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SUSTAINING BUSINESS R&D SPENDING IN CALIFORNIA

Milken Institute Center for Regional Economics and California Center

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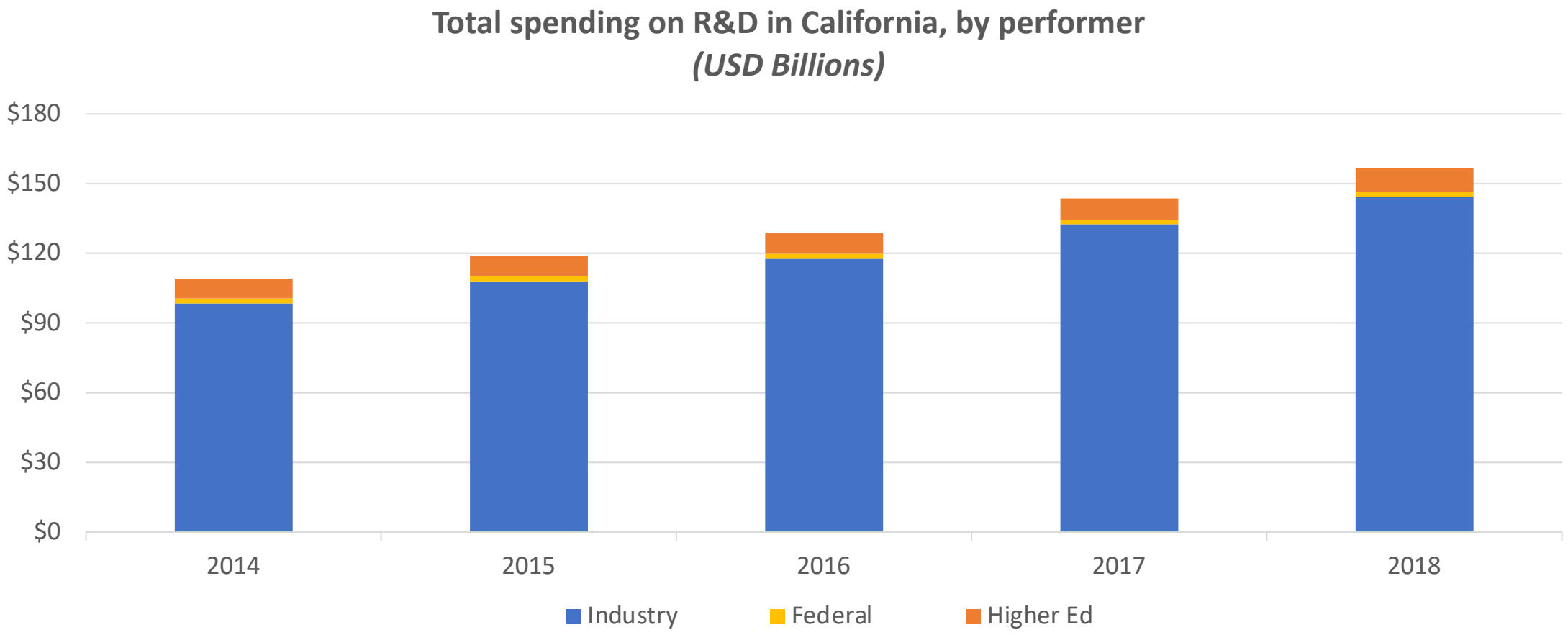
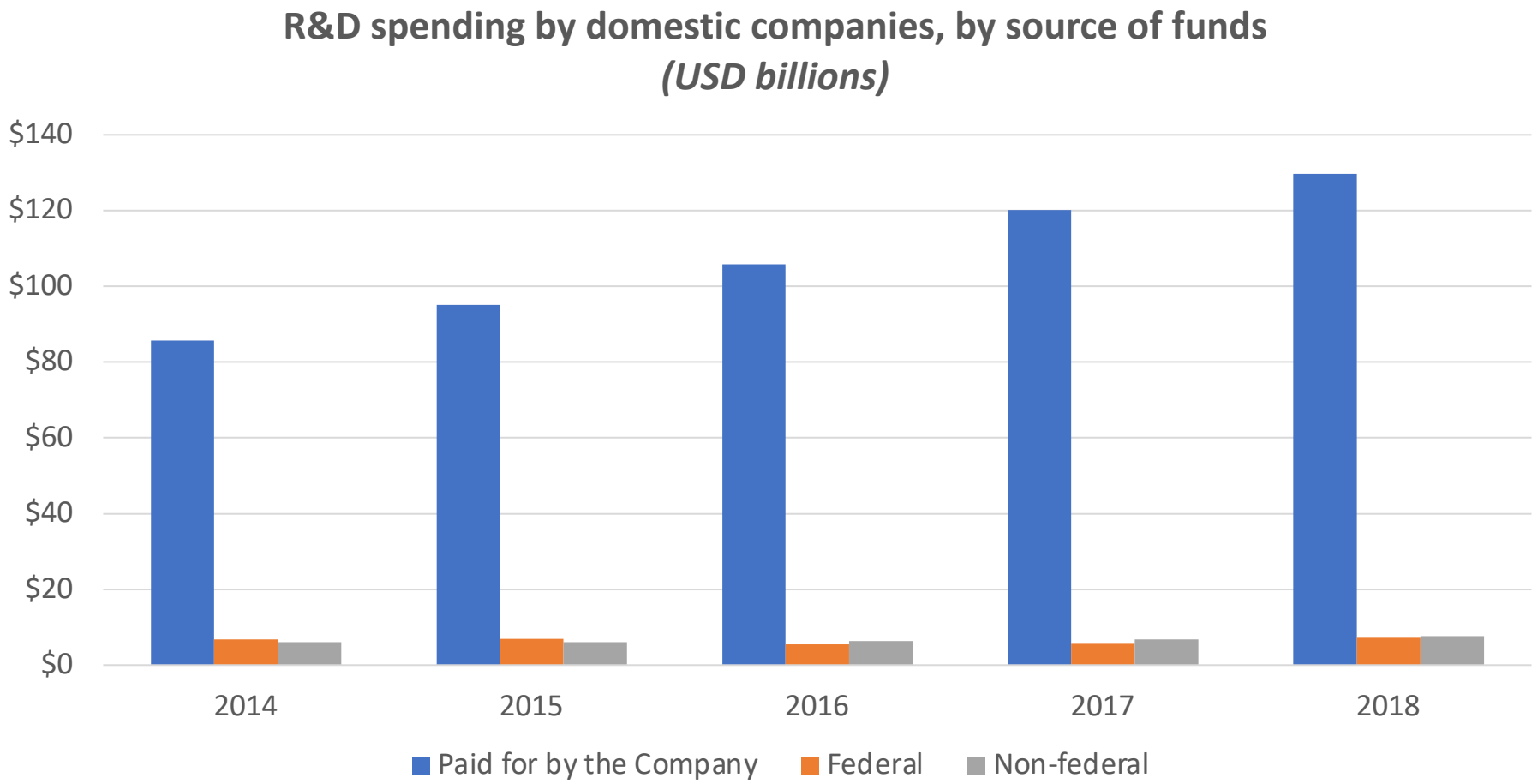
Most R&D in California is performed by industry



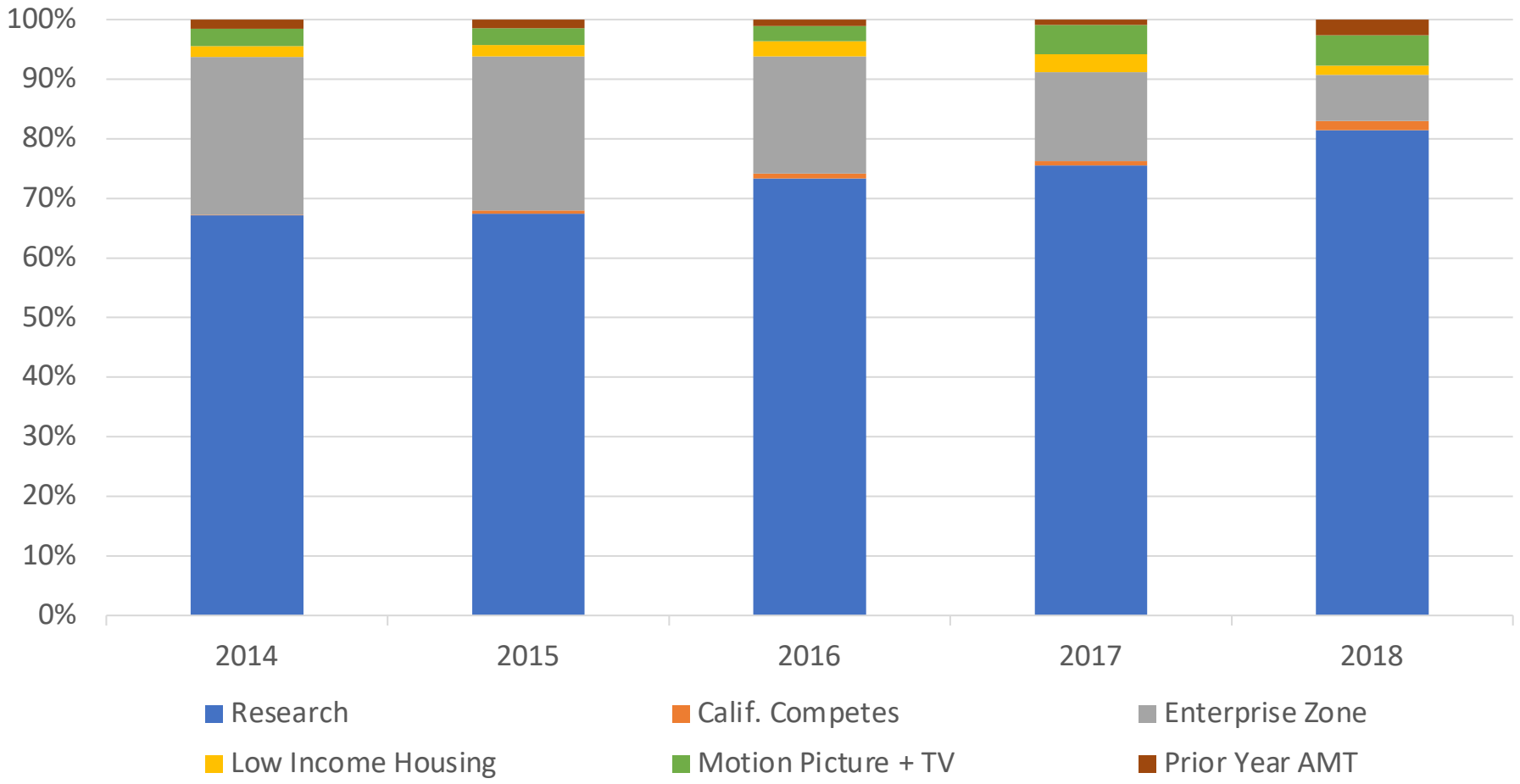
Source: National Science Foundation - Business and Industry R&D (2018)

California companies mostly fund their own R&D



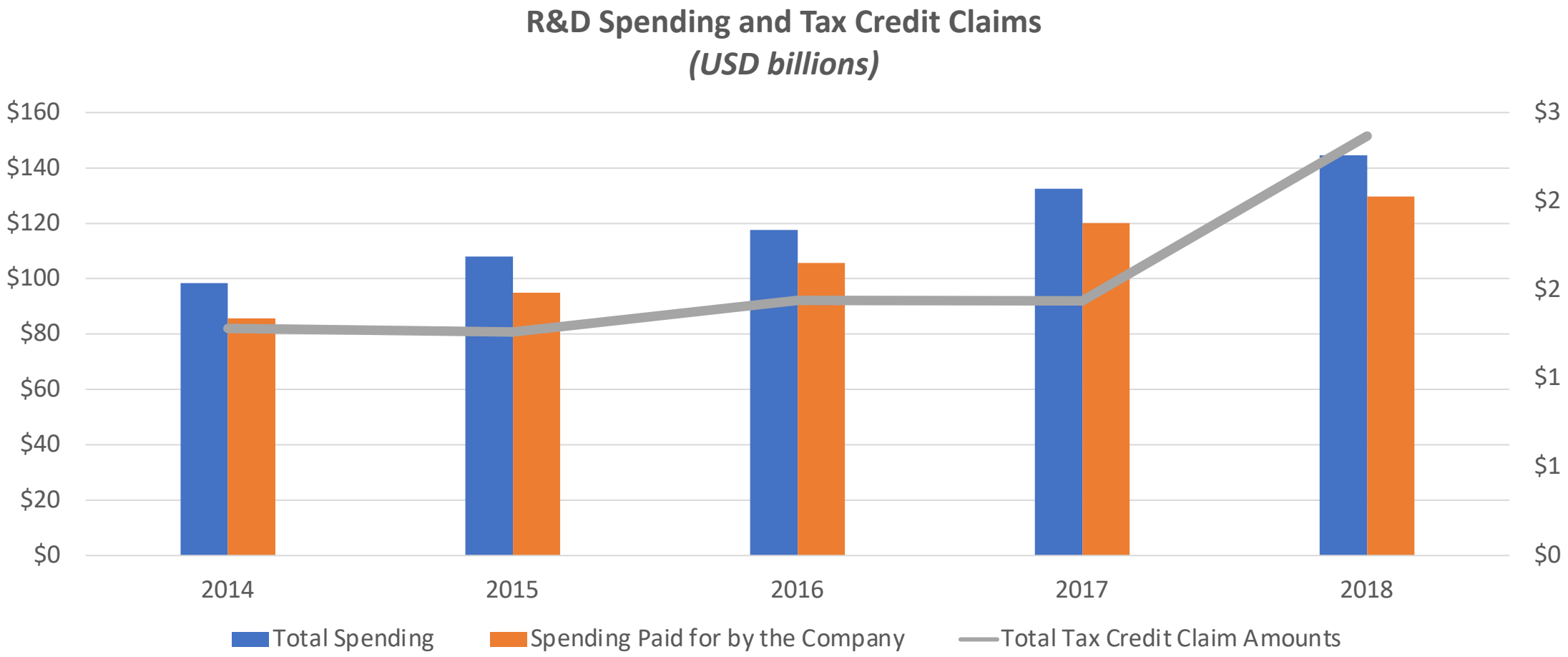
Source: National Science Foundation - Business and Industry R&D (2018)

R&D is California's most popular tax credit



Source: California Franchise Tax Board (FTB) Annual Reports, 2015–2019

Total R&D tax credit claims have generally risen in line with total R&D spending



Source: California Franchise Tax Board (FTB) Annual Reports, 2015–2019

What constitutes R&D activity?
Filing Tax Credit Claims (California FTB Form 3523)

- **Qualified Research Expenses**
  - Undertaken to discover new technology or to develop improved business component
  - Must involve a process of experimentation
  - May be in-house or paid to non-employees (*e.g.,* contract research organizations, cloud computing to support research activities)
- **Wages**
  - Engaging in qualified research or direct supervision/support of research activities
  - Over 80 percent of employees' working hours spent on R&D
  - Frequent audits: base period calculations, state location of contractors, senior level jobs
- **Supplies**
  - Tangible property other than land or improvements to land
  - Must be subject to allowance for depreciation

California among many states with R&D tax credits

	Since	Base Amt	Credit Rate	Limit	Carry	Refund
California	1987	R&D percentage of gross receipts	• 15% above base amount • 24% of basic research payments	$5M *(as of 2020)*	N/A *(as of 2020)*	No
Colorado	1986	Spending within Enterprise Zone	• 3% of increase over prior 2 years	N/A	Unlimited	No
Delaware	2003	Spending over receipts for 4 years	• Standard: 10% over base amount or 50% apportioned share of fed credit • SME: 20% over base amount or 100% apportioned share of fed tax credit	50% of federal credit *($5M cap removed 2019)*	15 years	Yes
Maryland	2000	Spending over receipts for 4 years	• Basic: 3% under base amount • Growth: 10% over base amount	Basic prorated over $5.5M; Growth prorated over $6.5M	20 years	SME only
Massachusetts	1980s (revised 2015)	Gross receipts for 4 years	• 10% above base amount • 15% of basic research payments	100% of first $25K liability; 75% of excess	Unlimited *(first $25K)*; 15 years *(excess)*	No
Michigan	*Expired in 2012*					

Source: Milken Institute analysis of state-by-state R&D tax credits (2021)

But other states have fewer limits on R&D tax credits

	Since	Base Amt	Credit Rate	Limit	Carry	Refund
California	1987	R&D percentage of gross receipts	• 15% above base amount • 24% of basic research payments	$5M *(as of 2020)*	N/A *(as of 2020)*	No
Minnesota	1986	Gross receipts	• 10% up to $2 million • 2.5% above $2 million	N/A	15 years	*S Corp only (2010-2012)*
New Jersey	1992	Spending over receipts for 4 years	• 10% above base amount • 10% of basic research payments	$15M (lifetime)	7 years *(up to 15)*	No
Oklahoma	*Expired in 2013*					
Oregon	*Expired in 2018*					
Rhode Island	1994	50% of tax due	• 22.5% up to $111,111 • 16.9% above $111,111	N/A	7 years	No
Texas	2014	50% avg receipts for 3 years	• 5% above base amount • 3.125% of total spending if no R&D spending in one or more of 3 years	50% of franchise tax due	20 years	No
Washington	*Expired in 2014*					

Source: Milken Institute analysis of state-by-state R&D tax credits (2021)

California's level of industry R&D spending is No. 1 nationwide by a wide margin

	Total *(USD billions)*	Paid for by company	Federally funded	Non-federally funded**
California*	$144.5 (No. 1)	89.7% (No. 15)	5.0%	5.3%
Colorado*	$5.0	85.2%	10.2%	4.6%
Delaware*	$2.4	60.3%	0.4%	39.3%
Maryland*	$6.0	70.3%	22%	7.7%
Massachusetts*	$27.3	82.8%	2.4%	14.8%
Michigan	$22.4	90.7%	1.2%	8.2%
Minnesota*	$7.4	94.8%	1.9%	3.3%

** signifies state has an active R&D tax credit program*

*** includes foreign parent companies of US subsidiaries, state government agencies and labs, academic institutions, and other organizations.*

Source: National Science Foundation - Business and Industry R&D (2018)

California's share of industry-funded R&D comparable to other states with tax credits

	Total *(USD billions)*	Paid for by company	Federally funded	Non-federally funded**
California*	$144.5 (No. 1)	89.7% (No. 15)	5.0%	5.3%
New Jersey*	$20.2	83.2%	0.9%	15.9%
Oklahoma	$0.9	94.7%	1.5%	3.9%
Oregon	$8.8	96.5%	0.9%	2.6%
Rhode Island*	$0.7	94.3%	4.1%	2.4%
Texas*	$20.9	87.3%	2.9%	9.9%
Washington	$30.3	97.3%	0.6%	2.1%

** signifies state has an active R&D tax credit program*

*** includes foreign parent companies of US subsidiaries, state government agencies and labs, academic institutions, and other organizations.*

Source: National Science Foundation - Business and Industry R&D (2018)

Silicon Valley accounts for major R&D spending but state also has substantial assets in non-tech sectors

	California Total (USD billions)	Pct. of Total	National Total (USD billions)	Pct. of Total
Manufacturing	**$67.0**	**52%**	**$234.7**	**62%**
Chemicals (incl. pharma)	$15.9	12%	$73.6	19%
Machinery	$3.2	2%	$13.8	4%
Computers + electronics	$36.3	28%	$73.9	20%
Transport equipment	$4.9	4%	$35.9	10%
Non-manufacturing	**$62.7**	**48%**	**$143.1**	**38%**
Information	$50.1	39%	$93.5	25%
Prof, sci & tech services	$5.8	4%	$22.4	6%

Industries defined by NAICS Code (3- and 4-digit)
Source: National Science Foundation - Business and Industry R&D (2018)

R&D spending supports job creation across a variety of industries that benefit from new technologies

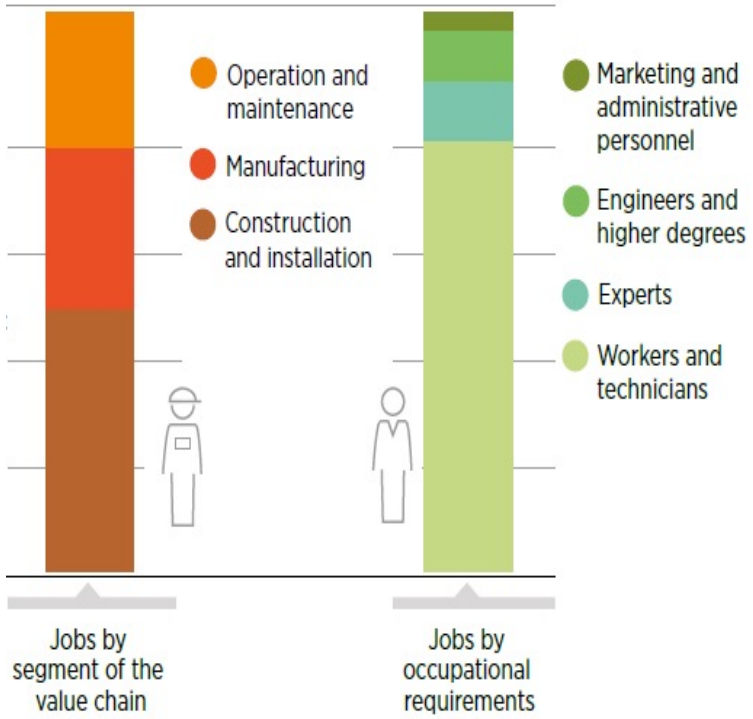
	Computers & mathematics	Architecture & engineering	Life & physical science	Arts, design & media
California Jobs	640,210	331,090	188,940	294,960
National Jobs	4,587,700	2,515,040	1,296,060	1,857,500
California Job Concentration*	1.18	1.11	1.23	1.34
California Avg Income	$116,820	$105,310	$90,800	$80,590
National Avg Income	$96,770	$90,300	$79,360	$64,400

**Note: Job concentration measured by Location Quotient (LQ). If > 1, industry has a larger relative share of area employment than it does nationwide.*

Source: US Bureau of Labor Statistics - Occupational Employment Statistics (2020)

R&D investment generates new technologies that create different types of jobs

- **Directly supports job creation** ***in the lab***
  - Analysts
  - Engineers
  - Scientists
- **Indirectly supports job creation** ***outside the lab***
  - Maintenance technicians
  - Marketing and advertising
  - Office managers and sales associates
  - Technology operators



Source: International Renewable Energy Agency - Global Renewables Outlook: Energy Transformation 2050 (April 2020)

Computers & Mathematics

Largest share of R&D-supported jobs in California

	California Jobs	Jobs per 100k	Avg Income
Computer systems analysts	62,640	381	$115,760
Info security analysts	10,470	111	$125,990
Comp + Info research scientists	7,170	93	$150,830
Computer network architects	19,650	120	$133,970
Computer programmers	21,800	133	$107,300
Software developers + QA analysts	249,700	1,520	$137,620
Web developers	22,020	145	$94,960
Data scientists	9,510	58	$129,060

Source: US Bureau of Labor Statistics - Occupational Employment Statistics (2020)

Architecture & Engineering

High salaries across all occupations, including technicians

	California Jobs	Jobs per 100k	Avg Income
Aerospace engineers	10,200	62	$126,650
Bioengineers + biomedical engineers	2,330	14	$106,700
Chemical engineers	1,910	12	$111,070*
Computer hardware engineers	15,140	92	$153,730
Electrical engineers	26,360	160	$124,390
Electronics engineers	22,010	134	$128,030
Aerospace technicians	2,280	14	$74,610
Electrical + electronic technicians	21,480	131	$73,810

** signifies Calif. Avg Income lower than National Avg Income*

Source: US Bureau of Labor Statistics - Occupational Employment Statistics (2020)

Life & Physical Sciences

Large number of jobs beyond the pharmaceutical sector

	California Jobs	Jobs per 100k	Avg Income
Biochemists + biophysicists	7,650	47	$115,110
Microbiologists	4,180	26	$116,630
Biological scientists	11,790	72	$101,040
Medical scientists	22,170	135	$116,230
Biological technicians	8,600	52	$54,510
Chemical technicians	7,070	43	$50,710*

** signifies Calif. Avg Income lower than National Avg Income*

Source: US Bureau of Labor Statistics - Occupational Employment Statistics (2020)

Arts, Design & Media

Many jobs don't require college degrees or academic credentials

	California Jobs	Jobs per 100k	Avg Income
Special effects artists and animators	11,460	70	$105,480
Commercial and industrial designers	4,060	25	$88,240
Audio and video technicians	9,980	61	$67,500
Broadcast technicians	2,790	17	$53,770
Sound engineering technicians	3,300	20	$84,910
Camera operators	3,700	23	$80,240
Film and video editors	7,990	49	$107,300
Lighting technicians and media and communication equipment workers	9,210	56	$75,730

Source: US Bureau of Labor Statistics - Occupational Employment Statistics (2020)

R&D supports a notable proportion of the workforce in multiple California metros

	Computers & Mathematics	Architecture & Engineering	Life & Physical Sciences	Arts, Design & Media
Bakersfield	1.4%	2.7%	1.2%	0.7%
Fresno	0.9%	0.9%	0.9%	0.9%
L.A.-Long Beach-Anaheim	3.0%	1.8%	0.8%	2.8%
Riverside-San Bernardino	1.2%	1.1%	0.7%	0.7%
Sacramento	3.5%	1.7%	1.5%	1.1%
San Diego	3.9%	2.7%	1.8%	1.2%
San Francisco-Oakland	6.8%	2.4%	1.7%	1.9%
San Jose	13.1%	4.7%	1.3%	1.8%

Source: US Bureau of Labor Statistics - Occupational Employment Statistics (2020)

Many R&D-supported occupations are growing fast

Projected Job Growth by Metro Area: 2018 to 2028

	Fastest-Growing Occupations	Pct. Change	Median Wage
Anaheim-Santa Ana	Occupational Therapy Assistants ***Information Security Analysts***	+52.0% ***+31.2%***	$75,190 ***n/a***
Bakersfield	Solar Photovoltaic Installers ***Wind Turbine Service Technicians***	+65.2% ***+58.3%***	$41,948 ***$60,782***
Fresno	Nurse Practitioners	+64.3%	$134,270
Los Angeles-Long Beach	Personal Care Aides ***Statisticians***	+46.3% ***+37.4%***	n/a ***$96,582***
Oakland	Nurse Practitioners ***Software Developers***	+45.0% ***+36.1%***	$136,841 ***n/a***

Employment projections are developed using models based on historical data through 2018; all input data precede the COVID-19 pandemic.

Source: California Employment Development Department – Employment Projections (April 2021)

Many R&D-supported occupations are growing fast

Projected Job Growth by Metro Area: 2018 to 2028

	Fastest-Growing Occupations	Pct. Change	Median Wage
Riverside-San Bernardino	Machine Feeders and Offbearers ***Software Developers***	+46.0% ***+29.9%***	$32,923 ***n/a***
Sacramento	Physician Assistants ***Operations Research Analysts***	+36.1% ***+27.5%***	$125,144 ***$77,977***
San Diego	Nurse Practitioners ***Statisticians***	+68.7% ***+43.2%***	$125,209 ***$111,021***
San Francisco	***Health Specialties Teachers***	***+49.1%***	***$198,189***
San Jose	***Statisticians***	***+39.5%***	***$113,861***

Employment projections are developed using models based on historical data through 2018; all input data precede the COVID-19 pandemic.
Source: California Employment Development Department – Employment Projections (April 2021)

R&D supports higher wages among fast-growing jobs

California Projected Job Growth: Q2 2020 to Q2 2022

	Pct. Change	Median Wage
Food Preparation and Serving	+29.7%	$28,018
Personal Care and Service	+15.9%	$30,408
Healthcare Support	+15.4%	$29,779
Sales	+14.9%	$34,374
Transportation and Material Moving	+14.6%	$34,260
Arts, Design & Media	+13.2%	$62,666

	Pct. Change	Median Wage
Farming, Fishing & Forestry	+11.1%	$26,475
Construction and Extraction	+10.9%	$58,399
Management	+10.1%	$124,283
Installation, Maintenance & Repair	+10.0%	$52,758
Building and Grounds Maintenance	+9.8%	$33,590
Computers and Mathematics	+9.5%	$109,142

Employment projections are based on data from the US Bureau of Labor Statistics (CES, QCEW, and OES).
Source: California Employment Development Department (March 2021)

Where does California go from here?
Reconsidering the R&D Tax Credit

- **Sustaining Business R&D Spending in California**
  - Evidence that incentives have been a key component of supporting business R&D
  - R&D spending has supported high-tech business formation and high-wage job creation
  - Spending has also generated job creation in occupations that require fewer credentials as well as in non-tech-intensive industries

- **R&D Policy Requires a Long-Term Outlook**
  - Companies favor a more predictable policy environment; changes to tax credit in 2020 were approved during a period of significant uncertainty
  - Research spending relies on longer-term planning, so any activities relocated outside California may take longer to return (if they return at all)

Where does California go from here?
Additional policy options for consideration

- **Refund credits for small businesses**
  - Example: Maryland SMEs (with assets under $5 million) can receive a refund for R&D credits that exceed tax liabilities
  - Total refunded credits could be capped each fiscal year; need more information on share of unused research credits earned by small businesses

- **Expanded credits for university research**
  - Example: Arizona firms that make basic research payments to a public university are eligible for additional credit of 10%
  - In addition to reducing universities' marginal research costs, can establish job opportunities (and potential career pathways) for local graduates

Source: "California's Innovation-Based Economy: Policies to Maintain and Enhance It" (Milken Institute, 2015)