Office for National Statistics

Article

The impact of higher energy costs on UK businesses: 2021 to 2024

Impact of the increase in electricity and gas prices between 2021 and 2024 on energy-intensive industries in the UK.

Contact:
Macroeconomic Insights team
economic.advice@ons.gov.uk
+44 2037 411784

Release date:
19 May 2025

Next release:
To be announced

Table of contents

1 . Main points

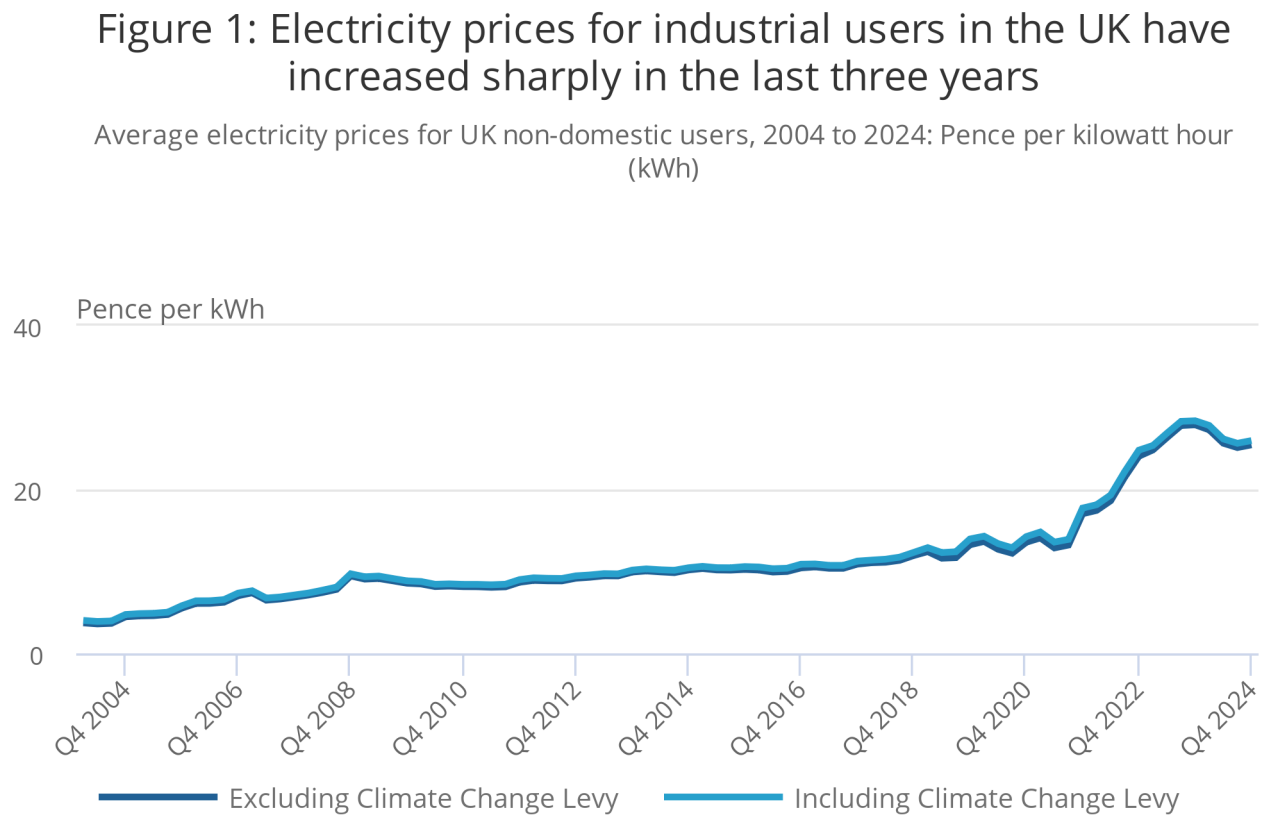
- UK electricity prices reflect the strong rise in gas prices since 2021, as the global economy moves out of the coronavirus (COVID-19) pandemic, and because of the war in Ukraine.
- UK electricity prices are high by international comparisons, because of the relative dependence on gas compared with other sources, for example, nuclear, coal, and renewables.
- Energy-intensive manufacturing industries, predominantly operating in international markets, consist of paper and paper products, petrochemicals, basic metals and castings, and inorganic non-metallic products.
- Collectively, the volume of output in these industries has fallen by one-third since the start of 2021 and is now at its lowest level since the start of the available time series in 1990.

2 . An overview of gas and electricity prices for UK non-domestic users

Since 2021, the average electricity price for UK non-domestic users has increased sharply from 14.81 pence per kilowatt hour (kWh) in 2021 Quarter 1 (Jan to Mar) to a peak of 28.39 pence per kWh in 2023 Quarter 4 (Oct to Dec) – a rise of over 90%. Since then, the average electricity price has fallen back to 25.97 pence kWh in 2024 Quarter 4. However, this is still 75% higher than the average price at the start of 2021 (see Figure 1).

Figure 1: Electricity prices for industrial users in the UK have increased sharply in the last three years

Average electricity prices for UK non-domestic users, 2004 to 2024: Pence per kilowatt hour (kWh)



Source: DESNZ - Gas and electricity prices in the non-domestic sector

Notes:

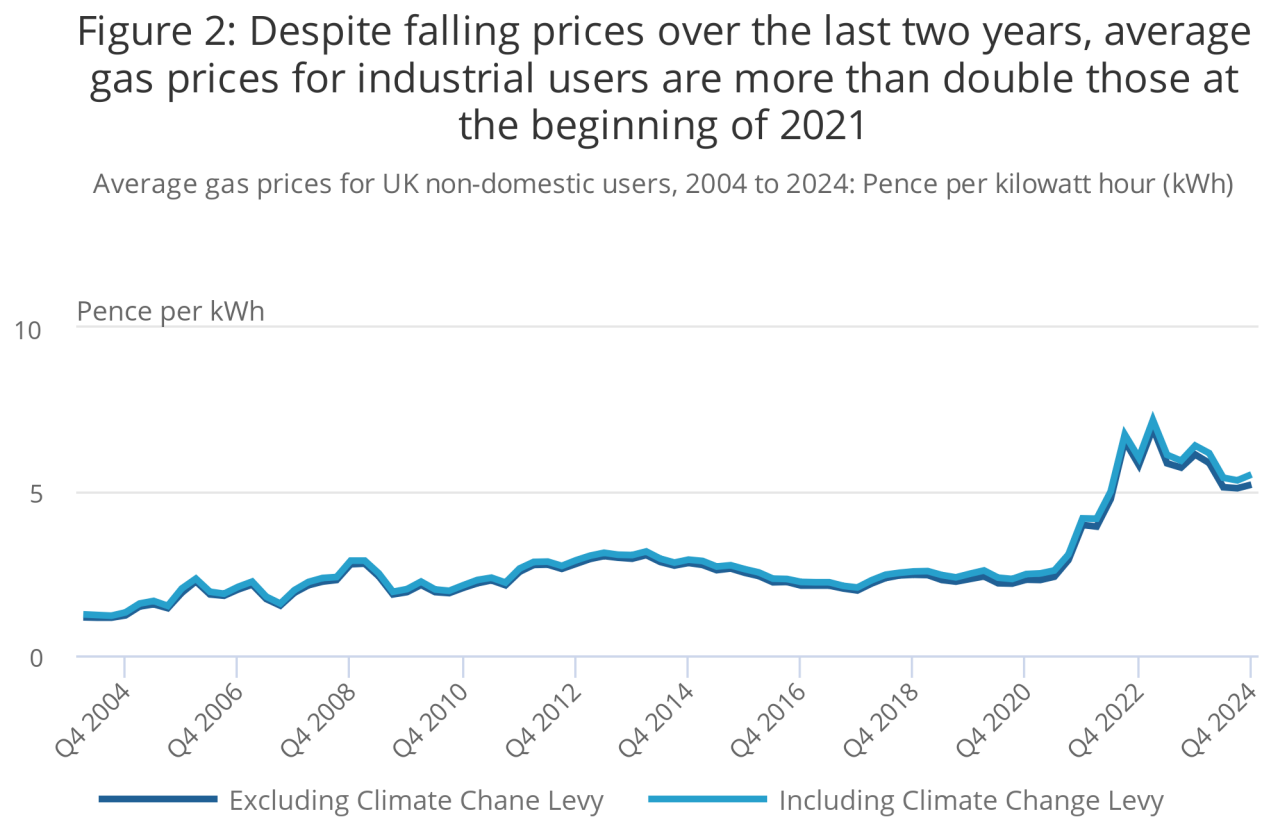
1. The average price shown in this chart is calculated as the total value of electricity usage divided by the total quantity purchased across all businesses.

2. The Climate Change Levy (CCL) is a tax on the commercial electricity and gas use above certain thresholds in the UK, which came into effect in April 2001.

Over the same period, the average gas price for UK non-domestic users has followed a similar trajectory. This increased nearly three-fold from 2.50 pence per kWh in 2021 Quarter 1 to 7.18 pence per kWh in 2023 Quarter 1. The average gas price has since fallen back to 5.52 pence per kWh, but this is still more than double the average price in 2021 Quarter 1 (see Figure 2).

Figure 2: Despite falling prices over the last two years, average gas prices for industrial users are more than double those at the beginning of 2021

Average gas prices for UK non-domestic users, 2004 to 2024: Pence per kilowatt hour (kWh)



Source: Gas and electricity prices in the non-domestic sector from the Department for Energy and Net Zero (DESNZ)

Notes:

1. The average price shown in this chart is calculated as the total value of gas usage divided by the total quantity purchased across all businesses.

2. The Climate Change Levy (CCL) is a tax on the commercial electricity and gas use above certain thresholds in the UK, which came into effect in April 2001.

In the UK there is a very close association between gas and electricity prices, which follows from the way the system price of electricity is determined. The system price is set by the most expensive supply bid accepted from the various electricity generators. The electricity generation plants whose bid determines the system price are called “price setter”, or “price maker”, or “plants at the margin”, while those with bids lower than this price are called “price taker” or “infra-marginal” plants.

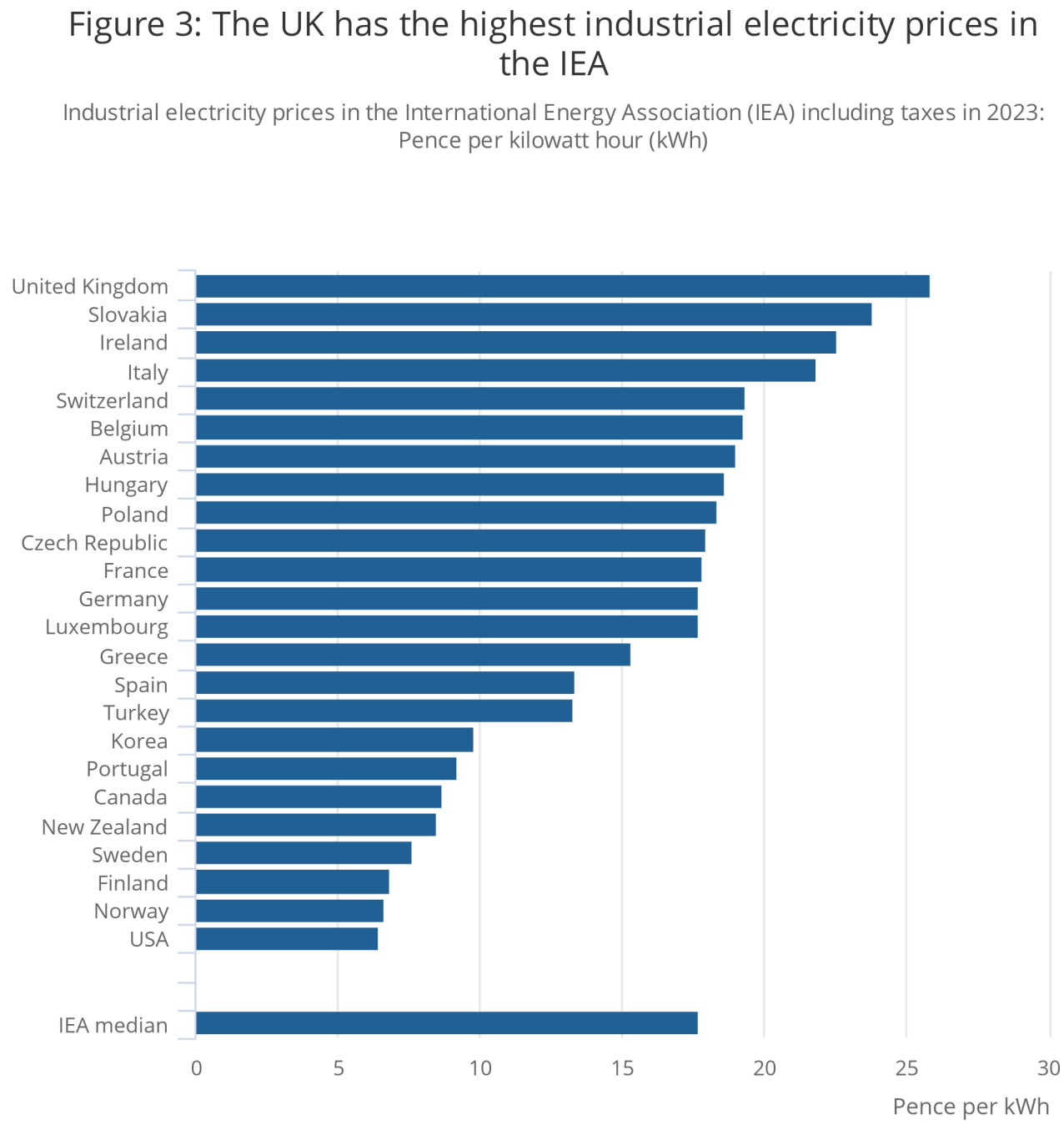
The article The role of natural gas in setting electricity prices in Europe, published in the Energy Reports journal, states that although in 2021 gas-fired power stations accounted for 43% of electricity generation in the UK, this form of generation set the system price 97% of the time. Therefore, it is the wholesale price of gas that is almost always the main factor in establishing UK electricity prices.

Since 2021, there has been a substantial increase in wholesale gas prices, first because of pressures in international supply chains as the global economy recovered from the coronavirus (COVID-19) pandemic, and then because of the Russian invasion of Ukraine. Wholesale gas prices are determined in international markets and, prior to the Ukrainian crisis, many European Union (EU) countries, especially Germany, could import abundant gas through pipelines from Russia. Although the UK can still import gas through pipelines from Norway, it and the rest of Europe increasingly relies on more expensive Liquified Natural Gas (LNG) from the US, Qatar, and Africa.

Following these marked increases in gas and electricity prices, in 2023, the UK reported the highest electricity prices for industrial users out of 24 countries reporting to the International Energy Association (IEA). The IEA is an organisation where the affiliated countries account for three-quarters of global energy demand. Electricity prices for UK industrial users were almost 50% higher than in France and Germany and four times higher than the United States and Canada. In 2023, UK electricity prices were 46% higher than the IEA median (see Figure 3). Over the last 10 years, UK electricity prices for industrial users have ranged from 17% above to 49% above the IEA median.

Figure 3: The UK has the highest industrial electricity prices in the IEA

Industrial electricity prices in the International Energy Association (IEA) including taxes in 2023: Pence per kilowatt hour (kWh)



Source: International industrial energy prices from the Department for Energy and Net Zero (DESNZ)

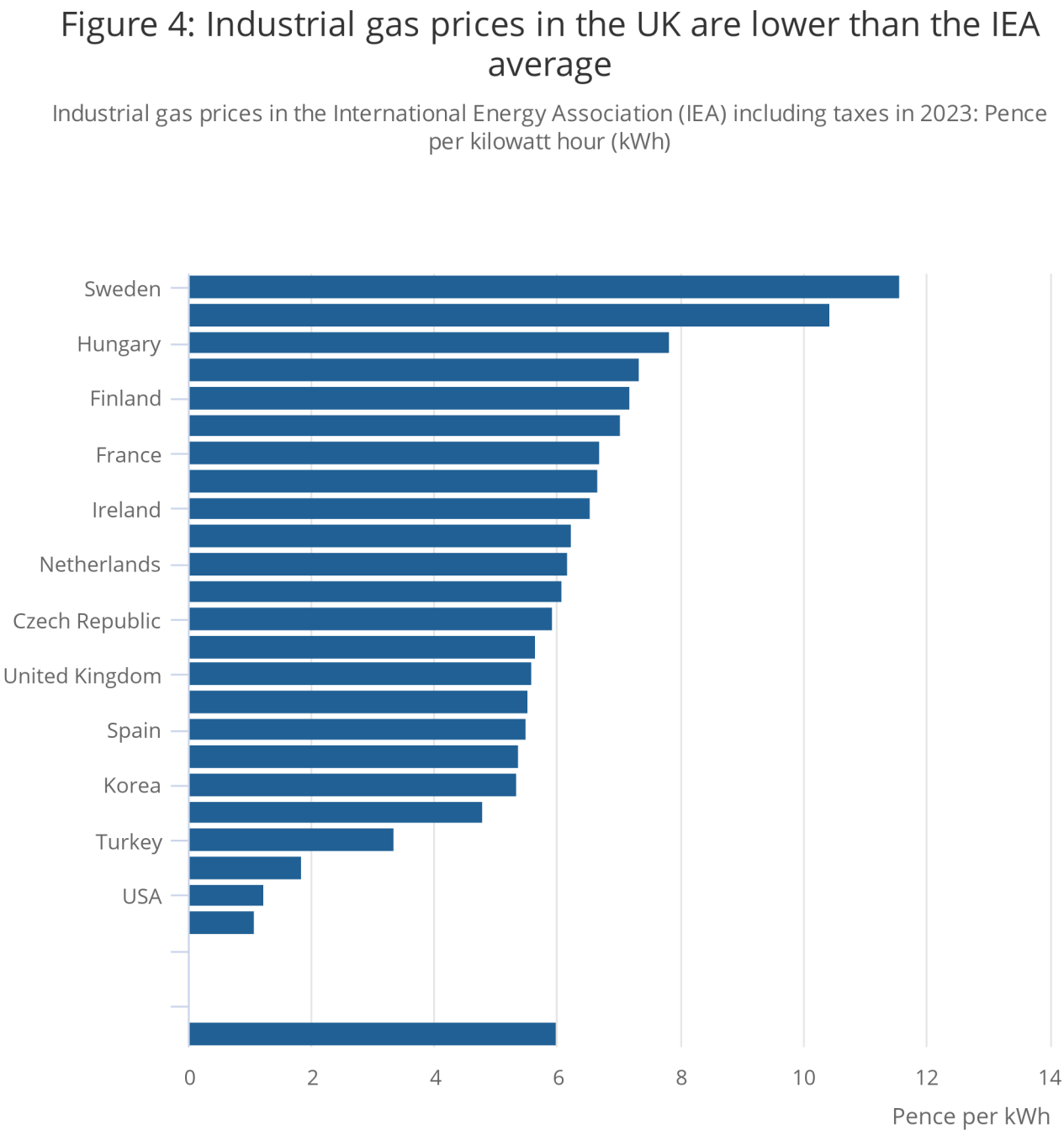
Notes:

1. Prices include all taxes on electricity purchases minus those refunded.
2. Prices converted to pounds sterling using annual average exchange rates.
3. Data for 2023 are not yet available for the following countries: Denmark, Netherlands, Australia, and Japan.

This contrasts with the same data for gas prices for industrial users where the UK is typically lower than the IEA average. In 2023, average gas prices for UK industrial users were 7% lower than the IEA median, and over the last two decades, up to 25% lower than the IEA median (see Figure 4).

Figure 4: Industrial gas prices in the UK are lower than the IEA average

Industrial gas prices in the International Energy Association (IEA) including taxes in 2023: Pence per kilowatt hour (kWh)



Source: International industrial energy prices from the Department for Energy and Net Zero (DESNZ)

Notes:

1. Prices include all taxes on gas purchases minus those refunded.
2. Prices converted to pounds sterling using annual average exchange rates.
3. Data for 2023 are not yet available for the following countries: Denmark, Netherlands, Australia, and Japan.

High electricity prices for UK industrial users relative to the United States and Canada reflect comparatively high gas prices. However, the same cannot be reasoned for high electricity prices relative to European countries. This gap is more of a reflection of gas prices relative to other forms of electricity generation and the relative reliance on gas-fired power stations.

According to the research published in the article, The role of natural gas in setting electricity prices in Europe, in 2021, natural gas set the marginal price of electricity in the EU only 36% of the time, although there was wide variation around this average. For instance, Italy also relies heavily on gas-fired generation and faces relatively high industrial electricity prices. However, in France and Germany, where the price-setting generators are more often nuclear and coal, respectively, gas-fired power generation sets the marginal electricity price only 7% and 24% of the time.

Research published by the UK regulator Office for Gas and Electricity Markets (OFGEM) in their Research into GB electricity prices for energy intensive industries report (PDF, 857KB) also concludes that high electricity prices for large industrial users are strongly driven by wholesale electricity costs that have been pushed higher by a generation mix that depends on comparatively expensive natural gas at the marginal plant. In part, this reflects the "dash for gas" in the 1990s, when a combination of technological and regulatory changes led to a fast and substantial increase in the number of gas-fired plants in the UK.

It also reflects the impact of the Carbon Price Support, which sets a relatively high minimum price for carbon emissions in the UK. This has been instrumental in decarbonizing power generation using coal. The last remaining coal-fired power station in the UK at Ratcliffe-on-Sour closed in September 2024.

The OFGEM research also identified two further factors resulting in higher electricity prices for UK large industrial users of electricity compared with those in Europe. The first are relative reductions in policy costs. Policy costs are designed to incentivise the use of renewables. In the UK, these include taxes such as Renewables Obligations, Feed-in tariffs and the Climate Change Levy. Although reductions in policy costs are applied to energy-intensive industries (EII) in the UK, these reductions are less generous than those in Germany, France, and the Netherlands.

The second factor is that network costs in Great Britain for EII are also higher because comparator European countries offer discounts to those users that provide a large baseload demand to the electricity grid, which lowers network costs for these users by up to 90%. The rationale for these discounts is that large and stable baseload demand helps lower the costs of balancing demand and supply for electricity in the grid.

3 . Energy-intensive industries in the UK

The input-output supply and use tables (IOSUTs) track the flow of goods and services through the economy and provide a convenient tool for identifying industries in the UK that are relatively energy intensive in terms of their inputs of gas and electricity. These are published annually by the Office for National Statistics (ONS) so allow the structure of production in terms of inputs into each industry and the nature of supply chains between different industries to both be tracked over time. The ONS has recently published an interactive tool based on the IOSUTs that makes it easy for users to explore how a selected product or service is used in the UK economy and how changes in the final demand for that product affects different industries.

The supply and use tables record the inputs of products and services (which are collectively known as intermediate consumption) along with labour and capital used in the production of each industry's total output. This enables the total intermediate consumption of gas and electricity to be calculated as a proportion of total output for each industry. This measure of energy intensity, based on an average over 2017 to 2019, when gas and electricity prices were relatively stable, is used in Table 1 to identify the UK's most energy-intensive industries.

Table 1: Intermediate consumption of electricity and gas as a percentage of gross output, average 2017 to 2019

Industry	Input-Output Group (IOG)	% of gross output
Electric power generation, transmission and distribution	D351	54.30
Manufacture of gas; distribution of gaseous fuels	D352_3	47.77
Manufacture of industrial gases, inorganics and fertilisers	C20A	11.07
Water collection, treatment and supply	E36	4.22
Manufacture of petrochemicals	C20B	3.68
Manufacture of vegetable and animal oils and fats	C104	3.61
Manufacture of dyestuffs, agro-chemicals	C20C	3.35
Manufacture of paper and paper products	C17	3.25
Manufacture of glass, refractory, clay, porcelain, ceramic, stone products	C23OTHER	3.24
Accommodation	I55	3.23
Manufacture of basic iron and steel	C241T243	3.08
Other mining and quarrying	B08	2.87
Manufacture of other basic metals and casting	C244_5	2.71
Manufacture of cement, lime, plaster and articles	C235_6	2.62
Manufacture of rubber and plastic products	C22	2.58
Sports activities and amusement and recreation activities	R93	2.33
Manufacture of bakery and farinaceous products	C107	2.24
Libraries, archives, museums and other cultural activities	R91	2.15
Rail transport	H491_2	2.10
Retail trade, except of motor vehicles and motorcycles	G47	2.09

Source: Input-output supply and use tables from the Office for National Statistics

This is a similar methodology to previous analysis published by the ONS in the article Business energy spending: experimental measures from the Office for National Statistics's business surveys, which presents experimental measures of energy intensity using the Annual Business Survey (ABS) and Annual Purchases Survey (APS). Both surveys ask businesses about their spending on energy and other aspects of their business performance.

Using the firm-level data from these surveys, energy intensity is measured as the proportion of a business's total purchases of energy, materials, goods, and services that it spends on energy. There is a positive association between the energy intensity of an industry division in 2019 and the proportion of businesses in that industry in the June and July 2022 Business Insights and Conditions Survey, reporting that they have been affected by energy prices.

This approach has the limitation that it can only measure the direct inputs of electricity and gas into the output of a particular industry. For instance, a certain industry that does not consume large quantities of electricity or gas but uses products like fertilisers, steel, or paper that in themselves require high energy inputs, would likely have its respective energy intensity underestimated.

The UK input-output dataset provides a solution to this by estimating type 1 effects – that is the total input requirements both directly and indirectly per unit of final use. Table 2 lists the industries during the years 2017 to 2019, where a unit change in final output had the largest impacts on the outputs of the electricity generation and gas distribution industries. Note that these effects reflect the entire supply chain of each industry, so will include the electricity and gas industry inputs into the inputs, the inputs into the inputs, and so on. For example, a unit change in the final demand of the Manufacture of industrial gases industry (C20A) would result in a 0.239 unit increase in the output of the electricity and gas industries.

Table 2: Input-output effects – how a one- unit change in the output of an industry affects the output of electricity and gas

Industry	Input-Output Group (IOG)	Impact on electricity and gas producing industries
Electric power generation, transmission and distribution	D351	2.072
Manufacture of gas; distribution of gaseous fuels	D352_3	1.984
Manufacture of industrial gases, inorganics and fertilisers	C20A	0.239
Water collection, treatment and supply	E36	0.102
Manufacture of petrochemicals	C20B	0.101
Manufacture of vegetable and animal oils and fats	C104	0.085
Manufacture of glass, refractory, clay, porcelain, ceramic, stone products	C23OTHER	0.081
Accommodation	I55	0.079
Manufacture of paper and paper products	C17	0.079
Manufacture of dyestuffs, agro-chemicals	C20C	0.077
Manufacture of basic iron and steel	C241T243	0.076
Other mining and quarrying	B08	0.074
Manufacture of bakery and farinaceous products	C107	0.070
Manufacture of rubber and plastic products	C22	0.069
Manufacture of cement, lime, plaster and articles	C235_6	0.066
Manufacture of grain mill products, starches and starch products	C106	0.062
Rail transport	H491_2	0.062
Processing and preserving of meat and production of meat products	C101	0.060
Processing and preserving of fish, fruit and vegetables	C102_3	0.060
Manufacture of other basic metals and casting	C244_5	0.060

Source: Input-output supply and use tables from the Office for National Statistics

Abstracting from the electricity generation and gas distribution industries that consume a substantial amount of their own products, the lists of energy-intensive industries presented in Tables 1 and 2 show broadly similar groups.

First, several of the services industries are found to be relatively highly energy intensive, specifically accommodation and rail transport services, but also sport and recreational services, libraries and museums and retail trade.

In our article, Food and drink service firms are most likely to cut trading to tackle energy costs, we reported that food and drink service businesses were more likely than any other industry to say they plan to cut trading by at least two days per week in November 2022 to reduce energy costs, identifying the hospitality industry among the UK businesses hardest hit by increasing energy costs.

The report also identified manufacturers as being under pressure, as more than half of manufacturing businesses (56%) said their production and/or supply had been affected by energy prices in early October 2022, the second highest of any broad industry group after hospitality.

Manufacturers form the largest group of energy-intensive industries identified in Tables 1 and 2, however, not all have been adversely affected to the same extent by the rise in electricity and gas prices in recent years. Analysis published by the Centre for Economic Performance and Research (CEPR) in their article, The energy crisis and the German manufacturing sector, suggests that the manufacturers of basic metals, glass, textiles, and basic chemicals are at the greatest risk. Other sectors that are energy intensive but are more sheltered from international competition, such as food processing and beverages, have greater scope to pass on higher energy prices to consumers. The same argument would also apply to energy-intensive services providers.

The German Federal Statistical Office (DESTATIS) report, Calculation and development of the new production index for energy-intensive industrial branches (PDF, 239KB), finds the production of chemicals and chemical products, the manufacture of basic metals, the production of glass, glassware and ceramics and paper and paper products to all exhibit high energy consumption relative to gross value added. Despite its high energy consumption, the production of food products is not categorised as an energy-intensive industry because the high energy consumption is offset by a high gross value added.

Therefore, from Tables 1 and 2, four specific groups of high energy-intensive industries in UK manufacturing are identified. These groups are operating in more competitive international markets and therefore might be at greater risk from a relatively large increase in UK electricity and gas prices. These are:

- Paper and paper products – consisting of Manufacture of paper and paper products (C17)
- Petrochemicals – consisting of Manufacture of industrial gases, inorganics and fertilisers (C20A); Manufacture of petrochemicals (C20B); Manufacture of dyestuffs, agro-chemicals (C20C); and Manufacture of rubber and plastic products (C22)
- Basic metals and castings – consisting of Manufacture of basic iron and steel (C241T243); Manufacture of other basic metals and casting (C244_5)
- Inorganic non-metallic products – consisting of Manufacture of cement, lime, plaster and articles of concrete, cement and plaster (C235_6); and Manufacture of glass, refractory, clay, porcelain, ceramic, stone products (C23OTHER)

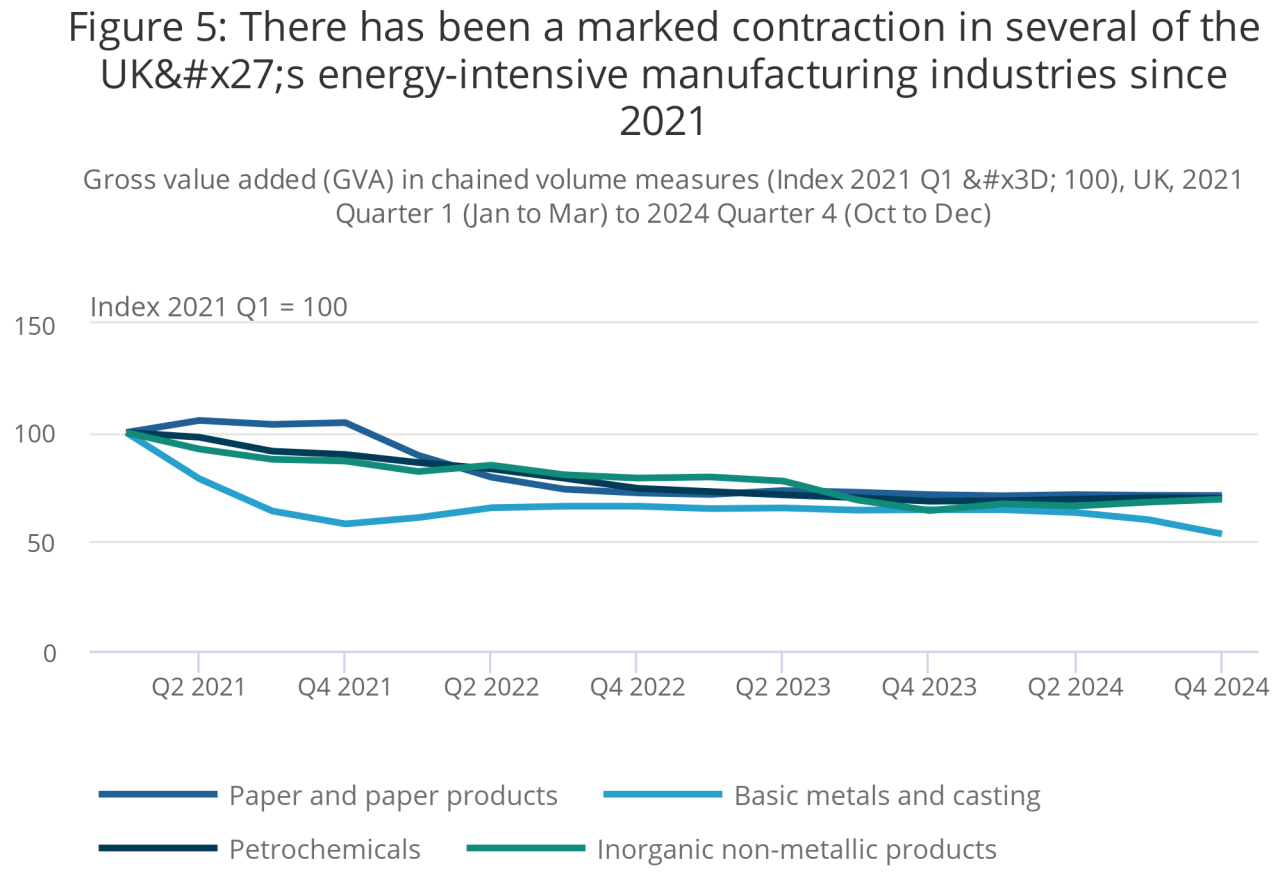
4 . The effect of higher energy prices on the output of energy-intensive industries

Figure 5 shows the volume of output in each of the four manufacturing energy-intensive industry (EII) groups, identified in the previous section, fell sharply during the period of rapidly increasing and high electricity and gas prices. Between 2021 Quarter 1 (Jan to Mar) and 2024 Quarter 4 (Oct to Dec), gross value added (GVA) in chain volume measures (CVM) declined by:

- 28.9% in the manufacture of paper and paper products
- 30.2% in the manufacture of petrochemicals
- 30.6% in the manufacture of inorganic non-metallic products
- 46.5% in the manufacture of basic metals and castings

Figure 5: There has been a marked contraction in several of the UK's energy-intensive manufacturing industries since 2021

Gross value added (GVA) in chained volume measures (Index 2021 Q1 = 100), UK, 2021 Quarter 1 (Jan to Mar) to 2024 Quarter 4 (Oct to Dec)

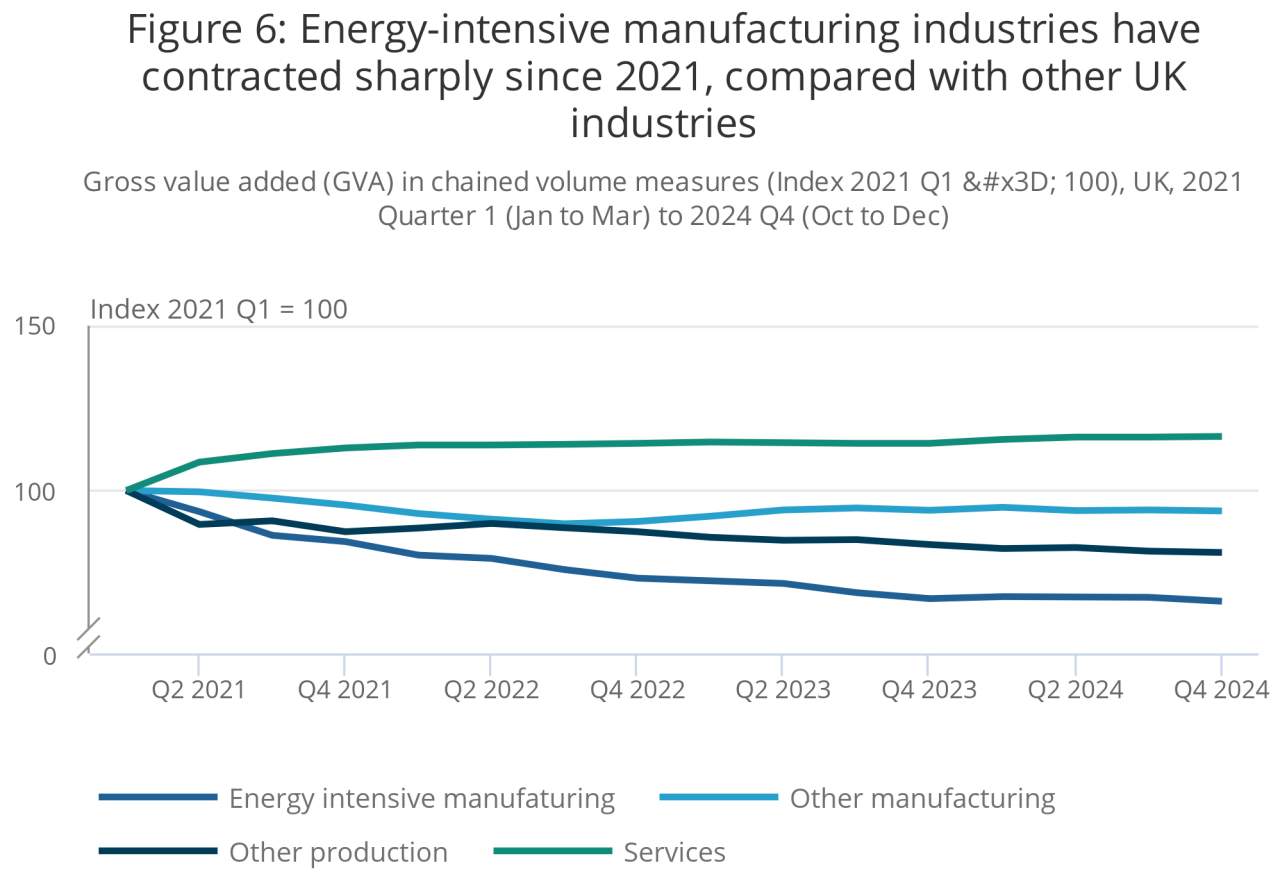


Source: GDP output approach – low-level aggregates from the Office for National Statistics

The relative performance of this group of 4 EIIs relative to other sectors of the UK economy is shown in Figure 6. The aggregate production index for the group of EIIs presented here mirrors a similar index published by DESTATIS, outlined in the report, Calculation and development of the new production index for energy-intensive industrial branches (PDF, 239KB), to track the industrial production of energy-intensive sectors in the German economy.

Figure 6: Energy-intensive manufacturing industries have contracted sharply since 2021, compared with other UK industries

Gross value added (GVA) in chained volume measures (Index 2021 Q1 = 100), UK, 2021 Quarter 1 (Jan to Mar) to 2024 Q4 (Oct to Dec)



Source: GDP output approach – low-level aggregates from the Office for National Statistics

For the UK, the real output of the EIIs fell by 33.6% between 2021 Quarter 1 (Jan to Mar) and 2024 Quarter 4 (Oct to Dec). This compares with a smaller fall of 6.2% in other manufactures. Note the output of UK foods and beverages manufacturing, of which several were identified as having high energy input costs, declined by 3% over this period.

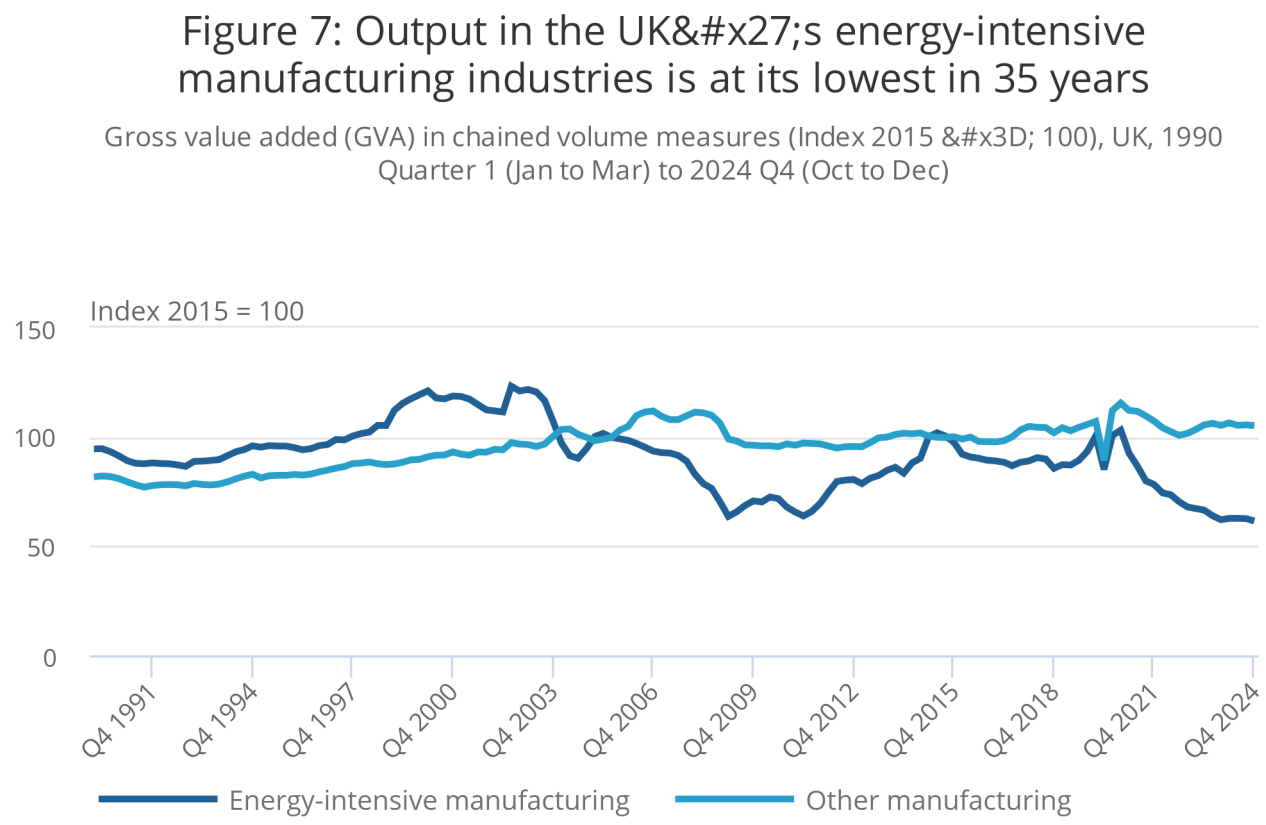
Output in other production industries declined by 18.2%, primarily because of a fall in mining and quarrying output as North Sea oil and gas production continues its long-term decline.

Services output, in contrast, increased by 16.4%. This partly reflects the recovery from the coronavirus (COVID-19) pandemic and because of the impact of the third national lockdown suppressing service sector output in 2021 Quarter 1. However, the recovery in output is also reflected in the relatively high energy-intensive service industries identified in Tables 1 and 2, notably hospitality and rail travel.

In Figure 7, the index of production for UK manufacturing EIIs is shown over a longer time series along with an index of production for the remainder of the manufacturing sector. This shows that the UK manufacturing EIIs are relatively cyclical, and that there have been large past declines in output not associated with rising energy prices, such as during the global financial crisis of 2008 to 2009.

Figure 7: Output in the UK's energy-intensive manufacturing industries is at its lowest in 35 years

Gross value added (GVA) in chained volume measures (Index 2015 = 100), UK, 1990 Quarter 1 (Jan to Mar) to 2024 Q4 (Oct to Dec)



Source: GDP output approach – low-level aggregates from the Office for National Statistics

However, this chart shows that the recent fall in output associated with the period of increasing and high energy prices has been substantial, and in 2024 Quarter 4, the index of production for the UK manufacturing EIIs was at its lowest point since the start of the available time series in 1990 Quarter 1.

5 . Energy costs and UK businesses data

Business insights and impact on the UK economy
Dataset | Released 03 April 2025
Weighted estimates from the voluntary fortnightly Business Insights and Conditions Survey (BICS) about financial performance, workforce, prices, trade, and business resilience.

Input-output supply and use tables
Dataset | Released 31 October 2024
Estimates of industry inputs and outputs, product supply and demand, and gross value added (GVA) for the UK. Supply and use tables for 1997 to 2022 are consistent with the UK National Accounts in Blue Book 2024.

UK inputoutput analytical tables: industry by industry
Dataset | Released 20 February 2025
Includes industry by industry and further analysis tables derived from the annual Supply and Use Tables (SUTs).

GDP output approach – low-level aggregates
Dataset | Released 28 March 2025
Annual and quarterly low-level aggregates of UK output gross value added (GVA) on a constant- and current-price basis.

6 . Data sources and quality

General information about data sources and quality that relate to this article can be found in the Data sources and quality section of our GDP first quarterly estimate, UK article.

7 . Related links

Gas and electricity prices in the non-domestic sector
Dataset | Released 27 March 2025
Quarterly and annual gas and electricity prices for the non-domestic sector, including and excluding the Climate Change Levy (CCL), split into consumption size bands.

International industrial energy prices
Dataset | Released 27 March 2025
DESNZ publishes comparisons of industrial energy prices by consumer size against other EU and G7 countries, using data from both Eurostat and the International Energy Agency (IEA).

Food and drink service firms are most likely to cut trading to tackle energy costs
Article | Released 14 November 2022
Explores some of the businesses hardest hit by increasing energy prices and discusses the potential consequences for customers, workers and bosses.

Research into GB electricity prices for Energy Intensive Industries (PDF 857KB)
Article | Released 09 July 2021
The purpose of this research is to increase Ofgem's understanding of what influences comparatively high GB electricity prices for EIIs and to place them in wider context by comparing with selected European countries.

The role of natural gas in setting electricity prices in Europe
Article | Released 01 November 2023
Understanding the extent to which electricity prices depend on fossil fuel prices and analysing the effects of the post-pandemic surge in power prices in 2021 and the energy crisis following the 2022 Russia-Ukraine war across Europe.

Interactive tool sheds new light on UK economy
Blog | Released 05 March 2025
The Office for National Statistics has today launched a new tool, allowing users to see how products and industries are interdependent across the economy.

Calculation and development of the new production index for energy-intensive industrial branches (PDF, 239KB)
Article | Released 01 February 2023
To monitor the monthly development of industrial production in energy intensive sectors, the Federal Statistical Office developed a production index for energy-intensive industrial branches.

The energy crisis and the German manufacturing sector
Article | Released 17 January 2023
This column discusses the impact of higher energy prices on industrial production in Germany. Results show that increases in energy costs will be unequally distributed across sectors.

Business energy spending: experimental measures from the Office for National Statistics' business surveys
Article | Released 07 September 2022
Business energy spending intensity in the Office for National Statistics's (ONS) Annual Business Survey 2019 and Annual Purchases Survey 2018, by industry, energy type, firm size and distribution.

8 . Cite this article

Office for National Statistics (ONS), released 19 May 2025, ONS website, article, The impact of higher energy costs on UK businesses: 2021 to 2024