Manufacturing Energy and Carbon Footprint
Sector: Petroleum Refining (NAICS 324110)

Primary Energy Use: 3,728 TBtu
Total GHG Emissions: 244 MMT CO₂e

Energy use data source: 2018 EIA MECS (with adjustments). For full information on references, definitions, assumptions, and other sectors, visit this webpage.

Last Revised: December 2021

Notes:
- Sector-wide aggregate data for year 2018; 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
- Excess steam refers to the sales and transfer offsite or purging of surplus steam

Energy for All Purposes estimated at 3,728 TBtu
Includes primary energy plus net energy consumed for nonfuel purposes, including feedstock use

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Prepared for the U.S. Department of Energy, Advanced Manufacturing Office by Energetics
Onsite Energy, 2018

Manufacturing Energy and Carbon Footprint
Sector: Petroleum Refining (NAICS 324110)

Onsite Energy Use: 3,374 TBtu
Onsite Emissions: 211 MMT CO₂e

Fuel Types:
- Conventional Boilers: 30.2, 30.1
- CHP/Cogeneration: 31.5, 31.5
- Other Electricity Generation (excludes 0.1 TBtu renewable, non-combustion electricity output): 1.1, 1.1
- Other Fuels: 62.8, 62.7

Energy (TBtu = Trillion British Thermal Units)
- Fuel
- Electricity
- Steam
- Combined
  - Losses

Greenhouse Gas (GHG) Emissions
(MMT CO₂e = Million Metric Tons Carbon Dioxide Equivalent)

Onsite Emissions = Onsite Combustion Emissions + Process Emissions

Greenhouse Gas Emissions:
- Other Process Uses: 4.8, 3.6
- Electro-Chemical: 0.1, 0.0
- Machine Drive:
  - Pumps: 135
  - Fans: 36
  - Compressed Air: 25
  - Materials Handling: 21
  - Materials Processing: 74
  - Other Systems: 27

Total Emissions = Onsite Combustion Emissions + Process Emissions
- Total Emissions: 177.9, 147.5, 0.0
- Steam Distribution Losses: 158
- Steam Distribution Losses: 158

Other Nonprocess:
- Facility HVAC: 1.9, 0.8
- Facility Lighting: 0.5, 0.0
- Other Facility Support: 0.3, 0.0
- Onsite Transportation: 0.1, 0.1
- Other Nonprocess: 3.1, 1.0
- Excess Steam*: 0
- Electricity Export*: 18

Energy use data source:
2018 EIA MECS (with adjustments); See webpage for details
Last Revised: December 2021

Notes:
- Sector-wide aggregate data for year 2018; 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
- ** Refers to sales and transfers offsite or purging of surplus steam

Feedstock energy excluded

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Fuel and GHG Emissions, 2018

- Offsite Generation
  - Electricity Generation: 21.9 TBTu
  - Steam Generation: 10.8 TBTu

- Onsite Generation
  - Conventional Boilers: 30.1 TBTu
  - CHP/Cogeneration: 31.5 TBTu
  - Other Electricity Generation: 1.1 TBTu

- Process Energy
  - Process Heating: 2,042 TBTu
  - Process Cooling and Refrigeration: 0 TBTu
  - Other Process Uses: 3.6 TBTu
  - Electro-Chemical: 0 TBTu
  - Machine Drive: 1.7 TBTu

- Nonprocess Energy
  - Facility HVAC: 0.8 TBTu
  - Facility Lighting: 0 TBTu
  - Other Facility Support: 0 TBTu
  - Onsite Transportation: 0.1 TBTu
  - Other Nonprocess: 0 TBTu

Total Greenhouse Gas Emissions: 243.8 TMT CO₂e

Fuel (TBTu = Trillion British Thermal Units)

Greenhouse Gas (GHG) Emissions (MMT CO₂e - Million Metric Tons Carbon Dioxide Equivalent)

Combustion

Notes:
- Sector-wide aggregate data for year 2018; energy values rounded to nearest whole number; emissions values rounded to nearest tenth