@Manufacturing Energy and Carbon Footprint
Sector: Chemicals (NAICS 325)

Primary Energy Use:
Primary Energy Use: 4,542 TBtu
Total Combustion Emissions: 260 MMT CO₂e

Primary Energy, 2014

<table>
<thead>
<tr>
<th>Energy</th>
<th>Combustion Emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>(TBtu = Trillion British Thermal Units)</td>
<td>(MMT CO₂e = Million Metric Tons Carbon Dioxide Equivalent)</td>
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<tr>
<td>Fuel</td>
<td></td>
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<tr>
<td>Electricity</td>
<td></td>
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<tr>
<td>Steam</td>
<td></td>
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<tr>
<td>Combined</td>
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</tbody>
</table>

| Last Revised: September 2018 |

Notes:
- Sector-wide aggregate data for year 2014; energy values rounded to nearest whole number
- Offsite generation shown on net basis (purchases, sales, and transfers accounted for) and includes onsite non-combustion renewable output
- Electricity export refers to sales and transfers offsite of electricity to utilities and other entities
- Feedstock energy excluded from primary, offsite, and onsite energy values and included in Energy for All Purposes

Energy for All Purposes estimated at 7,312 TBtu
Includes primary energy plus net energy consumed for nonfuel purposes, including feedstock use

Prepared for the U.S. Department of Energy, Advanced Manufacturing Office by Energetics
Manufacturing Energy and Carbon Footprint
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Onsite Energy, 2014

Onsite Energy Use:
3,527 TBtu
Onsite Combustion Emissions: 163 MMT CO₂eq

Process Energy
- Process Heating
  - 68.7
  - 49.1
- Process Cooling and Refrigeration
  - 7.9
  - 1.1
- Other Process Uses
  - 7.8
  - 4.4

Electro-Chemical
- 9.2
- 0.0

Machine Drive
- Pumps
  - 50.1
  - 6.2
- Fans
  - 160
- Compressed Air
  - 170
- Materials Handling
  - 145
- Materials Processing
  - 11
- Other Systems
  - 124
- Total
  - 143.7
  - 60.8

Nonprocess Energy
- Facility HVAC
  - 60
- Facility Lighting
  - 93
- Other Facility Support
  - 10.7
  - 3.4
- Onsite Transportation
  - 50
- Other Nonprocess
  - 1.3
  - 0.1
- Total
  - 17.3
  - 4.4

Electricity Export*
- 41

Fuel Types
- Natural Gas: 73%
- Waste Gas (byproduct fuel): 13%
- Coal: 9%
- Distillate and Residual Fuel Oils: < 1%
- HGL (excl. natural gasoline): < 1%
- Other Fuels: 4%

% of Total
- Conventional Boilers: 33.4
- CHP/Cogeneration: 65.0
- Other Electricity Generation (excludes 0.1 TBtu renewable, non-combustion electricity output): 0.2
- Steam Distribution Losses: 98.6
- Total: 97.5

Energy Use Data Source:
2014 EIA MECS (with adjustments); see page 1 of 2 for reference link
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Notes:
- Sector-wide aggregate data for year 2014; energy values and fuel type percentages rounded to nearest whole number
- Offsite generation shown on net basis (purchases, sales, and transfers accounted for) and includes onsite non-combustion renewable output
- * Refers to sales and transfers offsite of electricity to utilities and other entities
- Feedstock energy excluded

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