

# Shaping Our Energy Future: The Cost of Energy

## 1. Introduction

The total average UK household energy bill in 2011 has been assessed as between £1,249 and £1,300 [1] [2] [3]. The wholesale cost of gas and electricity is estimated to account for around half of the average bill. The rest is made up of a variety of costs including, transmission, distribution, meter provision, tax, energy efficiency policies, renewables policies and the energy company's operating costs and profit [2] [3]. However, it is wholesale energy costs that are having the greatest impact on energy bills, as they are dependent on volatile global prices [2]. Figure 1 shows historical wholesale prices for coal, gas and oil. Figure 2 shows domestic direct debit gas and electricity prices for the period 1998 to 2011 for England & Wales and Scotland.

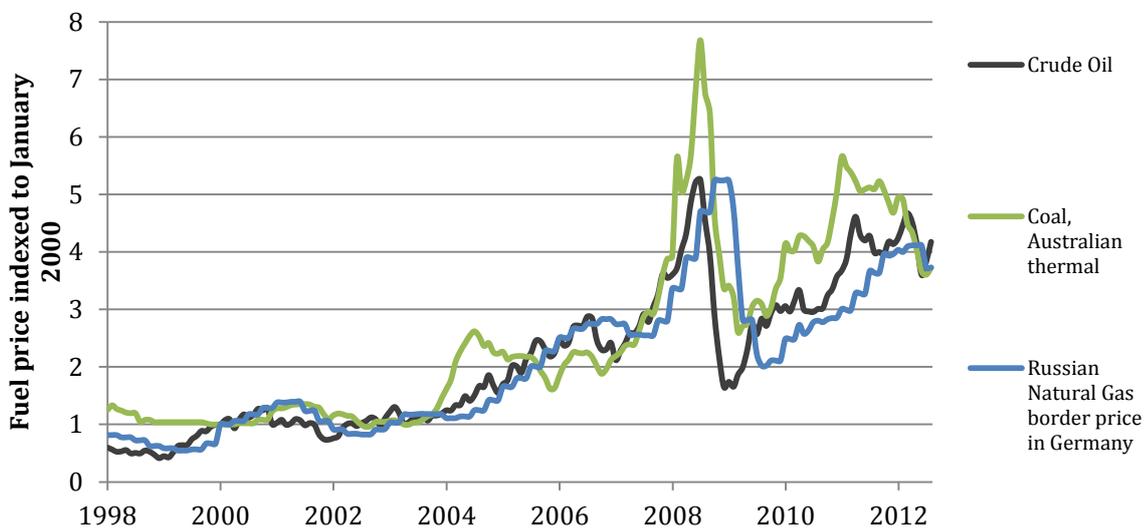


Figure 1. Crude oil, Australian thermal coal and Russian natural gas at the German border, monthly commodity prices indexed to January 2000 (source: Index Mundi, 2012 [4]).

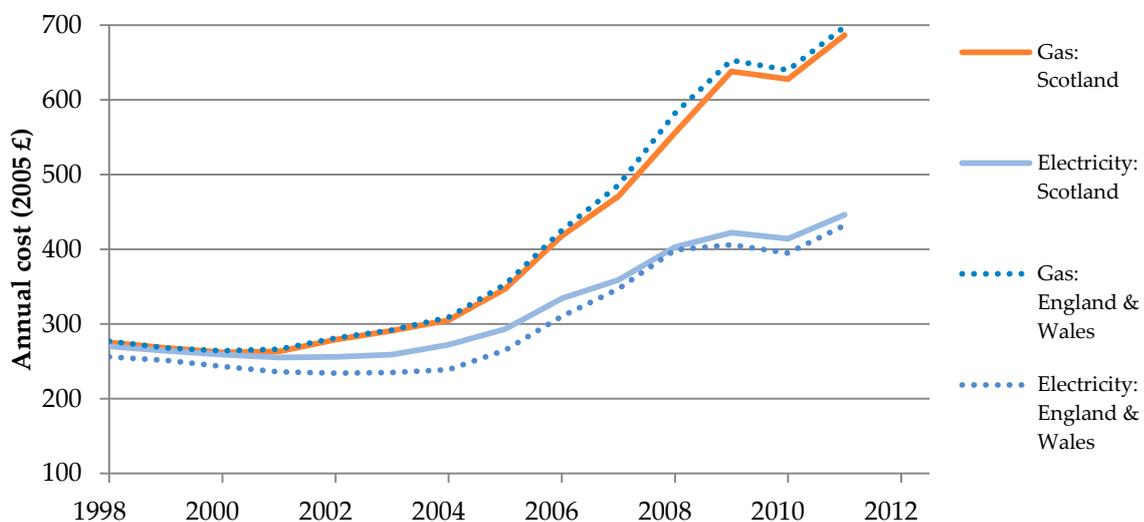


Figure 2. Annual domestic direct debit gas and electricity costs in 2005 terms assuming 18,000 kWh and 3,300 kWh used respectively (source: DECC, 2012 [5]).

## 2. The impact of energy efficiency and climate change policies

Energy efficiency and climate change policies currently make up an estimated 7% of total average domestic electricity and gas charges, according to DECC [1], while Ofgem estimated £100 or 8% [2]. Similarly, the environmental and social-supplier costs have been estimated by IPPR as £81, or 6% of the total energy bill [3]. This is made up of £49 to fund energy efficiency measures and £10 for the Warm Home Discount (a scheme to support low income households) with the remaining £22 going on subsidies for renewable energy, £19 via renewables obligation certificates and £3 via Feed-in Tariffs. DECC has highlighted that these policies also act to reduce prices by improving energy efficiency and through rebates. Accounting for these, DECC has calculated the current net effect of energy efficiency and climate change policies as an additional 2%, compared to the bills that would have existed without these policies [1].

Domestic energy prices increased significantly in the period 2004 to 2010 (see Figure 2). The average direct debit domestic gas and electricity bills in Scotland increased in real terms by approximately 77% and 31% respectively [6]. The Committee on Climate Change reported that the £455 average rise in bills over the period was around £290 (64%) from increases in wholesale costs. Around £75 of the rise was due to policies for investment in low carbon power generation (£30) and for energy efficiency improvements in homes (£45) [7]. In 2011 household electricity prices increased by around 16% and household gas prices by 25%, while the wholesale prices of electricity and gas were respectively around 23% and 38% higher [1]. Four of the UK's big six energy suppliers have announced further above-inflation price rises for winter 2012.

## 3. Electricity generation costs

Low carbon electricity generation plant such as nuclear or offshore wind typically has high upfront capital costs and low running costs, compared with unabated fossil fuel plant. Figure 3 shows an estimate of electricity generation cost by technology, broken down to show capital costs, operating costs and fuel costs.

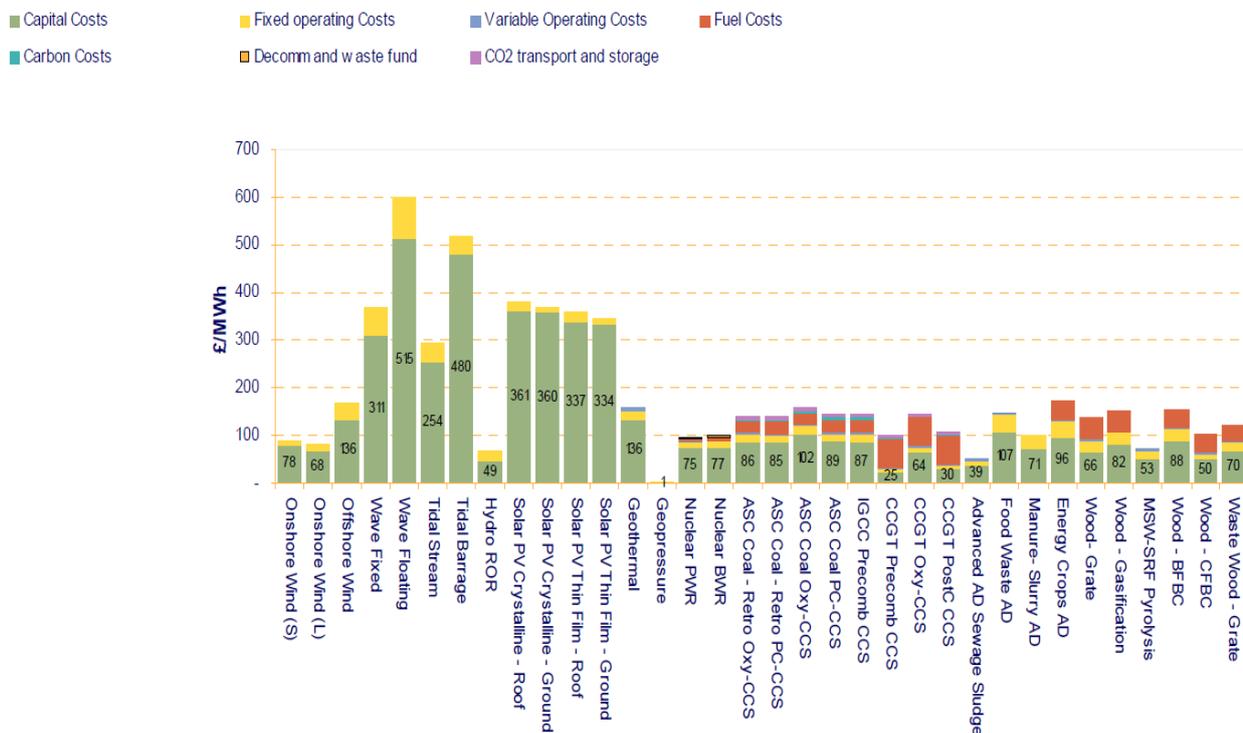


Figure 3. Electricity generation levelised costs in 2011, under base case assumptions (source: Mott MacDonald, 2011 [8]).

## 4. Future energy prices

### Oil prices

If, as many experts expect, global fossil fuel prices continue to rise over the medium and long term, then energy bills are likely to increase with or without energy efficiency and environmental policies. However there is no consensus on future fossil fuel prices. Figure 4 shows oil price predictions from a number of forecasters, as well as the historical price history. At 2030 the price predictions range from \$55/bbl to \$210/bbl. The predictions of coal and gas prices show a wide range of values, suggesting significant uncertainty.

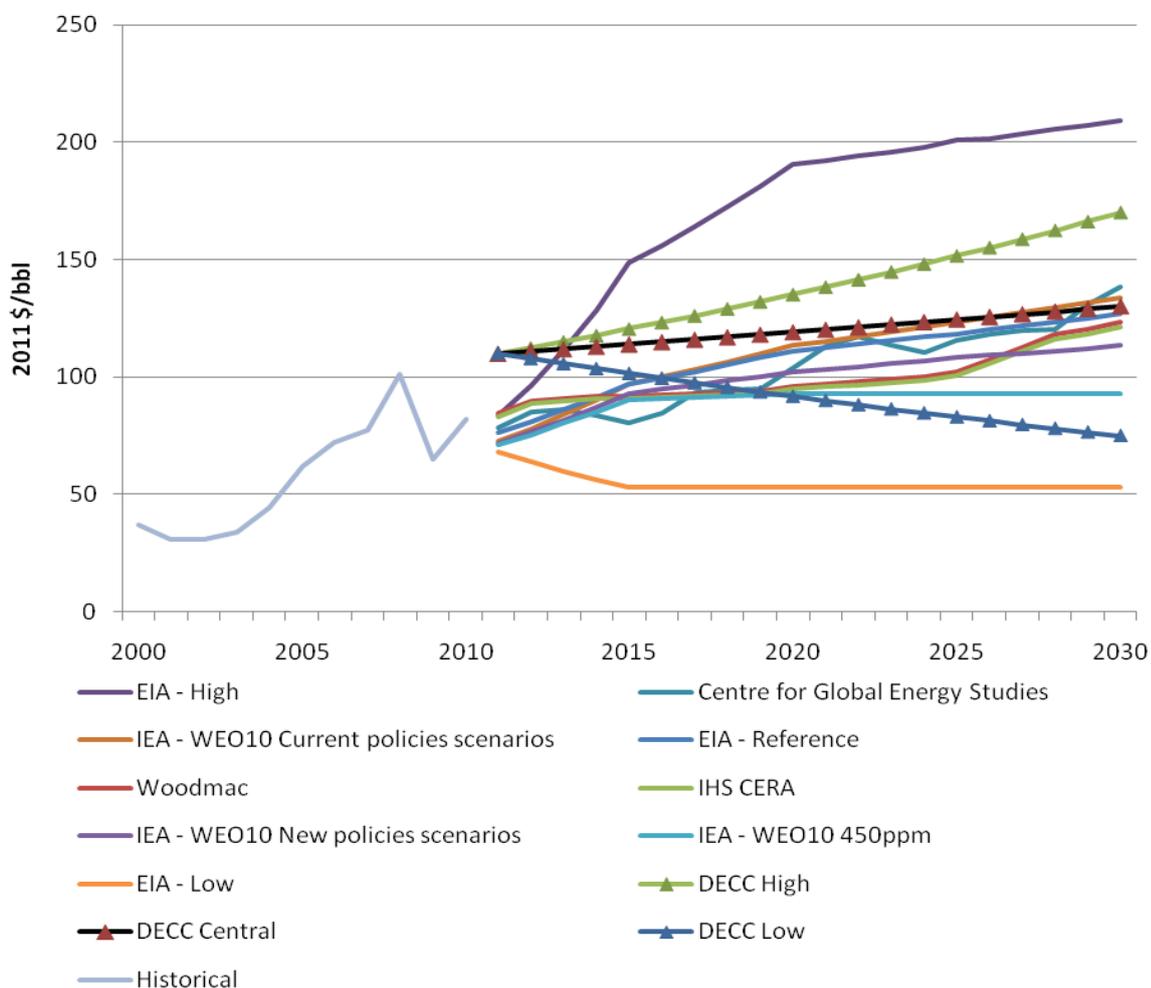


Figure 4. Comparison of oil prices, using historical data and predictions from a range of forecasters (source: DECC, 2011 [9]).

### Shale gas

Shale gas - natural gas trapped within formations of shale, fine-grained sedimentary rocks [10] - has transformed the US market in natural gas. Over the past decade, the combination of horizontal drilling and hydraulic fracturing has allowed economic access to large volumes of shale gas in the US [10]. As a result of the excess supply created, the price of natural gas in North America has fallen dramatically, to levels significantly lower than in Europe or Asia (see Figure 5). However due to factors including mineral-rights

law, and population density, shale-gas production is not expected to impact EU gas prices anywhere near as greatly as in the US [11] [12].

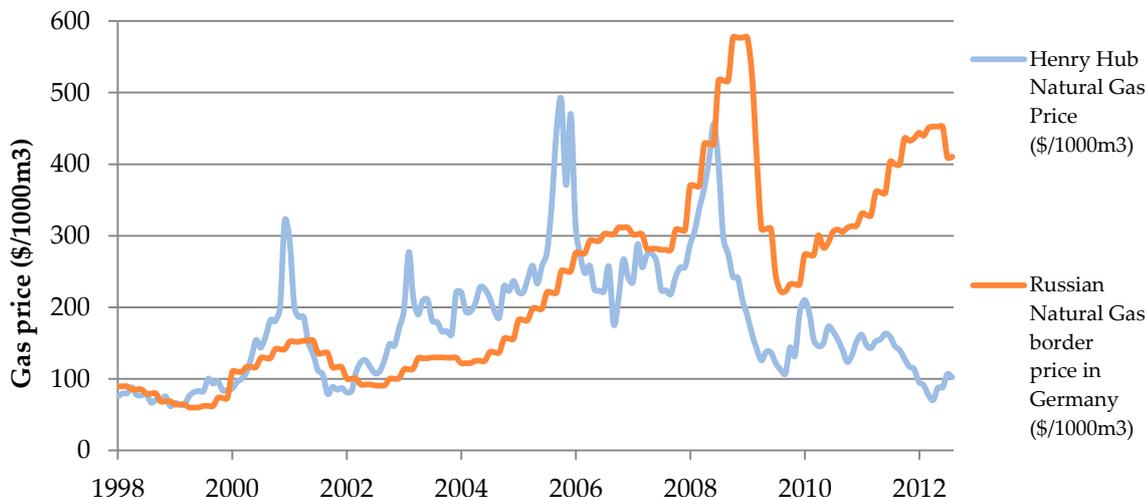


Figure 5. Comparison of US and European gas prices, respectively using Hendry Hub and Russian natural gas border price in Germany (source: Index Mundi, 2012 [4]).

### Future energy bills

Figure 6 shows DECC’s estimate of UK retail gas and electricity prices from 2011 to 2030 with the estimated impact of energy efficiency and climate policies. As already noted, UK energy and climate policies currently have a gross cost to consumers of approximately 7-8% and a net cost of about 2%. From 2013, DECC expects a net saving on average household energy bills, with a 7% reduction by 2020 compared to bills in the absence of these policies [1]. This is broken down as a gross cost of £280, offset by a £373 saving through increased energy efficiency and rebates. The IPPR approximation of energy bills in 2020 sees a modest rise, primarily driven by wholesale price increases [3].

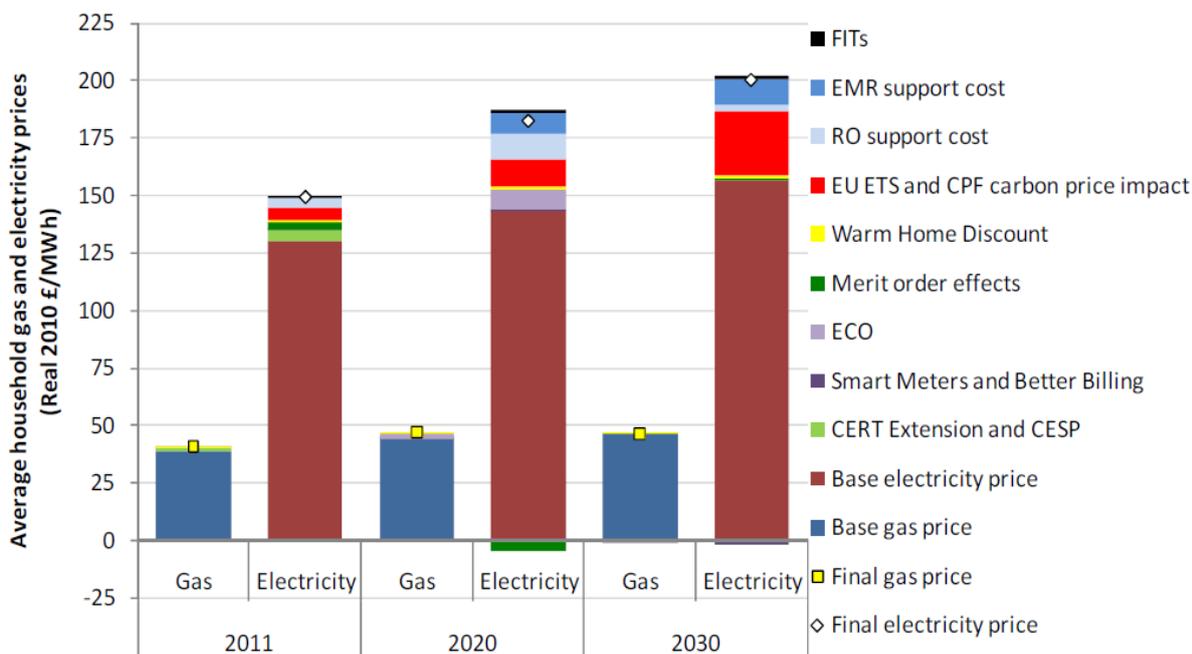


Figure 6. Estimated impact of energy efficiency and climate change policies on average retail gas and electricity prices paid by UK households (including VAT) (source: DECC, 2011 [1]).

## 5. Economic impact

Energy intensive industries are expected to have significantly higher cost of energy and climate policies per tonne of product in 2015 and 2020 compared to some countries outside the EU [13]. Some argue that such effects may make UK industry uncompetitive [14], whilst others suggest that investment in low carbon products and services is not incompatible with growth [15]. Indeed the CBI put a figure of £20 billion extra annual GDP and an almost £0.8 billion improvement in trade balance for the UK by developing the sector, already a £122 billion (or 8% of GDP) part of the economy [15]. More broadly the International Energy Agency suggested clean energy makes economic sense, with every additional dollar invested able to generate three dollars in future fuel savings by 2050 [16].

A BERR commissioned study reported that the value of Scotland's low carbon and environmental goods and services sector in 2007/8 was £8.49 billion (implying 7.5% of GVA [17]) and employed 73,000. Within which, £2.6 billion and 22,200 jobs were in the renewable energy sector [18]. The Scottish Government aims to increase the value of our low carbon goods and services sector to more than 10% of the Scottish economy by 2015, creating 60,000 green jobs [19] and perhaps supporting 130,000 jobs by 2020 [20]. Unfortunately official statistics on the employment and Gross Value Added (GVA) of the energy sector do not currently provide sufficient resolution to measure progress against these aims [6]. This is in part due to difficulties in accounting for organisations that cover a range of business activities and in including the impact on the wider supply chain [6]. Achieving Scotland's 2020 renewable energy targets has been estimated to be worth up to a £30 billion investment in Scotland, providing 40,000 jobs, with offshore wind alone generating up to £7 billion for the Scottish economy [21].

## 6. References

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