



Compendium of key analyses for Kentucky

Collaborative Blueprint created by and for Kentucky's Economic Developers

December 2023



Overview of this document

This document contains the following from the Collaborative Blueprint deliverables:

- Economic overview of Kentucky, focusing on 5 parts: Sectors & Firms, Talent & Human capital, Capital & Innovation, Infrastructure, Business climate, and Economic Development Operating Capabilities
- The Capital and Innovation section provides an overview of small business trends, and entrepreneurship and innovation metrics.
- Where applicable, the levers are analyzed through multiple lenses: state-wide, geographic breakdown, and by demographic group
- Data as of Dec 2023

Analyses were completed against a 6 part framework



- 1 Sectors & Firms**
- 2 Talent & Human capital**
- 3 Capital & Innovation**
- 4 Infrastructure**
- 5 Business climate**
- 6 Economic Development Operating Capabilities**

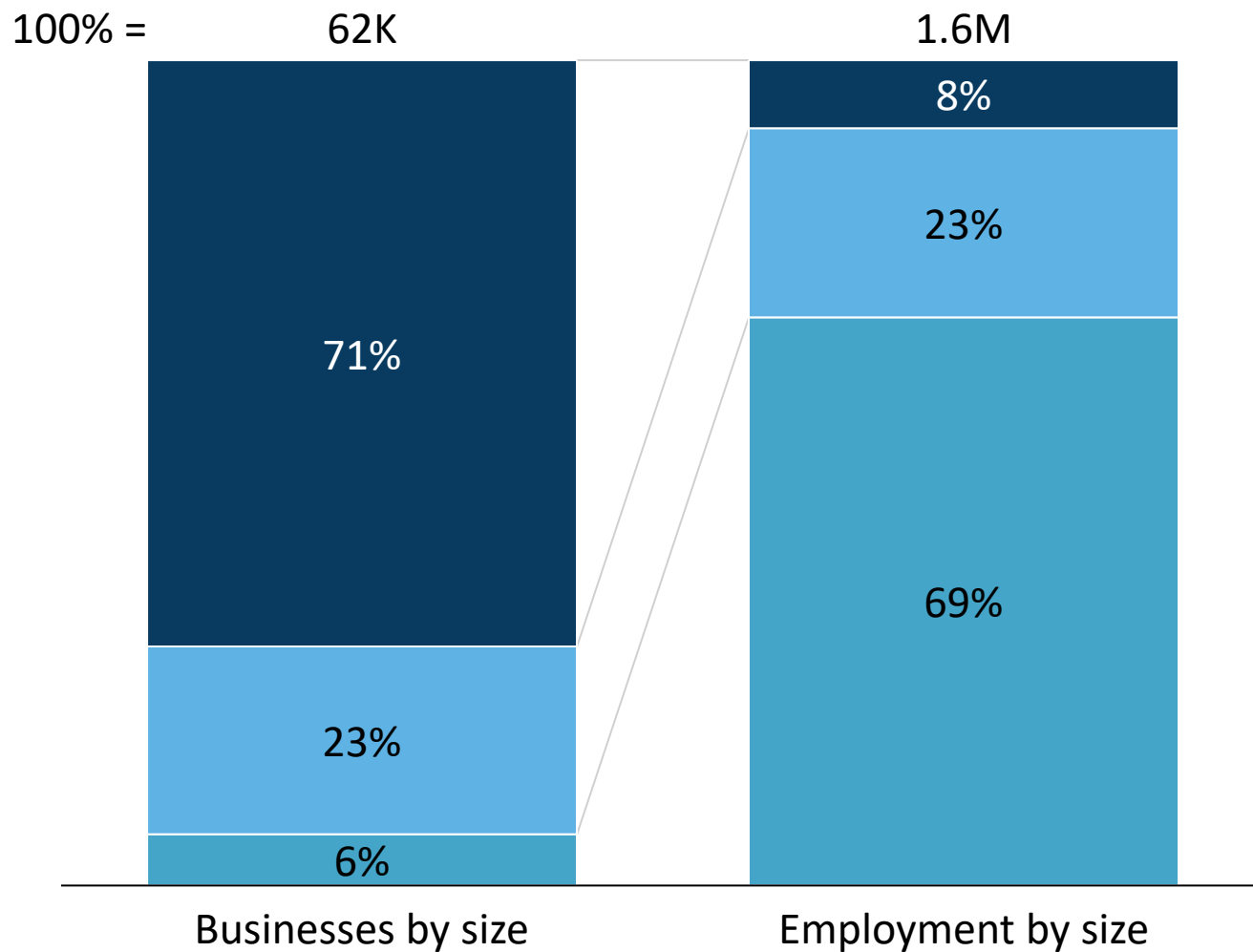
Where applicable, the levers are analyzed through multiple lenses: **state-wide, geographic breakdown, and by demographic group**

3. Capital and Innovation

Most businesses in Kentucky are small, while most employees work in larger established businesses

Annual Business Survey for Kentucky, 2019

- Small businesses (<10 employees)
- Second-stage growth businesses (10 to 99 employees)
- Established businesses (>100 employees)

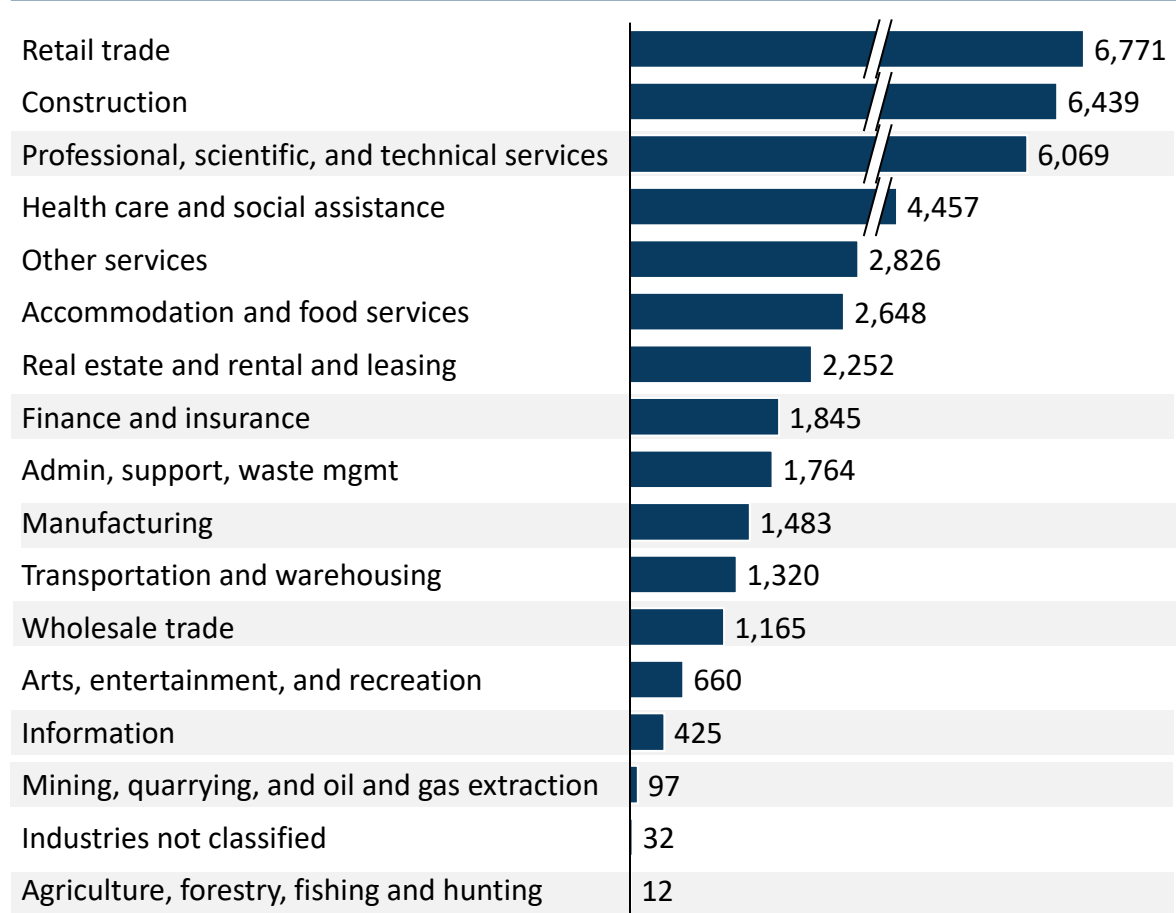


Kentucky's distributions are on par with peers and US national levels

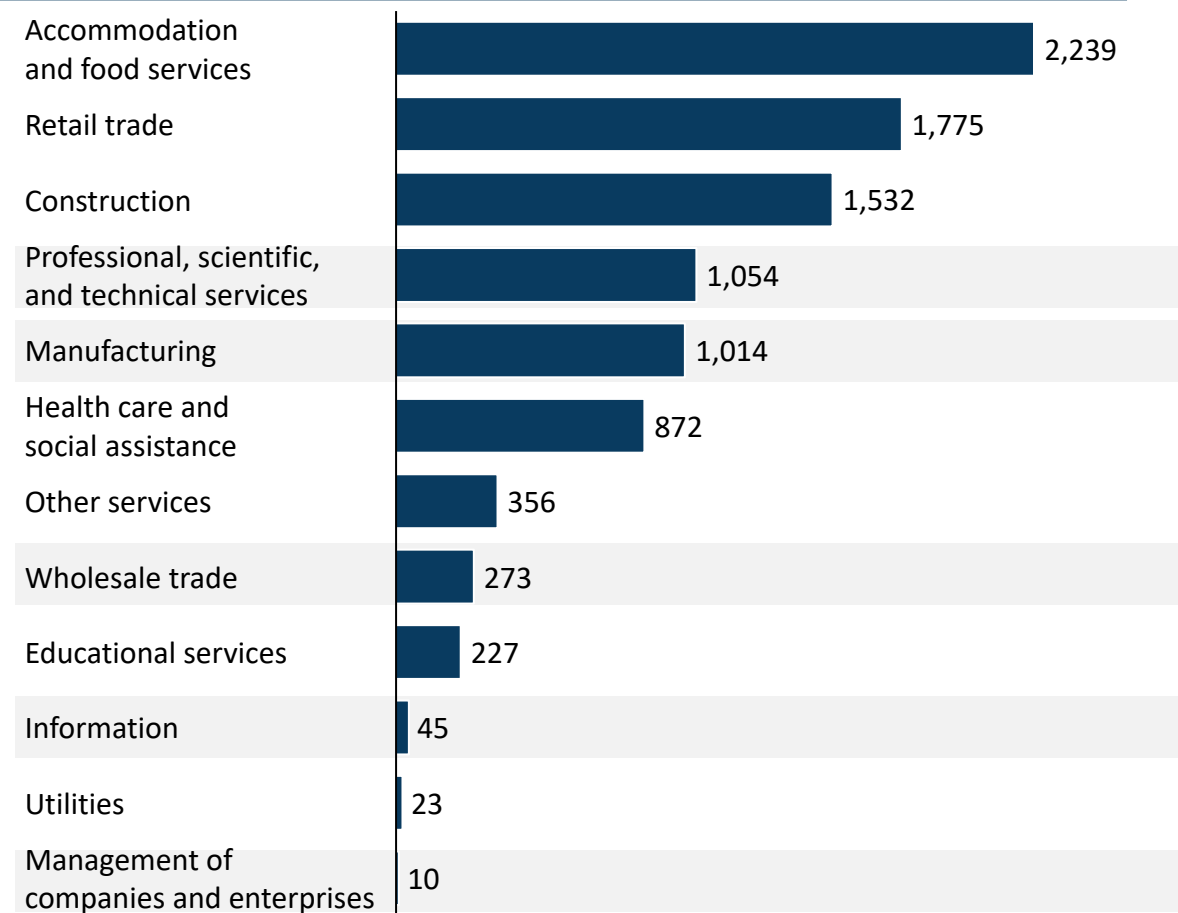
Most of Kentucky's small and second-stage growth businesses are in non-tradeable industries

Majority tradable industries

Number of small businesses¹ by industry, 2019



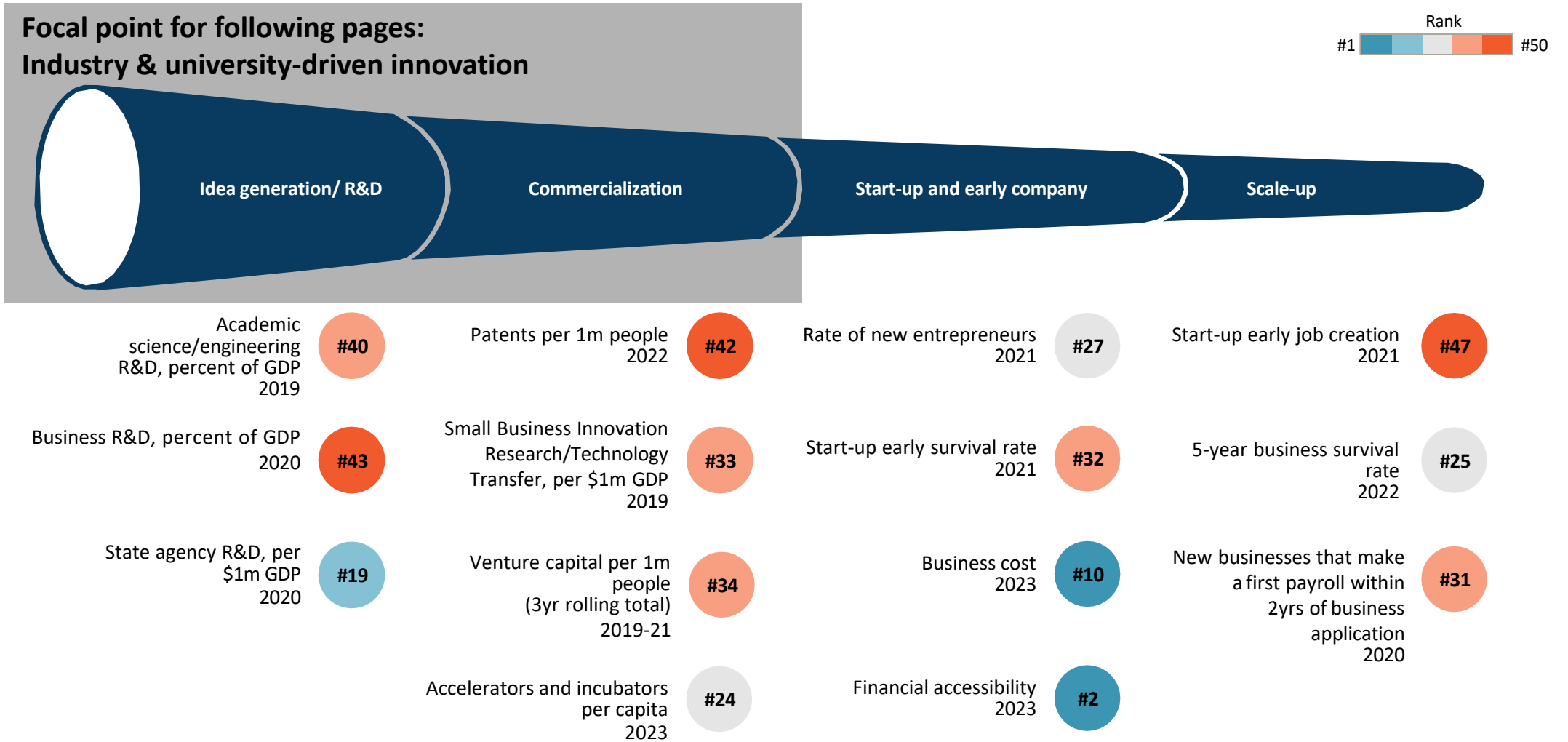
Number of second-stage growth businesses² by industry, 2019



1. Companies with <10 FTEs
2. Companies with 10-99 FTEs

Source: United States Census Bureau, Annual Business Survey, 2019
Data as of Dec 2023

Kentucky entrepreneurship and innovation-driven business creation and expansion outcomes: overview



Note: : Rate of 'new entrepreneurs' refers to the percent of the total number of new entrepreneurs who were not unemployed and not looking for a job as they started the new business | Business cost metric includes income tax, corporate tax, and property tax rates as of January 1, 2022 | Financial accessibility metric uses data from the Small Business Administration State Profiles to calculate the total amount of business funding available in 2021

Source: United States Patents and Trademarks Office (USPTO), National Science Foundation (NSF), Kauffman Indicators of Entrepreneurship, Moody's Analytics, PitchBook, Forbes Advisor [The Best States to Start a Business](#), Data as of Dec 2023

Kentucky corporate R&D spending is focused in Manufacturing

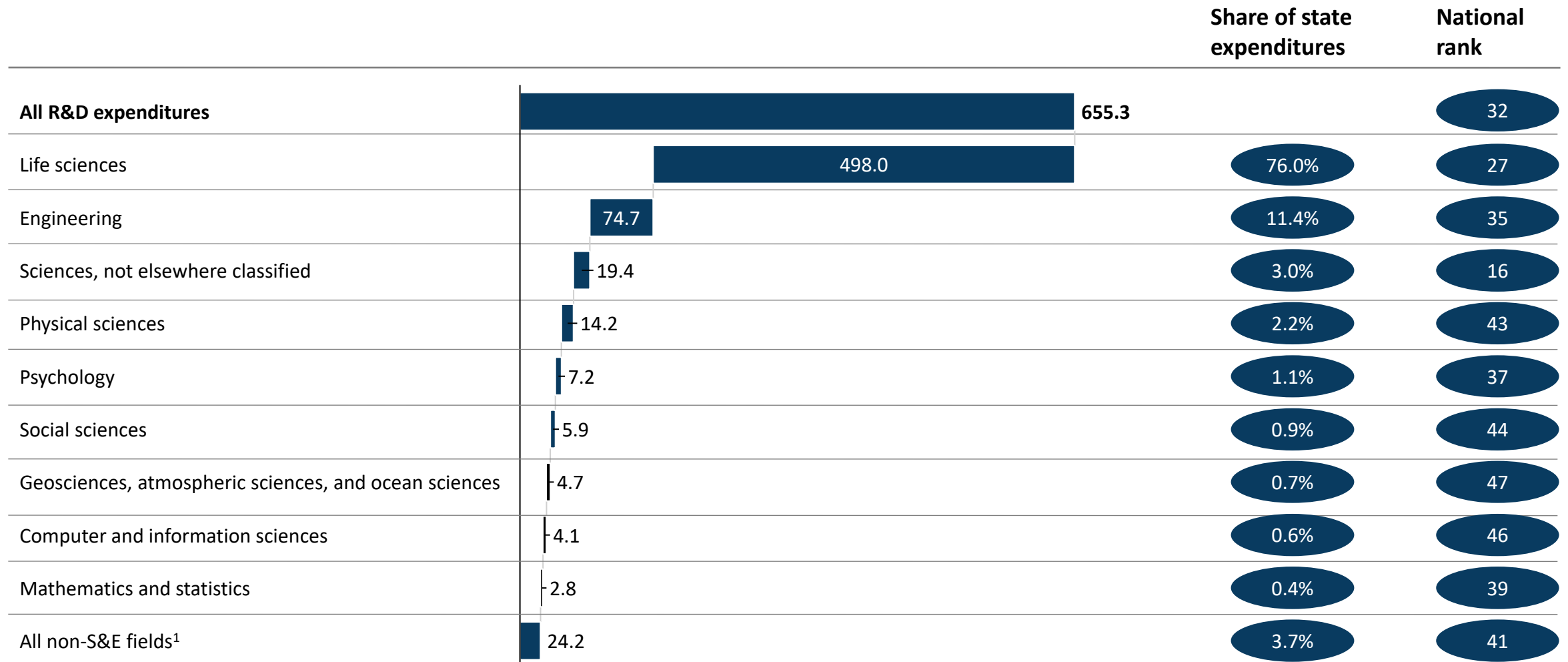
Domestic R&D paid for and performed by companies in KY, by industry¹, 2020, \$M

			% of KY's total corporate R&D	% of corporate R&D nationwide	Peer leader (% of corporate R&D nationwide)
All industries ¹	852			0.2%	North Carolina (2%)
Manufacturing industries	649		76.2%	0.2%	Indiana (3%)
Information	90		10.6%	0.1%	North Carolina (2%)
Finance and insurance	35	<p>Highest funded manufacturing sub-industries are:</p> <ul style="list-style-type: none"> • Chemicals (\$202M), over half of which goes to paint, coating, adhesive and other chemicals • Transportation equipment (\$107M), predominantly for motor vehicles, and • Machinery (\$61M) 	4.1%	0.3%	North Carolina (5%)
Professional, scientific, and technical services	28		3.3%	0.1%	North Carolina (3%)
Wholesale trade	5		0.6%	0.5%	North Carolina (7%)
Mining, quarrying, oil and gas extraction	1		0.1%	0.1%	Georgia (2%)
Transportation and warehousing	1		0.1%	0.0%	Tennessee (1%)
Health care services	1		0.1%	0.1%	Indiana (3%)

1. Industries will not sum to total due to data suppression within categories with limited survey responses

Kentucky's higher-education R&D expenditures are focused in Life Sciences

Higher educational R&D expenditures by field, 2021, \$M



Source: NSF, HERD Survey 2021, Data as of Dec 2023

1. Other non-science and engineering fields include Business management and business administration, Communication and communications technologies, Education; Humanities, Law, Social work, Visual and performing arts and other

R&D: Kentucky's R1 university R&D compared to peer state R1 institutions

■ Kentucky institutions

Kentucky & peer state¹ R1 institutions by total R&D expenditures, 2021

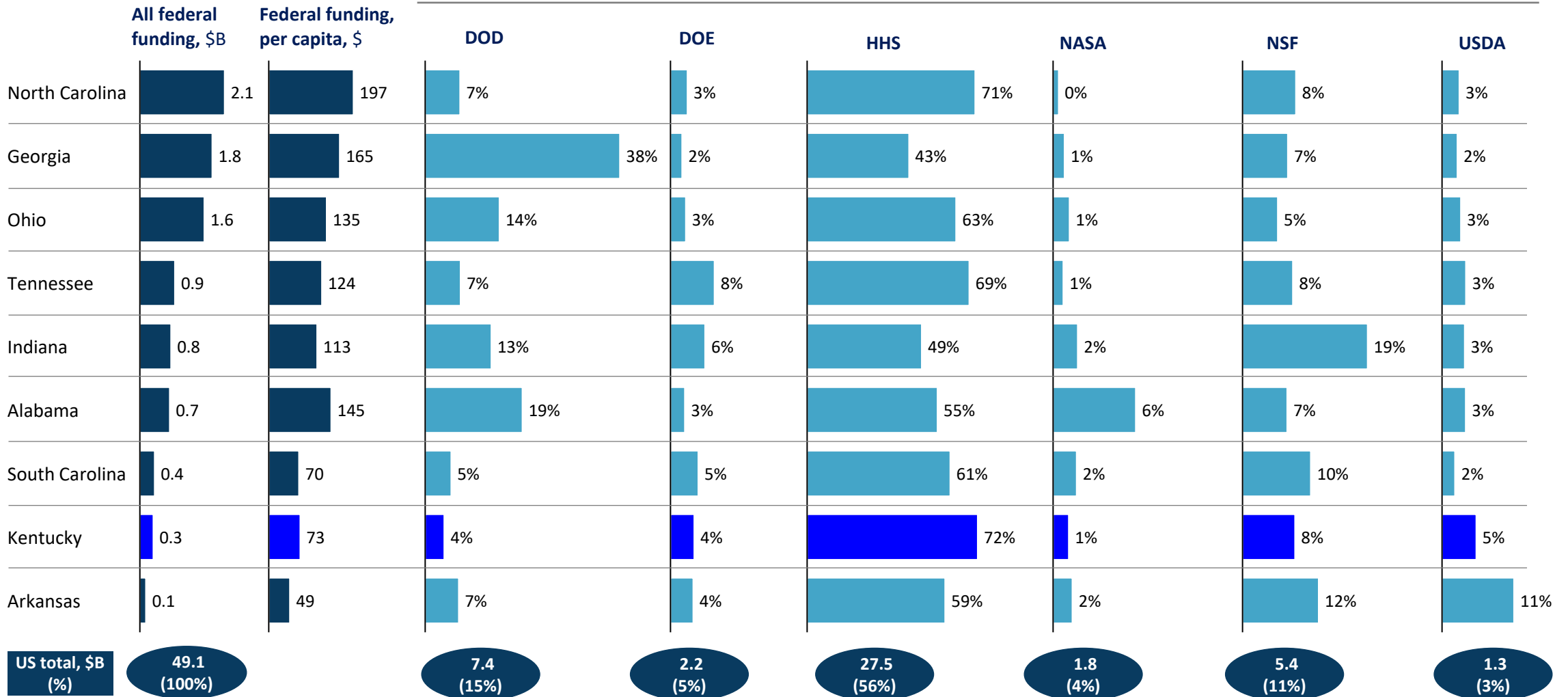
Peer Rank	Institution	State	National Rank	R&D spend \$M
1	Duke University	NC	11	1,238
2	Ohio State University-Main Campus	OH	12	1,236
3	University of North Carolina at Chapel Hill	NC	13	1,206
4	Georgia Institute of Technology-Main Campus	GA	20	1,114
5	Vanderbilt University	TN	24	1,019
6	Emory University	GA	31	853
7	Indiana University-Bloomington	IN	40	695
8	Purdue University-Main Campus	IN	41	679
9	University of Alabama at Birmingham	AL	44	644
10	University of Cincinnati-Main Campus	OH	51	552
11	North Carolina State University at Raleigh	NC	53	547
12	University of Georgia	GA	57	494
13	University of Kentucky	KY	64	429
14	Case Western Reserve University	OH	66	422
15	The University of Tennessee-Knoxville	TN	85	316
16	Auburn University	AL	100	266
17	University of Notre Dame	IN	106	240
18	Clemson University	SC	107	237
19	University of South Carolina-Columbia	SC	113	215
20	Georgia State University	GA	118	206
21	University of Louisville	KY	124	200
22	University of Arkansas	AR	140	164
23	University of Alabama in Huntsville	AL	145	150
24	The University of Alabama	AL	150	130
25	University of Memphis	TN	181	67
26	Kent State University at Kent	OH	205	50
27	Ohio University-Main Campus	OH	206	50

1. Peers include: AL, AR, GA, IN, NC, OH, SC, TN

R&D: Kentucky's federal funding for high-education R&D compared to peer states

Higher education R&D expenditures by source of federal funding¹, 2021

Share of state's federal funding for R&D, %



1. DOD = Department of Defense; DOE = Department of Energy; HHS = Department of Health and Human Services; NASA = National Aeronautics and Space Administration; NSF = National Science Foundation; USDA = Department of Agriculture.

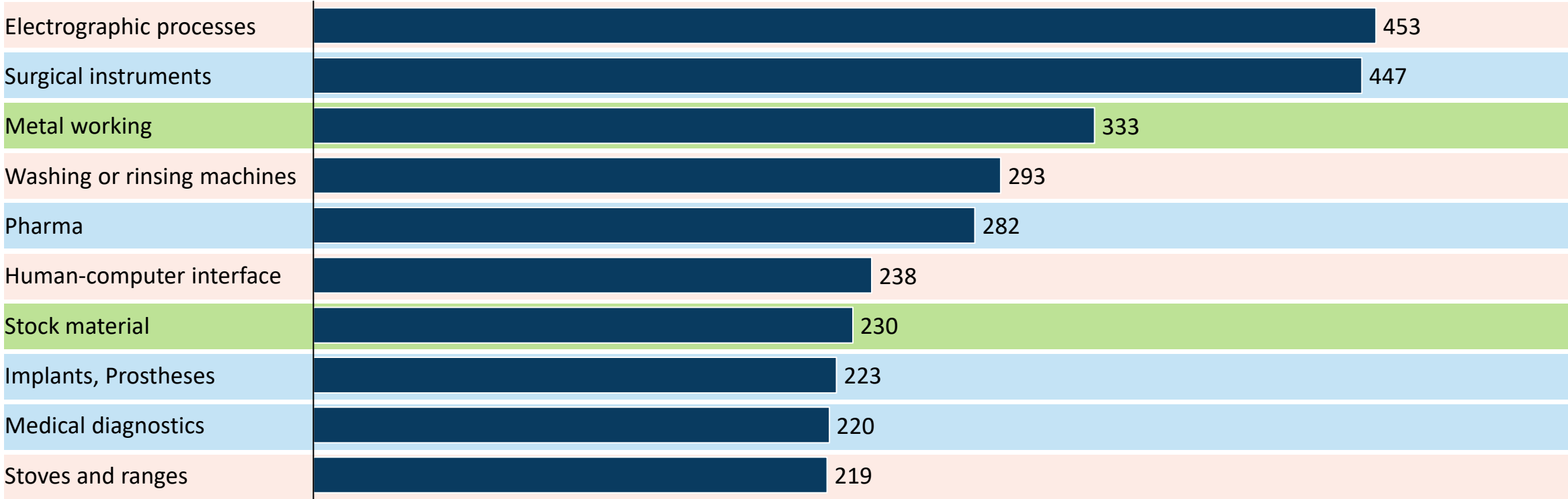
"All other" federal sources not included in chart, accounts for 7% of federal funding nationally

Source: National Science Foundation, Higher Education Research and Development Survey, Moody's Analytics, Data as of Dec 2023

Top themes for Kentucky patents granted: Manufacturing, Life Sciences, and Materials

Patent theme by Kentucky priority sectors: Manufacturing Life sciences Materials

Total patents granted, 2013-2022



Source: USPTO & McKinsey IP Analytics

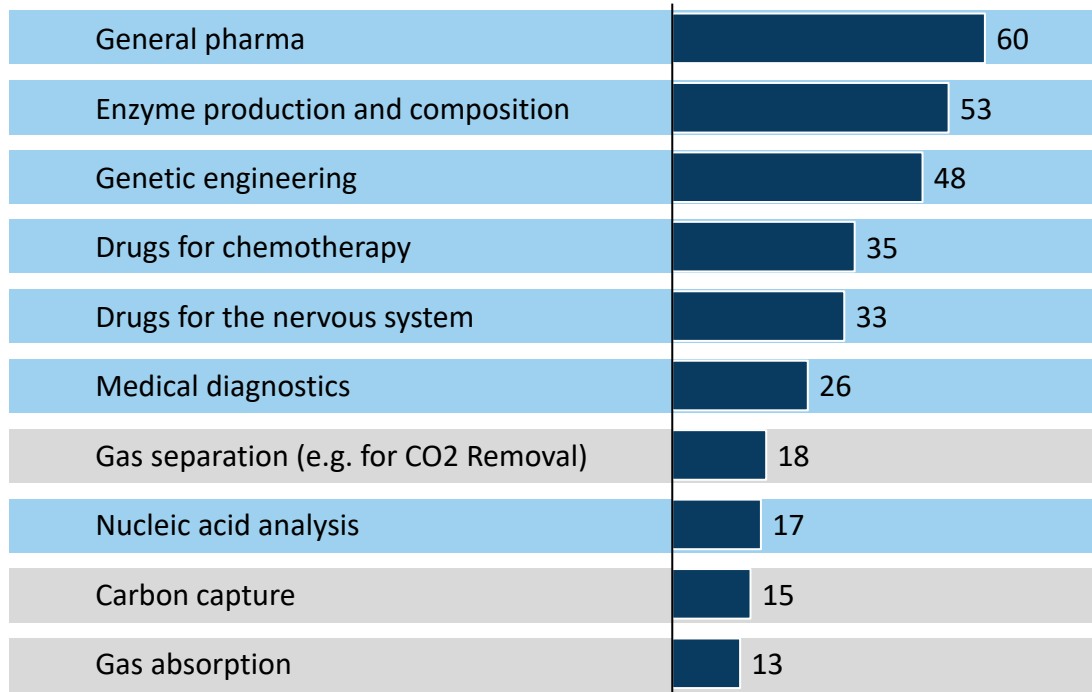
Data as of Dec 2023

Top themes for Kentucky R1 university patents granted: Life Sciences

Patent themes: ■ Life sciences ■ Other

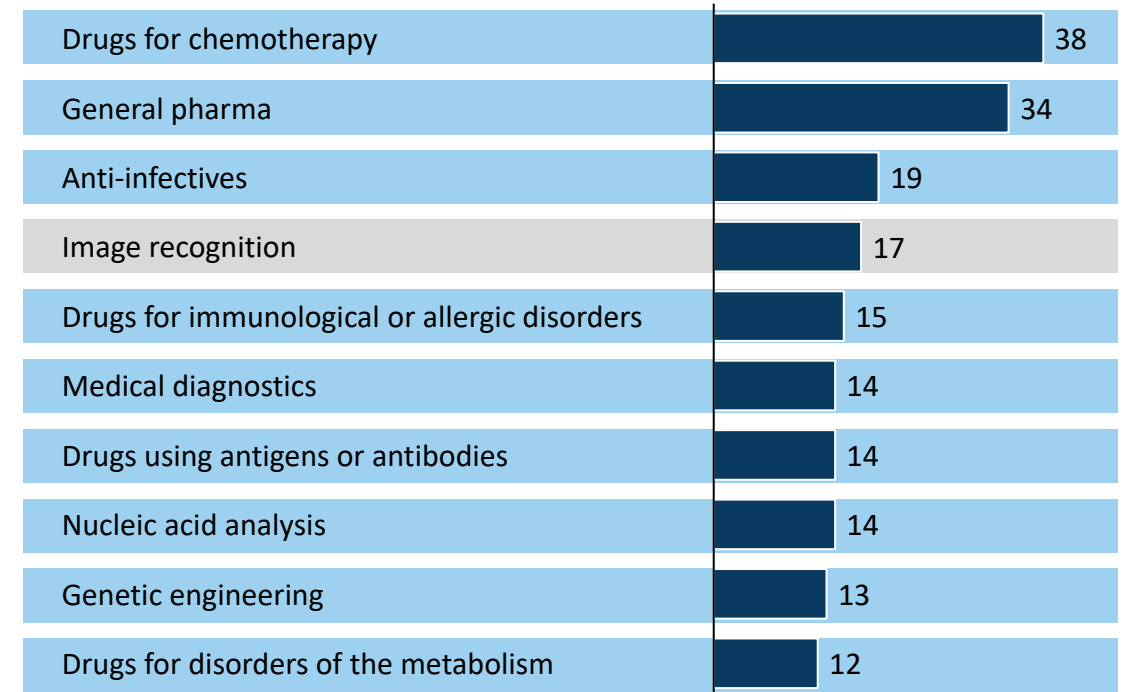
Top themes¹, University of Kentucky

Patents granted, 2013-2022, by theme (of 280 total)



Top themes¹, University of Louisville

Patents granted, 2013-2022, by theme (of 224 total)



1. Themes are not mutually exclusive

Source: USPTO & McKinsey IP Analytics

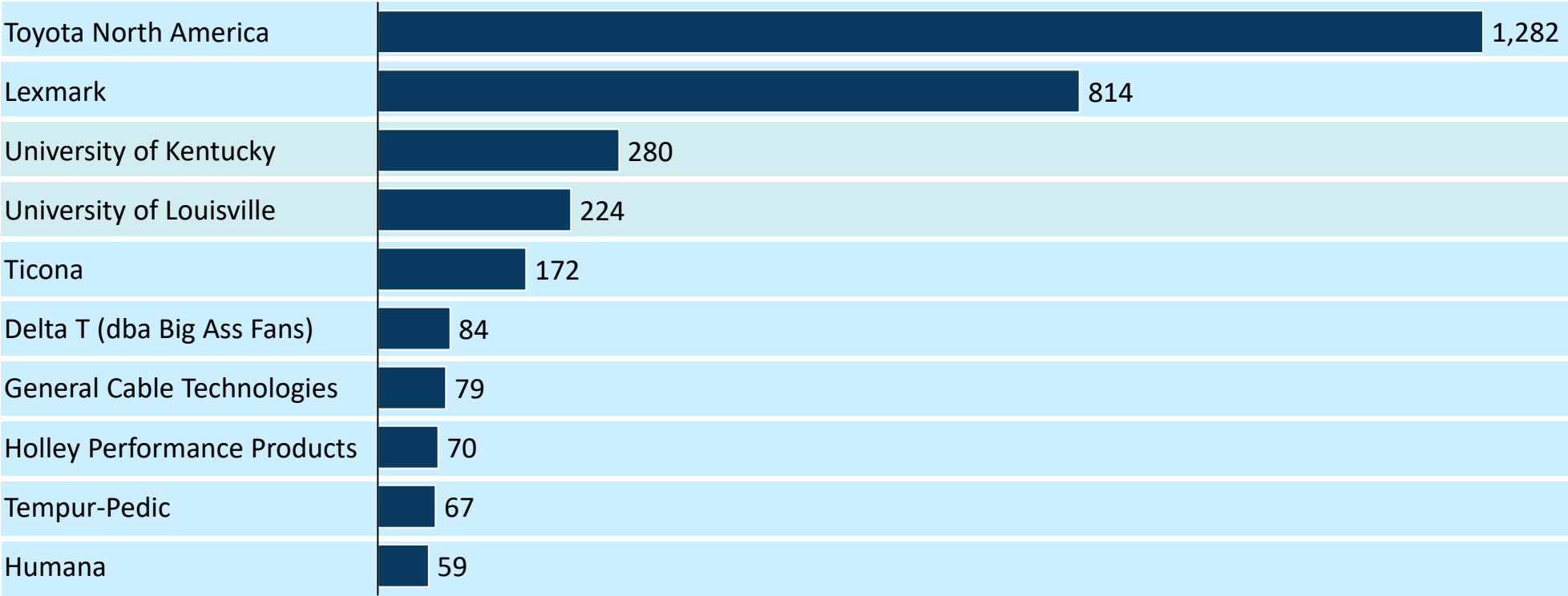
Data as of Dec 2023

Top patent generators and inventor share based in Kentucky

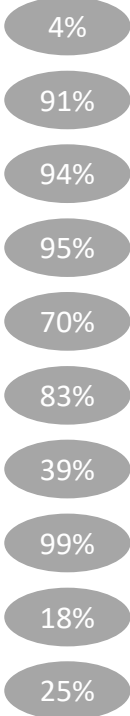
Patent filer type and share of total patents filed: ■ US Corp (85% KY, 45% US avg) ■ University (10% KY, 4% US avg) ■ Foreign Corp (3% KY, 49% US avg)

Top patent filers

Total patents granted, 2013-2022



Share of patents by Kentucky-based inventors

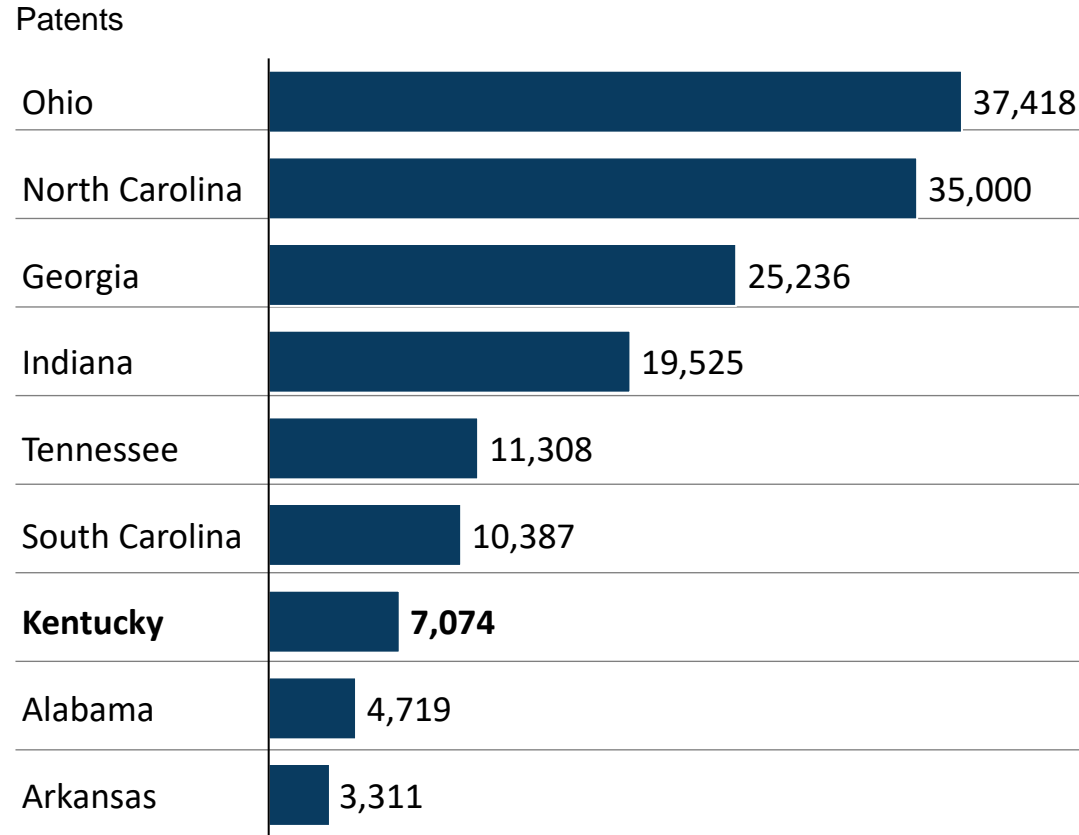


Source: USPTO & McKinsey IP Analytics

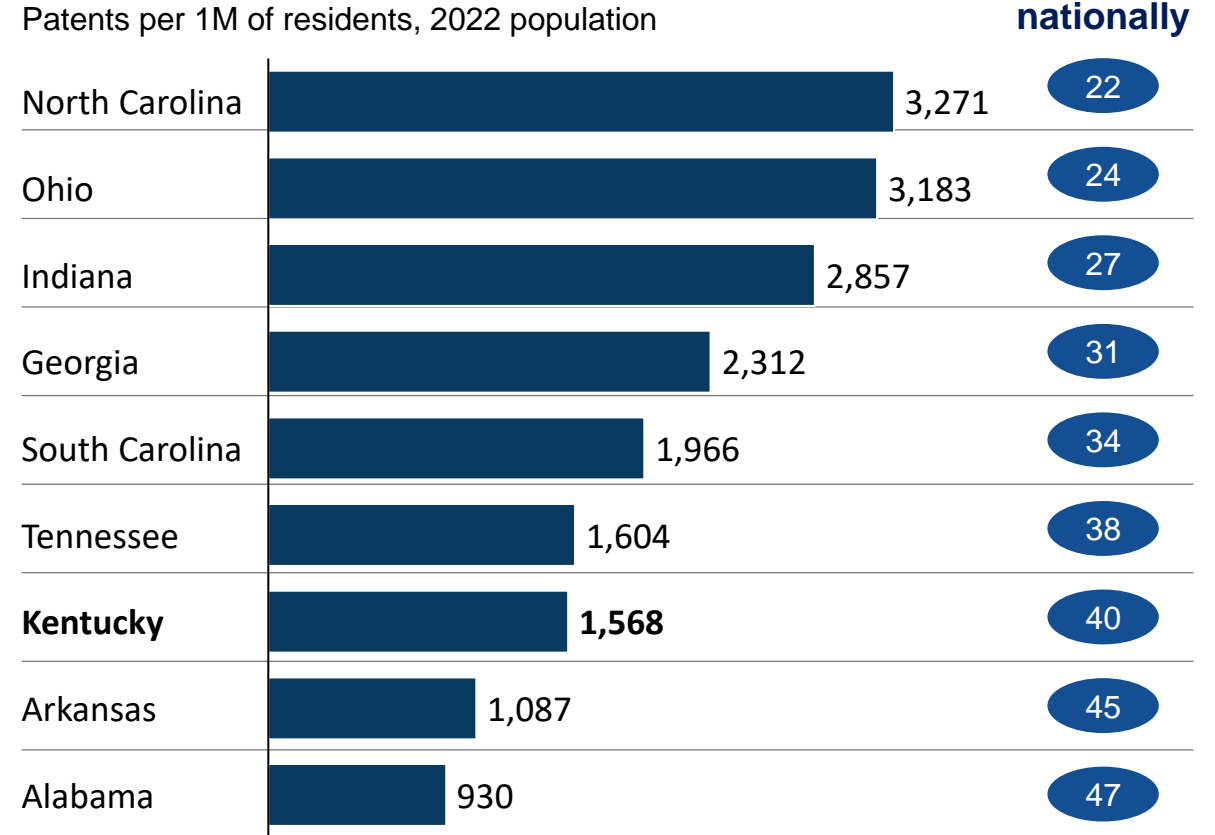
Data as of Dec 2023

Patents: Kentucky total and total per capita compared to peer states

Patents granted, 2017-2022¹

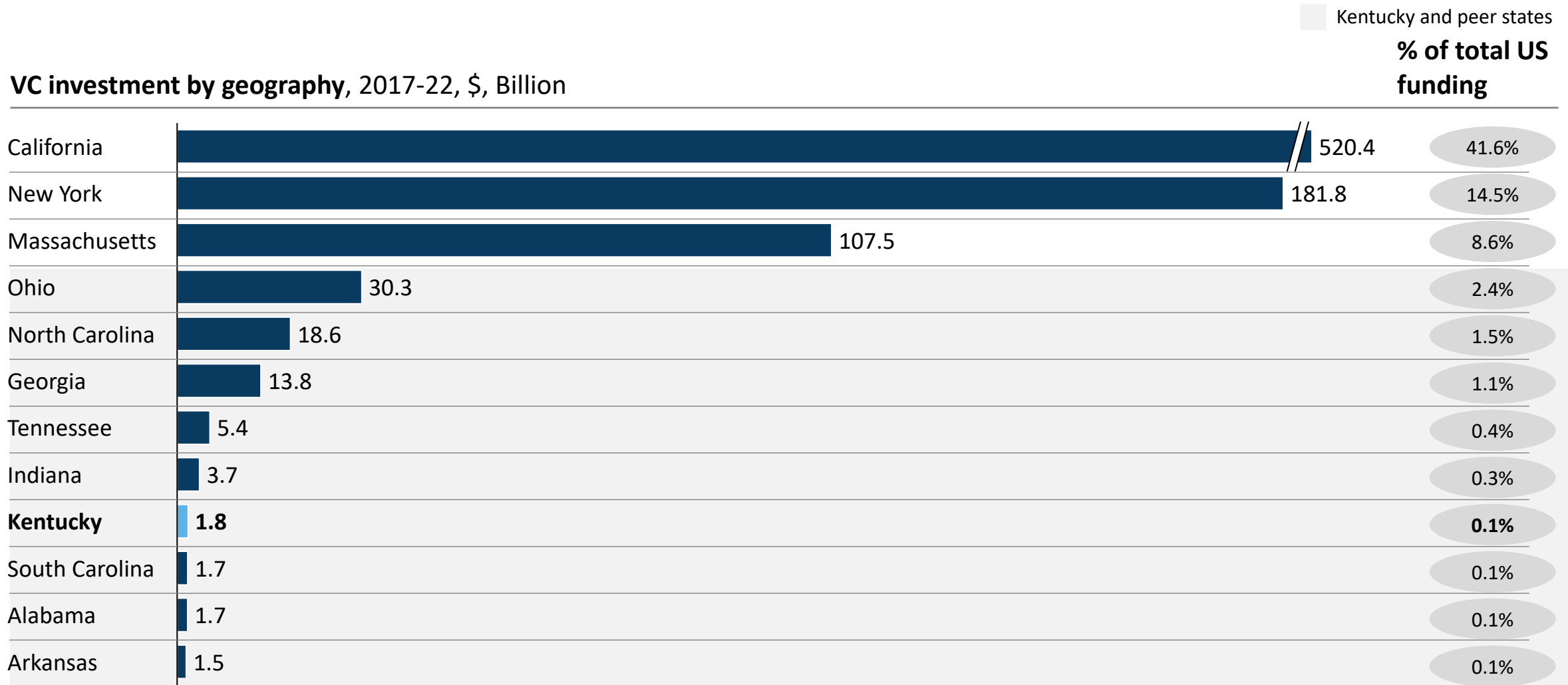


Patents granted per capita, 2017-2022¹



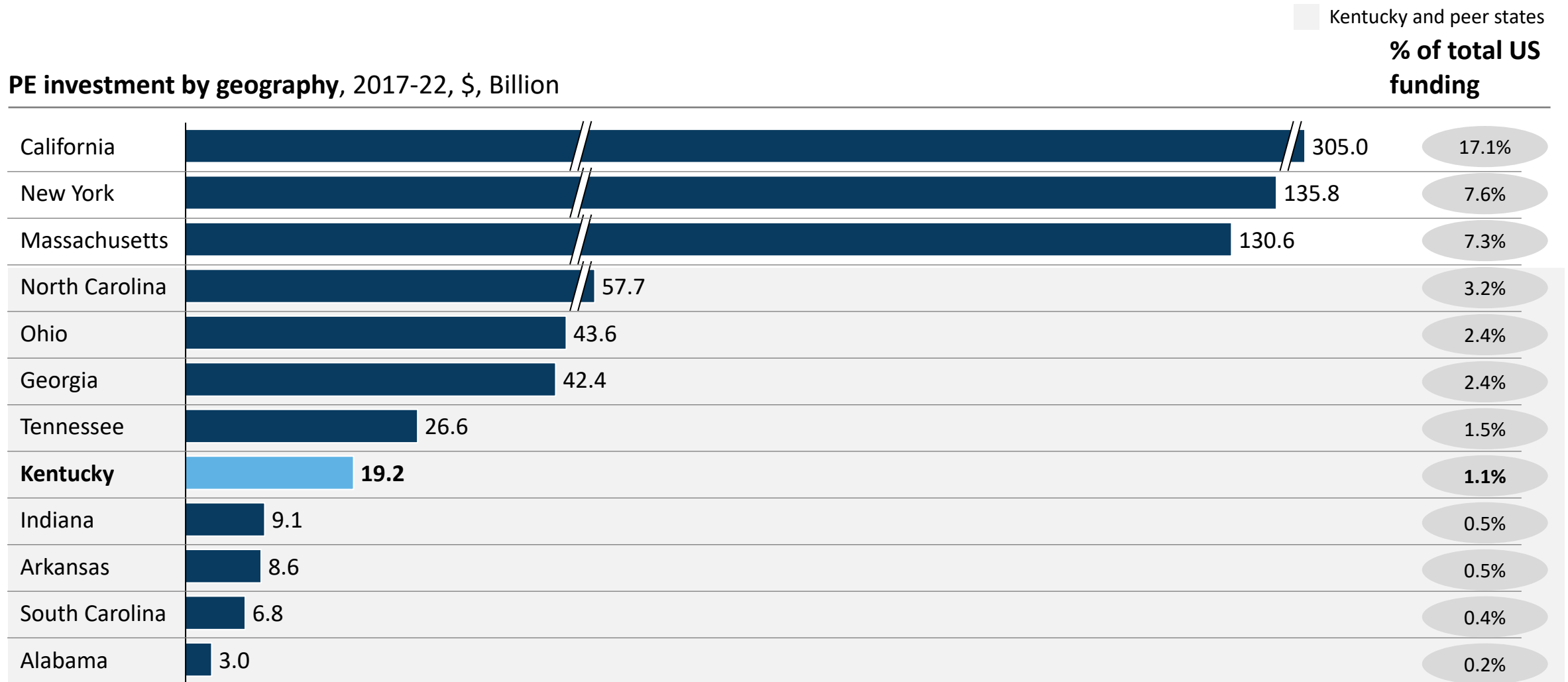
1. Patents granted based on the location of patent inventor

VC funding: VC investment in top 3 recipient states and peer states



Source: : Pitchbook, accessed 12/15/2023

PE funding: PE investment in top 3 recipient states and peer states



Source: : Pitchbook, accessed 12/15/2023

VC funding: Kentucky's VC investment and share of national total by vertical

		% of total US funding	Peer leader (% US funding)
KY Total VC investment by tech vertical, 2017-22¹, \$, Million			
SaaS	359	0.5%	GA (1.7%)
Life Sciences	350	0.2%	NC (2.2%)
Climate Tech	343	0.5%	NC (1.3%)
Mobile	333	0.2%	NC (4.3%)
CleanTech	282	0.4%	NC (1.8%)
Supply Chain Tech	275	0.5%	GA (2.1%)
AgTech	270	1.3%	NC (4.1%)
Mobility Tech	239	0.3%	OH (0.7%)
AI & Machine Learning	174	0.1%	GA (1.8%)
Big Data	144	0.1%	GA (1.5%)
HealthTech	93	0.1%	OH (1.8%)
Oncology	91	0.1%	NC (1.1%)
LOHAS & Wellness	74	0.1%	GA (1.5%)
E-Commerce	50	0.1%	NC (0.5%)
Digital Health	39	0.1%	OH (2.4%)
Manufacturing	38	0.1%	OH (2.0%)
Marketing Tech	29	0.1%	GA (2.9%)
Virtual Reality	28	0.2%	GA (2.6%)
Cannabis	25	0.2%	GA (5.4%)
FinTech	19	0.01%	GA (2.5%)
Nanotechnology	18	0.3%	OH (3.1%)
Advanced Manufacturing	14	0.1%	GA (3.1%)
Oil & Gas	14	0.4%	IN (1.3%)
Total VC	\$1.8B	0.1%	OH (2.4%)

Talaris Therapeutics, a late-clinical stage biotechnology company, leads startups in Life Sciences funding (\$115M in 2020 and \$100M in 2019)

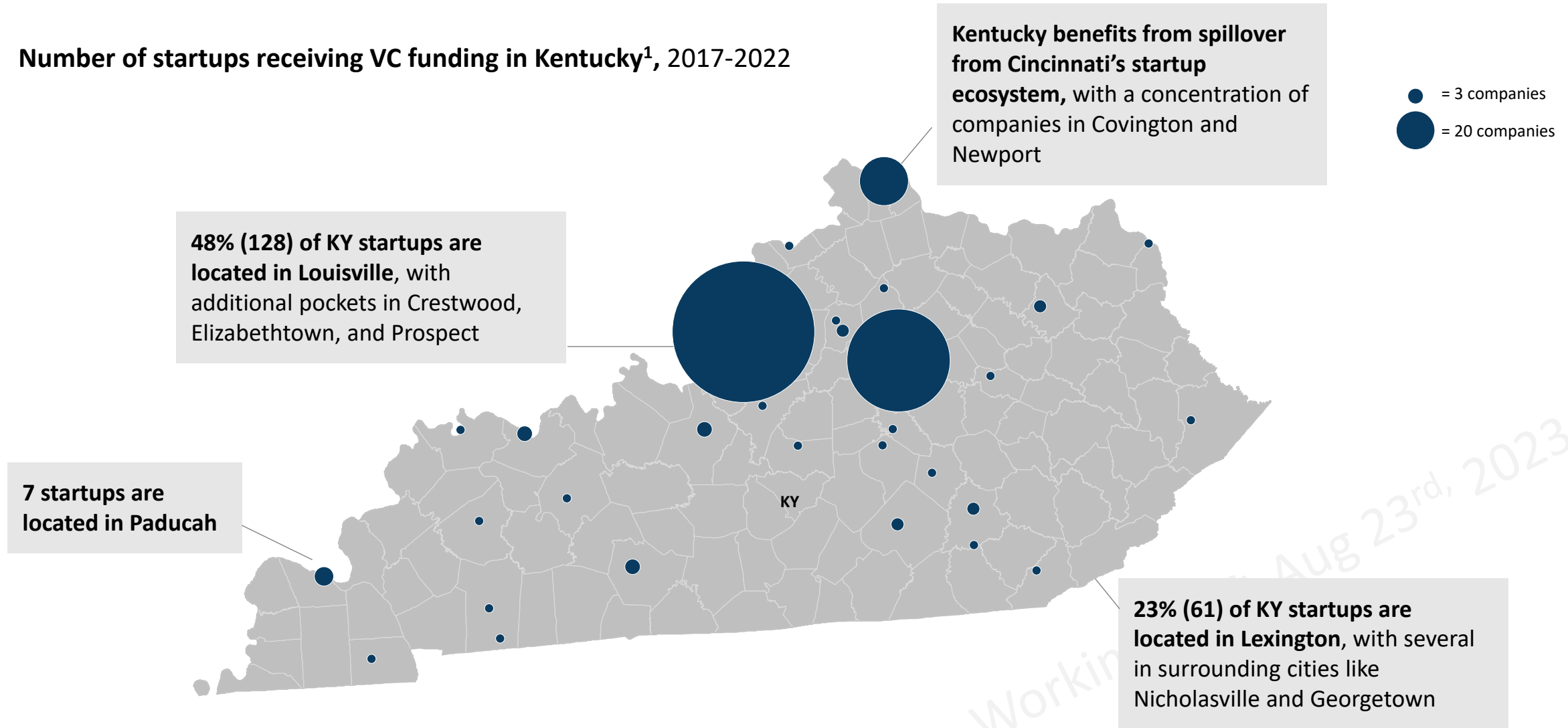
Rubicon (NYS: RBT), a software platform providing full-service waste management, recycling, and smart city technology solutions, accounts for a large share of CleanTech investment (\$236M, 2019 and 2017)

AppHarvest, an agriculture technology company engaged in developing and operating controlled environment indoor farms, received 5 rounds of funding from 2018-2020, totaling \$159M in investment

1. Figures will not sum up to total as multiple tech verticals can be applied to one deal; removed high-level verticals that include other verticals such as "TMT", "Industrials"

VC funding: Regional distribution of Kentucky startups receiving VC funds

Number of startups receiving VC funding in Kentucky¹, 2017-2022



1. Companies with HQ in Kentucky that received VC funding between 2017-2022, and are not out of business as of 8/3/23