

Natural Resources

Responsible use of the Earth's natural resources is critical to our long-term security and sustainability. As it stands, the U.S. currently accounts for only 4.4% of the world's population but 18% of the world's total primary energy consumption. Nonrenewable resources, such as coal and natural gas, take millions of years for the planet to replenish, and renewable resources must be replaced as they're being used. A scarcity of these resources can have both economic implications and security risks for the U.S.

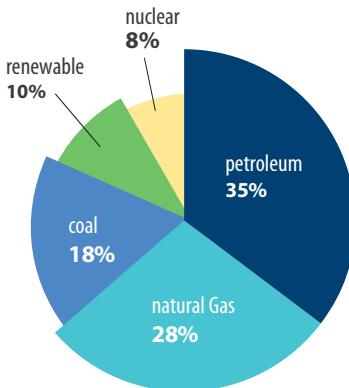
The American Geophysical Union and its network of Earth and space scientists are committed to studying the world's natural resources, their current conditions and performance, and the challenges and opportunities facing the U.S. and the world and to educating the public on their findings.



From 1980 to 2014, energy consumption increased 26%, and CO₂ emissions increased 17% through 2013.⁴

Energy Resources

- The energy industry is the third largest industry in the U.S., yet in 2014, U.S. energy production met only about 89% of the country's consumption needs.²
- U.S. energy consumption comes from the following sources: 35% petroleum, 28% natural gas, 18% coal, 10% renewable energy, and 8% nuclear electric power.³
- Renewable energy is the fastest-growing energy source and by 2040 is expected to provide a share of energy generation equal to that of coal and natural gas, roughly 15% of the world's energy consumption.⁶
- Using renewable resources responsibly and reusing products created from nonrenewables, such as recycled steel and plastic, ensures our self-reliance and can reduce greenhouse gas emissions.⁷



U.S. Energy Information Administration

- From 1980 to 2014, energy consumption increased 26%, and CO₂ emissions increased 17% through 2013.⁴
- The U.S. is the world's top natural gas producer, yet we still consume

more natural gas than we produce. In June 2015, the U.S. produced 89.5 billion cubic feet of natural gas every day.⁵

- Using renewable resources responsibly and reusing products created from nonrenewables, such as recycled steel and plastic, ensures our self-reliance and can reduce greenhouse gas emissions.⁷

¹U.S. Census Bureau, <http://www.census.gov/popclock/>; U.S. Energy Information Administration (EIA), <https://www.eia.gov/tools/faqs/faq.cfm?id=87&t=1>.

²EIA, http://www.eia.gov/energyexplained/index.cfm?page=us_energy_home.

³EIA, http://www.eia.gov/energyexplained/index.cfm?page=renewable_home.

⁴U.S. Environmental Protection Agency (EPA), "Air Quality Trends," <http://www.epa.gov/airtrends/aqtrends.html>.

⁵EIA, "Monthly Crude Oil and Natural Gas Production," <http://www.eia.gov/petroleum/production/?src=home-b6&src=home-b1>.

⁶EIA, <https://www.eia.gov/tools/faqs/faq.cfm?id=527&t=4>; http://www.eia.gov/pressroom/presentations/sieminski_05112016.pdf.

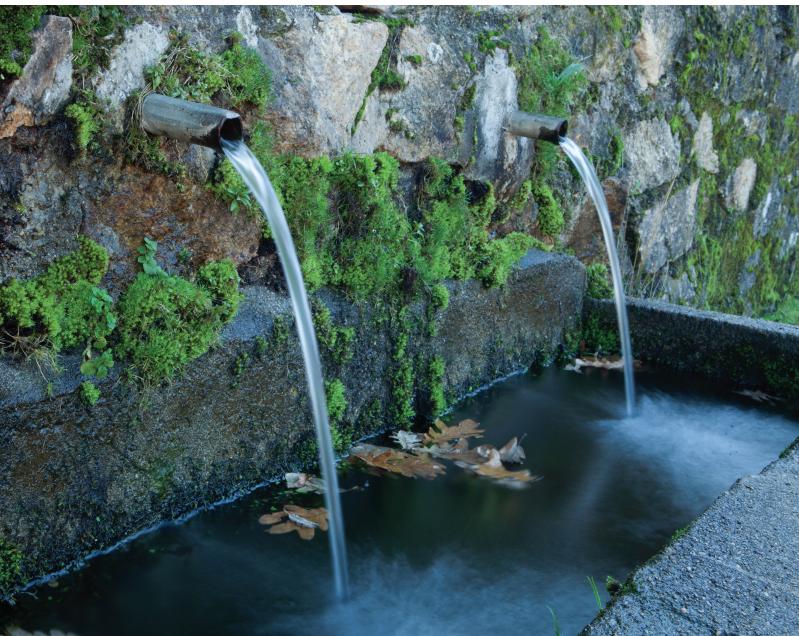
⁷EPA, "Natural Resources," http://www.epa.gov/osw/education/quest/pdfs/unit1/chap1/u1_natresources.pdf.

⁸U.S. Geological Survey (USGS), "Rare Earths," http://minerals.usgs.gov/minerals/pubs/commodity/rare_earth/mcs-2011-raree.pdf.

Rare Earth Elements

- Rare earth elements (REEs), found in the Earth's crust, are critical components to many modern technology devices and for use in clean energy and defense technologies; however, concentrated deposits of REEs are uncommon.
- The U.S. imported an estimated \$161 million worth of refined REEs in 2010.⁸ In fact, 100% of its REEs come from foreign sources, with the majority from China, which produces roughly 95% of the world's supply of REEs.⁹ The cost and complexity of exploring REE deposits and developing new mines is a barrier.¹⁰
- Recycling of REEs, research to find substitute materials, and efforts to recover REEs in collaboration with mineral deposits may help offset the future demand for REEs.¹¹

Sixty-three percent of public water in the United States, used for drinking water, public pools, firefighting, wastewater treatment, etc., comes from surface water sources, such as lakes and streams. The other 37% comes from groundwater sources.¹⁶



Water

- Despite being covered in water, less than 1% of the Earth's water is available for human use and consumption. The remaining 99% is salt water, is water trapped in ice caps or glaciers, or is too inaccessible to humans.¹²
- Global water demand for manufacturing is expected to increase by 400% from 2000 to 2050.¹³
- The U.S. consumes more than 1.3 billion liters of water per day and has the third highest "water footprint of consumption" of any country in the world.¹⁴ However, total water use in the United States decreased by 13% in 2010 from 2005.¹⁵
- Sixty-three percent of public water in the U.S., used for drinking water, public pools, firefighting, wastewater treatment, etc., comes from surface water sources, such as lakes and streams. The other 37% comes from groundwater sources.¹⁶
- About 50% of people in the U.S. rely on groundwater for their freshwater supply, yet those supplies are being depleted faster than they can be replenished in many areas across the U.S.¹⁷
- Natural resources such as sunlight, wind, rain, tides, waves, and geothermal heat provide renewable energy that does not require large quantities of fresh water.¹⁸

⁹USGS, <http://pubs.usgs.gov/sir/2010/5220/pdf/SIR2010-5220.pdf#page=22>.

¹⁰USGS, <http://dx.doi.org/10.3133/fs20143078>.

¹¹USGS, <http://dx.doi.org/10.3133/fs20143078>.

¹²EPA, "Tomorrow & Beyond," https://www3.epa.gov/watersense/our_water/~tomorrow_beyond.html.

¹³United Nations, <http://www.unwater.org/wwd15/learn/en/#sthash.llim8K84.dpuf>.

¹⁴A. Y. Hoekstra and M. M. Mekonnen, "The Water Footprint of Humanity," *Proceedings of the National Academy of Sciences of the United States*, 109(9), 3232–3237, 2012.

¹⁵M. A. Maupin, J. F. Kenny, S. S. Hutson, J. K. Lovelace, N. L. Barber, and K. S. Linsey, "Estimated Use of Water in the United States in 2010," U.S. Geological Survey Circular, 1405, 56 pp., 2014, <http://pubs.usgs.gov/circ/1405/>.

¹⁶Maupin et al., "Estimated Use of Water in the United States in 2010."

¹⁷USGS, "Ground-Water Depletion Across the Nation," <http://pubs.usgs.gov/fs/fs-103-03/#pdf>.

¹⁸United Nations, <http://www.unwater.org/wwd15/learn/en/#sthash.llim8K84.dpuf>.