U.S. Manufacturing Energy Consumption and Efficiency

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Major consumption surveys serve as underlying benchmark for energy consumption and efficiency measures

- EIA’s consumption survey consist of three separate collection programs
  - Commercial Building Energy Consumption Survey (CBECS)
  - Manufacturing Energy Consumption Survey (MECS)
  - Residential Energy Consumption Survey (RECS)

- Focus of talk is on intensity for manufacturing industries
  - Intensity often serves as a good proxy for efficiency
  - U.S. manufacturing’s energy use is large relative to others sectors
  - Recently released a more detailed set of 2018 MECS statistics
EIA’s consumption surveys are complex, long-term efforts

**Timeline of EIA’s 2018 Manufacturing Energy Consumption Survey**

<table>
<thead>
<tr>
<th>Year</th>
<th>Survey Prep</th>
<th>Data Collection</th>
<th>Data Processing and Disclosure</th>
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<tbody>
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<td>2014</td>
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Reference year

**Survey actions**

- Collection of energy consumption and expenditures: summary table and detailed data
Industry is the largest U.S. energy consumer with manufacturing making up about three-quarters of the total.

![Graph showing total consumption by end-use sector, 1949–2020](image-url)

**Total Consumption by End-Use Sector, 1949–2020**

- Industrial
- Transportation
- Residential
- Commercial
MECS Measures Improvements in Manufacturing Efficiency

- Gross output has increased since 1998 levels, but fuel consumption and total manufacturing employment have decreased. Between 1998 and 2018, manufacturing gross output grew by 12%, while fuel consumption decreased by 16%.

- Manufacturing fuel intensity—measured as fuel consumption divided by gross output—decreased by 25%. This decrease in fuel intensity suggests technological advancement, deployment of new efficient equipment, and changes in what is being manufactured in the U.S.

Four U.S. industries account for most of manufacturing consumption

Proportion of total consumption by industry and region

• The chemical, petroleum and coal products, paper, and primary metals industries make up 77% of manufacturing energy consumption.
• Manufacturing consumption is greatest in the South, and chemical manufacturing accounts for more than half (51%) of its energy consumption.
Nonfuel consumption is dominant in the U.S. chemicals industry

Manufacturing energy fuel and nonfuel (feedstock) consumption by industry, 2018 percentage

- Petroleum and coal products, chemicals, and primary metals account for more than 90% of feedstock use in manufacturing.
- Petroleum and coal products, chemicals, primary metals, paper, and food account for more than 84% of fuel used in manufacturing.

Total: 19.4 quadrillion British thermal units (Btu)
Total nonfuel: 6.1 quadrillion Btu
U.S. commercial buildings have become larger over the last 20 years.
U.S. homes built after 2000 are larger than those built in the 1960s with the same energy use.
Main takeaways

• Efficiency measures are often based on large, detailed consumption surveys

• Alternative measures often used for non-manufacturing sectors
  – No direct measure of output and depends on purpose
  – Floor space commonly used for commercial and residential

• Detailed industry data is often needed for greater understanding
  – Highlights importance of integration with other industry-level economic data
  – Energy consumption is U.S. manufacturing is concentrated in four industries