



InfoBrief

Business R&D Performance in the United States Nears \$700 Billion in 2022

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Businesses continued to increase their research and development (R&D) performance in 2022, spending \$692 billion on R&D in the United States, a 14.8% increase from 2021 ([table 1](#)). Funding from the companies' own sources accounted for \$608 billion of this spending in 2022, a 15.2% increase from 2021. Funding from other sources accounted for \$83 billion, an 11.8% increase from 2021. Data for this InfoBrief are from the 2022 Business Enterprise Research and Development (BERD) Survey, developed and cosponsored by the National Center for Science and Engineering Statistics (NCSES) within the U.S. National Science Foundation (NSF) and by the Census Bureau, which collected and tabulated data for the survey.¹

Table 1
Funds spent for business R&D performed in the United States, by type of R&D, source of funds, and size of company: 2019–22

(Millions of dollars)

| Selected characteristic and company size | 2019 | 2020 | 2021 | 2022 |
|--|---------|---------|---------|---------|
| Domestic R&D performance ^a | 492,956 | 537,619 | 602,499 | 691,547 |
| Type of R&D ^b | | | | |
| Basic research | 32,239 | 36,017 | 40,130 | 42,957 |
| Applied research | 74,031 | 76,088 | 86,485 | 100,654 |
| Development | 386,686 | 425,514 | 475,884 | 547,935 |
| Paid for by the company ^c | 428,968 | 466,162 | 527,804 | 608,058 |
| Basic research | 25,916 | 29,330 | 32,763 | 35,918 |
| Applied research | 59,697 | 60,620 | 69,130 | 80,834 |
| Development | 343,355 | 376,213 | 425,912 | 491,307 |
| Paid for by others | 63,989 | 71,457 | 74,695 | 83,489 |
| Basic research | 6,324 | 6,688 | 7,367 | 7,040 |
| Applied research | 14,333 | 15,468 | 17,355 | 19,821 |
| Development | 43,332 | 49,301 | 49,972 | 56,629 |
| Source of funds | | | | |

Table 1**Funds spent for business R&D performed in the United States, by type of R&D, source of funds, and size of company: 2019–22**

(Millions of dollars)

| Selected characteristic and company size | 2019 | 2020 | 2021 | 2022 |
|--|---------|---------|---------|---------|
| Federal | 21,941 | 28,905 | 23,582 | 31,626 |
| Other ^d | 42,048 | 42,552 | 51,113 | 51,863 |
| Size of company (number of domestic employees) | | | | |
| Small companies | | | | |
| 10–19 ^e | 5,501 | 5,047 | 5,477 | 5,277 |
| 20–49 | 12,418 | 12,994 | 15,061 | 14,695 |
| Medium companies | | | | |
| 50–99 | 14,021 | 12,993 | 14,540 | 15,265 |
| 100–249 | 19,793 | 25,411 | 24,023 | 27,847 |
| Large companies | | | | |
| 250–499 | 18,883 | 20,878 | 23,932 | 29,549 |
| 500–999 | 23,969 | 21,264 | 27,432 | 31,802 |
| 1,000–4,999 | 75,671 | 88,238 | 94,615 | 104,505 |
| 5,000–9,999 | 50,811 | 48,397 | 62,817 | 58,709 |
| 10,000–24,999 | 88,263 | 88,567 | 104,607 | 121,142 |
| 25,000 or more | 183,626 | 213,829 | 229,995 | 282,756 |

i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

^a Domestic R&D performance is the cost of R&D paid for and performed by the respondent company and paid for by others outside of the company and performed by the respondent company.

^b R&D comprises creative and systematic work undertaken in order to increase the stock of knowledge and to devise new applications of available knowledge. This includes (1) activities aimed at acquiring new knowledge or understanding without specific immediate commercial applications or uses (basic research), (2) activities aimed at solving a specific problem or meeting a specific commercial objective (applied research), and (3) systematic work, drawing on research and practical experience and resulting in additional knowledge, which is directed to producing new processes or to improving existing products—goods or services—or processes (development).

^c Paid for by the company includes foreign subsidiaries of U.S. companies.

^d Other includes companies located inside and outside the United States; U.S. state government agencies and laboratories; U.S. universities, colleges, and academic researchers; and all other organizations located inside and outside the United States.

^e The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):

Detail may not add to total because of rounding.

Source(s):

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey.

R&D Performance, by Type of R&D, Industry Sector, and Source of Funding

In 2022, of the \$692 billion that companies spent on R&D, \$43 billion (6%) was for basic research, \$101 billion (15%) was for applied research, and \$548 billion (79%) was for development ([table 1](#)). In 2022, companies in manufacturing industries performed \$372 billion (54%) of domestic R&D, defined as R&D performed in the 50 states and the District of Columbia ([table 2](#)). Most of the funding came from these companies' own funds (88%). Companies in nonmanufacturing industries performed \$319 billion of domestic R&D (46% of total domestic R&D performance), 88% of which was paid for from companies' own funds.

Table 2**Funds spent for business R&D performed in the United States, by source of funds, selected industry, and company size: 2022**

(Millions of dollars)

| Industry, NAICS code, and company size | All R&D ^a | Paid for by the company ^b | Paid for by others | | | | | | | | |
|--|----------------------|--------------------------------------|--------------------|---------|-----------|----------------------|--------------------------------------|-------|--------|-----|---|
| | | | Total | Federal | Companies | | All other organizations ^d | | | | |
| | | | | | Domestic | Foreign ^c | | | | | |
| All industries, 21–23, 31–33, 42–81 | 691,547 | 608,058 | 83,489 | 31,626 | 27,125 | i | 23,604 | 1,134 | | | |
| Manufacturing industries, 31–33 | 372,459 | 326,998 | 45,461 | 24,082 | 6,623 | | 14,360 | 396 | | | |
| Chemicals, 325 | 125,728 | 113,518 | 12,210 | 766 | 2,426 | | 8,946 | 72 | | | |
| Pharmaceuticals and medicines, 3254 | 116,073 | 104,720 | 11,353 | 703 | 2,388 | | 8,195 | 67 | | | |
| Other 325 | 9,655 | 8,798 | 857 | 63 | 38 | | 751 | 5 | | | |
| Machinery, 333 | 19,464 | 18,246 | 1,218 | 673 | 165 | | 358 | 22 | | | |
| Computer and electronic products, 334 | 104,718 | 99,234 | 5,483 | 2,560 | 537 | i | 2,263 | 123 | | | |
| Communication equipment, 3342 | 11,665 | 10,870 | 795 | i | 205 | | D | 3 | i | | |
| Semiconductor and other electronic products, 3344 | 49,330 | 47,380 | 1,950 | | 71 | | 23 | 1,777 | 78 | r | |
| Other 334 | 43,723 | 40,984 | 2,738 | | 2,284 | | D | D | 42 | | |
| Electrical equipment, appliance, and components, 335 | 7,086 | 6,657 | 429 | i | 21 | | 35 | 369 | 4 | | |
| Transportation equipment, 336 | 71,259 | 46,468 | 24,790 | | 19,934 | | 3,060 | 1,676 | 120 | | |
| Motor vehicles, bodies, trailers, and parts, 3361–63 | 32,881 | 30,722 | 2,087 | | D | | 528 | 1,559 | D | | |
| Aerospace products and parts, 3364 | 35,356 | 13,786 | 21,570 | i | 18,855 | i | 2,529 | 103 | 83 | | |
| Other 336 | 3,022 | 1,960 | 1,133 | | D | | 3 | 14 | 37 | | |
| Manufacturing nec, other 31–33 | 44,204 | 42,875 | 1,331 | | 128 | | 400 | 748 | 55 | | |
| Nonmanufacturing industries, 21–23, 42–81 | 319,088 | 281,060 | 38,028 | i | 7,544 | | 20,502 | i | 9,245 | 737 | |
| Information, 51 | 182,340 | 181,392 | 947 | | 176 | | 332 | 413 | 26 | | |
| Software publishers, 5112 | 50,295 | 49,602 | 693 | | 102 | r | 308 | 260 | 23 | | |
| Other 51 | 132,045 | 131,790 | 254 | | 74 | | 24 | 153 | 3 | | |
| Finance and insurance, 52 | 17,222 | 17,173 | 49 | | 0 | | 49 | 0 | 0 | | |
| Professional, scientific, and technical services, 54 | 74,773 | 38,633 | 36,139 | i | 7,273 | | 19,452 | i | 8,748 | 666 | i |
| Computer systems design and related services, 5415 | 22,534 | 18,878 | 3,656 | | 897 | | 408 | 2,278 | 73 | | |
| Scientific research and development services, 5417 | 39,625 | i | 9,297 | 30,328 | i | 5,084 | 18,562 | i | 6,170 | 512 | i |
| Other 54 | 12,614 | 10,458 | 2,155 | | 1,292 | | 482 | 300 | 81 | | |
| Nonmanufacturing nec, other 21–23, 42–81 | 44,753 | 43,862 | 893 | | 95 | | 669 | 84 | 45 | | |
| Size of company (number of domestic employees) | | | | | | | | | | | |
| Small companies | | | | | | | | | | | |
| 10–19 ^e | 5,277 | 4,009 | 1,269 | | 495 | | 433 | 242 | 97 | | |
| 20–49 | 14,695 | 12,788 | 1,907 | | 741 | | 553 | 475 | D | | |
| Medium companies | | | | | | | | | | | |
| 50–99 | 15,265 | 13,274 | 1,990 | | 746 | | 358 | 814 | 72 | r | |
| 100–249 | 27,847 | 24,844 | 3,003 | | 1,402 | | 554 | 946 | 99 | | |
| Large companies | | | | | | | | | | | |
| 250–499 | 29,549 | 26,469 | 3,080 | | 687 | | 607 | 1,588 | 194 | | |
| 500–999 | 31,802 | 29,007 | 2,795 | | 679 | | 980 | 1,088 | 48 | | |
| 1,000–4,999 | 104,505 | 94,615 | 9,890 | | 1,672 | | 2,346 | 5,778 | 95 | i | |
| 5,000–9,999 | 58,709 | 54,018 | 4,692 | | 2,573 | | 1,299 | 713 | 103 | i | |
| 10,000–24,999 | 121,142 | 96,071 | 25,072 | i | 1,960 | | 11,010 | i | 11,880 | i | D |
| 25,000 or more | 282,756 | 252,964 | 29,792 | | 20,670 | | 8,985 | 82 | D | | |

D = suppressed to avoid disclosure of confidential information; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse; r = relative standard error is more than 50%.

NAICS = North American Industry Classification System; nec = not elsewhere classified.

^a All R&D is the cost of R&D paid for and performed by the respondent company and paid for by others outside of the company and performed by the respondent company.

^b Paid for by the company includes foreign subsidiaries of U.S. companies (\$30.2 billion).

^c Foreign includes foreign parent companies of U.S. subsidiaries (\$21.0 billion) and unaffiliated companies (\$2.6 billion). Excludes funds from foreign subsidiaries to U.S. companies paid for through intercompany transactions (\$30.2 billion).

^d All other organizations includes U.S. state government agencies and laboratories (\$0.3 billion); U.S. universities, colleges, and academic researchers (< \$0.01 billion); and all other organizations located inside (\$0.7 billion) and outside the United States (< \$0.01 billion).

^e The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):

Detail may not add to total because of rounding. Industry classification was based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Statistics are representative of companies located in the United States that performed or funded \$50,000 or more of R&D.

Source(s):

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2022.

The U.S. federal government was a large source of external funding for R&D (also referred to as R&D paid for by others) across most industries. Of the \$83 billion in domestic R&D performance paid for by others, the federal government accounted for \$32 billion. Eighty-four percent of this federal government funding went to three industry groups: aerospace products and parts (North American Industry Classification System [NAICS] code 3364) (\$19 billion), scientific research and development services (NAICS 5417) (\$5 billion), and computer and electronic products (NAICS 334) (\$3 billion). Business R&D was also funded by other U.S. companies (\$27 billion) and by foreign companies, including foreign parent companies of U.S. subsidiaries (\$24 billion). Nineteen billion dollars (68%) of all business R&D funded by other U.S. companies was within scientific research and development services (NAICS 5417). Seventy-eight percent of foreign company R&D funding went to four industry groups: pharmaceuticals and medicine (NAICS 3254) (\$8 billion), scientific research and development services (NAICS 5417) (\$6 billion), computer systems design and related services (NAICS 5415) (\$2 billion), and semiconductor and other electronic products (NAICS 3344) (\$2 billion) ([table 2](#)). (See "[Survey Information and Data Availability](#)" for information on the availability of data tables with full industry detail.)

Sales, R&D Intensity, and Employment of Companies That Performed or Funded R&D

U.S. companies that performed or funded R&D reported domestic net sales of \$14 trillion in 2022 ([table 3](#)).² For all industries, the R&D intensity (R&D-to-sales ratio)³ was 4.9%; for manufacturers, 5.1%; and for nonmanufacturers, 4.7%. Manufacturing industries with high levels of R&D intensity in 2022 were semiconductor and other electronic products (NAICS 3344) (23.5%) and pharmaceuticals and medicines (NAICS 3254) (16.9%). Among the nonmanufacturing industries, industries with high levels of R&D intensity were scientific research and development services (NAICS 5417) (29.0%), software publishers (NAICS 5112) (13.7%), and computer systems design and related services (NAICS 5415) (12.1%).

Table 3**Sales, R&D, R&D intensity, and employment for companies that performed or funded business R&D in the United States, by selected industry and company size: 2022**

(Millions of dollars, percent R&D intensity, and thousands of employees)

| Industry, NAICS code, and company size | Domestic net sales (\$millions) ^a | All R&D (\$millions) ^b | R&D intensity (%) ^c | Domestic employment (headcounts in thousands) ^d | |
|---|--|-----------------------------------|--------------------------------|--|------------------|
| | | | | Total | R&D ^e |
| All industries, 21–33, 42–81 | 14,184,308 | 691,547 | 4.9 | 24,092 | 2,110 |
| Manufacturing industries, 31–33 | 7,322,263 | 372,459 | 5.1 | 10,251 | 1,008 |
| Chemicals, 325 | 1,493,442 | 125,728 | 8.4 | 1,446 | 217 |
| Pharmaceuticals and medicines, 3254 | 685,744 | 116,073 | 16.9 | 664 | 172 |
| Other 325 | 807,698 | 9,655 | 1.2 | 782 | 45 |
| Machinery, 333 | 520,724 | 19,464 | 3.7 | 941 | 105 |
| Computer and electronic products, 334 | 734,451 | 104,718 | 14.3 | 1,033 | 245 |
| Communication equipment, 3342 | 94,162 | 11,665 | 12.4 | 131 | 36 |
| Semiconductor and other electronic products, 3344 | 209,620 | 49,330 | 23.5 | 311 | 93 |
| Other 334 | 430,669 | 43,723 | 10.2 | 591 | 116 |
| Electrical equipment, appliance, and components, 335 | 190,989 | 7,086 | 3.7 | 373 | 27 |
| Transportation equipment, 336 | 1,377,381 | 71,259 | 5.2 | 1,856 | 195 |
| Motor vehicles, bodies, trailers, and parts, 3361–63 | 934,230 | 32,881 | 3.5 | 896 | 110 |
| Aerospace products and parts, 3364 | 356,684 | 35,356 | 9.9 | 766 | 71 |
| Other 336 | 86,467 | 3,022 | 3.5 | 194 | 14 |
| Manufacturing nec, other 31–33 | 3,005,276 | 44,204 | 1.5 | 4,602 | 219 |
| Nonmanufacturing industries, 21–23, 42–81 | 6,862,045 | 319,088 | 4.7 | 13,840 | 1,102 |
| Information, 51 | 1,852,965 | 182,340 | 9.8 | 2,394 | 489 |
| Software publishers, 5112 | 367,970 | 50,295 | 13.7 | 475 | 144 |
| Other 51 | 1,484,995 | 132,045 | 8.9 | 1,919 | 345 |
| Finance and insurance, 52 | 1,250,350 | 17,222 | 1.4 | 1,310 | 52 |
| Professional, scientific, and technical services, 54 | 561,046 | 74,773 | 13.3 | 1,646 | 376 |
| Computer systems design and related services, 5415 | 186,067 | 22,534 | 12.1 | 525 | 111 |
| Scientific research and development services, 5417 | 136,566 | 39,625 | 29.0 | 406 | 149 |
| Other 54 | 238,413 | 12,614 | 5.3 | 715 | 116 |
| Nonmanufacturing nec, other 21–23, 42–81 | 3,197,684 | 44,753 | 1.4 | 8,490 | 185 |
| Size of company (number of domestic employees) | | | | | |
| Small companies | | | | | |
| 10–19 ^f | 41,616 | 5,277 | 12.7 | 86 | 34 |
| 20–49 | 113,186 | 14,695 | 13.0 | 267 | 89 |
| Medium companies | | | | | |
| 50–99 | 179,757 | 15,265 | 8.5 | 366 | 87 |
| 100–249 | 384,889 | 27,847 | 7.2 | 808 | 143 |
| Large companies | | | | | |
| 250–499 | 366,007 | 29,549 | 8.1 | 768 | 123 |
| 500–999 | 573,879 | 31,802 | 5.5 | 993 | 131 |
| 1,000–4,999 | 2,052,262 | 104,505 | 5.1 | 3,159 | 348 |
| 5,000–9,999 | 1,590,874 | 58,709 | 3.7 | 1,909 | 181 |
| 10,000–24,999 | 2,883,419 | 121,142 | 4.2 | 3,373 | 338 |
| 25,000 or more | 5,998,417 | 282,756 | 4.7 | 12,363 | 636 |
| Size of company by group (number of domestic employees) | | | | | |
| Small ^f and medium companies | | | | | |
| 10–249 | 719,448 | 63,084 | 8.8 | 1,527 | 353 |

Table 3**Sales, R&D, R&D intensity, and employment for companies that performed or funded business R&D in the United States, by selected industry and company size: 2022**

(Millions of dollars, percent R&D intensity, and thousands of employees)

| Industry, NAICS code, and company size | Domestic net sales (\$millions) ^a | All R&D (\$millions) ^b | R&D intensity (%) ^c | Domestic employment (headcounts in thousands) ^d | |
|--|--|-----------------------------------|--------------------------------|--|------------------|
| | | | | Total | R&D ^e |
| Larger companies | | | | | |
| 250–24,999 | 7,466,441 | 345,707 | 4.6 | 10,202 | 1,121 |
| Largest companies | | | | | |
| 25,000 or more | 5,998,417 | 282,756 | 4.7 | 12,363 | 636 |

i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = North American Industry Classification System; nec = not elsewhere classified.

^a Dollar values are for goods sold or services rendered by R&D-performing or R&D-funding companies located in the United States to customers outside of the company, including the U.S. federal government, foreign customers, and the company's foreign subsidiaries. Included are revenues from a company's foreign operations and subsidiaries and from discontinued operations. If a respondent company is owned by a foreign parent company, sales to the parent company and to affiliates not owned by the respondent company are included. Excluded are intracompany transfers, returns, allowances, freight charges, and excise, sales, and other revenue-based taxes.

^b All R&D is the cost of R&D paid for and performed by the respondent company and paid for by others outside of the company and performed by the respondent company.

^c R&D intensity is the cost of domestic R&D paid for by the respondent company and others outside of the company and performed by the company divided by domestic net sales of companies that performed or funded R&D.

^d Data recorded on 12 March represent employment figures for the year.

^e Headcounts of researchers, R&D managers, technicians, clerical staff, and others assigned to R&D groups.

^f The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):

Detail may not add to total because of rounding. Industry classification was based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned.

Source(s):

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2022.

Businesses that performed or funded R&D employed 24.1 million people in the United States in 2022 ([table 3](#)).⁴ Approximately 2.1 million (9%) were business R&D employees.⁵

Of the 2.1 million people working on R&D in companies that performed or funded business R&D in 2022, 1.5 million were men and 0.6 million were women; 48% of the men and 47% of the women worked in manufacturing industries, and 52% of the men and 53% of the women worked in nonmanufacturing industries ([table 4](#)). Researchers—that is, scientists, engineers, and their managers—accounted for 1.4 million of the 2.1 million R&D workers (68%). Of the R&D workers, 143,000 (7%) held PhD degrees. R&D technicians numbered 473,000, and 196,000 were grouped as other supporting staff.

Table 4**Domestic employment, R&D employment by sex and work activity, R&D researchers by level of education, and full-time equivalent researcher employment for companies that performed or funded business R&D in the United States, by industrial sector: 2022**

(Thousands of employees)

| Industry and NAICS code | Domestic employment ^a | R&D employment | | | | | | | | | |
|---|----------------------------------|----------------|-------|--------|--------------------------|----------|---|----------------------------------|-------------------------------------|-----------------------------------|--------------------------|
| | | Total | Male | Female | Researchers ^b | | | Technicians and equivalent staff | Other supporting staff ^c | Full-time equivalent ^d | |
| | | | | | Total | With PhD | | | | Total | Researchers ^b |
| All industries, 21–33, 42–81 | 24,092 | 2,110 | 1,501 | 609 | 1,441 | 143 | | 473 | 196 | 1,941 | 1,316 |
| Manufacturing industries, 31–33 | 10,251 | 1,008 | 723 | 285 | 690 | 86 | | 205 | 113 | 925 | 634 |
| Nonmanufacturing industries, 21–23, 42–81 | 13,840 | 1,102 | 778 | 324 | 752 | 56 | i | 267 | 82 | 1,016 | 682 |

i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = North American Industry Classification System.

^a Data recorded on 12 March represent employment figures for the year.^b Researchers includes R&D scientists and engineers and their managers.^c Other supporting staff includes clerical staff and others assigned to R&D groups.^d The number of persons employed who were assigned full time to R&D, plus a prorated number of employees who worked on R&D only part of the time.**Note(s):**

Detail may not add to total because of rounding. Industry classification was based on the dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned. Excludes data for federally funded research and development centers. Also available in the full set of data tables are statistics on domestic R&D employment, by state; foreign R&D personnel headcounts, by country; and headcounts of leased (i.e., external) R&D personnel, by function.

Source(s):

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2022.

R&D Performance, by Company Size

Small- and medium-sized companies (10–249 domestic employees) performed 9% of the nation's total business R&D in 2022 ([table 3](#)).⁶ For these companies as a group, the R&D intensity was 8.8%. These companies accounted for 5% of sales and employed 6% of the 24.1 million employees who worked for R&D-performing or R&D-funding companies. They employed 17% of the 2.1 million employees engaged in business R&D in the United States.

Larger companies with 250–24,999 domestic employees performed 50% of the nation's total business R&D in 2022, and their R&D intensity was 4.6%. They accounted for 53% of sales, employed 42% of those who worked for R&D-performing or R&D-funding companies, and employed 53% of R&D employees in the United States.

The largest companies (25,000 or more domestic employees) performed 41% of the nation's total business R&D in 2022, and their R&D intensity was 4.7%. They accounted for 42% of sales, employed 51% of those who worked for R&D-performing or R&D-funding companies, and employed 30% of business R&D employees in the United States.

R&D Performance, by State

In 2022, of the \$692 billion of R&D performed in the United States, businesses in California alone accounted for 34.1% ([table 5](#)). Other states with large amounts of business R&D were Washington (8.3% of the national total in 2022), Massachusetts (7.2%), New York (4.7%), Texas (4.5%), and New Jersey (3.8%).⁷

Table 5**Funds spent for business R&D performed in the United States, by state and source of funds: 2022**

(Millions of dollars)

| State | All R&D ^a | | Paid for by the company | | Paid for by others | |
|----------------------|----------------------|---|-------------------------|---|--------------------|---|
| United States | 691,547 | | 608,058 | | 83,489 | |
| Alabama | 4,907 | | 2,259 | | 2,649 | i |
| Alaska | 211 | i | 189 | i | 22 | |
| Arizona | 10,261 | | 8,250 | | 2,010 | |
| Arkansas | 604 | | 545 | | 59 | |
| California | 235,556 | | 220,081 | | 15,474 | |
| Colorado | 10,496 | | 8,135 | | 2,362 | i |
| Connecticut | 11,443 | | 9,037 | | 2,406 | |
| Delaware | 4,544 | | 2,874 | | 1,670 | |
| District of Columbia | 1,007 | | 881 | | 126 | |
| Florida | 11,509 | | 8,746 | | 2,763 | i |
| Georgia | 8,666 | | 7,684 | | 982 | i |
| Hawaii | 491 | | 447 | | 44 | |
| Idaho | 2,932 | | 2,883 | | 49 | |
| Illinois | 18,061 | | 16,785 | | 1,276 | i |
| Indiana | 11,493 | | 9,943 | | 1,550 | i |
| Iowa | 3,956 | | 3,257 | | 698 | |
| Kansas | 2,996 | | 2,219 | | 777 | i |
| Kentucky | 1,053 | | 925 | | 129 | i |
| Louisiana | 604 | | 530 | | 75 | |
| Maine | 656 | | 597 | | 59 | |
| Maryland | 8,591 | | 5,843 | | 2,748 | |
| Massachusetts | 49,732 | | 43,311 | | 6,421 | |
| Michigan | 25,790 | | 23,381 | | 2,409 | |
| Minnesota | 8,537 | | 8,141 | | 396 | |
| Mississippi | 532 | | 442 | | 91 | |
| Missouri | 5,478 | | 4,914 | | 564 | i |
| Montana | 404 | | 376 | | 28 | |
| Nebraska | 1,459 | | 1,395 | | 64 | |
| Nevada | 1,811 | | 1,471 | | 340 | |
| New Hampshire | 3,293 | | 1,449 | | 1,844 | |
| New Jersey | 26,511 | | 20,144 | | 6,366 | i |
| New Mexico | 1,844 | | 1,514 | | 330 | |
| New York | 32,196 | | 29,915 | | 2,282 | |
| North Carolina | 16,541 | | 11,503 | | 5,038 | i |
| North Dakota | 472 | | 454 | | 18 | |
| Ohio | 13,759 | | 10,501 | | 3,257 | |
| Oklahoma | 1,893 | | 1,820 | | 73 | |
| Oregon | 12,678 | | 12,426 | | 252 | |
| Pennsylvania | 20,624 | | 17,151 | | 3,473 | i |
| Rhode Island | 635 | | 594 | | 40 | |
| South Carolina | 2,616 | | 2,319 | | 297 | |
| South Dakota | 213 | | 201 | | 12 | |
| Tennessee | 3,473 | | 2,147 | | 1,326 | i |
| Texas | 31,365 | | 26,151 | | 5,214 | i |
| Utah | 4,019 | | 3,748 | | 271 | |
| Vermont | 676 | | 614 | | 62 | |
| Virginia | 8,766 | | 6,451 | | 2,315 | |
| Washington | 57,295 | | 55,718 | | 1,576 | |

Table 5**Funds spent for business R&D performed in the United States, by state and source of funds: 2022**

(Millions of dollars)

| State | All R&D ^a | Paid for by the company | Paid for by others |
|----------------------------------|----------------------|-------------------------|--------------------|
| West Virginia | 467 | 444 | 23 |
| Wisconsin | 7,585 | 6,470 | 1,114 i |
| Wyoming | 81 | 78 | 3 i |
| Undistributed funds ^b | 765 | 703 | 62 |

i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

^a All R&D is the cost of domestic R&D paid for by the respondent company and others outside of the company and performed by the respondent company.^b Undistributed funds includes data reported that were not allocated to a specific state by multi-establishment companies. For single-establishment companies, data reported were allocated to the state in the address used to mail the survey form.**Note(s):**

Detail may not add to total because of rounding.

Source(s):

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2022.

Capital Expenditures

Companies that performed or funded R&D in the United States in 2022 spent \$870 billion on capital, that is, assets with expected useful lives of more than 1 year ([table 6](#)). Of this amount, \$36 billion (4%) was for assets used for domestic R&D operations (i.e., land acquisitions, buildings and land improvement, equipment, capitalized software, and other assets). Companies in manufacturing industries spent \$24 billion on capital for domestic R&D, and companies in nonmanufacturing industries spent \$12 billion. Industries with high levels of capital expenditures on assets used for domestic R&D in 2022 were pharmaceuticals and medicines (NAICS 3254) (\$5.2 billion, or 15% of national capital expenditures on assets used for R&D) and semiconductor and other electronic products (NAICS 3344) (\$5 billion, or 14%). Among all types of capital assets, both manufacturing and nonmanufacturing industries spent the most on equipment. For equipment, manufacturing disbursed \$14.7 billion, or 62% of total capital assets used for domestic R&D and nonmanufacturing industries spent \$7.5 billion, or 61%.

Table 6**Capital expenditures in the United States, total and amount used for domestic R&D, by type of expenditure, industry, and company size: 2022**

(Millions of dollars)

| Selected industry, NAICS code, and company size | Total ^b | Used for domestic R&D ^a | | | | | | |
|---|--------------------|------------------------------------|------------------|---|-----------|----------------------|-----------------------------|--|
| | | Total ^{b,c} | Land acquisition | Buildings and land improvement ^d | Equipment | Capitalized software | Other intellectual property | All other and undistributed ^e |
| All industries, 21–33, 42–81 | 869,538 | 36,069 | 155 | 5,135 | 22,228 | 2,743 | 3,726 | 2,082 |
| Manufacturing industries, 31–33 | 310,111 | 23,717 | 100 | 3,790 | 14,713 | 1,466 | 2,144 | 1,504 |
| Chemicals, 325 | 62,932 | 6,121 | 52 | 1,611 | 2,988 | 323 | 884 | 263 |
| Pharmaceuticals and medicines, 3254 | 28,479 | 5,234 | 41 | 1,332 | 2,453 | 290 | 877 | 241 |
| Other 325 | 34,453 | 887 | 11 | 279 | 535 | 33 | 7 | 22 |
| Machinery, 333 | 16,324 | 1,788 | 1 i | 255 | 978 | 167 | 39 | 349 |
| Computer and electronic products, 334 | 47,559 | 8,444 i | 2 | 721 | 6,106 i | 514 | 788 i | 312 i |

Table 6**Capital expenditures in the United States, total and amount used for domestic R&D, by type of expenditure, industry, and company size: 2022**

(Millions of dollars)

| Selected industry, NAICS code, and company size | Total ^b | Used for domestic R&D ^a | | | | | | | | | |
|--|--------------------|------------------------------------|------------------|---|-----------|----------------------|-----------------------------|--|---|--|--|
| | | Total ^{b,c} | Land acquisition | Buildings and land improvement ^d | Equipment | Capitalized software | Other intellectual property | All other and undistributed ^e | | | |
| Communication equipment, 3342 | 3,855 | 482 | 1 | D | 307 | 71 | i | D | D | | |
| Semiconductor and other electronic products, 3344 | 26,434 | i 4,981 | i 1 | i 185 | i 3,846 | i 239 | i 491 | i 220 | i | | |
| Other 334 | 17,270 | 2,981 | i 0 | D | i 1,953 | i 204 | D | D | | | |
| Electrical equipment, appliance, and components, 335 | 6,676 | i 675 | * | 44 | i 495 | 28 | 14 | i 94 | | | |
| Transportation equipment, 336 | 56,376 | 3,128 | 12 | i 542 | 1,892 | 245 | 253 | i 183 | | | |
| Motor vehicles, bodies, trailers, and parts, 3361–63 | 42,726 | 2,159 | 8 | i 339 | 1,218 | 193 | 250 | i 152 | | | |
| Aerospace products and parts, 3364 | 10,782 | 819 | 4 | 168 | 574 | 49 | 2 | 22 | | | |
| Other 336 | 2,868 | 150 | 0 | i 35 | 100 | 3 | 1 | i 9 | | | |
| Manufacturing nec, other 31–33 | 120,244 | 3,561 | 33 | 617 | 2,254 | 189 | 166 | 303 | | | |
| Nonmanufacturing industries, 21–23, 42–81 | 559,428 | 12,353 | 55 | i 1,345 | i 7,515 | 1,277 | i 1,582 | i 578 | | | |
| Information, 51 | 218,255 | 7,889 | 13 | i 765 | i 5,062 | 878 | i 886 | i 285 | | | |
| Software publishers, 5112 | 32,114 | 2,915 | 9 | i 67 | i 2,477 | 214 | D | D | | | |
| Telecommunications, 517 | 93,417 | 487 | i 0 | 61 | i 116 | i 309 | 0 | * | | | |
| Other 51 | 92,724 | 4,487 | 4 | i 637 | i 2,469 | 355 | D | D | | | |
| Finance and insurance, 52 | 26,641 | 59 | i 0 | 6 | 39 | 5 | i 8 | 1 | i | | |
| Professional, scientific, and technical services, 54 | 27,522 | 2,370 | 42 | i 479 | 1,311 | 216 | i 165 | 158 | | | |
| Computer systems design and related services, 5415 | 10,418 | 528 | 0 | 19 | 362 | 81 | 27 | 40 | | | |
| Scientific research and development services, 5417 | 9,266 | i 1,423 | i 41 | i 426 | 737 | 54 | 68 | 97 | | | |
| Other 54 | 7,838 | 419 | 1 | i 34 | 212 | 81 | i 70 | 21 | | | |
| Nonmanufacturing nec, other 21–23, 42–81 | 287,010 | 2,035 | 0 | 95 | 1,103 | 178 | 523 | 134 | | | |
| Size of company (number of domestic employees) | | | | | | | | | | | |
| Small companies | | | | | | | | | | | |
| 10–19 ^f | 1,349 | i 204 | i 2 | i 26 | 122 | i 23 | i 13 | 17 | | | |
| 20–49 | 6,698 | 847 | 18 | 87 | 583 | 48 | i 50 | 62 | | | |
| Medium companies | | | | | | | | | | | |
| 50–99 | 10,638 | 887 | 16 | 186 | 541 | 65 | i 27 | i 52 | | | |
| 100–249 | 15,299 | 1,540 | 8 | i 268 | 949 | 125 | 110 | 80 | | | |
| Large companies | | | | | | | | | | | |
| 250–499 | 15,387 | 1,322 | 3 | i 262 | 724 | 132 | 123 | 78 | | | |
| 500–999 | 27,577 | 1,729 | 22 | 234 | 974 | 178 | 115 | 206 | | | |
| 1,000–4,999 | 91,332 | 4,944 | 40 | 878 | 2,933 | i 473 | i 325 | 296 | | | |
| 5,000–9,999 | 85,689 | 3,152 | 5 | i 301 | 2,254 | 360 | 113 | i 119 | | | |
| 10,000–24,999 | 204,664 | 7,313 | 26 | 1,226 | 4,286 | 429 | 999 | 346 | | | |
| 25,000 or more | 410,906 | 14,131 | i 16 | i 1,666 | i 8,863 | 909 | i 1,850 | i 826 | | | |

* = amount < \$500,000; D = data withheld to avoid disclosing operations of individual companies; i = more than 50% of the estimate is a combination of imputation and reweighting to account for nonresponse.

NAICS = North American Industry Classification System; nec = not elsewhere classified.

^a Domestic R&D is the R&D paid for by the respondent company and others outside of the company and performed by the company.

^b Capital expenditures are payments by a business for assets that usually have a useful life of more than 1 year. The value of assets acquired or improved through capital expenditures is recorded on a company's balance sheet. Statistics from the Business Enterprise Research and Development Survey exclude the cost of assets acquired through mergers and acquisitions.

^c Capital expenditures for long-lived assets used in a company's R&D operations are not included in its R&D expense, but any depreciation recorded for those assets is included in its R&D expense. For 2022, depreciation associated with domestic R&D paid for and performed by the company was \$20.2 billion and with domestic R&D performed by the company and paid for by others was \$2.3 billion.

^d Buildings and land improvement includes the cost of purchased or improved buildings and other facilities that are fixed to the land.

^e All other and undistributed includes the cost of other capital expenditures, including purchased patents and other intangible assets, and expenditures not distributed among the categories shown.

^f The Business Enterprise Research and Development Survey does not include companies with fewer than 10 domestic employees.

Note(s):

Detail may not add to total because of rounding. Industry classification was based on dominant business code for domestic R&D performance, where available. For companies that did not report business codes, the classification used for sampling was assigned.

Source(s):

National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2022.

Survey Information and Data Availability

The sample for the BERD Survey was selected to represent all for-profit, nonfarm companies that were publicly or privately held, had 10 or more employees in the United States, and performed or funded R&D either domestically or abroad. The estimates in this InfoBrief are based on responses from a sample of the population and may differ from actual values because of sampling variability or other factors. As a result, apparent differences between the estimates for two or more groups may not be statistically significant. All comparative statements in this InfoBrief have undergone statistical testing and are significant at the 90% confidence level unless otherwise noted. The variances of estimates in this report were calculated using design-based formulas. Also, because the statistics from the survey are based on a sample, they are subject to both sampling and nonsampling errors. (See the 2022 "Technical Notes" at <https://nces.nsf.gov/surveys/business-enterprise-research-development/2022#methodology>.)

Beginning in survey year 2018, companies that performed or funded less than \$50,000 of R&D were excluded from tabulation.

In this InfoBrief, money amounts are expressed in current U.S. dollars and are not adjusted for inflation. A company is defined as a business organization located in the United States, either U.S. owned or a U.S. affiliate of a foreign parent company, of one or more establishments under common ownership or control.

For 2021, a total of 47,500 companies were sampled to represent the population of 1,137,000 companies; for 2022, a total of 45,500 companies were sampled, representing 1,104,000 companies. The actual numbers of reporting units in the sample that remained within the scope of the survey between sample selection and tabulation were 44,000 for 2021 and 42,500 for 2022. These lower counts represent the number of reporting units that were determined to be within the scope of the survey after all data collected were processed. Reasons for the reduced counts include mergers, acquisitions, and instances where companies had fewer than 10 employees in the United States or had gone out of business in the interim. Of these in-scope reporting units, 69% were considered to have met the criteria for a complete response to the 2021 survey; 67% fulfilled the 2022 complete response criteria. Coverage of the previous year's known positive R&D stratum for 2021 was 92%; the coverage rate for 2022 was 94%. Industry classification was based on the dominant business activity for domestic R&D performance, where available. For reporting units that did not report business activity codes for R&D, the classification used for sampling was assigned.

The estimation methodology for state estimates in the BERD Survey takes the form of a hybrid estimator, combining the unweighted reported amount, by state, with a weighted amount apportioned (or raked) across states with relevant industrial activity. The hybrid estimator smooths the estimate over states with R&D activity, by industry, and accounts for real observed change within a state. [Table 5](#) shows the adjusted state estimates after this estimation methodology was applied.

The full set of data tables from the 2022 survey will be available at the [BERD Survey page](#). Individual data tables and tables with relative standard errors and imputation rates from the 2022 survey are available from the author in advance of the full release. To minimize reporting burden, survey items are rotated on and off the survey on an odd- and even-numbered year schedule. Statistics on R&D performed by others by type of performer, activities with academia, federal R&D by government agency, and R&D by application area were rotated off the survey for 2022. Items rotated on the survey for 2022 include questions on patents, intellectual property, and technology transfer activities.

The BERD Survey contains confidential data that are protected under Title 13 and Title 26 of the U.S. Code. Restricted microdata can be accessed at the secure Federal Statistical Research Data Centers (FSRDCs) administered by the Census Bureau. FSRDCs are partnerships between federal statistical agencies and leading research institutions. FSRDCs provide secure environments supporting qualified researchers using restricted-access data while protecting respondent confidentiality. Researchers interested in using the microdata can submit a proposal to the Census Bureau, which evaluates proposals based on their benefit to the Census Bureau, scientific merit, feasibility, and risk of disclosure. To learn more about the FSRDCs and how to apply, please visit <https://www.census.gov/about/adrm/fsrdc.html>.

NCSES has reviewed this product for unauthorized disclosure of confidential information and approved its release (NCSES-DRN24-042).

Notes

- 1 NSF has cosponsored an annual business R&D survey since 1953. The Survey of Industrial Research and Development (SIRD) collected data for 1953–2007, and its successor, the Business R&D and Innovation Survey (BRDIS), collected data for 2008–16. Beginning with 2017, the collection of innovation data was moved to the Annual Business Survey (ABS), another survey cosponsored with the Census Bureau, and BRDIS became the Business Research and Development Survey (BRDS). Beginning with 2019, the business R&D data collection reported here was renamed for international comparability to the Business Enterprise Research and Development (BERD) Survey.
- 2 Determining the amount of domestic net sales and operating revenues was left to the reporting company. However, guidance was given to include revenues from foreign operations and subsidiaries and from discontinued operations and to exclude intracompany transfers, returns, allowances, freight charges, and excise, sales, and other revenue-based taxes.
- 3 R&D intensity is the cost of domestic R&D paid for by the respondent company and others outside of the company and performed by the company divided by domestic net sales of companies that performed or funded R&D.
- 4 Employment statistics in this InfoBrief are headcounts unless they are designated as full-time equivalent (FTE) estimates. R&D employees include researchers (defined as R&D scientists and engineers and their managers) and the technicians, technologists, and support staff members who work on R&D or who provide direct support to R&D activities.
- 5 The number of persons employed who were assigned full time to R&D plus a prorated number of employees who worked on R&D only part of the time was 1.9 million FTEs, of which 1.3 million FTEs were R&D researchers.
- 6 Company size classifications changed for 2017 and subsequent years in response to the revised *Frascati Manual*; see Organisation for Economic Co-operation and Development (OECD). 2015. *Frascati Manual: Guidelines for Collecting and Reporting Data on Research and Experimental Development. The Measurement of Scientific, Technological, and Innovation Activities*. Paris: OECD Publishing. Available at https://www.oecd-ilibrary.org/science-and-technology/frascati-manual-2015_9789264239012-en. Anderson and Kindlon (2019) provide estimates of R&D performance and employment using these new classifications over 2008–15. The authors also compare the trends to those observed in SIRD for the time prior to 2008. The ABS, also cosponsored by NCSES and the Census Bureau, collects R&D data from companies with fewer than 10 employees for 2017 and beyond. See Anderson G, Kindlon A; NCSES. 2019. *Indicators of R&D in Small Businesses: Data from the 2009–15 Business R&D and Innovation Survey*. NSF 19-316. Alexandria, VA: U.S. National Science Foundation. Available at <https://www.nsf.gov/statistics/2019/nsf19316/>.

7 In addition to statistics for all states and for all states by industry, below-state level statistics are available in the full set of data tables and in other InfoBriefs; see Shackelford B, Wolfe R; NCSES. 2019. *Over Half of U.S. Business R&D Performed in 10 Metropolitan Areas in 2015*. NSF 19-322. Alexandria, VA: U.S. National Science Foundation. Available at <https://www.nsf.gov/statistics/2019/nsf19322/>. Also see Shackelford B, Wolfe R; NCSES. 2020. *Businesses Performed 60% of Their U.S. R&D in 10 Metropolitan Areas in 2018*. NSF 21-331. Alexandria, VA: U.S. National Science Foundation. Available at <https://nces.nsf.gov/pubs/nsf21331>. Information and statistics on U.S. state trends in R&D, science and engineering education, workforce, patents and publications, and knowledge-intensive industries is also available in the Science and Engineering State Indicators data tool at <https://nces.nsf.gov/indicators/states>.

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