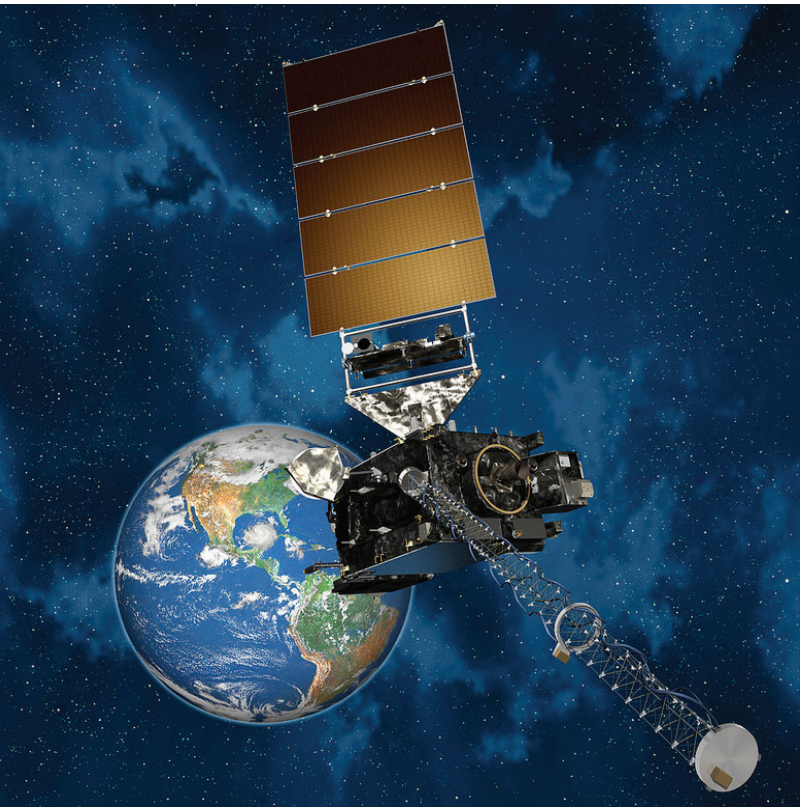
Economic Value of Earth and Space Science

Promoting discovery in Earth & space science for the benefit of humanity

Investing in Earth and space science research and development (R&D) creates jobs, helps grow our economy, and supports global competitiveness.

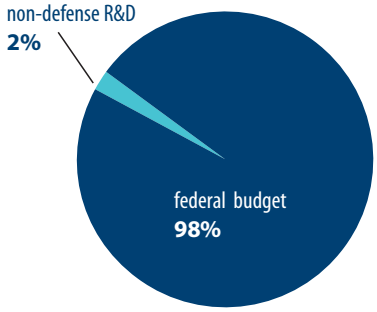
History shows that much of the economic growth the U.S. enjoyed post–World War II was the result of strong support for and investments in science and technology. In fact, much of the scientific R&D that we rely on to fuel our economic engine is funded through the U.S. nondefense discretionary budget.

> **"When the U.S. invests in innovation, it creates companies and jobs at home, makes Americans healthier and safer, and saves lives and fights poverty in the world's poorest countries." – Bill Gates[4]**



NOAA/Lockheed Martin

- Since a historic high in the mid-1960s, the percentage of the U.S. federal budget spent on research and development has been trending down. Since 2011, total federal R&D funding has made up less than 4% of the federal budget, and non-defense R&D has been less than 2%.[1]



- The U.S currently ranks sixth behind South Korea, Japan, Finland, Taiwan, and Germany for R&D spending as a percentage of gross domestic product (GDP).[2]
- In 2013, the U.S spent $456.1 billion on research and development. This accounted for about 27% of global R&D expenditures compared to China's 20% global share, or $336.5 billion. In 2001, U.S. R&D accounted for 37% of the global share.[3]

Economic Benefits

Federally funded scientific R&D has led to innovations that demonstrate many benefits across American industries:

- The U.S. agriculture industry sees $460 million in annual savings from accurate El Niño and La Niña forecasting.[5]
- Since 1977, investments in R&D at the U.S. Department of Energy's Office of Fossil Energy have resulted in an estimated $1.3 trillion in public health benefits associated with emissions reductions of sulfur dioxide and nitrogen oxide.[6]

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- Every $1 million spent on U.S. Department of Interior ecosystem restoration projects returns an estimated $2.2 to $3.4 million in benefits to the U.S. economy.[7]
- The Internet industry, which has roots in networks built by federally funded programs for the U.S. Department of Defense and National Science Foundation, now represents about 6% of U.S. GDP, equivalent to $966.2 billion, and is responsible for nearly 3 million jobs.[8]
- From 2015 to 2027 estimated savings of $5.1 billion, including $1.28 billion for energy providers, $265 million for the airline industry, and $545 million in agriculture, are expected as a result of the National Weather Service's GOES-R satellite system (used for monitoring hurricanes, heavy rainfall, lightning strikes, tornadoes, and space weather).[9]
- Research funded by the National Science Foundation's Directorate of Geoscience has contributed to understanding the nutrients that pollute the Chesapeake Bay, helping protect the Chesapeake Bay and the $60 billion commercial activity that relies on the bay.[10]

USGS/Kristi Wallace

[1]American Association for the Advancement of Science(AAAS), "Historical Trends in Federal R&D," 2016, http://www.aaas.org/page/historical-trends-federal-rd.

[2]AAAS, "Historical Trends in Federal R&D," 2016.

[3]National Science Foundation (NSF), "Science and Engineering Indicators 2016," 2016, http://www.nsf.gov/statistics/2016/nsb20161/uploads/1/7/chapter-4.pdf; NSF, "Science and Engineering Indicators 2014," 2014, http://www.nsf.gov/statistics/seind14/index.cfm/chapter-4/c4h.htm

[4]Bill Gates, "America's Secret Weapon," Reuters, 18 April 2016, http://blogs.reuters.com/great-debate/2016/04/18/bill-gates-americas-secret-weapon/?utm_source=twitter.

[5]National Weather Service, "Weather-Ready Nation Roadmap," April 2013, http://www.nws.noaa.gov/com/weatherreadynation/files/nws_wrn_roadmap_final_april17.pdf.

[6]U.S. Department of Energy Office of Fossil Energy, "Fossil Energy Research: A Legacy of Benefit," June 2011, http://energy.gov/sites/prod/files/legacy_factcard.pdf.

[7]Catherine Cullinane Thomas, Christopher Huber, Kristin Skrabis, and Joshua Sidon, "Estimating the Economic Impacts of Ecosystem Restoration—Methods and Case Studies," U.S. Geological Survey Open-File Report, 2016-1016, 2016, doi:10.3133/ofr20161016.

[8]Internet Association, "New Report Calculates the Size of the Internet Economy," 10 December 2015, https://internetassociation.org/121015econreport/.

[9]NWS, "Weather-Ready National Roadmap," April 2013.

[10]NSF, "Unraveling Earth's Complexity," September 2013, http://www.nsf.gov/about/congress/reports/geo_research.pdf.

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