

Energy Usage in the Manufacturing Sector



Did you know?

- The manufacturing sector uses approximately 54% of the total energy delivered throughout the world — more energy than any other sector globally.
- In 2018, the industrial sector accounted for about 32% of total U.S. energy consumption.
- The manufacturing sector totals approximately 35% of Pennsylvania's energy consumption.
- PA energy usage trends show that the use of coal has declined significantly, while renewable energy, electricity, petroleum, and natural gas have seen continued increases in use over the past five decades.
- Pennsylvania's manufacturing industry is currently comprised of more than 18,900 establishments.
- The largest energy users in the PA manufacturing sector are chemical, food processing, and fabricated metal.

Energy-Saving Tips

- Add simple heat recovery systems to air compressors to save on heating costs.
- Replace bulbs with LED bulbs to save up to 30% on lighting costs.
- Repair compressed air leaks to save up to 25% on compressed air costs.
- Monitor steam traps for malfunctions to save up to 10% on fuel costs.
- Repair steam leaks to save between 3% and 5% on fuel costs.
- Minimize the air-to-fuel ratio in boilers and ovens to save between 5% and 10% on fuel costs.

<https://www.eia.gov/outlooks/ieo/pdf/industrial.pdf> - text; <https://dced.pa.gov/key-industries/manufacturing/> - Manufacturing industry establishments; <https://www.eia.gov/state/?sid=PA#tabs-2> – State statistics. ; <https://www.nam.org/state-manufacturing-data/2019-pennsylvania-manufacturing-facts/> - largest manufacturing sectors



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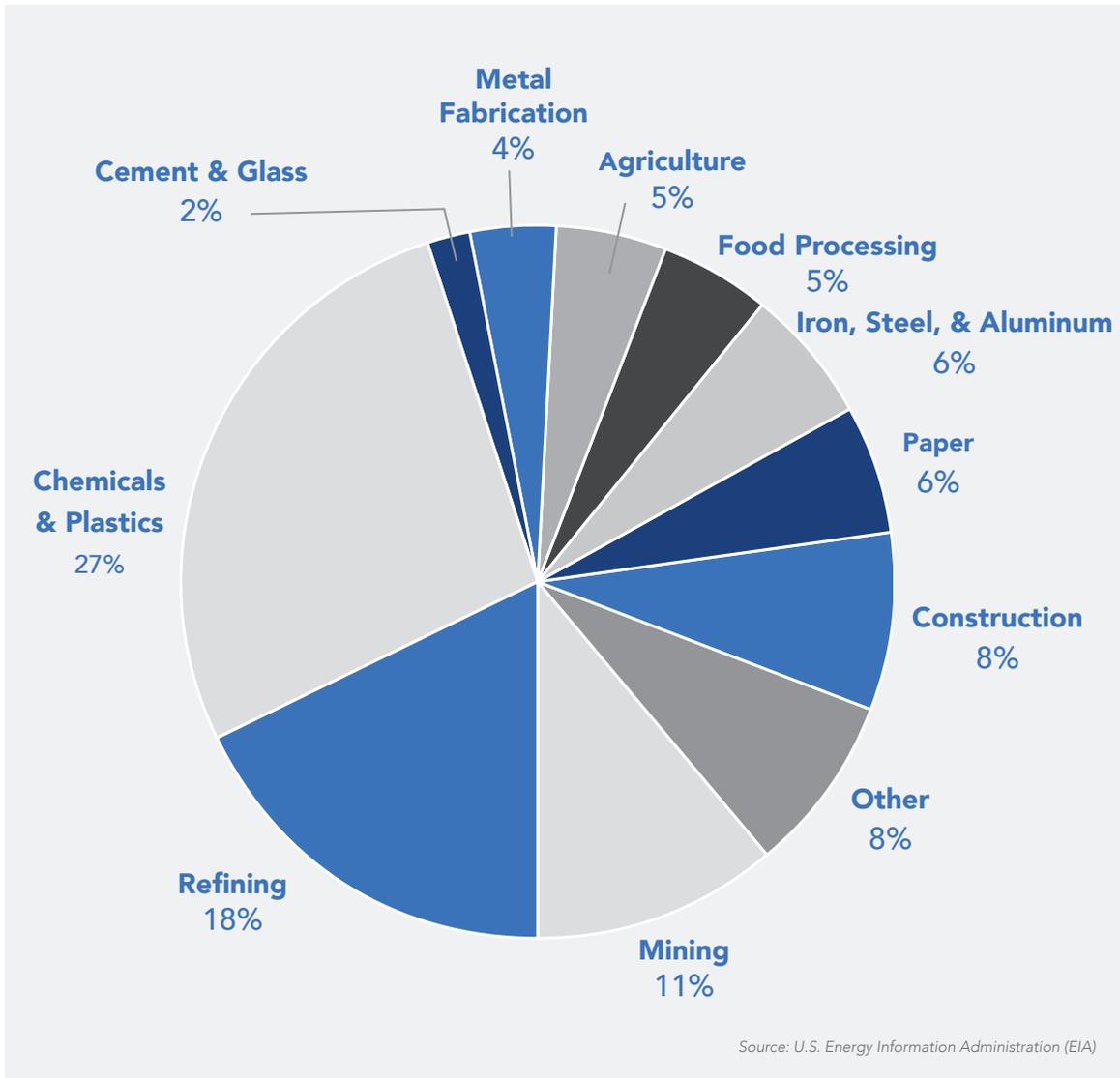
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Energy Usage in the Manufacturing Sector

U.S. Manufacturing Sector Energy Consumption by Industry Type (2018)



<https://www.eia.gov/energyexplained/use-of-energy/industry.php> – graph



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Energy Savings Opportunities in Metal Casting

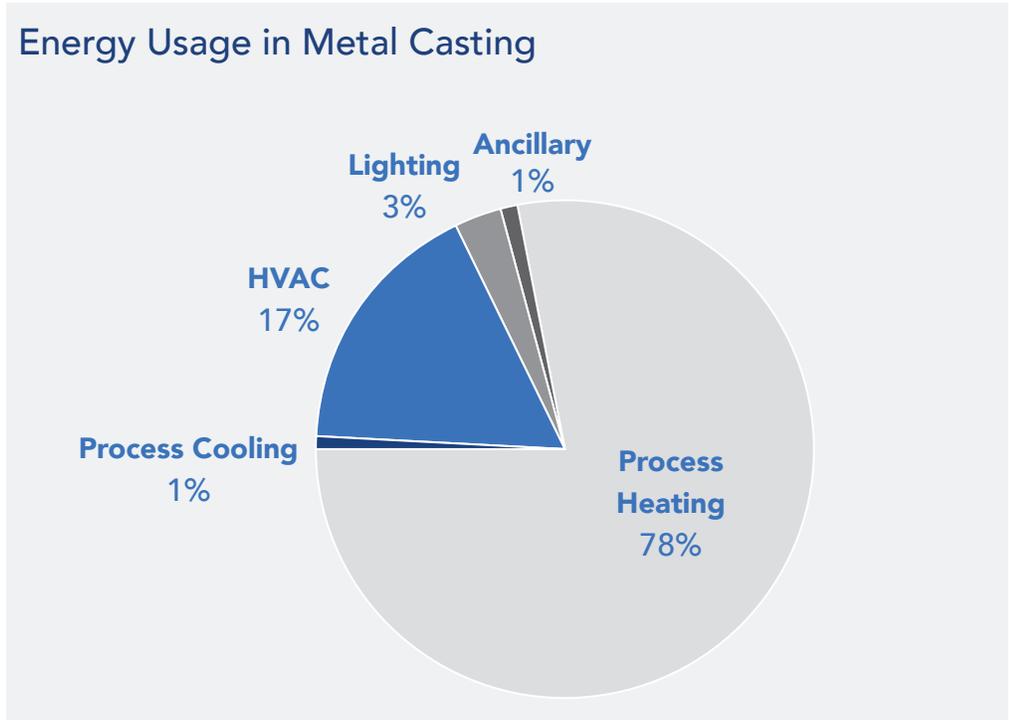


In the United States, the metal-casting industry is one of the most energy-intensive manufacturing sectors. Metal casting is dominated by small businesses. The industry has large-scale energy savings opportunities, such as furnace optimization. However, these savings are generally costly. A list of energy-saving tips is included below.

Energy-Saving Tips

- The timing of melting operations can have a large impact on electrical demand costs.
- Excess heat can be used to preheat the parts before melting.
- Avoid the use of compressed air for personal cooling in the grinding area.
- Use variable frequency drives on dust fans.
- Circulate the air to avoid heating costs elsewhere.

Energy Usage in Metal Casting



Pie Chart based on https://www.energy.gov/sites/prod/files/2018/10/f56/2014_mecs_foundries_energy_footprint.pdf; Lighting 30% - <https://www.energy.gov/energysaver/save-electricity-and-fuel/lighting-choices-save-you-money>; Compressed Air leak – when doing google search to verify, at least 3 sources reported the same savings or more (last resource provided below says 30%); <https://www.plantservices.com/articles/2018/ca-money-in-your-pocket-fix-your-compressed-air-system-leaks/>; <https://www.quincycompressor.com/why-you-need-to-fix-compressed-air-leaks/>; <https://fluidairedynamics.com/how-to-detect-and-fix-compressed-air-leaks/>; The data was published in 2018 but is based on 2014.



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Energy Savings Opportunities in Food Processing



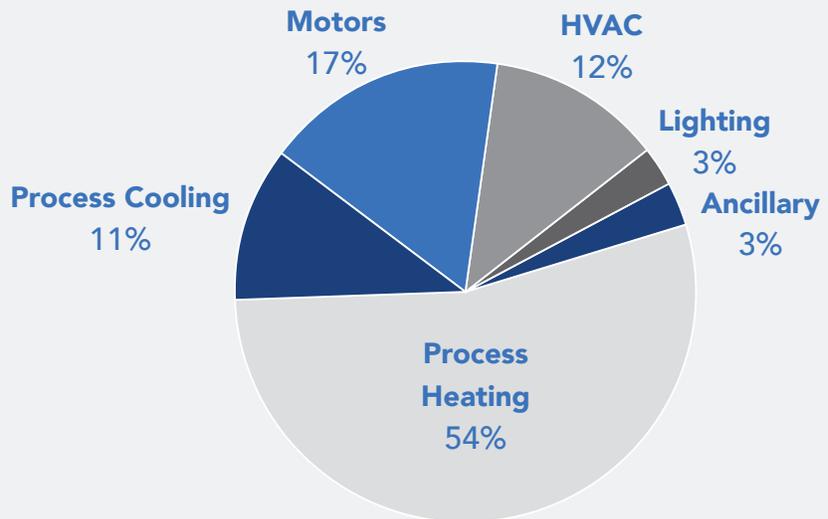
Did you know?

Food processing employs more than 1.6 million people in the United States, with facilities ranging from small to large processing plants. These locations have a variety of functions, including inspection, processing, and packaging. Every segment of the industry relies on energy-intensive processes, such as cold rooms, cleaning, sterilization, and heating. A list of energy-saving tips is included below.

Energy-Saving Tips

- Reduce the lighting load in cold rooms to reduce the operating costs of the cooling system.
- Replace evaporator fan blades with lightweight blades, which can save up to 30% on cold room costs.
- Avoid using heating and cooling in the same room.
- Take advantage of ambient heating and cooling when possible.
- Add insulation to boiler pipes and tanks.
- Filter inlet air to save energy and avoid contamination.

Energy Usage in Food Processing



1.6 million employed (scroll to table for NAICS code 311000) : https://www.bls.gov/oes/2018/may/naics3_311000.htm; Pie Chart based on https://www.energy.gov/sites/prod/files/2018/10/f56/2014_mecs_food_beverage_energy_footprint.pdf; Carbon Fiber fan blades <https://www.environmentalleader.com/2014/05/carbon-fiber-evaporator-motor-fan-blades-save-energy/>; The data was published in 2018 but is based on 2014.



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Energy Savings Opportunities in Chemical Manufacturing

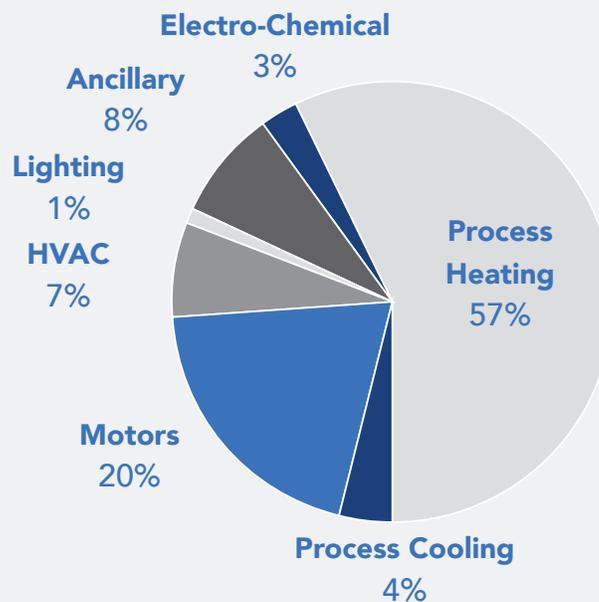


The chemical industry is the second largest energy user in the U.S. and a major contributor to the U.S. economy. Energy costs can represent a significant portion of a chemical product's total production costs. A list of energy-saving tips is included below.

Energy-Saving Tips

- Recovering heat from products can significantly lower heating costs.
- Use an absorption chiller to turn waste heat into cooling capacity.
- Insulate piping to reduce heat loss and avoid injuries.
- Minimize product losses.
- Minimize the storage of finished products.

Energy Usage in the Chemical Field



<https://www.eia.gov/consumption/manufacturing/briefs/chemical/index.php> – 2nd largest energy user in US; Air to fuel ratio and steam leaks - https://eta-publications.lbl.gov/sites/default/files/petrochemical_guidebook_en.pdf, pages 64 and 67; Pie Chart based on https://www.energy.gov/sites/prod/files/2018/10/156/2014_mecs_chemicals_energy_footprint_0.pdf; The data was published in 2018 but is based on 2014.



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