
for
Center for Strategic and International Studies
September 24, 2019 | Washington, DC

by
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U.S. Energy Information Administration
IEO2019 cases examine a range of conditions through 2050

**Reference case**
- Assumes implementation of current laws and regulations
- Reflects current views of economic and demographic trends, and improvements in known technology
- Macroeconomic projections from Oxford Economics—3.0% global GDP growth per year, 0.7% global population growth per year
- Assumes Brent $100 per barrel crude price in 2018 dollars by 2050

**High and Low Economic Growth cases**
- 3.7%/year GDP growth, High Economic Growth case
- 2.4%/year GDP growth, Low Economic Growth case

**High and Low Oil Price cases (Brent crude prices by 2050 in 2018 dollars)**
- $185/barrel, High Oil Price case, driven by higher economic growth and less oil supply
- $45/barrel, Low Oil Price case, driven by lower economic growth and more oil supply
The IEO2019 Reference case reflects important shifts in the global energy system

- Manufacturing centers are shifting toward Africa and South Asia, especially India, resulting in energy consumption growth
- Natural gas and petroleum product consumption is rising in Asia faster than supply is growing, potentially shifting trade patterns and infrastructure investments
- End-use consumption is increasingly shifting toward electricity
- Falling costs, demand growth, and policy all work together to shift the electricity generation mix
- Renewables displace petroleum as the most used energy source.
World energy consumption rises nearly 50% from 620 quadrillion Btu in 2018 to 910 quadrillion Btu in 2050

The fastest GDP growth is found in Asia and Africa, but Africa remains a relatively small percentage of the overall world economy.
Non-OECD regions account for most of the growth and the majority of the uncertainty.

Energy consumption
quadrillion British thermal units

Non-OECD Asia is the largest source of growth in global energy consumption

Primary energy consumption by region
quadrillion Btu

The industrial sector is the largest consumer of energy, with energy-intensive manufacturing the largest component.

**End-use energy consumption by sector, world**

- **History**
- **Projections**

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<th>Industrial</th>
<th>Transportation</th>
<th>Residential</th>
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<td>2050</td>
<td>400</td>
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</table>

**Energy consumption by sub-sector, world**

- **History**
- **Projections**

<table>
<thead>
<tr>
<th>Year</th>
<th>Energy-intensive Manufacturing</th>
<th>Non-energy-intensive Manufacturing</th>
<th>Non-Manufacturing</th>
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Renewables displace petroleum as the most used energy source, as electricity use grows faster than any other end-use fuel

**Primary energy consumption by fuel, world**

- quadrillion British thermal units

**End-use energy consumption by fuel, world**

- quadrillion Btu

**1** = Includes biofuels.  **2** = Largely biomass

Motor gasoline and diesel continue to be predominant transportation fuels, but growth comes in jet fuel, natural gas, and electricity.

**Transportation energy consumption**
quadrillion Btu

**History Projections**

OECD

2010 2020 2030 2040 2050

0 20 40 60 80 100 120

non-OECD

2010 2020 2030 2040 2050

0 20 40 60 80 100 120

OECD liquid fuels consumption slows, but growth continues in non-OECD Asia and Africa

Liquid fuels consumption
quadrillion Btu

OECD

History  Projections

0  20  40  60  80  100  120  140  160

2010 2020 2030 2040 2050

Historical data projected from 2010 to 2050.

While petroleum product demand is growing in Asia, crude oil production grows in the Middle East, Americas, and Russia

**Crude oil and lease condensate production**

million barrels per day

**OECD**

**non-OECD**

Natural gas demand grows in the OECD, but more rapidly in non-OECD Asia, the Middle East, and Africa

**Natural gas consumption**
quadrillion Btu

**History Projections**

**OECD**

**non-OECD**

Natural gas production is concentrated in the OECD Americas, Middle East, and non-OECD Europe and Eurasia

Trade of natural gas expands significantly through 2050 in all regions

Net imports of natural gas
trillion cubic feet

OECD

non-OECD

Despite a less carbon intensive fuel mix, growth in energy consumption results in a continuing rise in emissions.
Renewables displace petroleum as the most used energy source, as electricity use grows faster than any other end-use fuel.

Dr. Linda Capuano, CSIS
IEO2019, September 24, 2019

For more information


International Energy Outlook | www.eia.gov/ieo

Short-Term Energy Outlook | www.eia.gov/steo

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