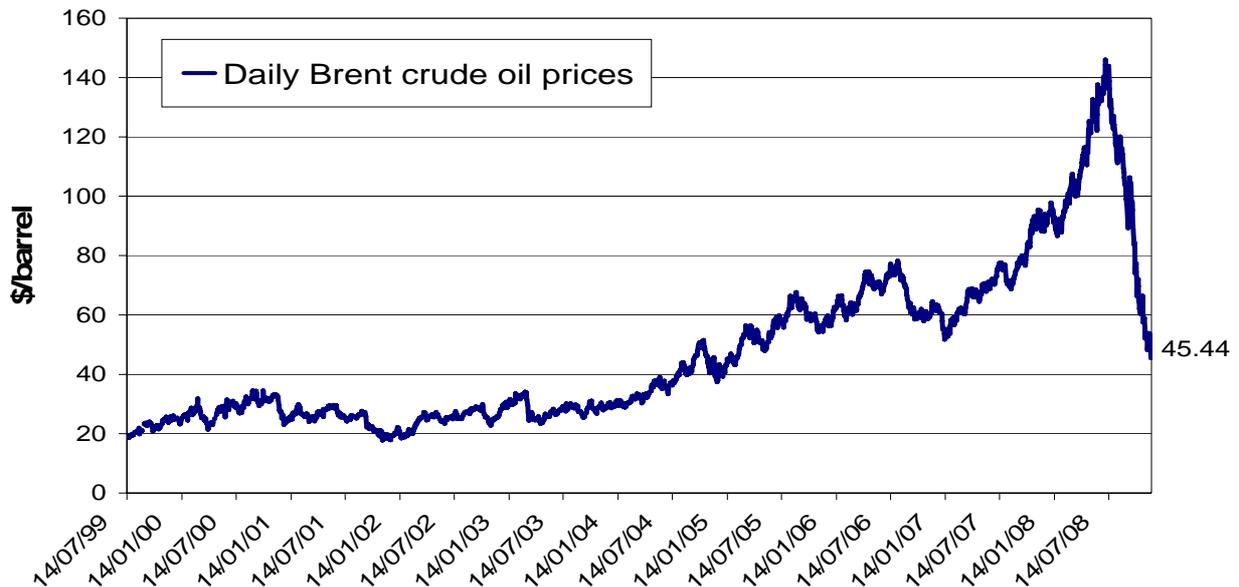
Table 1 – Changing price of energy between 2003 and 2008

| Commodity | RPI change over yr to Oct 08 | RPI change over 5 yrs to Oct 08 |
|--------------------|------------------------------|---------------------------------|
| Gas | 51.9% | 147.3% |
| Coal & solid fuels | 35.0% | 80.8% |
| Electricity | 31.4% | 96.5% |
| Oil & other fuel | 26.7% | 124.2% |
| Diesel | 20.2% | 54.5% |
| Petrol | 10.3% | 40.8% |
| All items | 4.2% | 19.2% |

Source: Office for National Statistics (2008b)

One of the key drivers of changing energy prices is the price of oil. This year has seen the price of crude oil reach its highest peak to date at \$147 per barrel on 11th July 2008 (Royal Bank of Scotland, 2008a), but it has since dropped to below \$50 per barrel (FT.com, 2008a). The International Energy Agency predicts that oil will rebound to more than \$100 a barrel as soon as the world economy recovers (FT.com, 2008b). Figure 1 below illustrates the changing value of crude oil prices between July 1999 and December 2008.

Figure 1 – Daily Brent crude oil prices July 1999 - December 2008



Source: House of Commons Library electronic holdings, FT.com (2008)
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Cost of energy for domestic consumers

Average household expenditure on all fuels has risen by 87 per cent in cash terms between 1990 and 2006, with the biggest rise being heating oils and other fuels where expenditure has more than trebled over the period (BERR, 2008b). In 2008 there has been significant press coverage surrounding rising energy prices for households as a result of two rounds of price rises announced by the 'Big Six' UK energy companies. The first round of announcements occurred between January and March and the second round of announcements occurred in July and August. Given the increases in the forward wholesale price of gas, further price rises are possible around the turn of the year (Bolton, 2008a).

Table 2 below illustrates the scale of the second round of price increases announced by the 'Big Six' in July and August 2008.

Table 2 – Main tariff price changes announced by the 'Big Six' in July/August 2008

| Company | Main Tariff Price Change | |
|----------------------------|--------------------------|-------------|
| | Gas | Electricity |
| British Gas | +35% | +9% |
| E.ON | +26% | +16% |
| Npower | +26% | +14% |
| Scottish power | +34% | +9% |
| EDF Energy | +22% | +17% |
| Scottish & Southern Energy | +29.2% | +19.2% |

Source: Bolton (2008a)

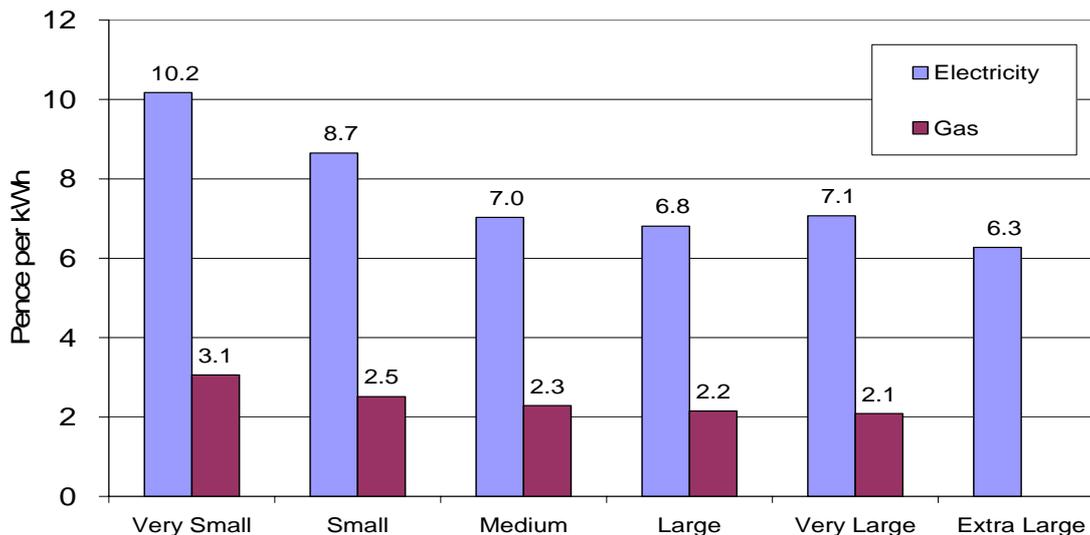
According to Consumer Focus, the UK Government consumer watchdog, gas prices have gone up by 51% since the start of 2008 and electricity by 28%. They estimate the current average annual domestic energy bill (excluding motor fuel) to be £1,308 (Consumer Focus, 2008).

Higher wholesale electricity and gas prices have been the largest contributor to increasing household energy bills. Wholesale costs now account for around 50-70 per cent of a consumer's energy bill (Ofgem, 2008a).

Cost of energy for non-domestic consumers

Average electricity and gas prices for non-domestic consumers have risen 92% and 88% in cash terms respectively between Q1 2004 and Q2 2008. Figure 2 below shows the price of fuels purchased by non-domestic consumers of different sizes. It illustrates that smaller companies tend to be charged higher prices for electricity and gas relative to larger companies as a result of different buying practices. Despite lower average prices for larger companies, prices have been rising at a faster rate compared to those for smaller companies (BERR, 2008c). Larger companies are more exposed to changes in the wholesale energy market as wholesale prices make up a larger share of their bill.

Figure 2 – Price of fuels purchased by UK non-domestic consumers as at Q2 2008



Source BERR (2008c)

Motor Fuel Prices

In 2008 the prices of unleaded petrol and diesel have reached the highest level in cash terms since price data started being collected in 1902. Similar to oil prices, motor fuel prices had their highest peak in July 2008. However, there has been a reduction of prices in recent months (BERR, 2008d). Table 3 provides information on how the retail price of fuel has changed in 2008.

Table 3 – Typical UK retail prices of motor fuels in 2008 (including taxes)

| Date | Super Unleaded | Premium Unleaded | Diesel |
|------------|-------------------|------------------|---------|
| January | 110.59 | 103.71 | 108.70 |
| February | 110.28 | 103.50 | 108.85 |
| March | 113.05 | 106.36 | 113.15 |
| April | 113.61 | 107.56 | 116.55 |
| May | 117.87 | 112.69 | 124.20 |
| June | 123.41 | 117.49 | 130.59 |
| July | 126.04 | 119.62 | 132.98 |
| August | 118.18 | 112.06 | 123.95 |
| September | 118.68 | 112.30 | 123.92 |
| October | 113.04 | 106.03r | 117.54r |
| November p | Not yet available | 94.83 | 108.73 |

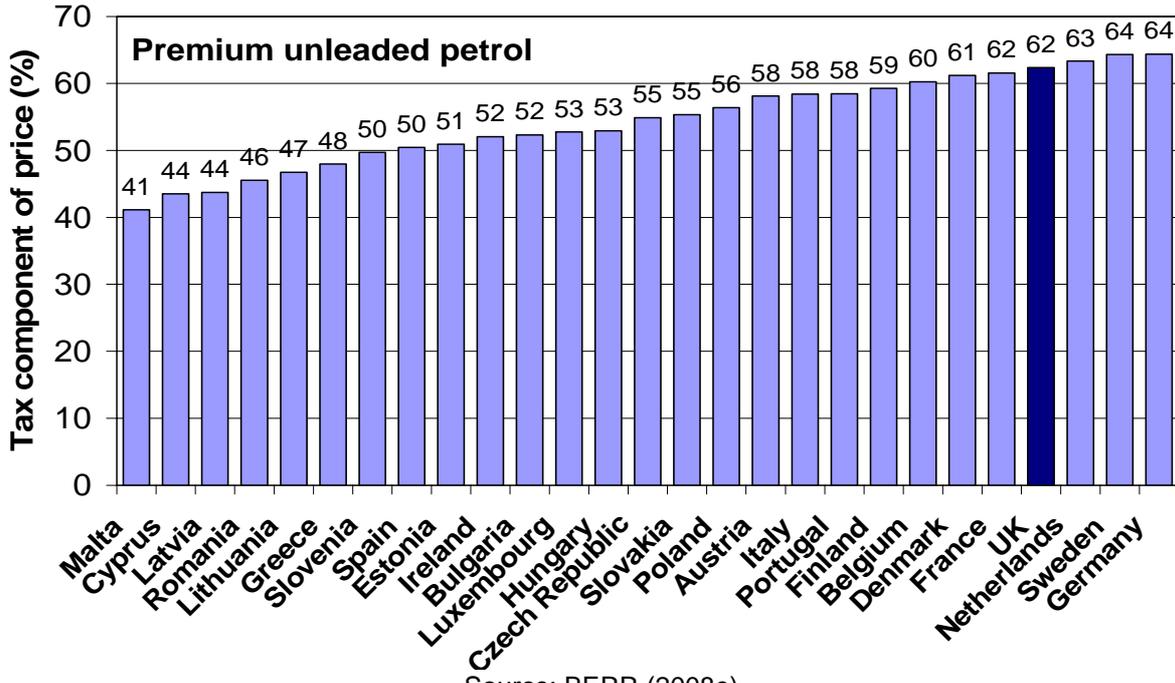
Source: BERR (2008d)

r – revised

p – provisional

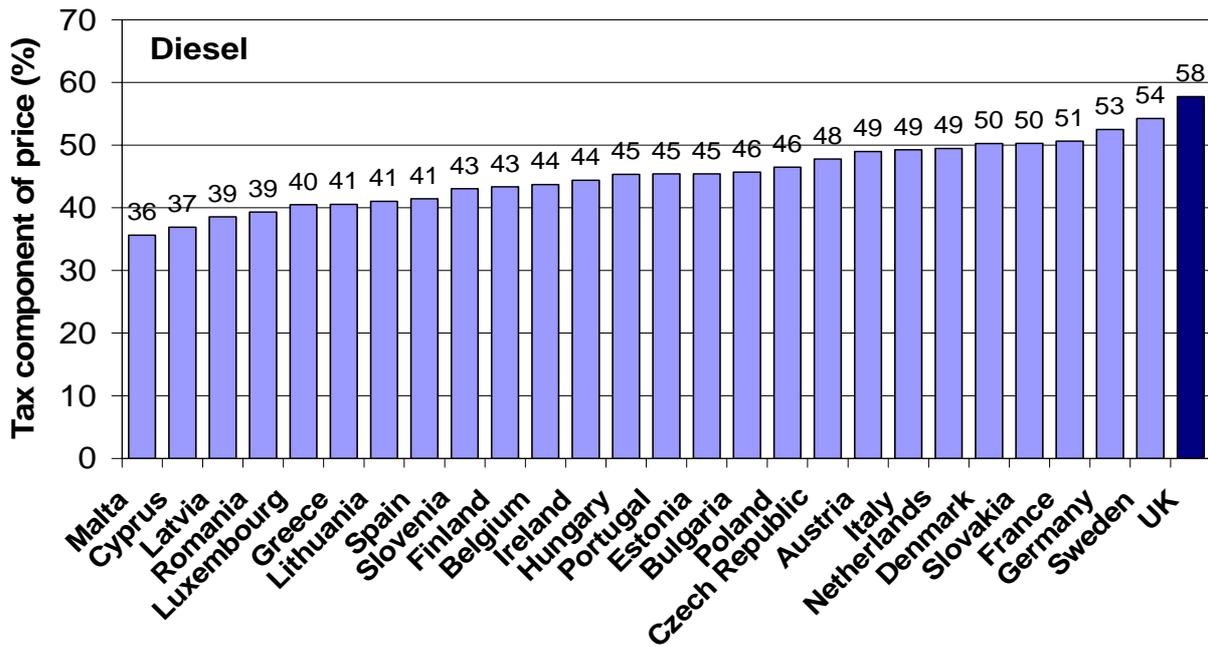
October 2008 data shows the pump price of unleaded fuel in the UK is the 6th highest in the EU and the pump price of diesel is the highest in the EU (BERR, 2008e). The high UK motor fuel prices are mainly due to the high level of taxes levied. Figures 3 and 4 below show the tax component of fuel prices for both unleaded and diesel fuel. In the UK, tax accounts for 62% of the price of unleaded petrol (the 4th highest in the EU) and 58% of the price of diesel (the highest in the EU).

Figure 3 - Tax component of unleaded petrol prices in the EU – October 2008



Source: BERR (2008e)

Figure 4 - Tax component of diesel prices in the EU – October 2008



Source: BERR (2008e)

KEY FACTORS INFLUENCING ENERGY PRICES

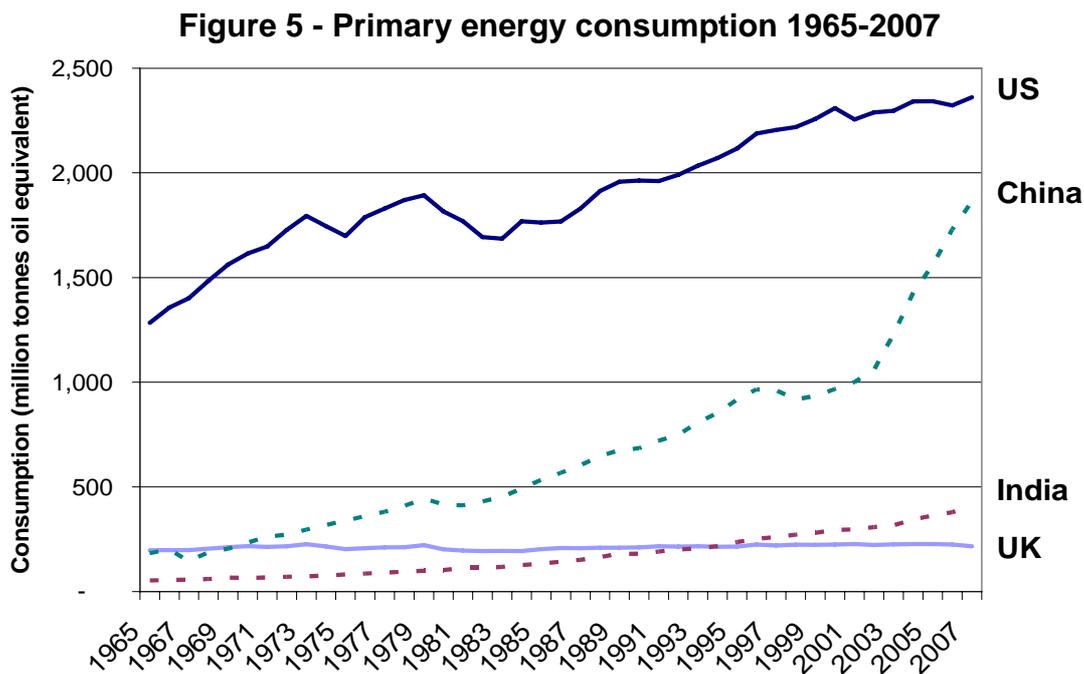
There are factors influencing both;

- the general price of energy, and
- the price of individual energy commodities such as oil, gas and electricity.

The following section outlines the key factors for each of these in turn.

FACTORS INFLUENCING THE GENERAL PRICE OF ENERGY

- **Increasing global demand for energy.** General economic trends and changing lifestyles influence the global demand for energy. UK energy demand growth has been relatively slow in the last couple of decades and has fallen in recent years. The BP Statistical Review of World Energy highlights that while there has been reduced growth in the demand for energy within developed countries, major developing economies such as China and India have expanded rapidly and their demand for energy has also increased at a rapid pace (BP, 2008). However it is important to note that the per capita energy consumption in developed countries still dwarfs that of developing and emerging economies (European Environment Agency, 2008). Figure 5 shows the changing primary energy consumption in the UK, the US, China and India.



Source: BP (2008)

- **Political instability.** Political risks militate against the security of supplies of oil and gas. The worldwide political risks to the supply of oil and gas have been identified as (Winstone, Bolton & Gore, 2007):
 - Heightened competition over depleting energy sources.
 - The new scramble for Africa's oil and gas.
 - The security of supplies from the Middle East and the instability of their governments' dependency on "petrodollars".
 - The future of Iraq, with the world's second largest oil reserves.
 - The energy-rich countries using energy supply and price as a political weapon.
 - Potential dangers of liberalisation of energy supplies and distribution.

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- **The decline in the value of sterling.** The value of sterling as measured by the rate of exchange against a basket of currencies has declined since July 2007 (Office for National Statistics, 2008c). In particular, as most fuels are traded in US Dollars, the exchange rate between the Dollar and Sterling most impacts the price of energy. The recent depreciation of Sterling against the Dollar has had the effect of increasing the sterling price of imported fuel.
- **The price of crude oil.** High oil prices impact on the price of products derived from oil – petrol, diesel, heating oil and aviation fuel, and also on alternative forms of energy such as gas and coal. This linkage is exacerbated by major gas exporters in countries such as Norway and Russia who link their price to oil.
- **The cost of reconciling pollution from energy sources.** Burning fossil fuels is the main source of greenhouse gases. As recognition of climate change has grown, governments have imposed restrictions on emissions or required polluters to pay for the privilege. This has added to the cost of supplying energy but the effect on energy prices to final consumers in the long term is unclear. It may be passed through to consumers with the effect of higher prices or energy companies may find efficiencies elsewhere to offset the increased costs. Currently environmental costs make up 3% of gas bills and 8% of electricity bills (Ofgem, 2008b).
- **The cost of using renewables.** The Scottish Government has set a target of 20% of all energy to be sourced from renewable sources by 2020, with 50% of electricity generated in Scotland to come from renewable sources by 2020, and an interim target of 31% by 2011 (Scottish Government, 2008a). The cost of renewables can be higher than fossil fuels although the gap has narrowed as a consequence of improvements in efficiency in developing renewable resources and the rise in fossil fuel prices. However, as renewables are currently a small proportion of the total energy mix the impact on overall energy prices is limited.

FACTORS INFLUENCING THE PRICE OF OIL

Crude oil prices are down from the peak of \$147 per barrel reached on 11th July 2008, but the effect of these high prices has fed through the supply chain and over the course of 2008 the major energy companies have increased prices for gas and electricity. The main factors influencing the global price of oil are those that influence the demand and the supply of oil.

Factors affecting demand

Economic growth, particularly in emerging economies

Efforts to decouple economic activity from increasing energy use and to decarbonise economies have failed and the global demand for energy remains heavily influenced by the general level of economic activity. This applies in particular to the demand for oil. With rapid economic expansion in countries such as China and India, their oil demand has also increased at a rapid pace (BP, 2008). Similarly, an economic downturn can reduce the demand and thus price of oil as has been seen in recent months. The International Energy Agency predicts that oil will rebound to more than \$100 a barrel as soon as the world economy recovers (FT.com, 2008b).

Lack of flexibility of demand in the short-run

A rise in prices tends to reduce demand. However many oil fuel using products such as vehicles, aircraft and domestic appliances may have a life of 10 to 30 years and it can be decades before they are replaced with more fuel efficient products. Thus in the short-run a change in prices may not immediately lead to a major change in demand, though overall trends could be an innovation driver in these sectors.

The exchange rate between the Dollar and Sterling

The Dollar is the currency in which most oil trades are expressed. More recently the decline in the value of sterling has contributed to an increase in the cost of oil imported to the UK when expressed in pounds.

Speculation

Speculators buy and sell oil futures with the aspiration of profiting by judging correctly the future price of oil. An example was seen as the financial crisis unfolded in 2008. Bolton states that as “a world economic downturn looked more likely the expectation was of lower oil demand in the future, earlier speculation went into reverse and the fall in prices continued” (Bolton, 2008b). Speculation can cause short-term price movements and thus increase the volatility of oil prices, but there is doubt that speculation has been driving any long-term changes in the price of oil.

Factors affecting supply

Lack of flexibility of supply in the short-run

There is a lack of flexibility in the supply of oil for two main reasons:

- Firstly, the Organisation of Petroleum Exporting Countries (OPEC) - an intergovernmental organisation made up of 13 oil producing nations - has a strategy of active crude oil market management with the aim of defending steadily higher oil prices (PFC Energy, 2007). This reduces the natural responsiveness of the market to changes in demand.
- Secondly, there is a lack of immediately accessible oil reserves. “Only Saudi Arabia and the United Arab Emirates are thought to be able to increase their output from today's levels...That leaves the oil market at the mercy of even small disruptions to supply” (Economist, 2008a).

In the medium term supply is likely to become more flexible as a result of increased investment in non OPEC oil sources, non oil alternatives and less energy intensive forms of production and consumption. However, it may be some years yet before the effect of OPEC restrictions and past underinvestment ceases to have a significant effect on oil prices.

Protection of national resources

Protectionism by oil-rich countries can result in a lack of access to areas where there is still potentially a lot of oil to be discovered, such as Russia, thus limiting the development of new fields. This means that oil companies must look elsewhere for new oil, for example, in areas where extraction is more technically challenging and environmentally sensitive: in deep water, or in the Arctic, or both (Economist, 2008a).

Dwindling reserves and the cost related to new extraction

The finite nature of fossil fuels, including oil, and increasingly challenging nature of exploration suggests a long run rising trend in oil prices. Estimates of reserves vary, and the concept of “peak oil”, whether we have already reached the maximum output of these resources, is often debated. On the narrowest definition oil and gas reserves would meet current levels of production for 41 and 65 years respectively – projected increases in production reduce these times (Winstone, Bolton & Gore, 2007).

Political instability

With a large proportion of the world's oil supply produced in politically unstable areas geopolitical factors can exert significant influence over oil prices, particularly in the short-term. An example of this was highlighted by RBS in August 2008, “Crude oil jumped by c5%, to \$121 a barrel in New York on Thursday...The rally appeared to have been prompted by an agreement between the US and Polish governments to install a missile defense system in Poland, a move that investors think might alienate Russia, the world's largest producer of natural gas and second largest consumer of crude oil” (RBS, 2008b).

FACTORS INFLUENCING THE PRICE OF DOMESTIC GAS

According to BERR, “Gas prices in real terms fell each year from 1995 to 2000 due to the advent of competition, the reduction in VAT from 8 to 5 per cent in September 1997, and reductions in British Gas’ standard tariffs....Increases in wholesale gas prices in late 2000 began to feed through to domestic customers in mid 2001. Since 2001 there have been further rises in wholesale gas prices, partly due to upward pressure on prices in continental Europe, where gas prices are contractually linked to oil prices. UK gas production is declining, so the UK gas market is in a transitional phase as it adjusts to increasing import dependence. There are also specific conditions relating to the UK gas market which have affected UK prices” (BERR, 2008g). Looking at these factors in more detail:

Increasing reliance on imports

The UK changed from being a net exporter of gas to being a net importer in 2004. Over the last 30 years UK businesses and households have benefited from cheap and, apparently, plentiful supplies of gas from the North Sea. These supplies are now declining and are being replaced with supplies from further afield, mainly from Norway and the Netherlands. This means that UK gas prices, from having tended to be lower than those in continental Europe, are becoming higher than on the continent. It has been estimated that this factor alone would account for a £400 rise in the cost of household fuel bills (Likvern, 2008). The UK has also been unable to attract adequate ships carrying liquefied natural gas, with many diverted to the Far East to take advantage of Asia’s willingness to pay even higher prices than the UK (Economist, 2008b).

The price of oil

Major continental Europe gas exporters from which the UK imports oil link their price to oil. By linking gas prices to oil prices, producers are able to prevent gas sales being undercut at times of falling crude prices. Peak oil prices in July 2008 influenced the wholesale price of gas and were a key driver behind price rises announced by gas energy suppliers in July/August 2008.

Lack of storage capacity

As the UK has historically sourced gas from the North Sea it does not have extensive storage capacity for gas. This means that the UK does not have the ability to buy gas when it is cheap and store it for peak times. As a result, prices are relatively more volatile in the UK. UK energy companies are currently investigating storage capacity to help rectify this situation.

Lack of competition

When the UK gas market was initially liberalized there were approximately 20 companies operating in the supply market. Over the last decade, this number has reduced to 6. Ofgem, the energy market regulator, are conducting an investigation into the markets in electricity and gas for households and small businesses in response to concerns about the competitiveness of the market. An interim report published in October 2008 found that while the market works well in a number of respects, competition is not yet fully effective in all sectors of the market (Ofgem, 2008a).

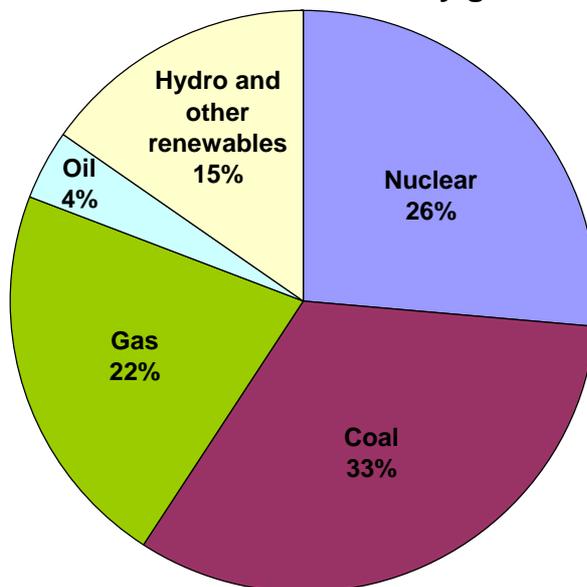
North Sea oil and gas

The North Sea has, over the last four decades, become the centre of one of the world’s most productive energy industries. In 1975 a small American company, Hamilton Brothers, brought the first UK oil ashore, to be followed very soon after by BP in the massive Forties field. Discoveries of oil grew in number as more companies took out leases on sectors of the North Sea. By the early 1980s Britain had become a net exporter of oil, and by the mid-1990s of gas. Production grew and peaked around 2000/1. Now, the North Sea is regarded as a mature province on a slow decline. However, with more sophisticated technology, larger amounts of oil and gas could be drawn for anything up to 50 years (University of Aberdeen, 2006).

FACTORS INFLUENCING THE PRICE OF ELECTRICITY

Electricity in Scotland is generated from a variety of different sources, with the most recent figures shown in Figure 6 below.

Figure 6 - Fuel used in Scottish electricity generation - 2006



Source: Scottish Government (2008b)

Electricity prices, in turn, follow the prices of the commodities from which they are generated. With 33% of Scottish electricity generated from coal, 26% from nuclear energy and 22% from gas – the prices of coal, uranium and gas feed into the price of electricity.

With gas and coal prices at record levels, electricity prices are rising. In addition, the second phase of the European Emissions Trading Scheme, which began in January 2008, has increased the price of carbon and this in turn has increased electricity prices (Ofgem, 2008b).

Specifically, the wholesale price of electricity is often determined by the short-run costs of extra production at marginal power plants – typically gas fired power plants in the UK (HM Treasury, 2008). This has a knock on effect for retail prices, though there is often a lag between changes in wholesale prices, and changes in retail prices.

EXTERNALITIES IN THE ENERGY MARKET

Whilst the financial costs of harnessing sources of energy, whether fossil fuels, nuclear or renewables are usually passed onto the end consumer, other impacts from consuming energy are not always factored in – these effects are often known as “externalities”. Externalities are described by the Economist as:

“Costs or benefits arising from an economic activity that affect somebody other than the people engaged in the economic activity and are not reflected fully in prices” (Economist, 2008c).

Externalities can be negative or positive, depending on the activity being undertaken, however in energy policy, negative externalities are by far the most obvious. For example, pollution produced by the burning of fossil fuels affects many people who have not made the decision to use the fuel. Another example is resource depletion – the price on the market for an energy source does not always reflect its future availability.

Options for dealing with positive and negative externalities include:

- Negative – tax the activity or regulate it. This is the theory that sees polluters or consumers having to pay for the right to pollute to certain levels.
- Positive – subsidise the activity, for instance support for the renewables industry could result in progress towards reducing greenhouse gas emissions.

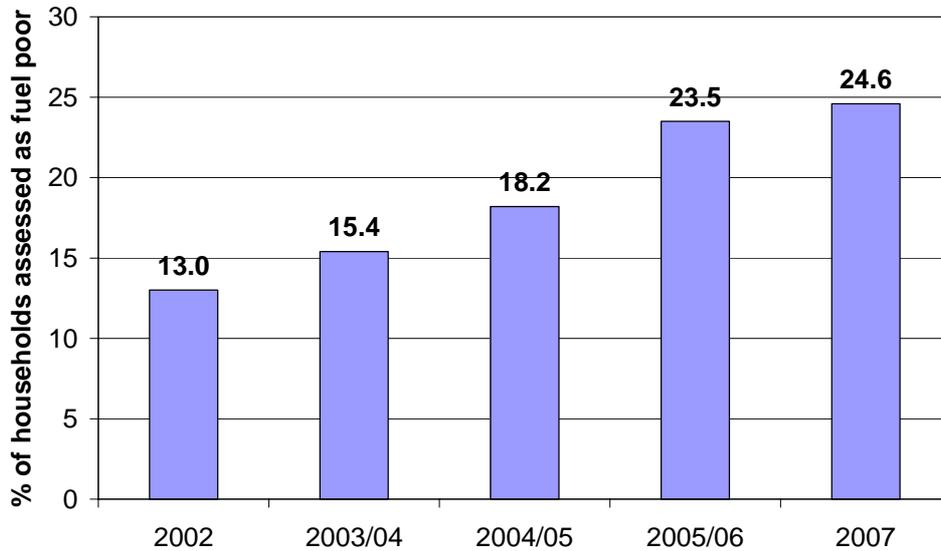
Emissions Trading Schemes are one way of reducing emissions from industrial processes. The EU Emissions Trading Scheme (EU ETS) is a Europe wide scheme which aims to reduce emissions of carbon dioxide by creating an overall emissions cap, and forcing high emitters to pay for the emissions they produce. The Scheme is designed to create a market for carbon. It has been in place since 2005 and is the first scheme of its kind in the world (Department for Environment, Food and Rural Affairs, 2008a). More detail on emissions trading will be available in a forthcoming SPICe Briefing on the topic.

KEY IMPACTS OF CHANGING ENERGY PRICES – WINNERS AND LOSERS

SCOTTISH HOUSEHOLDS

If, in order to maintain a satisfactory heating regime, a household would be required to spend more than 10 per cent of household income on all household fuel use then they are defined as living in fuel poverty (Scottish Government, 2008c). The percentage of households living in fuel poverty in Scotland has been rising consistently since 2002 as shown in Figure 7.

Figure 7 - % of households in Scotland assessed as fuel poor



Source: Scottish Government (2008c)

In 2007, an estimated 569,000 households (24.6% of all households) were classified as fuel poor (Scottish Government, 2008c). It has been estimated that for every 1% increase in average annual fuel prices an estimated 8,000 more households would enter fuel poverty (Scottish Government, 2008e). There are three main factors which influence whether or not a household is in fuel poverty (Scottish Government, 2008d):

Low household income - The impact of changing energy prices is greatest for those for whom energy spending make up a greater proportion of total income. Typically, this includes pensioners and other households with low income.

High fuel costs - When fuel costs fluctuate, the effect can be greatest on those for whom the cost of energy is above average. Ofgem found that inactive consumers (particularly “non dual fuel”), “electricity only” customers and standard credit and prepayment customers have been subject to higher energy costs (Ofgem, 2008a).

Poor energy efficiency - The impact of changing energy prices is greatest for those living in ‘hard-to-treat’ properties in energy efficiency terms. This includes dwellings classified as ‘non-traditional’ (split between concrete, timber and metal-framed housing). Flatted and tenemental properties which do not have a loft are also hard to insulate (Energy Action Scotland, 2008).

In October 2008 the Scottish Government (2008i) published “Towards 2016 - The Future of Fuel Poverty Policy in Scotland”. The Scottish Parliament Local Government and Communities Committee is carrying out an ongoing inquiry into fuel poverty.

SCOTTISH BUSINESSES

According to Scottish Enterprise increased energy prices affect the cost of doing business and the competitiveness of high energy user industries, which could result in possible business failure and difficulty to attract inward investment (Scottish Enterprise, 2005). The extent to which changing energy prices impact on the profit of Scottish businesses depends on both their level of energy consumption and the ability of the firm to pass these price changes onto the consumer.

| High level of energy consumption | Ability to pass price changes onto consumer |
|---|---|
| <p>Energy can account for different proportion of input costs depending on the type of business. Businesses which are the first to be affected by changing energy prices are those for which energy makes up a large proportion of input costs, such as those in or associated with the fishing, airline, distribution and energy-intensive manufacturing industries. It should be noted that rising energy costs specific to the UK can cause export prices to rise and, depending on exchange rates, erode the competitiveness of businesses within the international marketplace (Global Insight, 2006).</p> | <p>According to the September 2008 edition of the UK Business Barometer 92% of business advisers reported that their clients were slightly or strongly negatively affected by the credit crunch and the increase in fuel costs. 83% of the negatively affected group comprised respondents who said they cannot pass on price increases to consumers at all or only to a very limited extent (University of Nottingham, 2008). Businesses in this category tend to be those with intense foreign and domestic competition (such as retail businesses) or those with slowing demand.</p> |

THE PUBLIC SECTOR

The public sector's annual electricity bill is around £200 million (Scottish Government, 2008f) and thus a change in energy prices has the potential to have a large impact on the public purse.

An example of the impact that changing energy prices can have is highlighted by Highland Council who stated that "increases in energy costs on our buildings have been estimated at approximately £10m in 2009/10 and an additional £4m pressure has been identified as direct and indirect implications from fuel prices e.g. school transport contracts, bitumen materials, waste contracts etc." (Highland Council, 2008).

In order to help reduce such demands, the Scottish Government has launched a bulk-buy tender arrangement to supply electricity on a national basis to all public bodies (BBC, 2008c). Scotland's Climate Change Declaration committed all local authorities to:

"Produce and publicly declare a plan, with targets and time-scales, to achieve a significant reduction in greenhouse gas emissions from our own operations. This will include our energy use and sourcing, travel and transportation, waste production and disposal, estate management, procurement of goods and services, and improved staff awareness" (Sustainable Scotland Network, 2008).

ENERGY PRODUCERS

The price of energy impacts both profits of energy producers and their levels of investment in exploration and future technologies. For example, falling energy prices tend to result in reduced profit and investment by energy producers. An article in the Times commenting on recent reductions in the price of oil stated that “Dutch Shell became the latest oil company to respond to soaring costs and shrinking oil prices by halting development of Canada's formerly booming tar sands industry” (The Times, 2008). The same argument will hold true for the funding of development of new and renewable technologies, and in improving the efficiency of existing energy networks.

ENERGY SUPPLIERS

When the price of wholesale energy rises, energy suppliers can only continue to make profits if they increase prices and/or cut costs. Often the retail price rises lag behind spikes in the wholesale price.

In a climate of changing energy prices, almost all of the ‘Big Six’ energy suppliers increased profits in 2006/07 (E.ON made a loss of more than £300 million). In addition, according to research by the Local Government Association the ‘Big Six’ energy suppliers increased their shareholder dividend payouts by 19% last year (Local Government Association, 2008). Energy suppliers also use these profits to increase levels of investment in the energy infrastructure.

THE ENVIRONMENT

Reliance on fossil fuels (and other types of energy) impact heavily on the environment in a number of ways. Initial resource extraction (e.g. coal mining), burning for transportation, heating or electrical generation, and dealing with the consequences of different types of energy (e.g. radioactive waste) all have environmental costs.

Changing energy prices have the potential to alter consumer behaviour. For example, high energy prices could potentially encourage users to be more efficient with their use of energy, particularly if there is a sustained period of high prices. According to the Economist “you could see the rise in the oil price over the past five years as a gigantic carbon tax. It is, at last, succeeding in cutting demand in the developed world (although not yet in the developing one)” (Economist, 2008d).

However, despite demand generally responding to changes in energy prices, changes in demand have been sluggish. Within the domestic sector demand has been more responsive to price falls and less responsive to price increases. The result over the last 10 years is that demand has changed very little despite overall large price rises. There is some evidence that industrial demand has responded to a greater extent, but this sector has faced larger price rises and long-term demand trends have tended to be downwards. Electricity generation can and does respond to price signals because it can substitute one type of fuel for another to a certain extent. The transport sector has shown the smallest demand response (Bolton, 2008c).

POLICY OPTIONS

Energy price changes can lead policy-makers to make decisions which try to influence the demand or supply of energy. This is a complex and interrelated area, however some of the different policy options that the EU, the UK and the Scottish Governments have are highlighted below.

EUROPEAN UNION

The European Union (EU) plays an important role in influencing energy prices, for example through introducing legislation within the energy sector, harmonising market conditions and setting energy objectives for Europe. A major climate and energy package of measures is currently being debated at EU level however the discussions are underpinned by three main principles: security of supply; price; and environmental protection. Key areas of influence with regard to energy prices are summarised below.

Supply side

- **Develop security of supply:** The Commission encourages the diversification of the energy mix as a method of increasing security of supply partly through setting renewable energy targets and encouraging the development of new energy technologies. For example the EU has a Renewable Energies Roadmap which sets itself the objective of increasing the proportion of renewable energies in its total energy mix (not just electricity) by 20% by 2020 (Europa, 2007a).
- **Encourage political stability:** EU relations with consumer countries and producer countries and countries of transit are also of prime importance from the perspective of geopolitical security and economic stability (Europa, 2007a).
- **Encourage competition and fair pricing:** EU internal market legislation aims to create fully competitive and transparent markets through further liberalisation of EU energy markets (Europa, 2008a). This is aimed at harmonising energy markets within the EU, ensuring more competitive energy pricing across countries.

Demand side

- **Encourage energy saving and efficiency:** The EU is keen to see itself as a world leading power with regard to international climate change negotiations. In its Action Plan for Energy Efficiency (2007-2012) the EU has set itself the target of reducing its energy consumption by 20% by 2020 (Europa, 2007b). One of the ways through which the EU tries to influence levels of energy consumption is through minimum levels of taxation applicable to energy products (when used as motor or heating fuels) and electricity (Europa, 2007c). The EU also has energy efficiency legislation on buildings and energy-using products (Europa, 2008b).
- **Reduce fuel poverty:** The EU is developing an Energy Customers' Charter. The charter will principally encourage the implementation of aid schemes for the most vulnerable citizens in the face of increasing energy prices and also the improvement of the level of information consumers receive concerning the different suppliers and supply options (Europa, 2007a).

UK GOVERNMENT

Many important policy levers, such as taxation, regulation, the provision of social security benefits and the exploitation of deposits of oil and natural gas are the responsibility of the UK Government. Key areas of influence with regard to energy prices are summarised below.

Supply side

- **Diversification of the energy mix:** The UK Government states that diversification of the energy mix is important for security of supply. The private sector on its own may not invest adequately in the development of these technologies and public/private sector collaboration is important. The Energy Technologies Institute is an example of a joint venture in the UK devoted to the research and development of new energy technologies (DTI, 2007). The Renewables Obligation, the Renewable Transport Fuel Obligation and the Energy Transformation Fund are also examples of UK Government policy response to encourage the diversification of the energy mix.
- **Exploitation of fossil fuel energy reserves:** The UK Government plays a role in the North Sea licensing process and establishing the fiscal regime for the UK Continental shelf. Through applying changes to these the UK Government can play a role in maximising the recovery of the UK's oil and gas reserves and reducing reliance on imports (DTI, 2007).
- **Create the necessary conditions to encourage investment:** The UK Government can influence levels of investment by energy companies in energy infrastructure and new energy generation projects, for example, through providing market information on energy supply and demand trends, improving the planning system and ensuring that a clear and stable regulatory regime is in place, including for valuing carbon (DTI, 2007).
- **Encourage competition through regulation and legislation:** Ofgem, the gas and electricity market regulator, is an important partner in delivery of public policy objectives in energy pricing. For example, Ofgem launched a probe into the energy supply markets in February 2008 which concluded that pre-payment users face unjustifiably high charges. The Government stated in September 2008 that if no solution is offered by the energy suppliers and the regulator, it will consult on legislation to reduce any unjustified tariff differentials (Department for Environment, Food and Rural Affairs, 2008b).

Demand side

- **Encourage energy saving and efficiency:** The UK Government policy instruments to reduce energy use and emissions generally fall into one of four groups; command and control regulation (for example, by regulating energy efficiency standards), economic instruments (eco-taxes), information-based approaches (eco-labelling) or negotiated agreements and voluntary approaches (Parliamentary Office of Science & Technology, 2008). The UK Government also has energy efficiency programmes targeted at those most vulnerable to fuel poverty, such Warm Front and the Carbon Emissions Reduction Commitment.
- **Benefits for those in fuel poverty:** The UK Government can influence energy bills of consumers through changing benefits available to those in fuel poverty. For example, the UK Government pledged that this winter households with those over 60 will receive an extra £50 on their Winter Fuel Payment (up from £200-£250) with an extra £100 for over-80s households (up from £300-£400) (Department for Environment, Food & Rural Affairs, 2008b).
- **Changing energy taxes for consumers:** Domestic gas and electricity bills are subject to VAT at 5% which compares with 17% for most other household purchases. Petrol and diesel also subject to varying amounts of duty. It could not be guaranteed that a reduction in taxes would result in a reduction in energy prices for consumers. In addition, the lack of stability in taxation may make it difficult for energy companies to plan ahead and therefore companies may increase energy prices for consumers to give themselves more of a financial cushion.

SCOTTISH GOVERNMENT

Many aspects of energy policy are reserved to the UK Government however the Scottish Government does have powers at its disposal. These include approval of new power stations, overhead electricity lines, and the promotion of energy efficiency and renewables. Key areas of influence with regard to energy prices are summarised below.

Supply side

- **Utilise energy consents to create a secure domestic supply:** In Scotland, applications to build and operate power stations and to install overhead electricity lines, are made to the Scottish Ministers and local authorities for consent (Scottish Government, 2008g). The Scottish Government can utilise this power to influence the level, location and type of investment in Scotland's energy infrastructure and create a secure domestic energy supply.
- **Develop new energy technologies:** The development of new low carbon energy solutions is important to diversify the energy mix. The Scottish Government is supporting the Energy Technology Partnership, Scottish European Green Energy Centre and the Intermediate Technology Institute for Energy (ITI – Energy) to bring forward research development and demonstration of these technologies (Scottish Government, 2008a).
- **Provide a supportive environment for the generation of renewable energy:** The development of renewable energy is also important to diversify the energy mix. The Scottish Government states that Scotland will play its part in meeting the contribution proposed for the UK of 15% energy from renewable sources by 2020 and will aim to go further than this to 20%. For electricity, the aim of the Scottish Government is that 50% of Scottish demand for electricity should be met from renewable sources by 2020, with a milestone of 31% by 2011 (Scottish Government, 2008a). The Government Economic Strategy also states that the Scottish Government will take action to address connection to the grid charges for renewable energy and ensure that the regulatory environment supports the growth of Scotland's renewable energy sector (Scottish Government, 2007). A key support mechanism is the Renewables Obligation (Scotland). This operates by obliging licensed electricity suppliers to provide an increasing proportion of electricity which they supply to customers in Scotland from eligible renewable resources.

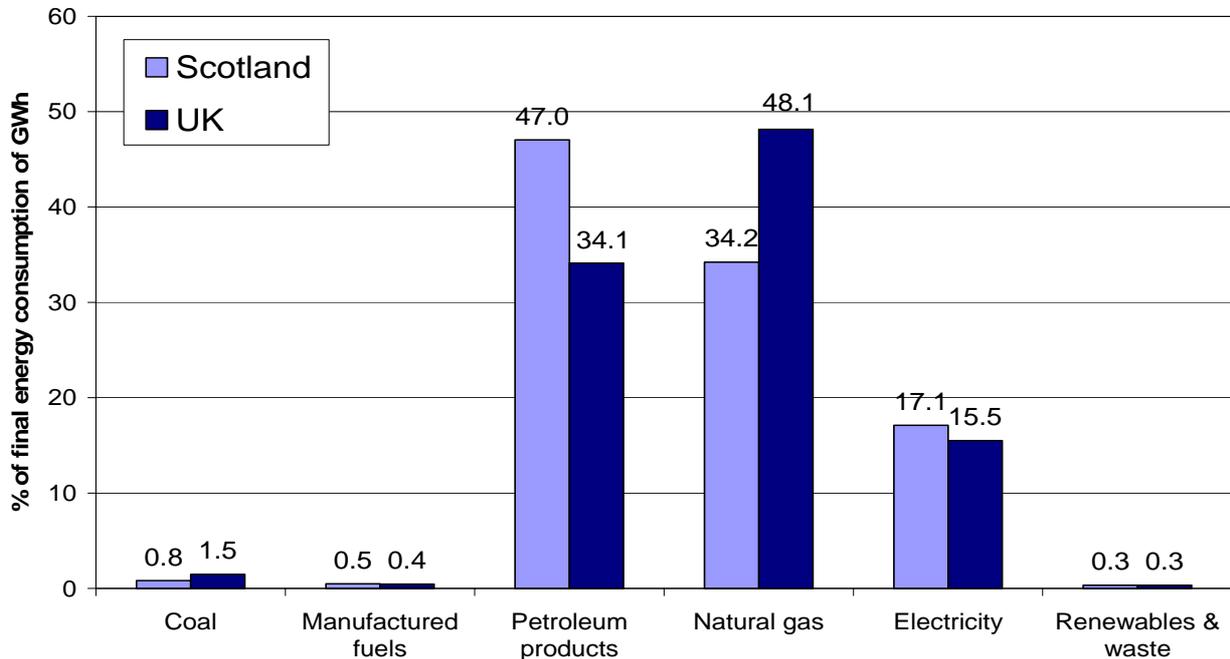
Demand side

- **Encourage more domestic energy saving and efficiency:** The Scotland Act 1998 (c 46) states that the encouragement of energy efficiency other than by prohibition or regulation is devolved to the Scottish Government. The Scottish Government has recently announced the Energy Assistance Package to be introduced in April 2009 - an holistic package to help maximise incomes, reduce fuel bills and improve the energy efficiency of homes (Scottish Government, 2008h). The Central Heating Programme and Warm Deal are presently the main programmes aimed at improving energy efficiency for those most vulnerable to fuel poverty (Scottish Government, 2008i).
- **Encourage more non-domestic energy saving and efficiency:** The Scottish Government has recently consulted on proposals for improving the energy performance of existing non-domestic buildings. One example is the proposal to introduce primary legislation on the reduction of carbon dioxide emissions from existing non-domestic buildings (Scottish Government, 2008j).

APPENDIX A - CURRENT ENERGY SOURCES IN THE UK AND SCOTLAND

The majority of energy consumed in the UK and Scotland is currently sourced from oil and gas as shown in Figure 5 below.

Figure A.1 - Final energy consumption in the UK and Scotland 2006



Source: BERR (2008f)

Note – includes industrial, commercial, domestic and transport consumption.

However, the energy mix evolves over time to respond to factors such as market forces and Government intervention. According to the Department of Trade and Industry (DTI) [now with functions split between the Department for Business, Enterprise and Regulatory Reform (BERR) and the Department of Energy and Climate Change]:

“Renewables and other low carbon technologies will play an increasing role in our energy mix over the longer term; however, fossil fuels will continue to be the predominant source of energy for decades to come. In fact, global fossil fuel resources are still plentiful, and markets are well-developed to deal with increased trade. By 2020, fossil fuels are expected to still supply the great majority of UK energy needs” (DTI, 2007).

This analysis however needs to be squared with the UK Climate Change Act 2008 which sets binding targets for the UK to reduce its greenhouse gas emissions by 80% by 2050 relative to 1990 levels, and UK targets to provide 15% of all energy from renewable sources by 2020.

A more diverse mix of energy sources tends to avoid exposure to the risks associated with individual energy sources and helps to maintain a more secure and flexible supply, with less resultant volatility in prices.

The Scottish Government has recently published commissioned research on Energy and Carbon Dioxide Projections for Scotland. This is Volume 5 of the Scottish Energy Study (Scottish Government 2008k). The Scottish Government (2008l) has also published commissioned research on policy options to reach greenhouse gas emission targets in 2050.

APPENDIX B - HISTORIC OVERVIEW OF THE ENERGY MARKET IN SCOTLAND

| <i>Period</i> | <i>Key aspects of the Scottish energy landscape</i> |
|---|--|
| Pre industrial Revolution | <ul style="list-style-type: none"> Energy needs mostly met by animal, wind and water power, and burning of renewable fuels e.g. peat. Before 1700 wood based charcoal was used directly for domestic and other purposes, followed by cheaper coke from coal, mostly mined by hand (International Development Research Centre, 2008). |
| Industrial Revolution 1750 to 1850 | <ul style="list-style-type: none"> Initially, factories remained limited to areas where water power could be utilised or where forestry was abundant (tree cover reduced markedly over Europe at this time). Following on from forestry, coal was the key driver of the industrial revolution, directly burned as an energy source and progressively more efficiently mined, with associated environmental impacts. In the 1760s James Watt revolutionised the steam engine (BBC, 2008a) and industry became closer located to coal fields. Energy use and population both increased markedly over this period. |
| 1850 to 1940s | <ul style="list-style-type: none"> In 1859 the kerosene lamp was invented and created the first demand for petroleum products In the late 1800s electricity changed from being a scientific curiosity to a medium for energy and in the 1870s lighting became one of the first domestic uses for electricity. Kinloch Castle on the Isle of Rum was the first private residence in Scotland to have electricity, generated from a hydro scheme (Isle of Rum Community, 2008). At the start of 20th century solid fuels began to be supplemented by liquid (and later gaseous) fuels with networked gas beginning to be used for heating and lighting. During the Second World War gas and electricity use was rationed, but by the end of the war around 2/3 of households were connected to the electricity grid |
| 1940s to early 1970s | <ul style="list-style-type: none"> Use of oil products rockets. Power to the glens: Tom Johnson (Britannica, 2008) pioneered the development of hydro power in Scotland (Resources for Learning in Scotland, 2008). Nuclear electricity: Chapelcross & Dounreay developed through 1950s, Hunterston A online in 1964. Commissioned in 1972, Longannet coal fired power station was the largest power station in Europe |
| Mid 1970s to 1990 | <ul style="list-style-type: none"> In 1973 the OPEC oil embargo was the first oil supply disruption to cause major price increases and a worldwide energy crisis. A further oil shock occurs in 1979-1980 with the Iran-Iraq war North Sea oil came on-stream in 1975 (BBC, 2008b) with oil prices continually rising. Coal generated electricity – Crockenzie came online in 1967. Nuclear electricity – Hunterston B came online in 1976; Torness came online in 1986. Oil fired electricity – Peterhead came online in 1980 and was later reconfigured to take gas. Deep mining declines through the 1980s – the miners strike. |
| 1990 to 2002 | <ul style="list-style-type: none"> Total energy use was similar, but the mix changed markedly: Direct consumption of solid fuels fell by 80% largely due to the closure of Ravenscraig steelworks but was still heavily used to generate electricity Use of oil reduced, but gas use increased markedly. Hydro was the only significant renewable generator but wind began to make a small contribution. Electricity demand increased by 20%. Other critical energy developments included the privatisation of gas and electricity markets. |
| 2002 to 2008 | <ul style="list-style-type: none"> Key energy policy drivers include: climate change and environment, security of supply and cost. Renewable electricity generation developed at an increased pace – particularly onshore wind. Scottish Executive and Government targets gradually increased to renewables meeting 50% of Scottish electricity demand by 2020. Scottish Government publishes overview of Energy Policy stating that within the context of overall sustainable economic development, the “main objective as far as Energy is concerned is to progressively increase the generation of renewable and clean energy, to migrate Scotland away from a dependence on nuclear energy” (Scottish Government, 2008a). Scottish Government developing legislation to reduce greenhouse gas emissions by 80% by 2050. UK Government developing legislation on energy, planning and climate change. |

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