



# State Government R&D Expenditures Total More than \$2.2 Billion in FY 2015

by Christopher Pece<sup>1</sup>

State government agency expenditures for research and development totaled \$2.2 billion in FY 2015, an increase of 16.9% from FY 2014 (table 1). Five state governments (California, New York, Florida, Texas, and Ohio) accounted for 61% of all state government R&D in FY 2015 (table 2), an increase from 59% in FY 2014. This InfoBrief presents summary statistics from the FY 2014 and FY 2015 Survey of State Government R&D, sponsored by the National Science Foundation, National Center for Science and Engineering Statistics (NCSES).

The FY 2014 and FY 2015 survey presents the most recent NCSES statistics of R&D activities performed and funded by state government agencies in each of the 50 states, as well as the governments of the District of Columbia and Puerto Rico. Survey data are available by state and by individual state agency. Further details are also available on R&D performer (intramural and extramural), source of funding, type of R&D (basic research, applied research, and experimental development), and R&D by government function (agriculture, energy, environment and natural resources, health, transportation, and other).

## National Totals

State government agency R&D expenditures in FY 2015 totaled \$2.2

TABLE 1. State agency R&D and R&D facilities expenditures: FYs 2014–15

(Thousands of current dollars)

Characteristic	FY 2014	FY 2015	% change
All R&D and R&D plant expenditures	1,906,586	2,240,042	17.5
All R&D expenditures	1,885,923	2,205,147	16.9
Source of funds			
Federal government	482,439	483,984	0.3
State government and other nonfederal sources	1,403,484	1,721,163	22.6
All R&D plant expenditures	20,663	34,896	68.9
Performer			
Intramural <sup>a</sup>	577,638	581,667	0.7
Extramural	1,308,285	1,623,479	24.1
Academic institutions	820,591	951,096	15.9
Companies and individuals	284,414	449,158	57.9
Other	203,280	223,226	9.8
Intramural by type of R&D			
Basic research	NA	110,468	na
Applied research	NA	458,172	na
Experimental development	NA	13,027	na
R&D project by government function			
Agriculture	129,029	127,363	-1.3
Energy	120,229	312,114	159.6
Environment and natural resources	366,678	413,230	12.7
Health	852,894	939,828	10.2
Transportation	253,299	247,780	-2.2
Other <sup>b</sup>	163,794	164,831	0.6

na = not applicable. NA = not available; intramural by type was not collected for FY 2014.

<sup>a</sup> Intramural performers include employees within the same state department or agency and services performed by others in support of intramural R&D projects.

<sup>b</sup> Includes government functions for corrections, criminal justice, education, forensic sciences, labor, public safety, and social services.

NOTES: R&D plant includes acquisition of land, facilities, major equipment, and major building renovations intended primarily for R&D use. Puerto Rico is not included in these U.S. totals due to its classification as a U.S. territory. Detail may not add to total because of rounding.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, Survey of State Government Research and Development, FYs 2014 and 2015.

billion, of which 78% came from state and other nonfederal sources (table 1). Seventy-four percent of the states' R&D expenditures went to extramural R&D performers (i.e., performers other than state agencies) in FY 2015. Academic institutions were the primary recipients of these expenditures (59% of all extramural funding in FY 2015, excluding direct state appropriations to colleges and universities), followed by companies and individuals (28% in FY 2015). Intramural performers, the state agencies themselves, performed \$582 million of R&D in FY 2015, a 0.7% increase from FY 2014.

Health-related R&D projects made up the largest share of state agencies' R&D expenditures (45% in FY 2014 and 43% in FY 2015). The total amount spent on health-related R&D increased 10% from FY 2014. R&D projects related to the environment and natural resources accounted for 19% of total state government R&D expenditures in FY 2015 and FY 2014. Energy, transportation, agriculture, and all other projects' shares of total R&D expenditures in FY 2015 were 14%, 11%, 6%, and 7%, respectively. Energy-related R&D projects increased 160% in FY

2015 over the previous year, driven mostly by special funding in California. R&D projects related to environment and natural resources and to health increased by 13% and 10%, respectively, from FY 2014. Agriculture- and transportation-related R&D declined by 1% and 2%, respectively.

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 \$34.9 million in FY

TABLE 2. State agency expenditures for R&D, by state and performer: FY 2015  
(Thousands of current dollars)

State	All R&D expenditures	Intramural performers <sup>a</sup>		Extramural performers <sup>b</sup>		State	All R&D expenditures	Intramural performers <sup>a</sup>		Extramural performers <sup>b</sup>	
		Amount	Percent	Amount	Percent			Amount	Percent	Amount	Percent
United States <sup>c</sup>	2,205,147	581,667	26.4	1,623,479	73.6	Missouri	9,806	1,151	11.7	8,655	88.3
Alabama	24,487	6,168	25.2	18,319	74.8	Montana	10,363	2,273	21.9	8,089	78.1
Alaska	11,258	9,465	84.1	1,794	15.9	Nebraska	5,475	535	9.8	4,941	90.2
Arizona	14,942	8,268	55.3	6,674	44.7	Nevada	3,107	4	0.1	3,103	99.9
Arkansas	16,643	661	4.0	15,982	96.0	New Hampshire	1,607	83	5.2	1,524	94.8
California	500,072	55,223	11.0	444,848	89.0	New Jersey	33,756	1,864	5.5	31,892	94.5
Colorado	16,321	8,468	51.9	7,854	48.1	New Mexico	52,303	2,540	4.9	49,763	95.1
Connecticut	55,817	21,886	39.2	33,931	60.8	New York	365,552	241,921	66.2	123,631	33.8
Delaware	2,200	1,710	77.7	490	22.3	North Carolina	34,002	14,429	42.4	19,573	57.6
District of Columbia	3,216	1,541	47.9	1,675	52.1	North Dakota	9,612	1,190	12.4	8,422	87.6
Florida	191,599	45,016	23.5	146,583	76.5	Ohio	94,299	864	0.9	93,435	99.1
Georgia	10,053	1,709	17.0	8,344	83.0	Oklahoma	29,953	351	1.2	29,602	98.8
Hawaii	11,521	1,660	14.4	9,861	85.6	Oregon	31,990	18,022	56.3	13,968	43.7
Idaho	12,936	6,469	50.0	6,467	50.0	Pennsylvania	75,024	7,387	9.8	67,637	90.2
Illinois	30,817	1,551	5.0	29,267	95.0	Rhode Island	2,595	281	10.8	2,314	89.2
Indiana	9,987	658	6.6	9,329	93.4	South Carolina	27,419	22,352	81.5	5,068	18.5
Iowa	11,278	3,696	32.8	7,581	67.2	South Dakota	4,212	240	5.7	3,972	94.3
Kansas	5,469	1,334	24.4	4,135	75.6	Tennessee	3,829	532	13.9	3,297	86.1
Kentucky	17,256	2,734	15.8	14,522	84.2	Texas	185,094	2,745	1.5	182,349	98.5
Louisiana	32,175	9,325	29.0	22,850	71.0	Utah	38,168	18,192	47.7	19,976	52.3
Maine	12,610	2,912	23.1	9,698	76.9	Vermont	2,199	556	25.3	1,643	74.7
Maryland	24,853	846	3.4	24,007	96.6	Virginia	43,616	14,191	32.5	29,425	67.5
Massachusetts	22,665	11,254	49.7	11,410	50.3	Washington	36,919	10,470	28.4	26,448	71.6
Michigan	12,676	702	5.5	11,973	94.5	West Virginia	11,482	4,728	41.2	6,754	58.8
Minnesota	21,456	2,828	13.2	18,628	86.8	Wisconsin	14,518	6,548	45.1	7,970	54.9
Mississippi	781	253	32.4	528	67.6	Wyoming	5,161	1,883	36.5	3,277	63.5
						Puerto Rico <sup>d</sup>	5,674	4,454	78.5	1,219	21.5

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

<sup>b</sup> Extramural performers include academic institutions, companies and individuals, and other non-intramural performers.

<sup>c</sup> U.S. total reflects all 50 states and the District of Columbia.

<sup>d</sup> Puerto Rico is not included in U.S. total due to its classification as a U.S. territory.

NOTE: Detail may not add to total because of rounding.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, Survey of State Government Research and Development, FYs 2014 and 2015.

2015, a 69% increase from the \$20.7 million reported in FY 2014.

### State Governments' Shares of R&D

Individual state government expenditures on R&D (including funds from federal, state, and other sources) in FY 2015 varied widely, ranging from under \$1 million in Mississippi to over \$500 million in California (table 2). Similarly, the range of state governments receiving federal funds for R&D projects ranged from under \$1 million in Mississippi and Delaware to more than \$150 million in New York. Combined, the five largest state governments in terms of total R&D expenditures (California, New York, Florida, Texas, and Ohio) received 46% of the total \$484 million in federal funds provided to all state governments for R&D activities.

### Intramural R&D Performance

Five states accounted for 66% of the \$582 million of intramural R&D performed by state agencies in FY 2015 (table 2): New York (\$242 million), California (\$55 million), Florida (\$45 million), South Carolina (\$22 million), and Connecticut (\$22 million). In FY 2015, 42% (\$243 million) of state agency intramural R&D performance was funded by the federal government. The share of federal support for intramural R&D ranged from 100% in Nevada to 2% in Utah.

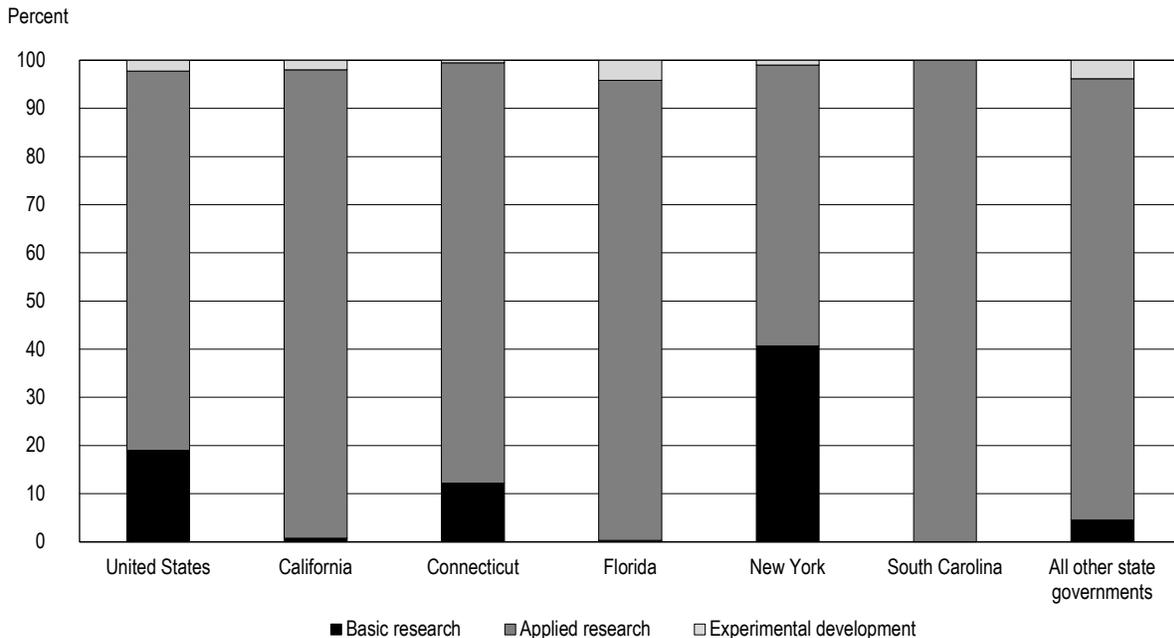
The majority (79%) of state government intramural R&D performance is directed toward applied research (\$458 million), whereas basic research constitutes approximately 19% of intramural R&D and experimental development at 2% (figure 1).<sup>2</sup> All state governments

except for Nevada, which reported all of their intramural R&D as basic research, reported a portion of their intramural R&D as applied research; 27 state governments reported some intramural R&D as basic research; and 26 reported some intramural R&D as experimental development. Twelve state governments reported all of their intramural R&D as applied research. New York's intramural R&D (\$242 million) constitutes 42% of all state governments' intramural R&D activities, with \$98 million directed toward basic research, \$141 million toward applied research, and \$2 million toward experimental development.

### Extramural R&D Performance

Five states accounted for 61% of the \$1.6 billion in FY 2015 state government funding for extramural R&D

FIGURE 1. State government intramural R&D, by type: FY 2015



NOTES: U.S. total reflects all 50 states and the District of Columbia. The five states listed reported the largest amount of intramural R&D.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, Survey of State Government Research and Development, FYs 2014 and 2015.

performance (table 2): California (\$445 million), Texas (\$182 million), Florida (\$147 million), New York (\$124 million), and Ohio (\$93 million). However, states varied in how they funded extramural R&D. For example, Texas state agencies directed the majority of this funding toward academic institutions (\$140 million, or 77%), whereas Ohio state agencies directed the bulk of their funding for extramural performance toward companies and individuals (\$85 million, or 91%). In addition to Texas, state agencies in California (\$207 million), Florida (\$86 million), New York, (\$79 million), and Pennsylvania (\$34 million) combined accounted for 57% of the total support to academic institutions in FY 2015. Similarly, state agencies in California (\$170 million), Ohio (\$85 million), Texas (\$35 million), New York (\$27 million), and Louisiana (\$17 million) combined accounted for 75%

of the total R&D support from state governments to companies and individuals (\$449 million) in FY 2015.

### R&D by State Agency Functions

Most states reported a broad mix of R&D projects related to state government functions: agriculture, energy, environment and natural resources, health, transportation, and other (table 3). All states reported R&D expenditures in at least two of these governmental function categories, and 18 states reported R&D expenditures across all functions in FY 2014 or FY 2015. Some R&D functions are highly concentrated within a handful of states. For example, in FY 2015, a total of 39 state governments reported some expenditures for energy-related R&D, yet 83% of all state government R&D expenditures for energy-related R&D was concentrated in five states: Cali-

fornia (\$194 million), New York (\$41 million), Ohio (\$11 million), Oregon (\$7 million), and Virginia (\$6 million). Similarly, 35 states reported expenditures for health-related R&D in FY 2015, yet 82% of all state government agency expenditures on health-related R&D was reported by agencies in five states: New York (\$244 million), California (\$222 million), Texas (\$150 million), Florida (\$103 million), and Pennsylvania (\$52 million).

The five state governments with the most R&D expenditures for agriculture, environment and natural resources, and transportation were somewhat less concentrated in their shares of the respective national totals than were the states with the largest shares of energy R&D and health R&D. For instance, 38 states reported some R&D expenditures for agriculture, but the five largest states—namely,

TABLE 3. State agency expenditures for R&D, by state and function of R&D, for the 10 states with the highest levels of R&D expenditures: FY 2015

(Thousands of current dollars)

State	Total	Agriculture	Energy	Environment and natural resources	Health	Transportation	Other
United States <sup>a</sup>	2,205,147	127,363	312,114	413,230	939,828	247,780	164,831
California	500,072	7,567	194,354	30,382	221,873	35,201	10,694
New York	365,552	2,166	40,788	21,641	244,408	6,851	49,699
Florida	191,599	18,530	1,117	57,934	102,896	11,121	0
Texas	185,094	809	0	14,491	149,991	19,803	0
Ohio	94,299	0	11,049	42,607	3,247	10,142	27,255
Pennsylvania	75,024	787	2,157	9,129	52,399	2,438	8,114
Connecticut	55,817	4,229	1,944	10,303	28,804	5,410	5,127
New Mexico	52,303	28,426	2,978	3,348	11,313	2,787	3,451
Virginia	43,616	1,121	6,264	9,600	6,250	17,555	2,827
Utah	38,168	2,035	4,836	18,246	8,531	1,471	3,049
All others	603,603	61,694	46,629	195,547	110,116	135,001	54,616
Puerto Rico <sup>b</sup>	5,674	683	400	150	3,123	560	757

<sup>a</sup> U.S. total reflects all 50 states and the District of Columbia.

<sup>b</sup> Puerto Rico is not included in U.S. total due to its classification as a U.S. territory.

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

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, Survey of State Government Research and Development, FYs 2014 and 2015.

New Mexico (\$28 million), Florida (\$19 million), North Carolina (\$12 million), Washington (\$10 million), and Arkansas (\$8 million)—make up 61% of all state government spending on agriculture-related R&D. In the case of environment and natural resources, all states except Illinois reported some R&D expenditures. However, five states accounted for 43% of the total (\$413 million) in FY 2015: Florida (\$58 million), Ohio (\$43 million), California (\$30 million), South Carolina (\$24 million), and New York (\$22 million). Transportation-related R&D projects were conducted by all state governments except for Massachusetts, with California (\$35 million), Texas (\$20 million), Virginia (\$18 million), Minnesota (\$12 million), and Florida (\$11 million) accounting for 38% of total transportation-related R&D expenditures (\$248 million).

## Data Sources and Limitations

Data presented in this InfoBrief are in current dollars and have not been adjusted for inflation. All 50 states, the District of Columbia, and Puerto Rico participated in the FY 2014 and FY 2015 survey, and 618 of the 643 selected agencies (96%) responded to the survey. Data for the FY 2014 and FY 2015 survey were collected for NCSES by the U.S. Census Bureau under an inter-agency agreement.

Most states and the territory of Puerto Rico have a fiscal year period that begins on 1 July and ends the following 30 June. For example, FY 2015 begins on 1 July 2014 and ends on 30 June 2015. There are, however, five exceptions to the June 30 fiscal year end: New York (ends 31 March), Texas (ends 31 August), and Alabama, Michigan, and the District of Columbia (ends 30 September).

Terms such as state, state government, and state agencies have equivalent meaning and are used interchangeably throughout this report. The amounts reported here are for R&D expenditures of state government departments, agencies, public authorities, institutions, 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. Amounts reported do not include direct appropriations from state legislatures to universities, colleges, and private organizations. As a result, the \$951 million in FY 2015 expenditures reported by state agencies to support R&D performance by academic institutions differs from the figure reported by universities and colleges in FY 2015 (\$3.8 billion) for expenditures on R&D activities

that were funded from state and local government sources. (See National Science Foundation, National Center for Science and Engineering Statistics. 2016. *Higher Education Research and Development, Fiscal Year 2015*. Data Tables. Arlington, VA. Available at <https://ncesdata.nsf.gov/herd/2015/>.)

State-specific data not available in this InfoBrief will be available in the full set of detailed tables from this survey in the report *State Government Research and Development: FYs 2014 and 2015*, at <https://www.nsf.gov/statistics/staterd/>. Individual detailed tables from the FY 2014 and FY 2015 survey may be available in advance of the full report. For further information, contact the author.

## Notes

1. Christopher Pece, Research and Development Statistics Program, National Center for Science and Engineering Statistics, National Science Foundation, 4201 Wilson Boulevard, Suite 965, Arlington, VA 22230 (cpece@nsf.gov; 703-292-7788).
2. The intramural R&D total is distributed heavily toward a lower percentage of applied research and a higher percentage of basic research due to New York. Without New York the total intramural would be distributed as 4% basic research, 93% applied research, and 3% experimental development.

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