



GLOBAL INSIGHT

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**THE IMPACT OF ENERGY PRICE SHOCKS
ON THE UK ECONOMY**

**A REPORT TO THE
DEPARTMENT OF TRADE AND INDUSTRY**

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Executive Summary

This report briefly describes the results of simulation exercises conducted for the six scenarios developed for the Department of Trade and Industry. The model employed to develop and run the scenarios is the Global Scenario Model built by Global Insight, Inc.

The six scenarios considered are:

Scenario 1. UK aggregate energy price scenario: In this scenario, the UK's aggregate energy price rises by 30% from the baseline level permanently.

Scenario 2. Pan-Europe aggregate energy price scenario: As a variation of Scenario 1 designed to evaluate impact sensitivities, aggregate energy prices of all European countries rise by 30% from their baseline levels permanently.

Scenario 3. Global aggregate energy price scenario: As another variation of Scenario 1, aggregate energy prices rise globally by 30% from the baseline permanently.

Scenario 4. UK temporary gas price scenario: Domestic natural gas price increases by 30% from the baseline in the first three years with the shock gradually phasing out by 2015.

Scenario 5. UK permanent gas price scenario: Domestic natural gas price increases by 30% from the baseline permanently.

Scenario 6. Crude (Brent) oil price scenario: Brent crude oil price rises by 30% from the baseline permanently.

In all of the above scenarios, the shocks start from 2010 and run through 2025, except for Scenario 4 where the shock ends in 2015. In developing the scenarios, no additional shocks were introduced other than those noted above.

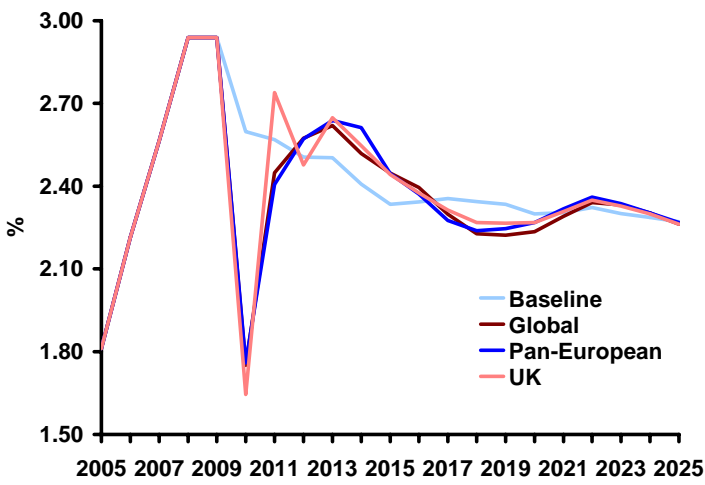
Main Results

- As expected, shocks to aggregate energy prices cause the largest macroeconomic and energy demand effects (in terms of growth rate volatility).
- Shocks to gas prices produce a greater growth volatility for macroeconomic and energy demand than shocks to oil prices.
- In general terms, shocks specific to the UK market tend to produce more growth rate volatility than wider ranging price shocks (global or pan-European).
- All of the price shocks considered have a recursive effect on the main indicators, which tend to stabilise around the baseline level in the long run.
- Most of the variability across scenarios occurs at the shock date and in the 5-6 years that follow, after which growth rate levels tend to converge.

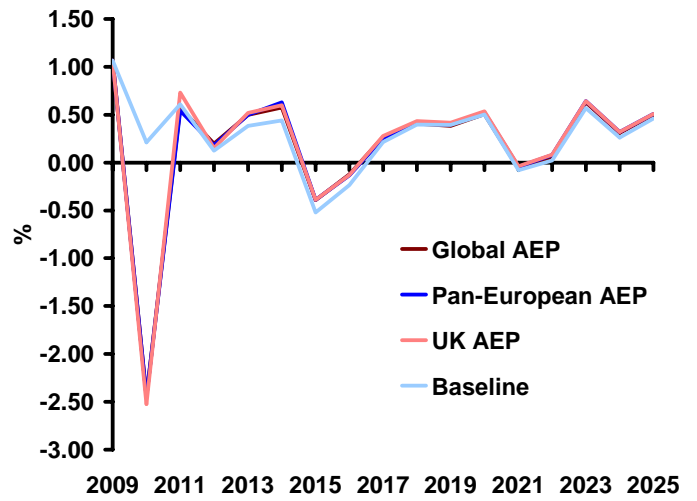
The figures below summarize the results obtained in the different scenarios.

GDP and Energy Use (growth rates)

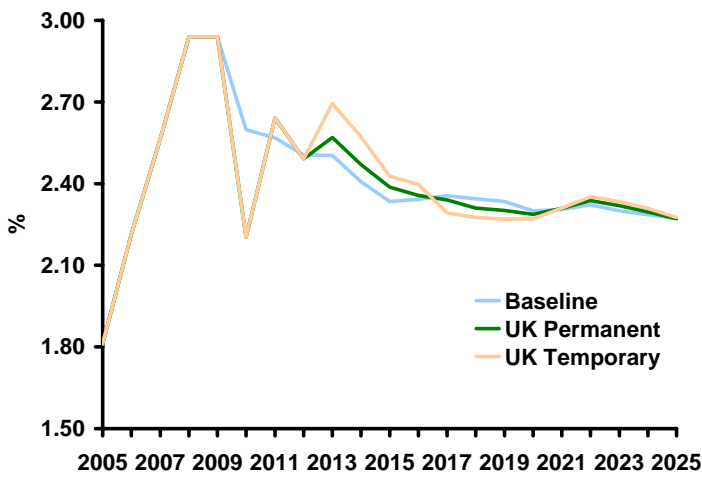
Real GDP Growth - Aggregate Energy Price Scenarios



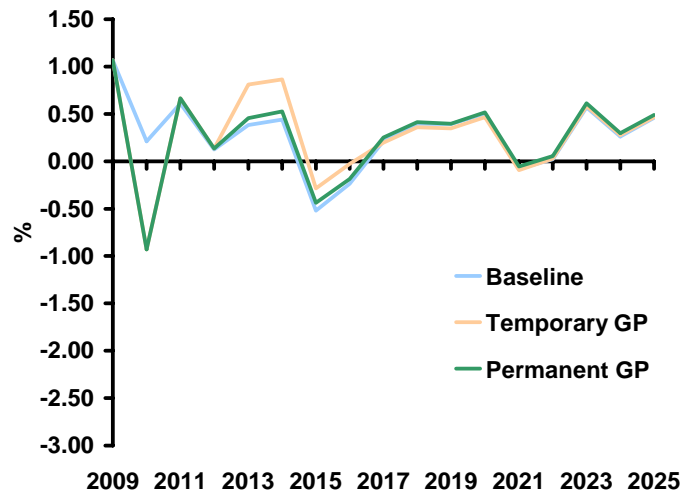
Total Energy Use - Aggregate Energy Price Scenarios



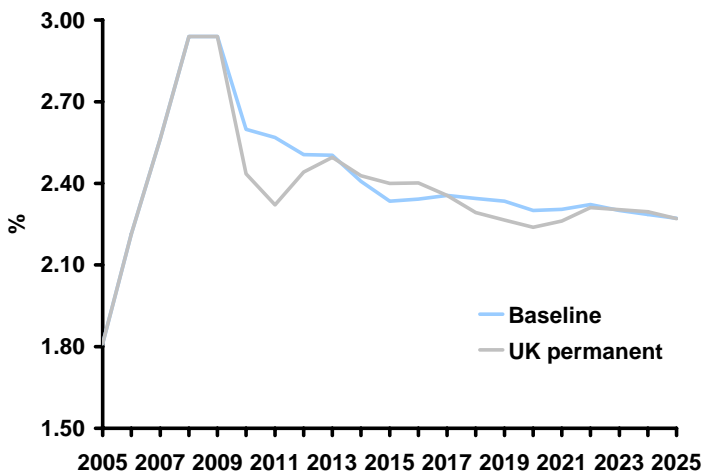
Real GDP Growth - Gas Price Scenarios



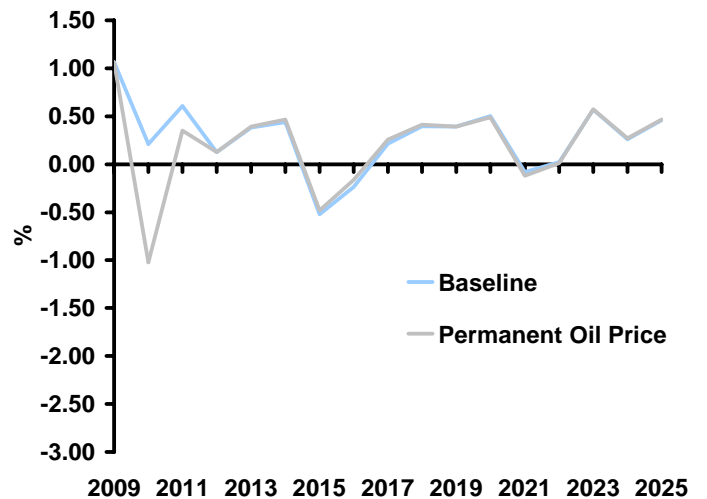
Total Energy Use - Gas Price Scenarios



Real GDP Growth - Permanent Oil Price Scenario

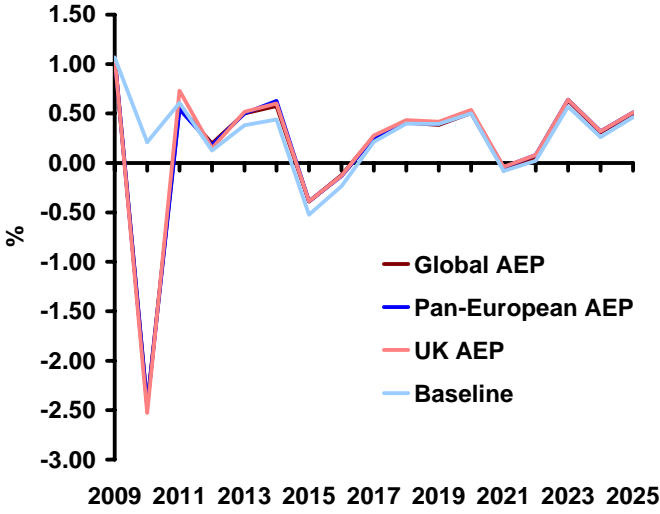


Total Energy Use - Oil Price Scenario

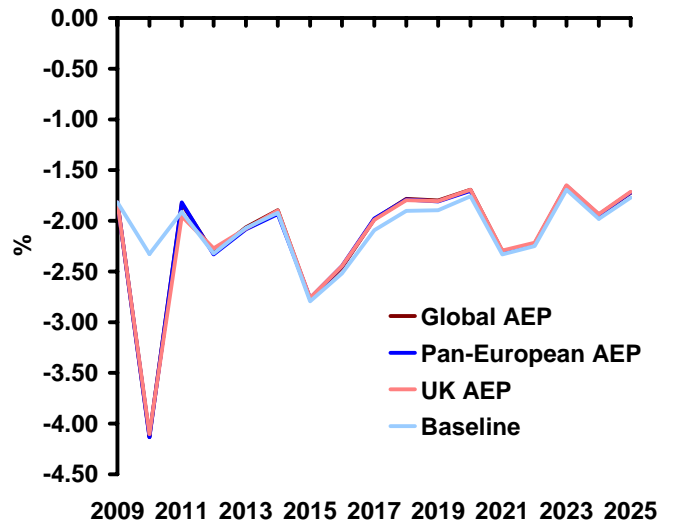


CO₂ and Energy Intensity (growth rates)

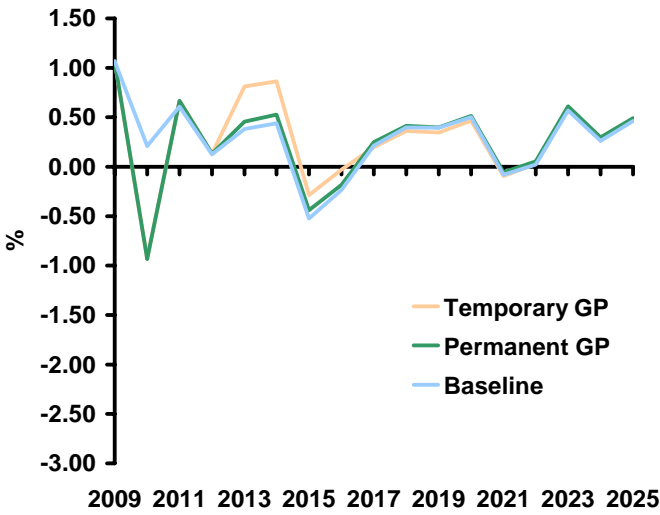
Carbon Emissions - Aggregate Energy Price Scenario:



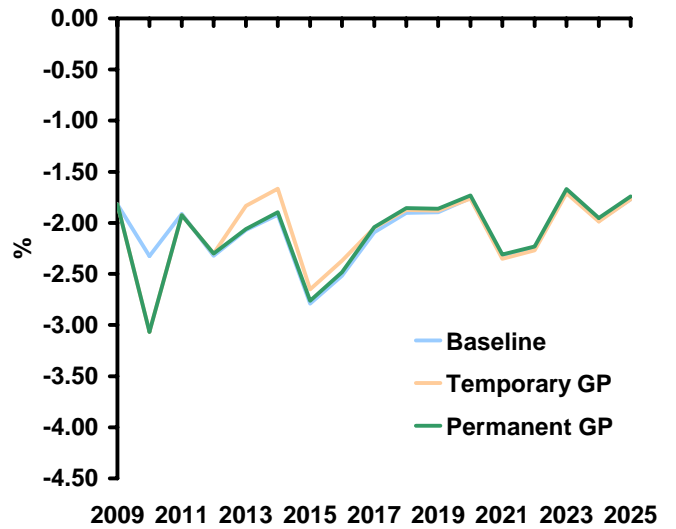
Energy Intensity - Aggregate Energy Price Scenarios



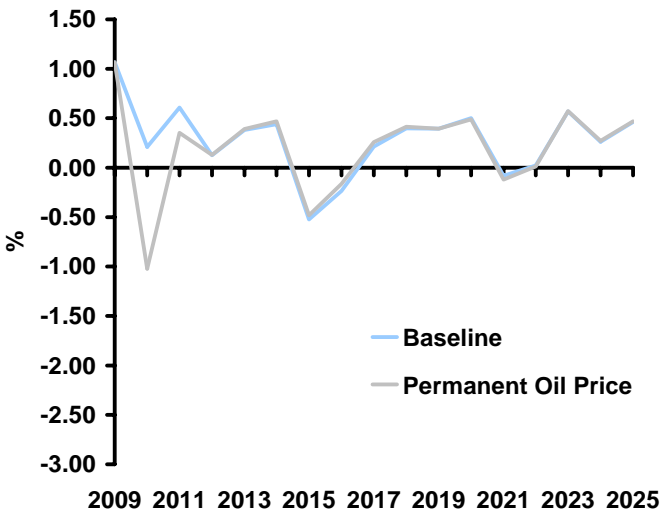
Carbon Emissions - Gas Price Scenarios



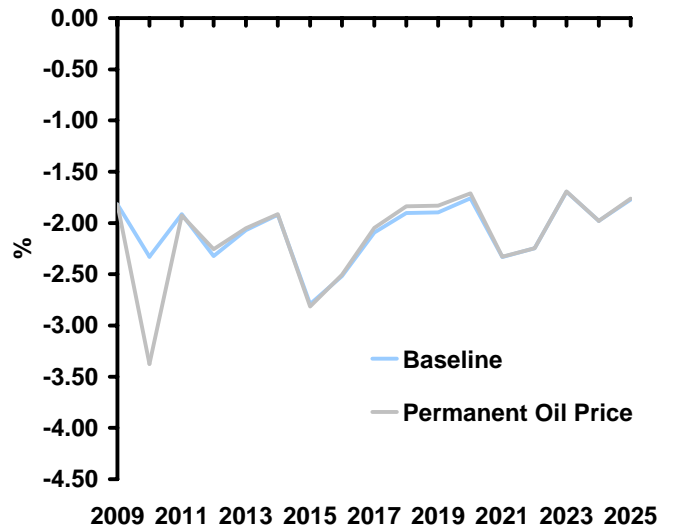
Energy Intensity - Gas Price Scenarios



Carbon Emissions - Permanent Oil Price Scenario



Energy Intensity - Oil Price Scenario



Energy Price Scenarios

1. UK temporary gas price scenario

In this scenario, the price of domestic natural gas goes up temporarily from the level forecast in the baseline scenario. Specifically, the gas price is assumed to rise by 30% from the baseline level for the first three years of 2010-2012, then 20% in 2013, 10% in 2014 and 5% in 2015, after which it returns to the baseline level.

1.1 Period 2010 – 2015

An increase in natural gas prices affects both consumers and industries. At the industry level, higher gas prices raise the costs of producing goods and services, which in turn are passed on to product prices. Prices of consumer products, capital goods, and exports all rise as a result. At the same time, household consumers are also directly affected because of higher fuel bills. As a consequence, the economy experiences a general rise in inflation.

In the first year of the shock, the CPI inflation rate rises 0.5 percentage point from the baseline, after which inflation rate or the rate of change in CPI falls slightly from the baseline, reflecting the fact that the shock is introduced as a proportion of the baseline *level*. In terms of deviation from the level, in the first three years of this period, a sustained 30% increase in gas price causes the aggregate energy price to go up by 11.4% on average each year, which in turn is translated into an increase of 0.3% in the CPI and an increase of 0.4% in the GDP deflator from baseline levels. Over the whole six-year period, the CPI rises by 0.1% and the GDP deflator by 0.2% annually on average from the baseline level, reflecting the fact that in the latter three years, the increase in gas price is gradually phased out.

In assessing the significance of price changes, it is noted that there are mitigating secondary effects on prices stemming from real economic activity. As will be discussed below, when higher prices depress demand and output, the resulting negative output gap or economic slack tends to dampen initial inflationary pressures, thus reducing the magnitude of price changes.

Private consumption falls on average by 0.3% each year from the baseline over the period of 2010-2015, primarily due to a decline in real disposable income. This income loss is the combined result of lower real wage rates and lower employment. Real wages fall by 0.2% and employment decreases by 0.3% on average each year from the baseline level.

In the first three years, real exports decrease by an average of 0.2%, or 0.8 billion pounds, from the baseline each year, because of worsening competitiveness caused by higher export prices. With aggregate domestic demand falling, real imports also decrease, but at a higher rate of 0.3%, or 1.4 billion pounds, on average. As a result, real net exports improve by an average of 1% each year in absolute terms, or by 0.6 billion pounds, compared to the baseline. In the latter half of the period, the gas price hike being phased out, the rise in export prices starts to moderate and hence real net exports improve further by an average of 2 billion pounds each year in comparison to the baseline. Over the period of 2010-2015, real net exports improve annually by 1.3 billion pounds, or 2.2% in absolute terms.

Business investment and residential construction are both adversely affected by higher prices of capital goods, reduced output, and lower real disposable income. Over the six-

year period, higher capital costs and declining output result in an average annual reduction of 0.3% in total fixed investment from the baseline level.

Overall, real GDP averages 0.2% below the baseline over the six-year period. With a slowdown in economic activity, employment also suffers. Unemployment rate rises 0.2 percentage point on average from the baseline level.

The higher gas price, and consequently higher aggregate energy price, causes the demand for total energy to decrease by an average of 0.7% from the baseline level. Energy intensity also falls by 0.5%. The decrease in total energy use results in the level of carbon emissions falling by an average of 4.7 million metric tons each year from the baseline.

1.2 Period 2016-2020

With the gas price shock discontinued from 2016, there is a general bounce-back setting in for the economy. Real consumption and investment rise annually by 0.1% and 0.2% respectively from the baseline levels. Primarily due to rising imports responding to recovering domestic demand, real net exports fall by 1 billion pounds, or 1.2% in 2016-2020. Employment, total energy use, and carbon emissions all display impacts consistent with a rise in aggregate demand.

Demand pressures from the upturn in the real economy prevent prices from falling. In fact, with lagged price effects from the previous period spilling over into this period, the CPI and GDP deflator both increase slightly at higher rates than the baseline. The result is that their percent deviations from the baseline are somewhat larger than those of the previous period.

1.3 Period 2021-2025

This period is characterized by a return toward the pre-shock economy. By 2025, real GDP is pushed back up to where it was prior to the shock. Most of other disaggregated variables show similar converging trends.

(Table 1.1) Temporary Gas Price Scenario

	2010-2015	2016-2020	2021-2025
Gas price	20.83	0.00	0.00
Real GDP	-0.17	0.04	0.00
Real consumption	-0.30	0.07	-0.07
Real investment	-0.21	0.16	-0.11
Real net exports (deviation, bill. £)	1.29	-0.96	1.00
Real capital stock	-0.04	-0.03	-0.02
GDP deflator	0.15	0.20	0.06
CPI index	0.10	0.15	0.09
Inflation rate (deviation,%)	-0.02	0.06	-0.02
Real wage rate	-0.17	-0.05	-0.01
Employment	-0.22	0.07	0.00
Unemployment rate (deviation,%)	0.15	-0.04	0.02
Total energy use	-0.69	0.15	0.09
Energy intensity	-0.53	0.11	0.09
Carbon emissions	-0.69	0.15	0.09

Annual average % difference from baseline level unless noted otherwise

2. Permanent Gas Price Scenario

This scenario assumes that gas price rises by 30% from the baseline level permanently.

2.1 Period 2010-2015

Overall impacts in this period are slightly larger than Scenario 1 (temporary gas price scenario), with a shock larger than that of Scenario 1 where the increase of gas price averages to 20%. On average, the CPI exceeds its baseline level by 0.2%, while the GDP deflator is 0.3% higher. This compares with increases of 0.1% and 0.2% for CPI and GDP deflator, respectively, in Scenario 1.

Consequently, real consumption and investment rise by averages of 0.4% and 0.3%, respectively, from the baseline, compared with the counterpart figures of 0.3% and 0.2% in Scenario 1. Real net exports rise by 1.3 billion pounds, with imports falling relatively more than Scenario 1. Overall, real GDP is lowered in this scenario by an average of 0.3% (vs. 0.2% in Scenario 1) from the baseline level, suggesting that a 10% increase in gas price is equivalent to a 0.1% loss of real GDP.

2.2 Period 2016-2020

Over the period, gas prices remain 30% above the baseline level, unlike Scenario 1 where the shock is ceased completely. Adverse impacts on prices thus continue: the GDP deflator averages 0.4% above the baseline level (vs. 0.2% in Scenario 1) and the CPI is 0.3% higher (vs. 0.2% in Scenario 1). Real GDP falls by 0.2% from the baseline level, a figure slightly lower than 0.3% of Scenario 1. This is largely due to a mitigated fall in private consumption and investment, attributable to declining real interest rates as inflation rises faster than nominal interest rates.

Despite a fall in import demand, real net exports improve only by 0.7 billion pounds, or 0.9% in absolute terms, reflecting a further worsening of export competitiveness.

Energy use and energy intensity continue their decline as compared to the baseline but at a rate slower than the previous period.

2.3 Period 2021-2025

The overall impacts of the sustained gas price shock are similar to those of the previous period. On average, the CPI and GDP deflator remain 0.4% and 0.5%, respectively, above the baseline level, and real GDP is lower by 0.2%. While there is an indication of the economy moving toward the pre-shock position, the return appears to be a very slow one. It is in large measure a reflection of the adjustment mechanism built into the Global Scenario Model. The behavioural equations in the model follow an adjustment process prescribed by the error-correction mechanism. Thus estimated, their empirical parameters often display lags of considerable length.

(Table 2.1) Permanent Gas Price Scenario

	2010-2015	2016-2020	2021-2025
Gas price	30.00	30.00	30.00
Real GDP	-0.27	-0.18	-0.20
Real consumption	-0.42	-0.31	-0.44
Real investment	-0.25	-0.07	-0.21
Real net exports (deviation, bill. £)	1.33	0.73	2.51
Real capital stock	-0.05	-0.09	-0.11
GDP deflator	0.29	0.43	0.47
CPI index	0.20	0.33	0.42
Inflation rate (deviation,%)	0.02	0.06	0.02
Real wage rate	-0.26	-0.29	-0.27
Employment	-0.28	-0.20	-0.19
Unemployment rate (deviation,%)	0.19	0.14	0.16
Total energy use	-1.00	-0.74	-0.61
Energy intensity	-0.73	-0.56	-0.42
Carbon emissions	-1.00	-0.74	-0.61

Annual average % difference from baseline level unless noted otherwise

3. Crude Oil Price Scenario

This scenario assumes that the Brent crude oil price rises by 30% permanently from baseline level, which is equivalent to an increase of \$13-\$17 per barrel. One additional assumption made in this particular scenario is that there are no changes in exchange rates as a result of the rise in oil prices. As an increase in crude oil prices is global in nature, it is assumed that little or relatively insignificant changes are brought to those factors determining exchange rates, such as relative inflation rates, interest differentials and relative foreign asset positions.

3.1 Period 2010-2015

A 30% increase in world oil prices, equivalent to around \$13 per barrel, raises UK's aggregate domestic energy price by 22% compared to the baseline, suggesting in part that gas and coal prices respond to crude oil price with lags. A higher domestic energy price in turn triggers a rise in inflation by pushing up production input costs, import prices, and consumer energy prices. The GDP deflator rises by 0.7% on average from the baseline, import prices by 2.6%, and the CPI by 1.0%. Export prices exceed their baseline levels by an average of 1.9%. As a result, the inflation rate, as measured by the CPI, jumps by 1.0 percentage point from the baseline in the first year and by 0.1% point over the whole period of 2010-2015.

Over the six-year period, real private consumption falls by an average of 0.9% from the baseline level, reflecting primarily a decrease in real disposable income from reduced real wage compensation: the real wage rate falls by 0.6% on average and employment declines by 0.4% from the baseline.

Despite rising capital costs brought by higher inflation and rising interest rates, higher oil prices cause fixed investment to rise by stimulating business investments in energy explorations. In the first three years of this period, real investment goes up by 1% on average from the baseline level. However, in the latter half of the period, fixed investment reverses its course falling by 0.7% on average as the positive effects on investment are more than offset by falling aggregate demand and output. Over the whole six-year period, fixed investment rises by 0.1% on average.

Higher oil prices adversely affect the global economy by slowing down economic growth in most countries. With global demand for the UK's goods and services reduced, its exports decrease annually by 1% on average from the baseline. The UK's imports also fall short of baseline levels due to weakened domestic demand: imports experience an average decrease of 1.8% from the baseline level. With imports shrunk more than exports, net exports exceed the baseline by 4.5 billion pounds, or 8.1% in absolute terms.

As a result, UK's economy suffers each year a loss of 5.3 billion pounds, or 0.4%, in GDP on average in comparison to the baseline. Employment falls by 0.4%, thus raising the unemployment rate by 0.3 percentage point.

Responding both to falling GDP and rising aggregate energy price, the UK's total energy use decreases by an average of 1.4% each year from the baseline level. Energy intensity also falls by 1%. Directly reflecting the decrease in total energy use, the level of carbon emissions falls by an average of 9.6 million metric tons each year from the baseline.

3.2 Period 2016-2020

The 30% rise in crude oil prices in this period is equivalent to an increase of \$14 per barrel, reflecting a slightly higher baseline crude oil price than in 2010-2015.

The picture on overall impacts remains close to what is observed in the previous period. Real GDP is lower by 0.4% and the prices represented by the GDP deflator and CPI are higher by 0.7% and 1%, respectively. Nevertheless, there is a slight difference between the two periods regarding how these impacts are generated. While private consumption in this scenario falls at the same rate as in the previous period, investment is worsened in the present period, which is then offset by a further improvement in net exports. With the delayed impacts starting to be accumulated in this period, income effects come to dominate investment and import responses. Fixed investment falls on average by 0.6%, while net exports rise by 7.5 billion pounds, or 10.4% in absolute terms.

3.3 Period 2021-2025

The 30% rise in crude oil price in this period is equivalent to an increase of \$16 per barrel.

The impact on real GDP over this period is slightly larger than that of the previous period: the UK's GDP is higher on average by 0.6% in 2021-2025, compared to 0.4% in 2016-2020. As seen from the table below, the GDP impact peaks in year 2022 and stabilizes at a level steadily lower than the baseline by the end of the forecast horizon. The impact on the GDP deflator, however, displays a tendency of moving down toward the pre-shock level. By 2025, GDP deflator reaches a level 0.5% higher than the baseline.

(Table 3.1) Impact on GDP and Price (% deviation from baseline level)

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Real GDP	-0.33	-0.33	-0.38	-0.45	-0.51	-0.55	-0.56	-0.55	-0.55	-0.55
GDP deflator	0.46	0.63	0.8	0.87	0.84	0.75	0.63	0.53	0.47	0.45

The fact that GDP stabilizes at a level lower than the baseline appears at odds with a general expectation that even with a sustained oil price hike, the economy will trend toward the pre-shock state. The long-term nature of the impacts as indicated here reflects in part a limitation of the model, which lacks a built-in mechanism whereby the financial wealth, or "petro-dollars", accrued to major oil exporters from higher oil prices is recycled back into the global economy. The windfall financial wealth recycled through

trade and capital flows should mitigate substantially economic damages incurred from a sustained rise in oil prices, thereby contributing to the restoration of economic activity to the pre-shock state.

(Table 3.2) Crude Oil Price Scenario

	2010-15	2016-20	2021-25
Crude oil price			
Deviation (US \$/bbl)	13.2	13.9	15.6
% deviation	30.00	30.00	30.00
Real GDP	-0.39	-0.40	-0.55
Real consumption	-0.91	-0.90	-1.19
Investment	0.10	-0.57	-0.49
Real net exports (deviation, bill. £)	4.50	7.50	10.50
Real capital stock	0.12	-0.15	-0.25
GDP deflator	0.71	0.72	0.56
CPI Index	0.97	1.03	0.88
Inflation (deviation,%)	0.14	0.06	-0.06
Real wage rate	-0.55	-0.61	-0.62
Employment	-0.41	-0.48	-0.62
Unemployment rate (deviation,%)	0.27	0.32	0.41
Total energy use	-1.42	-1.29	-1.32
Energy intensity	-1.03	-0.89	-0.77
Carbon emissions	-1.42	-1.29	-1.32

Annual average % difference from baseline level unless noted otherwise

4. UK aggregate energy price scenario

This scenario has the UK's domestic aggregate energy price rising by 30% over the baseline from 2010 to 2025.

4.1 Period 2010 – 2015

The immediate effect of a rise in domestic energy prices is an increase in production costs. Producers in turn pass on the higher costs of production to their output prices, thereby raising both producer and consumer prices. With higher energy prices feeding into all aspects of the economy, inflation measured in consumer prices rises by 1.0 percentage point during the first year. For the six-year period, the average consumer price level remains 0.5% above the baseline. The GDP deflator rises by 1.7% from the baseline level in the first year and for the 6-year period, increases by an average of 0.8% from the baseline.

Higher inflation eats into household's real income by slowing down real wage growth. As a result, private consumption decreases by 1.0% on average from the baseline level.

Real fixed investment is also adversely affected by a general decline in economic activity, and also by rising capital costs due to higher interest rates and higher prices of capital goods. Investment growth slows down to 3.0% in the first year of the shock, compared to 3.2% in the baseline. For the six year period, real fixed investment averages 0.6%, or 1.4 billion pounds, less than the baseline level.

Higher energy prices cause export prices to rise as well, resulting in a weakening of UK's export competitiveness. The erosion in the UK's competitiveness, however, is mitigated gradually by a subsequent depreciation in the sterling's exchange rate, which is

attributable to a rise in UK's inflation relative to the rest of the world. In the first three years of the period, the UK's total exports fall on average by 0.6%, or 1.8 billion pounds, each year. In the latter half of the period, however, total exports register a gain of 0.3%, or 1.1 billion pounds, each year compared to the baseline. Reflecting a lower import demand from consumers and businesses, total imports are reduced by 0.7%, or 3.7 billion pounds, on average from the baseline level. The net result is that there is an average annual reduction of 3.3 billion pounds over the period in the net export deficit compared to the baseline.

With private consumption, investment, and net exports all falling, real GDP growth slows down to 1.6% in 2010, a full percentage point below the baseline growth rate. In terms of percent deviation, the level of real GDP declines by an average of 0.7% from the baseline in the 2010-15 period.

Higher energy costs and declining economic activity cause energy demand to fall by an average 2.4% each year from the baseline. Energy intensity also decreases by 1.8% annually relative to the baseline.

4.2 Period 2016 – 2020

The price shock continues to deepen during this period as the full impacts of higher energy prices begin to be absorbed by the economy. Prices continue to rise and input and capital costs remain higher. CPI inflation rises annually by 0.2 percentage point above the baseline. In terms of level, the CPI and GDP deflator rise on average by 0.9% and 1.2%, respectively, from the baseline. These increments are higher than their counterpart figures of the previous period. Although the real wage inflation is seen to return to the baseline rates in this period, the level of the real wage rate still stays below the baseline. As a result, a general slow down in economic activity continues.

Real GDP is reduced by an average of 0.5% from the baseline level in 2016-20, which is slightly less than in the previous period. A mitigation of private consumption and fixed investment losses explains the difference. This in turn is a result of falling real interest rates seen in this period, as the continued reduction in economic activity puts downward pressure on nominal interest rates despite higher inflation.

Over this period, net exports improve by a smaller amount of 2.3 billion pounds, reflecting the fact that the fall in domestic demand moderates in comparison to the previous period.

4.3 Period 2021 – 2025

During this period, economic activity shows a slow but continued tendency of returning to the baseline. By the end of the forecasting horizon, real GDP remains 0.5% below the baseline level. The GDP deflator, on the other hand, is 1.6% above the baseline by 2025.

(Table 4.1) Aggregate Energy Price Scenario: UK-Only

	2010-15	2016-20	2021-25
Domestic Energy Price	30.00	30.00	30.00
Real GDP	-0.68	-0.49	-0.54
Real consumption	-1.03	-0.83	-1.20
Investment	-0.57	-0.20	-0.54
Real net exports (deviation, bill. £)	3.16	2.09	6.45
Real capital stock	-0.11	-0.23	-0.29
GDP Deflator	0.74	1.13	1.31
CPI Index	0.50	0.84	1.15
Inflation rate (deviation, %)	0.05	0.14	0.06
Real wage inflation	-0.11	-0.01	-0.02
Employment	-0.70	-0.56	-0.65
Unemployment rate (deviation, %)	0.48	0.37	0.43
Total energy use	-2.47	-1.97	-1.74
Energy intensity	-1.81	-1.49	-1.20
Carbon emissions	-2.47	-1.97	-1.74

Annual average % difference from baseline level unless noted otherwise

5. Pan-European Aggregate Energy Price Scenario

In this scenario, aggregate energy prices for the UK, Germany, France, Italy, and Spain are raised by 30% for the period of 2010–25. The aggregate energy prices of the rest of the world remain the same as in the baseline.

5.1 Period 2010 – 2015

The main difference between this scenario and the UK-only one is the feedback effects on the UK economy stemming from the four European economies' adjustments to the energy price shock. The primary channel through which these feedbacks enter the UK economy is trade. As real income and output in these economies fall, their demand for goods and services from the UK as well as the rest of the world is reduced. The UK's exports thus suffer a decline which in turn causes a fall in UK's GDP. On the other hand, the UK's imports from these four countries become more expensive as a result of higher energy costs. The UK's import demand falls consequently, partially offsetting the negative impact of reduced exports.

Over the 2010-15 period, the UK's total exports decrease by 0.4%, or 2.2 billion pounds, annually from the baseline level, which compares to a fall of 0.1%, or 0.5 billion pounds, in the UK-only scenario. Over the same period, however, imports decline by 0.9% or 5.6 billion pounds, compared to 0.7% or 3.7 billion pounds of the UK-only scenario. As a result, net exports improve by 3.4 billion pounds annually from baseline levels in this scenario, compared with 3.2 billion pounds in the UK-only scenario.

Real GDP in this period falls annually by 0.8% from the baseline, only slightly worse than the 0.7% decline of the UK-only case. This difference is explained by private consumption and fixed investment both of which show a slight worsening in comparison to the UK-only scenario.

The GDP deflator rises on average by 0.6%, compared to 0.7% in the UK-only case, reflecting an economy that is more depressed.

5.2 Period 2016 – 2020

With the negative impact on the UK's exports more pronounced, net real exports improve by only 0.7 billion pounds annually from the baseline, less than the gain of 2.1 billion pounds in the UK-only scenario. Largely because of the less favourable trade position, the UK's real GDP in this period remains at a level slightly lower than the UK-only scenario. On average, GDP falls by 0.6% each year from the baseline level, compared to 0.5% in the UK-only case.

5.3 Period 2021 – 2025

The net trade position in this period continues to deteriorate in comparison to the UK-only scenario. Net exports increase by 2.8 billion pounds in this period, which is substantially less than the 6.5 billion improvement seen in the UK-only scenario. As a result, real GDP remains at a level lower than the UK-only scenario over the period.

(Table 5.1) Aggregate Energy Price Scenario: Pan-European

	2010-15	2016-20	2021-25
Domestic Energy Price	30.00	30.00	30.00
Real GDP	-0.76	-0.61	-0.67
Real consumption	-1.10	-0.80	-1.01
Investment	-0.69	-0.26	-0.55
Real net exports (deviation, bill. £)	3.36	0.73	2.77
Real capital stock	-0.13	-0.28	-0.33
GDP Deflator	0.61	0.59	0.27
CPI Index	0.45	0.35	0.13
Inflation rate (deviation, %)	0.01	0.06	-0.04
Real wage inflation	-0.11	0.00	-0.01
Employment	-0.79	-0.69	-0.81
Unemployment rate (deviation, %)	0.54	0.46	0.55
Total energy use	-2.53	-2.09	-1.90
Energy intensity	-1.79	-1.49	-1.23
Carbon emissions	-2.53	-2.09	-1.90

Annual average % difference from baseline level unless noted otherwise

6. Global aggregate energy price scenario

In this scenario, aggregate energy prices increase by 30% permanently for all 15 countries covered in the model. As in the crude oil price scenario, all exchange rates are assumed to remain unchanged.

6.1 Period 2010 – 2015

A 30% global rise in aggregate energy prices results in a significant reduction in global economic activity, cutting world GDP by an average of 1.1% each year from the baseline level. Due to a resulting loss in global demand for the UK's goods and services, total exports decrease by an average of 1.3%, or 5.7 billion pounds, from the baseline. This compares with a loss of 0.4%, or 2.2 billion pounds, in Pan-European case.

The UK's imports incur a much larger shock than exports, because of a significant rise in import prices and subsequent fall in domestic demand. Overall import prices in this period rise on average by 2.2% each year from the baseline level, which compares to the increments of 0.5% and 0.7% in the UK-only and Pan-European cases, respectively. In this scenario, the energy shock causes an average reduction of 2.3%, or 12.0 billion

pounds, in total imports from the baseline. As a result, net exports rise by an average of 6.2 billion pounds.

Despite the positive effect on the net trade position, the economy suffers a loss in real income and output. Real GDP falls on average 0.8% from the baseline level, a loss similar to that in the Pan-European case. What offsets the favorable impact from reduced imports is a higher inflation for consumer and investment goods, because of rising import prices. The CPI rises on average by 1.0% from the baseline level, compared to 0.5% in the previous two scenarios. As a result, real wage rate decreases by 0.9% in this scenario, which largely accounts for real disposable income falling by 1.3% from the baseline. In comparison, real disposable income falls by 0.9% and 1% in the UK-only and Pan-European scenarios, respectively. As a result, private consumption in this scenario suffers a larger decline, with an average fall of 1.4% from the baseline level, compared to 1.0% and 1.1% in the UK-only and Pan-European cases, respectively.

All in all, real GDP in this period registers an average decrease of 0.8% from the baseline level in 2010-15, which is the same magnitude of impact as in the Pan-European scenario.

6.2 Period 2016 – 2020

In this period, the overall impacts as measured in real GDP are slightly larger than the Pan-European scenario. The effects on prices and real income remain higher than the previous two scenarios, resulting in a larger decline in domestic demand.

6.3 Period 2021 – 2025

By 2025, real GDP remains at a level 0.8% lower than the baseline, compared to 0.7% in the Pan-European scenario. The net export position continues to improve throughout the period, whereas worsening real income and aggregate demand continue to dominate the responses of the economy to the energy shock.

(Table 6.1) Aggregate Energy Price Scenario: Global

	2010-15	2016-20	2021-25
Domestic Energy Price	30.00	30.00	30.00
Real GDP	-0.77	-0.66	-0.81
Real consumption	-1.38	-1.24	-1.61
Investment	-0.65	-0.58	-0.84
Real net exports (deviation, bill. £)	6.23	7.11	11.87
Real capital stock	-0.11	-0.33	-0.47
GDP Deflator	0.88	1.07	0.68
CPI Index	0.98	1.19	0.94
Inflation rate (deviation, %)	0.13	0.09	-0.06
Real wage inflation	-0.14	-0.01	-0.03
Employment	-0.80	-0.77	-0.97
Unemployment rate (deviation, %)	0.54	0.51	0.65
Total energy use	-2.51	-2.09	-1.96
Energy intensity	-1.76	-1.43	-1.17
Carbon emissions	-2.51	-2.09	-1.96

Annual average % difference from baseline level unless noted otherwise