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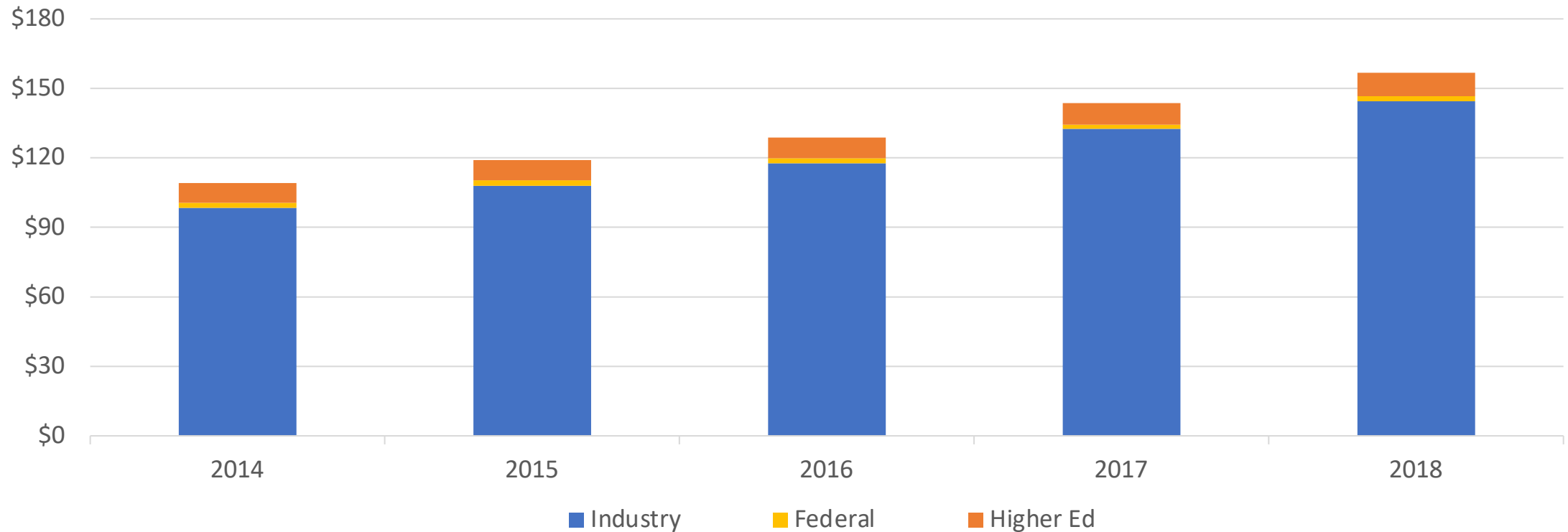
SUSTAINING BUSINESS R&D SPENDING IN CALIFORNIA

Milken Institute Center for Regional Economics and California Center

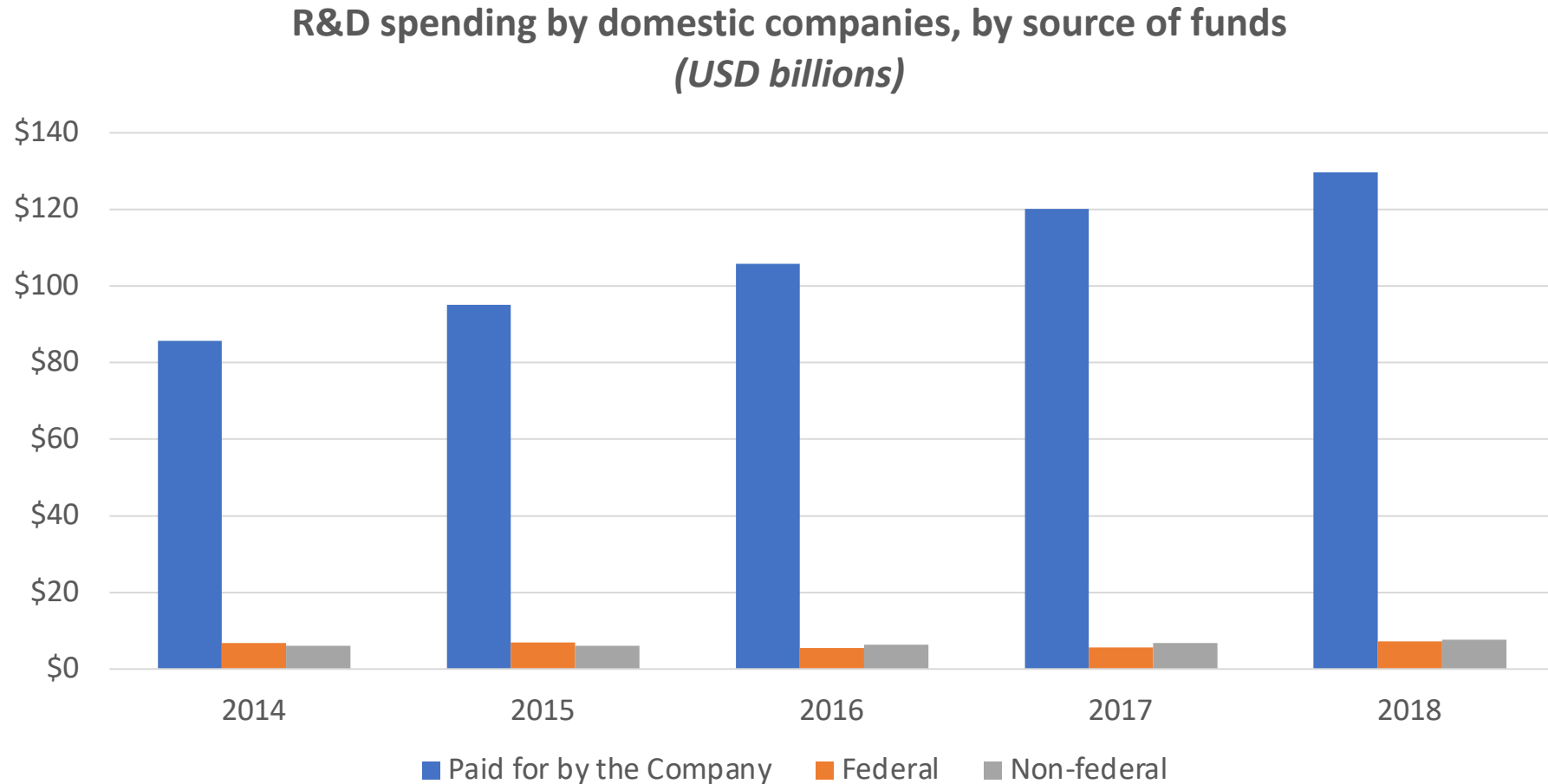
May 2021

Most R&D in California is performed by industry

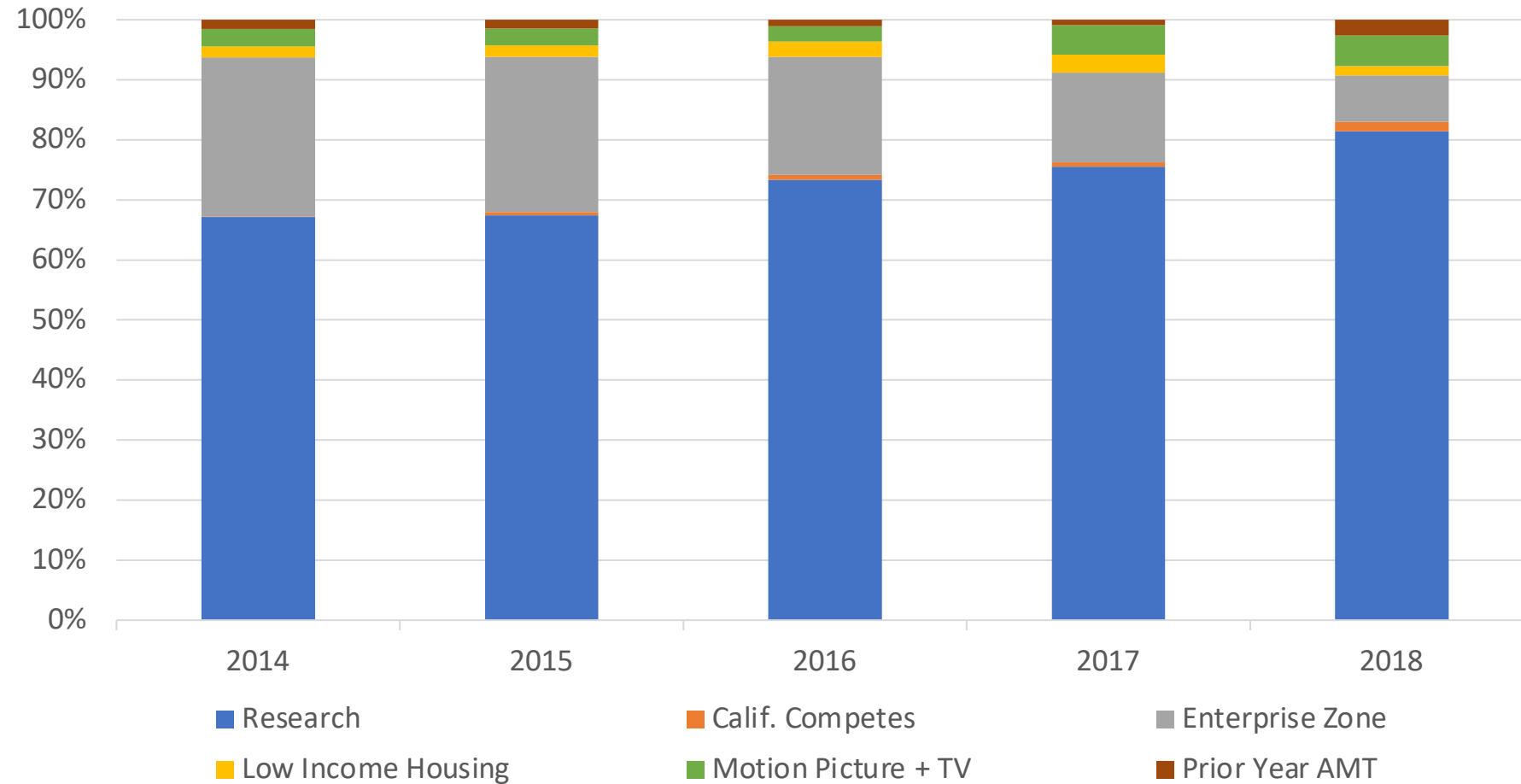
Total spending on R&D in California, by performer
(USD Billions)



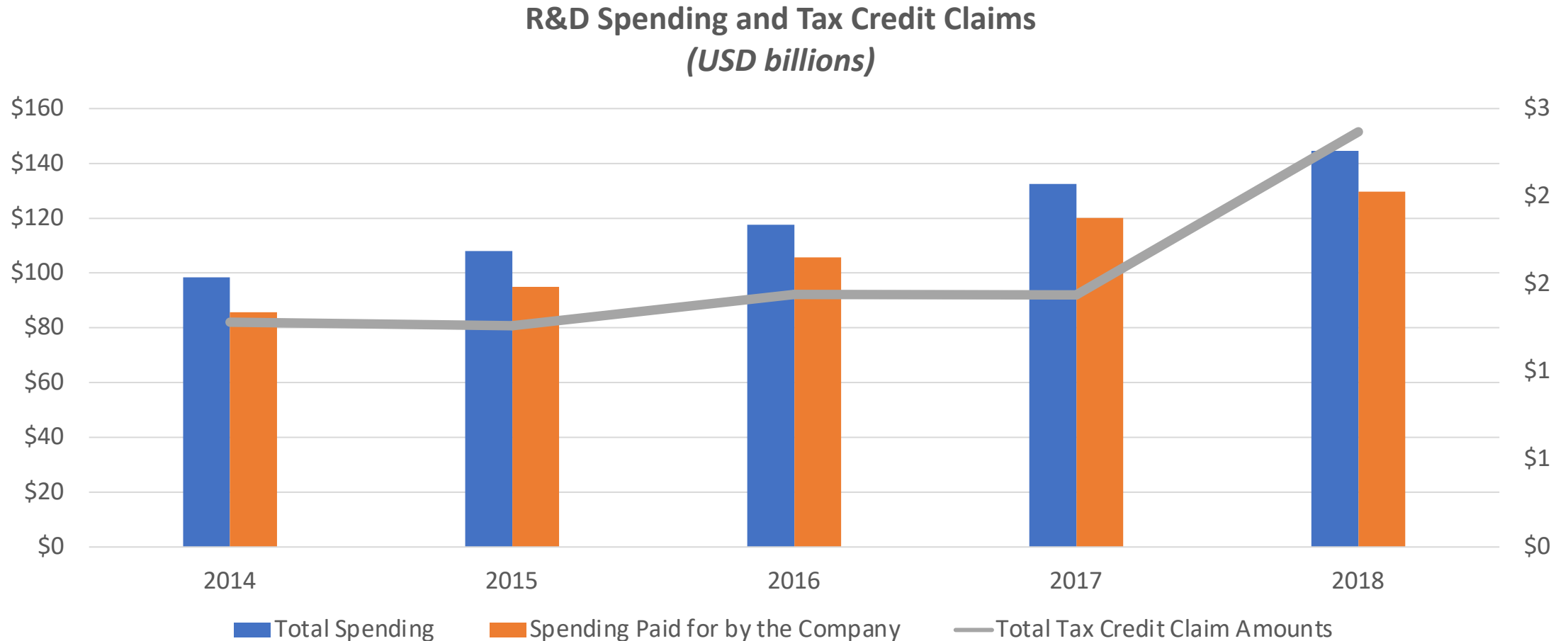
California companies mostly fund their own R&D



R&D is California's most popular tax credit



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



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	<ul style="list-style-type: none"> 15% above base amount 24% of basic research payments 	\$5M <i>(as of 2020)</i>	N/A <i>(as of 2020)</i>	No
Colorado	1986	Spending within Enterprise Zone	<ul style="list-style-type: none"> 3% of increase over prior 2 years 	N/A	Unlimited	No
Delaware	2003	Spending over receipts for 4 years	<ul style="list-style-type: none"> 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 <i>(\$5M cap removed 2019)</i>	15 years	Yes
Maryland	2000	Spending over receipts for 4 years	<ul style="list-style-type: none"> 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 <i>(revised 2015)</i>	Gross receipts for 4 years	<ul style="list-style-type: none"> 10% above base amount 15% of basic research payments 	100% of first \$25K liability; 75% of excess	Unlimited <i>(first \$25K);</i> 15 years <i>(excess)</i>	No
Michigan	<i>Expired in 2012</i>					

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	<ul style="list-style-type: none"> 15% above base amount 24% of basic research payments 	\$5M <i>(as of 2020)</i>	N/A <i>(as of 2020)</i>	No
Minnesota	1986	Gross receipts	<ul style="list-style-type: none"> 10% up to \$2 million 2.5% above \$2 million 	N/A	15 years	<i>S Corp only (2010-2012)</i>
New Jersey	1992	Spending over receipts for 4 years	<ul style="list-style-type: none"> 10% above base amount 10% of basic research payments 	\$15M (lifetime)	7 years <i>(up to 15)</i>	No
Oklahoma	<i>Expired in 2013</i>					
Oregon	<i>Expired in 2018</i>					
Rhode Island	1994	50% of tax due	<ul style="list-style-type: none"> 22.5% up to \$111,111 16.9% above \$111,111 	N/A	7 years	No
Texas	2014	50% avg receipts for 3 years	<ul style="list-style-type: none"> 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	<i>Expired in 2014</i>					

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

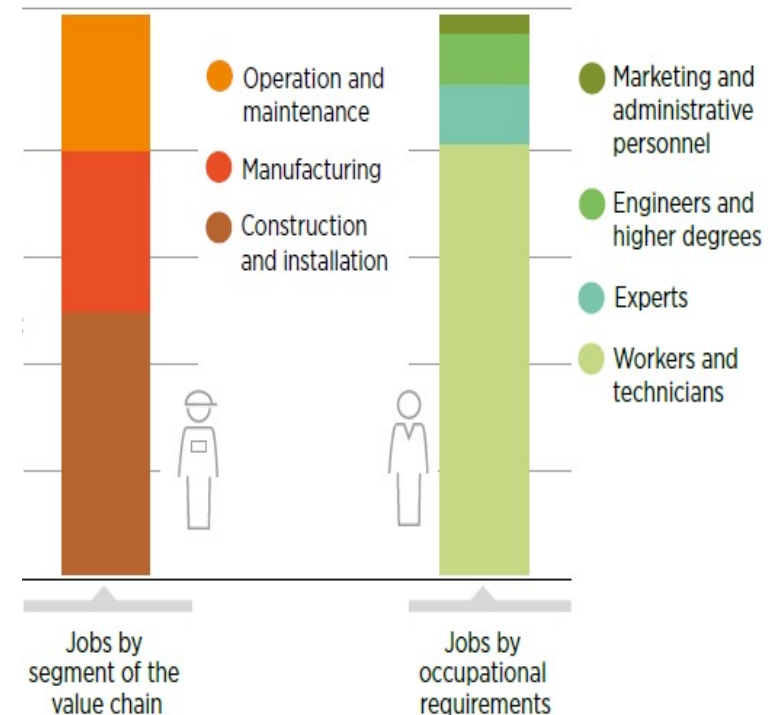
	Computers & mathematics	Architecture & engineering	Life & physical science	Arts, design & media
California Jobs	640,210	331,090	188,940	294,960
National Jobs	4,587,700	2,515,040	1,296,060	1,857,500
California Job Concentration*	1.18	1.11	1.23	1.34
California Avg Income	\$116,820	\$105,310	\$90,800	\$80,590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



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

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

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%

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 <i>Information Security Analysts</i>	+52.0% +31.2%	\$75,190 <i>n/a</i>
Bakersfield	Solar Photovoltaic Installers <i>Wind Turbine Service Technicians</i>	+65.2% +58.3%	\$41,948 \$60,782
Fresno	Nurse Practitioners	+64.3%	\$134,270
Los Angeles-Long Beach	Personal Care Aides <i>Statisticians</i>	+46.3% +37.4%	n/a \$96,582
Oakland	Nurse Practitioners <i>Software Developers</i>	+45.0% +36.1%	\$136,841 <i>n/a</i>

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 <i>Software Developers</i>	+46.0% +29.9%	\$32,923 <i>n/a</i>
Sacramento	Physician Assistants <i>Operations Research Analysts</i>	+36.1% +27.5%	\$125,144 \$77,977
San Diego	Nurse Practitioners <i>Statisticians</i>	+68.7% +43.2%	\$125,209 \$111,021
San Francisco	<i>Health Specialties Teachers</i>	+49.1%	\$198,189
San Jose	<i>Statisticians</i>	+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		Pct. Change	Median Wage
Food Preparation and Serving	+29.7%	\$28,018	Farming, Fishing & Forestry	+11.1%	\$26,475
Personal Care and Service	+15.9%	\$30,408	Construction and Extraction	+10.9%	\$58,399
Healthcare Support	+15.4%	\$29,779	Management	+10.1%	\$124,283
Sales	+14.9%	\$34,374	Installation, Maintenance & Repair	+10.0%	\$52,758
Transportation and Material Moving	+14.6%	\$34,260	Building and Grounds Maintenance	+9.8%	\$33,590
Arts, Design & Media	+13.2%	\$62,666	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