


2022 Manufacturing Energy Consumption Survey:

Highlights from Data Release 1

Independent Statistics and Analysis
U.S. Energy Information Administration

2022 Manufacturing Energy Consumption Survey

August 2025

U.S. Energy Information Administration
Office of Energy Statistics
U.S. Department of Energy
Washington, DC 20585

This publication is available at
https://www.eia.gov/consumption/manufacturing

Note: As additional 2022 MECS data are released, this report will be updated.

What is the *Manufacturing Energy Consumption Survey* (MECS)?

MECS is the only nationally representative source for estimates of energy-related characteristics, consumption, and expenditures for manufacturing establishments in the United States.

The U.S. Energy Information Administration (EIA) collects data for manufacturing establishments mainly through web questionnaires.

- EIA drew the 2022 MECS sample size of approximately 15,000 establishments from a national sample frame representing approximately 97% of the manufacturing payroll. We estimate the sample to represent at least that percentage of manufacturing energy consumption.
- This sample allows us to report separate estimates of energy use for 21 three-digit manufacturing subsectors and 50 industry groups and industries, as defined by the North American Industry Classification System (NAICS).

EIA has conducted the MECS periodically since 1985.

- The 2022 MECS is the 11th iteration.

Key takeaways from EIA's 2022 MECS consumption, end use, and fuel-switching results

- Growth in gross output continues to outpace manufacturing energy consumption growth, resulting in an overall decrease in energy intensity.
- From 1998 to 2022, manufacturing energy intensity decreased by 52%. During this same period, manufacturing gross output increased by 81%, implying continued energy efficiency gains.
- Nonfuel consumption (or using energy as a feedstock or raw input rather than for fuel) is dominant in the chemicals industry.
- Four industries—chemical, petroleum and coal products, paper, and primary metals—account for most manufacturing energy consumption.
- Most subsectors cannot easily switch from natural gas to alternative fuels such as coal, electricity, and renewables.

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Manufacturing energy consumption

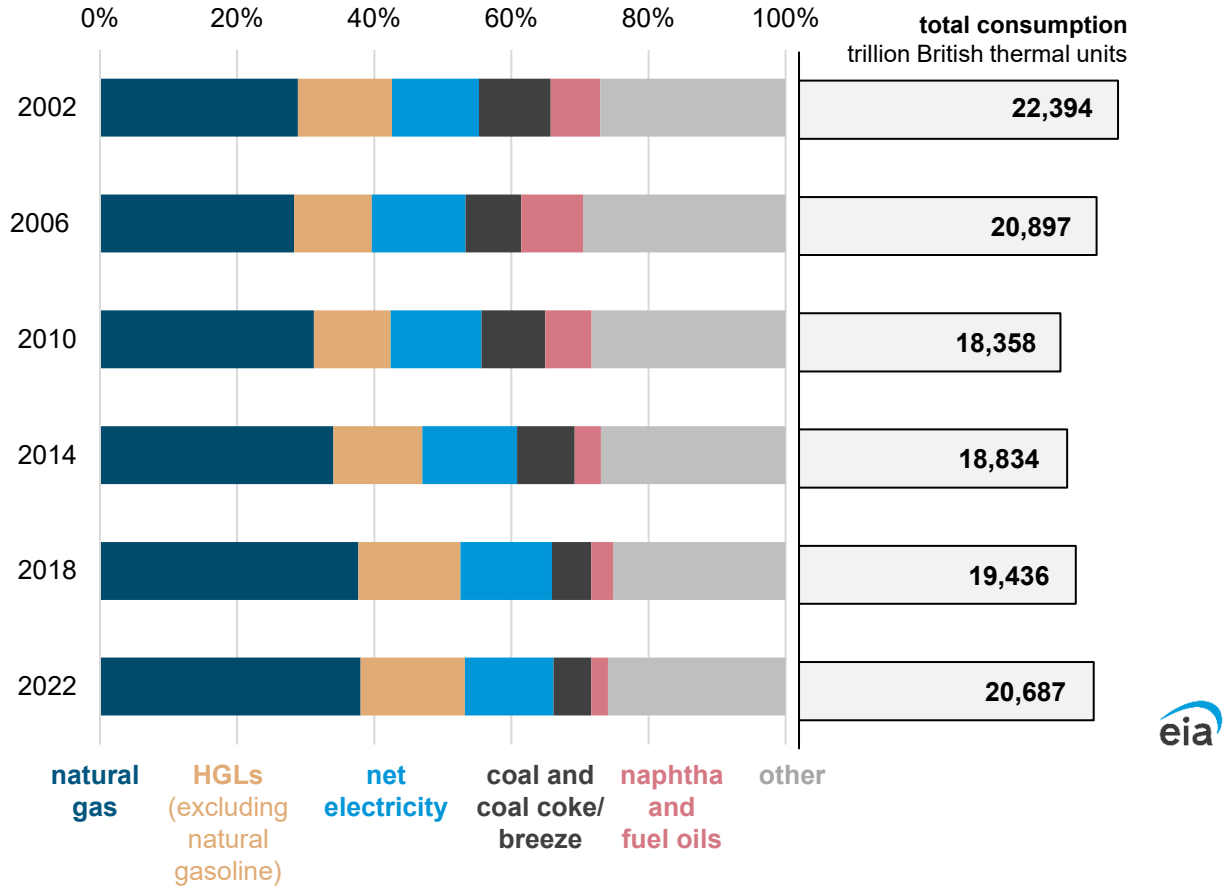
Manufacturing is the physical, mechanical, or chemical transformation of materials or substances into new products. Manufacturing operations are generally conducted in facilities described as plants, factories, or mills and characteristically use power-driven machines and materials-handling equipment. In addition, assembling the components of manufactured products (for example, blending materials, such as lubricating oils, plastics, resins, or liquors) is considered manufacturing.

An establishment is an economic unit at a single location where manufacturing is performed. Manufacturing establishments are classified by the North American Industrial Classification System (NAICS), which categorizes establishments according to the types of production processes they primarily use.

Manufacturers have two types of energy consumption—*fuel* and *nonfuel*. *Fuel* consumption is the use of any substance that can be burned to create heat, produce power, or to generate electricity. *Nonfuel* consumption is the use of energy as feedstock or raw material input.

Natural gas and HGLs continue to increase their shares of total consumption

Proportion of total consumption by energy source and year, 2002–2022
percentage



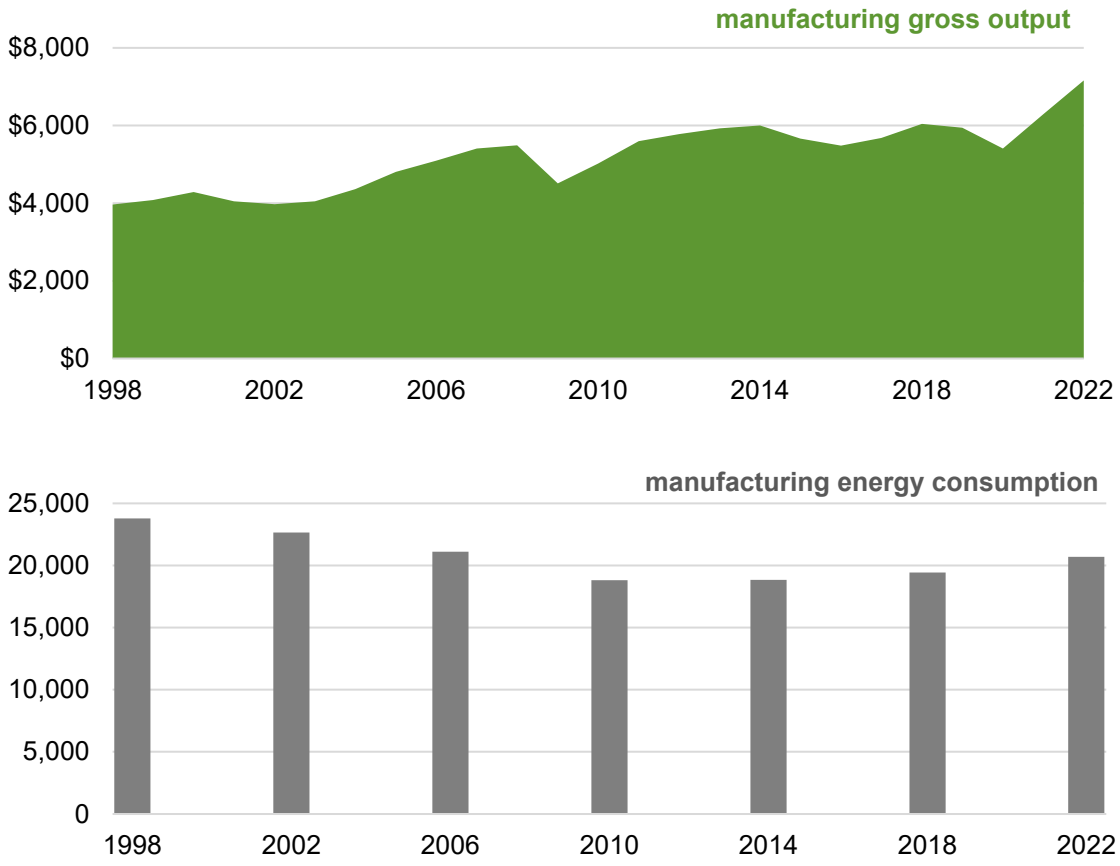
- MECS estimates that manufacturing first-use energy consumption in 2022 totaled 20,687 trillion British thermal units (Btu).
- Natural gas and hydrocarbon gas liquids (HGLs*) continue to increase as shares of total consumption, rising from an estimated 43% of consumption in 2002 to an estimated 53% in 2022.
- Conversely, the estimated use of coal and coal coke/breeze as well as naphtha and fuel oils has declined each survey cycle since 2002.

* Hydrocarbon gas liquids (HGLs) include ethane, ethylene, propane, propylene, normal butane, butylene, ethane-propane mixtures, propane-butane mixtures, and isobutane produced at refineries or natural gas processing plants, including plants that fractionate raw natural gas liquids (NGLs). The MECS excludes natural gasoline from its definition because natural gasoline is not used as an energy source—fuel or feedstock—at manufacturing establishments.

Data source: U.S. Energy Information Administration, *Manufacturing Energy Consumption Survey*

Growth in gross output continues to outpace manufacturing energy consumption growth

Manufacturing gross output and energy consumption, 1998–2022
billions of U.S. dollars and trillion British thermal units (Btu)

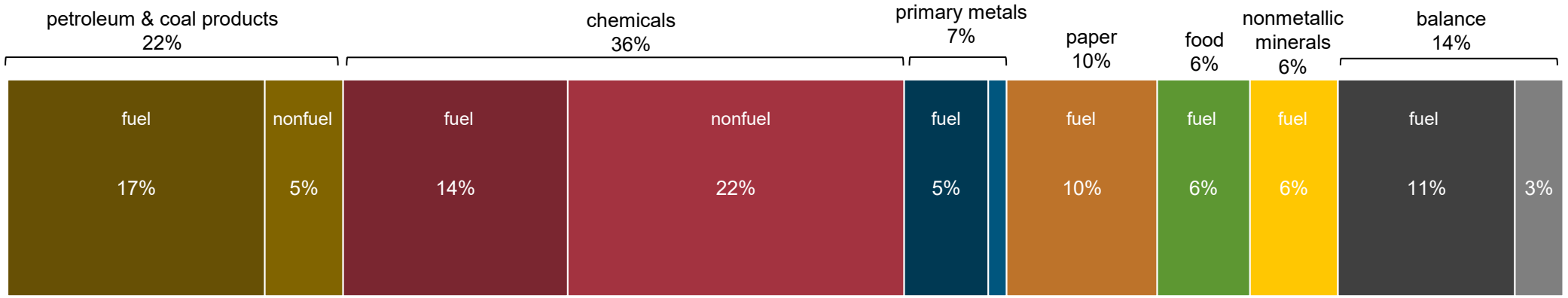


- Manufacturing gross output increased by 19% between 2018 and 2022. Manufacturing energy consumption increased by 6% over the same time period, to 20,687 trillion Btu in 2022.
- From 1998 to 2022, estimated manufacturing energy intensity decreased by 52%. During this same period, manufacturing gross output increased by 81%, implying continued long-term energy efficiency gains in U.S. manufacturing.

Data sources: U.S. Energy Information Administration, *Manufacturing Energy Consumption Survey*; Bureau of Economic Analysis, *Gross Output by Industry*

Nonfuel consumption is dominant in the chemicals sector

Manufacturing energy fuel and nonfuel (feedstock) consumption by sector, 2022
percentage



total consumption:
20.7 quadrillion Btu

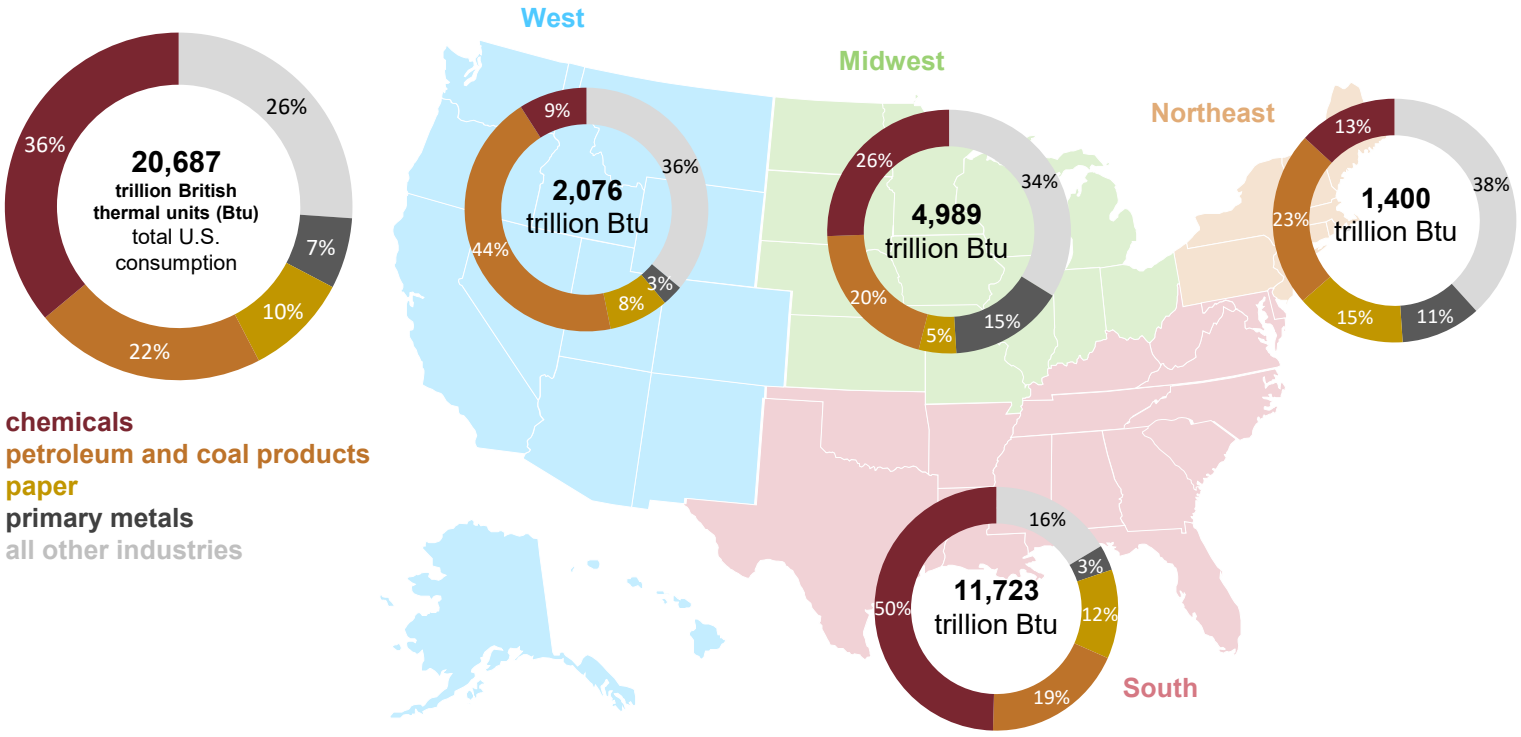
total nonfuel:
6.4 quadrillion Btu

Data source: U.S. Energy Information Administration, *Manufacturing Energy Consumption Survey*

- Chemicals (70%), petroleum and coal products (16%), and primary metals (4%) account for nearly all feedstock used in manufacturing.
- Petroleum and coal products, chemicals, primary metals, paper, food, and nonmetallic mineral products account for 84% of fuel used in manufacturing.

Four sectors account for most manufacturing energy consumption

Proportion of total energy consumption by sector and region, 2022
percentage

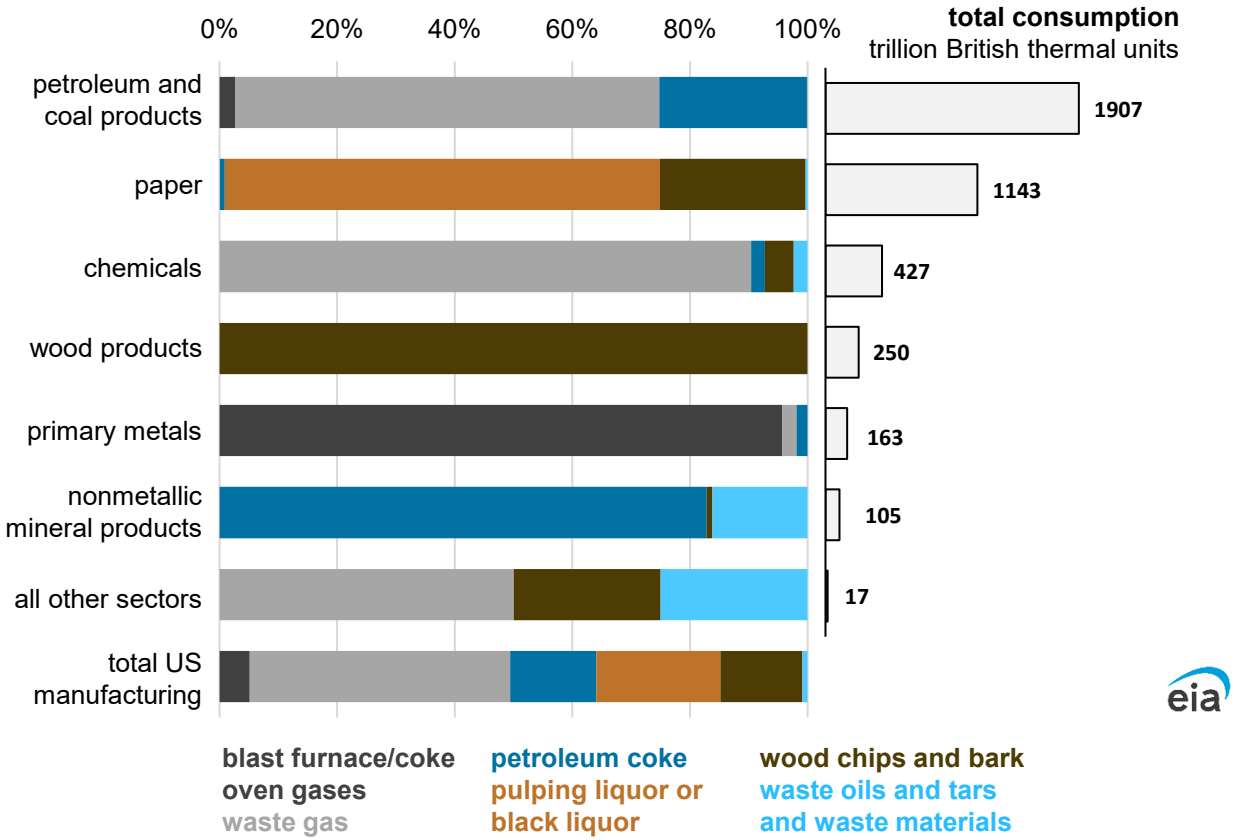


- The chemical, petroleum and coal products, paper, and primary metals sectors accounted for 74% of manufacturing energy consumption in 2022.
- Manufacturing energy consumption was greatest in the South, and chemical manufacturing accounted for half of the South's energy consumption.

Data source: U.S. Energy Information Administration, *Manufacturing Energy Consumption Survey*

Byproducts in fuel consumption vary by sector

Selected byproducts used in fuel consumption by sector, 2022
percentage and trillion British thermal units (Btu)

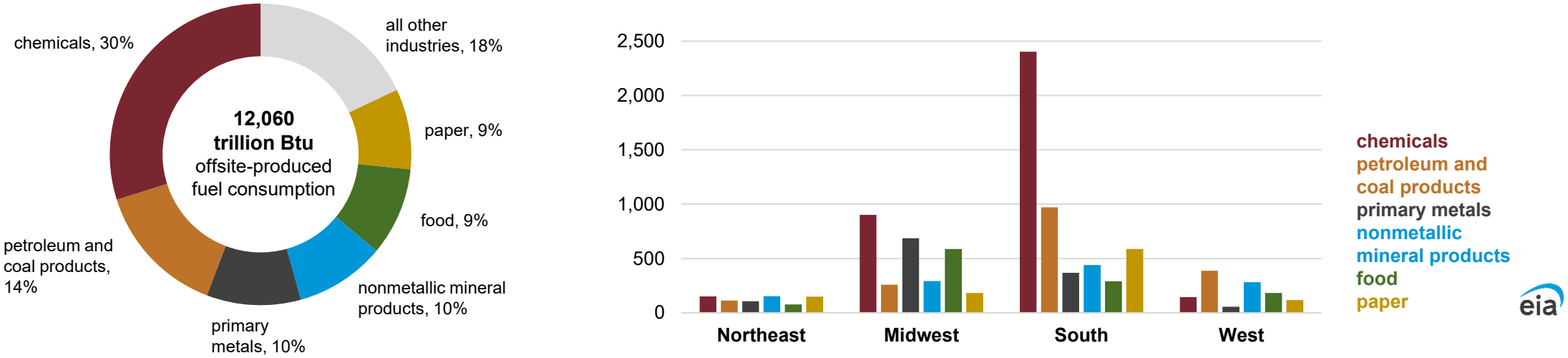


- Waste gas (for example, still gas, refinery gas, off gas, and vent gas) accounted for 44% of the manufacturing byproducts consumed as fuel, the largest share.
- Pulping liquor, or black liquor, accounted for 21% of manufacturing byproducts, all of which was consumed by the paper sector (846 trillion British thermal units).
- Of all byproducts consumed in primary metals, blast furnace/coke oven gas constituted 96%.

Data source: U.S. Energy Information Administration, *Manufacturing Energy Consumption Survey*

Six sectors accounted for more than three-fourths of offsite-produced fuel consumption

Offsite-produced fuel consumption by region and top six consuming sectors, 2022
percentage and trillion British thermal units (Btu)

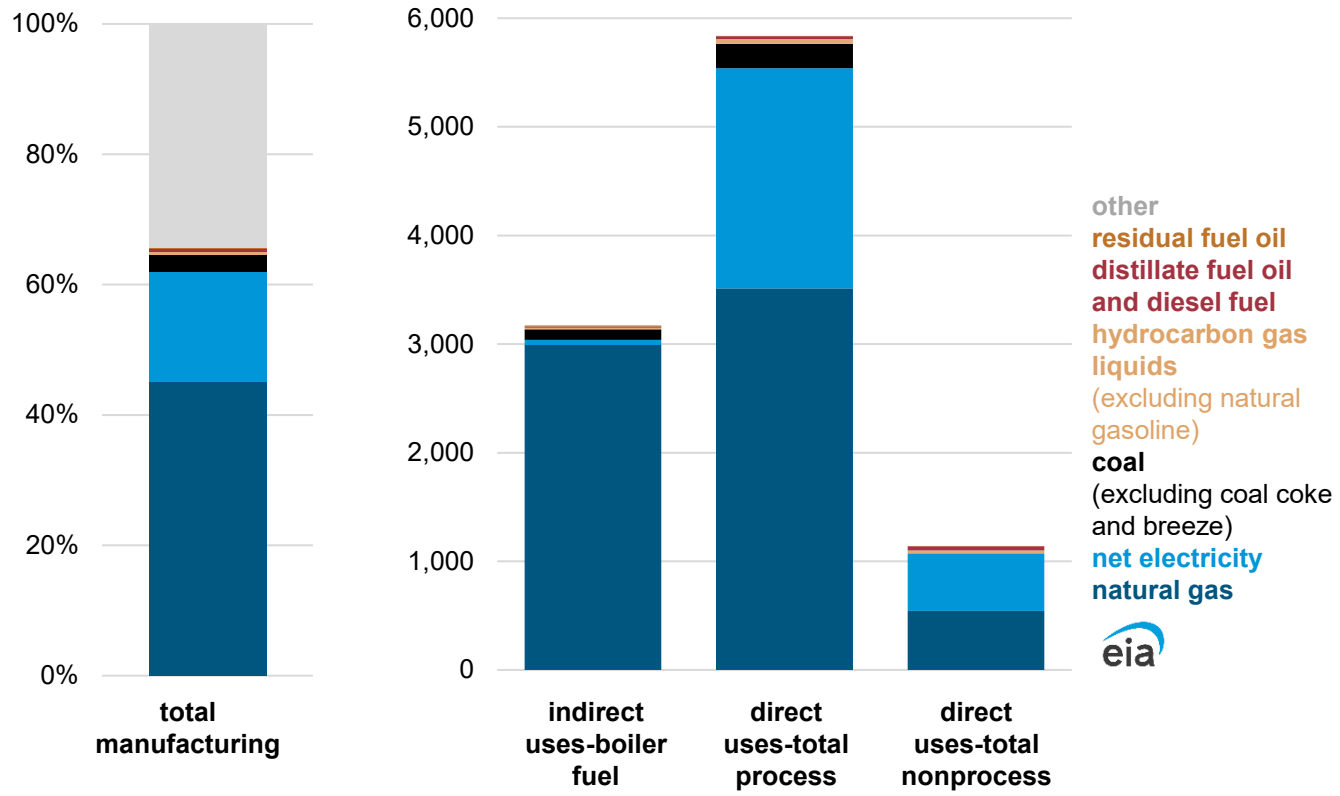


Data source: U.S. Energy Information Administration, *Manufacturing Energy Consumption Survey*

- Chemicals, petroleum and coal products, primary metals, nonmetallic mineral products, food, and paper together accounted for 9,893 trillion Btu (82%) of offsite-produced fuel consumed in manufacturing.
- Offsite-produced fuel is a measure of fuel consumption (which is equivalent to purchased fuel), transfers of fuel onsite, and fuel produced offsite and consumed onsite. It excludes fuel produced and consumed onsite, energy used as raw material input, and electricity losses. An example of onsite-produced fuel is the production of black liquor in the pulping process to make paper and the subsequent use of the produced black liquor as a fuel at pulp and paper mills.

Natural gas was the most-used fuel for all end uses

End uses of fuel consumption, 2022
percentage and trillion British thermal units (Btu)

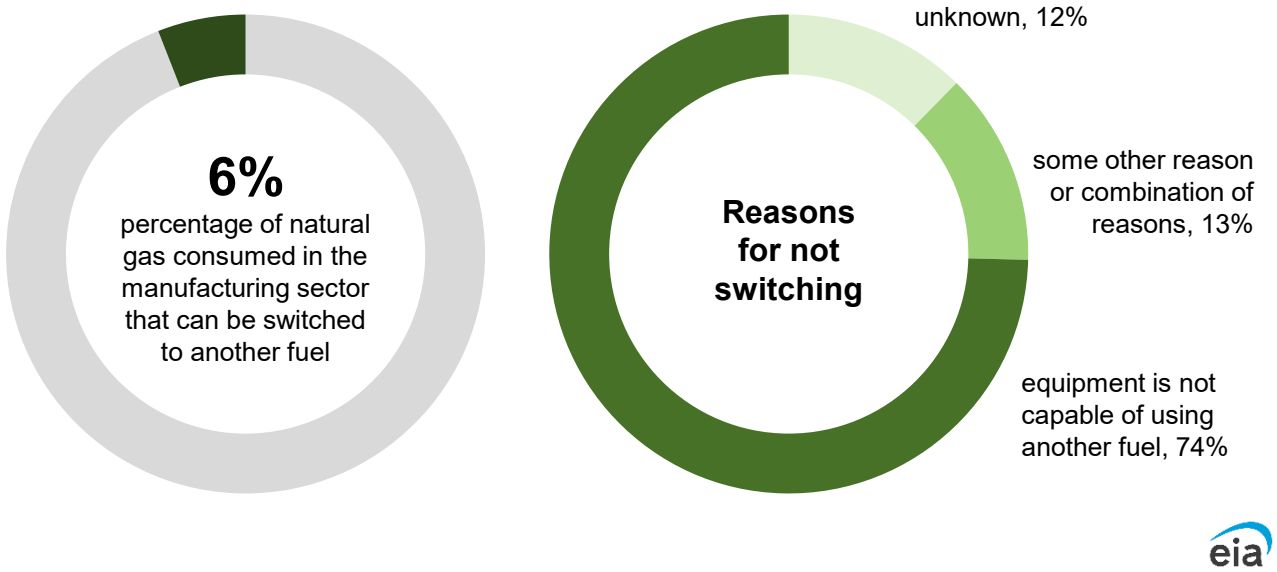


- Natural gas accounted for 45% of manufacturing fuel consumption (7,087 trillion Btu) in 2022. It accounted for 43% of manufacturing fuel consumption in 2018.
- Direct process uses—which can include process heating, process cooling and refrigeration, and electro-chemical processes—made up the largest share of reportable consumption, followed by indirect uses and direct nonprocess uses.
- Examples of direct total nonprocess end uses include facility lighting, heating, ventilation, and air conditioning (HVAC), onsite transportation, and conventional electricity generation.

Data source: U.S. Energy Information Administration, *Manufacturing Energy Consumption Survey*

Most sectors cannot easily switch from natural gas to another fuel

Non-switchable natural gas and reasons that made natural gas unswitchable, 2022
percentage of billion cubic feet



Data source: U.S. Energy Information Administration, *Manufacturing Energy Consumption Survey*

- Overall, 94% of the natural gas used in the manufacturing sector in 2022 could not be replaced with an alternative fuel.
- The most common reason manufacturers could not switch from natural gas to other fuels (such as coal, fuel oils, electricity, or HGLs) was that their equipment could not use another fuel.

References and additional information

References

Gross output estimates are sourced from the Bureau of Economic Analysis, *Gross Output by Industry* data series. All other figures are sourced from Form EIA-846A/B, *Manufacturing Energy Consumption Survey*.

Please direct questions about the MECS to eiainfoconsumptionefficiency@eia.gov

Projected schedule of MECS releases

Consumption, end use, and fuel-switching tables | August 2025

Economic and expenditure tables | October 2025

Energy-management and count tables | December 2025

Hand-suppressed tables | March 2026

For more information

U.S. Energy Information Administration homepage | www.eia.gov

Manufacturing Energy Consumption Survey | www.eia.gov/consumption/manufacturing

Consumption and Efficiency | https://www.eia.gov/consumption

Today in Energy | www.eia.gov/todayinenergy