



InfoBrief

State Agencies' R&D Increased 1% in FY 2020; Health-Related R&D Declined for the Second Year in a Row

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State government agencies' expenditures for research and development totaled \$2.4 billion in FY 2020, an increase of 1% from FY 2019 ([table 1](#)). While total R&D expenditures saw a slight increase in FY 2020, state agency expenditures for health-related R&D declined for the second year in a row from a high of \$1.1 billion in FY 2018.¹ Nonetheless, and despite additional pressures on state health agencies due to the COVID-19 pandemic, health remains the largest governmental function for states' R&D, with \$1.0 billion in expenditures in FY 2020.² Although state government expenditures for R&D are relatively small within the national portfolio of R&D performance, with \$693 million for intramural R&D, state agencies serve as important fiduciary intermediaries between the federal government and other performers of R&D by financing \$1.8 billion in extramural R&D in FY 2020 to businesses, higher education, and nonprofit institutions, among others. This InfoBrief presents summary statistics from the FY 2020 Survey of State Government Research and Development, sponsored by the National Center for Science and Engineering Statistics (NCSES) within the National Science Foundation. Amounts reported do not include direct appropriations from state legislatures to universities, colleges, and private organizations.

Summary of National Totals

Of the \$2.4 billion in state government agency R&D expenditures in FY 2020, 75% came from state and other nonfederal sources; the remainder came from federal sources ([table 1](#)). Although state governments are both funders and performers of R&D, the majority (72%) of their expenditures support extramural R&D (i.e., performers other than state agencies). Higher education institutions were the primary recipients of these expenditures, receiving 54% of all extramural funding, followed by companies and individuals (26%). Intramural performers of R&D, the state agencies themselves, totaled \$693 million in FY 2020, an increase of 5% from \$658 million in FY 2019.

Expenditures for R&D plant (construction projects, major building renovations, major equipment purchases, and land and building acquisitions intended primarily for R&D use) totaled close to \$10 million in FY 2020, a 5% decrease from FY 2019.³

Table 1**State government R&D and R&D facilities expenditures: FYs 2019–20**

(Thousands of current dollars)

Characteristic	FY 2019	FY 2020	% change
All R&D and R&D plant expenditures	2,422,334	2,454,768	1.3
All R&D plant expenditures	10,291	9,787	-5.1
All R&D expenditures	2,412,043	2,444,981	1.3
Source of funds			
Federal government	560,856	607,789	7.7
State government and other nonfederal sources	1,851,187	1,837,193	-0.8
Performer			
Intramural ^a	657,808	692,719	5.0
Extramural	1,754,235	1,752,262	-0.1
Higher education institutions	1,028,931	951,572	-8.1
Companies and individuals	437,131	459,984	5.0
Other	288,173	340,706	15.4
Intramural, by type of R&D			
Basic research	110,556	129,980	14.9
Applied research	524,336	523,350	-0.2
Experimental development	22,916	39,389	41.8
R&D project, by government function			
Agriculture	136,997	142,105	3.6
Energy	323,077	390,827	17.3
Environment and natural resources	440,270	448,510	1.8
Health	1,081,355	1,027,757	-5.2
Transportation	260,025	279,443	6.9
Other ^b	170,320	156,339	-8.9

^a Intramural performers include employees within the same state department or agency and services performed by others in support of internal R&D projects.

^b Includes government functions for corrections, criminal justice, education, forensic sciences, labor, public safety, and social services.

Note(s):

R&D plant includes acquisition of land, facilities, major equipment, and major building renovations intended primarily for R&D use. Detail may not add to total because of rounding.

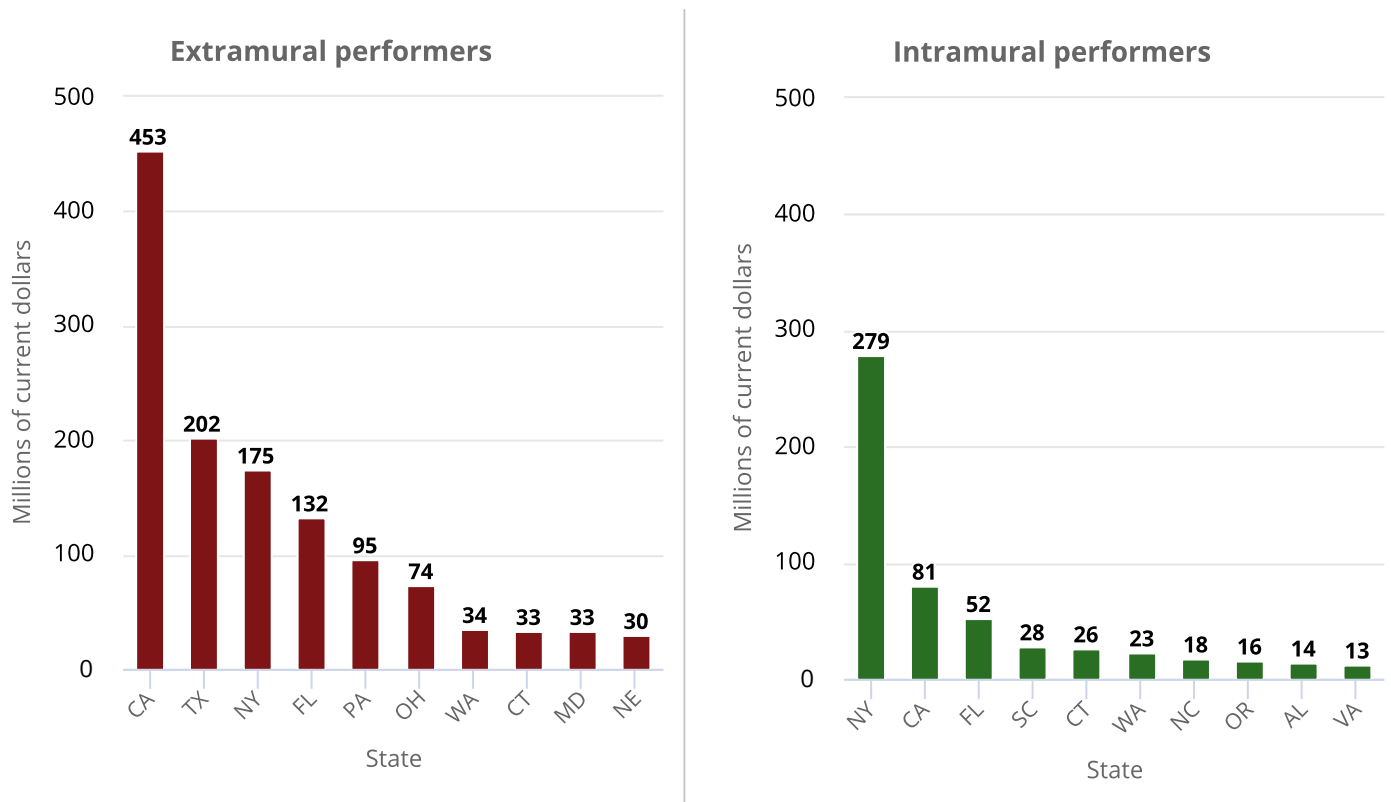
Source(s):

National Center for Science and Engineering Statistics, Survey of State Government Research and Development.

State Government R&D Performance

Overview

Although all states had government agencies with R&D expenditures in FY 2020, the amounts are often concentrated in a handful of states. Specifically, five states (California, New York, Texas, Florida, and Pennsylvania) accounted for 61% of all state government R&D expenditures in FY 2020 ([figure 1](#)). Expenditures also vary by state between intramural and extramural R&D. For example, 61% (\$279 million) of New York's R&D expenditures are directed toward intramural performance, whereas only 15% (\$81 million) of California's R&D is directed toward intramural performers.

Figure 1**State government expenditures for intramural and extramural R&D, by 10 largest states: FY 2020****Note(s):**

Extramural performers are those outside the department or agency who perform R&D. Intramural performers include a department's or agency's own employees who perform R&D and services performed by others in support of an internal R&D project. Detail may not add to total because of rounding.

Source(s):

National Center for Science and Engineering Statistics, Survey of State Government Research and Development, FY 2020.

Intramural R&D Performance

Five states accounted for 67% of the \$693 million in total expenditures for intramural R&D performed by state agencies in FY 2020: New York (\$279 million), California (\$81 million), Florida (\$52 million), South Carolina (\$28 million), and Connecticut (\$26 million). In FY 2020, 43% (\$297 million) of all state agency intramural R&D performance was supported by federal funds.⁴

State agency intramural performance is heavily organized around applied research, with 76% (\$523 million) of all intramural expenditures classified as applied, while basic research and experimental development constitute 19% and 6%, respectively.⁵

Extramural R&D Performance

The state governments of California, Texas, New York, Florida, and Pennsylvania accounted for 60% of the total \$1.8 billion in FY 2020 state government expenditures for extramural R&D performance. However, states varied in how they distributed extramural R&D. For example, Texas state agencies directed 70% of their extramural funding for R&D toward academic institutions (\$142 million), compared with 15% (\$29 million) to companies and individuals. By comparison, California's distribution of extramural R&D funding is relatively balanced across the three sectors, with 32% (\$144 million) directed toward academic institutions, 46% (\$209 million) toward companies and individuals, and 22% (\$100 million) toward other performers.

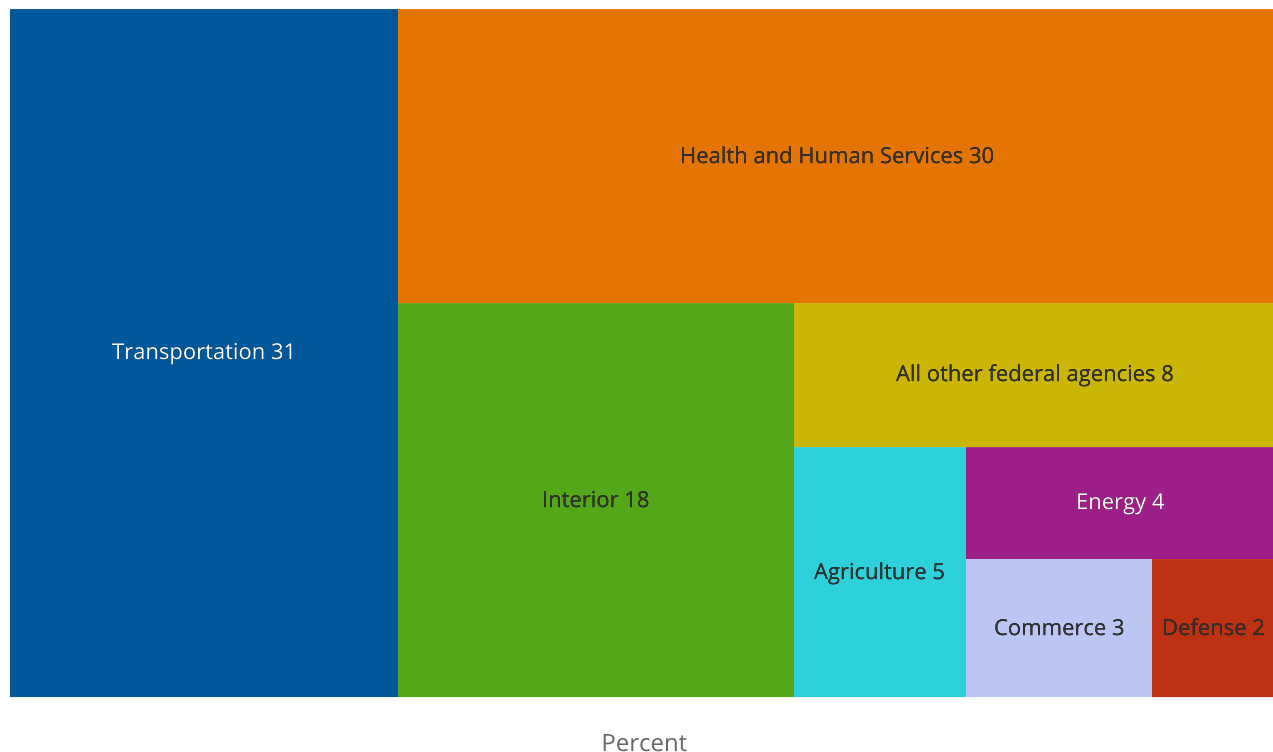
R&D Support from Federal Funds

State government R&D expenditures from federal funds increased 8% from \$561 million in FY 2019 to nearly \$608 million in FY 2020. At the same time, funding from state governments' own funds for R&D declined nearly 1% from \$1.9 billion to \$1.8 billion (table 1). Thus, FY 2020 state government R&D expenditures were buoyed by an increase in federal funds to state governments for R&D, preventing a decline in total state R&D investment.

The U.S. Department of Transportation was the single largest source of federal funds, with 31% (\$188 million) of all federal funds to state government for R&D, followed by the Department of Health and Human Services, with 30% (\$180 million), and the Department of the Interior, with 18% (\$107 million) (figure 2). The Department of Agriculture, Department of Energy, Department of Commerce, and Department of Defense contributed 5%, 4%, 3%, and 2%, respectively. All other federal departments and agencies combined accounted for nearly 8% of all federal funds to state governments for R&D.

Figure 2

State government expenditures for R&D funded from federal sources, by federal agency: FY 2020



All other federal agencies includes the Departments of Education, Housing and Urban Development, Homeland Security, Justice, Labor, State, Treasury, and Veterans Affairs; National Aeronautics and Space Administration; National Science Foundation; Environmental Protection Agency; and others.

Note(s):

State R&D totals can display considerable volatility between survey years due to several national and state-specific factors. Large changes are not unusual, especially for discretionary spending items such as R&D. Detail may not add to total because of rounding.

Source(s):

National Center for Science and Engineering Statistics, Survey of State Government Research and Development, FY 2020.

While New York accounted for 28% of all federal funds to state governments for R&D in FY 2020, the next 10 largest states with expenditures for R&D from federal funding accounted for an additional 34% of the total federal funds to states for R&D (table 2). Florida and South Carolina followed New York, with \$30 million each in federal funds, while Texas and California each reported \$23 million in federal funds.

Some states are more reliant on federal funds for their R&D than they are from their own state sources. For example, South Carolina reported \$30 million in federal funds for R&D compared to nearly \$17 million in state funds. In addition to South Carolina, the state governments of Georgia, Hawaii, Idaho, Indiana, Iowa, Kansas, Louisiana, Michigan, Mississippi, Montana, New Mexico, Tennessee, Vermont, West Virginia, Wisconsin, and Wyoming had more expenditures from federal funds for R&D in FY 2020 than they did from their own state appropriations.

Table 2**State government expenditures for R&D for all performers, by state and source of funds: FY 2020**

(Thousands of current dollars)

State	All R&D expenditures	Source of funds	
		Federal government	State and all others ^a
United States ^b	2,444,981	607,789	1,837,193
New York	453,807	173,176	280,631
Florida	184,600	30,383	154,217
South Carolina	46,801	30,291	16,510
Texas	205,207	23,193	182,014
California	533,901	22,658	511,243
Pennsylvania	103,099	19,656	83,443
Louisiana	32,361	19,452	12,909
Connecticut	58,811	15,874	42,937
Virginia	35,553	14,999	20,554
Washington	57,239	14,747	42,492
Georgia	15,877	14,101	1,776
Idaho	21,883	12,620	9,263
Oregon	30,486	11,979	18,508
Massachusetts	31,700	1,140	20,303
North Carolina	35,892	9,126	26,766
Mississippi	10,268	8,768	1,500
Ohio	76,170	8,464	67,706
Wisconsin	14,340	8,359	5,981
Oklahoma	30,050	7,922	22,128
Iowa	12,348	7,734	4,614
Illinois	16,056	7,642	8,414
Hawaii	11,123	7,331	3,792
Michigan	11,192	7,184	4,008
Indiana	9,591	7,127	2,465
West Virginia	10,862	6,903	3,959
Nebraska	32,424	6,818	25,606
Montana	13,131	6,778	6,353
Alabama	25,696	6,775	18,921
Colorado	34,366	6,660	27,706

Table 2**State government expenditures for R&D for all performers, by state and source of funds: FY 2020**

(Thousands of current dollars)

State	All R&D expenditures	Source of funds	
		Federal government	State and all others ^a
Kansas	13,153	6,613	6,540
Kentucky	26,782	6,274	20,509
Minnesota	20,512	6,272	14,239
Alaska	15,194	6,144	9,050
Missouri	14,826	5,750	9,076
Arkansas	19,921	4,966	14,955
Tennessee	7,040	4,792	2,248
New Mexico	5,228	4,239	989
Maine	29,036	4,163	24,873
North Dakota	18,065	4,025	14,040
Maryland	33,407	4,017	29,390
Arizona	16,011	3,767	12,244
Wyoming	6,391	3,556	2,836
New Jersey	23,755	3,300	20,455
District of Columbia	5,861	2,560	3,301
Rhode Island	4,594	1,918	2,676
Utah	9,205	1,721	7,484
Nevada	4,765	1,607	3,158
Delaware	3,598	1,477	2,121
Vermont	1,670	1,119	551
South Dakota	2,913	753	2,161
New Hampshire	8,222	640	7,582

^a State and all others include companies; nonprofit organizations; other state governments; and city, county, regional, or other local governments.^b U.S. total reflects all 50 states and the District of Columbia.**Note(s):**

Detail may not add to total because of rounding.

Source(s):

National Center for Science and Engineering Statistics, Survey of State Government Research and Development, FY 2020.

R&D by State Government Functions

Whether performed by state agencies themselves or by other performers outside the agency, most states reported a broad mix of R&D projects related to state government functions: agriculture, energy, environment and natural resources, health, and transportation ([table 3](#)). Health-related R&D expenditures account for the largest share (42%) of state agencies' R&D. Environment and natural resources R&D expenditures accounted for 18% of total state government R&D expenditures in FY 2020, while energy R&D accounted for 16%. Transportation, agriculture, and all other functions' share of total R&D expenditures in FY 2020 were 11%, 6%, and 6%, respectively.

Table 3**State R&D expenditures, by state and function of R&D: FY 2020**

(Thousands of current dollars)

State	All R&D expenditures	Agriculture	Energy	Environment and natural resources	Health	Transportation	Other ^a
United States ^b	2,444,981	142,105	390,827	448,510	1,027,757	279,443	156,339
Alabama	25,696	0	117	5,930	2,000	3,602	14,047
Alaska	15,194	0	500	8,879	475	5,340	0
Arizona	16,011	1,042	0	1,850	11,086	1,473	560
Arkansas	19,921	12,606	503	2,455	2,813	690	853
California	533,901	7,116	256,533	46,018	171,494	41,249	11,491
Colorado	34,366	1,038	3,347	11,610	8,061	3,269	7,041
Connecticut	58,811	3,857	4,083	11,474	29,124	2,734	7,538
Delaware	3,598	0	21	2,241	0	1,336	0
District of Columbia	5,861	0	520	2,920	1,929	239	252
Florida	184,600	21,101	785	56,852	92,453	13,322	88
Georgia	15,877	256	5,826	1,164	0	8,600	32
Hawaii	11,123	1,977	6,467	385	0	488	1,806
Idaho	21,883	7,279	0	10,832	212	3,318	242
Illinois	16,056	3,140	0	0	400	9,711	2,805
Indiana	9,591	100	95	142	0	8,735	520
Iowa	12,348	60	0	4,171	0	7,229	888
Kansas	13,153	3,675	0	4,841	0	3,638	999
Kentucky	26,782	540	150	2,258	15,024	7,159	1,651
Louisiana	32,361	636	2,614	12,456	2,800	9,200	4,654
Maine	29,036	3,329	0	7,070	9,464	824	8,349
Maryland	33,407	269	1,169	1,184	24,466	3,660	2,658
Massachusetts	31,700	0	4,183	10,053	6,850	3,840	6,775
Michigan	11,192	3,316	0	1,265	0	6,610	0
Minnesota	20,512	5,526	0	3,366	0	11,620	0
Mississippi	10,268	1,214	0	4,637	0	4,418	0
Missouri	14,826	912	500	11,624	233	1,557	0
Montana	13,131	3,567	0	7,753	0	1,811	0
Nebraska	32,424	2,453	0	6,941	19,978	1,986	1,066
Nevada	4,765	188	0	223	0	1,299	3,055
New Hampshire	8,222	113	0	114	0	662	7,333
New Jersey	23,755	0	0	2,207	14,879	3,126	3,543
New Mexico	5,228	0	169	2,147	0	2,808	103
New York	453,807	7,919	65,978	30,312	313,858	9,464	26,277
North Carolina	35,892	13,961	1,500	7,263	3,810	8,877	480
North Dakota	18,065	2,956	10,111	790	349	3,635	224
Ohio	76,170	0	11,930	50,406	2,753	6,249	4,832
Oklahoma	30,050	2,158	599	2,282	17,420	6,481	1,110
Oregon	30,486	707	1,590	16,706	3,100	2,460	5,923
Pennsylvania	103,099	3,877	837	8,869	73,606	3,935	11,975
Rhode Island	4,594	46	0	3,869	140	0	540
South Carolina	46,801	809	126	27,722	15,992	1,852	301
South Dakota	2,913	1,526	16	50	0	1,321	0
Tennessee	7,040	0	107	919	0	2,651	3,364
Texas	205,207	1,151	0	7,456	175,905	20,694	0
Utah	9,205	0	501	5,558	5	3,142	0
Vermont	1,670	0	0	283	215	1,081	91
Virginia	35,553	2,445	180	5,986	3,829	19,783	3,330
Washington	57,239	17,506	6,732	23,572	1,260	4,890	3,279

Table 3**State R&D expenditures, by state and function of R&D: FY 2020**

(Thousands of current dollars)

State	All R&D expenditures	Agriculture	Energy	Environment and natural resources	Health	Transportation	Other ^a
West Virginia	10,862	10	1,390	3,939	712	2,028	2,782
Wisconsin	14,340	1,060	0	5,423	1,000	4,107	2,750
Wyoming	6,391	662	1,651	2,044	62	1,241	732

^a Other functions include, but are not limited to, corrections, criminal justice, education, forensic science, labor, public safety, and social services.

^b U.S. total reflects all 50 states and the District of Columbia.

Note(s):

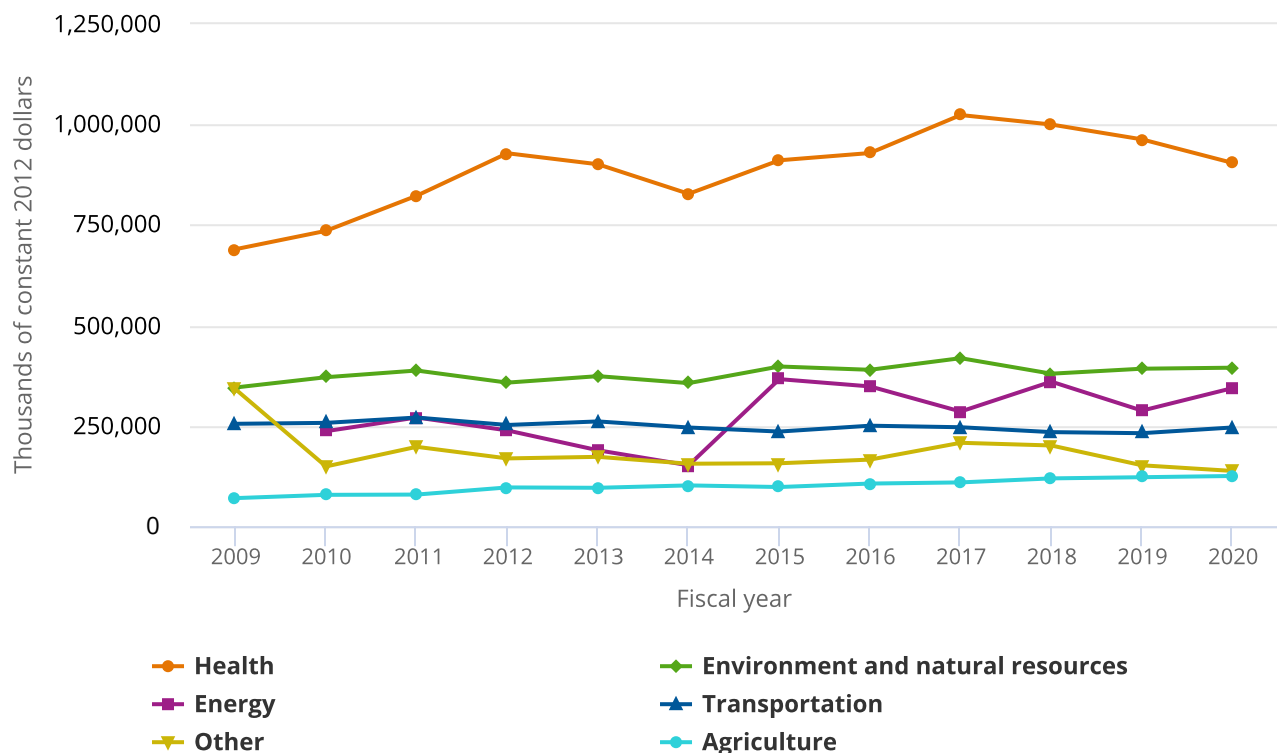
Detail may not add to total because of rounding.

Source(s):

National Center for Science and Engineering Statistics, Survey of State Government Research and Development, FY 2020.

Inflation-Adjusted Time Series

Among all functions, health-related R&D has shown the largest dollar change between FY 2009 and FY 2020 ([figure 3](#)). When adjusted for inflation,⁶ health-related R&D expenditures increased 31%, from \$690 million in FY 2009 to \$905 million in FY 2020. During the same period, R&D expenditures for agriculture and for environment and natural resources increased 79% and 14%, respectively, whereas transportation decreased 4%, from \$255 million in FY 2009 to \$246 million in FY 2020. The energy function was not collected separately until FY 2010,⁷ but it has shown increases in inflation-adjusted expenditures of 45% from FY 2010 to FY 2020.

Figure 3**State government expenditures for R&D, by function: FYs 2009–20**

NA = not available; not collected as a separate function for FY 2009.

Note(s):

Gross domestic product implicit price deflators were used to convert current to constant dollars. Because of rounding, detail may not add to total. State R&D expenditures by function were surveyed beginning with the FY 2009 survey. State R&D totals can display considerable volatility between survey years due to several national and state-specific factors. Large changes are not unusual, especially for discretionary spending items such as R&D. Energy category was introduced with the FY 2010 and FY 2011 Survey of State Government Research and Development. Previously, energy-related R&D was reported primarily in the categories Other and Environment and natural resources. Detail may not add to total because of rounding.

Source(s):

National Center for Science and Engineering Statistics, Survey of State Government Research and Development.

Agency-Specific R&D Details

Of the 699 state agencies that responded to the survey in FY 2020, the largest 20, by total expenditures, accounted for 58% of all agency R&D expenditures (table 4). To illustrate how concentrated expenditures are for health-related R&D, these 20 agencies accounted for \$799 million of the \$1.0 billion in state agency health R&D, or almost 78% of the funding for total health-related R&D. Although many states invested in health-related R&D, it is still highly concentrated. The six largest health agencies reporting R&D expenditures in FY 2020 constitute 67% of all state government health-related R&D. State expenditures for energy-related R&D is even more highly concentrated; the California Energy Commission alone accounted for 56% of all state agencies' energy-related R&D expenditures.

Table 4

Individual state agency expenditures for R&D, by total R&D and function, for the 20 largest agencies: FY 2020

(Thousands of current dollars)

State	Total	Agriculture	Energy	Environment and natural resources	Health	Transportation	Other
United States ^a	2,444,981	142,105	390,827	448,510	1,027,757	279,443	156,339
Energy Commission (California)	219,533	0	219,533	0	0	0	0
Cancer Prevention and Research Institute (Texas)	169,451	0	0	0	169,451	0	0
Mental Health, Office of (New York)	166,944	0	0	0	166,944	0	0
Institute for Regenerative Medicine (California)	127,546	0	0	0	127,546	0	0
Health, Department of (Florida)	91,115	0	0	0	91,115	0	0
Health, Department of (New York)	74,723	379	0	2,273	72,072	0	0
Roswell Park Cancer Institute (New York)	66,297	0	0	0	66,297	0	0
Energy Research and Development Authority (New York)	63,801	0	54,176	5,546	0	4,079	0
Development Services Agency (Ohio)	63,372	0	11,855	45,893	1,253	0	4,372
Fish and Wildlife Conservation Commission (Florida)	56,279	0	0	56,279	0	0	0
Health, Department of (Pennsylvania)	53,279	0	0	0	53,279	0	0
Transportation, Department of (California)	41,249	0	0	0	0	41,249	0
Public Utilities Commission, Executive Division (California)	37,000	0	37,000	0	0	0	0
Economic Development, Department of (New York)	34,943	0	2,838	0	6,177	0	25,928
Community and Economic Development, Department of (Pennsylvania)	31,350	0	837	0	18,000	721	11,792
Innovation Inc. (Connecticut)	27,245	0	4,083	0	16,657	0	6,505
Natural Resources, Department of (South Carolina)	25,081	0	0	25,081	0	0	0
Technology Institute (Maine)	23,161	2,401	0	2,947	9,464	0	8,349
Agriculture and Consumer Services, Department of (Florida)	22,451	20,451	785	355	860	0	0

Table 4**Individual state agency expenditures for R&D, by total R&D and function, for the 20 largest agencies: FY 2020**

(Thousands of current dollars)

State	Total	Agriculture	Energy	Environment and natural resources	Health	Transportation	Other
Transportation, Department of (Texas)	20,695	0	0	0	0	20,695	0
All other agencies	1,029,468	118,874	59,721	310,137	228,642	212,700	99,394

^a U.S. total reflects all 50 states and the District of Columbia.**Note(s):**

Includes state agency funding from all sources for both intramural and extramural performance. Detail may not add to total because of rounding.

Source(s):

National Center for Science and Engineering Statistics, Survey of State Government Research and Development, FY 2020.

Data Sources and Limitations

All 50 states and the District of Columbia participated in the FY 2020 survey, and 699 of the 726 selected agencies responded to the survey. Puerto Rico agencies did not report to the survey for FY 2020. Data for the FY 2020 survey were collected for NCSSES by the U.S. Census Bureau under an interagency agreement.

Most states' fiscal year begins on 1 July and ends the following 30 June. For example, FY 2020 begins on 1 July 2019 and ends on 30 June 2020. There are, however, five exceptions to the 30 June fiscal year end: New York (ends 31 March), Texas (ends 31 August), and Alabama, Michigan, and the District of Columbia (ends 30 September). Data presented in this InfoBrief are for each of the respective fiscal year periods as defined by the states.

Terms such as state, state government, and state agencies have equivalent meaning and are used interchangeably throughout this InfoBrief. The amounts reported here are for R&D expenditures of state government departments, agencies, public authorities, commissions, and other dependent entities that operate separately or somewhat autonomously from the central state government. State government R&D totals can display considerable volatility between survey years due to several national and state-specific factors. Large changes are not unusual, especially for discretionary spending items such as R&D. R&D plant expenditures can be highly variable year to year and will increase or decrease as capital projects begin or end.

Amounts reported do not include direct appropriations from state legislatures to universities, colleges, and private organizations. As a result, the \$952 million in FY 2020 expenditures reported by state agencies to support R&D performance by academic institutions differs from the figure reported by universities and colleges in the NCSSES Higher Education R&D Survey for expenditures on R&D activities funded from state and local government sources.

State- and agency-specific data not available in this InfoBrief are available in the full set of data tables from this survey in the report *Survey of State Government Research and Development: FY 2020* at <https://nsf.gov/statistics/srvystaterd/#tabs-2>.

Notes

1 Pece C; National Center for Science and Engineering Statistics (NCSSES). 2020. *State Government R&D Expenditures Decline 4% in FY 2019; Health-Related R&D Declines 2%*. NSF 21-300. Alexandria, VA: National Science Foundation. Available at <https://ncses.nsf.gov/pubs/nsf21300/>.

2 Although there was no systematic data collection on the reasons for the decline in health-related R&D, the downturn may have been the result of state budget priorities having been set early in the states' fiscal year, well before the COVID-19 pandemic was declared; in other cases, funding priorities may have been adjusted from R&D projects to other operational priorities associated with pandemic response early in the crisis.

3 Expenditures for R&D do not include expenditures for R&D plant because the two are separate funding activities.

4 Data on intramural R&D by source of funds are available in data table 5, available at <https://nces.nsf.gov/pubs/nsf21301#data-tables>.

5 Detailed data on intramural R&D by type are available in data table 7, available at <https://nces.nsf.gov/pubs/nsf21301#data-tables>.

6 Gross domestic product implicit price deflators were used to convert current to constant 2012 dollars. Data on calendar year, historical figures, 1953–2020 are taken from Bureau of Economic Analysis (BEA), National Economic Accounts, Gross Domestic Product, accessed 22 June 2021. Based on the BEA practice of updating the reference year based on the five-year comprehensive update (CU), the July 2018 CU revised the reference year from 2009 to 2012.

7 The energy category was introduced with the FY 2010 and FY 2011 Survey of State Government Research and Development. Previously, energy-related R&D was reported primarily in the other category and, to some degree, in the environment and natural resources category.

Suggested Citation

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