

EU-MERCI

EU coordinated **ME**thods and procedures based on **Re**al **C**ases for the effective implementation of policies and measures supporting energy efficiency in the **I**ndustry

HORIZON 2020 Project Nr. 693845

Analysis of the industrial sectors in different Countries: United Kingdom

WP4: Picture of efficiency projects implemented by the Industry sector-by-sector and process-by-process

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1 General Overview of Industry in the UK

While the UK remains one of the largest manufacturer globally, it has moved away from a manufacturing to a service-based industry over the last 50 years. Currently, the manufacturing industry contributes to only around 10% to GDP, which has fallen from 15% in 2000 (World Bank 2017). Meanwhile, the service industry has expanded by more than 22% over the last 50 years. Most of the industrial sectors have experienced growth over the last decade, except pulp and paper, which has experiences decreased due to more use of digital technology. The largest contributors to the UK manufacturing industry are (including their respective % of total manufacturing):

- Food (16%)
- Transport (13%)
- Metals (11%)
- Other and repair (10%)
- Plastics (9%)
- Wood and paper (8%)
- Pharmaceuticals (8%)
- Machinery (7%)
- Computer equipment (7%)
- Chemicals (4%)

The total energy consumption of the industry sector (NACE Code C) in the UK was 23,594 ktoe in 2015.

The following eight sectors are both the largest energy consuming sectors and producers of emissions (around 66%):

- Cement
- Ceramics
- Food & Drink
- Chemicals
- Glass
- Iron & Steel
- Oil refining
- Pulp & paper

These eight sectors contribute to around 4% of total GVA and currently employ around 2% of the UK workforce.

Fuel prices for the manufacturing sector generally followed the price of crude oil, which has been increasing between 2002 and 2012 with a significant decrease in 2009. Average prices for electricity increased between 2005 and 2015, with falls in 2007 and 2010. Gas prices was less steady, with constant fluctuations. Coal prices increased between 2005 and 2014, with decreases in 2006, 2009, 2012 and 2015. Main sources of energy for industries as a whole:

- Natural gas (8,123 ktoe)
- Electricity (7,940 ktoe)
- Petroleum (3,935 ktoe)

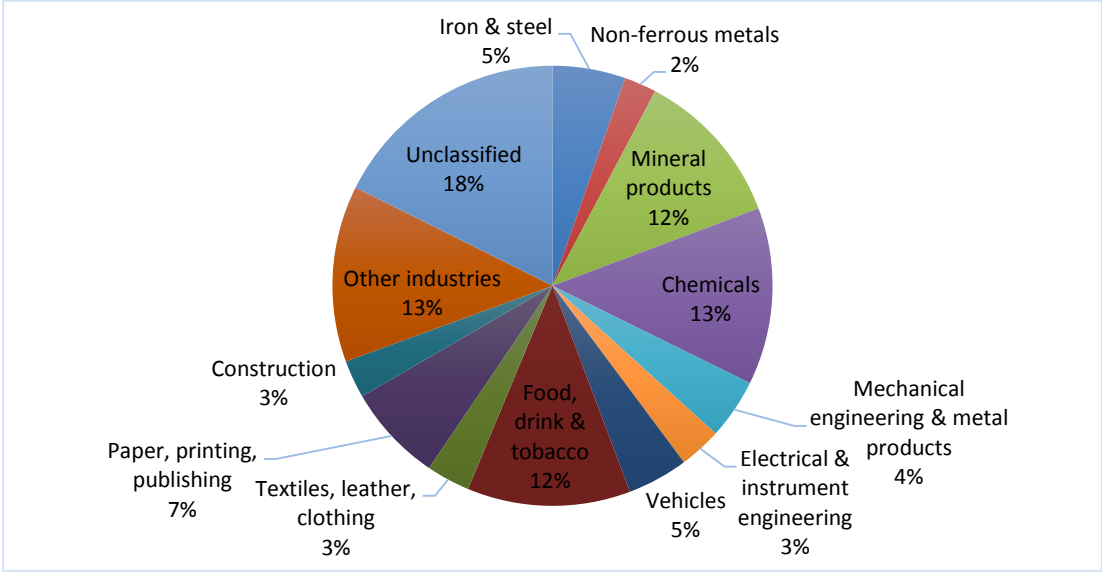


Figure 1: Energy consumption by sector in the UK manufacturing industry.

2 Food & Beverage sector

The food and beverage sector is characterised by NACE Codes 10 (Manufacture of food products), 11 (Manufacture of beverages) and in many official statistics, 12 (Manufacture of tobacco products).

2.1 Sectoral Organisation

Food and drink is the largest manufacturing sector in the UK and the UK is among the top three in Europe for this sector. The UK government has strict regulation for this sector, which means it provides safe, affordable and healthy foods.

2.2 Economic Indicators

In 2014, the UK food and beverage industry was comprised of 8,606 enterprises with a total turnover of 97,058 €. Total purchases made was 85,057 €, with an approximate gross value added of 25,287 € and a value of industrial services purchased of 1,293 €.

Table 1: Key economic parameters for British Food and Beverage sector.

Description	NACE (group)	Number of enterprises 2014	No. of persons employed 2014 [thousands]	Turnover 2014 [mil €]	Value added [mil €]	Production value [mil €]
Manufacture of food products	C10	7,107	374	97,057	25,287	88,255
Processing and preserving of meat and production of meat products	C10.1	1,022	81	21,453	3,829	20,669
Processing and preserving of fish, crustaceans and molluscs	C10.2	317	14	3,886	870	N/A
Processing and preserving of fruit and vegetables	C10.3	562	33	8,222	2,595	7,283
Manufacture of vegetable and animal oils and fats	C10.4	59	1	862	189	N/A

Manufacture of dairy products	C10.5	608	26	12,651	2,837	10,064
Manufacture of grain mill products, starches and starch products	C10.6	143	10	8,157	1,778	7,872
Manufacture of bakery and farinaceous products	C10.7	2,447	102	12,469	4,450	12,025
Manufacture of other food products	C10.8	1,536	95	20,358	6,630	18,364
Manufacture of prepared animal feeds	C10.9	413	15	8,999	2,109	7,531
Manufacture of beverages	C11	1,489	N/A	N/A	N/A	N/A
Distilling, rectifying and blending of spirits	C11.01	173	N/A	5,533	2,973	4,971
Manufacture of wine from grape	C11.02	25	N/A	N/A	N/A	N/A
Manufacture of cider and other fruit wines	C11.03	68	N/A	810	146	N/A
Manufacture of other non-distilled fermented beverages	C11.04	N/A	N/A	N/A	N/A	N/A
Manufacture of beer	C11.05	953	N/A	9,956	2,622	7,782
Manufacture of malt	C11.06	10	N/A	930	176	N/A
Manufacture of soft drinks; production of mineral waters and other bottled waters	C11.07	260	N/A	6,003	1,697	5,844

2.3 Energy Consumption

The food and drink processing industry is the fourth greatest energy user in the UK industry. In 2015, the total energy consumption for the food, drink and tobacco industry was 2,832 thousand tonnes of oil equivalent (ktoe). Within this total, the manufacture of food products covered 2,270 ktoe, the manufacture of beverages covered 544 ktoe and the manufacture of tobacco products covered 18 ktoe. It is also the fourth largest emitter of the industrial manufacturing sector, having emitted 9.5 million tonnes of CO₂ in 2012.

3 Pulp & Paper sector

The pulp and paper sector is defined by NACE Code 17 (Manufacture of paper and paper products), which consists of subsectors 17.1 (Manufacture of pulp, paper and paperboard) and 17.2 (Manufacture of articles of paper and paperboard).

3.1 Sectoral Organisation

The paper and paperboard manufacturing industry is mainly represented by DS Smith Paper Ltd. and UPM-Kymmene (UK) Ltd.

3.2 Economic Indicators

Due to the increasing usage of computers and other communication technologies and the transition towards more paperless operations, this industry is gradually reducing in size. Industry revenue has fallen over most of the last decade and is expected to decline at an annual compound rate of 1.9% over the next five years. Many manufacturers have even left the industry during the last decade.

Table 2: Key economic parameters for British Pulp and Paper sector.

Description	NACE (group)	Number of enterprises 2014	No. of persons employed 2014 [thousands]	Turnover 2014 [mil €]	Value added [mil €]	Production value [mil €]
Manufacture of paper and paper products	C17	2,626	55	13,390	3,424	11,337
Manufacture of pulp, paper and paperboard	C17.1	295	N/A	4,249	911	3,169
Manufacture of pulp	C17.11	N/A	N/A	N/A	N/A	N/A
Manufacture of paper and paperboard	C17.12	295	N/A	4,249	911	3,169
Manufacture of articles of paper and paperboard	C17.2	2,331	N/A	9,141	2,513	8,166

3.3 Energy Consumption

In 2015, the total energy consumption for the manufacture of paper and paper products was 1257 ktoe. In 2012, this sector emitted 3.3 million tonnes of CO₂.

4 Petroleum refineries sector

The coke and petrol products sector is defined by NACE Code 19 (Manufacture of coke and refined petroleum products). This includes subsectors 19.1 (Manufacture of coke oven products) and 19.2 (Manufacture of refined petroleum products).

4.1 Sectoral Organisation

The petroleum sector is mainly represented by Essar Energy Plc., Esso Petroleum Company Ltd., Phillips 66 Ltd., Total UK Ltd. and Valero Energy Ltd.

4.2 Economic Indicators

The petroleum is one of the sectors that experiences the most fluctuations in market conditions, including oil price volatility, decreasing demand, decreasing domestic oil feedstock, stricter environmental regulations and thinning margins.

Table 3: Key economic parameters for British Petroleum refineries sector.

Description	NACE (group)	Number of enterprises 2014	No. of persons employed 2014 [thousands]	Turnover 2014 [mil €]	Value added [mil €]	Production value [mil €]
Manufacture of coke and refined petroleum products	C19	242	N/A	48,776	1,762	48,746
Manufacture of coke oven products	C19.1	N/A	N/A	N/A	N/A	N/A
Manufacture of refined petroleum products	C19.2	242	N/A	48,776	1,762	48,746

4.3 Energy Consumption

In 2015, the total energy consumption for the manufacture of coke and refined petroleum products was 3,946 ktoe.

5 Chemical sector

The chemical sector is defined by NACE Code 20 (Manufacture of chemicals and chemical products).

5.1 Sectoral Organisation

The chemical industry in the UK acts as one of its major exporter and employer, but is a sensitive sector due to the increases in raw material and non-renewable fuel costs. Globally, the UK falls behind China, the US, Japan and Germany in terms of global sales and is the fourth largest producer within the EU after Germany, France and Italy.

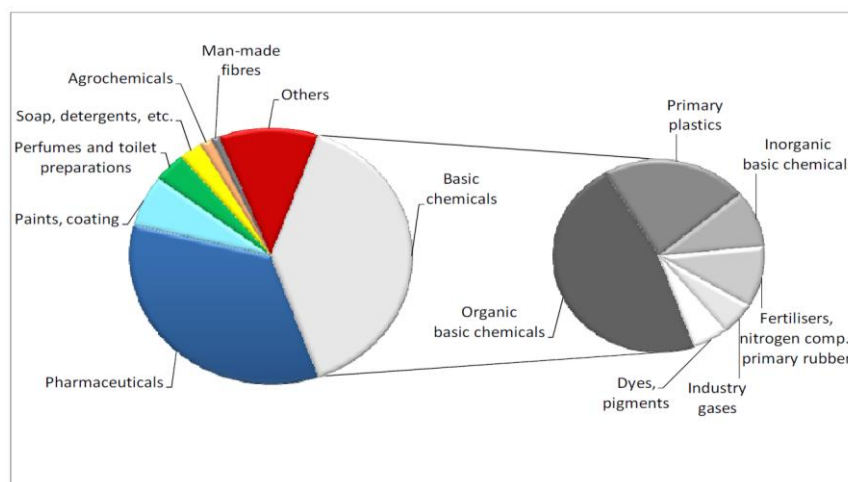


Figure 2: Chemical industry division by production value in 2010.

5.2 Economic Indicators

The chemical industry covers a large proportion of the UK economy regarding turnover, employment and trade. It has a 16% share of the countries manufacturer sales and contributes roughly 1.4% to its GDP. However, this sector falls behind those of the US and Middle East due to the lower costs of energy and chemical availability.

Table 4: Key economic parameters for British Chemical sector.

Description	NACE (group)	Number of enterprises 2014	No. of persons employed 2014 [thousands]	Turnover 2014 [mil €]	Value added [mil €]	Production value [mil €]
Manufacture of chemicals and	C20	2,617	103	39,265	11,104	32,465

chemical products						
Manufacture of basic chemicals, fertilisers and nitrogen compounds, plastics and synthetic rubber in primary forms	C20.1	736	35	17,511	4,669	16,126
Manufacture of pesticides and other agrochemical products	C20.2	73	3	1,534	377	1,169
Manufacture of paints, varnishes and similar coatings, printing ink and mastics	C20.3	408	N/A	4,505	1,172	3,917
Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations	C20.4	757	N/A	7,253	1,881	4,104
Manufacture of other chemical products	C20.5	628	21	8,227	2,969	6,918
Manufacture of man-made fibres	C20.6	15	N/A	234	36	231

5.3 Energy Consumption

The chemical industry is the largest consumer of energy in the industrial sector in the UK, representing around 30% of industry costs. Even though it is the greatest consumer of energy, it is not the greatest emitter. Annual emissions were 18.4 million tonnes of CO₂ just behind the emissions of the iron and steel manufacturing industry. In 2015, the total energy consumption for the chemical industry was 3,070 ktoe. Scope 1 greenhouse gas (GHG) emissions have reduced by 70% since 1990, partly due to enhancements in energy efficiency, but mainly due to the closure of production sites and outsourcing to nations with lower production costs. This industry is expected to grow by 1-3% and this could account for 11-25% of the UK's total carbon budget by 2050. However, the UK government has an emissions reduction target of 34% by 2020 and 80% by 2050, which should limit this increase.

D4.2 - Picture of efficiency projects implemented by the
Industry sector-by-sector and process-by-process

6 Non-metallic minerals sector

6.1 Glass

The glass sector is defined by NACE Code 23.1 (manufacture of glass and glass products) within the manufacture of other non-metallic mineral products sector (C23). This includes the manufacturing of flat glass, hollow glass, glass fibres and other glass products. The other sections within the non-metallic mineral products sector are listed in section 5 (ceramic & cement).

6.1.1 Sectoral Organisation

The majority of the glass industry in the UK is represented by British Glass; specifically the interests of primary glass manufacturers and the glass supply chain, from raw materials to retail and the end consumer. Glass and glass products manufacturing makes up 24.4% of the manufacturing of other non-metallic mineral products sector (C23) in terms of number of enterprises and produces around 3 million tonnes of glass a year.

6.1.2 Economic Indicators

The non-metallic mineral products industry in general has experienced a compound annual revenue expansion of 2% since 2011. Glass manufacturing is an energy intensive process, mainly using natural gas to run the furnaces and due to the significance of the fuel, the industry has worked to improve energy efficiency. Energy consumption has therefore decreased by half over the last three decades.

Table 5: Key economic parameters for British Glass sector.

Description	NACE (group)	Number of enterprises 2014	No. of persons employed 2014 [thousands]	Turnover 2014 [mil €]	Value added [mil €]	Production value [mil €]
Manufacture of glass and glass products	C23.1	1,073	23	4,166	1,439	3,982
Manufacture of flat glass	C23.11	4	1	443	144	407
Shaping and processing of flat glass	C23.12	559	11	1,977	594	1,871
Manufacture of hollow glass	C23.13	57	5	703	265	697
Manufacture of	C23.14	56	3	731	320	708

glass fibres						
Manufacture and processing of other glass, including technical glassware	C23.19	397	2	313	115	300

6.1.3 Energy Consumption

In 2015, the total energy consumption for the manufacture of other non-metallic mineral products (in which the manufacture of glass and glass products falls) was 2,375 ktoe (DBEIS 2016a). It takes 9 GWh of primary energy to make glass and emits 2 million tonnes of CO₂ a year (British Glass 2014).

6.2 Ceramic & Cement sector

The ceramic and cement sector is represented by most of the subgroups of NACE Code 23 (Manufacture of other non-metallic mineral products), except for subgroup 23.1 (Manufacture of glass and glass products). In this section, there is a focus on the subsectors 23.2 (Manufacture of refractory products), 23.3 (Manufacture of clay building material), 23.4 (Manufacture of other porcelain and ceramic products), 23.5 (Manufacture of cement, lime and plaster), 23.6 (Manufacture of articles of concrete, cement and plaster), 23.7 (Cutting, shaping and finishing of stone) and 23.9 (Manufacture of abrasive products and non-metallic mineral products n.e.c.).

6.2.1 Sectoral Organisation

Within the ceramic and cement industry, ready-mix concrete is the main material input for infrastructure, building foundations and panels cast on-site.

6.2.2 Economic Indicators

The industry has a medium level of capital intensity and mainly dependent on manual labour and capital equipment. Employment costs contribute to 14.5% of industry revenue, whilst depreciation charges cover 3.5%.

The ready-mix concrete division is expected to generate a revenue of 3.1 billion € in 2017 (a 2.3% increase from 2016). The stone cutting, shaping and finishing section is sensitive, experiencing many high and low points in time, with projected revenue to decrease slightly by 0.1% after 2016. The ceramic household and ornamental section's revenue is expected to decrease by 2.4% in 2017. The non-metallic mineral product section is expected to increase by 0.9%, potentially generating a revenue of around 1.6 billion € since 2011. The industry's main product – rock wool insulation – has benefited from increasing energy efficient developments. Concrete construction product's revenue is projected

to decline by 1.3% to 2.6 billion € in 2017 due to a low business confidence from the uncertainty in the EU referendum.

Table 6: Key economic parameters for British Ceramic and Cement sector.

Description	NACE (group)	Number of enterprises 2014	No. of persons employed 2014 [thousands]	Turnover 2014 [mil €]	Value added [mil €]	Production value [mil €]
Ceramic and cement sector	C23.2-C23.9	2,806	42	10,493	13,017	16,147
Manufacture of refractory products	C23.2	100	2	381	472	586
Manufacture of clay building material	C23.3	194	N/A	822	1,020	1,266
Manufacture of other porcelain and ceramic products	C23.4	282	N/A	645	800	993
Manufacture of cement, lime and plaster	C23.5	13	N/A	342	425	527
Manufacture of articles of concrete, cement and plaster	C23.6	888	32	6,189	7,677	9,524
Cutting, shaping and finishing of stone	C23.7	1,096	8	691	857	1,063
Manufacture of abrasive products and non-metallic mineral products n.e.c.	C23.9	233	N/A	1,423	1,765	2,190

6.2.3 Energy Consumption

In 2015, the total energy consumption for the manufacture of other non-metallic mineral products (in which the manufacture of ceramic and cement is the majority) was 2,375 ktoe. Ceramic is also the least emitting sector in industrial manufacturing, having only emitted 1.3 million tonnes of CO₂ in 2012.

7 Iron & Steel sector

The iron and steel sector is represented by the NACE Codes 24.1 (Manufacture of basic iron and steel and of ferro-alloys), 24.2 (Manufacture of tubes, pipes, hollow profiles and related fittings, of steel), 24.3 (Manufacture of other products of first processing of steel), 24.4 (Manufacture of basic precious and other non-ferrous metals) and 24.5 (Casting of metals).

7.1 Sectoral Organisation

The iron and steel manufacturing industry is mainly represented by British Steel Ltd, Celsa Steel (UK) Ltd and Tata Steel Europe Ltd. Manufacturing location in the UK has typically been in the northern areas of England, with 15.9% in Yorkshire and 14% in the West Midlands. Yorkshire contains the highest concentration with plants owned by Tata Steel Europe Ltd – the industry’s largest operator (IBIS World 2016b).

7.2 Economic Indicators

As a smaller industry in the UK, both domestic and global demand for steel has remained below ‘pre-crisis’ levels, adding to the decrease in revenue (IBIS World 2016b).

Table 7: Key economic parameters for British Iron and Steel sector.

Description	NACE (group)	Number of enterprises 2014	No. of persons employed 2014 [thousands]	Turnover 2014 [mil €]	Value added [mil €]	Production value [mil €]
Entire basic metals sector	C24	1,595	72	22,135	5,369	21,185
Manufacture of basic iron and steel and of ferro-alloys n.e.c.	C24.1	449	21	8,593	1,152	8,473
Manufacture of tubes, pipes, hollow profiles and related fittings, of steel	C24.2	287	N/A	3,147	1,123	2,874
Manufacture of other products of first processing of steel	C24.3	67	3	788	169	758

Casting of metals	C24.5	456	N/A	7,576	2,124	7,236
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7.3 Energy Consumption

In 2015, the total energy consumption for the manufacture of iron and steel was 1,263 ktoe. Despite the sector not being the greatest consumer of energy, it is the largest emitter, having emitted 22.8 million tonnes of CO₂ in 2012.

8 Other Metals sector

The other metals sector refers to the manufacture of basic metals and is defined by NACE Code 24 excluding iron and steel. The sector thus includes the Manufacture of basic precious and other non-ferrous metals (24.4) that includes for example copper, lead, zinc, tin and aluminium production, as well as the casting of light metals (24.53) and casting of other non-ferrous metals (24.54).

8.1 Sectoral Organisation

Organisations in this sector are very specific, so each one focuses on a specific element or operation within the industry.

8.2 Economic Indicators

Over the last five years the basic steel processing has generally followed the conditions of the wider economy, however, revenue is expected to increase at a compound annual rate of 0.2% over the next five years.

Table 8: Key economic parameters for British Other metals sector.

Description	NACE (group)	Number of enterprises 2014	No. of persons employed 2014 [thousands]	Turnover 2014 [mil €]	Value added [mil €]	Production value [mil €]
Entire basic metals sector	C24	1,582	72	26,468	6,995	24,388
Other metals sector	NACE codes below combined	1,180	N/A	17,083	3,908	14,300
Manufacture of basic precious and other non-ferrous metals	C24.4	495	N/A	9,934	2,487	8,541
Precious metals production	C24.41	74	N/A	1,573	273	620
Aluminium production	C24.42	183	N/A	3,011	588	2,937
Lead, zinc and tin production	C24.43	25	N/A	774	136	737

Copper production	C24.44	78	N/A	1,032	123	734
Other non-ferrous metal production	C24.45	N/A	N/A	N/A	N/A	N/A
Processing of nuclear fuel	C24.46	N/A	N/A	N/A	N/A	N/A
Casting of light metals	C24.53	177	N/A	466	172	447
Casting of other non-ferrous metals	C24.54	148	N/A	293	128	284

8.3 Energy Consumption

In 2015, the total energy consumption for the manufacture of non-ferrous metals was 561 ktoe and the energy consumption for basic metals in general was 1,823 ktoe.

9 Machinery sector

The machinery and equipment sector is a varied sector consisting of the Manufacture of fabricated metal products, except machinery and equipment (NACE code 25), Manufacture of computer, electronic and optical products (NACE code 26), Manufacture of electrical equipment (NACE code 27) and Manufacture of machinery and equipment not elsewhere classified (NACE code 28). There are many more subsectors under these four main categories.

9.1 Sectoral Organisation

Each subsector is represented by a different organisation. For example, parts of the manufacture of fabricated metal products, except machinery and equipment is represented by Tata Steel Europe Ltd. (IBIS World 2016f), parts of the manufacture of computer, electronic and optical products are represented by Siemens, Sony and Seagate Technology.

9.2 Economic Indicators

The manufacture of fabricated metal products, except machinery and equipment industry has experienced a revenue decrease 3.5% over the last year and is expected to continue to decrease at a compound annual rate of 3.2% over the next five years. For electrical component manufacturing, revenue has been on a decline and is expected to decrease by a further 3.3% over the next year.

Table 9: Key economic parameters for British Machinery sector.

Description	NACE (group)	Number of enterprises 2014	No. of persons employed 2014 [thousands]	Turnover 2014 [mil €]	Value added [mil €]	Production value [mil €]
Entire metal products, machinery and equipment industry	C25, C26, C27, C28	47,081	697	131,502	50,007	115,516
Manufacture of fabricated metal products, except machinery and equipment	C25	26,607	299	42,507	17,641	40,740
Manufacture of structural metal products	C25.1	4522	73	12,564	4,829	12,130
Manufacture of tanks, reservoirs and containers of metal	C25.2	381	10	1,898	691	1,634

Manufacture of steam generators, except central heating hot water boilers	C25.3	91	2	218	86	218
Manufacture of weapons and ammunition	C25.4	138	N/A	2,853	1,151	2,852
Forging, pressing, stamping and roll-forming of metal; powder metallurgy	C25.5	918	19	3,349	1,167	3,259
Treatment and coating of metals; machining	C25.6	13,516	112	11,198	5,750	11,172
Manufacture of cutlery, tools and general hardware	C25.7	2,027	N/A	2,469	1,149	2,168
Manufacture of other fabricated metal products	C25.9	5,014	50	7,959	2,817	7,308
Manufacture of computer, electronic and optical products	C26	7,097	128	26,476	10,693	23,821
Manufacture of electronic components and boards	C26.1	1,119	26	4,973	2,065	4,249
Manufacture of computers and peripheral equipment	C26.2	801	N/A	3,007	855	2,816
Manufacture of communication equipment	C26.3	1,668	N/A	4,313	1,625	4,218
Manufacture of consumer electronics	C26.4	758	N/A	2,737	1,151	1,912
Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	C26.5	2463	60	10,409	4,529	9,605
Manufacture of irradiation, electromedical and electrotherapeutic equipment	C26.6	81	5	457	158	457
Manufacture of optical instruments and photographic equipment	C26.7	166	N/A	576	308	559
Manufacture of magnetic and optical media	C26.8	41	N/A	5	2	5
Manufacture of electrical	C27	3288	82	16,706	5,397	13,737

equipment						
Manufacture of electric motors, generators and transformers and electricity distribution and control apparatus	C27.1	1,065	32	7,050	2,620	6,153
Manufacture of batteries and accumulators	C27.2	96	2	452	112	361
Manufacture of wiring and wiring devices	C27.3	301	N/A	3,037	543	1,702
Manufacture of electric lighting equipment	C27.4	701	14	2,068	815	1,881
Manufacture of electric domestic appliances	C27.5	385	N/A	3,107	868	2,703
Manufacture of other electrical equipment	C27.9	740	N/A	994	440	938
Manufacture of machinery and equipment n.e.c.	C28	10,089	188	45,814	16,275	37,217
Manufacture of general-purpose machinery	C28.1	1286	N/A	16,767	5,753	11,934
Manufacture of other general-purpose machinery	C28.2	3924	68	15,009	5,241	13,273
Manufacture of agricultural and forestry machinery	C28.3	462	8	2,273	391	1,636
Manufacture of metal forming machinery and machine tools	C28.4	1,134	N/A	1,556	619	1,138
Manufacture of other special-purpose machinery	C28.9	3,283	36	10,211	4,272	9,237

9.3 Energy Consumption

In 2015, the total energy consumption for the manufacture of mechanical engineering and metal products was 1,044 ktoe. Along with this, the manufacture of fabricated metal products, except machinery and equipment was 641 ktoe, the manufacture of computer, electronic and optical products was 413 ktoe, the manufacture of electrical equipment was 317 ktoe and the manufacture of machinery and equipment n.e.c. was 404 ktoe.

10 Energy Statistics

10.1 Energy Consumption

The total energy consumption of the industry sector (NACE Code C) in the UK was 23,594 ktoe in 2015. The main sources of energy were natural gas (8,123 ktoe), electricity (7,940 ktoe) and petroleum (3,935 ktoe). The sectors with the highest energy consumption were chemical (3,070 ktoe), food, drink and tobacco (2,832 ktoe) and mineral products (2,725 ktoe).

In 2015, the industry sector accounted for 17% of total energy consumption. Sub-sectors that experienced increases were vehicles (4.6%), chemicals (1.5%) and electrical and instrument engineering (2.7%). Those that experienced decreases were mineral products (3.8%), iron and steel (7.1%) and mechanical engineering (2.7%). Energy intensity decreased by 1.5% between 2014 and 2015.

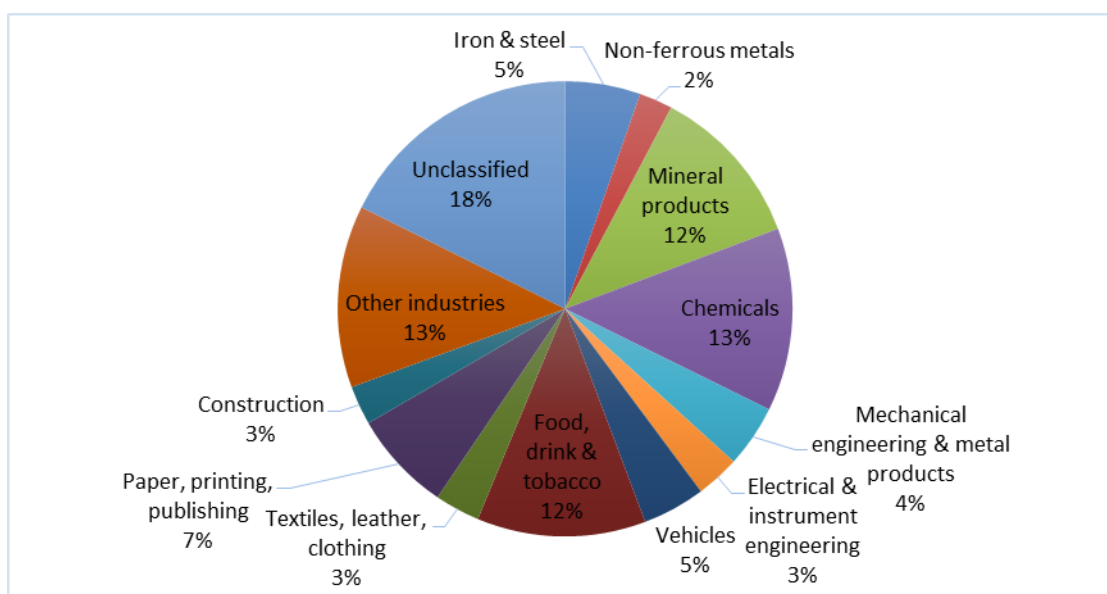


Figure 3: Energy consumption by general sectors in the UK manufacturing industry.

Table 10: Total energy consumption by detailed industry sector breakdown in the UK.

Description	NACE (group)	Total energy consumption, 2014 [ktoe]	Percentage of industrial energy consumption [%]	Key energy carriers
Entire industry sector	C	23,594	100	Natural gas (8,123 ktoe) and electricity (7,940 ktoe)
Food	10	2,270	9.6	Natural gas (1,418 ktoe), electricity (735 ktoe)
Beverages	11	544	2.3	Natural gas (340 ktoe), electricity (176 ktoe)

Tobacco	12	18	0.1	Electricity (11 ktoe), natural gas (7 ktoe)
Textiles	13	495	2.1	Natural gas (286 ktoe), electricity (149 ktoe)
Clothing	14	230	1	Natural gas (136 ktoe), electricity (65 ktoe)
Leather and shoes	15	33	0.1	Natural gas (17 ktoe), electricity (16 ktoe)
Wood and wood products	16	328	1.4	Electricity (210 ktoe), natural gas (110 ktoe)
Pulp and paper	17	1,257	5.3	Electricity (586 ktoe), natural gas (574 ktoe)
Printing and publishing	18	430	1.8	Electricity (324 ktoe), natural gas (103 ktoe)
Refined petroleum	19	3,946	16.7	N/A
Chemical industry	20	3,070	13	Natural gas (1,179 ktoe), electricity (1,215 ktoe)
Pharmaceuticals	21	265	1.1	Electricity (127 ktoe), natural gas (123 ktoe)
Rubber and plastics	22	1,480	6.3	Electricity (857 ktoe), natural gas (253 ktoe)
Building materials	23	656	2.8	N/A
Basic metals	24	1,823	7.7	Electricity (696 ktoe), natural gas (632 ktoe)
Metal products	25	641	2.7	Electricity (324 ktoe), natural gas (328 ktoe)
Computers and electronics	26	413	1.8	Electricity (315 ktoe), natural gas (95 ktoe)
Electrical equipment	27	317	1.3	Electricity (199 ktoe), natural gas (117 ktoe)
Machinery	28	404	1.7	Electricity (218 ktoe), natural gas (186 ktoe)
Motor vehicles	29	1,052	4.5	Natural gas (282 ktoe), electricity (262 ktoe), gas oil (103 ktoe)
Other transport equipment	30	352	1.5	Electricity (152 ktoe), natural gas (117 ktoe), gas oil (62 ktoe)
Furniture	31	124	0.5	Electricity (80 ktoe), natural gas (42 ktoe)
Other manufacturing	32	167	0.7	Electricity (108 ktoe), natural gas (57 ktoe)
Repair and installation	33	N/A	N/A	N/A

10.2 Energy Prices

Fuel prices for the manufacturing sector generally followed the price of crude oil, which has been increasing between 2002 and 2012 with a significant decrease in 2009. The price of crude oil fell by 2.8% in 2013, 9.2% in 2014 and 47% in 2015. Prices were at their lowest in 2016.

Average prices for electricity increased between 2005 and 2015, with falls in 2007 and 2010 and priced at 0.094 €/kWh as an average across all consumer sizes in 2016. Gas prices was less steady, with constant fluctuations and priced at 0.018 €/kWh as an average across all consumer sizes in 2016. Coal prices increased between 2005 and 2014, with decreases in 2006, 2009, 2012 and 2015 and priced at 3.29 €/GJ as an average across all consumer sizes in 2016.

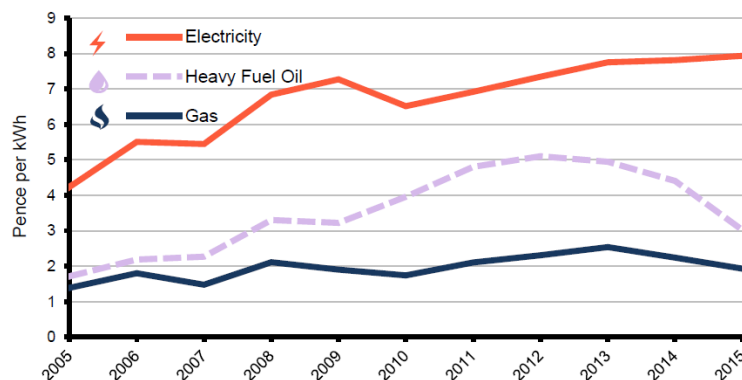


Figure 4: Average annual fuel prices purchased by the manufacturing industry.

10.3 Carbon Dioxide Conversion Factors

The UK conversion factor is 2,715.8 kg CO₂/tonne for natural gas, 3,475.8 kg CO₂/tonne for gas oil and 0.41205 kg CO₂/kWh for electricity.

10.4 Conversion Factors to Primary Energy

The Department for Environment, Food and Rural Affairs has published a set of conversion factors to primary energy in tonnes of oil equivalent and kilowatt-hour. These are:

- 1 GJ = 0.02388 toe (or 277.78 kWh)
- 1 kWh = 0.00009 toe
- 1 Therm = 0.00252 toe (or 29.307 kWh)