

## **Communication on DECC Fossil Fuel Price Assumptions**

### **Section 1:**

These assumptions are an update to the fossil fuel price assumptions published in spring 2008.

The fossil fuel price assumptions inform government analysis of different policy options which affect the demand and supply for energy. They provide a sensitivity to analyse how different policies will vary depending on fossil fuel price assumptions.

DECC uses assumptions for fossil fuel prices in a number of areas, primarily DECC's Energy Model which provides emissions projections which are published annually. In conjunction with the results of the Energy Model, the fossil fuel price assumptions provide a range of scenarios to analyse policies such as Carbon Budgets and the Renewable Energy Strategy. The fossil fuel price assumptions are also used for policy analysis across government.

We have revised the assumptions in line with the best information available on market fundamentals and the feedback received on previous assumptions. The last year has seen extremely volatile markets and there is a great deal of uncertainty over future trends in fossil fuel prices. We capture this through four **illustrative** scenarios which reflect different patterns of demand and investment in supply. The four scenarios are as follows:

- Scenario 1 - Low global energy demand
- Scenario 2 - Timely investment and moderate demand
- Scenario 3 - High demand and producers' market power
- Scenario 4 - High demand, significant supply constraints

These illustrative scenarios are meant to capture the uncertainty around the outturn of future fossil fuel prices. We recommend that policy makers use all four scenarios for sensitivity analysis. Further advice can be provided by DECC officials; please see contact details at the bottom of the page.

A description of the scenarios that supports the price assumptions is presented in Section 2. Please note that the DECC focus is on the long-term trend of fossil fuel prices rather than year-to-year fluctuations.

The latest assumptions are set out in Tables 1-4 below. Section 3 presents charts with historical prices and our forecasted trends.

**We would welcome any comments regarding the fossil fuel price assumptions, the associated methodology and the rationale which underlies the price assumptions: Comments and suggestions may be sent to: [emissionsprojections@berr.gsi.gov.uk](mailto:emissionsprojections@berr.gsi.gov.uk)**

## Tables 1-4 - Revised Fossil fuel price assumptions<sup>1</sup>

(Note: Detailed yearly assumptions are available on request)

<b>Scenario 1 - Low Global Energy Demand</b>			
2008 prices	<b>Oil - Brent</b>	<b>Gas - NBP</b>	<b>Coal - ARA</b>
Year	\$/barrel	p/therm	\$/tonne
<b>2008</b>	102	58	147
<b>2010</b>	50	34	80
<b>2015</b>	58	35	50
<b>2020</b>	60	35	50
<b>2025</b>	60	36	50
<b>2030</b>	60	36	50

<b>Scenario 2 - Timely Investment, Moderate Demand</b>			
2008 prices	<b>Oil - Brent</b>	<b>Gas - NBP</b>	<b>Coal - ARA</b>
Year	\$/barrel	p/therm	\$/tonne
<b>2008</b>	102	58	147
<b>2010</b>	70	58	110
<b>2015</b>	75	63	80
<b>2020</b>	80	67	80
<b>2025</b>	85	71	80
<b>2030</b>	90	74	80

<b>Scenario 3 - High Demand, Producers' Market Power</b>			
2008 prices	<b>Oil - Brent</b>	<b>Gas - NBP</b>	<b>Coal - ARA</b>
Year	\$/barrel	p/therm	\$/tonne
<b>2008</b>	102	58	147
<b>2010</b>	84	70	120
<b>2015</b>	102	83	100
<b>2020</b>	120	97	100
<b>2025</b>	120	97	100
<b>2030</b>	120	97	100

<sup>1</sup> All assumptions are in 2008 prices. The exchange rate used for conversion from \$ to £ is 1.60. The rate of conversion typically used from \$/tonne to \$/GJ is 25.12 (i.e. \$100/tonne is equivalent to \$3.98/GJ).

<b>Scenario 4 - High Demand, Significant Supply Constraints</b>			
2008 prices	<b>Oil - Brent</b>	<b>Gas - NBP</b>	<b>Coal - ARA</b>
<b>Year</b>	<b>\$/bbl</b>	<b>p/therm</b>	<b>\$/tonne</b>
<b>2008</b>	102	58	147
<b>2010</b>	103	84	130
<b>2015</b>	142	113	130
<b>2020</b>	150	119	130
<b>2025</b>	150	119	130
<b>2030</b>	150	119	130

## Section 2 – Description of Scenarios

### Climate Change policies

We recognise that any forthcoming climate change policies will have significant potential to affect levels of production and prices in the market. For example, any change in the carbon price or how widely it is applied will affect coal producers due to the close substitutability of coal and gas in many uses.

However, across the four scenarios, we have not incorporated any explicit assumptions about the nature or extent of future policies to combat climate change nor their interactions, although existing policies have been considered. This is due to the many uncertainties which surround forthcoming international negotiations.

### Scenario 1 – Low global energy demand

- This scenario reflects a deep global recession continuing into 2011, followed by slow growth in global GDP growth. As a result, global demand for energy initially decreases, then grows at a slower rate compared to previous trends.
- On the investment side, a number of investment projects come to fruition in the next few years which increase energy supplies.
- Liberalisation of markets increases competitive pressures in the markets so that prices reflect the long run marginal costs of supply.
- In spite of the recession, technological advances and investment lead to strong competition from substitutes such as nuclear generation and renewable sources.

#### 1.1 Oil

- Barriers to investment including investment costs reduce and the world has continued access and develops those oil resources that are available at least cost.
- Skills shortage eases and technological advances reduce cost pressures that have been recently observed.
- Investment in production and refining capacity is very timely and comes online long in advance of demand strengthening.
- In the long run, the price is assumed to reflect the long run marginal cost of supply.

#### 1.2 Gas

- New production coming on stream combined with falling demand leads to prices falling significantly.
- There is a glut of LNG supply in the Atlantic basin as the US approaches self-sufficiency and more US production comes on stream. There is also less scope for cargoes to be sent to the Asian market as the Pacific basin also remains well supplied and Asian demand

remains low relative to 2008 levels as electricity needs become increasingly met by nuclear generation.

- We assume that the European market is liberalised which means that the oil-gas link no longer holds. This is also driven by committed investments and low demand which means that gas producers require a decoupling of prices to sell sufficient volumes.

### **1.3 Coal**

- Demand for coal falls due to lower global energy demand and greater switching to alternative power sources.
- A number of coal-related infrastructure projects come to fruition, leading to supply exceeding the reduced demand.
- Freight costs are low due to falling fuel prices and extra vessels coming online as well as lower global demand for freight capacity.

## **Scenario 2 – Timely investment and moderate demand**

- The global recession continues to 2010 and low demand keeps prices low in the short term.
- In the medium term, global economic growth picks up and pushes up demand for energy.
- Investment is made in a timely manner, so supply is sufficient to meet growing demand.

### **2.1 Oil**

- Oil demand growth resumes in 2010 growing strongly in the medium term.
- Investment is made in a timely manner. High demand means that more expensive oil resources need to be developed. This leads to increases in prices over the period.
- Prices continue to rise until 2030, reflecting that more expensive resources such as oil shales will need to be developed,

### **2.2 Gas**

- Prices are expected to weaken in the short term due to low global demand and a glut of LNG.
- In the medium term, the link between oil prices and gas prices is assumed to remain in place<sup>2</sup>. The continued use of oil-linked contracts is driven by a number of factors such as the greater depth of the traded oil market enabling better hedging of risks.
- Timely investment enables supply to remain sufficient to meet growing demand. LNG trading and capacity increases, as does UK storage capacity. Asian LNG contracts linked to oil prices prevent a weakening of the oil gas link.

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<sup>2</sup> There is a strong historic relationship between oil prices and gas prices, driven by the use of long term contracts in Europe for gas supply where the price is linked to movements in the oil price.

- LNG will also begin to play a major role as the UK builds up storage capacity and imports increases.

### **2.3 Coal**

- Prices fall away from their peak towards an average of around \$80 per tonne, which is still high in historic terms. This reflects moderate but sustained demand for coal, particularly in emerging economies, and the impact of historically high oil prices on coal production and transport costs.
- A number of coal-related infrastructure projects come to fruition, leading to supply comfortably matching demand.

## **Scenario 3 - High demand and producers' market power**

- The recession affects demand in 2009, but demand picks up strongly in 2010.
- Emerging markets grow strongly which places pressure on energy markets.
- Investments in supply are made but are too slow to come online and are not sufficient to keep up with the increase in demand.
- Supply shortages increase market power of dominant players.
- Substitution to non-fossil fuels such as nuclear power and renewable sources is limited and expensive, due to delays to investment and slower than expected technological progress.

### **3.1 Oil**

- Oil demand resumes quickly in 2010 and growth in emerging economies puts pressure on the market.
- Investments are made but do not keep pace with growing demand in the medium term. This leads to price increases over the medium term.
- In the long term, investments are made but resources are increasingly concentrated amongst a small number of producers.
- Oil demand remains strong and significant substitution to alternatives does not occur because prices stabilise below levels at which demand destruction may occur.

### **3.2 Gas**

- The desire of buyers to ensure security of supply means that long term contracts remain in place. We assume that these remain linked to the oil price due to the greater depth of the oil market and a desire on the part of gas producers to have revenues link to oil prices. Limited potential for substitution in energy generation and in energy intensive industries means that demand remains strong despite high prices. This is further affected by high producer concentration.
- Increased exposure to imports and dollar denominated contracts coupled with a weak exchange rate cause further increases in NBP prices.

- Investments in gas production and LNG are not made in a timely fashion and are insufficient to meet continued growth in global demand.
- Demand destruction begins to occur, especially through domestic energy efficiency measures. However, the scale is insufficient to cause a price fall.

### **3.3 Coal**

- Significant expansion of electricity generating capacity in emerging economies, coupled with high cost of non-fossil fuel substitutes, result in high overall demand.
- Demand is further sustained due to its relative security of supply as a result of its geographical dispersion.
- Upward pressure is exerted on production and freight costs due to high costs of other fossil fuels adding to the cost of producing and delivering coal.
- Opportunities for switching between coal and gas lead to a close relationship between coal and gas prices in the medium term.

## **Scenario 4 – High Growth, significant supply constraints**

- The global economy recovers quickly from 2009 onwards and global energy demand grows very quickly.
- New investments are slow to come on stream and output is unable to keep up with demand and supply constraints lead to rapid increases in prices.
- Supply constraints rapidly push prices up to levels where substitution at the margins begins.
- Alternative technologies and fuels are relatively expensive due to delays to investments and technological progress is slower than expected. In spite of sustained high fossil fuel prices, it is assumed substitution is limited as alternatives are not economically viable.

### **4.1 Oil**

- In the short and medium term oil demand grows rapidly
- Investment is too slow to relieve upward pressure on prices.
- Prices achieve levels where demand destruction starts taking place but supplies remain insufficient to meet demand, implying that prices don't fall, but stabilise at a high level.

### **4.2 Gas**

- As in scenario 3, the desire of buyers to ensure security of supply means that long term contracts remain in place. We assume that these remain linked to the oil price due to the greater depth of the oil market and a desire on the part of gas producers to have revenues linked to oil prices. Limited potential for substitution in energy generation and in energy intensive industries means that demand remains strong despite high prices. This is further affected by high producer concentration.

- Increased exposure to imports and dollar denominated contracts coupled with a weak exchange rate cause further increases in NBP prices.
- Investments in gas production and LNG are not made in a timely fashion and are insufficient to meet continued growth in global demand.
- Demand destruction occurs more widely than in scenario 3, especially through domestic energy efficiency measures. However, the scale is insufficient to cause a price fall.

### **4.3 Coal**

- Investors' concerns about climate change policy uncertainties result in reluctance to invest in coal infrastructure, leading to global supply shortages.
- Coal resource nationalism severely reduces export supplies and hence creates upward pressures on prices.
- Especially in emerging economies, the high relative cost of non-fossil fuel substitutes means that global demand for coal remains strong.
- Upward pressure on production and freight costs intensifies further due to high costs of other fossil fuels adding to the cost of producing and delivering coal.
- A close relationship between coal and gas prices in the medium term persists due to the opportunities for switching between coal and gas.

## Section 3: Historical prices and projected price assumptions

This section presents a summary of the four scenarios for each of the fossil fuels. The scenario titles are as follows:

- Scenario 1 - Low global energy demand
- Scenario 2 - Timely investment and moderate demand
- Scenario 3 - High demand and producers' market power
- Scenario 4 - High demand, significant supply constraints



