NETL Energy Related Diagrams

2020 Edition

- Erik Shuster, Ken Kern, Peter Balash
  - Strategic Systems Analysis & Engineering
Estimated U.S. Energy Consumption in 2020: 93 Quads
Contributions of Major Energy Sources

Estimated U.S. Energy Consumption in 2020: 93 Quads

Contributions of Major Energy Sources

- **Renewables** (11.4 Quadrillion Btu's)
  - Hydro: 2.58
  - Wind: 3.60
  - Biomass: 0.42
  - Geothermal: 0.15
  - Solar: 0.00

- **Nuclear** (8.25 Quadrillion Btu's)

- **Coal** (9.21 Quadrillion Btu's)

- **Natural Gas** (31.53 Quadrillion Btu's)

- **Petroleum** (32.23 Quadrillion Btu's)

- **Electricity** (35.60 Quadrillion Btu's)

- **Transportation** (24.26 Quadrillion Btu's)
  - Motor Gasoline: 67%
  - Diesel: 30%
  - Jet Fuel: 9%

Share of Major Energy Sources:
- **Fossil Energy %**
- **Nuclear %**
- **Renewable %**

75.1% of Total Energy Delivered to End-use Sectors (69.54 Quadrillion Btu's)

Reference: Data is based on DOE/EIA-0035(2021/03); Lawrence Livermore National Laboratory (2012 example), Rearranged to segregate and accumulate totals by major energy source.
Changes in Energy Consumption

2019 - 2020

Primary Fuel Consumption

<table>
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<tr>
<th>Change in Primary Energy Consumption 2019-2020</th>
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<tbody>
<tr>
<td>Petroleum</td>
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<td>-8.0</td>
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Total U.S. Energy Consumption

% Change in Primary Energy Consumption 2019-2020

<table>
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<tr>
<th>Percent</th>
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<tr>
<td>-20%</td>
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Total U.S. Energy Consumption

Electricity – Fuel Consumption

<table>
<thead>
<tr>
<th>Change in Fuel Consumption for Electricity Generation 2019-2020</th>
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<tbody>
<tr>
<td>- Solar</td>
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<td>-2.5</td>
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Total Electricity

% Change in Fuel Consumption for Electricity Generation 2019-2020

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<th>Percent</th>
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<td>-25%</td>
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- Solar | - Wind | Total Renewables | Nuclear | Natural Gas | Coal |
| Percent |

Metric Ton = 1.1023 U.S. short Ton
Metric Tons of Carbon Dioxide to Carbon Equivalent multiply by 12/44

General CO₂ Emissions Coefficients
(Metric Ton of CO₂ per Quadrillion Btu)
Coal: 94.6  Natural Gas: 53.9  Petroleum: 74.5

Reference: DOE/EIA-0035(2021/04)
SSAE 5/5/2021
2020 Estimated U.S. Energy-Related CO₂ Emissions by End Use

Million Metric Tons (MT) of Carbon Dioxide (CO₂)

Residential

- HVAC 412
- Water Heating 131
- Other Uses 222
- Cooking 13
- Lighting 24
- Clothes & Dish Wash/Dry 34
- TV, Computer, Related Equipment 34
- Refrigeration/Freezer 42
- 894 MT

Commercial

- HVAC 243
- Water Heating 36
- Refrigeration 75
- Other Uses 187
- Cooking 28
- Office Equipment 50
- Lighting 61
- 718 MT

Industry - Manufacturing

- Food Production 78
- Balance of Manufacturing 99
- Iron, Steel, Aluminum 104
- Refining 235
- Bulk Chemicals 274
- Computer and Electronics 13
- Machinery 12
- Glass 12
- Plastics 23
- Cement and Lime 22
- Transportation Equipment 24
- Fabricated Metal Products 28
- Paper Products 48
- 991 MT

Transportation

- Light-Duty Vehicles 904
- Commercial Trucks and Busses 421
- Shipping (Domestic & International 68
- Air 132
- 1,591 MT

Industry – Non Manufacturing

- Agriculture 81
- Mining 81
- Construction 73
- 236 MT

Biomass Combustion

- Renewable Diesel & Gasoline 5
- Biomass – Electric Power Sector 19
- Biodiesel 17
- Biogenic Waste 27
- 405 MT

Metric Ton = 1.1023 U.S. short Ton
Metric Tons of Carbon Dioxide to Carbon Equivalent multiply by 12/44
HVAC: Heating, ventilation, and air conditioning

Reference: DOE/EIA-AEO 2021 Reference Scenario
SSAE-EMAT 5/5/2021