

## IV Energy price rises and their impact on demand

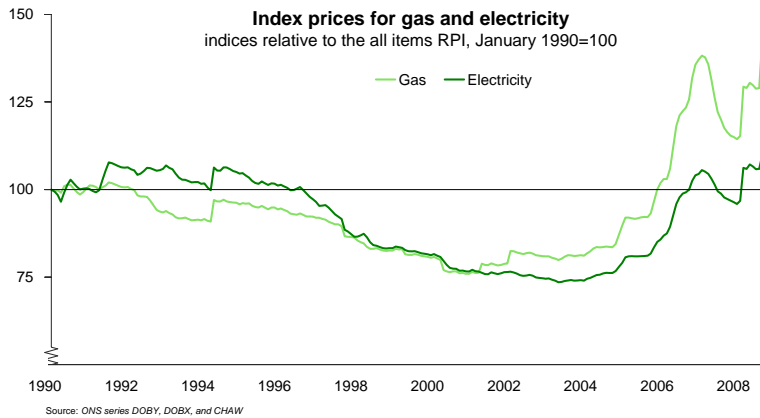
Gas, electricity, and fuel prices have generally increased over the past three to four years, but more recent sharp increases have focussed attention on their impact. They have a very clear impact on household budgets, business costs, inflation and fuel poverty, but how has demand changed in response to energy prices rises over the past few years?

This article briefly summarises trends in UK energy prices since 1990 before comparing trends in demand and prices and looking at the implications of these findings.

### Summary of price trends

This section uses monthly or quarterly price indices for the most important types of energy. Indices focus on price *changes* rather than price levels and hence make it easier to compare different fuels and sectors.

#### Domestic gas and electricity

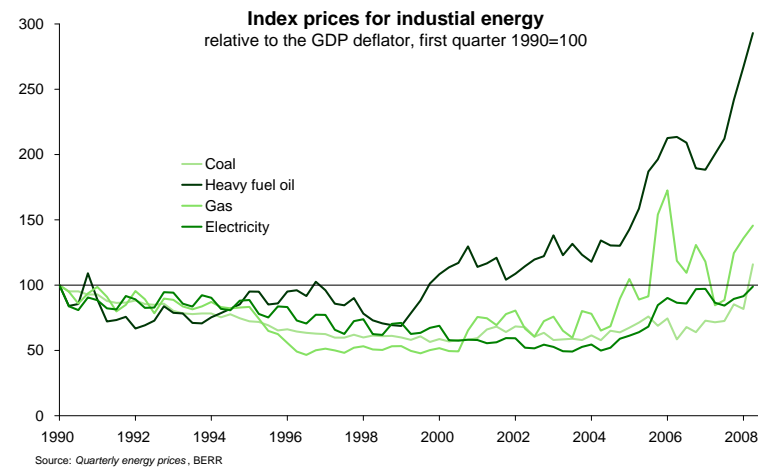


Monthly domestic gas and electricity prices fell consistently in real terms from 1991 and for the rest of the 1990s, with the exception of 1995 when VAT was introduced. The main reasons for the price falls during this period were price controls set by the regulator and, latterly, the impact of competition. Reductions in the Fossil Fuel Levy from 1996 onward helped further reduce electricity prices.

By late 2000 gas prices had reached a low which was around 25% below their 1990 level in real terms. The price rose relatively slowly over the following few years and more rapidly from autumn 2005 to the end of 2006. Prices peaked during this period in January 2007 at a level 82% above the late 2000 low. Prices increased again in early 2008 and in summer 2008. August 2008 levels were the highest in this period.

Electricity prices reached their low in spring 2003 at around 25% below 1990 levels in real terms. Trends since then have mirrored gas prices in terms of *direction*, but changes have been smaller. The January 2007 price peak was 44% above the 2003 low. As with gas, prices increased in early 2008 and summer 2008 and the August 2008 level was the highest in this period.

#### Industry

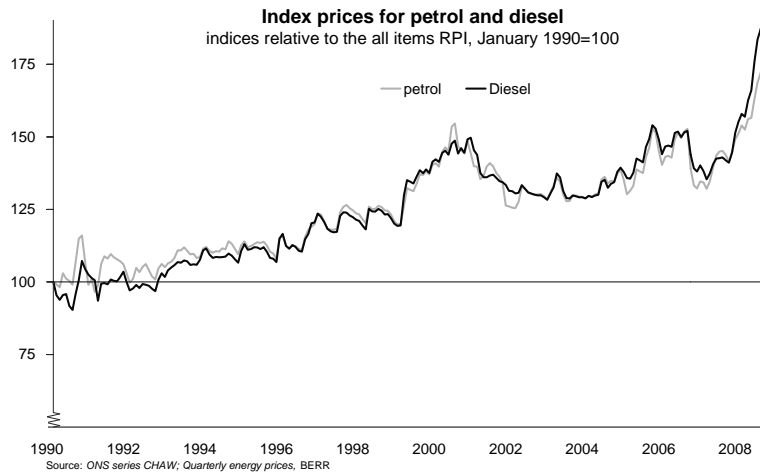


The general pattern of industrial fuel, gas and electricity prices shows some similarity with domestic prices, but despite being quarterly averages they are clearly more volatile. The peak in gas prices was sharper, happened earlier and the subsequent fall was greater. Industrial electricity

prices fell to a greater extent than domestic prices and the increase in prices since 2004 has therefore been greater, almost 100%.

The prices of oil and coal are also illustrated. Oil prices have increased for longer and by a greater amount than any other fuel. Coal prices have also risen, but these increases have not been particularly rapid or consistent until the last two years during which prices nearly doubled in real terms.

### Transport



Trends in road fuel prices can be separated into three periods: Consistent price rises during the 1990s peaking in late 2000; real falls in prices and stabilisation over the following 3-4 years; and much greater volatility and rapid price rises afterwards, particularly since late 2007. The real increases between September 2007 and July 2008 were 22% and 33% for petrol and diesel respectively. These increases come on top of cash prices which were already at near record highs.

#### *Why have prices increased by so much?*

There are some common factors and interactions between the trends illustrated here. This note gives an extremely brief outline of the reasons behind recent rises; more detail is given in the standard notes on [oil prices](#), [energy prices](#) and [petrol and diesel prices](#).

*Oil*- rising demand from rapidly industrialising countries coupled with a weak US dollar, poor returns on equities and speculation.

*Coal*- increasing demand internationally and in the UK from power suppliers in response to higher gas prices.

*Gas*- falling UK production means greater dependence on imports, contractual links between oil and gas prices in continental Europe.

*Electricity*- Closely connected to gas and coal prices as they produce the large majority of UK generation.

*Gas/electricity*- prices further increased by suppliers passing on the costs of the Renewables Obligation, EU Emissions Trading Scheme and the Carbon Emissions Reduction Target (domestic only).

### Direct impacts

Total domestic expenditure on gas and electricity was £12.3 billion in 2000 and reached £21.0 billion in 2007; a real increase of 41%. This was before the two rounds of price increases seen in 2008. Over the same period real increases in expenditure by the industrial and commercial sectors were 61% and 26% respectively.<sup>1</sup> Household expenditure on petrol and diesel increased by 1% between 2000 and 2007.<sup>2</sup> The earlier chart showed that prices were relatively high in 2000 and did not increase until late 2007.

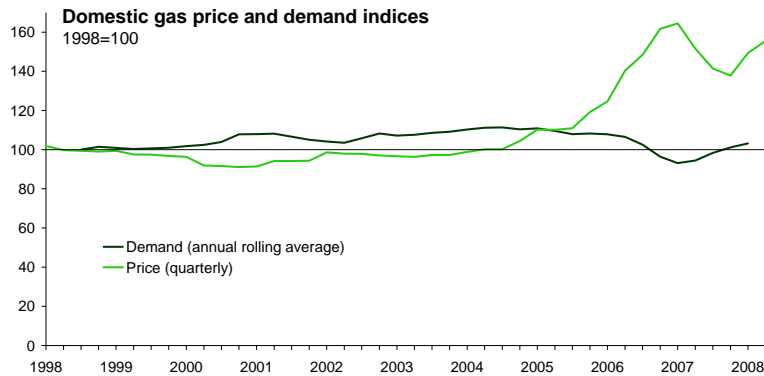
Increased fuel prices between 2004 and 2006 saw the estimated number of households in fuel poverty<sup>3</sup> across UK increase from 2.0 million to 3.5 million. The 2006 data has just been published. The Government has projected that price increases in 2007 and 2008 suggest an additional 0.7 million and 0.5 million households in fuel poverty in England alone. This would take the total number in England to around 3.5 million; nearly three times the number in 2003 and 2004.<sup>4</sup>

### Changes in demand

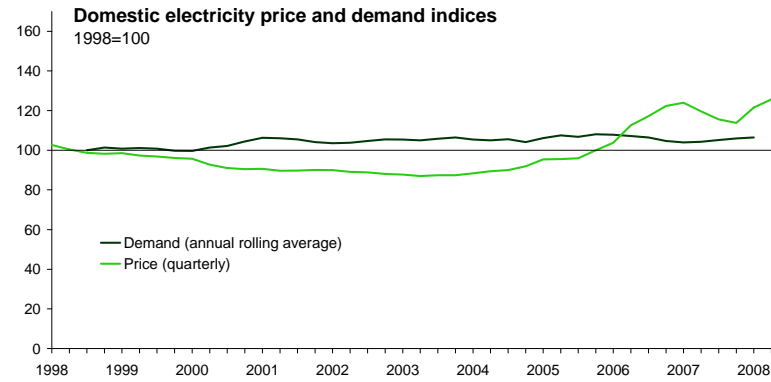
This section focuses on the period since 1998 and compares trends in prices with trends in demand. Again indices are used to compare changes.

*Domestic gas and electricity*

The chart below uses an annual rolling average of quarterly demand data to smooth seasonal variations and quarterly price data adjusted for inflation. The result is that price variations are not as marked as in the earlier charts.

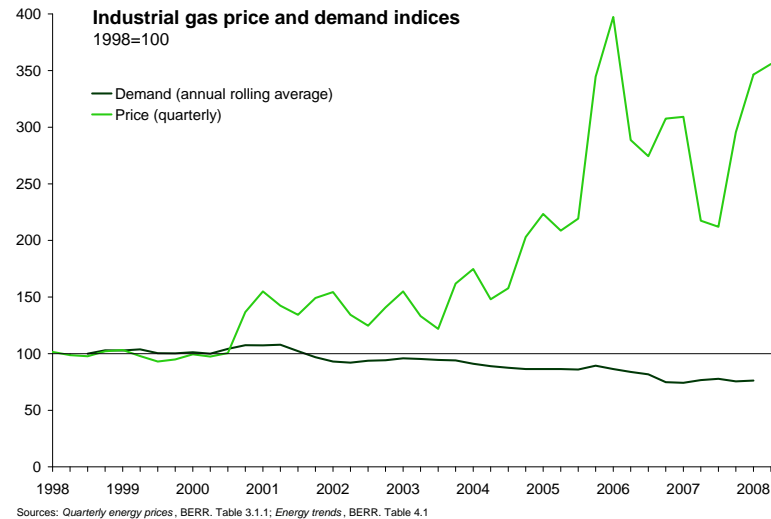


Domestic gas demand shows a pattern broadly similar to what one might expect –moving in the opposite direction to prices. Changes in demand have been much less than changes in price, again as one might expect. More importantly, demand has been less responsive to increases in prices –it is ‘sticky downwards’. For instance prices increased by just over 30% between the first quarters of 2006 and 2007 and demand fell by around 14%. Over the next year prices fell by 9%, but demand had increased back to nearly its first quarter 2006 level. The net result was a price increase of 20% and a fall in demand of 4%. This could in part be the result of an underlying increase in demand for gas. The response to prices over the next few quarters will give an indication of whether domestic demand is really falling, or just varying around a more or less static level.

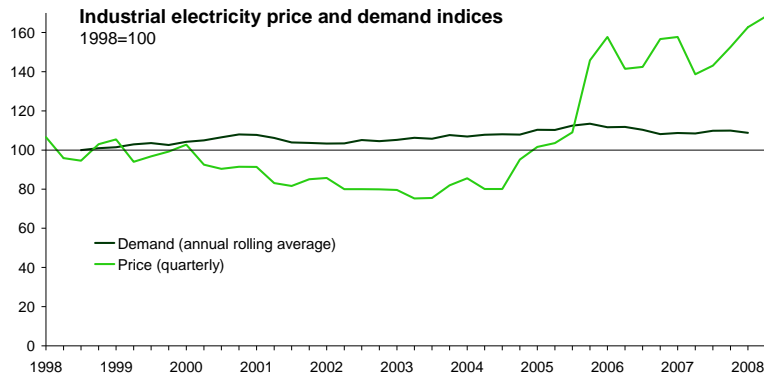


Again electricity demand has varied in the opposite direction to price, but the scale of changes was smaller than for gas. Consumption has been broadly static since 2001 despite a real increase in prices of 40%. The last time domestic demand fell for any length of time was the early 1980s<sup>5</sup> when the recession coincided with rising prices.

*Industry*



Use of gas by industry has shown signs of a more permanent shift in use. Price rises in 2001 saw demand fall by 10%. It fell by a similar amount around the time of another upward shift in prices in 2005. Demand fell again soon after the very sharp price spike of 2005/06 and subsequent high prices. Structural changes in UK industry mean that its overall energy consumption has been falling for some decades. However, this trend slowed from the 1990s and gas consumption increased up to 2000.<sup>6</sup>



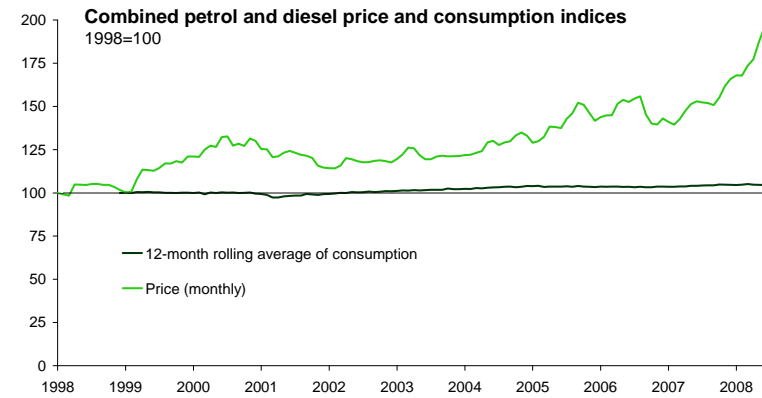
Sources: Quarterly energy prices, BERR, Table 3.1.1; Energy trends, BERR, Table 5.2

The underlying trend for industrial electricity use has been upwards since the mid-1990s. The chart above shows that the increase in prices (near doubling in the two years to the end of 2006) resulted in a fall in consumption during 2006. However, in the decade covered prices increased by around at the same time as demand increased around 9%.

One of the most obvious shifts in demand related to prices was in electricity generation. A drop in the price of coal in 2003, the rising price of gas from 2003 onwards, and particularly in winter 2005/06 made generation from coal more economically attractive. Between 2002 and 2006 gas used by power producers fell by 6% while coal use increased by 21%. Gas prices stabilised in 2007 and coal prices increased dramatically, the result was a 14% increase in gas use and an 8% fall in coal use.<sup>7</sup> The change in fuel mix between 2002 and 2006 was largely responsible for an increase in CO<sub>2</sub> emissions from power generation of 19 million tonnes, or 12%.<sup>8</sup>

*Transport*

Public attention on petrol and diesel prices was even greater than on gas and electricity prices up to summer 2008. Price rises have been greater than those of other fuels and they are more obvious –people fill up their cars more often than they pay energy bills and prices are advertised on every forecourt.



Sources: Quarterly energy prices, BERR, Table 4.1.1; Hydrocarbon oils bulletin, HMRC

The chart above shows very little change at all in consumption. The most obvious was the short lived fall in consumption at the time of the 2000 fuel protests. Consumption increased to the greatest extent when real prices were falling/static from 2001 to 2004. Since then there has been little or no change despite rising prices. Over the year to July 2008 prices increased by 31%, but consumption has only shown annual falls since April 2008. Data from the next few months will help to show whether fuel consumption is likely to resume its upward path

Analysis of road fuel consumption is complicated by the ongoing shift from petrol to diesel. One of the prime motivations behind this is the greater fuel efficiency of diesel vehicles. This shift has also meant that diesel has become more expensive over time. It is therefore important not just to look at declining petrol consumption and conclude this is down to recent price rises. Petrol consumption has been falling for more than a decade.<sup>9</sup>

Similarly one cannot simply conclude that the small recent decline in road fuel use means that people are driving less is due to prices. Total traffic levels have increased in each year since 1980. Greater fuel efficiency and the 'dieselisation' of the car fleet mean that traffic can increase while fuel remains static or even falls. Estimated traffic levels in the second quarter of 2008 were down by 0.6% on the same period from 2007,<sup>10</sup> which would suggest that record high prices are having some effect.

#### *Isolating the impact of price changes*

The data presented earlier compares price and demand. There are many other factors which can affect demand that need to be borne in mind. These include past trends in demand, the health of the economy, population growth, industrial change, technological change, energy efficiency measures/publicity and the weather. These and other factors will have an impact on demand that cannot be easily factored out. However, the recent price rises have been so large that we would expect some noticeable impact over and above the other influences.

#### **Summary**

Demand for different forms of energy has generally responded to recent changes in price in the expected direction -price up, demand down; price down, demand up. Changes in demand have been smaller than changes in prices –energy demand is price inelastic- as we might expect given the importance of energy use and the limited scope for substitution in most sectors in the short to medium term. 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. A lack of substitutes for electricity use is one likely cause for the small cuts in demand that have resulted from large price increases in the industrial and domestic sectors.

The transport sector has shown the smallest demand response, only the September 2000 fuel protests (where supplies were physically limited for a

period of time) and the recent run of record prices have resulted in any cuts in demand.

Why have there been such small cuts in demand when prices have been increasing for some years and reached record levels? There are a number of possible explanations:

- Within the domestic sector demand might have continued to increase without these price rises and hence the long-term trend has been changed and further larger falls can be expected in the future.
- People are absorbing the higher costs of energy while they can by cutting back on other areas of expenditure.
- In the short-term people are not able to make major energy efficiencies –buying a new car, new energy efficient appliances, a new boiler etc. – or major changes in the way they live. These are not every day events and people may wait and see what happens with prices.
- Prices have been creeping up for some years and most households have absorbed these, made minor changes and become used to them. The recent rises may have approached or passed a 'tipping point' which will result in many more households cutting back on energy use.
- Overall motoring costs have fallen in real terms from their 2000 level and increases in fuel costs over the past year have only increased total costs by a few percentage points.<sup>11</sup>

Data on use over the next six months and further into the future, particularly how households respond to gas/electricity price rises and falling road fuel costs, will give a better idea.

The impact of the credit crunch and resulting financial crisis will undoubtedly have an impact on demand. While the overall impact on demand is likely to be negative, it may also cut expenditure on energy efficiency measures that have a relatively high upfront cost.

#### **Implications**

Higher fuel prices may provide greater incentives to cut greenhouse gas emissions and reduce reliance on imported fossil fuels, but they have caused millions of additional households to move into fuel poverty, pushed

households already in fuel poverty into ‘extreme fuel poverty’<sup>12</sup> and increased the cost of heating, lighting and transport by billions of pounds.

The results set out above are far from conclusive, but so far they only show a sluggish response to price signals from the domestic sector. If this continues then the resulting scenario would be much greater fuel poverty, higher spending on energy and little impact on emissions. The Government does not set final energy prices –even road fuel duty is an imprecise policy instrument- but this scenario would have implications for policies on energy use (what incentives do people need to cut back on use?) and on fuel poverty, particularly how the two objectives can best be reconciled. An alternative scenario where a tipping point in demand has been reached and energy use declines noticeably raises questions around the impact on different types of household; what are the implications for those in fuel poverty? Are they being forced to cut back dangerously on heating? Are poorer people being priced out of certain forms of transport? Also what can be done to ensure that genuine efficiencies that people make in energy use are maintained in the long-term?

### Paul Bolton

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<sup>1</sup> *Digest of UK energy statistics 2008*, BERR. Table 1.7

<sup>2</sup> *Quarterly energy prices*, BERR. Table 2.6.2

<sup>3</sup> Households that need to spend more than 10% of their income on fuel

<sup>4</sup> *The UK fuel poverty strategy. 6<sup>th</sup> annual report 2008*, Defra/BERR

<sup>5</sup> *Digest of UK energy statistics*, BERR. Table 5.1.2

<sup>6</sup> *ibid.* Table 1.1.5

<sup>7</sup> *Energy trends*, BERR. Table 5.1 *Quarterly energy prices*, BERR. Table 3.2.1

<sup>8</sup> *e-Digest of Environmental Statistics*, climate change table 4a, Defra

<sup>9</sup> *Digest of UK energy statistics*, BERR. Table 3.1.2.

<sup>10</sup> *Road traffic and congestion in Great Britain: Q2 2008*, DfT

<sup>11</sup> ONS series CHAW and CHBK (all items RPI and motoring expenditure)

<sup>12</sup> Households that need to spend more than 20% of their income on fuel