

The Cost of Gas since the Russian Invasion of Ukraine

The UK will have spent in the region of £60–70bn buying gas on wholesale markets in the 12 months since 24th February 2022, adding around £50–60bn of additional costs to the UK economy compared to before the gas crisis and pandemic.

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Context

Russia's invasion of Ukraine drove unprecedented turmoil in international gas markets, with supply restrictions, sanctions and sabotage contributing to record wholesale prices and significant volatility.

Prices peaked in March and August at record levels that were at least [ten times the typical prices](#) in the years before the crisis. Only towards the end of last year did [wholesale prices begin to fall](#), but are still around three times their historical levels.

Complex pricing

The high wholesale prices feed through into retail gas bills paid by customers, but the exact relationship is complex. For each 'delivery day' when customers will use gas, their supplier uses a 'hedging strategy' to build up a portfolio of gas over time, essentially trying to balance the risks of not knowing whether gas will become cheaper or more expensive as the delivery day approaches.

Initially during the gas crisis, many retail prices lagged the rising wholesale prices because suppliers' portfolios were still largely made up of gas purchased at lower prices before the crisis. But as the crisis progressed, wholesale trades at high prices made up increasing proportions of suppliers' portfolios, pushing retail prices upwards.

Similarly, the currently falls in wholesale prices will not be reflected in retail prices for some time. Indeed, retail prices have not yet reached their peak in 2023. And neither wholesale nor retail gas prices are likely to fall back to their pre-crisis levels during this decade, if ever.

Counting the cost

The cost of the gas crisis has been estimated in various ways, including its central role in energy bills and inflation, and the costs of Government support schemes to help customers manage the impacts.

What is perhaps less clear is the underlying cost of gas – that is, how much the UK has spent buying wholesale gas, as opposed to the multiplying damaging effects of that gas on energy bills and across the economy. Analysts can access data about traded volumes and prices to build up a picture, but they can't know the confidential details of long-term bilateral contracts. But we can estimate the overall costs, using some reasonable assumptions.

Household costs

The cost of gas for households can be estimated using data from Ofgem's price cap model. This uses a "nominal supplier's hedging strategy" to estimate the overall cost of supplying a unit of gas to a home (taking into account advanced trades and day-ahead prices). Looking at the four years 2016 to 2019, just before trends were disrupted during the pandemic, and before prices rose in the gas crisis, Ofgem's estimated wholesale price averaged just over £16 per MWh. So, a household using the average 12MWh of gas per year, would have been paying around £200 a year for wholesale gas. Although most households were not on the price cap at that time, the range in tariffs was small compared to the impacts of the gas crisis, and so the historical price cap value provides a useful benchmark.

Roll forward to the gas crisis, and the price cap model estimates overall wholesale prices rising throughout 2022 and reaching £114/MWh in Q1 2023. In addition, such was the volatility in 2022 that wholesale prices outpaced estimates, leaving suppliers unable to recover their costs. Ofgem introduced 'backwardation' to allow suppliers to retrospectively recoup those extra costs.

The overall price of wholesale gas in the year since the invasion can be estimated by taking the wholesale costs and backwardation for Q1 2022 to Q1 2023, and then weighting them according to quarterly demand, and including only the year from 24th February 2022. This gives a value of £83/MWh, which is over five times the average from 2016–2019.

Scaling this up means that the average household that uses gas has spent £1,000 on wholesale gas over the past 12 months, £800 more than in a typical year. And scaling it up to the c.300TWh of gas typically used in a year in UK homes, the total cost comes to £25bn over the past 12 months since the invasion. This is £20bn more than the typical value of £5bn from before the pandemic and gas crisis.

Non-domestic, industrial and power generators

The cost of wholesale gas for other customers is not quite so clear cut. There are numerous types of tariffs for non-domestic customers (businesses, charities and public sector), industry and power generators.

An initial estimate of wholesale gas costs can be made on the assumption that these customers pay a similar amount to households. This is not normally the case, because larger customers can achieve savings through economies of scale, although many of the old rules have broken down during the gas crisis. Plus, one commonly used proxy for overall gas costs is the day-ahead price, which averaged around £78/MWh for the past 12 months, which is within 6% of the value from the price cap method.

So, assuming that their c.575TWh of gas demand was all bought at the same overall price of £83/MWh, the total cost would have been £47bn for the past 12 months. Or, using the average day-ahead price, the total comes to £45bn.

A more nuanced estimate can be made by examining costs from before the pandemic and their evolution during the gas crisis. The most useful source is BEIS'

publication of [Quarterly Energy Prices](#). These give retail unit rates, based on surveys of around 600 customers covering non-domestic, industrial and power generation, and the data is currently available for up to the end of Q3 2022. This data can be compared with the household data (see methodology), showing that other sectors do ordinarily pay lower prices than households.

However, the percentage differences between the sectors' gas prices have shrunk during the gas crisis. The method suggests that non-domestic customers used to pay 60-70% the price of households, but that has been around 80% during the gas crisis. For industrial customers, the value used to be 50-60%, but has been around 70% in the crisis. And for power generators, the value used to be around 35-55%, but has been around 90% during the crisis (lending credence to a view amongst some analysts that the power sector was particularly exposed to short-term gas trades).

Using these estimates, along with estimated annual demand from each sector, gives a total cost of £35–40bn over the past 12mths, compared to an estimated £5bn in a typical year – that is, £30–35bn of additional costs. (The range reflects uncertainty owing to the need to extrapolate for the final part of the year for which data has not yet been published.)

Overall costs for UK

The results above suggest that the UK has spent in the region of £60–70bn over the past 12months since the Russian invasion of Ukraine. These costs were at least six times higher than the value of around £10bn for a typical year before the pandemic. So, overall, the gas crisis has added £50–60bn of wholesale gas costs in just one year.

With net imports equating to around 55% of UK gas demand, the cost of gas has impacted upon the nation's balance of trade. Under pre-pandemic prices, gas contributed over £5bn a year to the UK balance of trade deficit. Based on the results of this analysis, this negative impact of gas costs has risen by around £30bn, taking the total impact to £35bn for the past 12months.

This balance of payments is lower than it could have been, had the UK not invested in measures that reduce gas demand. Renewables currently generate around the same amount of power each year as do gas power stations (each producing around 40% of our total power output). So, without renewables, the UK could have been relying upon gas power stations operating more often, potentially using twice as much gas for power generation as we currently do, equating to an extra 32% of gas demand, and adding 58% to our gas imports. Therefore, without renewables displacing gas power generation, the UK's balance of payments could have had a further deficit of around £20bn over the past 12months, for a total of £55bn.

Methodology

The analysis of household costs uses the 'wholesale gas cost allowance' from Annex 2 of Ofgem's price cap model. This allowance is measured in terms of £/MWh at the National Balancing Point (NBP), i.e. it gives the cost of gas when it is injected into the transmission system and does not include the extra c.10% that is added to the allowance to account for other costs that scale with the wholesale price (e.g. losses and balancing).

This allowance is calculated by Ofgem on the basis of a "nominal supplier's hedging strategy". As the crisis developed and most households moved onto the price cap, surviving suppliers tended to follow Ofgem's nominal hedging strategy in order to minimise their exposure to wholesale price risks. Ofgem's price cap model has therefore become an increasingly accurate measure of wholesale gas and power costs for households – almost a 'self-fulfilling prophecy'. Whilst most households were not on the price cap in 2016–2019, the range of prices was small compared to the impacts of the gas crisis, and so it is a useful illustration of overall costs at that time.

Gas demand levels are taken from DUKES 4.1 (BEIS, 2022). Historical averages for each sector are taken from 2016 to 2019, i.e. before the pandemic and before the gas crisis. Quarterly demand data from this source is used to weight prices to give annual values.

BEIS publishes estimates of the total costs of energy for different end-user sectors of the economy (DUKES 1.1.6). However, this data is about retail costs, and so includes standing charges and other costs beyond wholesale gas costs; and it does not include the costs of gas for power generators, which is instead rolled into the cost of electricity for end-users. This data is currently available for up to the end of 2021.

BEIS' Quarterly Energy Price data can be compared with household data, but not directly. The BEIS data is retail unit rates, which excludes the standing charge, but includes more than just the wholesale gas price. To make a comparison, the household price cap data was used to calculate the household retail price, and then retail prices were expressed as percentages of household retail prices. Trends were observed to the end of Q3 2022, and then extrapolated over this winter to obtain overall values for the past 12 months.

Balance of payments calculations use data from DUKES 4.1 (BEIS, 2022) for gas demand and imports and from DUKES 5.6.2 (BEIS, 2022) for electricity generation. Note that the ONS estimates a different value for balance of payments, using day-ahead gas prices, and the ONS notes that these do not include longer-term trades.