DEPARTMENT OF ENERGY & CLIMATE CHANGE

Estimated impacts of energy and climate change policies on energy prices and bills

November 2011

Contents

Ministerial Foreword by the Secretary of State

The move to a low-carbon economy is vital if we are to combat climate change, secure our energy supplies and seize the economic opportunities that green industries offer. Everyone has a role to play – individuals, communities, the public sector and businesses.

The Coalition Government is committed to ensuring that our policies are focused on keeping the lights on in the cheapest, cleanest way, to make sure that energy consumers get the best deal in the long term.

We are also committed to being open and transparent about the impacts of these policies. This document reflects our commitment to publish, each year alongside the Annual Energy Statement, the estimated cumulative impact of energy and climate change policies on energy prices and bills for households and businesses. It updates the analysis published last year, extends it to cover the impacts to 2030 and updates provisional analysis published on large energy intensive users.

It is important to recognise that recent energy prices rises have been driven by international factors, not Government policies. Nervousness in global markets and increased demand for gas and coal around the world are pushing up prices.

As this document sets out, policies currently only add around 2% on average to a typical household dual fuel bill. Looking to the future, policies are estimated to help households save money. A net saving on average from policies on household energy bills is expected from around 2013 and, over the remaining lifetime of this Parliament (2012-2015), households are estimated to be saving on average on their energy bills compared with what they would have had to pay if we did not pursue these policies. By 2020, households are estimated to be spending, on average, 7% less to heat and power their homes compared to what they would be paying in the absence of policies.

A number of policies take special account of the needs of low income households and enable more of the most vulnerable to heat their homes more affordably. These savings rely on households, supported by the Government, taking up measures that will help them reduce their energy use.

While the impact of policies is greater for businesses, most businesses will only see a very small increase in their total costs. On average, energy accounts for only around 3% of total manufacturing costs.

However, for a small but important section of business, energy constitutes a significant proportion of their total costs. While it is important that these industries play their part in the transition to a low-carbon economy, it is equally important that they remain competitive, and that the UK remains an attractive location for them.

Many of the policies are designed to help bring forward the levels of low-carbon energy investment which are required if the UK is to meet its future energy needs securely and affordably. These policies will also place the British economy at the leading edge of a new global low-carbon industrial transformation.

However, there would be no advantage – for the UK economy or for global efforts to curb emissions – in simply forcing businesses to relocate elsewhere. We are working on measures to support those industries who are most affected, which will be published by the end of the year.

We are also acting now to help keep energy bills down – for all consumers.

The new Warm Home Discount will require energy companies by law to give a discount on energy bills to more of their most vulnerable customers.

Cold Weather Payments of £25 per week – triggered by extended periods of cold weather – are also given to a defined group of means-tested vulnerable households. And the Winter Fuel Payment for winter 2011/12 is £200 for households with someone aged over 60, and £300 for households with someone aged 80 or over.

We have also told energy companies to increase the help they make available to people to insulate their homes and save money. A total of 3.5 million homes are set to benefit by December 2012 as a result.

Next year we will be rolling out the Green Deal to help even more households and businesses save money through a greater range of energy efficiency measures. The Green Deal is the first scheme of its kind in the world and will radically overhaul the energy efficiency of millions of homes and businesses across the UK.

We also want more choice for consumers to make it easier for them to identify and switch to the best deal. Both the Government and regulator Ofgem are working to boost transparency in billing to help consumers make sure they are on the best deal.

We have also taken a number of policy decisions that will help reduce the pressure on bills, including the decision to fund the Renewable Heat Incentive from general taxation rather than through a levy on fossil fuel suppliers, and to consider alternative funding options instead of a levy for Carbon Capture and Storage.

Our proposals on Electricity Market Reform will provide a more cost-effective means of decarbonising electricity supplies and keeping the lights on. Finally, we also made the decision to raise the discount on the Climate Change Levy on electricity from 2013 for users covered by Climate Change Agreements from 65% to 80%.

It is important not to lose sight of our objective. 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 policies. But without the policies we are introducing, energy bills would be higher for most households and businesses. Our energy supplies would be more dependent on imports, more vulnerable to volatility in global fossil fuel prices, and there would be a far higher chance of costly blackouts.

We would also run the risk of exacerbating climate change. As recent reports from the United Nations Environment Programme and the International Energy Agency have made clear, we are running out of time to bring global carbon emissions under control. The Government is continuing to argue for a binding global deal to limit emissions; but in the meantime, we must do everything we can to cut carbon out of our own economy. By focusing on energy efficiency and low-carbon generation, we can play our part in the fight against dangerous climate change. If we do not act soon, our climate will destabilise further, bringing increased risk of disaster, conflict and disease.

That is a price that no-one should have to pay.

Estimated impacts of energy and climate change policies on energy prices and bills

Executive Summary

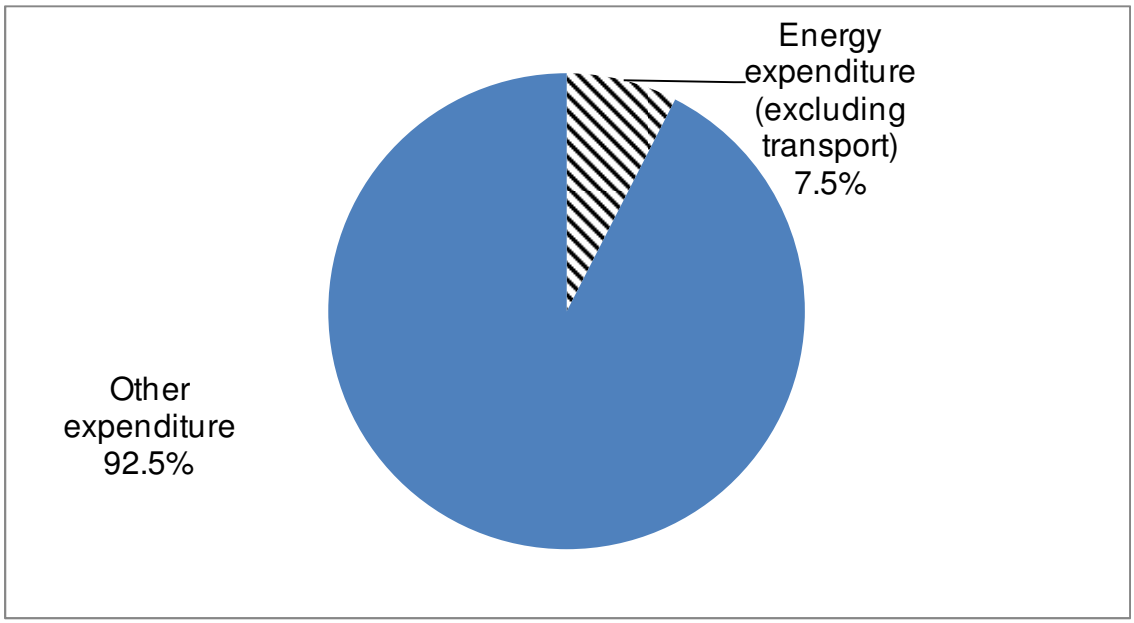
1. All six of the largest energy suppliers have implemented a second round of price increases this year starting between 1 August 2011 and 10 November 2011. This means household electricity prices will have increased by around 16% and household gas prices by 25% over the whole of 2011. These increases have been mainly driven by rising wholesale energy costs, which make up around half of a household energy bill (more for business bills) – UK wholesale gas prices have risen by nearly 40% over the last year. The costs of energy and climate change policies are estimated to make up around 7% of the average household energy bill – not accounting for the energy they help people save.

2. These policies – designed to deliver low-carbon, secure and affordable energy supplies, help households and businesses save energy and support low income and vulnerable consumers – will have an impact on energy consumers across the UK. The impact on households and businesses will be through changes in prices for goods and services and changing patterns of consumption, in particular for energy. This publication focuses on the impact of policies on energy (electricity and gas) prices and bills. It updates and extends analysis published in July 2010.[1]

3. Expenditure on energy (excluding transport) currently represents around 7.5%, on average, of total household expenditure[2] (see Chart 1) while for most businesses it represents a small proportion of total costs. For example, in 2009 purchases of energy and water accounted for around 2.7% of total costs for the UK manufacturing sector. This means that a 10% rise in direct energy costs increases total costs by just 0.27%. In contrast employment costs represented around 20% of total manufacturing sector costs in 2009 (see Chart 2).[3]

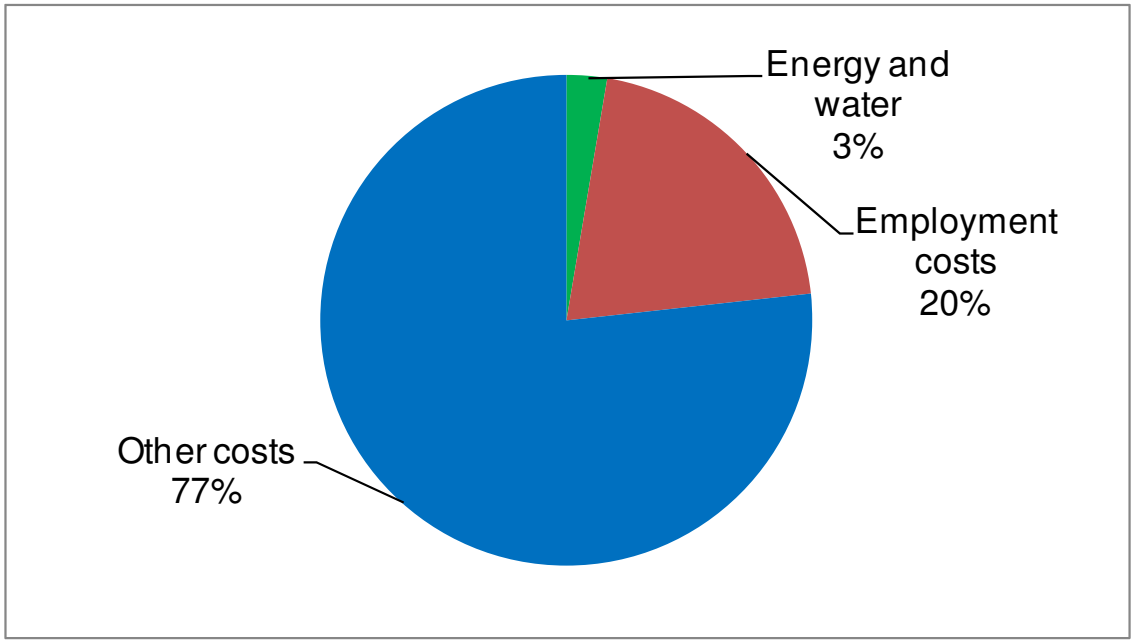
[1] Available online at: http://www.decc.gov.uk/media/viewfile.ashx?filetype=4&filepath=What%20we%20do/UK%20energy%20supply/236-impacts-energy-climate-change-policies.pdf.
[2] DECC analysis for 2011 based on Living Costs and Food survey.
[3] DECC analysis based on Annual Business Survey data for 2009.

Chart 1: Average energy expenditure (excluding transport) as share of total household expenditure in 2011



Source: DECC analysis for 2011 based on Living Costs and Food Survey data.

Chart 2: Energy costs as share of total costs in the UK manufacturing sector in 2009



Source: Annual Business Survey data for 2009. Energy costs are estimated to represent approximately 95% of energy and water costs.

4. There are three main routes through which policies can impact (either positively or negatively) the amount households and businesses pay for energy, with some policies impacting via more than one route:

    - **Wholesale energy costs**, by changing the costs of producing energy: for example, the EU Emissions Trading System (EU ETS) and Carbon Price Floor (CPF) increase the costs of generating electricity from fossil fuels, whereas the Renewables Obligation (RO) puts downward pressure on wholesale electricity prices by incentivising investment in low marginal-cost generating technologies;

    - **Retail energy costs**, by changing the costs of supplying energy to final customers: for example, the RO imposes costs on retail electricity suppliers, reflecting the amount required to support renewable technologies, whereas Smart Meters are expected to reduce supply costs for retail energy suppliers in the longer-term; and

    - **Energy use**, by changing behaviour and/or the amount of energy needed to provide a particular energy service (e.g. heating, power, etc): for example, EU minimum standards for product energy efficiency (Products Policy) improve the energy efficiency of appliances used by households (e.g. TVs, fridges, etc) and businesses (e.g. electric motors, lighting, etc), while Smart Meters are expected to encourage more energy efficient behaviour.

5. Table 1 summarises the estimated cumulative impact of energy and climate change policies on average energy (gas plus electricity) bills for households, medium-sized business and large energy intensive industrial users in 2011, 2020 and 2030 compared with what these bills would be in each year in the absence of policies.

Table 1: Estimated impact of energy and climate change policies on average energy (gas plus electricity) bills compared with bills in the absence of policies

Real 2010 prices	2011	2020	2030
Household[4]			
Bill without policies	£1,229	£1,379	£1,474
Bill with policies	£1,249	£1,285	£1,427
Impact of policies	£19 (2%)	-£94 (-7%)	-£46 (-3%)
Medium-sized business user[5]			
Bill without policies	£1,550,000	£1,738,000	£1,829,000
Bill with policies	£1,821,000	£2,073,000	£2,337,000
Impact of policies	£271,000 (18%)	£335,000 (19%)	£508,000 (28%)
Large energy intensive industrial user[6]			
Bill without policies	£8.2 to 15.6m	£9.3 to 17.4m	£9.7 to 18.0m
Bill with policies	£8.4 to 17.5m	£9.4 to 20.9m	£10.8 to 24.1m
Impact of policies	£0.3 to 1.9m (3 to 12%)	£0.2 to 3.5m (2 to 20%)	£1.1 to 6.1m (11 to 34%)

Source: DECC 2011. Figures may not add due to rounding.
For price impacts and individual gas and electricity bill impacts, please refer to Tables 2, 3 and 4.

6. The key conclusions of the analysis in this report are:

Households

i. Recent increases in energy bills have been largely driven by rising international prices for fossil fuels, particularly gas, and not by energy and climate change policies;

ii. Energy bills are likely to continue on an upward trend over time, with or without policies, as a result of rising fossil fuel prices and network costs;

[4] An average household energy user is defined by annual baseline (before the impact of policies) consumption of 16.6MWh of gas and 4.5MWh of electricity. The "With policies" bills are net of average Warm Home Discount rebates.
[5] A medium-sized business user is defined by an annual consumption of between 2,778 and 27,777MWh of gas and between 2,000 and 19,999MWh of electricity. The midpoints of these ranges have been used for this analysis. Figures to the nearest £1,000.
[6] Energy intensive users are defined as those in sectors covered by Climate Change Agreements. Energy intensive industries include a number of extraction, manufacturing, processing and finishing industries across a range of sectors, for example, iron & steel, aluminium, refineries, chemicals, plastics, food and drink, glass, paper, cement and lime, ceramics and textiles. The energy bills for these users are based on a range of three different mixes of gas and electricity consumption: 160,000MWh gas and 40,000MWh electricity, 100,000MWh each of gas and electricity and 40,000MWh gas and 160,000MWh of electricity. Figures to the nearest £0.1m.

iii. Wholesale gas and electricity costs represent around £600 (48%) of an average household energy bill (before any rebates) in the UK in 2011.[7] The wholesale prices of gas and electricity for delivery in winter 2011/12 are around 38% and 23% higher respectively compared with the prices of gas and electricity for delivery in winter 2010/11;[8]

iv. By contrast, Government policies are estimated to represent around £89 (7%) of an average household energy bill (before any rebates) in the UK in 2011. However, accounting for improvements in energy efficiency as a result of policies and the receipt by eligible households of a Warm Home Discount rebate, energy and climate change policies are estimated to be adding just 2% on average to household energy bills in the UK in 2011 (compared to bills in the absence of these policies);

v. A net saving on average from policies on household energy bills is expected from around 2013 and, over the remaining lifetime of this Parliament (2012-2015), households are estimated to be saving on their energy bills compared with what they would have had to pay if we did not pursue these policies;

vi. By 2020 households will, on average, save £94 (7%) on their energy bills compared to what they would have paid in the absence of policies. The impact of policies in helping people to save energy, or use it more efficiently, is expected to more than offset the impact that policies delivering low carbon investment will have on energy prices;

vii. The estimated impact of policies on household and business energy bills has fallen since the previous analysis DECC published in July 2010. This reflects, among other things, the Coalition Government's proposals on Electricity Market Reform (EMR), the Green Deal and proposed new cost-effective levels of support for large-scale renewable electricity and the decision to make a £40 million saving in 2014/15 on spending for the small-scale Feed-in-Tariffs (FITs) scheme and the decisions to fund the Renewable Heat Incentive (RHI) from general taxation rather than through a levy on fossil fuel suppliers and to consider several alternative funding options for the Government's CCS commitments rather than through their own levy;

viii. In the absence of mitigation policies, poorer households are typically hit hardest by rises in energy prices. Expenditure on energy generally represents a larger share of total expenditure for low income households. However, policies such as the Warm Home Discount (WHD) and part of the Energy Company Obligation (ECO) are targeted at low income and vulnerable households enabling more of the most vulnerable to heat their homes more affordably and to a more adequate level. As a result, average

[7] Based on an after policy consumption of 16.2MWh of gas and 4.0MWh of electricity.
[8] Source: ICIS Heren and Marex Spectron. Based on the average price over the period October 2010 and September 2011 of gas and electricity contracts for delivery in Winter 11/12 compared with the average price over the period October 2009 to September 2010 of gas and electricity contracts for delivery in Winter 10/11.

energy bills for the poorest 30% of households are expected to be 7% lower as a result of policies in 2020, compared to in the absence of policies;

ix. The UK ranks well internationally for household energy prices. When compared to the EU 15, UK households have faced the lowest domestic gas prices for the last three years (2008-2010) and third or fourth lowest electricity prices for the past two years;

Businesses

x. The impact of policies on energy bills for businesses is typically larger than households because households are supported by a greater number of energy efficiency policies than are available to the business sector. For most businesses, however, direct energy costs are a relatively small proportion of total costs.

xi. Businesses that are medium-sized consumers of energy currently face energy bills that are on average 18% higher as a result of policies. By 2020 the impact of policies is estimated to be 19%;

xii. Businesses that are large energy intensive users – where energy costs represent a significant proportion of their total operating costs – directly account for around 4% of gross value added (GVA) in the UK.[9] Such users face varying impacts depending on, among other things, their mixture of gas and electricity use, the extent to which they consume on-site generated electricity (exempt from a number of policy costs, such as the RO) and their ability to use their buying power to negotiate lower prices. Policies are estimated to be adding between 3 and 12% to energy bills for these users in 2011 and between 2 and 20% in 2020;

xiii. The Government has committed that, before the end of the year, it will announce a package of measures for those energy intensive industries for which the impact of Government policies on the cost of electricity will put their international competitiveness most at risk;

xiv. Average UK gas prices for all sizes of industrial users have been the lowest in the EU 15 since mid-2009. UK electricity prices have historically been similar to the EU 15 median for medium, large and extra-large industrial users;

xv. If fossil fuel prices rise faster and further than DECC's central projection, the impact of policies on businesses will be reduced (and the benefits for households increased) as Government policies help to shield energy consumers from rising fossil fuel prices. However, if fossil fuel prices fall, then the benefits of policies would be less and the costs greater.

[9] Source: BIS. Based on data for 2008.

1. Introduction

7. The Government is committed to ensuring that the transformation to a low-carbon economy happens, whilst delivering secure energy supplies, at least cost to energy consumers. It is also committed to being open and transparent about the impacts of energy and climate change policies.

8. Global fossil fuel prices (particularly gas prices) are the main drivers of retail energy prices in the UK (and elsewhere) and if, as expected, they continue to rise over the coming years, energy bills will likely continue on an upward trend with or without policies. Moreover, were the UK to do nothing, our energy supplies would become much more dependent on imports, more vulnerable to volatility in global fossil fuel prices, and there would be a far higher chance of costly and disruptive blackouts.

9. However, the Government recognises that energy and climate change policies can potentially have distributional impacts,[10] particularly concerning the most vulnerable households and the most energy intensive businesses.

10. Helping low-income and vulnerable households keep warm and tackling fuel poverty is a priority for the Government. Current action to help some of the poorest and most vulnerable keep warm at an affordable cost includes:

    - Improving the energy efficiency of homes through the delivery of heating systems and insulation through Warm Front, the Community Energy Saving Programme (CESP) and the Priority and Super Priority Groups[11] of the Carbon Emissions Reduction Target (CERT);

    - Requiring energy suppliers to provide up to £1.1bn worth of support on energy bills through the Warm Home Discount (WHD) scheme, which is expected to help around 2 million households per year;

    - The Green Deal and Energy Company Obligation (ECO), which will consult on options to improve the thermal performance of the homes, including those of low-income and vulnerable households.

11. For most businesses, energy costs only represent a small proportion of their total costs. Business users of energy in the UK have faced the lowest gas prices, on average, in the EU 15 over the past few years and electricity prices that are around the EU 15 median.[12] While energy and climate change policies will add to UK energy prices going forward, this is also likely to apply to businesses in

[10] i.e. have different impacts across different households or businesses, e.g. with different incomes, composition of the household, between those that do and do not take up measures and across sectors which face different levels of international competition, etc.
[11] Suppliers are required to meet 40% of their total CERT target by delivering measures to a 'Priority Group' of vulnerable and low-income households, including those in receipt of eligible benefits and pensioners over the age of 70. In addition, they are required to meet15% of the savings by delivering measures to a subset of low income households (a Super Priority Group) considered to be at high risk of fuel poverty.
[12] *DECC Quarterly Energy Prices*, June 2011, based on *Eurostat Statistics in Focus: Electricity Prices for EU Industry*, July-December 2010. Available online at: http://www.decc.gov.uk/en/content/cms/statistics/publications/prices/prices.aspx.

other EU countries and, through policies like the Green Deal, the Government is providing help for UK businesses to become more energy efficient – helping to save them energy.

12. For a small but important section of business, known as energy intensive industries, energy costs constitute a significant proportion of their total costs. In 2008, energy intensive industries directly accounted for around 4% of total gross value added in the UK and just over 2% of the workforce – though they also create indirect value and employment down the product supply chain. While it is important that these industries play their part in the transition to a low-carbon economy it is equally important that they remain competitive and that the UK remains an attractive location for them. There would be no advantage – both for the UK economy and in terms of global emissions reductions – in simply forcing UK businesses to relocate to other countries. Recognising this, the Government has committed that, before the end of the year, it will announce a package of measures for those energy intensive industries for which the impact of Government policies on the cost of electricity will put their international competitiveness most at risk.

Contents and structure of the document

13. This analytical paper sets out DECC's latest assessment of the impact of energy and climate change policies on gas and electricity prices and bills. It updates analysis that was previously published alongside the Annual Energy Statement in July 2010 and provisional analysis for large energy intensive users published in July 2011.[13] Updates will be published alongside future Annual Energy Statements.

14. The estimated changes in energy bills over time presented in this paper are a reasonable assessment of the trends over the period given the assumptions about future fossil fuel prices and changes in consumption driven by energy and climate change policies. In reality, however, other factors will also drive changes in energy bills (largely through consumption), most notably annual changes in weather. For the purpose of this analysis, the impacts of these other factors have not been captured in our energy bills estimates in order to focus on how energy and climate change policies will impact energy bills.[14]

15. The impacts of policies on energy prices and bills are presented as the difference between the average price or bill in a given year compared with what that price or bill would have been in the same year if the policies under assessment had never been in place (the "baseline"). This is different to a baseline scenario where policies were stopped in a given year. This is because, for example, support under the RO to existing stations is grandfathered, i.e. the rate of support per MWh is committed for existing stations under the RO for the operating lifetime of the power station or 20 years, whichever is shorter. As

[13] Both available online at: http://www.decc.gov.uk/en/content/cms/about/ec_social_res/analytic_projs/price_bill_imp/price_bill_imp.aspx.
[14] As such, baseline (before policies) energy consumption for all illustrative users in this document remains flat over time.

such, even if the RO were stopped today, RO costs will still need to be incurred. Similarly, policies such as CERT and its predecessors have already delivered a number of insulation measures to households which are expected to continue to deliver efficiency savings until the end of their technological lifecycle.

16. The analysis within this document is not a complete view of the impacts of energy and climate change policies on consumers. Energy and climate change policies are likely to have other costs and benefits that will impact energy consumers outside their electricity and gas bills. For example, some consumers will receive additional benefits, such as receipt of payments through the Renewable Heat Incentive (RHI) and small-scale Feed-in-Tariff (FIT) schemes and some businesses receive a free allocation of carbon allowances under the EU Emissions Trading System (EU ETS).

17. But there will also be other costs. For example, there will be an increased cost of appliances due to changes in energy efficiency standards, costs of achieving targets agreed under Climate Change Agreements (CCAs) and costs of purchasing carbon allowances to cover direct emissions under the EU ETS.

18. The results presented in this document are based on analysis of policies and proposals put forward by the previous Government as well as changes to these policies and new policies announced by the current Government. Only those policies already in place or that have been planned to a sufficient degree of detail (i.e. with quantified estimates of costs and benefits) have been included in the modelling.

19. The structure of this document is as follows:

- Section 2 “Trends and drivers” sets the context by presenting the recent trends in retail energy prices and the historic and expected future trends in wholesale energy prices, which are likely to remain the key drivers of retail energy prices in the UK;

- Section 3 “Methodology and policies covered” presents the key changes to the policy landscape since the July 2010 published analysis and provides a high-level description of the methodology used;

- Section 4 “Household energy prices and bills” focuses on the household sector, providing an international comparison of household energy prices, a breakdown of an average household gas and electricity bill in 2011 and presenting the estimated impacts of policies on household energy bills to 2030, including across the household distribution in 2020;

- Section 5 “Business energy prices and bills” focuses on the business sector, providing an international comparison of business energy prices and presenting the estimated impacts of policies on the energy bills faced by medium-sized business users and large energy intensive industrial users to 2030;

- Section 6 "Sensitivity analysis around fossil fuel prices" considers how different assumptions surrounding future trends in global fossil fuel prices might affect the results of the previous sections.

- Annexes A-H present the key assumptions for fossil fuel prices used for this analysis, further detail on the modelling methodology and more detailed results from the analysis summarised in the main sections of the document.

2. Trends and drivers

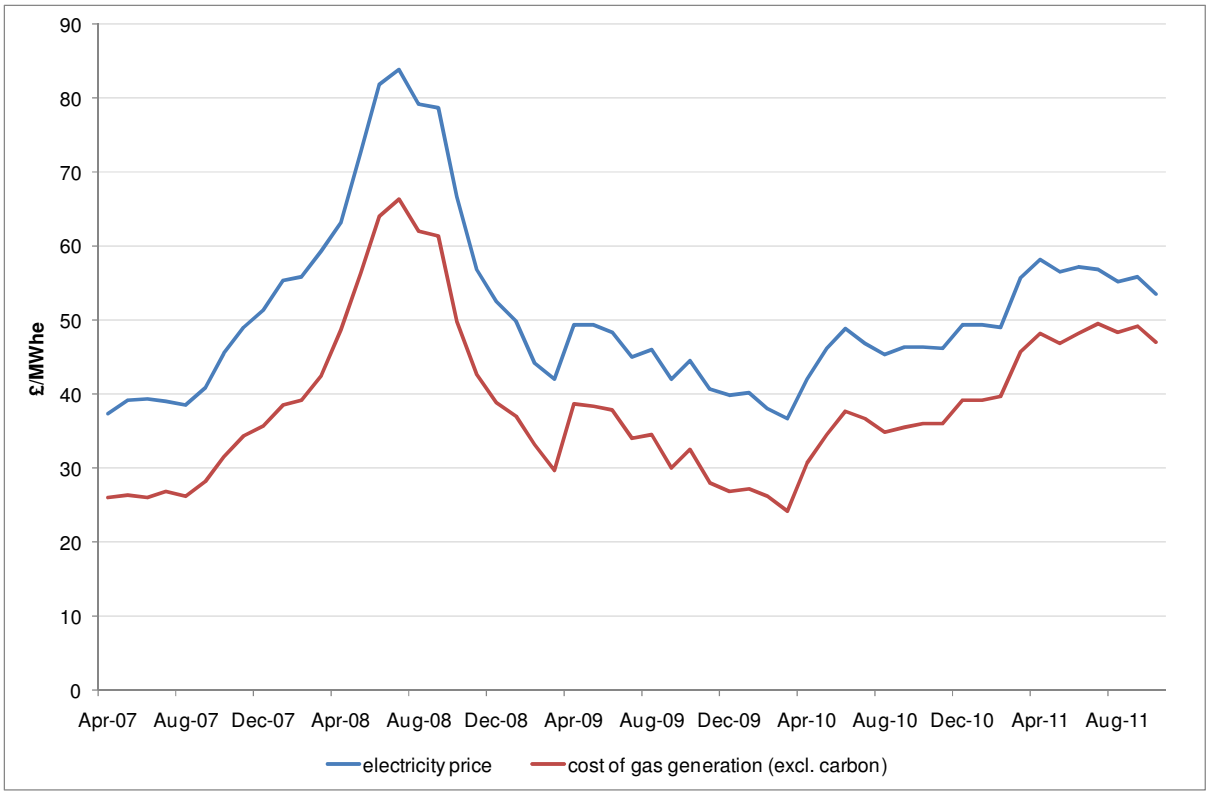
20. All six of the largest energy suppliers have implemented a second round of price increases this year starting between 1 August 2011 and 10 November 2011. Including the first round of price increases implemented earlier in the year, this means household electricity prices will have increased by around 16% and household gas prices by 25% on average over the whole of 2011.[15] These increases have been mainly driven by rising wholesale energy costs, which make up around half of a household energy bill (more for business bills). The wholesale prices of gas and electricity for delivery in winter 2011/12 are around 38% and 23% higher respectively compared with the prices of gas and electricity for delivery in winter 2010/11.[16]

21. Whilst wholesale prices are not at levels similar to their peak in 2008, retail prices will exceed their 2008 peak. This is because other aspects of retail prices have increased since 2008. The cost of transporting electricity and gas to consumers has increased by around 20% since 2008 as assets installed in the 1950s and 60s have been replaced and additional capacity built where use of gas and electricity networks is growing. The costs of environmental and social programmes (such as CERT and the RO), which currently account for around 7% of the average household energy bill before any rebates (see Section 4.2) have increased slightly – contributing to around 5-10% of the total increase in energy prices in 2011[17] – but have also helped people to save energy.

22. Chart 3 compares "April Annual"[18] wholesale electricity prices with the variable costs of gas generation (excluding carbon costs; based on the NBP[19] price for delivery in the forward financial year). In general, electricity prices have moved with gas prices over time. This is because, in the GB wholesale electricity market, the marginal (price-setting) plant is usually a gas generator, which can pass through any changes in gas or carbon prices to the electricity price.

[15] Price increases weighted by market share
[16] Source: ICIS Heren and Marex Spectron. Based on the average price over the period October 2010 and September 2011 of gas and electricity contracts for delivery in Winter 11/12 compared with the average price over the period October 2009 to September 2010 of gas and electricity contracts for delivery in Winter 10/11.
[17] Based on the estimated unit increase in policy costs as a share of the total increase in energy prices, weighted by relative gas and electricity demand for the average household. The remaining 90-95% of the increase will have been driven largely by rising wholesale and network costs.
[18] Price in a given period for electricity to be delivered in the forward financial year.
[19] National Balancing Point – the UK's virtual natural gas trading hub.

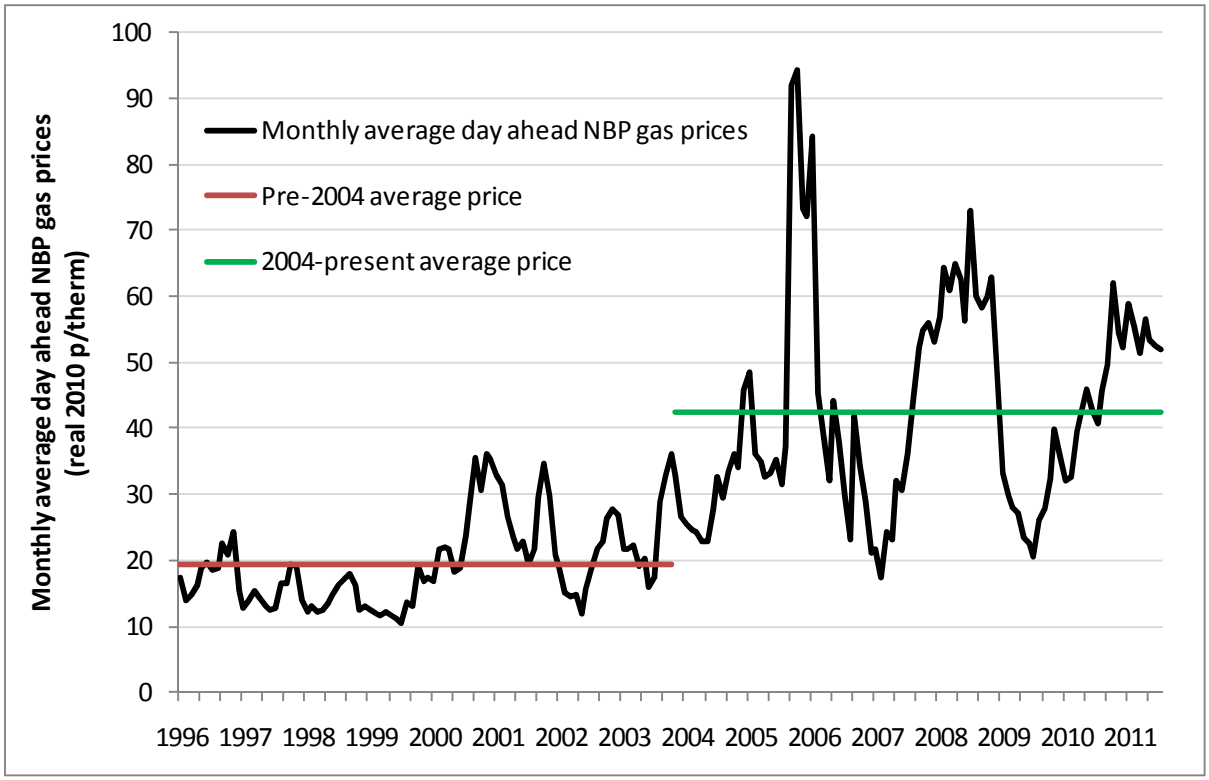
Chart 3: Forward (April Annual) baseload electricity prices and gas costs of generation (monthly averages)



Source: Marex Spectron, ICIS Heren. Note: Costs of generation based on 49.13% efficient gas plant.

23. Since wholesale costs represent the largest proportion of retail gas and electricity prices for energy consumers in the UK, sustained movements in international prices for fossil fuels will therefore be a key factor influencing retail gas and electricity prices going forward. Chart 4 presents monthly wholesale gas prices, in real 2010 prices, from 1996 to present and demonstrates both the volatility of wholesale gas prices and the rising trend.

Chart 4: Wholesale gas prices, 1996 to present



Source: Heren (converted by DECC to real terms using the UK GDP deflator)

24. A key factor to explain the increase in UK gas prices since competition was introduced in 1996 is the significant rise in oil prices. The physical interconnection provided by the IUK[20] and BBL[21] pipelines links the UK with continental gas markets where gas contracts are priced against the price of oil products. This means that gas prices in the UK are also heavily influenced by oil prices. The UK market's exposure to oil-indexed pricing has intensified as UK Continental Shelf gas production has declined over time, and imports have grown as a share of total supplies. Chart 4 illustrates the changing trend towards higher prices after the UK became a net importer of gas in 2004. Policies which help decarbonise the UK's energy supplies (such as the Renewables Obligation (RO)) will therefore reduce the vulnerability of UK energy prices to movements in fossil fuel prices but will add costs to retail prices in the short- to medium-term.

25. More recently, there has been a weakening of the oil-gas price link. This has been driven by factors such as the expansion of global markets in Liquefied Natural Gas (LNG), the rapid increase in US production of unconventional gas and the reduction in global gas demand that followed the global recession. In combination, these factors led the International Energy Agency (IEA) to state in its 2010 World Energy Outlook that a "sizeable glut of global gas-supply capacity has developed".

[20] Interconnector UK gas pipeline linking the Bacton gas terminal in England with the Zeebrugge terminal in Belgium.
[21] Gas pipeline linking the Bacton terminal in England to the Balgzand terminal in the Netherlands.

26. Future wholesale gas prices in the UK are likely to be influenced by expected rising oil prices via the transmission mechanism described, the rate of investment in supply-side infrastructure and the prospect of liberalisation in neighbouring European markets. DECC published a range of scenarios reflecting the inherent uncertainties in projecting long-term price movements[22] and these are presented in Annex A. DECC's central gas price scenario assumes a re-linking of gas to oil-indexed prices in the short-term as the 'gas glut' erodes. However, with liberalisation, and the bringing forward of further gas supply projects, it is assumed that from 2017 the oil-linkage begins to weaken significantly and that the gas price plateaus at 68p/therm (real 2010 prices).

3. Methodology and policies covered

27. The results presented in this document are based on analysis of policies and proposals put forward by both the previous and present Government. Only those policies already in place or that have been planned to a sufficient degree of detail (i.e. with quantified estimates of costs and benefits) have been included in the modelling. Annex B describes the policies assessed in this document and details any changes made to the policies since the last published analysis in July 2010. In particular, this analysis accounts for:

- The Government's decision to fund the Renewable Heat Incentive (RHI) through general taxation rather than a levy on fossil fuel suppliers;
- The Government's decision to consider several alternative funding options for providing financial support for its CCS commitments, including through CfDs, as they will not be funded through their own levy;
- The introduction of the Green Deal, from Autumn 2012, which will establish a framework to enable private firms to offer energy efficiency improvements to homes and businesses at no upfront cost, and to recoup payments through a charge in instalments on their energy bill;
- The introduction of a new Energy Company Obligation (ECO)[23] which will run alongside the Green Deal. The consultation for which will consider options for: the breadth of ECO support, how Green Deal and ECO are interwoven and delivering assistance to low income and vulnerable households to heat and improve the efficiency of their homes more affordably on a long-term basis;
- The introduction of the Warm Home Discount (WHD) scheme running from April 2011 to help eligible low-income and vulnerable households with their energy costs;

[22] Available online at: http://www.decc.gov.uk/en/content/cms/about/ec_social_res/analytic_projs/ff_prices/ff_prices.aspx.
[23] This replaces the Future Supplier Obligation included in the July 2010 analysis.

- The Government's decision to raise the discount on the Climate Change Levy (CCL) on electricity from 2013 for users covered by Climate Change Agreements (CCAs) from 65% to 80%;

- The introduction of a Carbon Price Floor (CPF) based on a linear trajectory starting at £16/tCO2 in 2013 and targeting £30/tCO2 in 2020 and £70/tCO2 in 2030 (in real 2009 prices);

- The Government's proposals for Electricity Market Reform (EMR) to ensure that the UK can meet its climate change goals and have a secure, affordable supply of electricity in the long-term;

- The proposed new cost-effective levels of support for large-scale renewable electricity from 2013 to 2017; and

- The decision to make a £40 million saving in 2014/15 on spending and the proposed new lower tariffs and energy efficiency eligibility requirement for solar PV under the Feed-in-Tariff (FIT) scheme.

28. The combined effect of the above decisions is estimated, in general, to reduce the future impact of energy and climate change policies on energy bills compared with the estimated impacts published in July 2010.

29. It is also important to note that an analysis of electricity and gas bills does not in itself tell us whether energy consumers, particularly businesses, are financially better or worse off as a result of energy and climate change policies or how international business competitiveness will be affected. A number of other important factors need to be taken into account. These are:

    a. **The commercial arrangements and contracts established between energy users and retail energy suppliers –** It is possible that the costs of policies are distributed in such a way that a few large users may face a smaller impact per unit of energy compared with smaller energy users. The same may also be true for households and businesses that may be more likely to switch tariffs or energy suppliers at the expense of more sticky customers. Our central assumption is that policy costs are spread evenly per unit of energy consumption across all relevant energy users.[24] There is currently limited evidence on how retail energy suppliers' costs are spread across their users. It is possible that, owing to their bargaining power and economies of scale in the supply of energy, very large energy consumers could pay retail prices that are close to the wholesale price, with energy and climate change policies only having an impact on the energy prices they pay insofar as they affect wholesale prices or are levies imposed

[24] For the analysis across the household distribution (Section 4.4) the support costs for CERT, CESP, WHD and ECO are spread on a per household basis.

directly on them (such as the Climate Change Levy (CCL)) – with the implication being that other users face higher policy costs as a result.[25]

The analysis for large energy intensive users presents a range. The lower bound estimates reflect the wholesale price impacts (including the carbon price) and the CCL, which is a tax directly on the end-use of energy by businesses. The upper estimates include the costs of all relevant policies.

b. **Large energy users' consumption of electricity generated on-site –** Some large users will use a significant amount of electricity which is generated on-site, and may be exempt from a number of costs which may affect the retail price of electricity purchased from the main grid.[26] This would mean that these users would not pay for the support costs of the RO, EMR and small-scale FITs on that portion of their electricity generated on-site and the impact of energy and climate change policies on the electricity price and bill paid by such users would be significantly smaller.

   The lower bound of the range for large energy intensive users reflects these exemptions. In reality, some large industrial users may also be exempt from the CCL in its entirety. This has not been reflected in the range as this is an exemption specific to particular production processes.

c. **Businesses' ability to pass on rising costs of energy to their customers –** The extent to which costs can be passed on to customers depends on a number of factors including: the ability of firms to discriminate between domestic and international markets, the degree of competition on non-price characteristics (e.g. quality) and the degree to which EU market size can influence the global price. The analysis presented in this document does not take into consideration the ability of some businesses to pass on the additional costs to their customers.

d. **Direct benefits of fuel switching and small-scale renewables –** The average price and bills analysis does not take into account potential savings to households and businesses from switching to renewable sources of energy supply, including payments that business users could receive from the Renewable Heat Incentive (RHI) and that both business and household users could receive from the small-scale Feed-in-Tariff (FIT)[27] scheme if they adopt these policies. However, the analysis of impacts across the household distribution (Section 4.4) *does* include the impact of fuel switching as a result of certain policies (for example, switching from electric to gas heating under the ECO) and the savings and tariffs received by households that take up small-scale FIT measures.

[25] It should be noted that such large energy users only represent a small proportion of total UK energy consumption. The magnitude of the range of impacts for smaller users would therefore be small.
[26] In 2010, 97% of final electricity consumption was supplied from the public distribution system (*DUKES 2011*).
[27] Although the analysis *does* consider the impact on electricity prices and bills of suppliers passing on the costs of the FITs obligation onto electricity users.

e. **The direct costs of policies –** Households and businesses will face up-front costs of purchasing renewable measures (such as Microgeneration technologies) and some insulation measures (which may have only been part subsidised by policies such as CERT). In addition, increased costs to businesses that manufacture energy using products sold in the EU (such as TVs and electric motors) which meet more stringent efficiency standards will likely be passed on to the retail prices of these products. As these costs are largely one-off costs and are separate to the energy bill, they have not been included in this analysis.[28]

   In addition, there will be costs incurred by businesses covered by the Carbon Reduction Commitment energy efficiency scheme (CRC) and EU Emissions Trading System (EU ETS) purchasing carbon allowances. To the extent that all the CRC allowances cover direct energy consumption (i.e. and no additional process emissions), this additional carbon cost has been applied to the retail electricity and gas prices estimated for the medium-sized business users. The direct cost of the EU ETS for businesses in the traded sector is more complicated because, for some sectors, process emissions make up a significant share of their total emissions. In addition, some allowances have also been allocated to some firms for free (see next bullet). As such, the direct cost of EU ETS on business sectors has not been included in the analysis.[29] The direct cost of the EU ETS on power generators is expected to be passed onto electricity users through the wholesale cost of electricity. This *indirect cost* of EU ETS on business and household users *has* been included.

f. **The impact of the free allocation of EU ETS allowances –** This will depend on the number of allowances allocated to firms for free, their level of emissions and their abatement opportunities. We estimate that the majority of firms will receive fewer free allowances than their forecast emissions in Phase III (from 2013). However a comparison of verified emissions and allocations indicates that most UK and EU energy intensive industries have built up a surplus in Phase II (34% more free allowances were allocated to these UK industries in 2008-10 compared to their emissions). These allowances can be carried over from Phase II to Phase III and may offset increases in costs at least in the shorter-term. On average, this surplus is likely to remain significant throughout the rest of Phase II and much of Phase III.

g. **The impact of policies on transmission and distribution costs –** The transmission and distribution costs in the analysis are based on price controls which allow transmission and distribution companies to recover the costs of adding and replacing new infrastructure to the network. Some of these costs may relate to connecting low-carbon generating capacity.

[28] However, these costs have been considered in the relevant policy impact assessments.
[29] However, DECC's estimates of the future cost of carbon allowances has been published separately at: http://www.decc.gov.uk/en/content/cms/about/ec_social_res/analytic_projs/carbon_values/carbon_values.aspx.

However, no estimate has been made of this component or how far it is a direct result of policy. Not all of the connection of low-carbon generation may be considered "additional as a result of policy" if it partly replaces aging infrastructure. In addition, where polices drive load shifting in consumption or generally reduced consumption, this may save on the costs involved in improving network infrastructure to deal with peak demand periods compared with in the absence of such policies;

h. **Energy used for transport –** The analysis in this document focuses on the use of energy for heat and power in the home, workplace or industrial site. The analysis does not consider the use of energy for transport.

i. **Building Regulations –** Building Regulations set standards for design and construction which apply to most new buildings and many alterations to existing buildings in England and Wales. Their objective is to ensure health, safety, welfare and convenience of people in and around buildings, and water and energy efficiency of buildings. These regulations could deliver significant efficiency savings to affected households and businesses. However, these savings have not been accounted for in the analysis in this document as the characteristics of the building stock are assumed to be fixed for simplicity.

j. **The wider business environment –** For most businesses, direct energy costs are a relatively small proportion of total costs. For example, in 2009, purchases of energy and water accounted for around 2.7% of total costs for the UK manufacturing sector as a whole. This means that a 10% rise in direct energy costs increases total costs to the manufacturing sector by just 0.27%. In contrast, employment costs represented around 20% of total manufacturing sector costs in 2009.[30] The wider business environment (e.g. corporation tax levels, labour costs etc) will also have important implications for the ability of UK businesses to compete internationally;

k. **The wider tax and benefit system –** Vulnerable and low-income households may receive additional benefits and allowances, such as Cold Weather Payments and unemployment benefits. In particular, energy costs will already factor in the inflation measures used to up-rate benefits. These are not reflected in energy prices or bills. The Warm Home Discount (WHD) also provides targeted rebates on energy bills for vulnerable households – the average impact of this is reflected in the analysis.

30. It should be noted that the results in the Annexes of this document for individual policies will differ from the results presented in individual policy Impact Assessments – which look at the marginal impact of individual policies as opposed to the cumulative impact of a numbers of policies. Further detail on this and the modelling methodology can be found in Annex C.

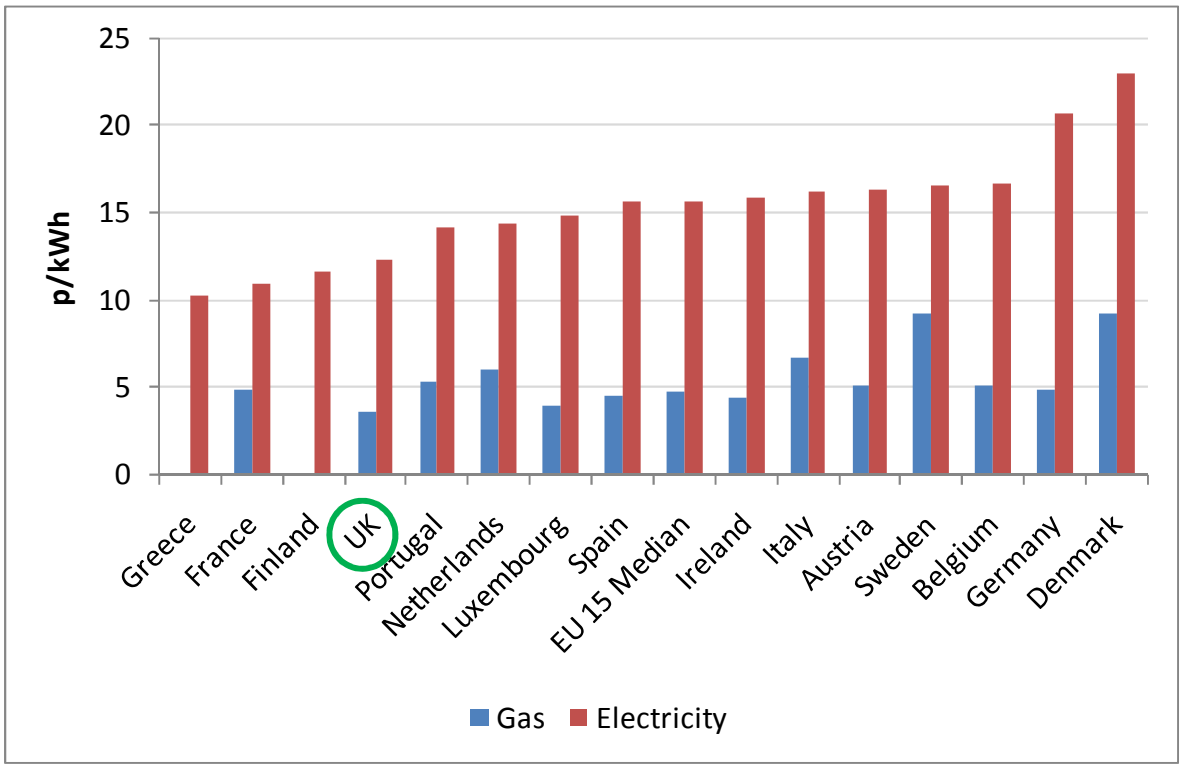
[30] Figures based on the Annual Business Inquiry. Purchases of energy represent approximately 95% of the total purchases of energy and water.

4. Household energy prices and bills

4.1. International comparisons

31. Charts 5 and 6 show how the UK's household gas and electricity prices compare to the rest of the EU 15 and G7. The UK ranks well internationally for household energy prices. When compared to the EU 15, UK consumers have faced the lowest household gas prices for all consumption categories for the last three years (2008-2010). Households in Canada and the US face lower gas prices on average than in the UK due to the exploitation of low cost shale gas reserves. For electricity prices, the UK also ranks reasonably well with the third or fourth lowest electricity prices in the EU 15 for all consumption categories for the past two years. Low levels of energy taxes in the UK contribute significantly to this positive ranking. Lower wholesale costs[31] and lower renewables support costs drive lower costs in France.

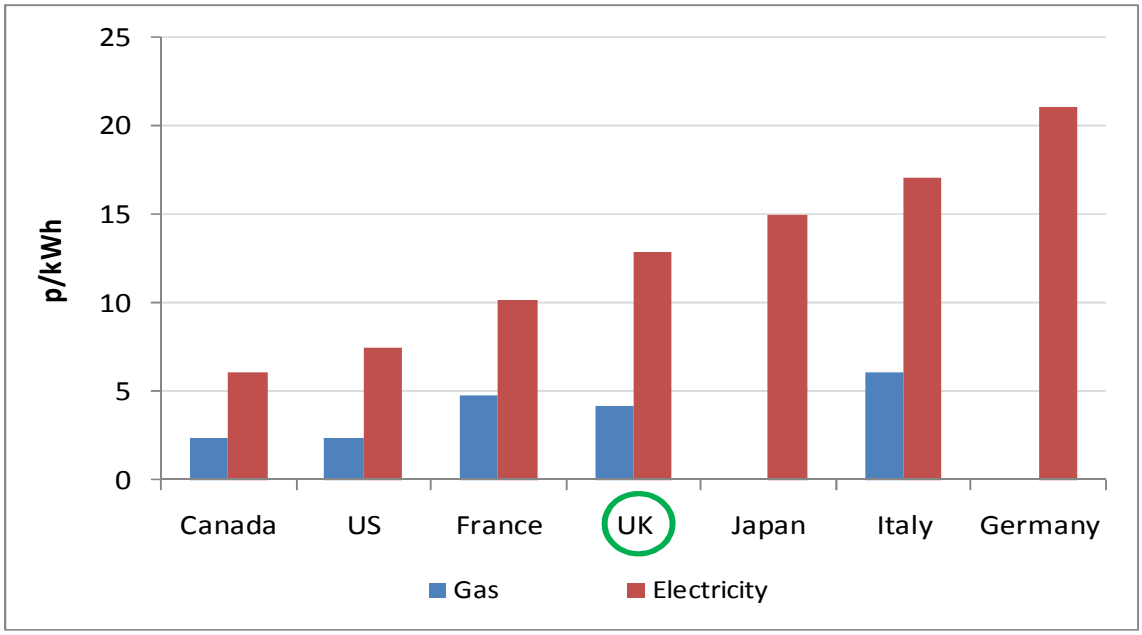
Chart 5: Average energy prices for medium-sized domestic customers in the EU15, July-December 2010[32]



Source: Eurostat data, published in DECC's *Quarterly Energy Prices, September 2011*. Gas data for Greece and Finland was unavailable for this period. Data sorted by electricity prices.

[31] France has a larger share of lower marginal cost nuclear generating capacity than the UK.
[32] Data is also available for the period January-June 2011 but for a smaller sample of countries.

Chart 6: Average Energy Prices for Domestic consumers in the G7, 2010

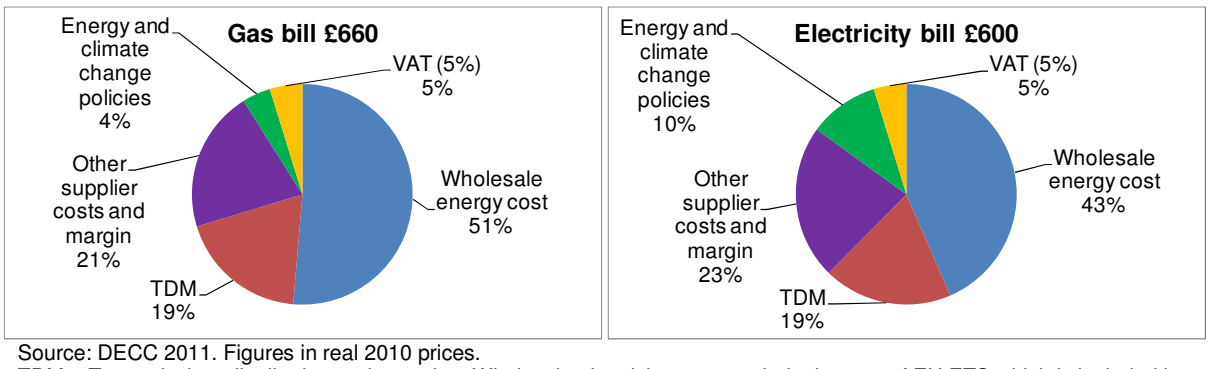


Source: IEA data, published in DECC's *Quarterly Energy Prices, September 2011.* Gas data for Germany and Japan was unavailable for this period. Data sorted by electricity prices.

4.2. A breakdown of current household energy bills

32. DECC's estimate of the breakdown of an average UK household gas and electricity bill in 2011 is presented in Chart 7 (more detail is given in Annex D).

Chart 7: Estimated breakdown of an average household gas and electricity bill in 2011[33]



Source: DECC 2011. Figures in real 2010 prices.
TDM = Transmission, distribution and metering. Wholesale electricity costs exclude the cost of EU ETS which is included in the energy and climate change costs component of the electricity bill.

33. DECC estimates the average household gas and electricity bill in 2011 to be £660 and £600, respectively (in real 2010 prices), before rebates.[34] Wholesale energy costs are estimated to currently make up around 51% of the average household gas bill and 43% of the average household electricity bill.[35]

[33] For detail on how the 2011 "with policy" bills compare with Ofgem's recent assessments, please see Annex D.
[34] Based on 16.2MWh of gas consumption and 4MWh of electricity consumption (after policies).
[35] Excluding the estimated cost of carbon.

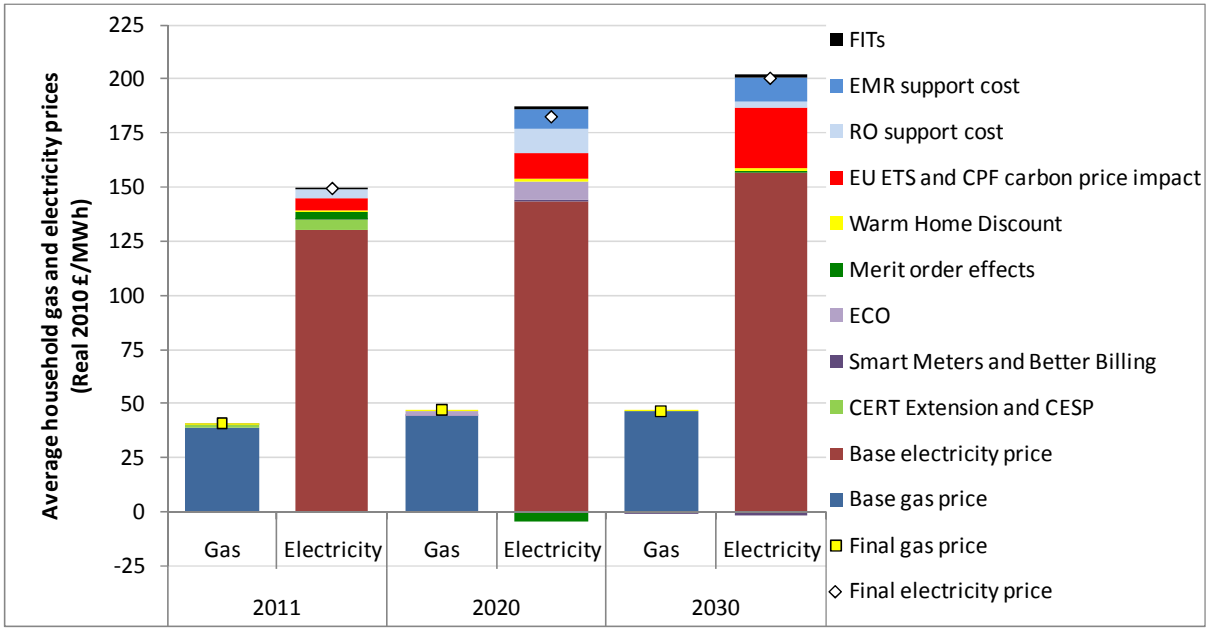
34. In 2011, energy and climate change policies (including the cost of carbon in electricity generation) are estimated to represent 4% of an average household gas bill, 10% of an average household electricity bill and 7% of an average household energy (gas plus electricity) bill. Transmission, distribution and metering costs, other supplier costs and margins and a 5% VAT rate are the other main components of the household energy bill.

35. However, energy efficiency policies (such as Products Policy, CESP, CERT and its predecessors) and Warm Home Discount rebates are estimated to deliver an average household saving of £97 on their energy bill in 2011. Accounting for this, VAT and any impacts policies may be having on wholesale energy costs, energy and climate change policies are estimated to be adding £19 or 2% to the average household energy bill in 2011, compared to a bill without policies.

4.3. Impacts of energy and climate change policies on an average household energy bill to 2030

36. Chart 8 and Table 2 illustrate the estimated impact on average UK household gas and electricity prices as a result of energy and climate change policies in 2011, 2020 and 2030. "Base prices" (i.e. energy prices excluding policies) are expected to increase to 2030, driven by rising wholesale prices, which are based on DECC's fossil fuel price assumptions, and rising transmission, distribution and metering costs, which are informed by current price controls and historical trends. The results are based on DECC's fossil fuel price scenario consistent with a wholesale gas price of 68p/therm in 2020 (in real 2010 prices).

Chart 8: Estimated impact of energy and climate change policies on average retail gas and electricity prices paid by UK households (including VAT)[36]



Source: DECC 2011

[36] For further detail on each policy including "Merit order effects", please see Annex B.

Table 2: Estimated impact of energy and climate change policies on average household gas and electricity prices and an average household gas, electricity and energy bill (inc. VAT)[37]

	2011	2020	2030
Price impacts (real 2010 £/MWh and % change)			
Average **gas price** without policies	39	44	46
Average **gas price** with policies	41	47	46
Impact of policies on average **gas price**	2 (5%)	3 (7%)	0 (0%)
Average **electricity price** without policies	130	144	157
Average **electricity price** with policies	149	183	201
Impact of policies on average **electricity price**	19 (15%)	39 (27%)	44 (28%)
Bill impacts (real 2010 £ and % change)			
Average **gas bill** without policies	£646	£735	£771
Average **gas bill** with policies	£660	£742	£721
Impact of policies on average **gas bill**	£14 (2%)	£7 (1%)	-£50 (-6%)
Average **electricity bill** without policies	£583	£644	£702
Average **electricity bill** with policies	£588	£543	£706
Impact of policies on average **electricity bill**	£5 (1%)	-£100 (-16%)	£4 (1%)
Average **energy bill** without policies	£1,229	£1,379	£1,474
Average **energy bill** with policies	£1,249	£1,285	£1,427
Impact of policies on average **energy (gas plus electricity) bill**	£19 (2%)	-£94 (-7%)	-£46 (-3%)

Source: DECC 2011. Numbers may not add up due to rounding.
The average household is assumed to be consuming 16.6MWh of gas and 4.5MWh of electricity in each year to 2030 *before* efficiency savings are made from policies.
The electricity bill and energy bill *with policies* are net of the average Green Deal loan repayment and Warm Home Discount rebate.
For details of each policy's contribution to the total price and bill impacts, see Annexes E and F.

37. Energy and climate change policies are currently estimated to be adding 5% to the average gas price paid by UK households in 2011. This reflects the estimated impact of energy suppliers passing on the costs of the CERT

[37] The percentages for 2011 in this table differ to those in Chart 7 because Table 2 represents the *impact of policies* on top of an energy bill *in the absence of policies* (and so captures policy impacts on wholesale energy costs and energy consumption), whereas Chart 9 presents the *share of policy costs* for an energy bill *in the presence of policies*.

Extension, CESP and Warm Home Discount obligations onto end users. The impact of policies on average household gas prices is estimated to rise to 7% in 2020 (compared with prices in 2020 in the absence of policies) as the proposed Energy Company Obligation (ECO) replaces the CERT and CESP obligations and, to a lesser extent, as Smart Meters are rolled out to households, adding slightly to energy supply costs. This 7% impact in 2020 is lower than the 18% impact estimated in July 2010 primarily as a result of the Government's decision to fund the RHI through general taxation rather than a levy on fossil fuel suppliers. The ECO is assumed to end in 2022 (for the purpose of this analysis), while Smart Meters are expected to reduce the cost of supplying energy in the long-run[38] (compared with in the absence of Smart Meters). As such, the estimated impact of policies on the average gas price paid by UK households is estimated to fall to 0% by 2030.

38. Policies are currently estimated to be adding 15% to the average electricity price paid by UK households in 2011. In addition to the CERT Extension, CESP and the Warm Home Discount, this also reflects the cost of the RO and small-scale FIT obligation on retail prices and the carbon cost of the EU ETS on wholesale electricity costs. The EU-wide cost of carbon adds approximately 4% to household electricity prices (before other policies are included) in 2011. The EU ETS carbon price will affect the cost of electricity generation in all EU countries. The extent to which this cost is passed onto retail electricity prices across the EU depends on, among other things, the carbon intensity of the electricity generation sector, the electricity supply market structure, and the extent to which there are regulated tariffs to particular energy users in each country.

39. Looking forward, the impact of policies on household electricity prices is expected to rise to 27% by 2020 with the introduction of the ECO, CPF, the increased deployment of renewables and other low-carbon generation funded by the RO, small-scale FITs and EMR[39] and, to a lesser extent, the rollout of Smart Meters. The increase over time is partly mitigated by the dampening effect on wholesale electricity prices as a result of increasing low-marginal cost generating capacity entering the system as a result of policies like the RO and EMR. This 27% impact in 2020 is lower than the 33% impact estimated in July 2010 as a result of announcements made on EMR, RO and small-scale FITs which have reduced the estimated future impact of policies on electricity prices. The impact of policies is then estimated to remain at around 28% in 2030.

40. The impact of policies on the average household energy bill is expected to be lower than their impact on energy prices. This is because bills are a combination of prices and energy usage. They therefore include the impact of policies which improve energy efficiency by helping households (and also businesses) reduce energy consumption, lessening the overall bill impact (see Table 2).

[38] By reducing the costs of metering, managing debt, theft, the customer switching process, pre-payment, etc.
[39] It should be noted that, with the introduction of the EMR, the RO support costs will be significantly lower than if the EMR package wasn't implemented and is expected to have a dampening effect on future wholesale electricity prices (reflected in this analysis by the net merit order effects). The impact of the support cost of the EMR is presented separately. The full *marginal* impact of the EMR on electricity prices and bills is presented in the Impact Assessment for the EMR White Paper (available online at: http://www.decc.gov.uk/assets/decc/11/policy-legislation/EMR/2180-emr-impact-assessment.pdf).

41. In 2011, efficiency measures delivered as part of CERT (and former Energy Efficiency Commitments, EEC 1 and 2) and CESP, as well as existing EU minimum efficiency standards (Products Policy) already mean the average household is currently expected to be consuming less energy than it would have done without these policies (see Box 1). As a result, energy and climate change policies are estimated to be adding just 2% on an average household energy bill in 2011 compared to what that bill would have been in the absence of policies.

Box 1: Estimating the Impact of Household Energy Efficiency Policies

The actual impact of energy efficiency policies on household energy consumption and energy bills will depend on (1) the performance of different energy efficiency measures and (2) uptake of measures.

The National Energy Efficiency Data-framework (NEED) is used to estimate the performance of insulation measures.[40] NEED contains evidence on consumption in over 10,000 homes before and after receiving cavity and loft insulation. It shows that the installation of energy efficiency measures enables significant energy savings for real households. For example, a saving of at least 2.2MWh for cavity wall insulation and 0.6MWh for a typical loft insulation.

In addition, estimates of the performance of insulation measures are modelled using the industry-standard SAP model, which takes account of potential underperformance of different measures and also comfort taking. Therefore, the assessment takes into consideration that policies that reduce energy consumption and bills also increase household's disposable income, which may in turn lead to greater consumption of energy. This is the "rebound effect".

In terms of the uptake of measures, there is clear evidence that households are installing energy efficiency measures. For example, the latest published statistics show that nearly 0.5million cavities have been insulated over the past 12 months and that a total of 1.7 million cavities and 3.5 million lofts have been insulated since the introduction of CERT.[41] This evidence is considered in looking at the impact of new energy efficiency policies.

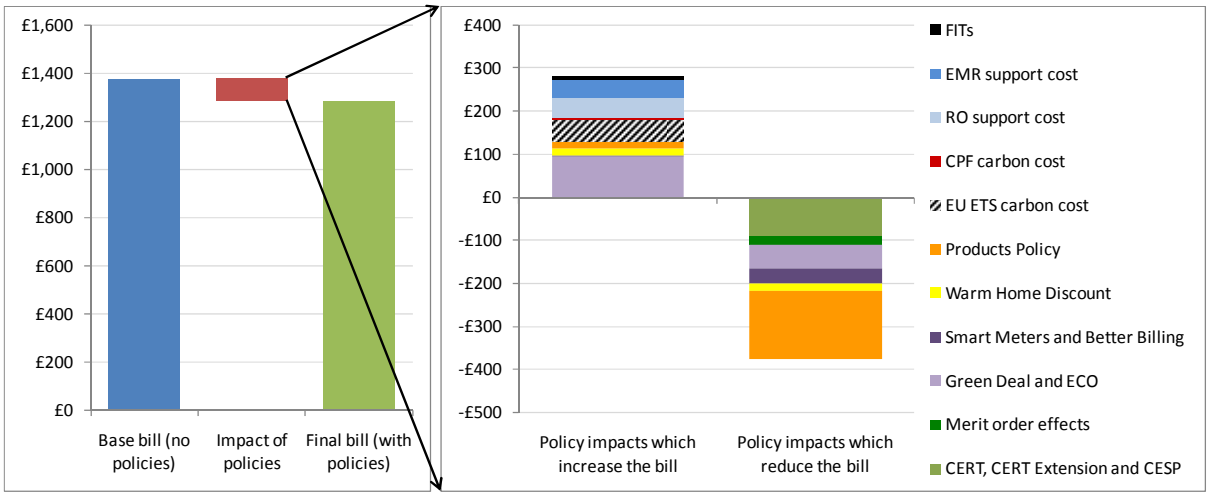
42. Efficiency savings are expected to continue to be made from energy efficiency improvements installed during CERT (and EEC 1 and 2) and CESP until the end of their technological life-span. There is also expected to be an increase in the average efficiency saving made by households over time as more Smart Meters are installed across the population, encouraging more energy efficient behaviour. The anticipated increased take-up of insulation and heating measures through the ECO and Green Deal and the replacement of the existing stock of pre-efficiency standard energy using products by new products that meet the minimum EU standards will also deliver efficiency savings.

[40] http://www.decc.gov.uk/assets/decc/11/stats/energy/energy-efficiency/2078-need-data-framework-report.pdf.
[41] Source: Ofgem/DECC estimates.

43. Accounting for these savings, the average Warm Home Discount rebate and Green Deal loan repayment, energy and climate change policies are estimated to *reduce* the average household energy bill from around 2013. Over the remaining lifetime of this Parliament (2012-2015), households are estimated to be saving on their energy bills compared with what they would have had to pay if we did not pursue these policies. In 2020, the average household energy bill is estimated to be 7% lower and, in 2030, 3% lower compared to what the bill would have been in these years without policies.[42] The slight reduction in savings between 2020 and 2030 reflects that some energy efficiency measures installed as part of CERT, CESP, Green Deal and ECO become less effective over time and there are assumed to be no policies in place after the ECO is assumed to end in 2022 to support new measures.

44. Chart 9 illustrates the counteracting effects of the policy price impacts (and rebound effects[43] and loan repayments), which increase the average household energy bill, and the efficiency savings (and rebates) which reduce the average household energy bill in 2020. Annexes E and F provide the total policy impact on gas and electricity prices and bills broken down by the individual policy contributions.

Chart 9: Estimated impact of energy and climate change policies on an average household energy bill in 2020 (including VAT)



Source: DECC 2011. Figures in real 2010 prices.

4.4. Impacts of energy and climate change policies on energy bills in 2020 across the household distribution

45. Looking at the impact of policies on average household prices and bills can mask significant distributional impacts across households. As policies can lead to transfers between different sections of the population, a model has been

[42] These impacts account for some level of comfort taking and underperformance of measures. See Annex B for further details.
[43] Specifically the Heat Replacement Effect (HRE) from more efficient products. As more efficient energy using products emit less heat, more heat fuel (in this case, gas) is needed to maintain the same level of comfort.

developed by the Centre for Sustainable Energy (CSE), supported by DECC, which simulates how the impacts on household energy bills are likely to be allocated across different households. (Further detail of the modelling methodology can be found in Annex C).

46. For instance, some socially cost effective energy efficiency measures, such as solid wall insulation, are unlikely to be taken up by individual households unless subsidised. Some low income households will be able to access fully subsidised measures whilst other households will be able to buy measures at subsidised prices. These subsidies are funded by all energy consumers through increased energy prices. Policies that drive energy efficiency, such as CERT, CERT Extension, CESP and ECO will therefore lead to transfers of benefits from those who do not take up measures but contribute to the costs of these policies through their energy bills to those who do take up measures.

47. Households that take up measures will therefore generally have lower energy bills as a result of a particular policy as the savings arising from the measure will typically be larger than the cost to the household of the policy (as the total policy cost is assumed to be spread evenly over all households).[44]

48. As outlined above, the costs of energy policies are generally passed on to consumers by retail energy suppliers. This could either be on a per household basis (through, for example, increasing the standing charge in the energy bill) or a per unit basis through an increase in the unit price of energy. The precise method of cost pass through will vary between energy suppliers depending on their own tariff structure and approach to cost mark-up. However, it is reasonable to assume some of the costs will be passed on by increasing the unit price of energy, meaning households with higher levels of energy consumption can be expected to face a larger absolute increase in their bill for the same increase in price. As people on higher incomes generally consume more energy, live in larger houses (which require more heating) and have more electrical appliances, they will typically experience a larger absolute increase in their bill relative to lower income families as a result of price increases.

49. However, when taken as a proportion of total expenditure, the impact on lower income households of energy price increases becomes greater, as the energy bill makes up a larger share of total expenditure for low income households – in 2011, energy is expected to represent around 13% of total expenditure for the bottom three deciles, compared with around 4% for the top three deciles.[45] It is the affordability of energy and climate change policies that is important when assessing distributional impacts, so the results below are presented as a proportion of total household expenditure. Equivalent results as a share of disposable income are presented in Annex G.

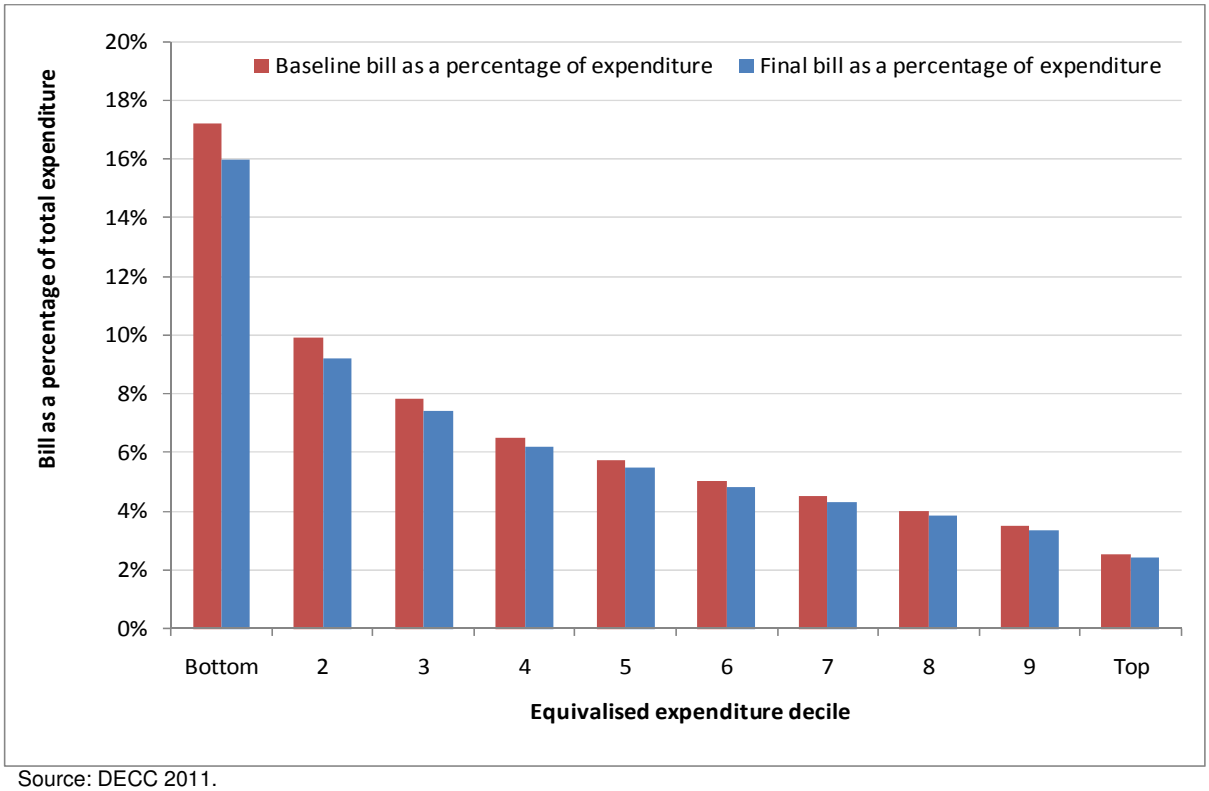
[44] In the case of household energy efficiency policies such as CERT and ECO, the costs of the policies are assumed to only be spread across household users and not businesses. For policies such as small-scale FITs, EMR and RO, the policy costs are assumed to be spread across all users, including businesses.
[45] DECC estimates based on Living Costs and Food survey data.

4.4.1. Impact by expenditure decile

50. Chart 10 shows the impact of energy and climate change policies on the average energy bills in each equivalised expenditure decile as a percentage of total (un-equivalised) expenditure in 2020.[46] The bottom three deciles see the greatest benefit with energy bills between 0.4% and 1.2% lower as a proportion of total expenditure as a result of energy and climate change policies – for example, excluding policies, energy represents 17.2% of expenditure in 2020 for the bottom decile, but this falls to 16.0% after the impact of policies. This compares to the remaining deciles where there is between a 0.1% and 0.3% reduction in bills as a share of expenditure resulting from policies.

51. This is in contrast to our July 2010 assessment, where all deciles were expected to experience an average increase in their energy bills, with the bottom three deciles expecting the greatest increase as a share of income.[47] This change is consistent with the results of our average price and bills analysis in the previous section and also reflects improvements in the distributional modelling methodology which now captures the direct benefits of small-scale FITs and WHD rebates.

Chart 10: Energy bill as a percentage of expenditure in 2020, with and without energy and climate change policies across expenditure deciles



Source: DECC 2011.

[46] Equivalised expenditure is a measure of household expenditure that takes account of the differences in a household's size and composition, and thus is equivalised or made equivalent for all household sizes and compositions. DECC uses the OECD equivalisation scale for this analysis.

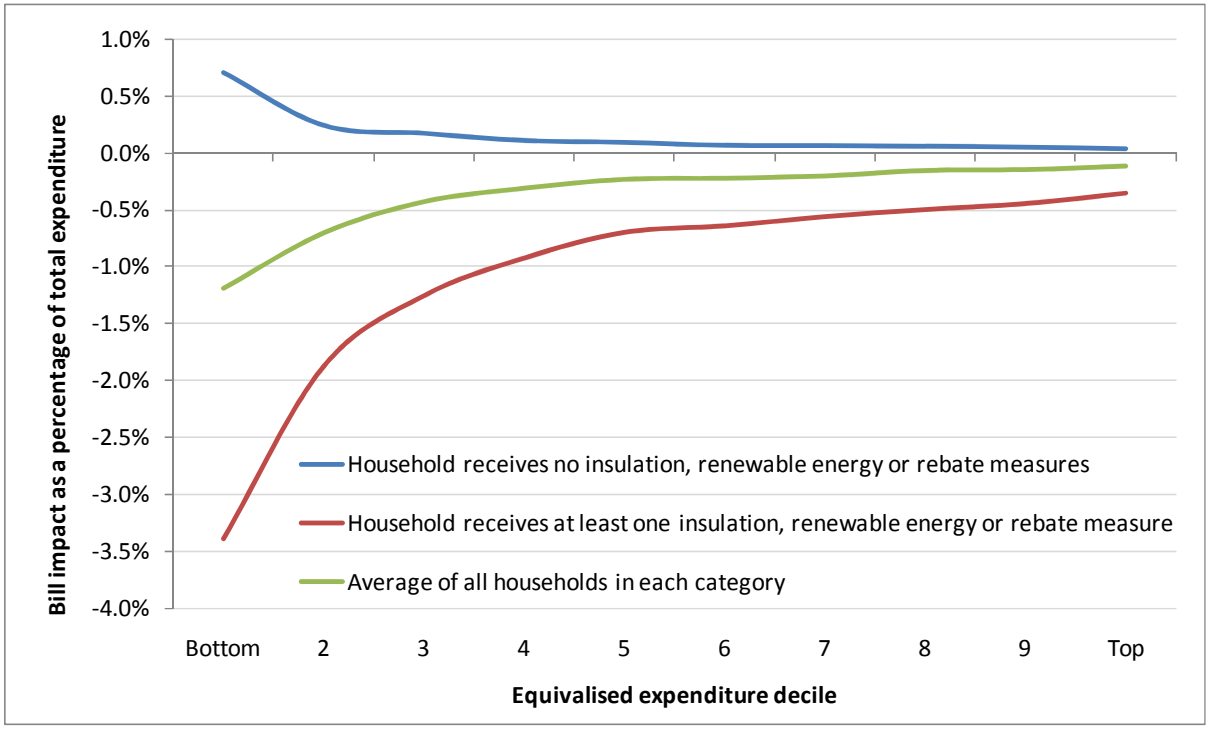
[47] The results in each decile will also differ because the July 2010 analysis presented results by income deciles as share of income, whereas the results in this section are by expenditure decile as share of expenditure. For results as share of income, including across income deciles, please see Annex G.

52. However, this does not tell the full story as the impact on households will depend upon whether they receive or take out policy measures. Chart 11 differentiates the average bill impact for each decile into those households that do and do not benefit from measures in 2020.

53. For the purposes of this analysis, a policy measure includes any insulation and renewable energy measures taken out by households as a result of the following policies: CERT, CERT Extension, CESP, Green Deal, ECO and small-scale FITs.[48] Also, households that receive a rebate on their energy bill as a result of WHD are assumed to have received a measure.

54. Smart Meters and the purchase of more energy efficient products as a result of Products Policy will impact on the final bill of all households. As all households are assumed to benefit from these policies, no distinction has been made between those receiving these policy benefits or otherwise in this analysis.

Chart 11: The effect of receiving an insulation or renewable energy measure or a rebate on the impact of policies on household energy bills as a percentage of expenditure in 2020 – across expenditure deciles



Source: DECC 2011.

55. Households in the bottom three expenditure deciles benefiting from policy measures could see their energy bill fall by between 1.2% and 3.4% of total expenditure. This compares to an increase of between 0.2% and 0.7% of total expenditure for households in the same deciles that do receive measures.

[48] Any tariff payments from FITs are deducted from the electricity bill rather than added to income/expenditure.

56. Although those in the bottom three deciles that do not receive measures will face the largest increase in their bill as a proportion of expenditure, the modelling suggests that around 40% of the households in the bottom three deciles could benefit from at least one of these measures. This is greater than in other deciles, where just over a third of households are expected to benefit.

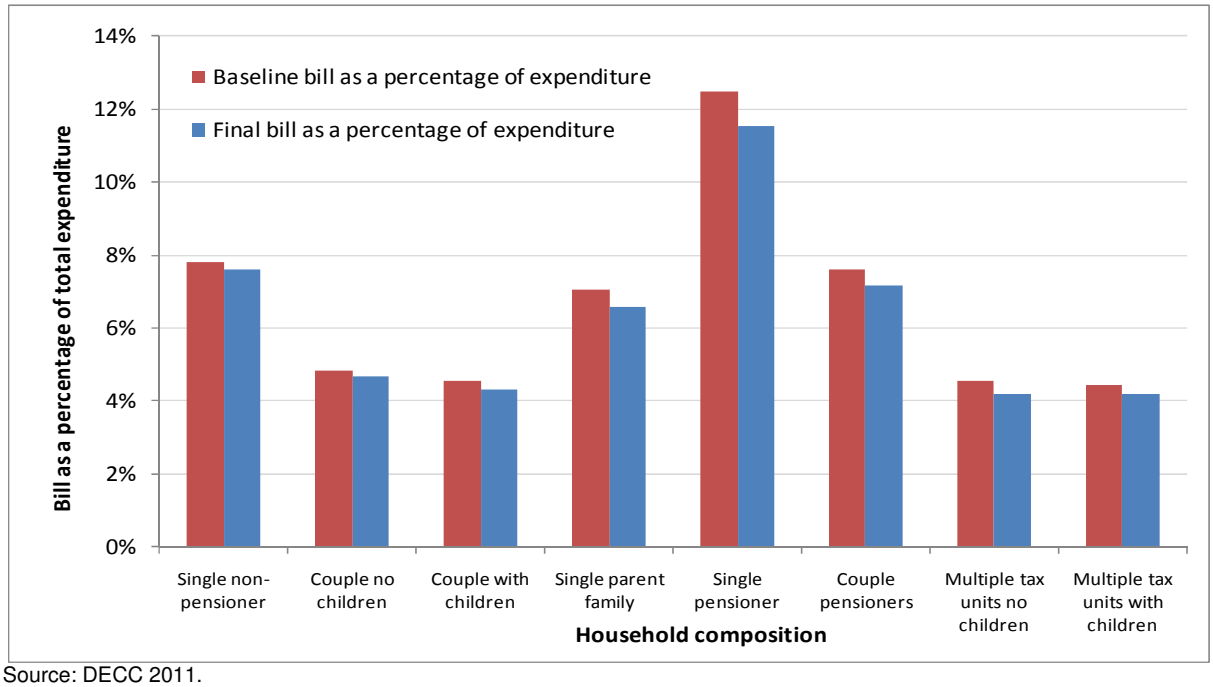
57. Households in the remaining deciles benefiting from policy measures could also see their energy bills fall relative to a no policy scenario but by only between 0.3% and 0.9% of their total expenditure. If households in these deciles do not receive a policy measure, they can expect their energy bills to rise by between 0.04% and 0.1% of their total expenditure as a result of policies.

58. The increased benefit of taking out measures for lower expenditure households is a result of policies such as the Warm Home Discount and ECO being targeted at low-income and vulnerable households (which typically fall in the bottom three expenditure deciles). In addition, for any given level of bill saving, the savings as a proportion of expenditure will be higher for lower deciles, given their correspondingly lower levels of expenditure.

4.4.2. Impacts by household type/composition

59. Chart 12 shows the impact of energy and climate change policies on the average energy bills of different household types/compositions as a percentage of total expenditure in 2020. It shows that there is a net saving for all household types as a result of energy and climate change policies. The largest savings as a proportion of expenditure go to single pensioner households, who could expect a bill saving equivalent to about 1.0% of their expenditure.

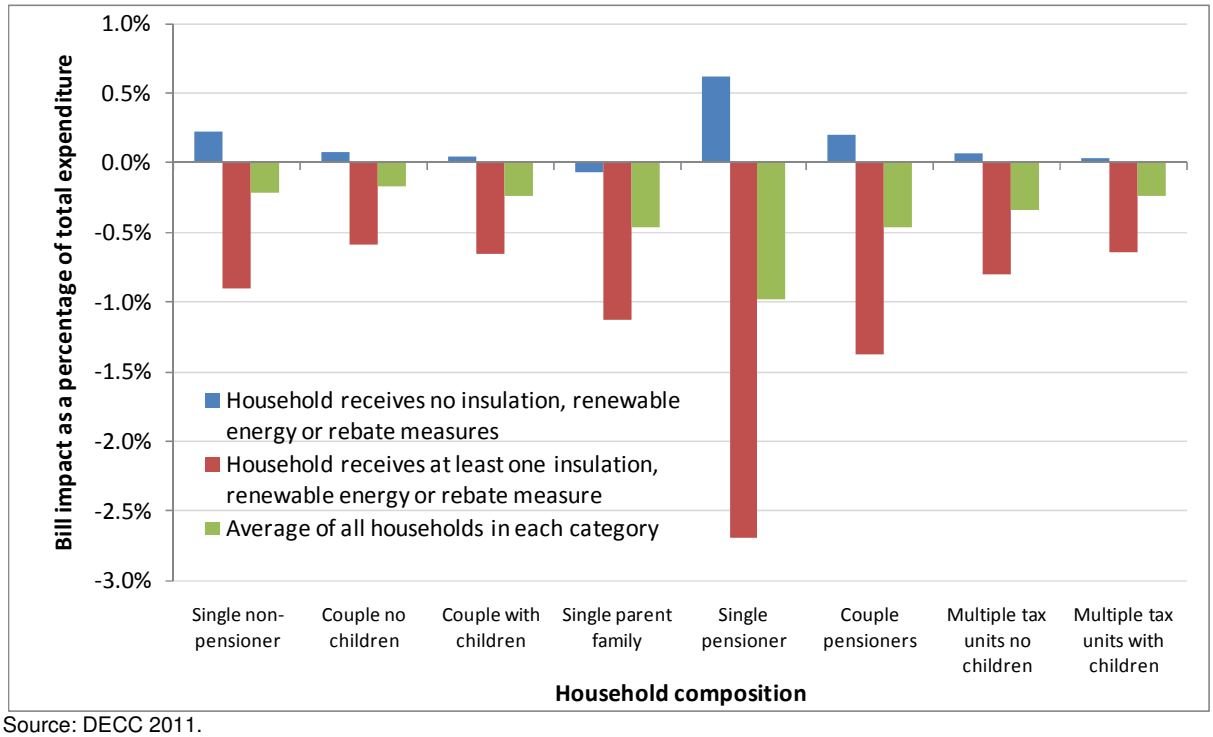
Chart 12: Energy bill as a percentage of expenditure in 2020, with and without energy and climate change policies across household types



Source: DECC 2011.

60. Chart 13 breaks these averages down further, looking at the impact on bills of households receiving policy measures compared with those who do not. As explained above, for the purpose of this analysis a policy measure includes insulation and renewable energy measures and WHD rebates on energy bills.

Chart 13: The effect of receiving an insulation or renewable energy measure or a rebate on the impact of policies on household energy bills as a percentage of expenditure in 2020 – across household types



Source: DECC 2011.

61. It is noticeable that, for households taking out policy measures, the largest bill saving as a percentage of expenditure (of around £193 or 2.7%), falls to single pensioner households – nearly half of whom are estimated to have received at least one measure or rebate by 2020. This is likely a reflection of the fact that policies such as WHD and ECO are targeted at vulnerable households including single pensioners.

62. Overall, the distributional analysis above suggests that, although households that do not take up measures can expect bill increases as a result of policies, the overall average impact on energy bills for each group from policies is a reduction in energy bills. This is particularly true for some of the most vulnerable households in society (those in the bottom three deciles and single pensioner households) where a number of policies such as WHD and ECO are targeted directly at them. The analysis of bills as a share of disposable income presented in Annex G shows a similar picture.

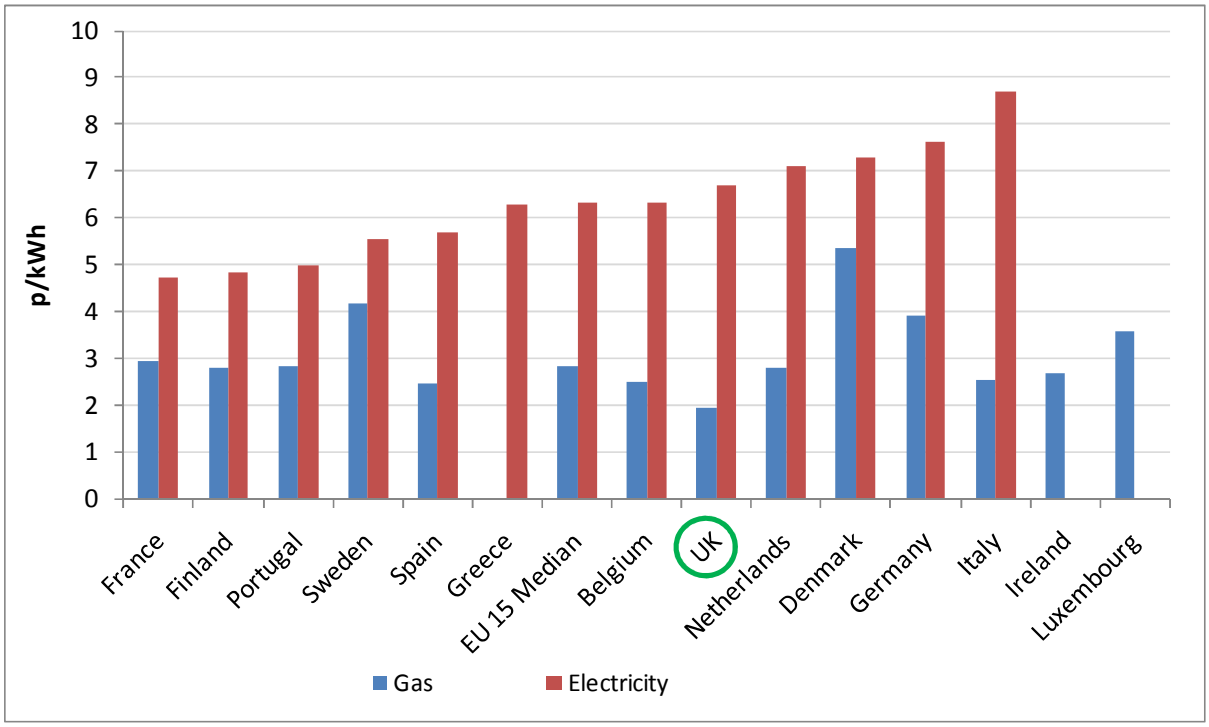
5. Business energy prices and bills

5.1. International comparisons

63. Charts 14, 15 and 16 show how UK average industrial energy prices compare with other EU 15 and G7 countries. The UK ranks well internationally for industrial gas prices with the lowest gas price in the EU 15 for all consumption bands since mid-2009. This is linked to the UK gas market being more liberalised and less reliant on long term oil-linked supply contracts which have tended to be at prices above supplies available from flexible LNG. The USA and Canada outperform the UK due to the availability of low cost local shale gas.

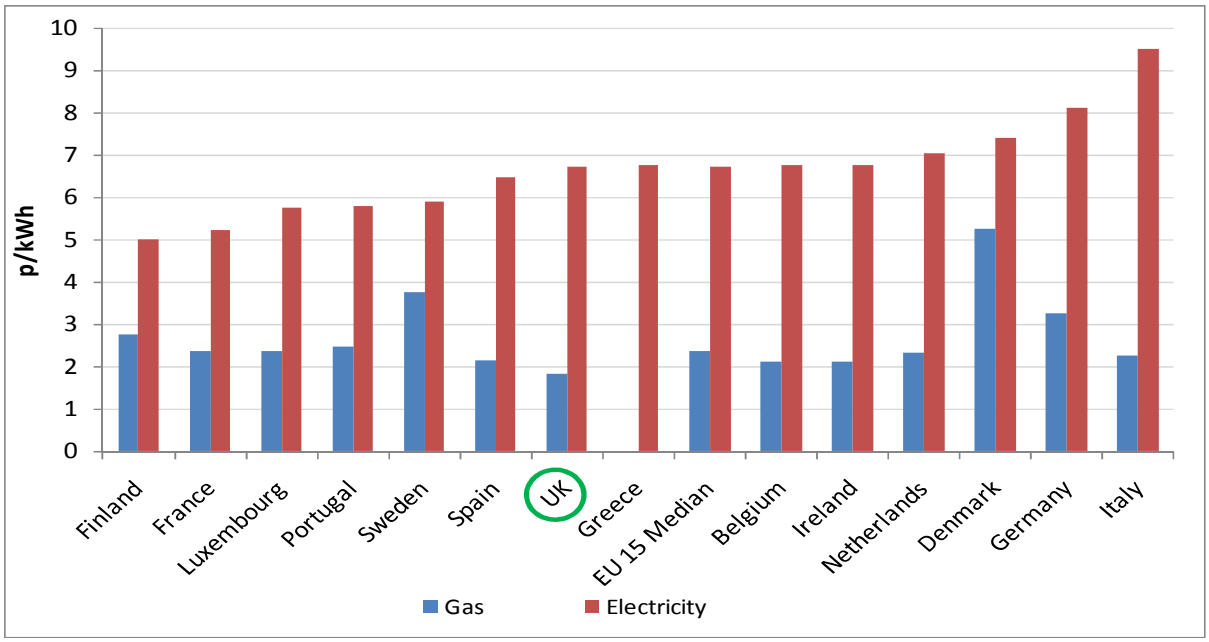
64. The UK ranks less well internationally for industrial electricity prices with prices similar the EU 15 median for both medium and large industrial consumers. Some countries such as Sweden and Finland outperform the UK due to low cost hydro resource while in countries like Spain and France many industrial firms still benefit from electricity prices at regulated levels below the market price.

Chart 14: Average energy prices for medium-sized industrial consumers in the EU 15, July-December 2010



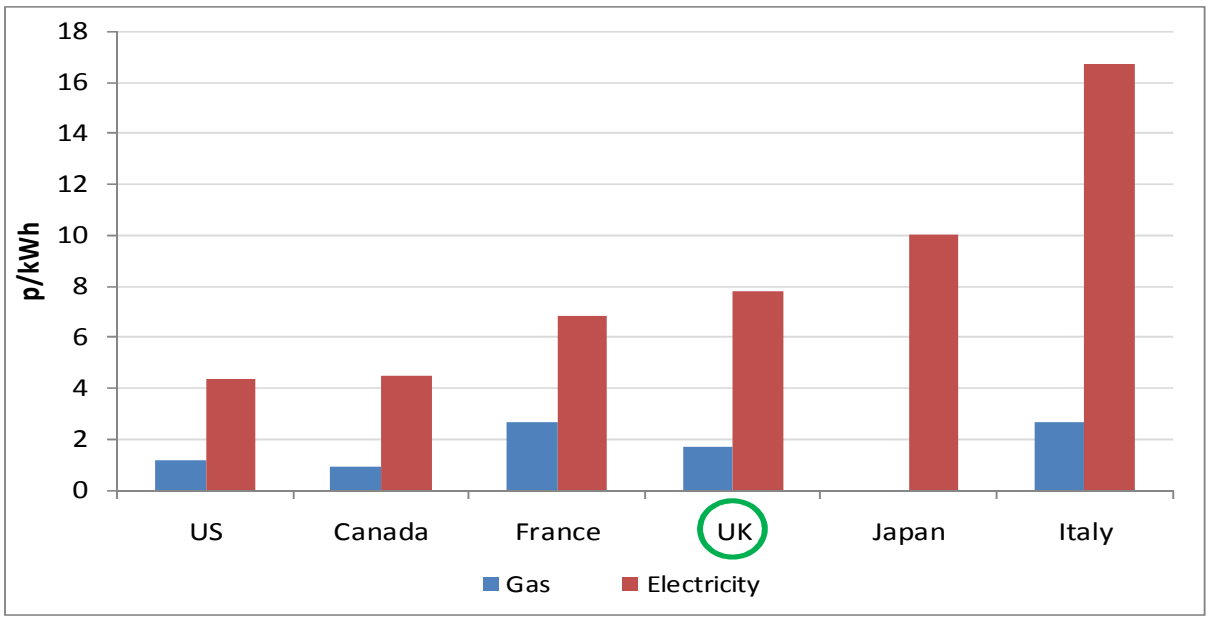
Source: Eurostat data published in DECC's *Quarterly Energy Prices, September 2011.* Data for Austria was unavailable. Gas data for Greece was unavailable. Electricity data for Ireland and Luxembourg was unavailable. Data sorted by electricity prices.

Chart 15: Average energy prices for large industrial consumers in the EU 15, July-December 2010[49]



Source: Eurostat data published in DECC's *Quarterly Energy Prices, September 2011.* Data for electricity prices is based on extra large users. Data for Austria was unavailable. Gas data for Greece was unavailable. Data sorted by electricity prices.

Chart 16: Average Industrial Energy Prices in the G7 excl. Germany, 2010



Source: IEA data published in DECC's *Quarterly Energy Prices, September 2011.* Data for Germany was unavailable. Gas data for Japan was unavailable. Data ranked by electricity prices.

[49] The Eurostat size band for large industrial gas users is annual consumption of between 27,778MWh and 277,777MWh and for extra large electricity users is annual consumption of between 70,000MWh and 150,000MWh. Many energy intensive users in the UK are above this threshold (particularly for electricity). Data for users that consume more than 150,000MWh a year of electricity is available on the Eurostat website (http://epp.eurostat.ec.europa.eu/portal/page/portal/energy/data/database) but only for a limited number of countries. It is therefore unclear whether the same comparison which applies to users below the 150,000MWh threshold will apply to larger users.

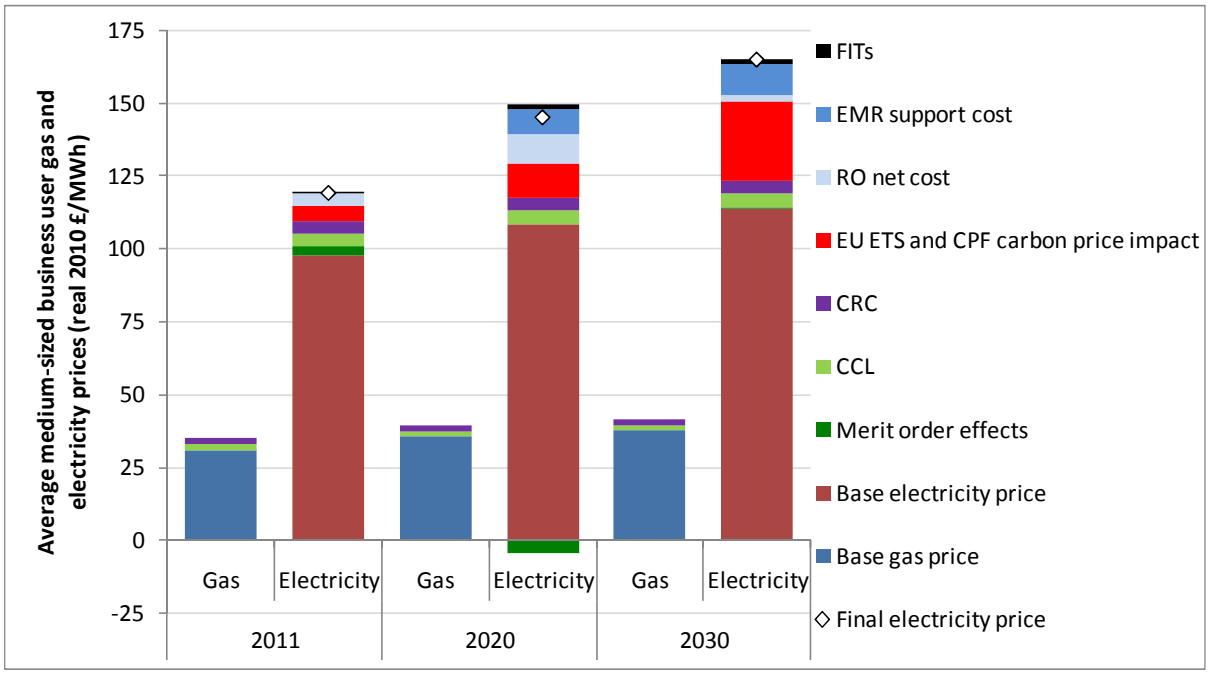
65. Current data allows us to estimate the current competitive position of UK energy prices but it is not possible to make an estimate of the future competitiveness of UK firms. Nevertheless, going forward energy prices are expected to increase in most countries due to rising international prices for fossil fuels. Moreover, all EU countries are subject to Europe-wide targets for renewable energy generation and carbon emissions and our other major competitors outside the EU also have ambitions to increase the amount of low carbon energy they consume and have policy programmes to support investment in low carbon generation. However, it is unclear what this will mean for prices in individual countries.

5.2. Impacts of energy and climate change policies on medium-sized business users' energy bills to 2030

66. Different policies apply to business sectors of the economy compared with the household sector. The analysis below has been carried out for a medium-sized business user of gas and electricity based on the midpoints of Eurostat size-bands for medium-sized gas and electricity consumers in industry.[50]

67. Chart 17 and Table 3 illustrate the estimated increase in average business sector gas and electricity prices due to energy and climate change policies in 2011, 2020 and 2030. As with household prices, the increases in prices excluding policies to 2030 are driven by rising wholesale prices, based on DECC's fossil fuel price assumptions, and rising transmission, distribution and metering costs, informed by current price controls and historical trends.

Chart 17: Estimated impact of energy and climate change policies on average retail gas and electricity prices paid by UK medium-sized business users



Source: DECC 2011

[50] Medium-sized business users are defined by annual consumption between 2,778 and 27,777MWh of gas and between 2,000 and 19,999MWh of electricity. The midpoints of these ranges have been used for this analysis.

Table 3: Estimated impact of energy and climate change policies on average gas and electricity prices and average gas, electricity and energy bills paid by medium-sized business users[51]

	2011	2020	2030
Price impacts (real 2010 £/MWh and % change)			
Average **gas price** without policies	31	36	38
Average **gas price** with policies	35	39	41
Impact of policies on average **gas price**	4 (12%)	4 (11%)	4 (10%)
Average **electricity price** without policies	98	109	114
Average **electricity price** with policies	119	145	165
Impact of policies on average **electricity price**	22 (22%)	37 (34%)	51 (45%)
Bill impacts (real 2010 £000s and % change)			
Average **gas bill** without policies	£476	£544	£575
Average **gas bill** with policies	£527	£577	£617
Impact of policies on average **gas bill**	£51 (11%)	£34 (6%)	£42 (7%)
Average **electricity bill** without policies	£1,074	£1,194	£1,254
Average **electricity bill** with policies	£1,294	£1,496	£1,720
Impact of policies on average **electricity bill**	£220 (21%)	£302 (25%)	£466 (37%)
Average **energy bill** without policies	£1,550	£1,738	£1,829
Average **energy bill** with policies	£1,821	£2,073	£2,337
Impact of policies on average **energy (gas plus electricity) bill**	£271 (18%)	£335 (19%)	£508 (28%)

Source: DECC 2011. Numbers may not add up due to rounding.
The average medium-sized business user is assumed to be consuming 15,278MWh of gas and 11,000MWh of electricity in each year to 2030 *before* efficiency savings (based on midpoints of Eurostat size bands).
The electricity bill and energy bill *with policies* are net of the average Green Deal Loan repayment.
For details of each policy's contribution to the total price and bill impacts, see Annexes E and F.

[51] It should be noted that these figures do not include the bills savings resulting from the Smart Meters rollout in the non-domestic sector (defined as those within electricity profile classes 3 and 4 and those with gas consumption below 732 MWh per annum) as these users are smaller than a medium-sized business user. These figures also do not include impacts on bills from advanced metering in larger electrical sites (defined as those within profile classes 5-8) and larger gas sites (defined as those with consumption above 732MWh per annum), whose energy suppliers are required to provide such metering by April 2014. Figures also exclude the very largest electricity sites (where maximum demand exceeds 100 KW) and gas sites (consumption exceeding 58,600MWh per annum), where half hourly metering has been mandatory since 1998.

68. Energy and climate change policies are currently estimated to be adding around 12% to the average unit cost of gas for medium-sized business users in the UK in 2011. This reflects the impact of the CCL on business users and the cost of purchasing a CRC allowance to cover the emissions from each unit of gas they consume. The impact of policies on gas prices is estimated to remain broadly constant to 2030. In July 2010 the impact in 2020 was estimated to be higher, at 24%. The reduction since then reflects the Government's decision to fund the RHI from general taxation rather than a levy on fossil fuel suppliers.

69. Policies are estimated to be adding around 22% to the average unit cost of electricity faced by medium-sized business users in the UK in 2011. As with the unit cost of gas for these users, this impact reflects the CCL and CRC allowance cost per unit of electricity consumed. It also reflects the cost of the RO and small-scale FITs obligation on retail prices and the carbon cost of the EU ETS on wholesale electricity costs in 2011. Looking forward, the impact of policies on unit electricity costs for business users is expected to rise to 34% by 2020 with the introduction of the CPF and the increased deployment of renewables and other low-carbon generation funded by the RO, small-scale FITs and EMR. This increase is partly mitigated by the dampening effect on wholesale electricity prices as a result of increasing low-marginal cost generating capacity entering the system as a result of policies like the RO and EMR. The 34% impact in 2020 is lower than the 43% estimated in July 2010 as a result of decisions the Government has made around the RO, small-scale FITs and EMR. Towards 2030, the impact of policies on business unit electricity costs is expected to rise to 45% reflecting the rising cost of carbon to electricity generators (which are assumed to be passed onto retail prices through wholesale electricity costs).

70. The EU-wide cost of carbon (EUA price) adds approximately 5% to electricity prices faced by medium-sized business users in 2011 (before other policies are included). This is expected to rise to 10% in 2020 and to between 11 and 24% in 2030.[52] The EU ETS therefore represents about one quarter of the total electricity price impact for business users. As discussed in previous sections, the EU ETS carbon price will affect the cost of electricity generation in all EU countries – and therefore costs of electricity to businesses in all EU countries, not just the UK. The extent to which this is passed onto retail electricity prices across the EU depends on, among other things, the carbon intensity of the electricity generation sector, the electricity supply market structure, and the extent to which there are regulated tariffs to particular users in each country.

71. As with households, the impact of policies on the average energy bill paid by a medium-sized business user is expected to be lower than the impact on energy prices. In 2011, efficiency savings achieved through actions to cut emissions covered by the CRC energy efficiency scheme[53] and existing Climate Change

[52] The range reflects uncertainty around the outturn EUA price in 2030. The lower bound price is consistent with DECC's central assumption for EUA prices consistent with a 20% carbon reduction target. The upper bound is based on DECC's central assumption for EUA prices in line with a global carbon market and limiting climate change to a level consistent with 2°C above pre-industrial temperatures.

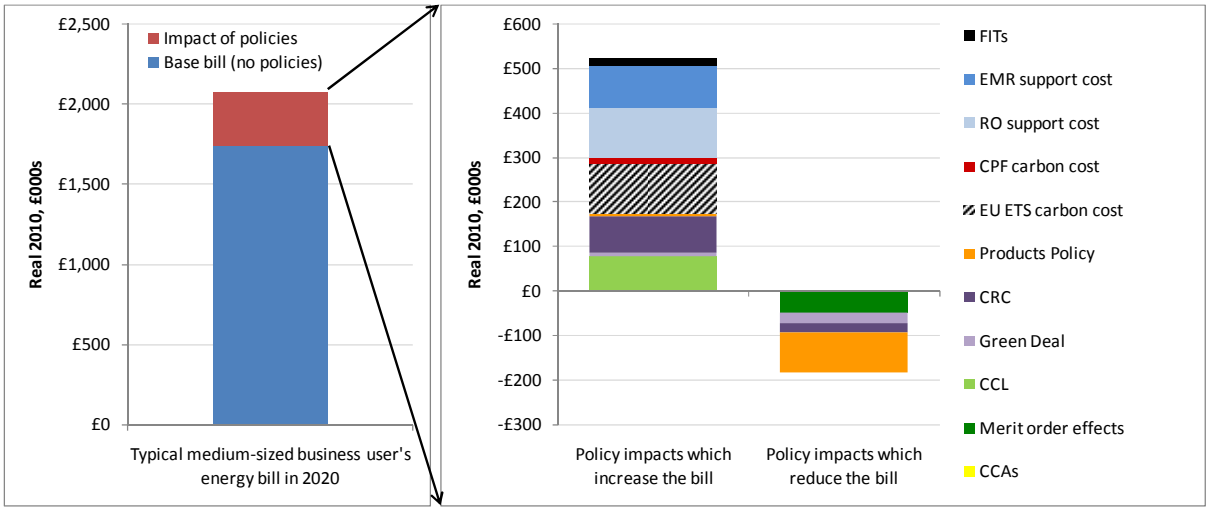
[53] The Environment Agency has just received the results from the first CRC footprint and annual reports. With only one year of data, it is not possible to verify any specific savings. Therefore, the price and bills savings are based on the impact Assessment modelling (see: http://www.decc.gov.uk/en/content/cms/emissions/crc_efficiency/policy/policy.aspx).

Agreements (CCAs),[54] as well as existing EU minimum efficiency standards for products (Products Policy) mean the average business user is currently expected to be consuming less energy than it would have done without these policies. As such, policies are currently estimated to be adding around 18% to the average energy bill of a medium-sized business user in 2011 compared to what the bill would have been in the absence of policies.

72. Efficiency savings are expected to continue to be made from measures installed to meet existing CCAs until the end of their technological life-span. There is also expected to be an increase in efficiency savings made by the average business as less efficient energy using products are increasingly removed from the market and replaced by new products which must meet the more stringent efficiency standards. Businesses are also expected to take up measures as part of the Green Deal when it is introduced. Accounting for these savings and the average annual Green Deal loan repayments for these users, energy and climate change policies are estimated to add around 19% to the average energy bill of a medium-sized business user in 2020, rising to 28% in 2030 (compared to what the bill would have been in these years in the absence of policies).

73. Chart 18 shows the counteracting effects of the policy price impacts (and rebound effects[55] and loan repayments) which increase the average energy bill, and the efficiency savings which reduce the average energy bill, for a medium-sized business user in 2020. Annexes E and F provide the total policy impact on gas and electricity prices and bills broken down by individual policy contributions.

Chart 18: Estimated impact of energy and climate change policies on an average medium-sized business user's energy bill in 2020



Source: DECC 2011. Figures in real 2010 prices.

[54] CCAs have been in place since 2001. Savings are attributed only to legacy savings from previous CCA targets initially identified in the Low Carbon Transition Plan and evidence supporting CCA milestone reviews (see, for example: http://www.decc.gov.uk/en/content/cms/emissions/ccas/cca_analysis/cca_analysis.aspx).

[55] Specifically the Heat Replacement Effect (HRE) from more efficient products. As more efficient energy using products emit less heat, more heat fuel (in this case, gas) is needed to maintain the same surrounding temperatures.

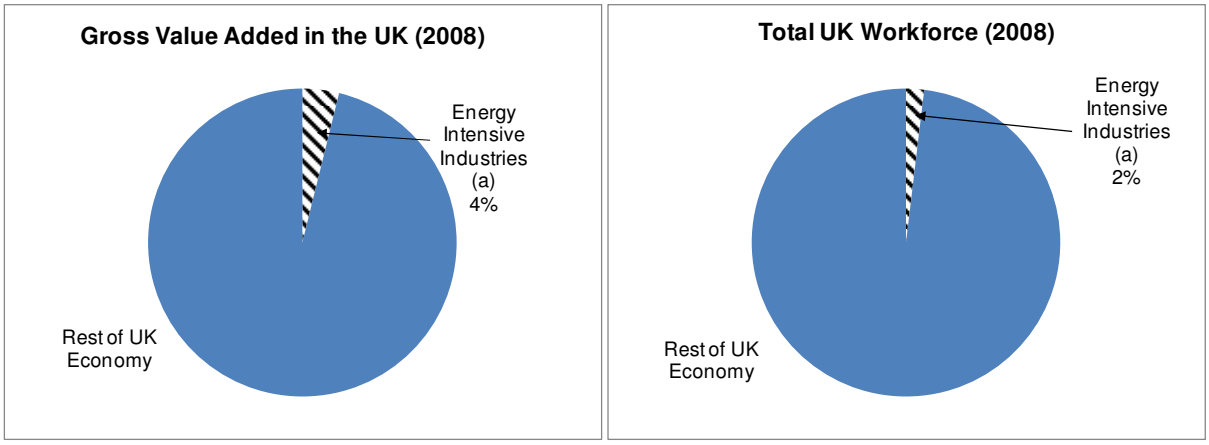
74. As discussed in Section 3, for most businesses, direct energy costs are a relatively small proportion of total costs. For example, the cost of energy and water represented around 2.7% of the total costs for the UK manufacturing sector as a whole. This implies that, if the average energy bill in the sector were 18% higher in 2011 as a result of energy and climate change policies, then the direct impact of energy and climate change policies on total costs in that sector is lower, at around 0.5%.

5.3. Impacts of energy and climate change policies on large energy-intensive users' energy bills to 2030

75. The analysis in this section updates provisional analysis DECC published in July 2011 on the impacts of energy and climate change policies on the electricity and gas prices faced by large energy intensive industries.

76. For most businesses, energy costs only represent a small proportion of their total costs. For a small but important section of business, known as energy-intensive industries, energy costs constitute a significant proportion of their total costs. In 2008, these industries directly accounted for around 4% of total gross value added in the UK and just over 2% of the workforce (see Chart 19) – they also create indirect value and employment down the product supply chain.

Chart 19: Energy Intensive Industries: Direct Gross Value Added and Employment as a share of total UK (2008)



Source: BIS. Based on the criterion that energy costs are at least 10% of GVA.

77. An analysis of electricity and gas bills does not in itself tell us whether energy intensive industries are financially better or worse off as a result of energy and climate change policies or how their international competitiveness will be affected. A number of other important factors need to be taken into account:

a. The commercial arrangements and contracts established between large energy intensive users and energy suppliers;
b. The savings to businesses from switching to renewable sources of energy;
c. The ability to pass on any increased costs to their customers;
d. The direct impact of the EU Emissions Trading System (EU ETS); and
e. The wider business environment.

78. More discussion on these wider factors is provided in the methodology section (Section 3), which also indicates if and how any of these factors has been accounted for in the main analysis.

79. The methodology and policies assessed in the analysis of large energy intensive industries differ to those for the analysis of medium-sized business users presented in the previous section for the following key reasons:

    - The policy assumptions in the modelling for energy intensive users are different – large energy intensive users receive a discount on the CCL for participating in CCAs[56] and are outside the Carbon Reduction Commitment Energy Efficiency Scheme (CRC).[57] The analysis assumes all electricity and gas used by the illustrative user faces a discounted rate of CCL.

    - There is not assumed to be any Green Deal take up for very large industrial users as it is unlikely to be available for large process installations.

    - Base prices (excluding policies) are lower for large energy intensive users – in line with historic trends, retail electricity and gas prices are assumed to be lower as a result of stronger bargaining power of larger energy users and economies of scale in supplying such users among other factors.[58]

80. The impact on energy intensive users' energy bills is complex to analyse. This is because of the diversity of energy usage (including a large use of non-metered fuels) and energy prices faced by energy users in the sector and the different levels of cost effective energy efficiency opportunities both within and across sectors. Due to the range of different production processes within the sector, each requiring a different fuel mix, it has not been possible to arrive at a single representative energy intensive user. Instead, analysis of the total energy (gas plus electricity) bill has been carried out based on three different illustrative users, defined by the relative share of electricity and gas consumption.[59]

81. Table 4 and Charts 20 and 21 present the results of this analysis. The ranges shown in the table reflect the uncertainty with which retail energy suppliers will be able to pass on costs (of policies such as the RO, small-scale FITs and the EMR) on an equal per unit basis as smaller energy customers and also the fact that a significant share of electricity consumed by large energy intensive industries is generated on-site and is likely to be exempt from a large number of policies, in particular, those which are obligations on retail energy suppliers.

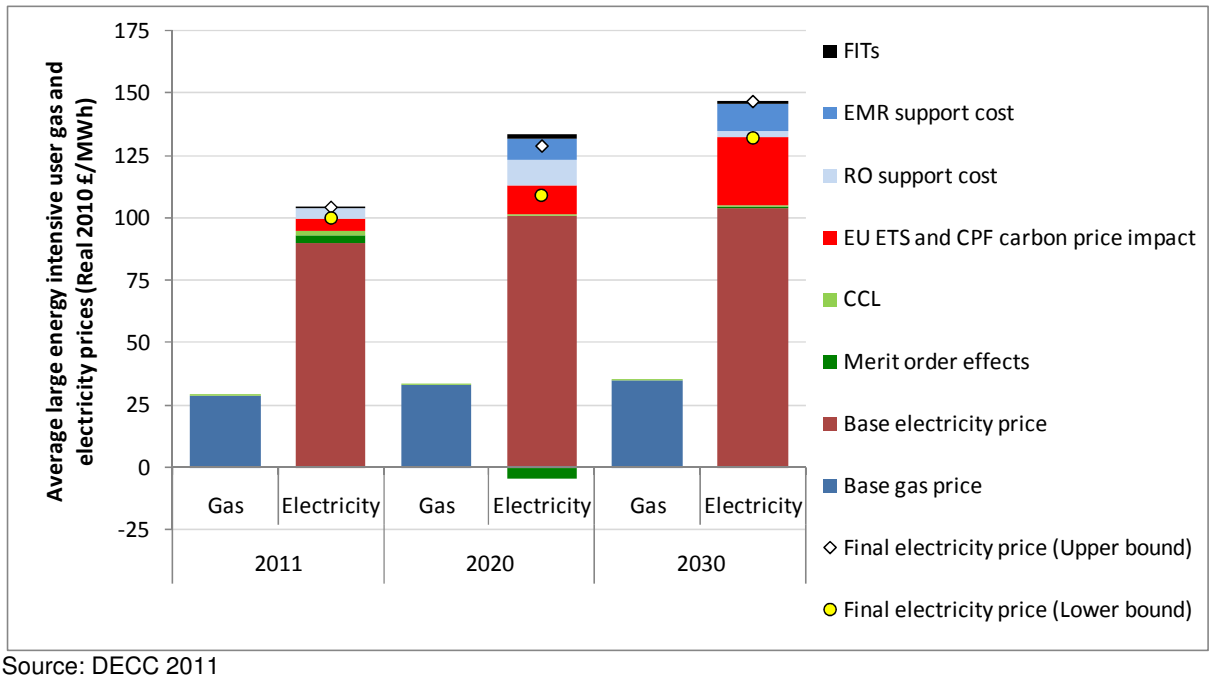
[56] The analysis does not account for any electricity consumption which is completely exempt from the CCL. For such users, the estimated impacts of energy and climate change policies should be considered an overestimate.
[57] The section on medium-sized business users covered all non-domestic users and therefore spread the savings from CCAs and the CRC equally across all non-domestic energy consumption. It also assumed a full rate of CCL was paid on all energy consumption.
[58] Historically, larger energy users have paid lower energy prices than smaller users. See DECC's *Quarterly Energy Prices* available online at: http://www.decc.gov.uk/en/content/cms/statistics/publications/prices/prices.aspx.
[59] The three illustrative users are 20% electricity, 80% gas, 50% electricity, 50% gas and 80% electricity, 20% gas informed by actual consumption data for companies in 2008 collected by AEA.

Table 4: Estimated impact of energy and climate change policies on average gas and electricity prices and bills paid by large energy intensive users compared with prices and bills in the absence of policies[60]

	2011	2020	2030
Gas and electricity price impacts			
Gas price	2%	2%	2%
Electricity price	11% to 16%	8% to 28%	27% to 41%
Gas and electricity bill impacts			
Gas bill	-1%	2%	2%
Electricity bill	8% to 13%	2% to 22%	23% to 36%
Illustrative energy (gas and electricity) bill impacts[61]			
80% electricity, 20% gas	8% to 12%	2% to 20%	21% to 34%
50% electricity, 50% gas	6% to 10%	2% to 17%	18% to 28%
20% electricity, 80% gas	3% to 5%	2% to 10%	11% to 17%

Source: DECC 2011.
For details of each policy's contribution to the total price and bill impacts, see Annexes E and F.

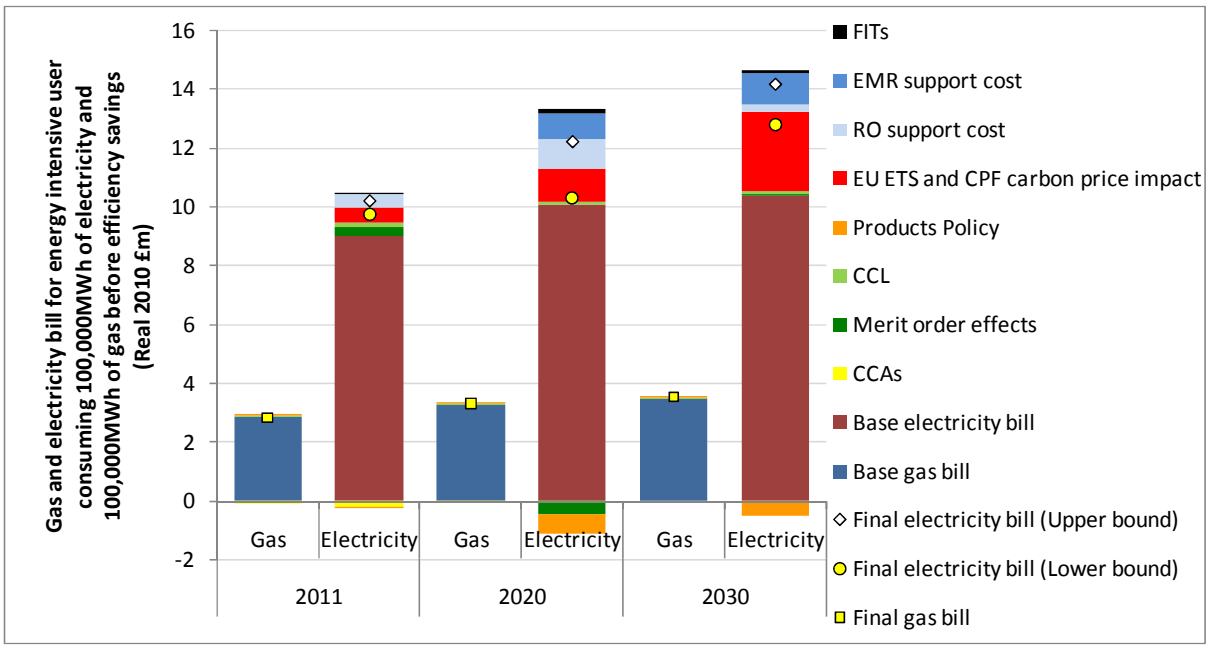
Chart 20: Estimated impact of energy and climate change policies on average retail gas and electricity prices faced by large energy intensive users



Source: DECC 2011

[60] The results in Table 4 focus on the % impacts rather than absolute impacts because, in reality, the scale of consumption in the sector varies significantly. As the results are scalable, the % impacts would remain unchanged across different scales of consumption.
[61] The illustrative users have been selected based on data on existing consumption mixes by CCA users.

Chart 21: Estimated impact of energy and climate change policies on average retail gas and electricity bills faced by large energy intensive users who consume 100,000MWh of gas and 100,000MWh of electricity before policies



Source: DECC 2011

82. The impacts of policies on the energy bills of large energy intensive users are higher than in the July 2011 provisional analysis partly as a result of revised lower CCA savings assumptions. The new assumptions reflect ongoing energy savings delivered from previous historic targets which decline at the rate of the average technological life-cycle. CCAs (and the CCL) are estimated to deliver no additional savings beyond those delivered by these historic targets. This is a conservative assumption as CCA targets will be set in 2012 following negotiations with industry which have not yet started.

6. Sensitivity analysis around fossil fuel prices

83. Assessing the future impact of energy and climate change policies on prices and bills depends on assumptions made about what prices would be in the absence of those policies ('the counterfactual'). It is possible to envisage a large number of plausible counterfactuals by making different assumptions on key factors including future fossil fuel prices.

84. Changes in fossil fuel prices (gas, coal and oil) are the primary drivers of wholesale energy costs. Fossil fuel prices also affect the cost of energy and climate change policies. With higher fossil fuel prices, the costs of energy and climate change policies are generally reduced.[62] Higher fossil fuel prices lower

[62] There are some exceptions, for example the cost of FITs is expected to be higher under higher fossil fuel prices because higher energy costs incentivise take up of FITs measures which help save households and businesses money on their electricity bill.

the cost of policies such as the EMR since less additional incentive is required to bring forward low-carbon investment. If fossil fuel prices are lower, more additional incentive would be required to bring forward the same amount of low-carbon investment. Higher fossil fuel prices also lead to higher baseline energy prices more generally and thereby increase the value of any energy savings from energy efficiency policies. Similarly, lower energy prices reduce the direct monetary value of energy efficiency savings.

85. The analysis in the previous sections is based on DECC's "Central" fossil fuel price scenario consistent with a wholesale gas price of 68p/therm in 2020, a coal price of $109/tonne in 2020 and an oil price of $118/bbl in 2020 (all in real 2010 prices).

86. Table 5 shows the estimated cumulative impact of energy and climate change policies on the average energy (gas plus electricity) bills paid by the illustrative energy users in 2020 and 2030, compared with what they would have been in each of these years in the absence of policies, based on three possible scenarios for fossil fuel prices:

- **"Low" –** Consistent with wholesale gas prices falling to 35p/therm by 2020. Oil prices are assumed to be $91/bbl and coal prices $79/tonne in 2020 (all real 2010 prices);

- **"Central" –** Consistent with wholesale gas prices plateauing at 68p/therm from 2018 onward. Oil prices are assumed to be $118/bbl and coal prices $109/tonne in 2020;

- **"High" –** Consistent with wholesale gas prices rising to 92p/therm by 2020. Oil prices are assumed to be $134/bbl and coal prices $150/tonne in 2020.

87. The full price assumptions to 2030 are presented in Annex A[63] and more detailed results for the "High" and "Low" scenarios are presented in Annex H.

[63] Further detail on DECC's fossil fuel price assumptions can also be found online at: http://www.decc.gov.uk/en/content/cms/about/ec_social_res/analytic_projs/ff_prices/ff_prices.aspx.

Table 5: Estimated impact of energy and climate change policies on average energy (gas plus electricity) bills compared with bills in the absence of policies under different fossil fuel price scenarios

Real 2010 prices	2020	2030
Household		
Low	-1%	1%
Central	-7%	-3%
High	-9%	-7%
Medium-sized business user		
Low	33%	38%
Central	19%	28%
High	13%	17%
Large energy intensive industrial user		
Low	5 to 35%	12 to 45%
Central	2 to 20%	11 to 34%
High	0 to 14%	7 to 19%

Source: DECC 2011. Figure may not add due to rounding.
The ranges presented for large energy intensive users capture the range of results for the three illustrative user mixes. The results for each illustrative large energy intensive user are presented separately in Annex H.

88. The effect that lower fossil fuel prices have of increasing the cost of incentivising low-carbon investment combined with the lower monetary value of energy efficiency savings when energy prices are lower mean that, under the "Low" fossil fuel price scenario, energy and climate change policies would be expected to lead to lower savings on the average household energy bill in 2020 and **increase** the average household energy bill in 2030 compared with what the bill would have been in these years without policies (this compares to an estimated **decrease** as a result of policies in the "Central" scenario in 2030). The impact of policies on business users would also be higher compared with in the "Central" scenario. However, energy bills for all users would be lower overall than they would be under the "Central" and "High" fossil fuel price scenarios.

89. Under the "High" fossil fuel price scenario, the opposite is true: energy bills for all users would be higher in all years than under the "Central" and "Low" scenarios, but the impact of policies would be lower (the savings from policies on the average household energy bill would be greater). Under high fossil fuel prices, policies are estimated to save the average household 9% on their energy bill in 2020 compared to a bill without policies.

Annex A: Fossil fuel price assumptions

Real 2010	Low			Central			High		
	Gas (p/therm)	Oil ($/bbl)	Coal ($/tonne)	Gas (p/therm)	Oil ($/bbl)	Coal ($/tonne)	Gas (p/therm)	Oil ($/bbl)	Coal ($/tonne)
2011	**61**	**109**	**128**	**61**	**109**	**128**	**61**	**109**	**128**
2012	47	107	123	67	110	128	77	111	135
2013	31	104	116	72	111	128	79	114	141
2014	32	102	111	78	112	125	81	116	142
2015	32	100	105	79	113	123	83	119	144
2016	32	98	100	79	114	120	84	122	145
2017	33	96	95	74	115	118	86	125	146
2018	33	94	90	68	116	115	88	128	147
2019	34	93	84	68	117	112	90	131	149
2020	**35**	**91**	**79**	**68**	**118**	**109**	**92**	**134**	**150**
2021	36	89	79	68	119	109	94	137	151
2022	37	87	79	68	120	109	97	140	151
2023	38	85	79	68	121	109	97	143	152
2024	39	84	79	68	122	109	97	146	152
2025	40	82	79	68	123	109	97	150	153
2026	41	80	79	68	124	109	97	153	153
2027	42	79	79	68	125	109	97	157	153
2028	43	77	79	68	126	109	97	160	153
2029	43	76	79	68	127	109	97	164	153
2030	**44**	**74**	**79**	**68**	**128**	**109**	**97**	**168**	**153**

Source: DECC's latest fossil fuel price assumptions available online at: http://www.decc.gov.uk/en/content/cms/about/ec_social_res/analytic_projs/ff_prices/ff_prices.aspx. Numbers may differ to those in the link due to the use of different base years to present prices.

Annex B: Policies assessed in this analysis

The results presented in this document are based on analysis of proposals and policies put forward by both the previous Government and the present Government. Only those policies which are already in place or planned to a sufficient degree of detail have been included in the modelling (i.e. with quantified estimates of costs and benefits). The table below sets out the policies analysed and where there have been significant changes in policy design since July 2010 and the analysis of price and bill impacts published alongside the 2010 Annual Energy Statement.

Policy	Notes
Better Billing	Suppliers are required to include on bills or statements comparisons between the energy used in the period covered by the bill or statement and that from the same period in the previous year. This requirement, which was part of the UK's implementation of the Energy Services Directive, was designed to help customers be more aware of their energy usage, and consequently use energy more efficiently. The savings estimates are consistent with the published Impact Assessment.[64]
Carbon Capture and Storage demonstrations (CCS)	CCS is a mitigation technology which captures CO_2 from fossil fuel power stations. The CO_2 is then transported via pipelines and stored safely offshore in deep underground structures, such as depleted oil and gas reservoirs, and deep saline aquifers. The individual processes involved in CCS are not novel, but the full chain of technologies has yet to be demonstrated together at commercial scale on a power station. The scale of the challenges involved in the demonstration of CCS at commercial scale – the increased costs and risks associated with these 'first of a kind' demonstration projects – means that the market alone will not deliver deployable CCS within the timeframe required to meet carbon reduction targets. As announced at Budget 2011, and consistent with its objectives for tax simplification, the Government will not proceed with a CCS levy to fund CCS demonstrations. Several alternative funding options for providing financial support for the Government's CCS commitments, including through CfDs, are being considered.
Carbon Emissions Reduction Target (CERT)	This requires energy suppliers to make savings in the amount of CO_2 emitted by householders. Suppliers meet this target by promoting (for example, through subsidies) the uptake of energy efficiency measures; predominantly loft insulation, cavity wall insulation and historically low energy lighting. This policy was introduced in April 2008 and extended to December 2012 (see below). The estimated savings delivered by CERT's

[64] The consultation document and accompanying Impact Assessment are available online at: http://www.decc.gov.uk/assets/decc/what%20we%20do/supporting%20consumers/smart%20energy%20meters/file40456.pdf.

	predecessors, Energy Efficiency commitments 1 & 2 (EEC1&2) which were in place between April 2002 and March 2008, are also included in this policy's bill impact estimates. The estimated efficiency savings from CERT allow for a comfort factor of 15% for insulation measures. They also reflect some degree of underperformance and under use of measures distributed based on available evidence. Bill impacts for CERT and the CERT extension arise from the cost to suppliers of meeting their targets and the reduced energy demand resulting from households receiving measures.[65]
CERT Extension	The CERT Extension is a 108Mt extension to CERT, due to run between 2011 and 2012. It includes a super-priority group which must receive 15% of this target; professional insulation must receive 68% of the target; and Compact Fluorescent Lights are no longer eligible measures. Analysis allows for a comfort factor of 40% for insulation measures in the super priority group (15% in all other groups) and 25% for heating measures in the super priority group (0% for all other groups).[66] The savings from installed measures expected to accrue in the years following.
Carbon Reduction Commitment (CRC)	The CRC Energy Efficiency Scheme (CRC) is a mandatory UK-wide scheme introduced in April 2010 which targets unregulated emissions from large public and private sector organisations. It is designed to incentivise the uptake of cost-effective energy efficiency opportunities through the application of additional financial and reputational drivers. Since publication of the last price and bills analysis, the CRC has been subjected to a number of changes which include the extension of phase I and the removal of revenue recycling. Government will consult on further simplification changes next year, which will focus on phase II of the CRC.[67]
Climate Change Agreements (CCA)	CCAs allow eligible energy intensive businesses to receive a discount on the CCL (see next box) in return for meeting energy efficiency or carbon saving targets. CCAs and the CCL are estimated to have no additional savings beyond business as usual projections from DECC's Energy Model.[68] The next round of CCA targets will be set in 2012 following negotiations with industry.[69]

[65] For further information, the Impact Assessment is available online at: http://www.decc.gov.uk/assets/decc/Consultations/carbon%20emissions%20reduction%20target/1_20090630122512_e_@@_CERTImpactAssessment.pdf.

[66] For further information, the Impact Assessment is available online at: http://www.decc.gov.uk/assets/decc/consultations/certextension/121-iacertextension.pdf.

[67] For further information, the Impact Assessment is available online at: http://www.decc.gov.uk/assets/decc/Consultations/crc-amendment/901-ia-crc-en-efficiency-scheme-amend.pdf.

[68] The latest projections are available online at: http://www.decc.gov.uk/en/content/cms/about/ec_social_res/analytic_projs/en_emis_projs/en_emis_projs.aspx.

Climate Change Levy (CCL)	The CCL was introduced in April 2001. It is a tax on the use of energy in industry, commerce and the public sector. The Government announced the full rates from 1 April 2012 would be £5.09/MWh for electricity and £1.77/MWh for gas. We assume these rates remain constant in real terms to 2020. The analysis assumes a CCA discount is received on this for all delivered electricity and gas consumption by energy intensive users. The discount is assumed to be 65% for both gas and electricity for the years 2011 and 2012, rising to 80% for electricity from 2013 in line with the Government's announcement in the 2011 Budget.
Community Energy Saving Programme (CESP)	CESP targets households in Great Britain, in areas of low income, to improve energy efficiency standards. It is funded by an obligation on energy suppliers and electricity generators and is expected to deliver up to £350 million of efficiency measures between October 2009 and December 2012.[70]
Electricity Market Reform (EMR)	The Government set out a package of measures to reform the electricity market to deliver secure, affordable, low carbon electricity in its EMR White Paper in July 2011.[71] This confirmed the Government's preferred type of large-scale FIT to provide certainty for investors in low carbon generation technologies – a FIT with Contracts for Difference (CfD) on the wholesale electricity price. This analysis assumes that FIT CfDs will replace the RO to support new renewable generation projects from 2016 commissioning (part-way through a period of choice for renewables investors between the RO and FIT CfDs). The full detail of the implementation of this policy has yet to be decided. As part of the White Paper, the Government also consulted on options for a Capacity Mechanism to ensure that there is sufficient reliable and diverse capacity to meet electricity demand. No decision has yet been taken on the type of Capacity Mechanism. For modelling purposes and for simplicity this analysis assumes a Strategic Reserve type of Capacity Mechanism. The Government will confirm its decision on the type of Capacity Mechanism in a technical update to the EMR White Paper at the turn of the year. This analysis includes updated assumptions from what was presented in the EMR White Paper. In particular the analysis has been revised to incorporate the latest DECC assumptions on fossil fuel prices, technology costs and electricity demand. The EMR packages were modelled to reach an illustrative level of decarbonisation of the power sector by 2030 (an emission intensity of 100gCO_2/kWh) to see how each package would reach

[69] For further information, see policy page at: http://www.decc.gov.uk/en/content/cms/emissions/ccas/ccas_policy/ccas_policy.aspx.
[70] For further information, see: http://www.decc.gov.uk/en/content/cms/funding/funding_ops/cesp/cesp.aspx.
[71] Available online at: http://www.decc.gov.uk/en/content/cms/legislation/white_papers/emr_wp_2011/emr_wp_2011.aspx.

	these targets and at what cost. This is an indicative target level consistent with modelling for the EMR Consultation Document and White Paper and with the previous recommendation for the power sector from the Committee on Climate Change (CCC). The most recent CCC publication for the 4th Carbon Budget, however, recommends decarbonising the power sector to a lower figure of around 50gCO_2/kWh in 2030. Sensitivities illustrating this level of decarbonisation were included in the EMR White Paper.
EU Emissions Trading System (EU ETS) and Carbon Price Floor (CPF)	The EU ETS was introduced in 2005. The estimated price and bill impacts of the EU ETS and CPF are based on analysis of the impact of the carbon price on wholesale electricity prices. The results presented assume full cost pass through of the EUA (carbon) price faced by the marginal generator to end use consumers regardless of whether allowances are allocated free of charge to generators or are purchased from auctions or the secondary carbon market. Electricity generation investment and dispatch decisions are held constant as the impact of policies on them is separately attributed to the "Wholesale electricity impacts (merit order effects)" element (described below). This analysis is based on a linear trajectory for the Carbon Price Floor between 2013 and 2020 and between 2020 and 2030, starting at £16/tCO_2 in 2013, targeting £30/tCO_2 in 2020 and £70/ tCO_2 in 2030 (in real 2009 prices). The CPF is designed to top up the carbon price to a target level and therefore the projected impact of the policy on bills depends on the underlying assumption for the EUA price. DECC's carbon price assumptions in this analysis are based on current funded policies consistent with the EU 20% emissions reduction target.[72] This carbon value is used to estimate the lower-bound impact of the EU ETS (and the CPF balance) in 2030. However, it is important to note that if Government is successful in its push for tougher EU and global action to limit emissions, the general trend will be for increasing future carbon prices. The Government is committed to continuing to push for global action to limit the increase in temperature to 2℃ is £70/tCO2 in 2030 (real 2009 prices).[73] Under this scenario the impact of the CPF would be reduced to zero in 2030. This carbon value is used to estimate the upper-bound impact of the EU ETS (and the CPF balance) in 2030. The impact on wholesale electricity prices of increased low carbon generation capacity (as a result of the RO and CPF) has also been accounted for and presented separately (see description of

[72] Available online at: http://www.decc.gov.uk/assets/decc/11/cutting-emissions/carbon-valuation/3138-carbon-values-decc-energy-modelling.pdf.
[73] Available online at: http://www.decc.gov.uk/assets/decc/11/cutting-emissions/carbon-valuation/3136-guide-carbon-valuation-methodology.pdf.

	"wholesale electricity price impacts" below). This analysis has not considered the direct costs of the EU ETS (i.e. the cost to businesses covered by the scheme of purchasing carbon allowances).
Small-scale Feed-in-Tariffs (FITs)	Introduced in April 2010, small-scale FITs are designed to incentivise small-scale, low-carbon electricity generation by households, communities and businesses. A small-scale FITs generator may use electricity generated onsite, thus avoiding having to purchase that electricity from their supplier, may export their generation directly to the grid, or (in many cases) some combination of the two. Small-scale FITs consist of two elements of payment to FITs generators: a generation tariff paid for every unit of electricity generated and metered, and an export tariff for any electricity generated and exported to the grid. Following a consultation, tariffs for 250-5,000kW solar PV installations were lowered, and those for Anaerobic Digestion (AD) raised on 1 August 2011. On 7 February 2011, the Government announced the first comprehensive review of the FITs scheme for small-scale low-carbon electricity generation. A principal objective of the review was to determine how the efficiency of FITs will be improved to deliver £40 million of savings, around 10%, in 2014/15, as committed to in the 2010 Spending Review. On 31 October 2011 DECC launched a new consultation on solar PV, which proposes further adjustments to tariffs, as well as an energy efficiency eligibility requirement. The analysis reflects the 31 October proposals for solar PV and the August changes to AD tariffs.[74]
Green Deal and Energy Company Obligation (ECO)	The Green Deal established a framework to enable organisations (including private companies, local authorities, charities and trade associations) to offer consumers energy efficiency improvements to their homes, community spaces and businesses at no upfront cost, and to recoup payments through a charge in instalments on the energy bill. The new ECO will require energy companies to support households in improving the energy efficiency of their homes, both improving the ability of the vulnerable and those on lower incomes to heat their homes affordably, and supporting households who live in harder and more expensive to improve homes (e.g. homes needing improvements such as solid wall insulation). In the analysis, the ECO replaces the Future Supplier Obligation set out in the July 2010 assessment. The main analysis presents a combined impact of the Green Deal

[74] For further information, see policy page at: http://www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/feedin_tariff/feedin_tariff.aspx.

	and ECO on households, encompassing the cost impact of the ECO support, the average efficiency saving from both ECO and Green Deal measures and the average Green Deal loan repayment. The ECO and Green Deal policies have been designed to support each other, and many measures will receive support from both policies. Most ECO measures will not be fully subsidised by the ECO policy but will also include an element of Green Deal finance to cover the full upfront cost of installation. The efficiency savings from the household measures include an 'underperformance' factor based on a review of measured versus theoretical energy savings.[75] In addition, it is estimated that approximately 10% of the building stock have parts of their external walls that are inaccessible, reducing performance of CWI installations. In addition, a 15% comfort factor is assumed. The Green Deal will also be introduced into the business buildings market but there will be no corresponding business ECO. A consultation on the Green Deal and Energy Company Obligation was launched in November 2011.[76]
Products Policy	Products Policy includes legally binding EU minimum standards of energy efficiency on energy related products, which raises the minimum level of efficiency of energy using products available in the market. It also includes labelling which encourages manufacturers to go beyond the minimum standards. There are a number of EU Implementing Measures (minimum standards and labelling) that have already been agreed by EU Member States covering a range of products used by households and businesses (such as lighting, TVs and electric motors and circulators), in order to improve their energy efficiency.[77] The associated savings are detailed in relevant Impact Assessments.[78] The EU framework directive also covers a second tranche of measures, which are also analysed, noting that the impacts are more uncertain due to their exact shape/timing not yet being finalised in Europe. The Products Policy energy savings estimates draw on a wide range of empirical data including present and historic data on the stock of products, product sales, energy efficiency of products,

[75] Glasgow Caledonian University, *Review of differences between measured and theoretical energy savings for insulation measures (2006*. Available online at: http://www.decc.gov.uk/assets/decc/what%20we%20do/supporting%20consumers/saving_energy/analysis/insulationmeasures-review.pdf.

[76] For further details, see Green Deal policy page online at: http://www.decc.gov.uk/en/content/cms/tackling/green_deal/green_deal.aspx.

[77] The full list of products covered by the first tranche of measures is available at: http://ec.europa.eu/enterprise/policies/sustainable-business/documents/eco-design/legislation/implementing-measures/index_en.htm.

[78] The IAs are available in Defra's IA library at: http://www.ialibrary.bis.gov.uk/search/index.cfm?Page=1&searchparam=%22energy%20using%20products%22&SortOrder=1.

	product lifespan, and usage. Data on energy efficiency is commonly taken from existing market research as well as manufacturers' literature.[79] The savings from Products Policy are more uncertain over later years as it becomes less clear whether policies drive efficiency improvements or whether this would have been driven regardless by i) either consumers' future preferences for better products, or ii) forecast energy prices and traded carbon prices. The savings from Products Policy are net of a heat replacement effect (HRE). HRE occurs where improved efficiency results in a reduction in the amount of useful space heating from products, resulting in an increase in the use of heating systems. Comfort taking (the direct rebound effect whereby the reduced cost of running appliances means they will be run more often) has not been modelled. For many products the *a priori* expectation is the magnitude of the impact is likely to be small. For instance, for fridges comfort taking would not occur, and for TV use the magnitude may be expected to be small. In order to realise savings associated with Products Policy, there will often be upfront financial costs of buying the more efficient products. The analysis does not consider these costs as it only looks at the impact on energy bills, however the increased costs of products are included in the relevant Impact Assessments. Products Policy includes legally binding EU minimum standards, which remove the most inefficient products from the market, and, therefore, households and businesses will automatically comply with these when purchasing products sold within the EU.
Renewable Heat Incentive (RHI)	The RHI will consist of tariffs paid to eligible commercial, public and industrial consumer groups who choose to take up renewable heat generating technologies. The Government will take a phased approach to implementing the RHI. Initially, in the first phase, long-term tariff support will be targeted at the big emitters in the non-domestic sector. A second phase of RHI support, including long-term tariff support for the domestic sector, will be introduced in 2012 to coincide with the introduction of the Green Deal for homes. Since July 2010, Government announced that RHI would be funded through direct taxation rather than a levy on the supply of fossil fuels.
Renewables Obligation (RO)	Introduced in April 2002, the RO is a mechanism for incentivising large-scale renewable electricity generation in the UK. It requires retail electricity suppliers to source an increasing proportion of their electricity from renewable sources by purchasing

[79] More data on individual product assumptions is available online at: http://efficient-products.defra.gov.uk/product-strategies/viewall/briefing-note#viewlist.

	Renewables Obligation Certificates (ROCs) issued to generators of renewable electricity by Ofgem. Suppliers who do not have sufficient ROCs to cover their obligation must pay a buy-out price. The RO support bill impacts cover all RO support and assume that suppliers pass on the costs of RO support evenly across all electricity sales. The RO support costs themselves are taken from analysis by Pöyry for the RO banding review, and assume the proposed technology bands in the RO consultation, published 20 October 2011, are implemented. This assumes that new renewables stations are supported under the RO until 2015, but from 2016 onwards all new renewables stations are supported by the new EMR support mechanism, whose bill impacts are described separately.[80] The RO support costs make up virtually all the impacts of RO policy to increase renewables on consumer bills. There is also a small offsetting reduction in wholesale prices through increased renewables which is included separately under Wholesale electricity impacts.
Smart Metering	The lack of consumer information about energy consumption will be addressed through the deployment of Smart Meters. Smart Meters will give energy consumers real-time information about the energy they are using, enabling them to better manage their energy use and reduce their carbon emissions. Smart Meters are also an important step towards the development of a smart grid, delivering improved network efficiency and responsiveness. On 30 March 2011 the Government and Ofgem jointly published the Government's response to the Smart Metering Implementation Programme: prospectus,[81] setting out conclusions about the approach to be taken to developing the regulatory framework for the rollout of smart meters. Since April, DECC has been directly responsible for the detailed implementation of the policy design and is planning to introduce regulations over the next 2 years to achieve and support the completion of the rollout in 2019. DECC is currently reviewing responses to the consultation on the draft licence conditions and technical specifications for the rollout of gas and electricity smart metering equipment, and is also consulting on the detailed policy design of the regulatory and commercial framework for a new data and communications entity (DCC).
Warm Home Discount (WHD)	The powers to introduce the WHD scheme were taken in the Energy Act 2010 and the scheme was launched in April 2011 following consultation. It is presently set to run from April 2011 to March 2015 and will be worth over £1.1bn in total over this period.

[80] For further information, see policy page at: http://www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/renew_obs/renew_obs.aspx.
[81] Available online at: http://www.decc.gov.uk/en/content/cms/consultations/smart_mtr_imp/smart_mtr_imp.aspx.

	Energy Suppliers are obliged to provide support with energy costs to more of their most low income and vulnerable customers. Suppliers' compliance will be monitored and enforced by Ofgem. Decisions on funding the scheme after March 2015 are yet to be taken; therefore going forward the scheme is assumed to be maintained at the same level as from April 2014 to March 2015. For the purpose of the modelling, the scheme is assumed to continue to 2030. No changes to the scheme have been made following its introduction in April 2011. The latest published policy updates on the scheme include the consultation response and final impact assessment published in February 2011 prior to the launch of the scheme.[82]
Wholesale electricity price impacts (merit order effects)	Energy and climate change policies will also affect investment and dispatch decisions in the wholesale electricity supply market. Policies such as the EU ETS and the Carbon Price Floor will affect the relative cost of generating electricity among existing plant. They will likely lead to the market switching away from carbon intensive unabated coal-powered generation at the margin towards less carbon intensive gas-powered generation in the short-term (i.e. switching the price setting plant from coal to gas). This merit order effect can increase or decrease the wholesale electricity price (before the cost of carbon is accounted for) depending on the relative cost of fuel and plant efficiency. In the medium- and longer-term, policies such as the RO and EMR will encourage greater investment in low-carbon generating capacity which typically has a lower marginal cost than unabated coal- or gas-powered generation. This will lead to more instances where lower marginal cost plant (such as nuclear, CCS or renewables) generate at the margin. This merit order effect would *decrease* the wholesale electricity price – any support costs associated with these low carbon technologies will be reflected in the final *retail* price.

[82] Available online at: http://www.decc.gov.uk/en/content/cms/consultations/warmhome/warmhome.aspx.

Annex C: A brief introduction to DECC's modelling and assumptions

Average price and bills model

The average energy prices and bills model produces estimates of the impact of energy and climate change policies on household and business energy users. Average in this case means that any price or consumption impact is spread evenly, on a per MWh basis, across all consumers affected by the policy, either domestic, non-domestic or both.

Results for the household sector are based on an average household, derived from historical total domestic consumption as published in DECC's Digest of United Kingdom Energy Statistics (DUKES) divided by Communities and Local Government (CLG) estimates of the number of households in the UK. The baseline (before the impact of policies) gas and electricity consumption for the average household user are 16.6MWh of gas and 4.5MWh of electricity.

Results for the business sector are based on the consumption of a medium-sized fuel user in industry (as defined by Eurostat).[83] For the energy intensive industry sector, analysis is based on three illustrative users assumed to consume 200,000MWh of electricity and gas in total (before policies), with the relative share of gas and electricity ranging between 20% electricity and 80% gas, 50% of each, and 80% electricity and 20% gas.

The baseline consumption (before the impact of policies) for an average household is assumed to remain constant over the period 2011 to 2030. This facilitates easier analysis of the impact of policies relative to a baseline. However, the total level of consumption used to spread policy costs is taken from the latest DECC Updated Energy Projections.[84]

The estimated price without policies is calculated by summing assumptions of the future wholesale price, transmission, distribution and metering costs and an assumed energy supplier cost and margin for each year.[85] The bill without policies is calculated using the estimated energy price without policies, including VAT, and multiplying by baseline consumption. Electricity distribution, gas distribution and transmission are all subject to separate Price Controls under Ofgem, with assumptions on network costs including agreed increases in allowed revenue set out in the latest distribution price control settlements.

The current electricity Distribution Price Control Settlement contains an allowance for flooding across all distribution companies of £112m for the duration of the Price

[83] A medium-sized gas user is defined by an annual consumption of between 2,778 and 27,777MWh of gas. A medium-sized electricity user is defined by an annual consumption of between 2,000 and 19,999MWh of electricity. The midpoints of these ranges have been used for this analysis.
[84] The latest projections are available online at: http://www.decc.gov.uk/en/content/cms/about/ec_social_res/analytic_projs/en_emis_projs/en_emis_projs.aspx.
[85] Transmission, distribution and metering cost projections are derived from conversations with Ofgem, current price controls and Ofgem historical data. Supplier cost and margin projections are derived from conversations with Ofgem and Ofgem historical data from their quarterly Electricity and Gas Supply Market Reports.

Control (5 years). This impact of which is included in the transmission and distribution cost estimate as a part of the base bill rather than an energy and climate change policy on top of the base bill.

In the absence of any firm evidence of differential pass-through to domestic and non-domestic customers, this analysis is based on the assumption that policy costs are spread evenly across total energy consumption in the UK.[86]

The results from the average price and bills model are useful indicators of the overall impact of policies on a particular sector (e.g. the household sector or the business sector). In reality, the heterogeneity among users within the same sector means that the impacts will differ across different households and businesses.

For the business sector, impacts will differ depending on the coverage of policies and the scale and mix of energy consumed among other factors. For this reason, the analysis was extended to include three illustrative large energy intensive industrial users. However, these results remain indicative for this particular subsector rather than an individual company or site.

In the household sector, the impact of policies will differ based on whether or not a household takes up a particular energy efficiency or renewable measure, whether they are eligible for a Warm Home Discount rebate, the type of house, the composition of the household, what the main heating fuel is, etc. For this reason, a separate model was developed to assess the impact of policies across different sets of household users.

Distributional Impacts Model for Policy and Strategic Analysis (DIMPSA)

The Centre for Sustainable Energy (CSE) worked with DECC to analyse the distributional impacts of energy and climate change policies on the energy bills of UK households.

DIMPSA is based on the Living Costs and Food (LCF) survey, from which household energy consumption is derived. The LCF does not include detailed information on physical household characteristics, beyond built form, which are important in modelling the impact of energy policies. Data from the 2007-08 English Housing Survey (EHS) was therefore used to generate a predictive model to identify wall type, loft insulation levels and heating system age/communal heating in the LCF dataset.

For the purpose of the model, data from six LCF surveys were combined, (financial years 2004/5,2005/6, and calendar years 2006, 2007, 2008 and 2009) generating a sample size of over 36,000 cases. Time- and location-specific fuel price information was used to convert survey expenditure data on household fuels into consumption. The model then uses a look up table containing a set of fuel prices for 2010 by method of payment, to estimate household energy bill in the baseline year. These prices are based upon DECC figures for average gas and electricity (taken from the average price and bills model).

[86] We assume that 100% of the costs of the policies borne by the energy suppliers are passed on to consumers.

The model identifies records in the LCF that may be suitable for sustainable energy technologies. The user can apply a number of criteria to the dataset to constrain the application of measures - variables used include; tenure, built form, central heating type, number of rooms, occupants, age of household representative, rurality (derived) and wall type

The total policy costs passed through to domestic customers is dependent upon what sectors the policy has an impact on. For instance, FITs will apply to both domestic and non-domestic customers; the costs have therefore been split between these two customer groups based on their total annual consumption. In addition, cost is distributed based on the fuel types covered by the policy (i.e. electricity, gas, oil, coal or LPG). The total policy costs to distribute domestically are then divided between the relevant fuels according to the weighted number of consumers using each fuel.

Policy costs and measures are input into the model to produce an estimated final bill for each household. The counterfactual bill is then subtracted to give a bill impact figure. The bill impact can then be presented on the basis of any of the variables in the model but typically results are presented in terms of equivalised income or expenditure decile or household composition.

Policy measures are targeted at specific groups consistent with policy design and randomly distributed between eligible households. For example, FITs measures are targeted at a group of early adopters of technology identified through specific household characteristics. ECO measures are targeted at a group that identifies vulnerable households.

The level of savings associated with different measures are estimated based on the year and household characteristics and are adjusted for comfort taking. For any heat consumption reduction measure or renewable heat pump or insulation measure the savings are adjusted by 15% to allow for comfort taking. This is consistent with the assumptions on comfort taking used in the Green Deal impact assessment and updates the figures used in July 2010.

Products Policy savings are applied in each year based on the number of brown and white goods the household has (with the savings associated with lighting distributed based on the number of rooms). This is an improvement on the modelling of Products Policy compared to the July 2010 analysis, where a blanket percentage reduction was assumed for all households to capture the Products Policy efficiency savings.

Smart Meter savings are based on a constant percentage reduction consistent with the roll-out profile in the Smart Meters Impact Assessment.

The installation of FIT measures will include some level of tariff payment. That is, the installation of a small scale generator (for example, solar panels) reduces your consumption of electricity from the grid but also provides a payment on top. There is also an additional payment for any surplus electricity fed back into the grid. Depending on the type of measure, household and year a corresponding tariff

payment is estimated. Tariff payments from the grid to households taking up FITs measures are netted off the final bill. This is an improvement on the July 2010 analysis, as early versions of DIMPSA were unable to estimate tariff payments.

WHD provides a rebate on bills for certain vulnerable households. They are targeted at three specific groups of vulnerable consumers. A 'legacy group' who will continue to receive support, including social tariffs, similar to that under the previous voluntary agreement between energy suppliers and the Government, a 'core group' of low-income and vulnerable households and a wider 'broader group'. Each group has specific characteristics consistent with vulnerable households and was developed in conjunction with DECC's Fuel Poverty team. The level of rebate is specified for each group and subtracted from the final bill. WHD rebates and legacy group support were not included in the July 2010 analysis.

For the presentation of results, expenditure is used rather than income as it may be a better indicator of the impact on households. This is because analysis of the income distribution can be potentially misleading. Some households – typically those containing students, self-employed and unemployed individuals – could be experiencing temporary periods of low income and funding their expenditure from savings or borrowings (anticipating a higher income stream in future). Because such households may be smoothing their lifetime consumption, expenditure may be a better indicator of their standard of living. This is different to the approach taken in previous analysis where the distributional impacts were presented as a percentage of income across income deciles. In July 2010, the first and last income decile were trimmed to remove anomalous extreme values. This year, the sample data has not been trimmed as expenditure data does not produce such anomalies.

The difference between marginal impacts and the combined impact of all policies on bills

It is important to be aware that the individual policy contributions presented in Annex F of this document differ from the marginal impact of policies set out in individual policy Impact Assessments (IAs).

To assess the impact of an entire policy package, we need to consider the impact of this policy package against a "no policy" counterfactual scenario which excludes all policies in the package. In contrast, individual policy IAs analyse policies against a baseline which includes other policies in order to identify the marginal impact of their introduction.

Summing across the marginal impacts of all individual policies results in double counting of the value of energy efficiency savings because of policy interactions (e.g. a policy that increases retail energy prices also increases the value of efficiency savings from all other policies). In order to remove this double counting, a more uniform approach is taken to attribute the contribution of individual policies to the total policy package impact: energy efficiency savings are valued at final (after all policies) energy prices and the cost impact of policies is estimated using baseline (before all policies) energy consumption.

As a result, the contribution from an individual policy presented in Annex F will generally be larger than the policy's marginal bill impact (presented in the policy IA). The individual impacts of policies which lead to net increases in bills will tend to be overstated in this overarching analysis and the impacts of policies which lead to net reductions in bills will tend to be understated in this analysis. The figures presented in this document fulfil a different analytical purpose from the numbers presented in the IAs and do not override the impacts presented in IAs.

Analysing EMR

Analysis presented in the EMR White Paper IA and subsequent provisional assessment of the impact of energy and climate change policies on the energy prices and bills paid by large energy intensive industrial users published in July 2011 showed the marginal impact of the EMR on a bill which included all other policies. These both show that the net marginal impact of EMR is to reduce electricity bills compared to a scenario of continuing with current policies. The marginal impact of the EMR on electricity prices and bills has three main components:

- **EMR support costs:** The large-scale FIT payments and capacity payments which are assumed to be funded through electricity bills (this will increase electricity bills);

- **Lower RO support costs:** From 2016, new renewable generation will be supported by FIT payments rather than the Renewables Obligation (RO). This lowers the future RO costs compared to a scenario where EMR is not introduced and large-scale renewables continue to be supported by the RO (the impact will be to decrease electricity bills);

- **Wholesale price effect:** Resulting changes in the generation mix and capacity margins affect the wholesale electricity price (this tends to decrease electricity bills).

The analysis published in the EMR White Paper IA showed that, for the FIT CfD package with Strategic Reserve under the central fossil fuel price scenario, the reduction in the RO support costs and reduction in wholesale electricity prices as a result of EMR were larger than the EMR support costs over much of the period analysed. As such, the net marginal impact of the EMR is expected to be a *reduction* in electricity prices and bills on average for all consumers.

The RO support cost impacts presented in Annexes E and F are net of the effect of introducing the EMR, and therefore lower than they would be in the absence of EMR. The impact of the EMR on the electricity wholesale price is captured by the "Merit order effects" component, which also captures the effect of the RO and other policies on wholesale electricity prices. The EMR support costs are listed separately and should not be confused with the net marginal impact of the EMR on electricity prices and bills as they only reflect one of the components of the impact.

Annex D: Breakdown of an average household gas and electricity bill in 2011

Table D1 presents an estimated breakdown of an average household gas and electricity bill in 2011. These figures are based on household consumption in 2011 after efficiency savings of 16.2MWh gas and 4.0MWh electricity.

Table D1: Breakdown of average household gas, electricity and energy bill in 2011

Real 2010 prices		Gas bill	Electricity bill	Energy bill
Wholesale energy cost		£339 (51%)	£261 (43%)	£600 (48%)
Transmission, distribution and metering		£125 (19%)	£113 (19%)	£238 (19%)
Other supplier costs and margin		£137 (21%)	£136 (23%)	£273 (22%)
Energy and climate change policies		£28 (4%)	£61 (10%)	£89 (7%)
Of which:	*CERT Extension*	*£20 (3%)*	*£17 (3%)*	*£38 (3%)*
	EU ETS	*N/A*	*£20 (3%)*	*£20 (2%)*
	RO	*N/A*	*£17 (3%)*	*£17 (1%)*
	WHD	*£6 (1%)*	*£5 (1%)*	*£10 (1%)*
	CESP	*£2 (0%)*	*£1 (0%)*	*£3 (0%)*
	FITs	*N/A*	*£1 (0%)*	*£1 (0%)*
	Better billing	*£0 (0%)*	*£0 (0%)*	*£0 (0%)*
VAT (5%)		£31 (5%)	£29 (5%)	£60 (5%)
Total		£660	£600	£1,260

Source: DECC 2011. Figures may not add due to rounding. Figures are before any WHD rebates.

The average household energy bill before receipt of any WHD rebates is estimated to be £1,260 in real 2010 prices with energy and climate change policy costs accounting for 7% of the bill. In Ofgem's latest Supply Market Report for October 2011[87] they estimated the average household energy bill to be around £1,335[88] with environmental costs accounting for 6% of the bill based on consumption of 16.9MWh gas and 4MWh electricity. The difference between the two sets of figures is largely accounted for by the different consumption assumptions, the fact that the Ofgem environmental costs do not include the cost of EU ETS which they have accounted for in their wholesale costs and the fact that the DECC estimate is in real 2010 prices. When based on Ofgem's consumption assumptions and inflated to real 2011 prices, the DECC estimated energy bill becomes £1,327, broadly comparable with Ofgem's estimate.

[87] Available online at: http://www.ofgem.gov.uk/Markets/RetMkts/rmr/Documents1/SMR_Oct_2011.pdf.
[88] Figures rounded to nearest £5.

Annex E: Breakdown of estimated impact of energy and climate change policies on average gas and electricity retail prices

Table E1: Estimated impact of energy and climate change policies on average household retail gas prices (including VAT)

£/MWh (real 2010 prices)		2011	2020	2030
Estimated average price without policies		39	44	46
Of which: wholesale energy costs		*22*	*24*	*24*
Estimated impact of policies		2	3	0
Of which:	*ECO support cost*	*N/A*	*2*	*N/A*
	Smart Meters	*N/A*	*0*	*0*
	CERT Extension	*1*	*N/A*	*N/A*
	CESP	*0*	*N/A*	*N/A*
	Better Billing	*0*	*0*	*0*
	WHD support cost	*0*	*0*	*0*
Estimated average price with policies		41	47	46
% impact (on baseline)		5%	7%	0%

Source: DECC 2011. Figures may not add due to rounding.

Table E2: Estimated impact of energy and climate change policies on average household retail electricity prices (including VAT)

£/MWh (real 2010 prices)		2011	2020	2030
Estimated average price without policies		130	144	157
Of which: wholesale energy costs		*65*	*71*	*70*
Estimated impact of policies		19	39	44
Of which:	*ECO support cost*	*N/A*	*8*	*N/A*
	Smart Meters	*N/A*	*0*	*-2*
	CERT Extension	*4*	*N/A*	*N/A*
	CESP	*0*	*N/A*	*N/A*
	Better Billing	*0*	*0*	*0*
	WHD support cost	*1*	*2*	*1*
	Merit order effects	*3*	*-5*	*0*
	EU ETS	*5*	*11*	*13 to 28*
	CPF	*N/A*	*1*	*16 to 0*
	RO support cost	*5*	*11*	*3*
	EMR support cost	*N/A*	*9*	*11*
	FIT support cost	*0*	*1*	*1*
Estimated average price with policies		149	183	201
% impact (on baseline)		15%	27%	28%

Source: DECC 2011. Figures may not add due to rounding.

Table E3: Estimated impact of energy and climate change policies on average retail gas prices paid by medium-sized business users

£/MWh (real 2010 prices)		2011	2020	2030
Estimated average price without policies		31	36	38
Of which: wholesale energy costs		*21*	*23*	*23*
Estimated impact of policies		4	4	4
Of which:	*CCL*	*2*	*2*	*2*
	CRC	*2*	*2*	*2*
Estimated average price with policies		35	39	41
% impact (on baseline)		12%	11%	10%

Source: DECC 2011. Figures may not add due to rounding.

Table E4: Estimated impact of energy and climate change policies on average retail electricity prices paid by medium-sized business users

£/MWh (real 2010 prices)	2011	2020	2030
Estimated average price without policies	98	109	114
Of which: wholesale energy costs	*62*	*68*	*66*
Estimated impact of policies	22	37	51
Of which: CCL	*5*	*5*	*5*
CRC	*4*	*4*	*4*
Merit order effects	*3*	*-4*	*0*
EU ETS	*5*	*10*	*12 to 27*
CPF	*N/A*	*1*	*15 to 0*
RO support cost	*4*	*10*	*3*
EMR support cost	*0*	*9*	*11*
FIT support cost	*0*	*1*	*1*
Estimated average price with policies	119	145	165
% impact (on baseline)	22%	34%	45%

Source: DECC 2011. Figures may not add due to rounding.

Table E5: Estimated impact of energy and climate change policies on average retail gas prices paid by large energy intensive industrial users

£/MWh (real 2010 prices)	2011	2020	2030
Estimated average price without policies	29	33	35
Of which: wholesale energy costs	*21*	*23*	*23*
Estimated impact of policies	1	1	1
Of which: CCL	*1*	*1*	*1*
Estimated average price with policies	29	33	35
% impact (on baseline)	2%	2%	2%

Source: DECC 2011. Figures may not add due to rounding.

Table E6: Estimated impact of energy and climate change policies on average retail electricity prices paid by large energy intensive industrial users

£/MWh (real 2010 prices)	2011	2020	2030
Estimated average price without policies	90	101	104
Of which: wholesale energy costs	*62*	*68*	*66*
Estimated impact of policies	10 to 14	8 to 28	28 to 43
Of which: CCL	*2*	*1*	*1*
Merit order effects	*3*	*-4*	*0*
EU ETS	*5*	*10*	*12 to 27*
CPF	*N/A*	*1*	*15 to 0*
RO support cost	*0 to 4*	*0 to 10*	*0 to 3*
EMR support cost	*N/A*	*0 to 9*	*0 to 11*
FIT support cost	*0*	*0 to 1*	*0 to 1*
Estimated average price with policies	100 to 104	109 to 129	132 to 147
% impact (on baseline)	11 to 16%	8 to 28%	27 to 41%

Source: DECC 2011. Figures may not add due to rounding.

Annex F: Breakdown of estimated impact of energy and climate change policies on average gas and electricity bills

Table F1: Estimated impact of energy and climate change policies on an average household gas bill (including VAT)

£(real 2010 prices)	2011	2020	2030
Estimated bill without policies	646	735	771
Of which: wholesale energy costs	*364*	*405*	*405*
Estimated impact of policies	14	7	-50
Of which: Green Deal and ECO	*N/A*	*33*	*-15*
Smart Meters	*N/A*	*-10*	*-19*
CERT and EEC 1&2	*-19*	*-19*	*-19*
CERT Extension	*22*	*-20*	*-12*
CESP	*1*	*0*	*0*
Better Billing	*-2*	*-2*	*-2*
WHD support cost	*6*	*8*	*7*
Products Policy	*5*	*17*	*10*
Estimated bill with policies	660	742	721
% impact (on baseline)	2%	1%	-6%

Source: DECC 2011. Figures may not add due to rounding.

Table F2: Estimated impact of energy and climate change policies on an average household electricity bill (including VAT)

£(real 2010 prices)	2011	2020	2030
Estimated bill without policies	583	644	702
Of which: wholesale energy costs	*291*	*319*	*313*
Estimated impact of policies	5	-100	4
Of which: Green Deal and ECO[89]	*N/A*	*9*	*-5*
Smart Meters	*N/A*	*-20*	*-30*
CERT and EEC 1&2	*-42*	*-44*	*-5*
CERT Extension	*20*	*-5*	*-6*
CESP	*0*	*-1*	*-1*
Better Billing	*-2*	*-2*	*-2*
WHD (net of rebate)	*-6*	*-8*	*-7*
Products Policy	*-25*	*-158*	*-136*
Merit order effects	*14*	*-20*	*2*
EU ETS	*23*	*49*	*56 to 127*
CPF	*N/A*	*6*	*70 to 0*
RO support cost	*20*	*48*	*12*
EMR support cost	*N/A*	*41*	*50*
FIT support cost	*1*	*6*	*6*
Estimated bill with policies	588	543	706
% impact (on baseline)	1%	-16%	1%

Source: DECC 2011. Figures may not add due to rounding.

[89] Net of estimated average Green Deal loan repayment.

Table F3: Estimated impact of energy and climate change policies on an average gas bill paid by medium-sized business users

£(real 2010 prices)	2011	2020	2030
Estimated bill without policies	476,000	544,000	575,000
Of which: wholesale energy costs	*319,000*	*354,000*	*354,000*
Estimated impact of policies	51,000	34,000	42,000
Of which: Green Deal	*N/A*	*-10,000*	*-8,000*
Products Policy	*1,000*	*5,000*	*4,000*
CCL	*25,000*	*26,000*	*26,000*
CRC	*32,000*	*14,000*	*21,000*
CCAs	*-6,000*	*-1,000*	*0*
Estimated bill with policies	527,000	577,000	617,000
% impact (on baseline)	11%	6%	7%

Source: DECC 2011. Figures may not add due to rounding. Figures to the nearest thousand.

Table F4: Estimated impact of energy and climate change policies on an average electricity bill paid by medium-sized business users

£(real 2010 prices)	2011	2020	2030
Estimated bill without policies	1,074,000	1,194,000	1,254,000
Of which: wholesale energy costs	*681,000*	*747,000*	*731,000*
Estimated impact of policies	220,000	302,000	466,000
Of which: Green Deal[90]	*N/A*	*-7,000*	*-8,000*
Products Policy	*-13,000*	*-92,000*	*-86,000*
CCL	*52,000*	*53,000*	*53,000*
CRC	*48,000*	*47,000*	*48,000*
CCAs	*-5,000*	*0*	*0*
Merit order effects	*34,000*	*-48,000*	*4,000*
EU ETS	*54,000*	*114,000*	*132,000 to 296,000*
CPF	*N/A*	*13,000*	*164,000 to 0*
RO support cost	*48,000*	*111,000*	*28,000*
EMR support cost	*N/A*	*96,000*	*117,000*
FIT support cost	*3,000*	*15,000*	*14,000*
Estimated bill with policies	1,294,000	1,496,000	1,720,000
% impact (on baseline)	21%	25%	37%

Source: DECC 2011. Figures may not add due to rounding. Figures to the nearest thousand.

[90] Net of estimated Green Deal loan repayment.

Table F5: Estimated impact of energy and climate change policies on an average gas bill paid by an energy intensive user consuming 100,000MWh of gas before policies[91]

£(real 2010 prices)	2011	2020	2030
Estimated bill without policies	2.86m	3.27m	3.48m
Of which: wholesale energy costs	*2.09m*	*2.32m*	*2.32m*
Estimated impact of policies	-17,000	53,000	64,000
Of which: Products Policy	*0*	*2,000*	*5,000*
CCL	*57,000*	*58,000*	*58,000*
CCAs	*-74,000*	*-8,000*	*0*
Estimated bill with policies	2.84m	3.33m	3.55m
% impact (on baseline)	-1%	2%	2%

Source: DECC 2011. Figures may not add due to rounding. Figures to the nearest thousand.

[91] The absolute £ figures in Tables F5 and F6 are based on a user consuming 100,000MWh each of gas and electricity before policies. These impacts are scalable for larger or smaller scales of consumption. The percentage impacts would remain unchanged. For example, if a user consumes 2million MWh of gas, before efficiency savings, the impact of policies on the average gas bill in 2020 would be (2million / 100,000) x (£53,000) = £1.06m. The % impact of policies would remain unchanged at 2%.

Table F6: Estimated impact of energy and climate change policies on an average electricity bill paid by an energy intensive user consuming 100,000MWh of electricity before policies[92]

£(real 2010 prices)	2011	2020	2030
Estimated bill without policies	9.02m	10.06m	10.40m
Of which: wholesale energy costs	*6.20m*	*6.79m*	*6.65m*
Estimated impact of policies	0.73 to 1.19m	0.25 to 2.16m	2.38 to 3.77m
Of which: Products Policy	*-56,000 to -58,000*	*-558,000 to -662,000*	*-444,000 to -493,000*
CCL	*164,000*	*96,000*	*96,000*
CCAs	*-169,000 to -177,000*	*-6,000 to -7,000*	*0*
Merit order effects	*307,000*	*-436,000*	*39,000*
EU ETS	*488,000*	*1.04m*	*1.20m to 2.69m*
CPF	*N/A*	*119,000*	*1.49m to 0*
RO support cost	*0 to 433,000*	*0 to 1.01m*	*0 to 297,000*
EMR support cost	*N/A*	*0 to 870,000*	*0 to 1.06m*
FIT support cost	*0 to 30,000*	*0 to 138,000*	*0 to 124,000*
Estimated bill with policies	9.75 to 10.20m	10.31 to 12.22m	12.78 to 14.17m
% impact (on baseline)	8 to 13%	2 to 22%	23 to 36%

Source: DECC 2011. Figures may not add due to rounding. Figures to the nearest thousand.

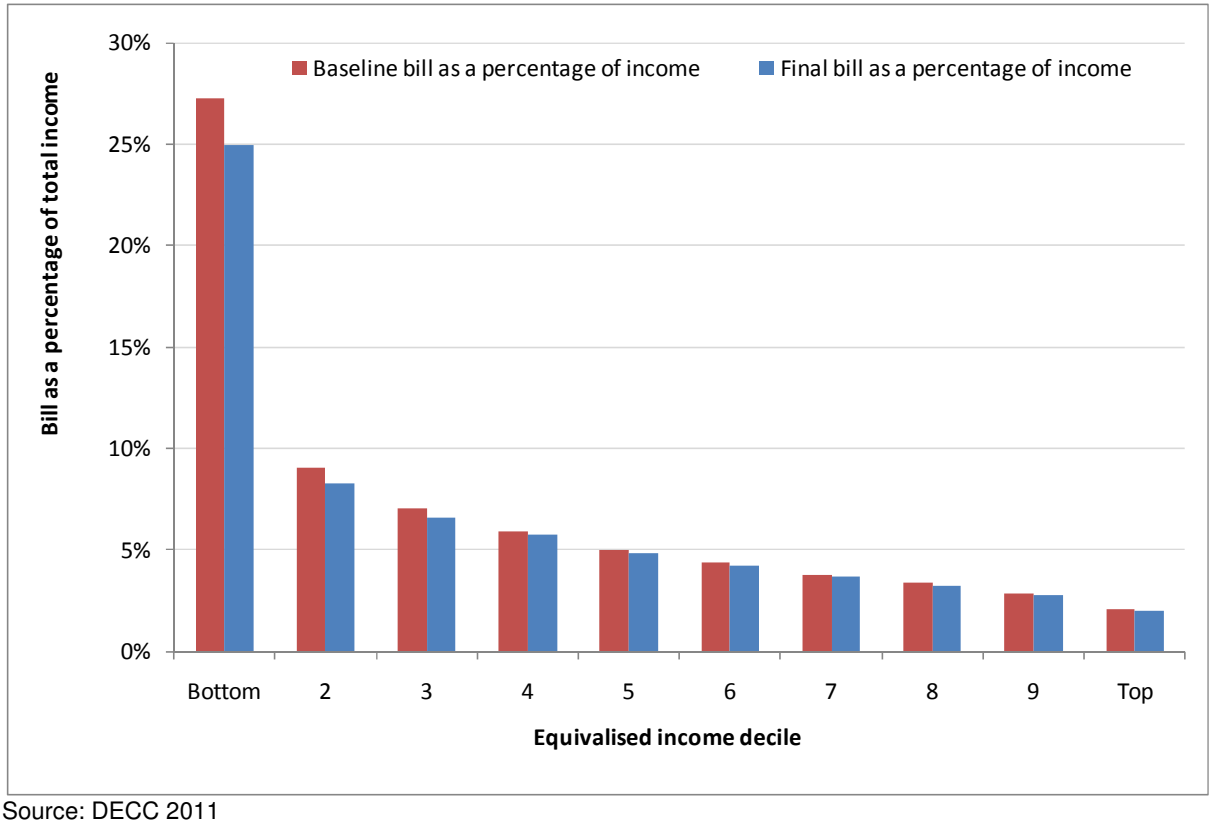
[92] See previous footnote.

Annex G: Household distributional impacts as share of disposable income

This Annex presents the equivalent results as in Section 4.4 but as a share of household disposable income.

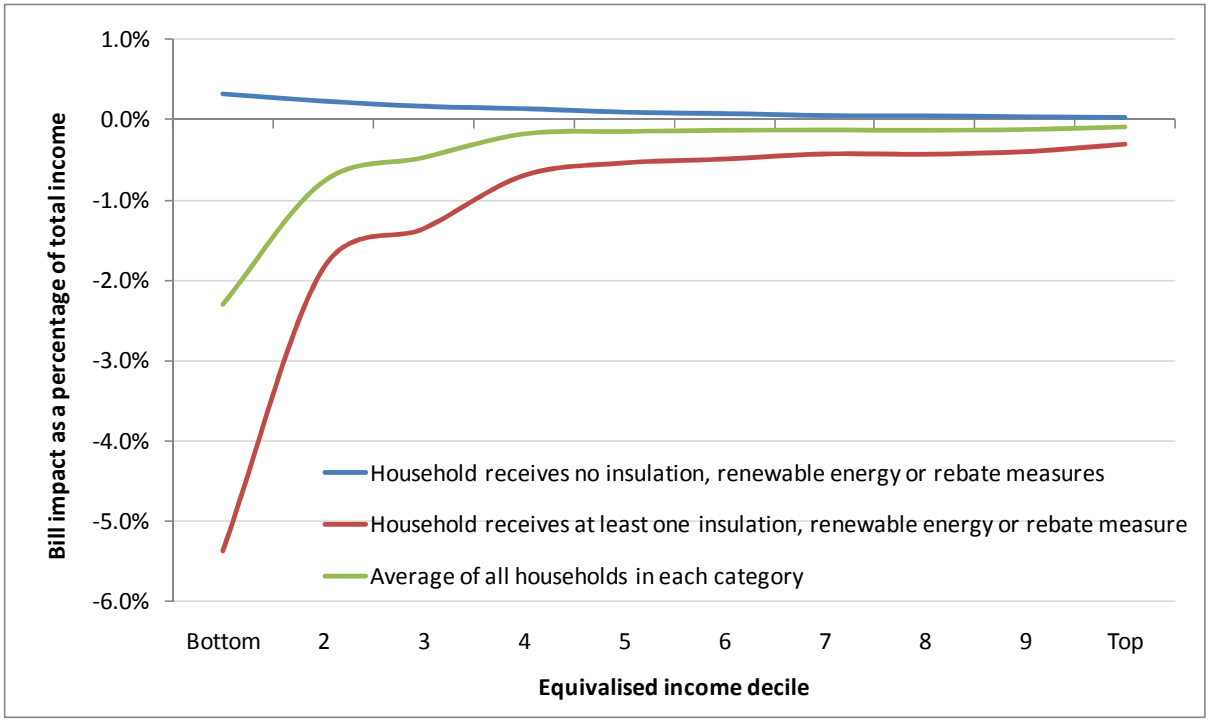
For the presentation of results in the main document, expenditure is used rather than income as it may be a better indicator of the impact on households. This is because analysis of the income distribution can be potentially misleading. Some households – typically those containing students, self-employed and unemployed individuals – could be experiencing temporary periods of low income and funding their expenditure from savings or borrowings (anticipating a higher income stream in future). The survey data tends to include very low or even zero income for such households accompanied with expenditure patterns more common for higher income households. As such, when presenting energy spend as share of income across income deciles, the values for the lowest income decile appear extreme (as per Chart G1). Because such households may be smoothing their lifetime consumption, expenditure may be a better indicator of their standard of living.

Chart G1: Energy bill as a percentage of disposable income in 2020, with and without energy and climate change policies across equivalised income deciles



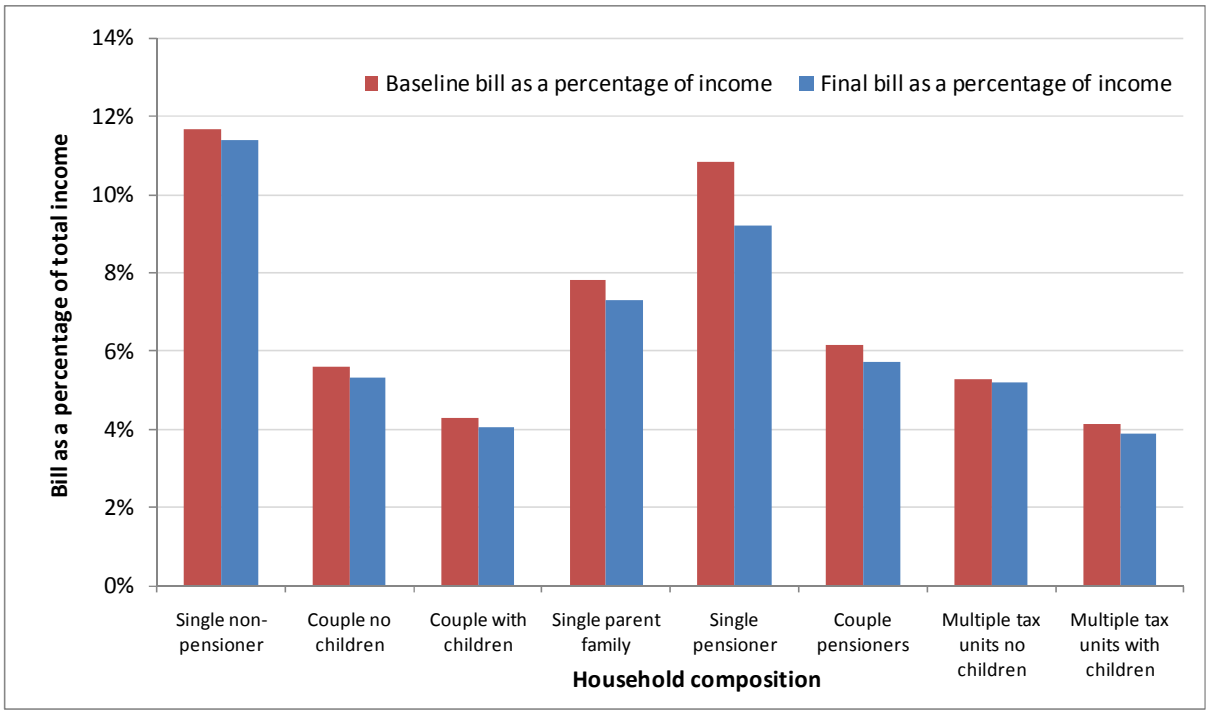
Source: DECC 2011

Chart G2: Impact of energy and climate change policies for households that receive an insulation or renewable energy measure or a rebate on their energy bill as a percentage of disposable income in 2020 across equivalised income deciles



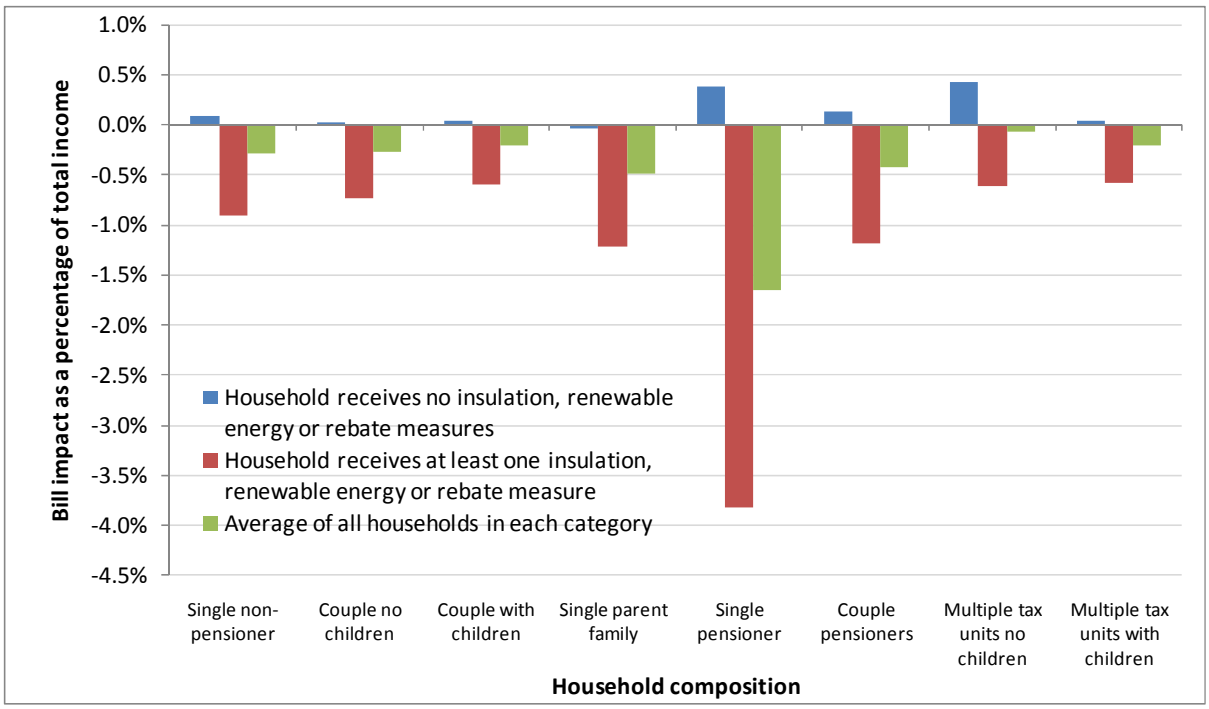
Source: DECC 2011

Chart G3: Energy bill as a percentage of disposable income in 2020, with and without energy and climate change policies across household types



Source: DECC 2011

Chart G4: Impact of energy and climate change policies for households that receive an insulation or renewable energy measure or a rebate on their energy bill as a percentage of disposable income in 2020 across household types



Source: DECC 2011

Annex H: Results of sensitivity analysis

Table G1: Estimated impact of energy and climate change policies on average household gas and electricity prices and an average household gas, electricity and energy bill (including VAT) – "Low" fossil fuel price scenario

	2020	2030
Price impacts (real 2010 £/MWh and % change)		
Average **gas price** without policies	28	34
Average **gas price** with policies	30	34
Impact of policies on average **gas price**	3 (10%)	0 (0%)
Average **electricity price** without policies	112	127
Average **electricity price** with policies	159	175
Impact of policies on average **electricity price**	46 (41%)	47 (37%)
Bill impacts (real 2010 £ and % change)		
Average **gas bill** without policies	459	568
Average **gas bill** with policies	480	531
Impact of policies on average **gas bill**	21 (5%)	-37 (-7%)
Average **electricity bill** without policies	503	570
Average **electricity bill** with policies	472	616
Impact of policies on average **electricity bill**	-31 (-6%)	46 (8%)
Average **energy bill** without policies	962	1,138
Average **energy bill** with policies	952	1,147
Impact of policies on average **energy (gas plus electricity) bill**	-9 (-1%)	9 (1%)

Source: DECC 2011. Numbers may not add up due to rounding.

Table G2: Estimated impact of energy and climate change policies on average household gas and electricity prices and an average household gas, electricity and energy bill (including VAT) – "High" fossil fuel price scenario

	2020	2030
Price impacts (real 2010 £/MWh and % change)		
Average **gas price** without policies	56	61
Average **gas price** with policies	59	61
Impact of policies on average **gas price**	3 (5%)	0 (0%)
Average **electricity price** without policies	168	183
Average **electricity price** with policies	203	215
Impact of policies on average **electricity price**	35 (21%)	31 (17%)
Bill impacts (real 2010 £ and % change)		
Average **gas bill** without policies	938	1,015
Average **gas bill** with policies	934	949
Impact of policies on average **gas bill**	-4 (0%)	-66 (-6%)
Average **electricity bill** without policies	754	822
Average **electricity bill** with policies	604	755
Impact of policies on average **electricity bill**	-150 (-20%)	-66 (-8%)
Average **energy bill** without policies	1,692	1,837
Average **energy bill** with policies	1,539	1,705
Impact of policies on average **energy (gas plus electricity) bill**	-154 (-9%)	-132 (-7%)

Source: DECC 2011. Numbers may not add up due to rounding.

Table G3: Estimated impact of energy and climate change policies on average gas and electricity prices and average gas, electricity and energy bills paid by medium-sized business users – "Low" fossil fuel price scenario

	2020	2030
Price impacts (real 2010 £/MWh and % change)		
Average **gas price** without policies	23	28
Average **gas price** with policies	27	32
Impact of policies on average **gas price**	4 (17%)	4 (13%)
Average **electricity price** without policies	86	94
Average **electricity price** with policies	129	149
Impact of policies on average **electricity price**	43 (51%)	54 (58%)
Bill impacts (real 2010 £000s and % change)		
Average **gas bill** without policies	350	433
Average **gas bill** with policies	392	479
Impact of policies on average **gas bill**	41 (12%	46 (11%)
Average **electricity bill** without policies	941	1,036
Average **electricity bill** with policies	1,331	1,550
Impact of policies on average **electricity bill**	390 (41%)	514 (50%)
Average **energy bill** without policies	1,291	1,469
Average **energy bill** with policies	1,723	2,029
Impact of policies on average **energy (gas plus electricity) bill**	432 (33%)	560 (38%)

Source: DECC 2011. Numbers may not add up due to rounding.

Table G4: Estimated impact of energy and climate change policies on average gas and electricity prices and average gas, electricity and energy bills paid by medium-sized business users – "High" fossil fuel price scenario

	2020	2030
Price impacts (real 2010 £/MWh and % change)		
Average **gas price** without policies	45	49
Average **gas price** with policies	49	53
Impact of policies on average **gas price**	4 (8%)	4 (8%)
Average **electricity price** without policies	127	134
Average **electricity price** with policies	159	173
Impact of policies on average **electricity price**	33 (26%)	39 (29%)
Bill impacts (real 2010 £000s and % change)		
Average **gas bill** without policies	686	746
Average **gas bill** with policies	713	784
Impact of policies on average **gas bill**	28 (4%)	38 (5%)
Average **electricity bill** without policies	1,393	1,475
Average **electricity bill** with policies	1,642	1,805
Impact of policies on average **electricity bill**	249 (18%)	330 (22%)
Average **energy bill** without policies	2,078	2,221
Average **energy bill** with policies	2,355	2,589
Impact of policies on average **energy (gas plus electricity) bill**	277 (13%)	368 17%

Source: DECC 2011. Numbers may not add up due to rounding.

Table G5: Estimated impact of energy and climate change policies on average gas and electricity prices and bills paid by large energy intensive users compared with prices and bills in the absence of policies – "Low" fossil fuel price scenario

	2020	2030
Gas and electricity price impacts		
Gas price	3%	2%
Electricity price	14 to 44%	27 to 53%
Gas and electricity bill impacts		
Gas bill	3%	2%
Electricity bill	8 to 37%	23 to 48%
Illustrative energy (gas and electricity) bill impacts		
80% electricity, 20% gas	8 to 35%	22 to 45%
50% electricity, 50% gas	7 to 30%	18 to 37%
20% electricity, 80% gas	5 to 19%	12 to 23%

Source: DECC 2011

Table G6: Estimated impact of energy and climate change policies on average gas and electricity prices and bills paid by large energy intensive users compared with prices and bills in the absence of policies – "High" fossil fuel price scenario

	2020	2030
Gas and electricity price impacts		
Gas price	1%	1%
Electricity price	5 to 21%	19 to 25%
Gas and electricity bill impacts		
Gas bill	1%	1%
Electricity bill	0 to 15%	15 to 21%
Illustrative energy (gas and electricity) bill impacts		
80% electricity, 20% gas	0 to 14%	14 to 19%
50% electricity, 50% gas	0 to 11%	12 to 16%
20% electricity, 80% gas	1 to 7%	7 to 9%

Source: DECC 2011

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