

Federal R&D Investments in the 2009 Budget

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October 24, 2008

for the University of Michigan Engineering Advisory Council

AAAS R&D Budget and Policy Program

<http://www.aaas.org/spp/rd>

See the “What’s New” section for the latest updates; see the “Seminars and Presentations” section for copies of this presentation.

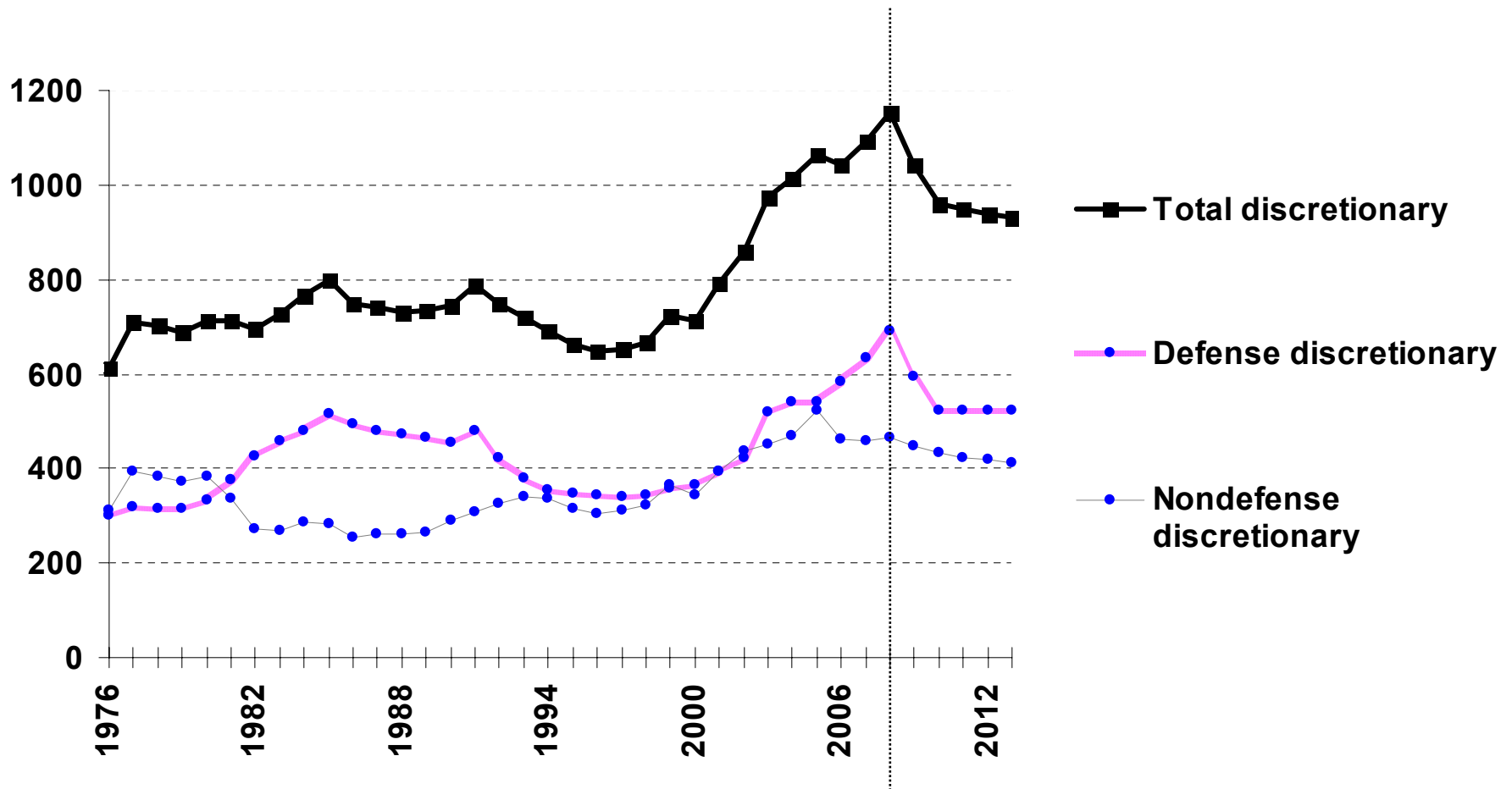


THE FY 2009 BUDGET SITUATION

- The federal government had a record budget deficit of \$455 billion in FY 2008, and an even larger deficit in 2009.
- To help control the deficit, President Bush proposes to keep domestic appropriations flat in 2009.
- Domestic appropriations barely kept pace with inflation in 2006, 2007, and 2008.
- Historically, federal R&D investments have closely tracked trends in discretionary spending.
- Entitlement spending will grow dramatically in the next few years as the baby-boom generation hits retirement age, and the financial rescue bill will add hundreds of billions of dollars over the next few years.
- Future war costs are a big unknown.

Trends in Discretionary Spending, FY 1976-2013

in billions of constant FY 2008 dollars



Data in fiscal years. Source: *Budget of the United States Government, FY 2009*. FY 2008 data are estimates. FY 2009-2013 data are budget projections. FY 2009-2013 figures exclude Iraq and Afghanistan military costs.

THE FY 2009 BUDGET

FY 2009 has started, but only 3 departments (DOD, DHS, VA) have their final 2009 budgets.

The remaining federal agencies are operating under a CR (continuing resolution) at or below 2008 levels through March 6.

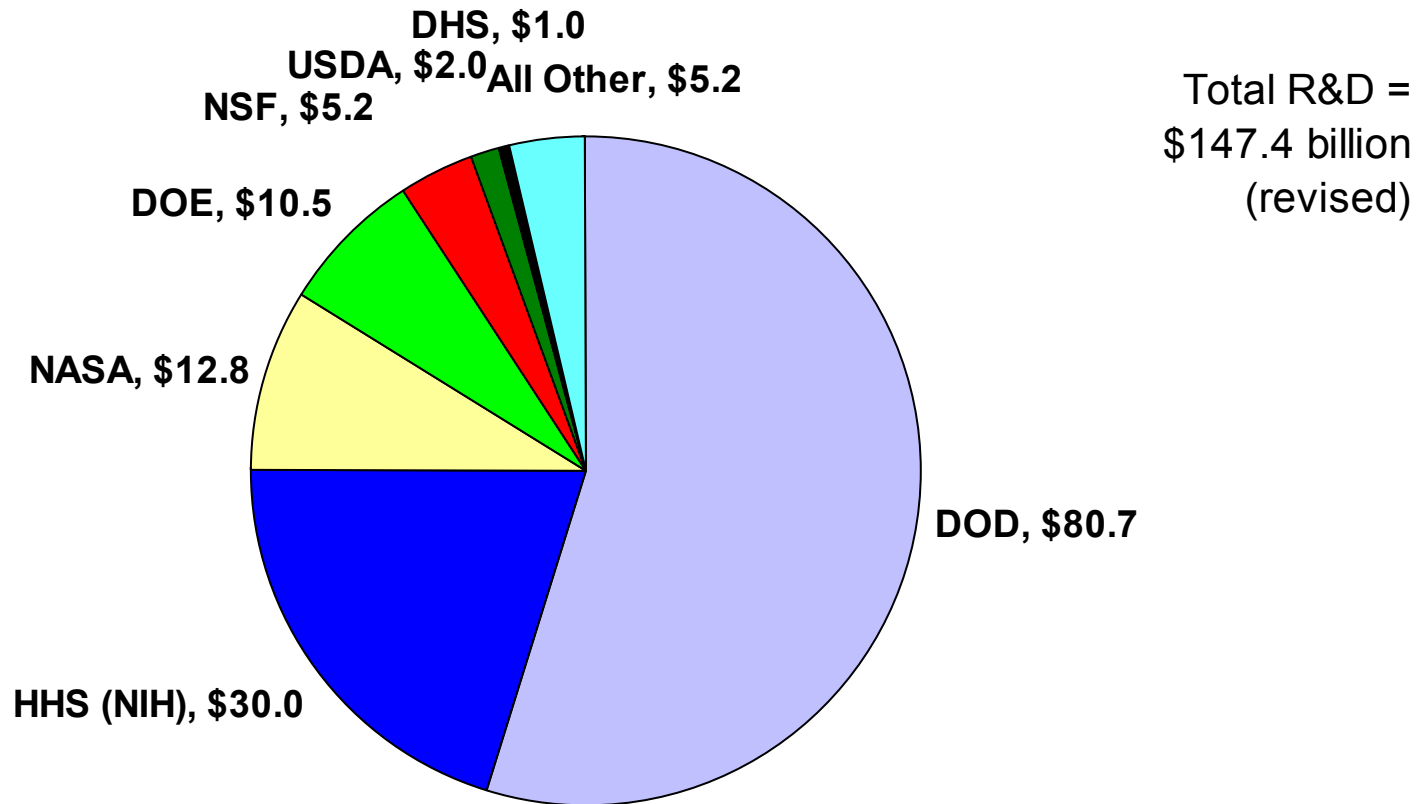
Because President Bush threatened to veto any appropriations bills that exceed his request, Congress has delayed the bills, which would collectively add \$21 billion to the request for domestic programs.

The next Congress plans to send the remaining 9 (of 12) 2009 appropriations bills to a new President.

This Congress may still approve 2009 supplementals for NIH, DOE, and others as part of an economic stimulus package.

Total R&D by Agency: FY 2009 Proposed

Budget Authority in billions of dollars



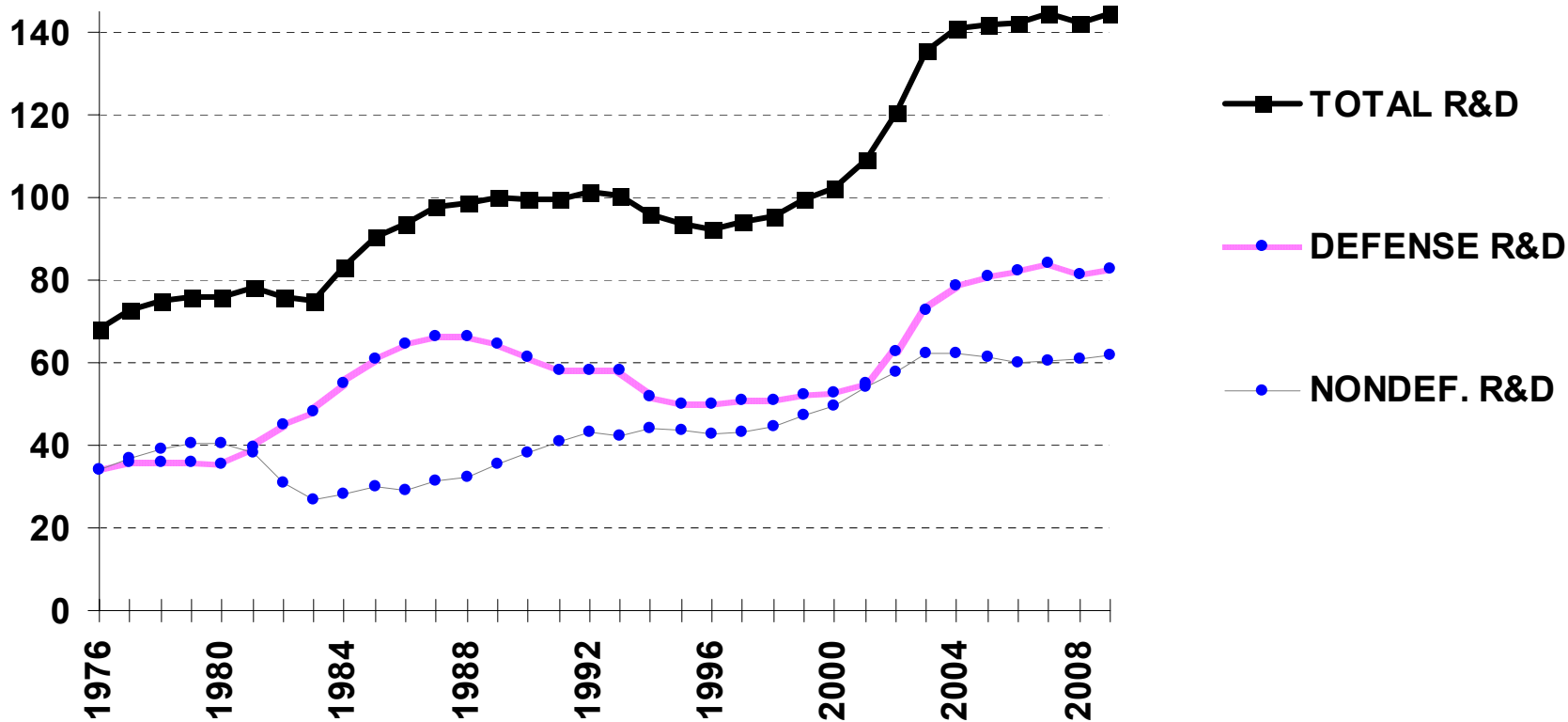
Source: AAAS, based on OMB R&D Budget Data and agency estimates for FY 2009.

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Trends in Federal R&D, FY 1976-2009 *

in billions of constant FY 2008 dollars



Source: AAAS analyses of R&D in AAAS Reports VIII-XXXIII. * FY 2009 figures are latest AAAS estimates of FY 2009 request.

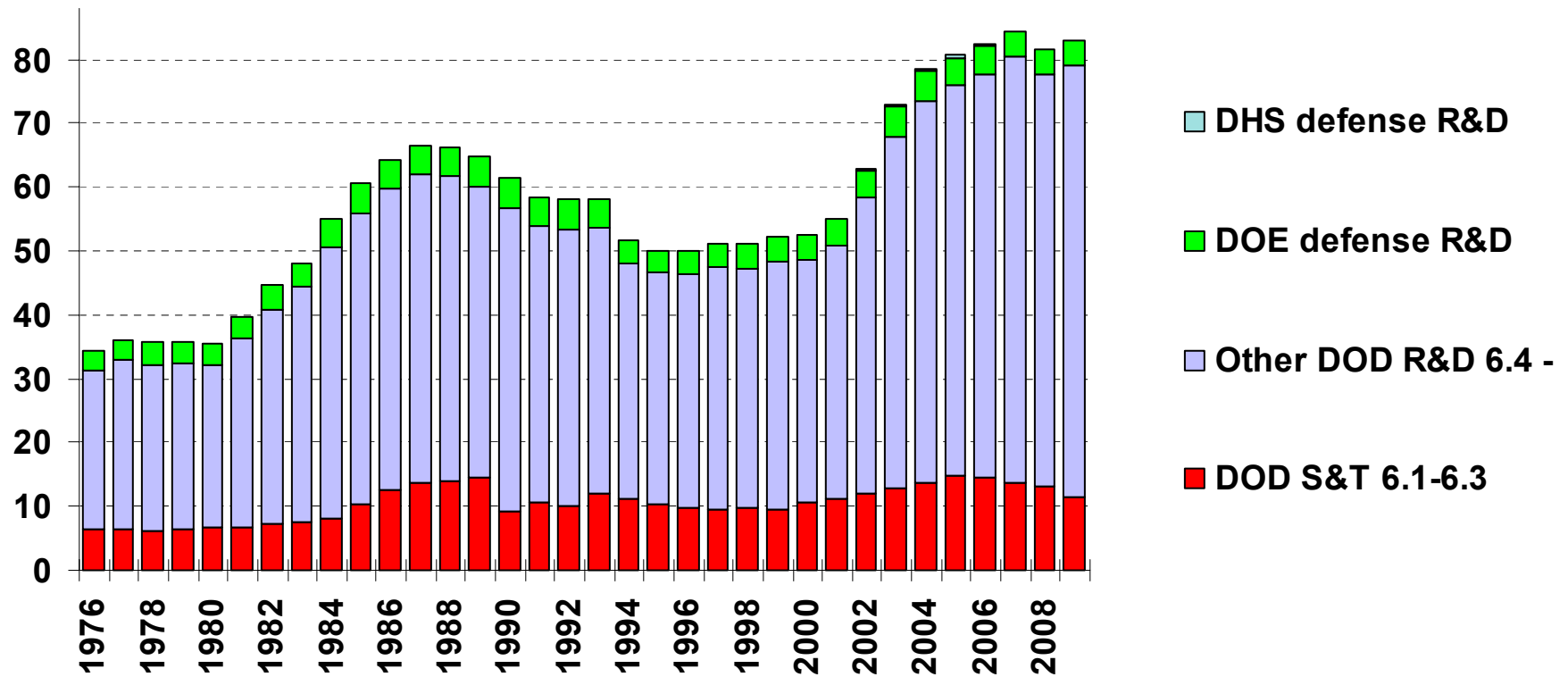
R&D includes conduct of R&D and R&D facilities.

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Trends in Defense R&D, FY 1976-2009 *

in billions of constant FY 2008 dollars



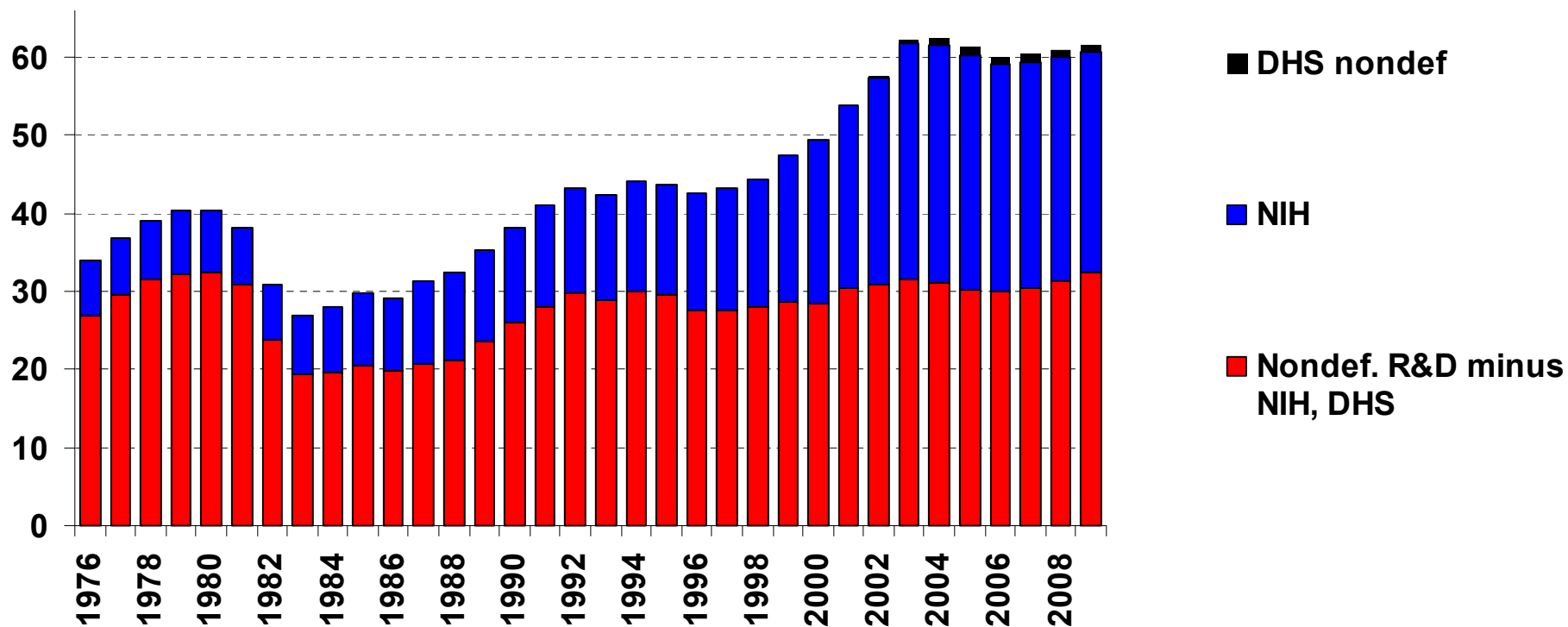
Source: AAAS analyses of R&D in annual R&D reports. * - FY 2009 figures are latest AAAS estimates of FY 2009 request. FY 2008 figures exclude pending supplementals. R&D includes conduct of R&D and R&D facilities. DOD S&T figures are not comparable for all years because of changing definitions.

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Selected Trends in Nondefense R&D, FY 1976-2009*

in billions of constant FY 2008 dollars



Source: AAAS analyses of R&D in *AAAS Reports VIII-XXXIII*. * FY 2009 figures are latest AAAS estimates of FY 2009 request.

R&D includes conduct of R&D and R&D facilities.

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THEMES IN THE BUDGET: INNOVATION AND COMPETITIVENESS

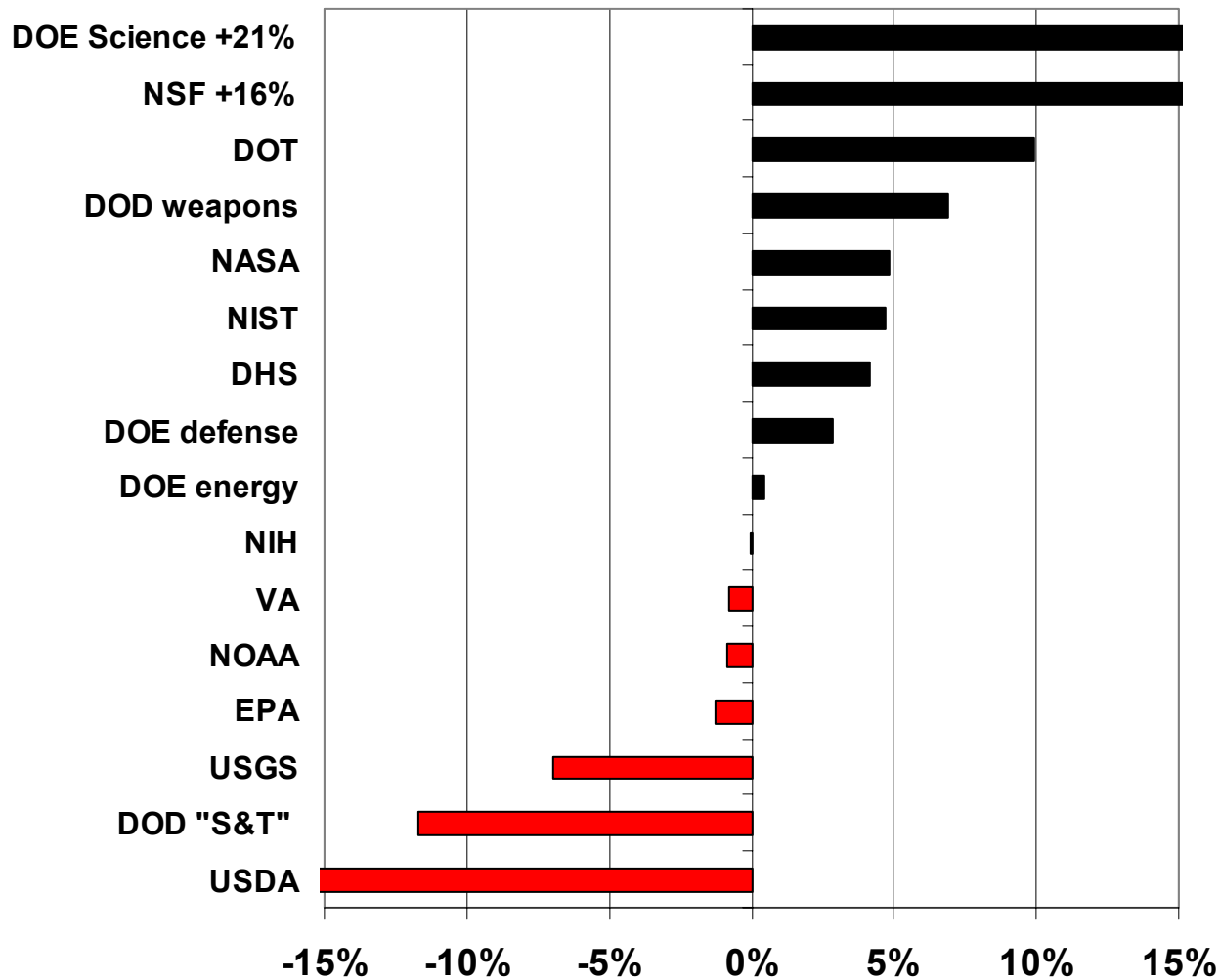
- In response to the “Gathering Storm” report and others, President Bush announced the American Competitiveness Initiative (ACI) in his 2006 State of the Union address.
- There are also several congressional responses, culminating in the America COMPETES Act of August 2007, an authorization bill.
- For R&D investments, the theme is boosting federal support for basic research in the physical sciences (broadly defined).
- The plan: Doubling the budgets of NSF, DOE Office of Science, and the NIST laboratories over 7 to 10 years. But 2007 and 2008 appropriations leave the plan off track despite COMPETES.

THE 2009 BUDGET FOR R&D

- The ACI continues for a third year, with large increases for NSF, DOE Science, and the NIST labs to catch up to a 10-year doubling track.
- Again, there would be large increases for DOD weapons and NASA spacecraft development, but also increases for most R&D programs.
- The NIH budget would be flat, agricultural and environmental R&D agencies would decline.
- Congress has a long way to go in finalizing 2009 appropriations, but is hoping to add money to the request, especially for energy, biomedical, and environmental R&D.

FY 2009 R&D Request

Percent Change from FY 2008

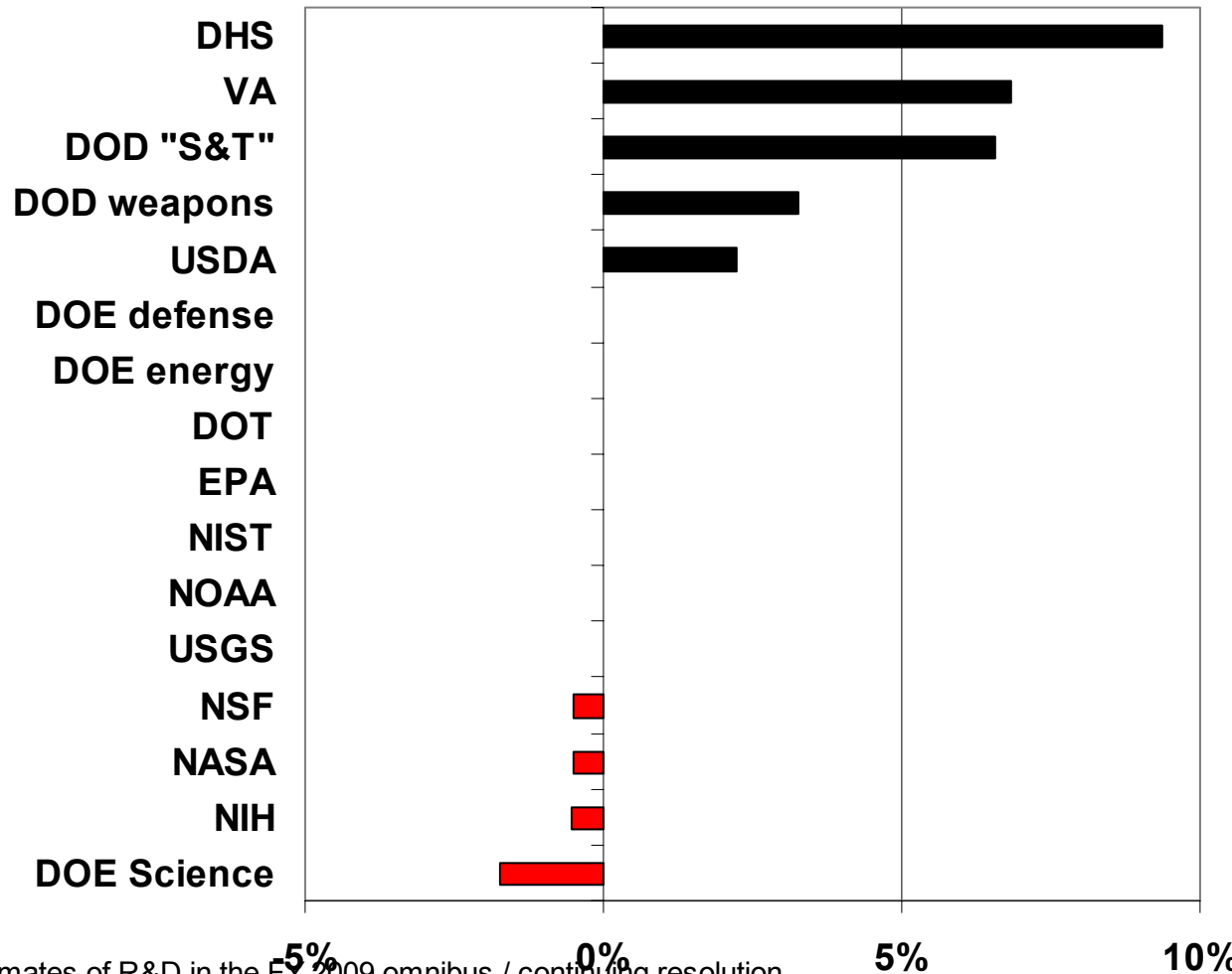


Source: AAAS, based on OMB R&D data and agency estimates for FY 2009.
 DOD "S&T" = DOD R&D in "6.1" through "6.3" categories plus medical research.
 DOD weapons = DOD R&D in "6.4" and higher categories.
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FY 2009 R&D Appropriations in the 2009 CR

Percent Change from FY 2008 (as of SEPT. '08)



Source: AAAS estimates of R&D in the FY 2009 omnibus / continuing resolution.

Only DOD, VA, and DHS have final FY 2009 appropriations. The remaining agencies are funded temporarily through March 6 under the continuing resolution.

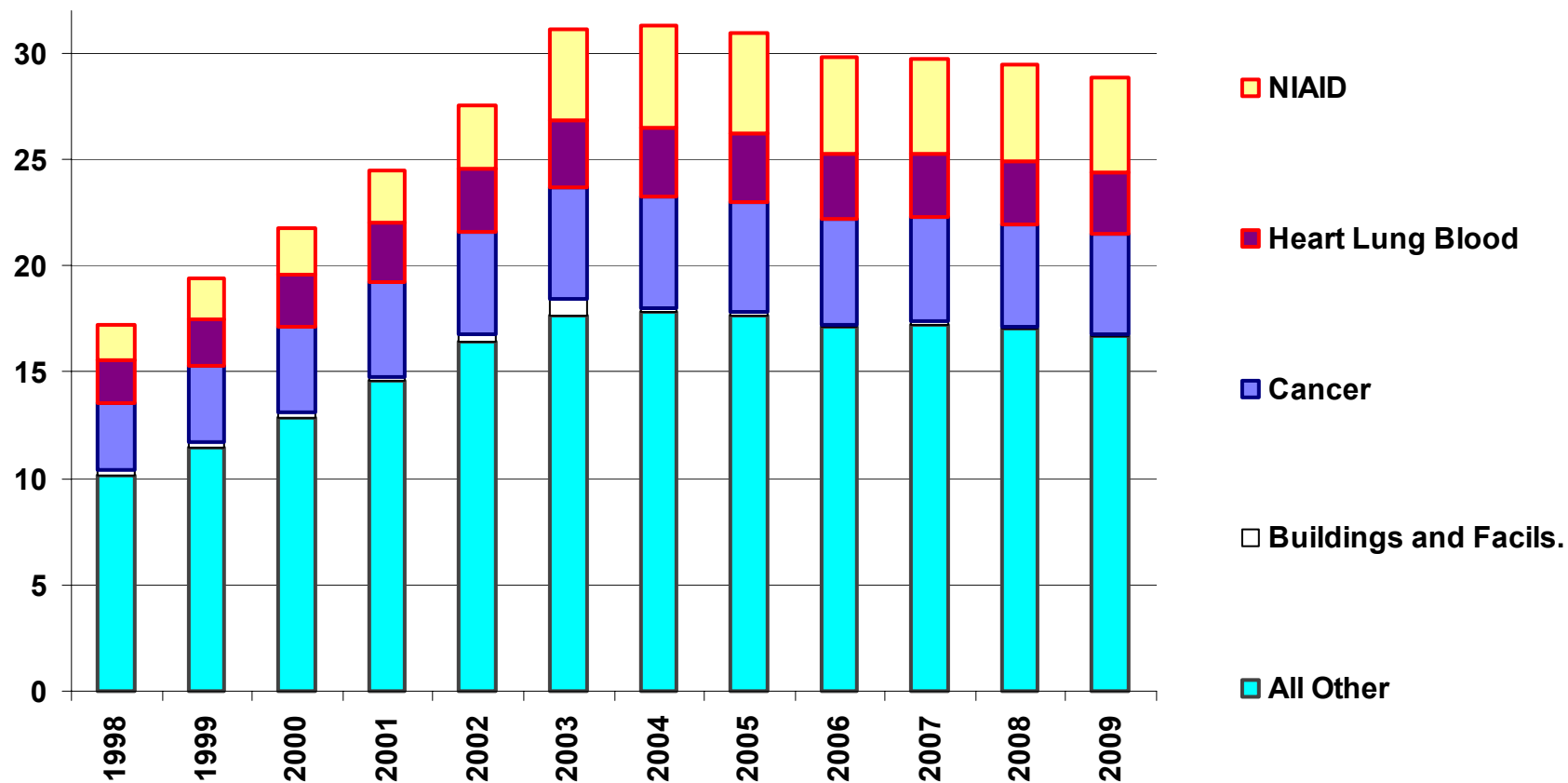
DOD "S&T" = DOD R&D in "6.1" through "6.3" categories plus medical research.

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National Institutes of Health Budget by Institute, 1998-2009 *

(budget authority in billions of constant FY 2008 dollars)



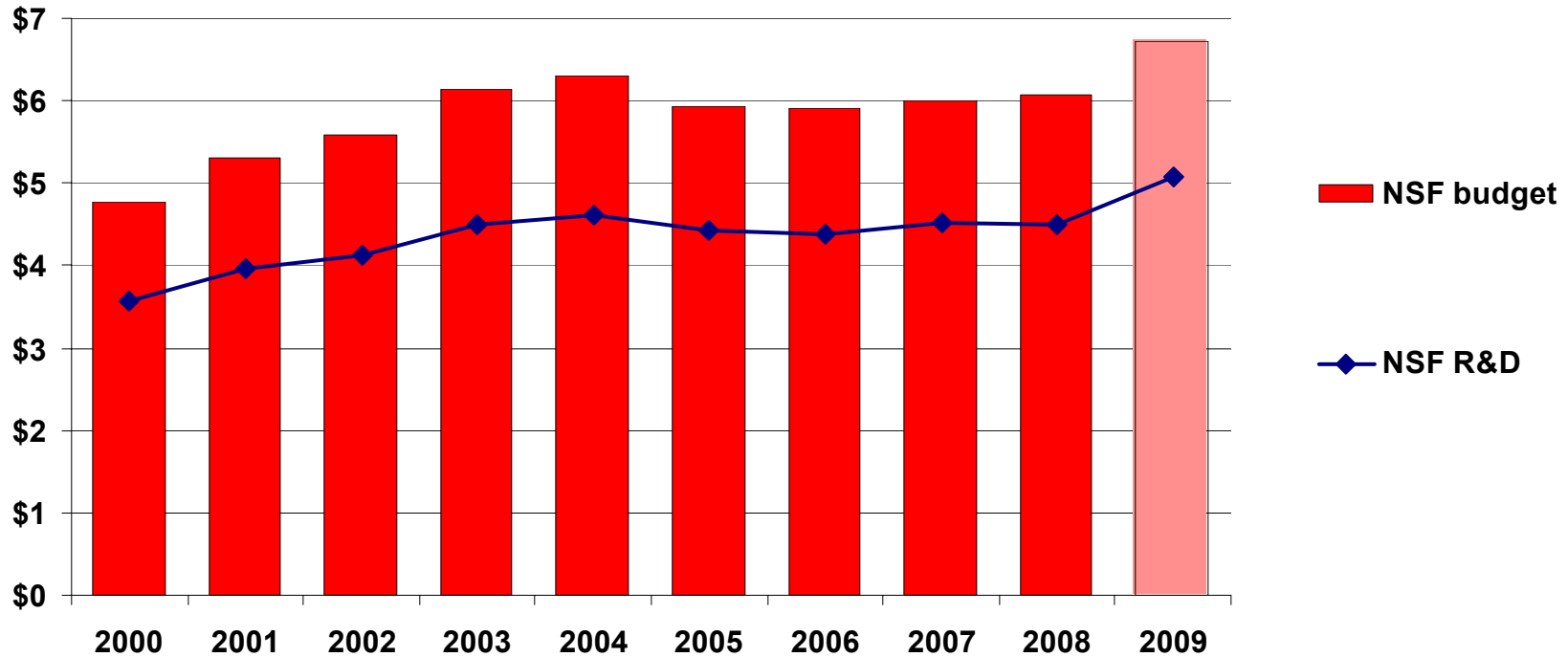
Source: AAAS R&D reports from NIH budget documents 1998-2009. * 2009 is latest AAAS estimates of FY 2009 request. Adjusted for inflation using OMB's GDP deflators.

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National Science Foundation Budget, FY 2000-2009

(budget authority in billions of constant FY 2008 dollars)

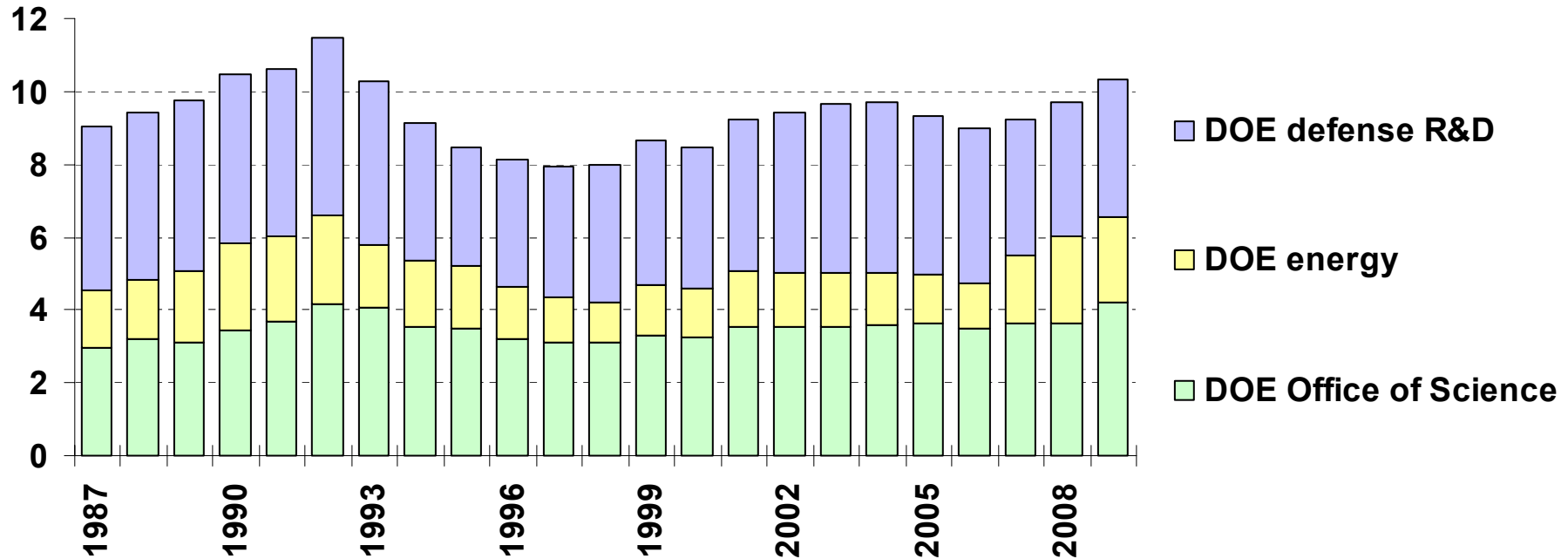


Source: National Science Foundation, and latest AAAS estimates of FY 2009 budget. FY 2009 is budget request.
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Trends in DOE R&D, FY 1987- 2009 *

in billions of constant FY 2008 dollars



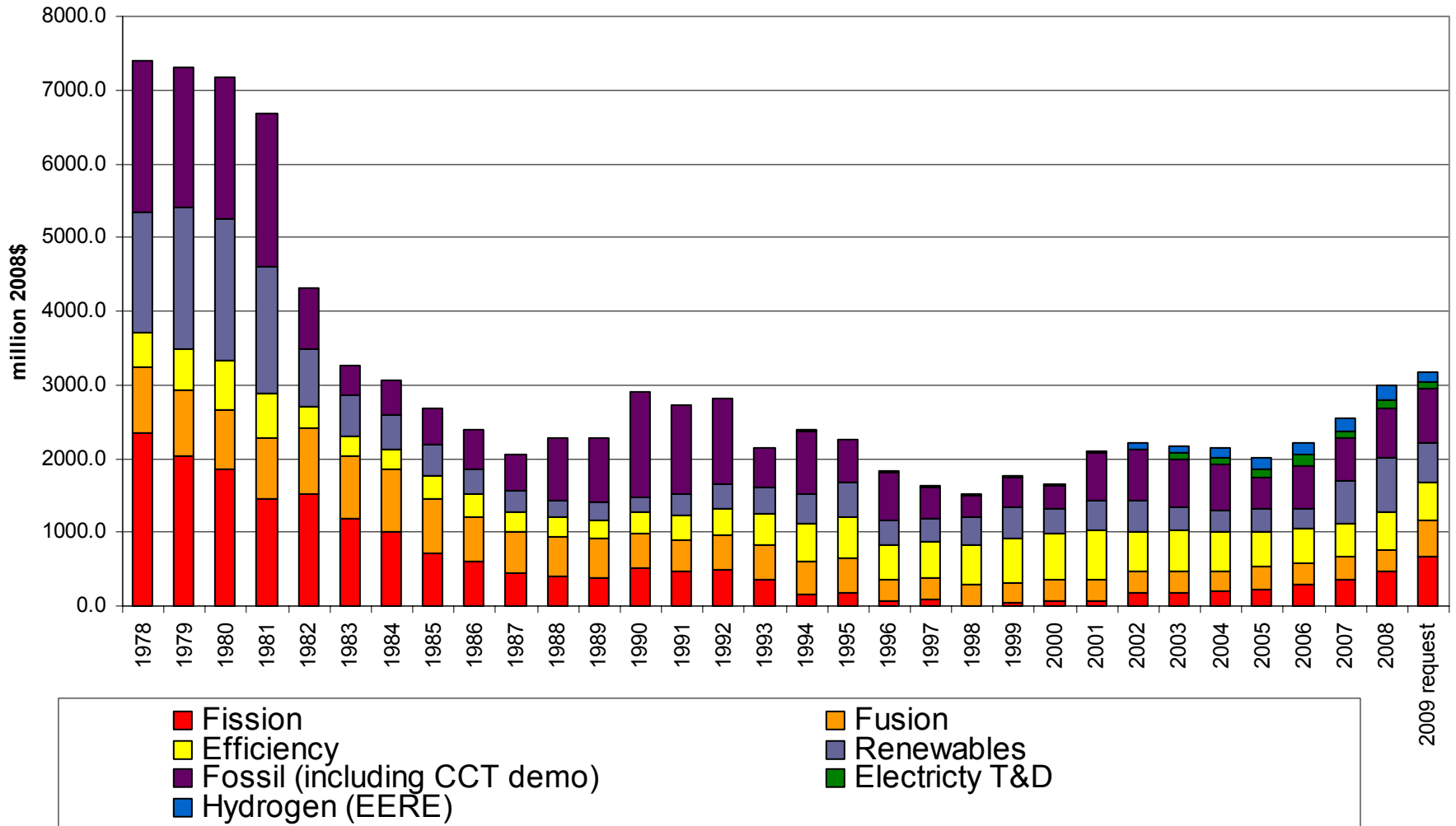
Source: AAAS analyses of R&D in *AAAS Reports VIII-XXXIII*. * FY 2009 figures are latest AAAS estimates of FY 2009 request.

R&D includes conduct of R&D and R&D facilities.

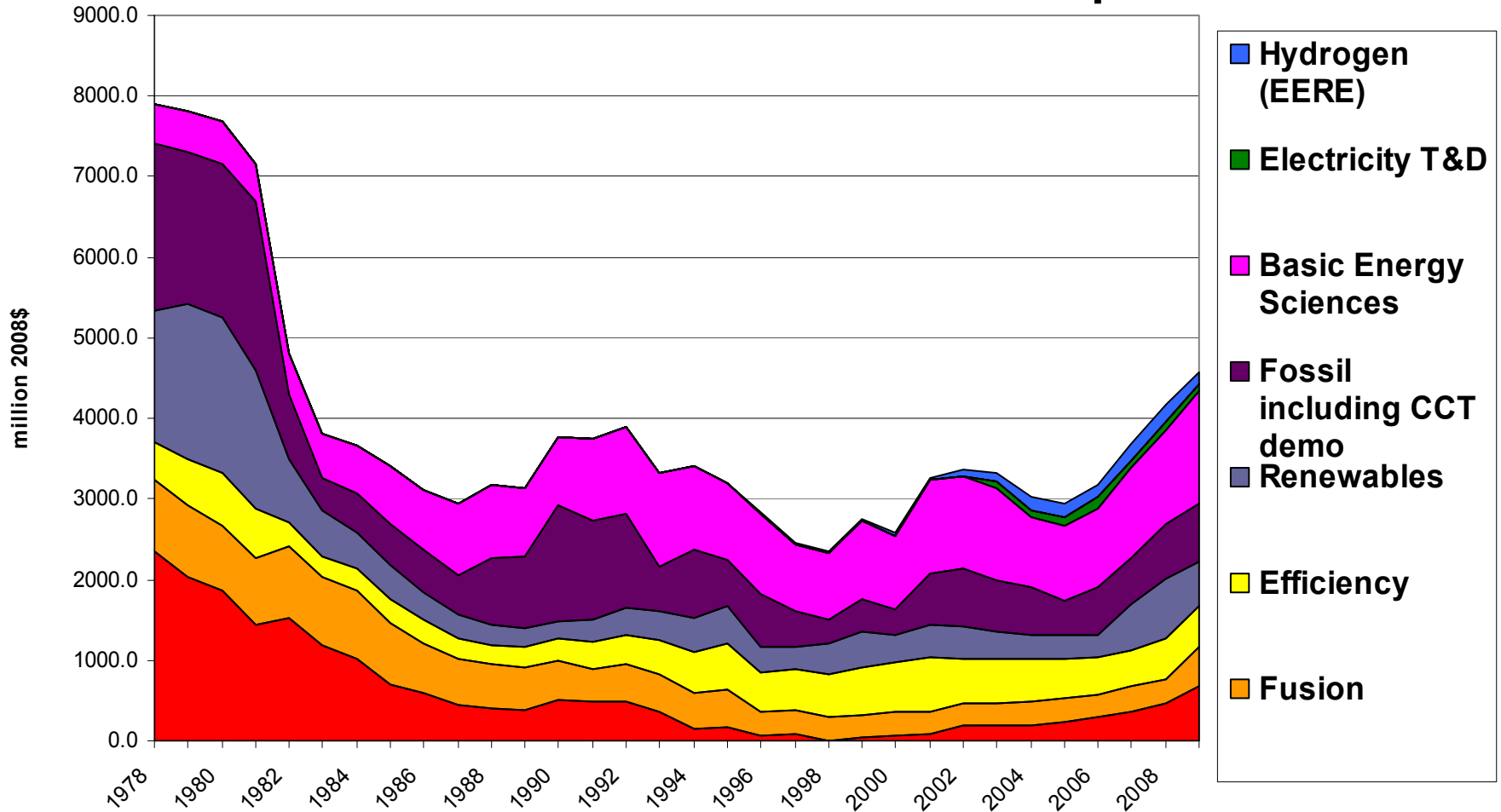
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U.S. DOE Energy RD&D Spending FY1978-FY2009 Request



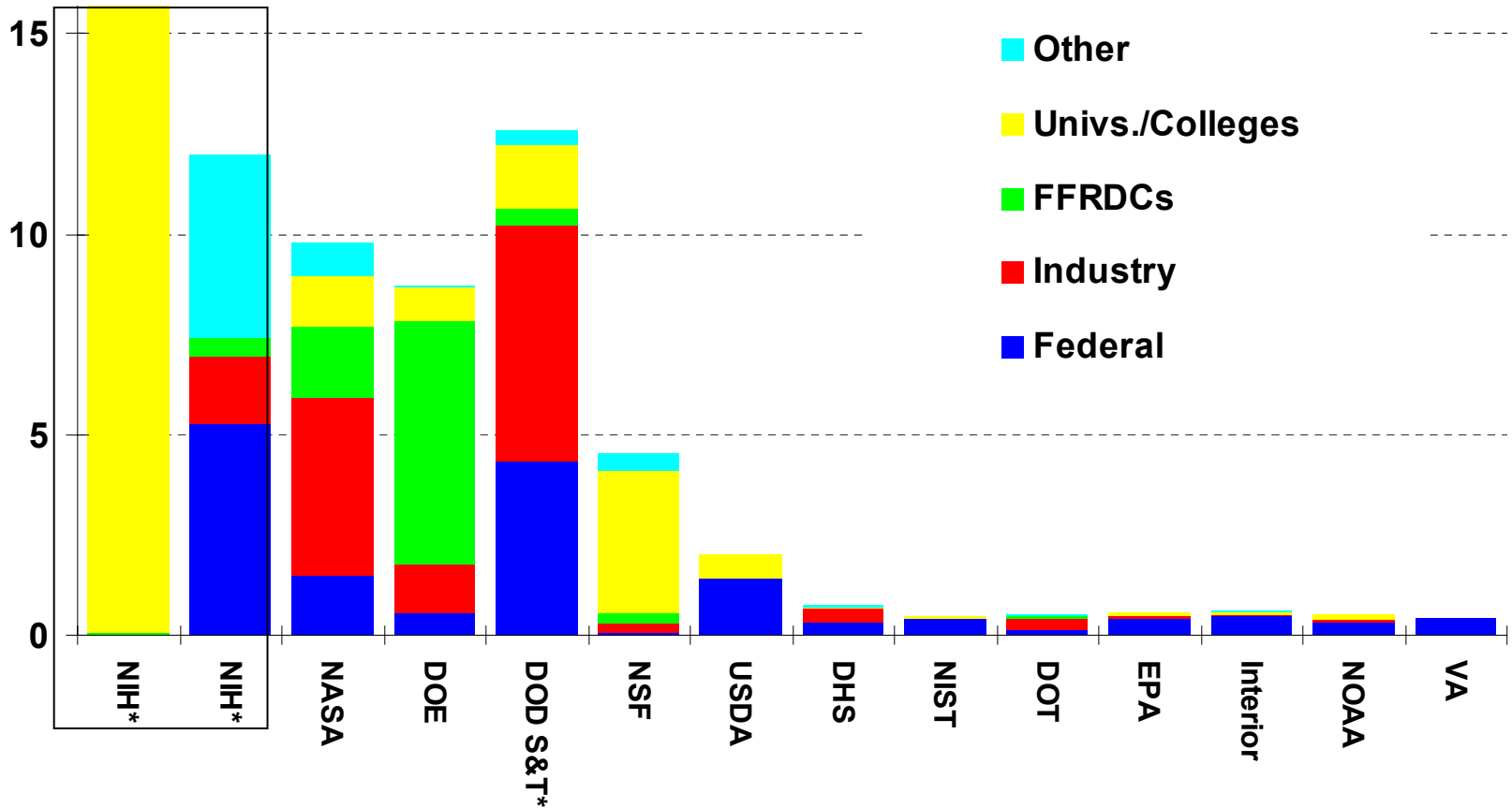
U.S. DOE Energy RD&D FY1978-FY2009 Administration Request



Federal R&D by Performer at Selected Agencies

billions of FY 2007 obligations (preliminary)

* NIH R&D - \$27.8 billion.
Shown as two bars.



Source: AAAS, based on NSF, Federal Funds for Research and Development, Fiscal Years 2005, 2006, and 2007, 2008. R&D includes research, development, and R&D facilities. * - DOD R&D in "6.1" through "6.3" categories.
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SOME NOTES ON ENERGY R&D

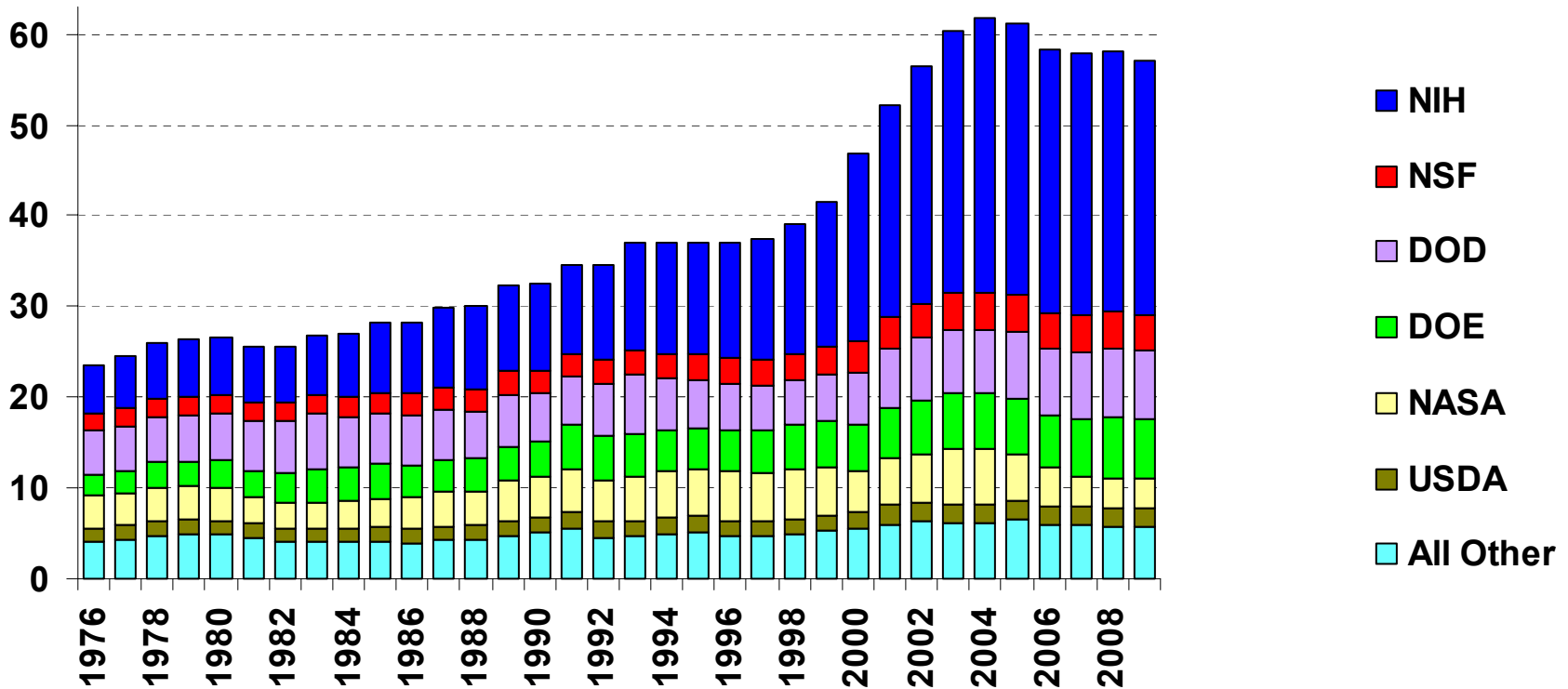
- Most federal energy R&D is performed in DOE national or federal labs, and industry.
- Although funding is flat so far in 2009 under the CR, the Senate proposed a 22 percent increase in DOE energy R&D.
- DOE's Office of Science, as part of the ACI, hopes to dramatically expand its energy research funding, especially at universities.
- ARPA-E is authorized under the America COMPETES Act, but so far has not received an appropriation.
- If Congress agrees on climate change legislation next year with a carbon tax or equivalent, there could be a major new revenue source. There is already discussion on setting aside a portion of revenues for renewable energy R&D and climate change research.

ENERGY POLICY

- There are many proposals, but Congress will have to start over in 2009.
- Proposed climate change bills contain authorizations for new or expanded programs in energy R&D in areas such as clean coal, carbon sequestration, alternative energy, nuclear energy, etc.
- Congress is deadlocked over offshore drilling and other expanded domestic oil production, but agreed to let the federal ban on offshore drilling expire on Sept. 30.
- Comprehensive energy legislation could contain expanded mandates for renewable energy sources, as well as tax incentives or subsidies for renewable energy.

Trends in Research by Agency, FY 1976-2009 (as of 9/08) *

in billions of constant FY 2008 dollars

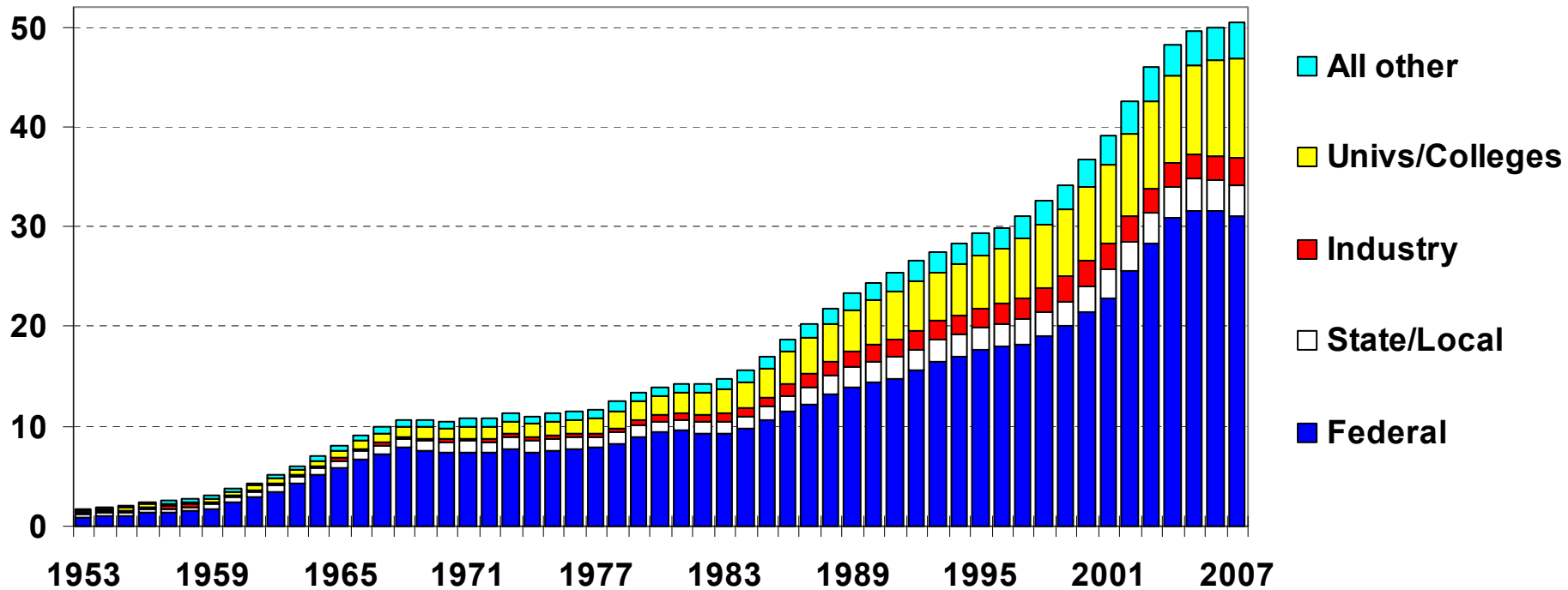


Source: AAAS analyses of R&D in annual AAAS R&D reports.
 * FY 2009 figures are AAAS estimates of R&D in the FY 2009 omnibus / continuing resolution. Research includes basic research and applied research. 1976-1994 figures are NSF data on obligations in the Federal Funds survey.
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R&D at Colleges and Universities by Source of Funds

in billions of constant FY 2008 dollars, FY 1953-2007



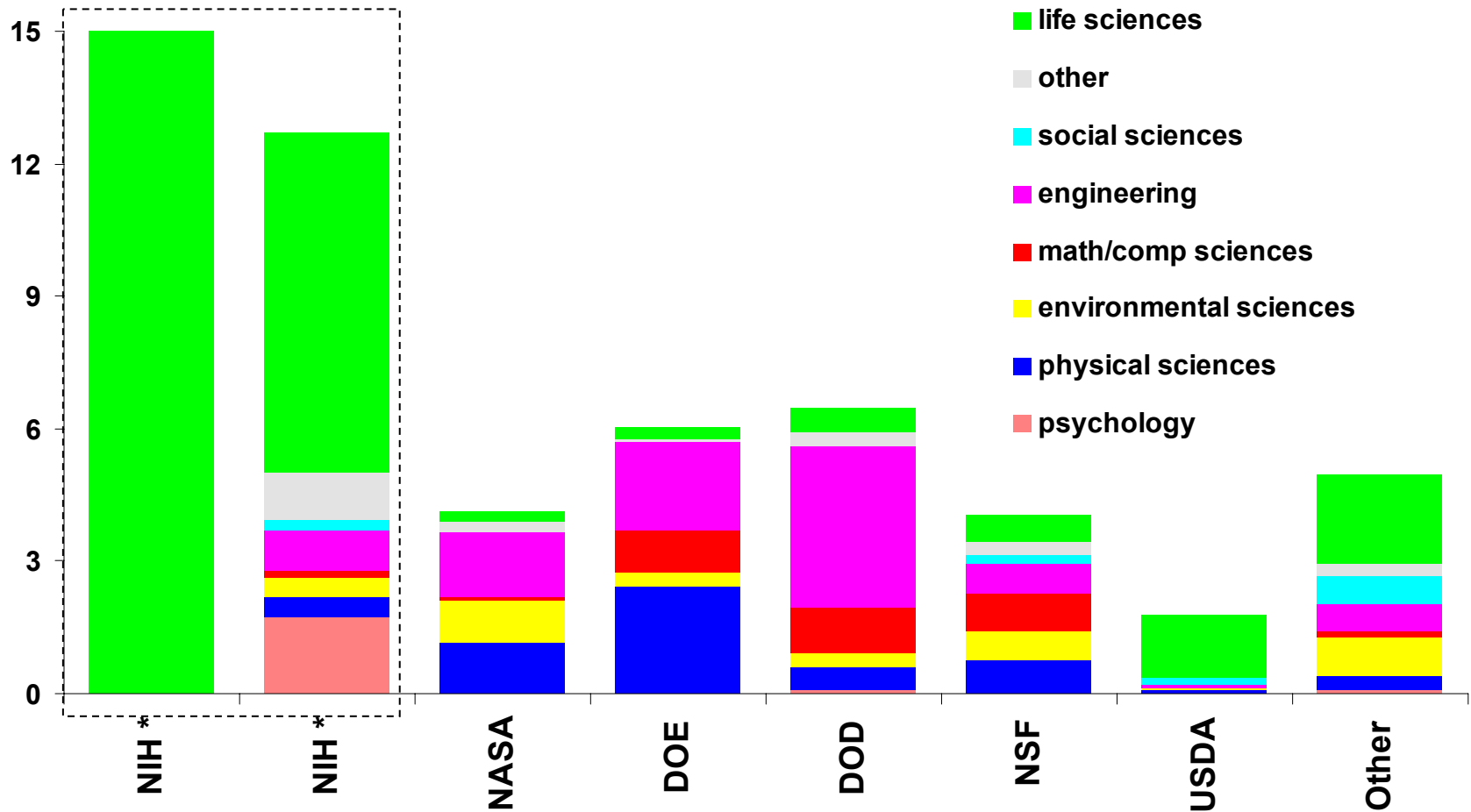
Source: National Science Foundation, Survey of Research and Development Expenditures at Universities and Colleges, Fiscal Year 2007, 2008. Constant-dollar conversions based on OMB's GDP deflators.

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Federal Research by Discipline at Selected Agencies, FY 2007 (preliminary obligations in billions of dollars)

* NIH research - \$27.7 billion.
Shown as two bars.

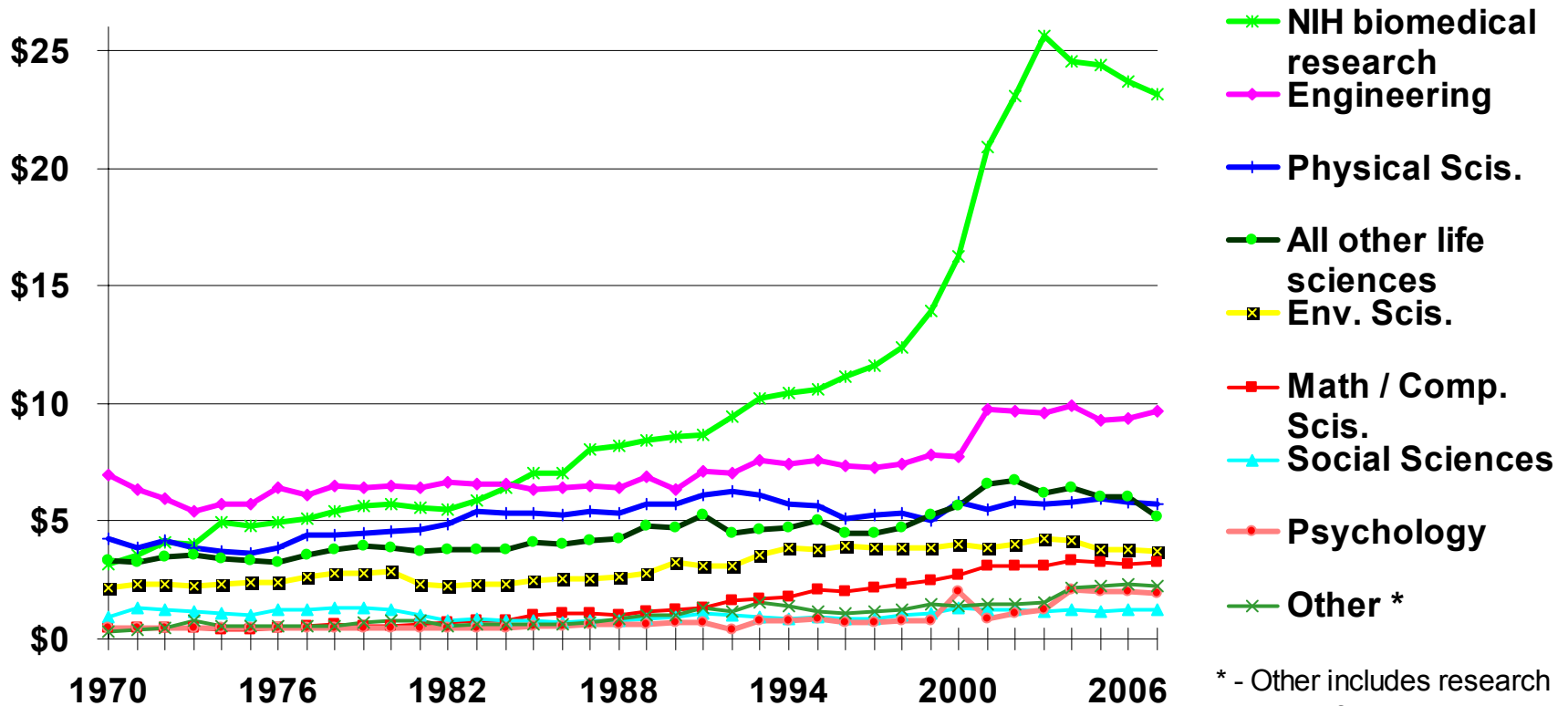


Source: National Science Foundation, *Federal Funds for Research and Development Fiscal Years 2005, 2006 and 2007, 2008*. Development and R&D facilities excluded. FY 2007 data are preliminary.
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Trends in Federal Research by Discipline, FY 1970-2007

obligations in billions of constant FY 2008 dollars



* - Other includes research not classified (includes basic research and applied research; excludes development and R&D facilities)

Life sciences - split into NIH support for biomedical research and all other agencies' support for life sciences.

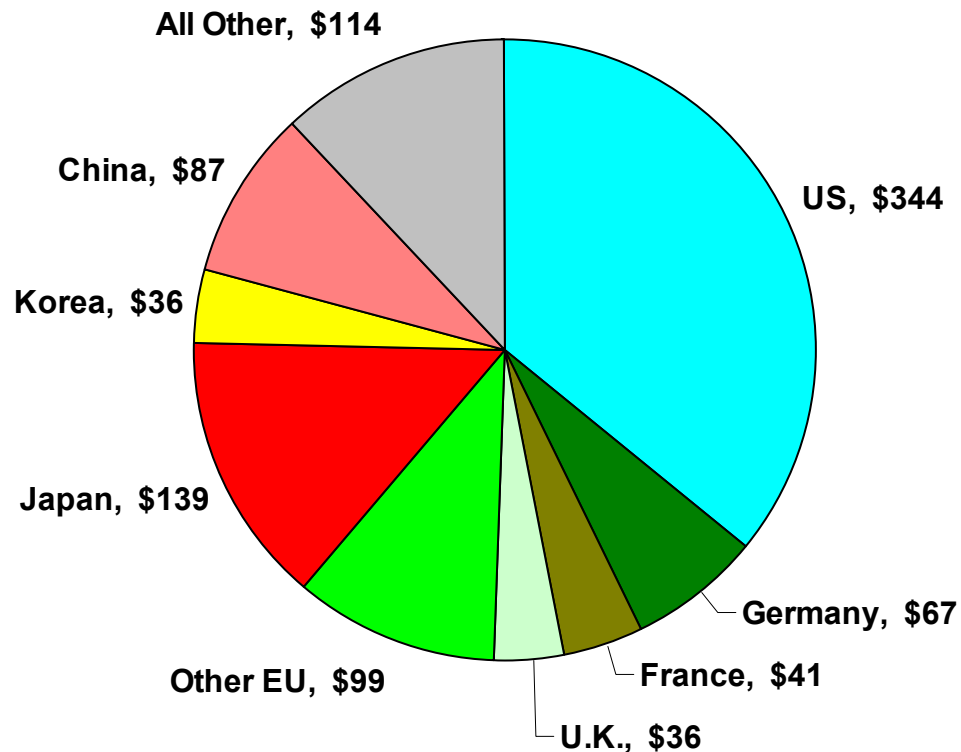
Source: National Science Foundation, *Federal Funds for Research and Development FY 2005, 2006, 2007, 2008*. FY 2006 and 2007 data are preliminary. Constant-dollar conversions based on OMB's GDP deflators. FEB. '08 © 2008 AAAS



HOW DOES THE U.S. COMPARE?

- The U.S. is still the leading science and technology superpower in R&D investments, but the lead is shrinking.
- The U.S. R&D / GDP ratio compares favorably with other nations, but defense development is a big factor in the U.S.
- Other nations:
 - EU – A plan to reach 3% of EU GDP by 2010, but it won't happen.
 - Korea – R&D growing by 10%+ a year, R&D/GDP ratio surpasses U.S. ratio in 2004 and hits 3%.
 - China – R&D spending grew 20% in 2004 and 25% in 2005; basic research still small, but expanding rapidly.
 - India – Not big in R&D spending yet, but there are plans to boost its R&D capabilities to compete in high-tech industries.

Shares of Total World R&D, 2007*



**Total World R&D =
U.S. \$962 billion****

* World = OECD members plus Argentina, China, Romania, Israel, Russia, Singapore, Slovenia, South Africa, Taiwan. 2007 or most recent year available.

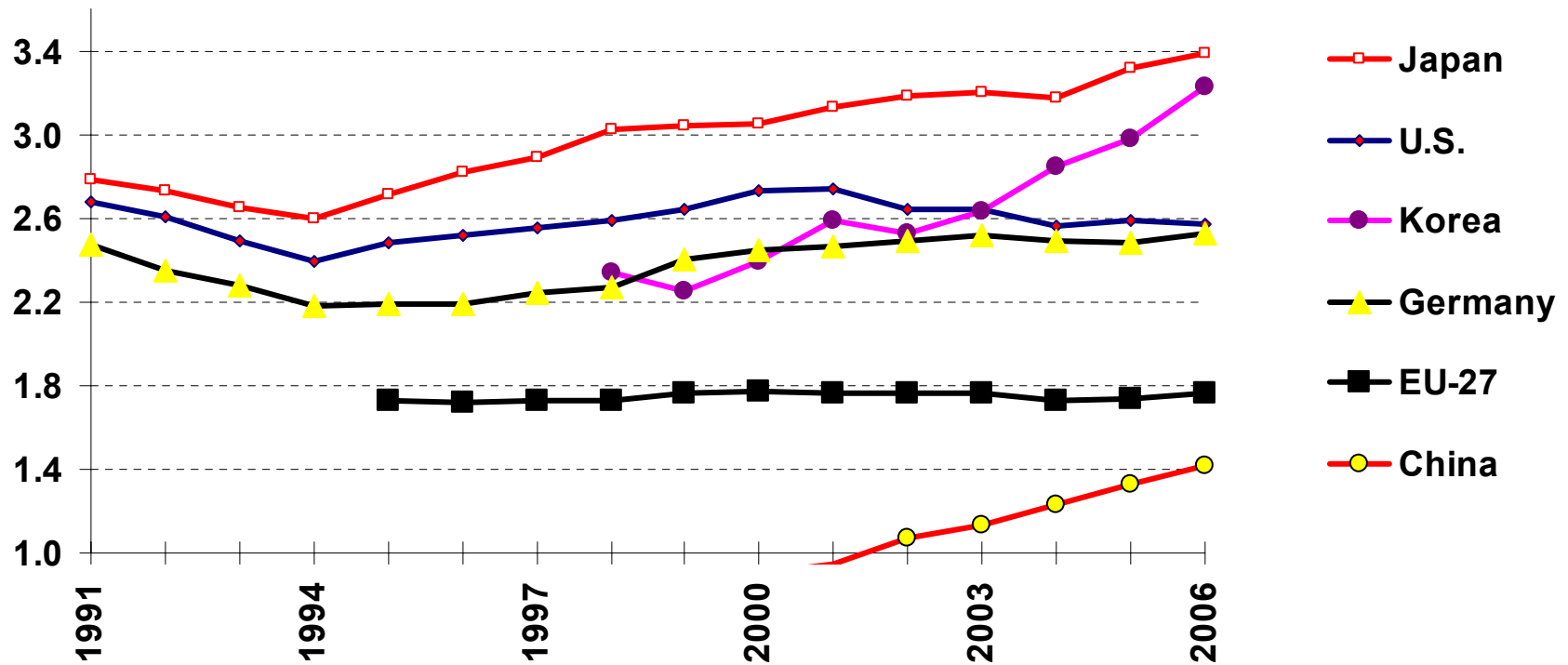
Source: OECD, Main Science and Technology Indicators, 2008.
2007 data or latest year available.

** - calculated using purchasing power parities.

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Total National R&D as % of GDP, 1991-2006



Source: National Science Foundation, National Patterns of R&D Resources and OECD, Main Science and Technology Indicators. Data not available for all nations for all years. AUGUST '08 © 2008 AAAS

FOR MORE INFORMATION...

The AAAS R&D web site is
www.aaas.org/spp/rd

