

Phystech Ventures

Deeptech Outlook 2021

#AI/ML

#quantum computing

#cybersecurity

#genetics

#bioinformatics

#neuroscience

#food/agro

#energy

#mobility

#space



Phystech Ventures (PV) is an early-stage deeptech VC firm, with a focus on next-gen computing, life sciences, energy, mobility, and space. PV has backed 31 companies from 9 countries, including spin-offs from 8 universities. PV was founded in 2013 to invest in deeptech across the globe. It specializes in Seed and Series A investments, and tends to be the first institutional investor in its portfolio companies. PV is rooted in [MIPT](#).

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To learn more, please visit
<https://phystech.vc>

\$60B Invested in Deeptech in 2020, 4x Growth

\$60B was invested in deeptech in 2020.

4x growth rate between 2016-2020.

US/EU = 3/1 of invested capital. UK is #1 in Europe.

Scientific publications - 32% EU, 28% US.

Equal number of US and EU patents.

Early-stage valuations: US 4.9x higher than EU.

Notable Deeptech Unicorns

Company	Estimated Valuation (\$B)	Estimated Investments (\$M)	Public	Sector
Intellia Therapeutics	10	245	NAS: NTLA	Gene Editing
Arrival	8.4	629	NAS: ARVL	Mobility
Joby Aviation	6.6	1,600		Air Mobility
SambaNova	5.1	1,100		AI Hardware
Snyk	4.7	497		Cybersecurity
Relativity Space	4.2	1,300		Autonomous Rocket Factory
Indigo AG	3.5	1,100		Agro Microbiomics
Graphcore	2.8	778		AI Hardware
Planet	2.8	386		Satellite Imaging
Zipline	2.8	553		Drone Delivery
IonQ	2	434		Quantum Computing
Element Biosciences	1.6	406		Next-Gen Sequencing
Prime Medicine	1.2	315		Gene Editing
Boom	1.2	254		Supersonic Aircraft

Source: Capital IQ; Crunchbase; Quid; BCG; Yahoo Finance; Scimago Journal & Country Rank Unicorn valuation information status-end of July 2021.

Scientific Publications as a Proxy for Growth in the Next Decade

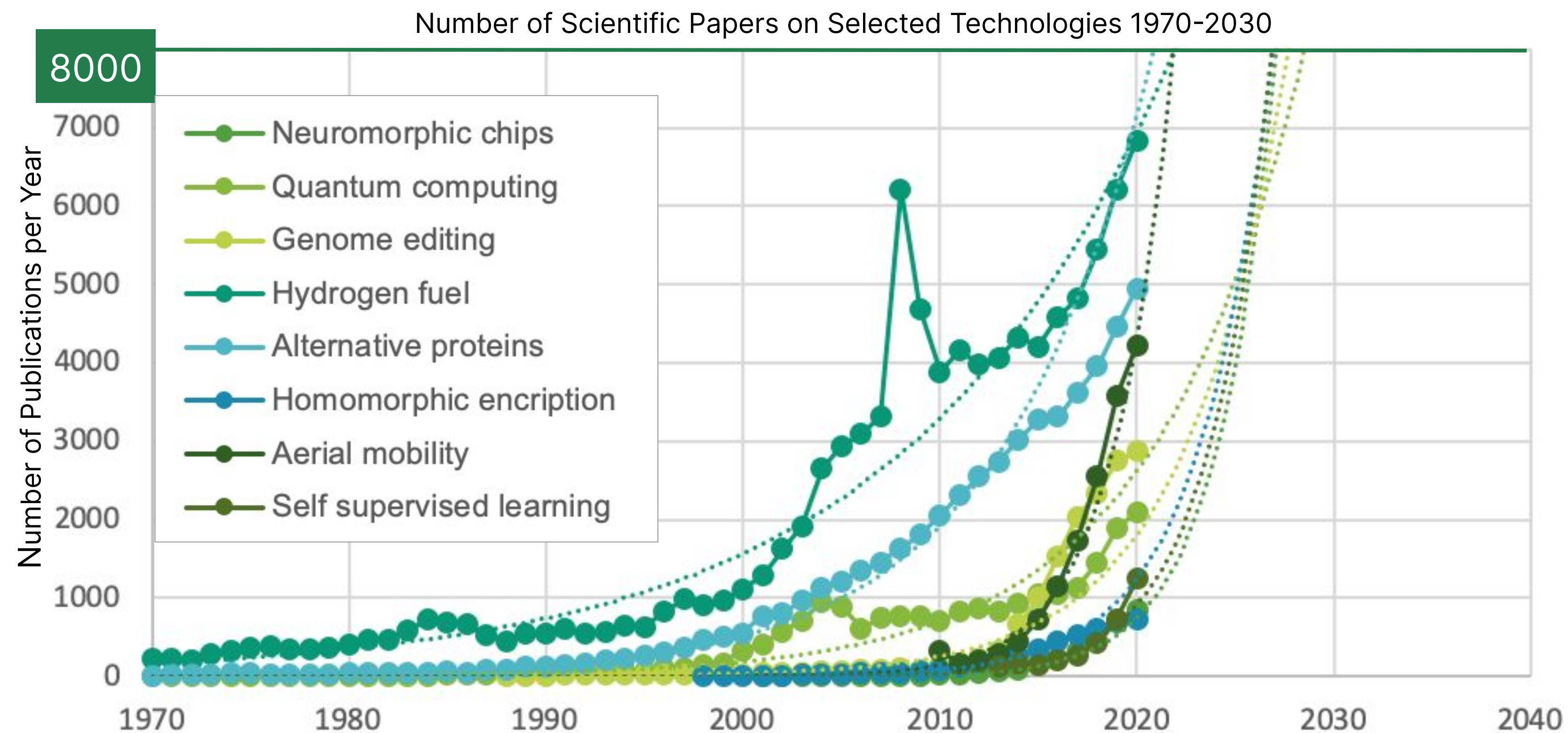
An 8K publications a year point tends to be a hype predictor.

The threshold to be achieved in the selected niches in 5 years.

The EU alone has produced 50K publications in these niches.

The US has made 35K.

Protected IPs saw a +5% increase in filings during 2020, despite the pandemic.



Source: Scopus, Google Patents.

NB 8K threshold was a historical tipping point e.g. observed in Machine Learning in 2012 and Renewables in 2010 (being breakout years for VCs)

AI/ML

VC and corporate investments in AI/ML have reached \$73B in 2020. Q1'21 set its second quarterly record, with \$20.1B invested.

A new AI hardware era is starting: neuromorphic chips offer 20x higher computation power vs top GPUs.

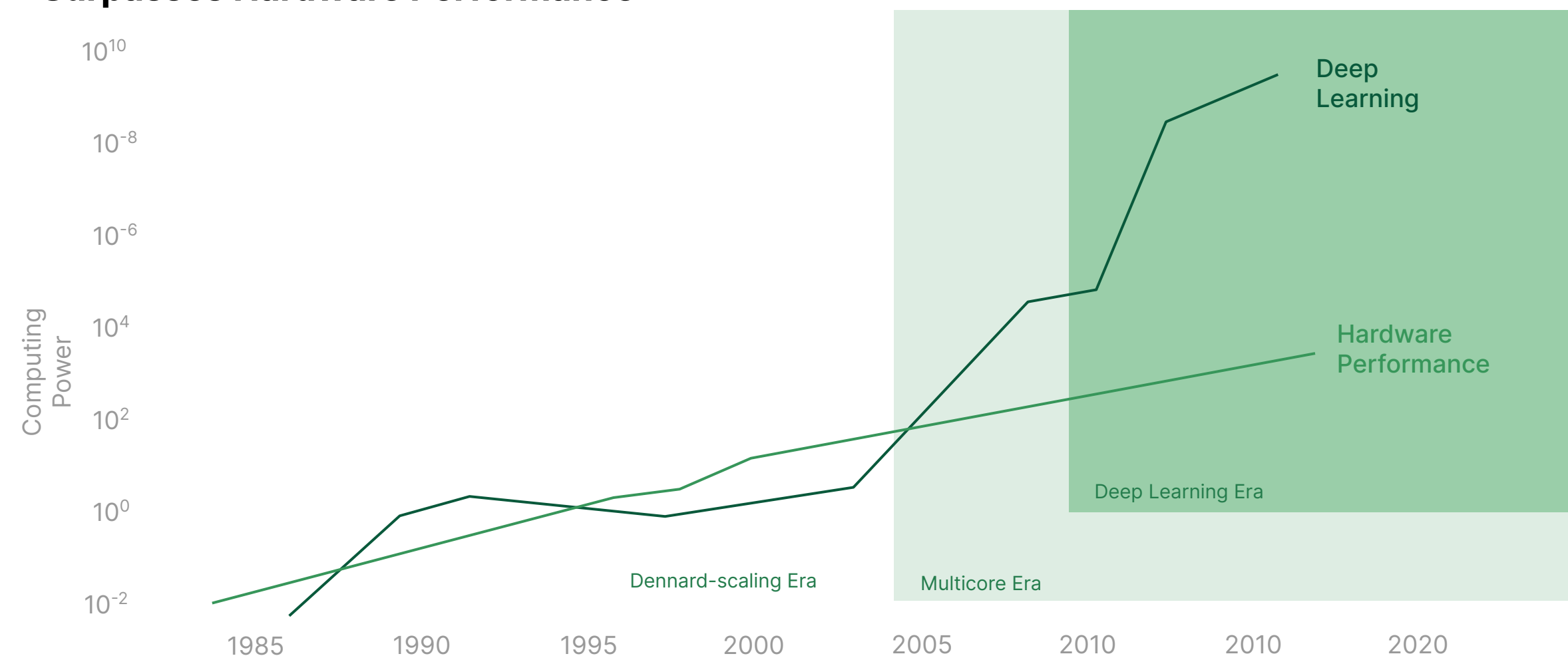
We have predicted the future AI hardware leaders in our [Neuromorphic Map](#).

AI/ML: 70% of all computer science papers.
65% of PhDs in the field are employed by the industry.

Areas of focus: neuromorphic chips, ASICs, reinforcement learning, MLOps, knowledge graphs, autoML, generative AI, GAN.

Source: PitchBook, Scopus, McKinsey, PV Neuromorphic Map
Valuation information status-end of July 2021

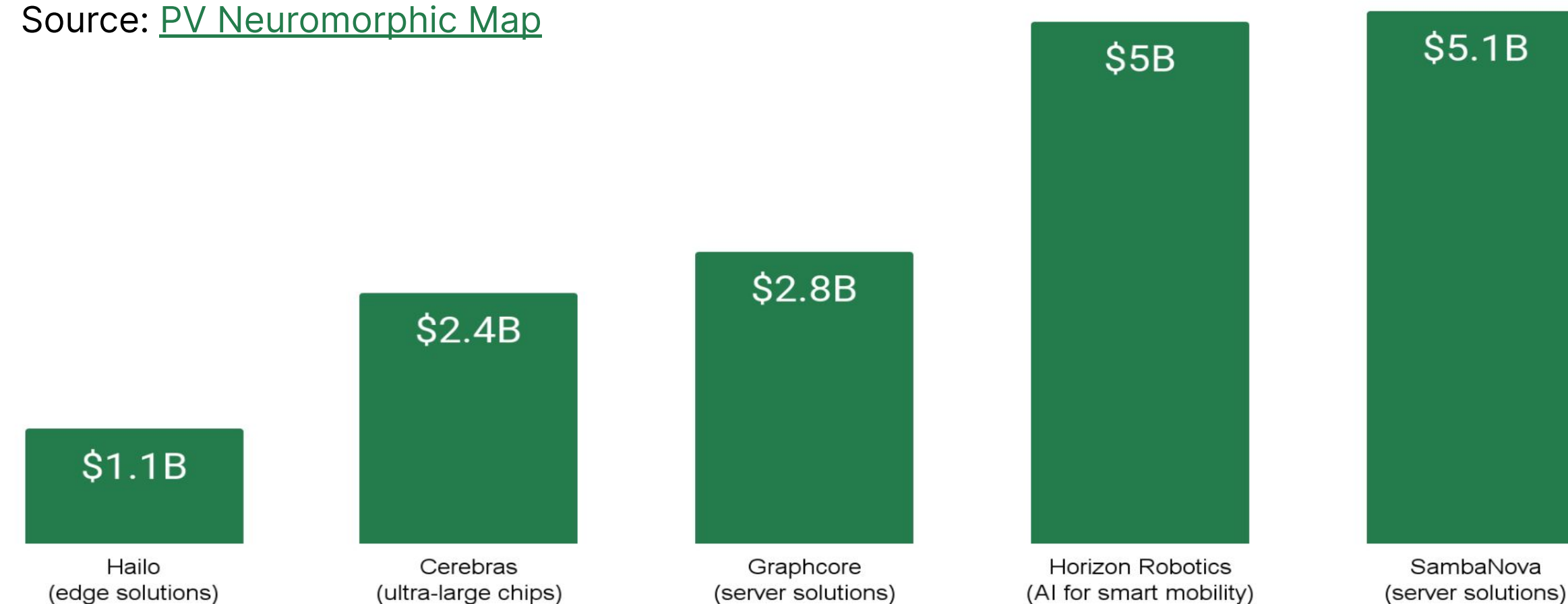
Deep Learning Demand for Computer Power Surpasses Hardware Performance



Source: Neil C. Thompson, 2020, The Computational Limits of Deep Learning

AI Hardware Unicorns

Source: [PV Neuromorphic Map](#)



Quantum Computing

The first quantum unicorns were born in 2021: PsiQuantum, IonQ and ArQit.

The “quantum advantage” will disrupt the industry in the next decade. We predict the sector’s future leaders in our [Quantum Map](#).

QC startups have raised \$1.8B in 1H 2021 (3x to 2020 and 5x to 2019). 30% of companies and 80% of funding are in North America.

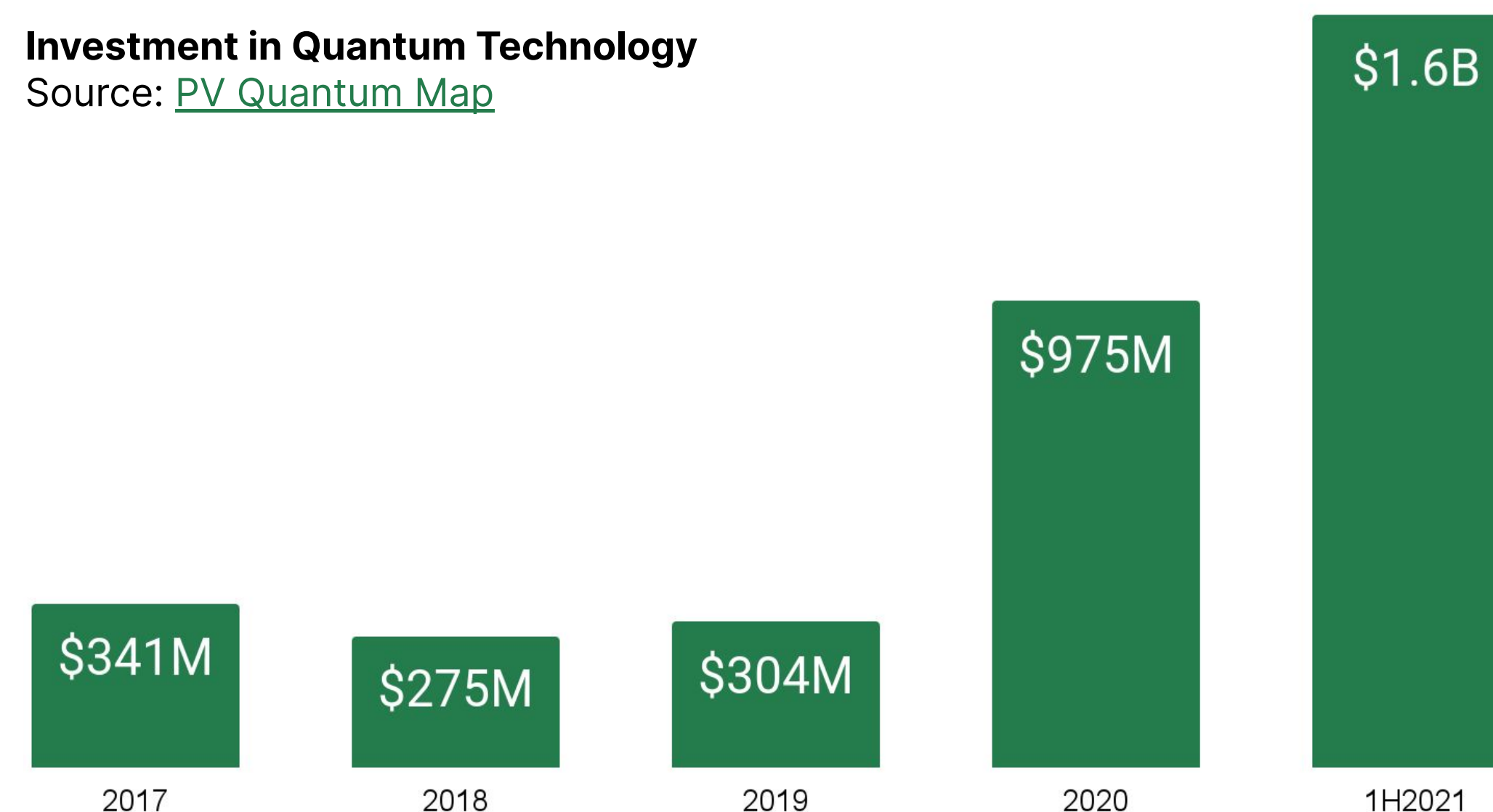
The QC market is expected to reach \$7.3B by 2025. Google, IBM, and Alibaba are all investing billions of dollars in quantum.

Areas of focus: physical platforms, new types of qubits, high-level/end-user software, quantum communication.

Source: Pitchbook, PV Quantum Map

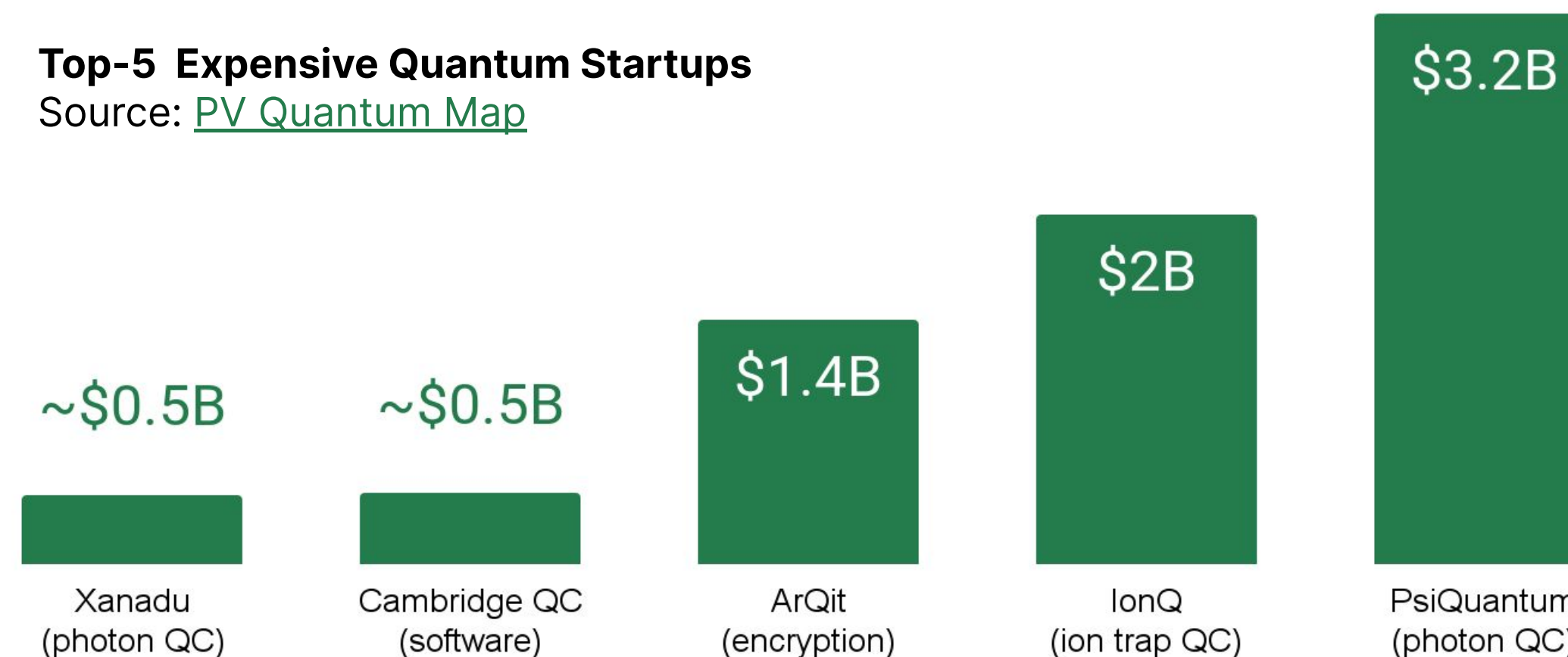
Investment in Quantum Technology

Source: [PV Quantum Map](#)



Top-5 Expensive Quantum Startups

Source: [PV Quantum Map](#)



Cybersecurity

11 cybersec unicorns were born in 2021, and \$7.8B was invested by VCs. Snyk grew from \$1B to \$4.7B in 18 months.

35.8B+ connected devices are active in 2021, representing 35.8B+ potential gates for cyber attacks.

8 hours will be needed for a quantum computer to break any current encryption.

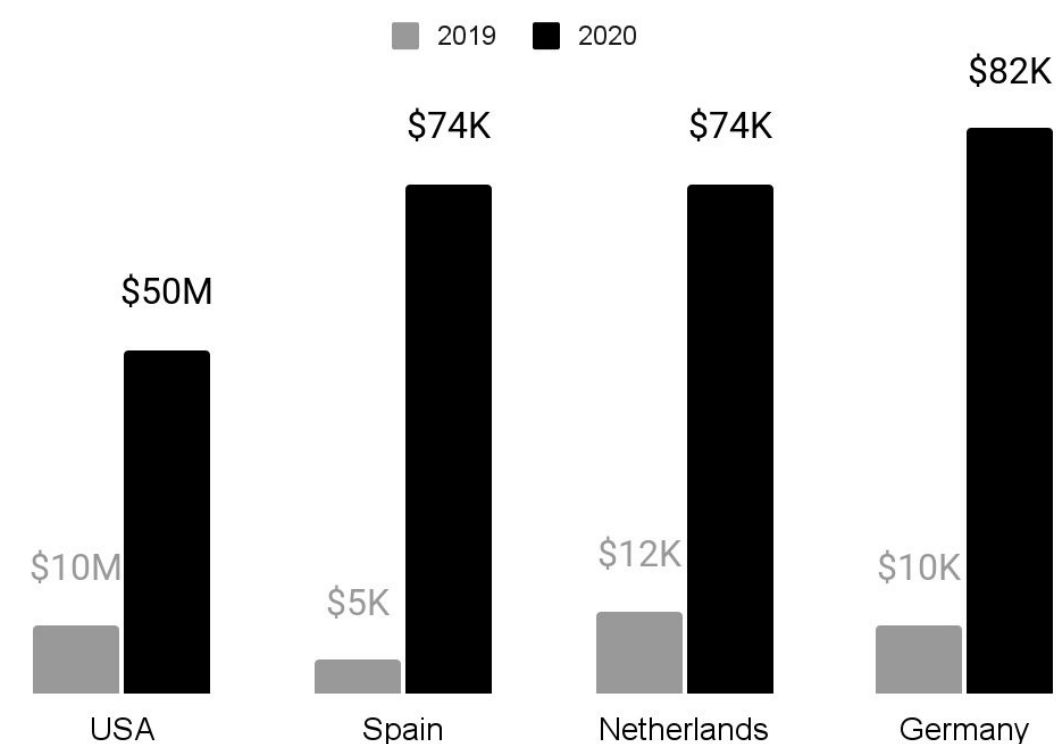
We are monitoring the best cybertech teams, with the help of [Acronis](#), [Veeam](#), and [Dr.Web](#).

Areas of focus: holistic cybersecurity, post-quantum cryptography, data privacy.

Source: Pitchbook, Crunchbase, Acronis

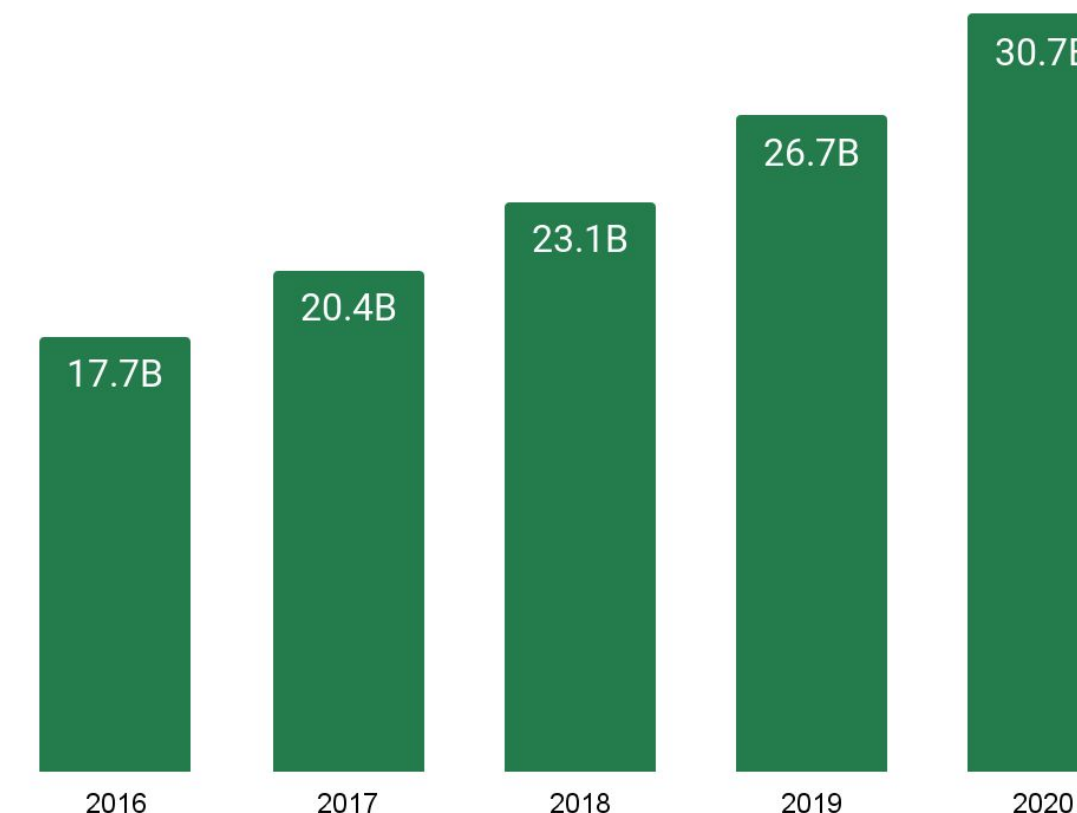
x8 Increase in Cybercrime Cost of Incident

Source: [consultancy.eu](#)



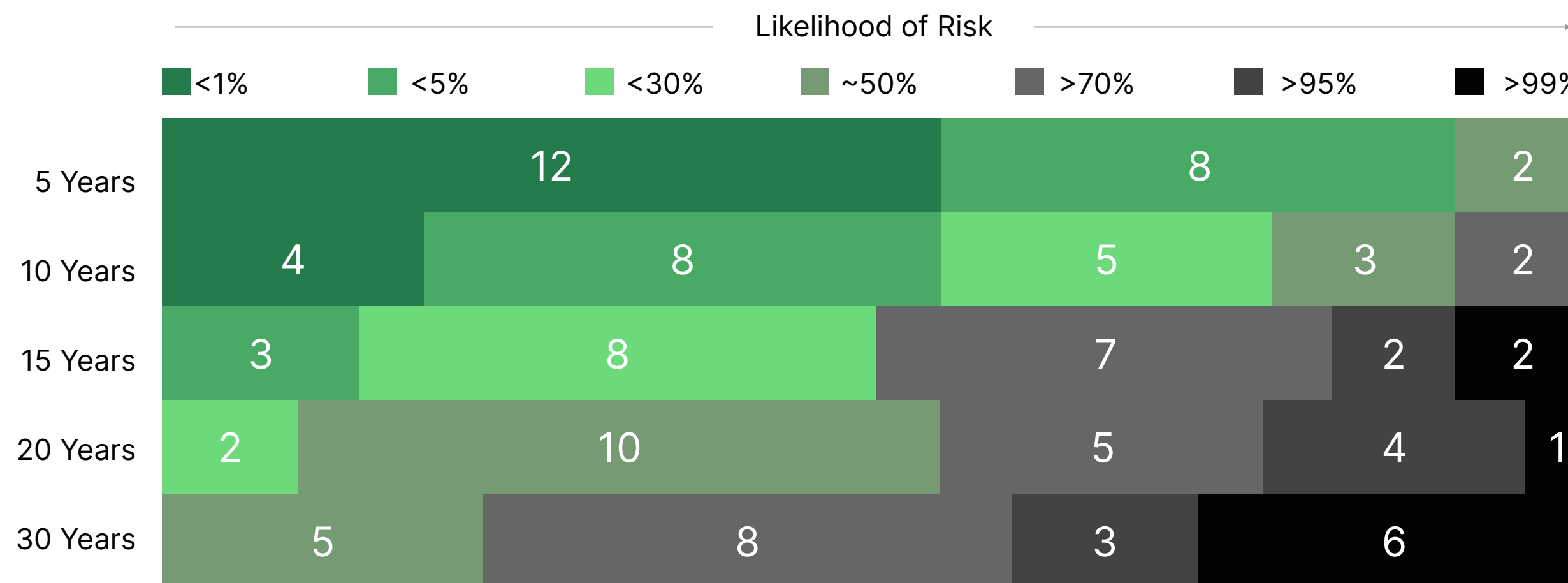
35.8B Connected Devices in 2021 and Counting

Source: [ResearchGate](#)



Increasing Risks From Quantum Threat to Encryption Cybersecurity over Time

Source: [Accenture](#)



Numbers reflect how many experts (out of 22) assigned a certain probability range

Genetics

The first gene editing **decacorns** were born in the last 12 months: Intellia and CRISPR.

Moderna increased from a \$7B to an \$142B valuation during COVID, monetizing its mRNA platform.

The [FDA](#) estimates it will approve 10-20 cell and gene therapies per year by 2025.

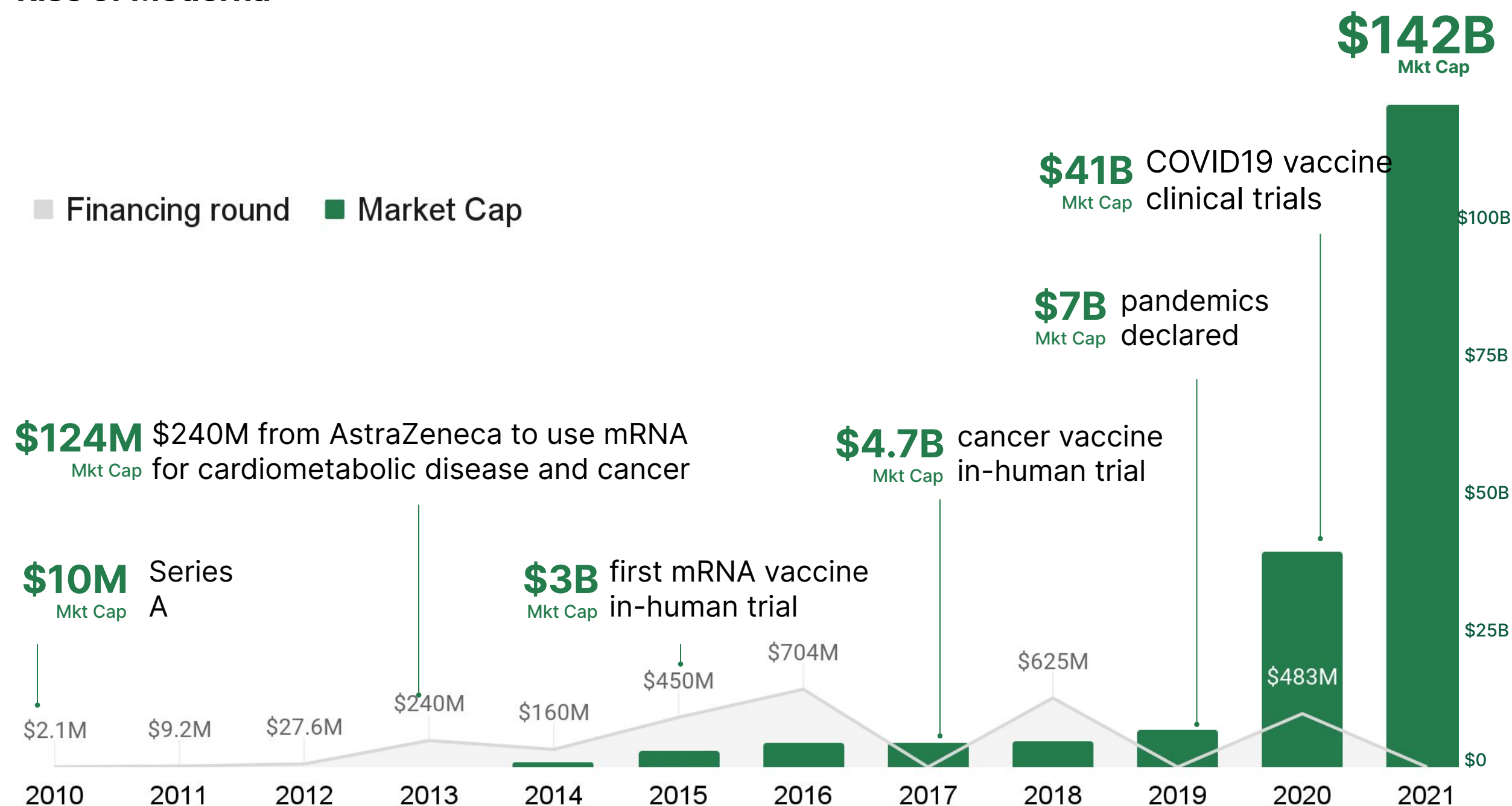
Gene therapy startups have raised \$20B over 329 deals in 2020, and an equal amount in the first half of 2021.

M&A deals in biotech amounted to \$190B in 2020. 1.4T more reserved by big pharma.

Areas of focus: gene editing, viral vectors, gene addition therapies, stem cells, mRNA.

Source: Pitchbook, FDA, Yahoo Finance
Valuation information status-end of July 2021

Rise of Moderna



CRISPR Unicorns: Inspired By Nobel Prize 2020

	Intellia Therapeutics	CRISPR Therapeutics	Editas Medicine	Beam Therapeutics	Prime Medicine
Technology	CRISPR+mRNA	CRISPR	CRISPR	Base editors	Prime editors
Scientific Paper	2012	2012	2012	2016	2019
Founded	2014	2013	2013	2017	2019
Series A	\$15M(2014)	\$60M(2015)	\$43M(2013)	\$87M(2018)	\$115M(2019)
\$1B Mkt Cap	2018	2018	2017	2020	2021
\$10B Mkt Cap	2021	2020	-	-	-

Bioinformatics

The bioinformatics market was valued at nearly \$10B in 2020, and is expected to reach \$19B by 2026.

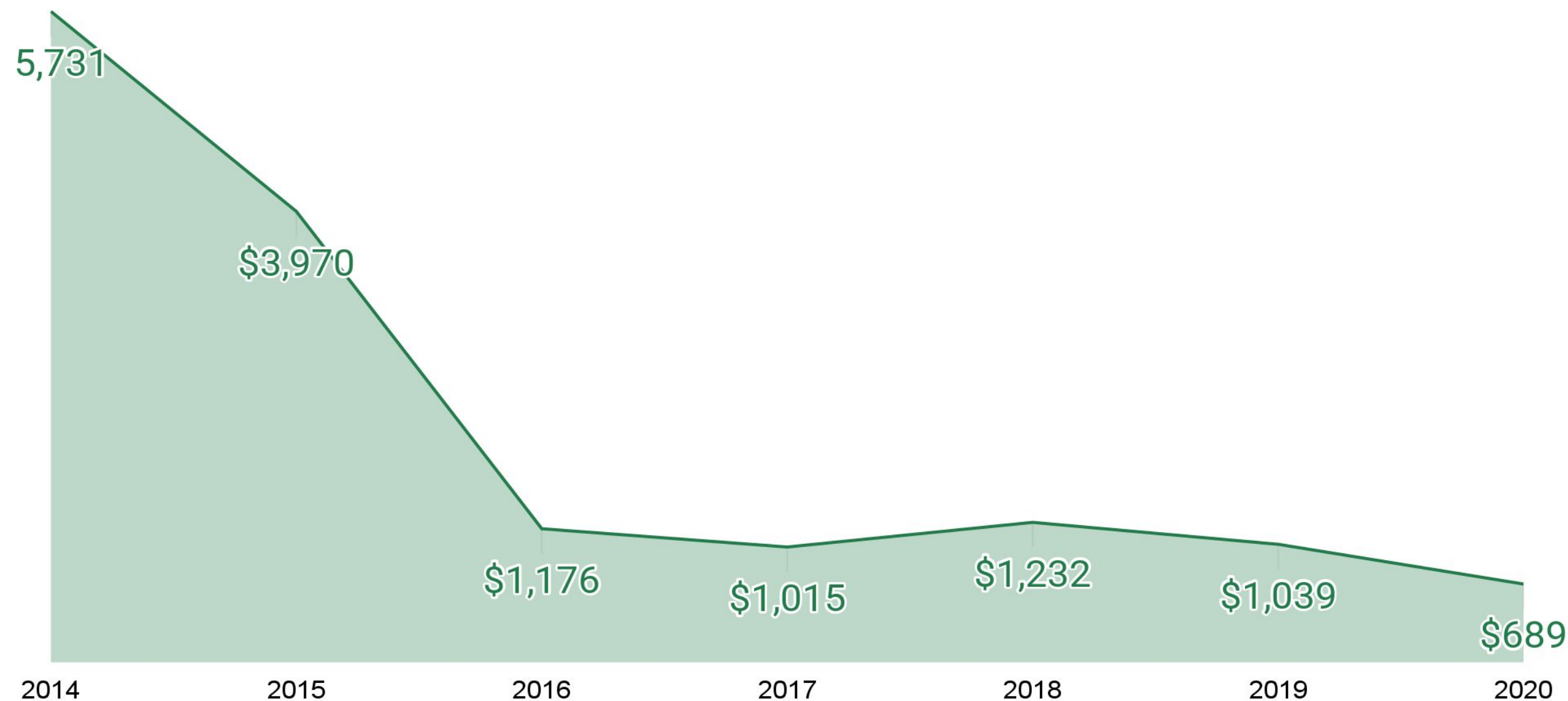
In 2020, the amount of investment totalled \$20B in 461 deals.

The sequencing giant Illumina is now valued at \$72B, and acquired Grail for \$8B in the largest M&A deal of the year.

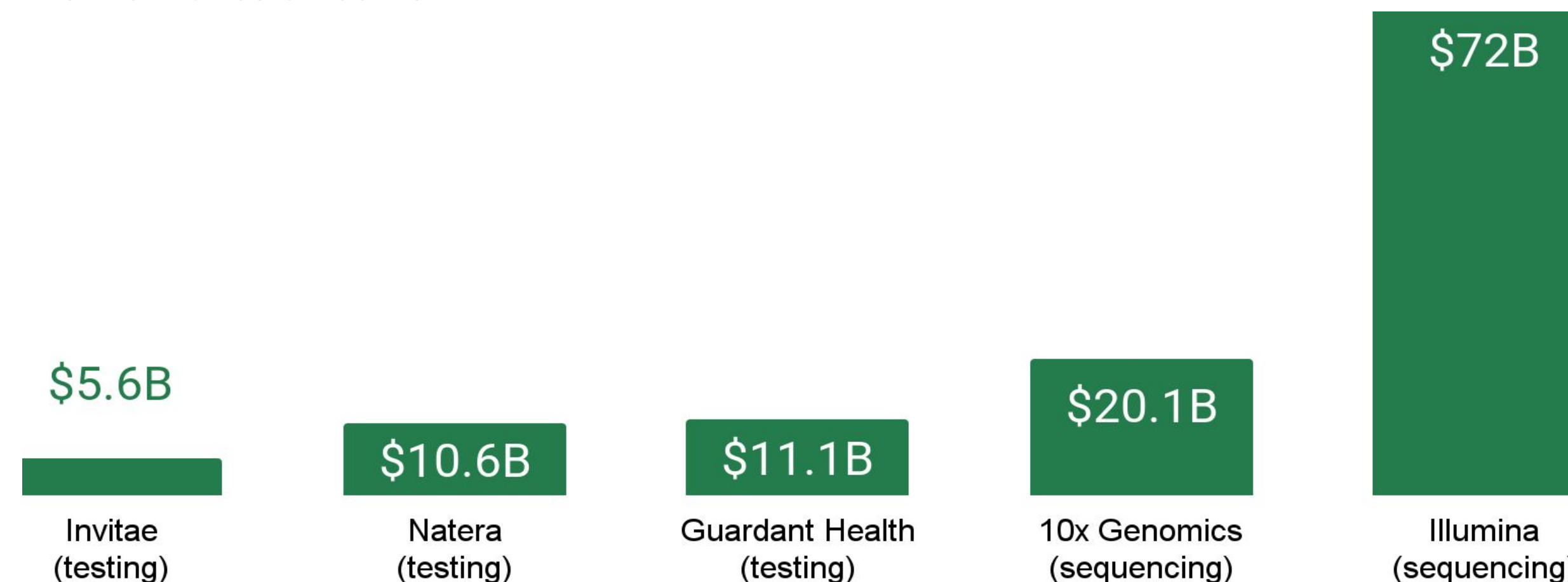
10x Genomics rose from \$7B in 2019 to \$20B in 2021. Oxford Nanopore increased its valuation to \$3.3B by raising \$280M in 2021.

Areas to focus: sequencing, genomics, proteomics, drug discovery platforms.

Cost per Human Genome Drastically Decreases



Bioinformatics Unicorns



Source: Pitchbook, National Human Genome Research Institute
Valuation information status-end of July 2021

Neuroscience

\$100B was generated in sales of neurological drugs and devices, and \$1.5B was invested in early-stage companies during 2020.

Neuroscience represents hundreds of unsolved medical needs and is linked to both neural control interfaces and longevity.

Neurological disorders are the 2nd leading cause of death.

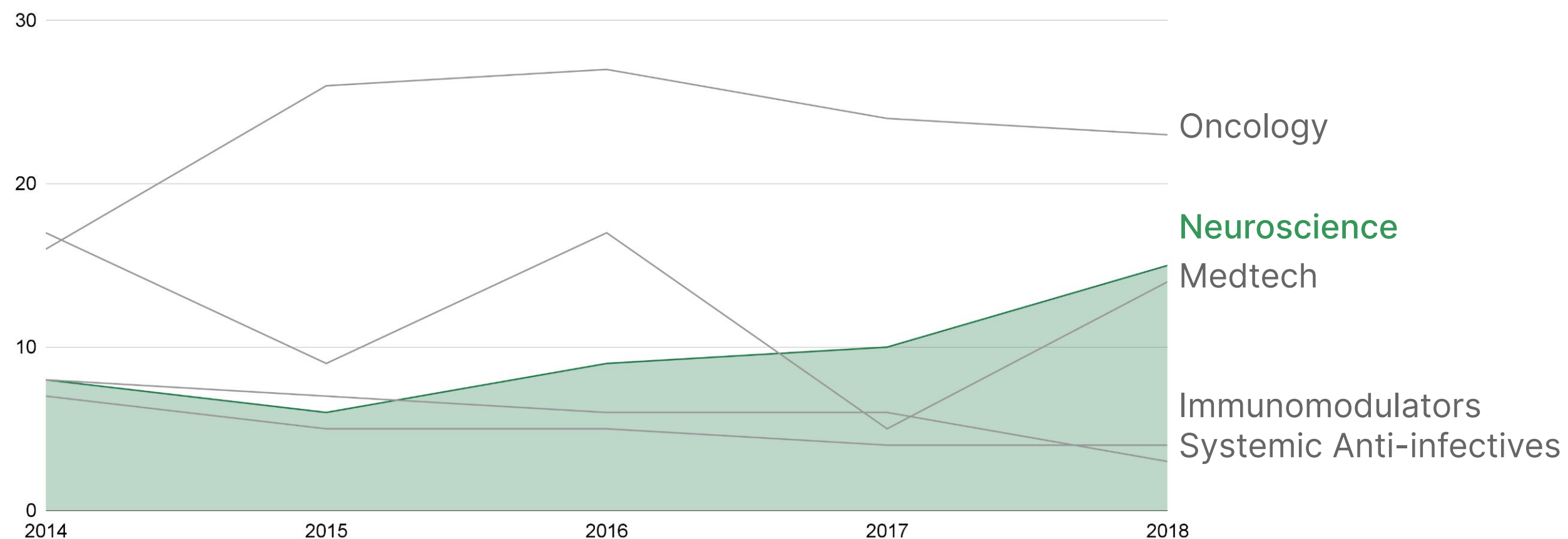
The Neuroscience Phase II to III success rate is 27% vs. 25% and 21% in oncology and cardiology, respectively.

Areas of focus: new enzyme/receptor targets, AI, biomarkers, implantables.

Source: BioSpace: Innovative Companies Diving into, 2020; Silicon Valley Bank: Healthcare investments and exits, 2020, Trends in Neuro Device Investing, 2018; Proventa International: Emerging Therapeutic Areas, 2021

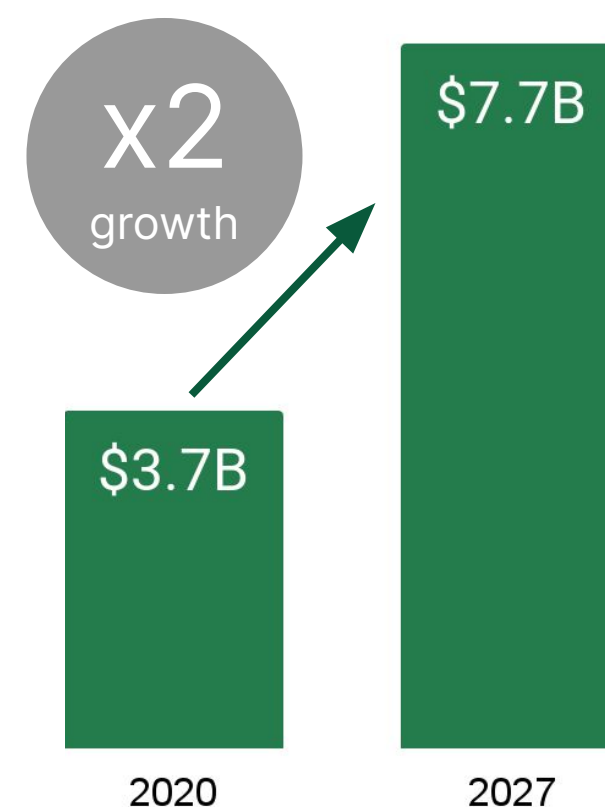
Number of Early-stage Investments: Neuroscience is Rapidly Growing

Source: [CNS Therapies: A Look at Rising Investment Activity](#)



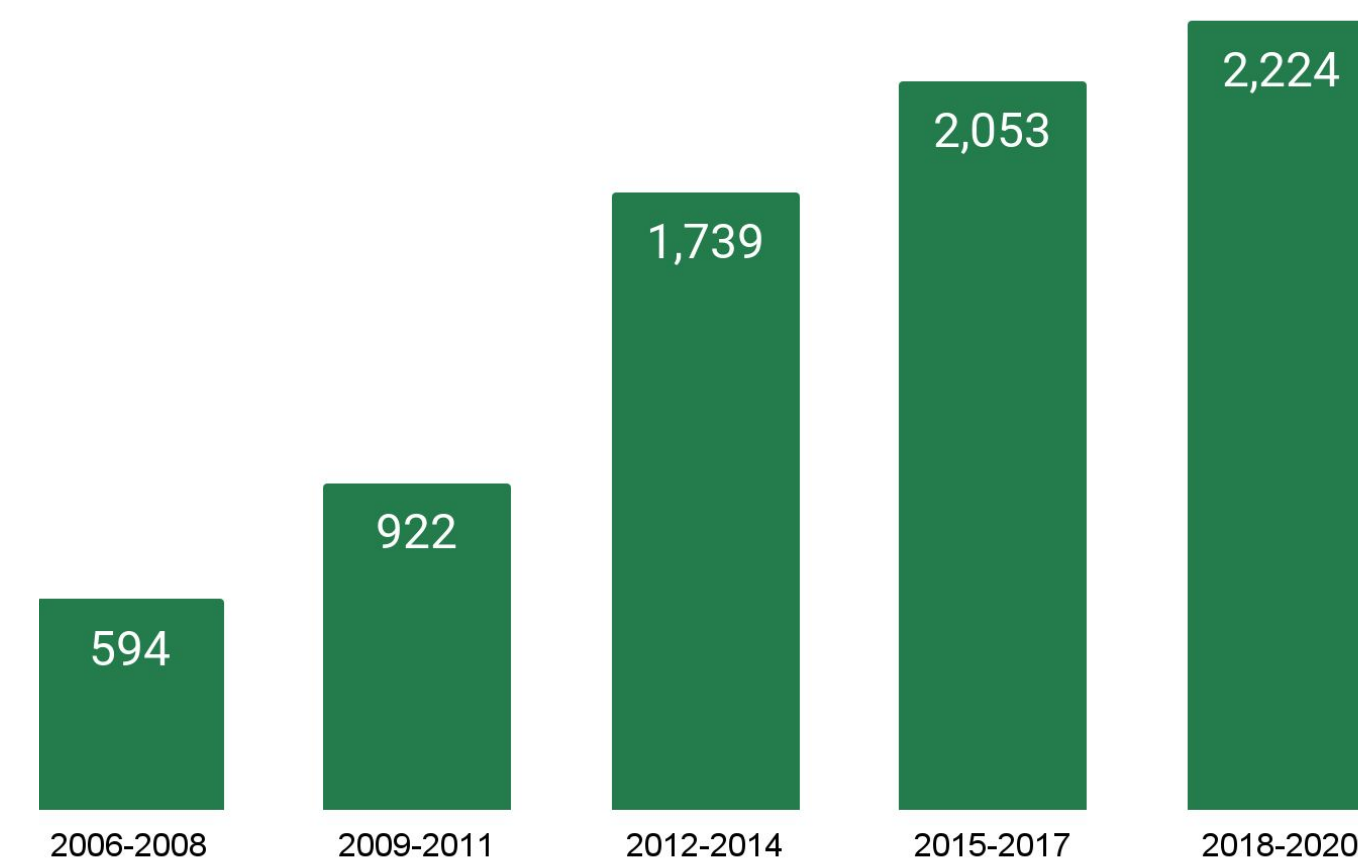
Global Market for Brain Implants

Source: [Brain Implants](#)



Number of Publications on Brain Computer Interface

Source: [Progress in Brain Computer Interface: Challenges and Opportunities](#)



Food/Agro

\$23B was invested in Foodtech in 2020, over 1290 deals. \$6B of venture capital was invested in Agtech over 480 deals.

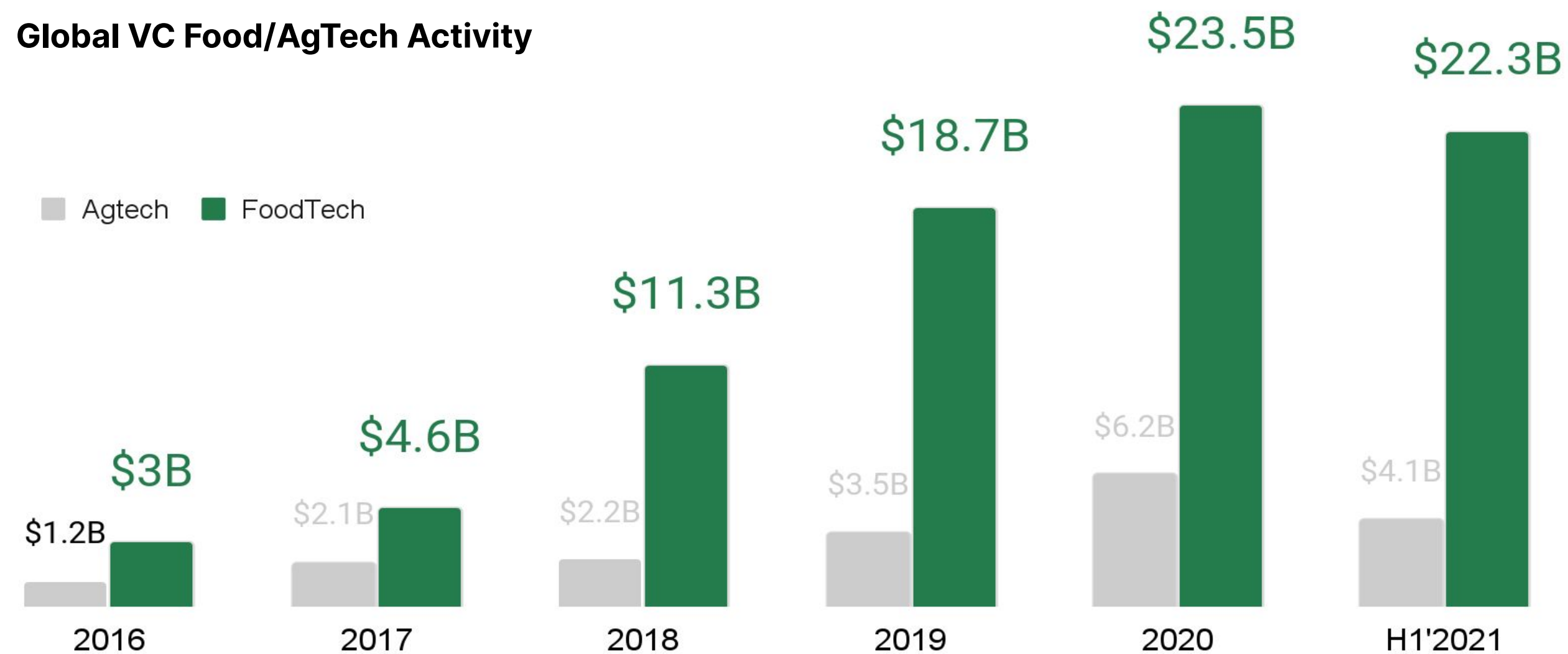
Innovative food products are on the rise, with \$2.3B invested in 2020 (+100%YoY) and \$1B in H1'21, as consumers are increasingly questioning the provenance of their food. 75% of total funding was raised in only 2 years.

Key market drivers: next-gen food and drinks, advanced farming, supply chain optimisation.

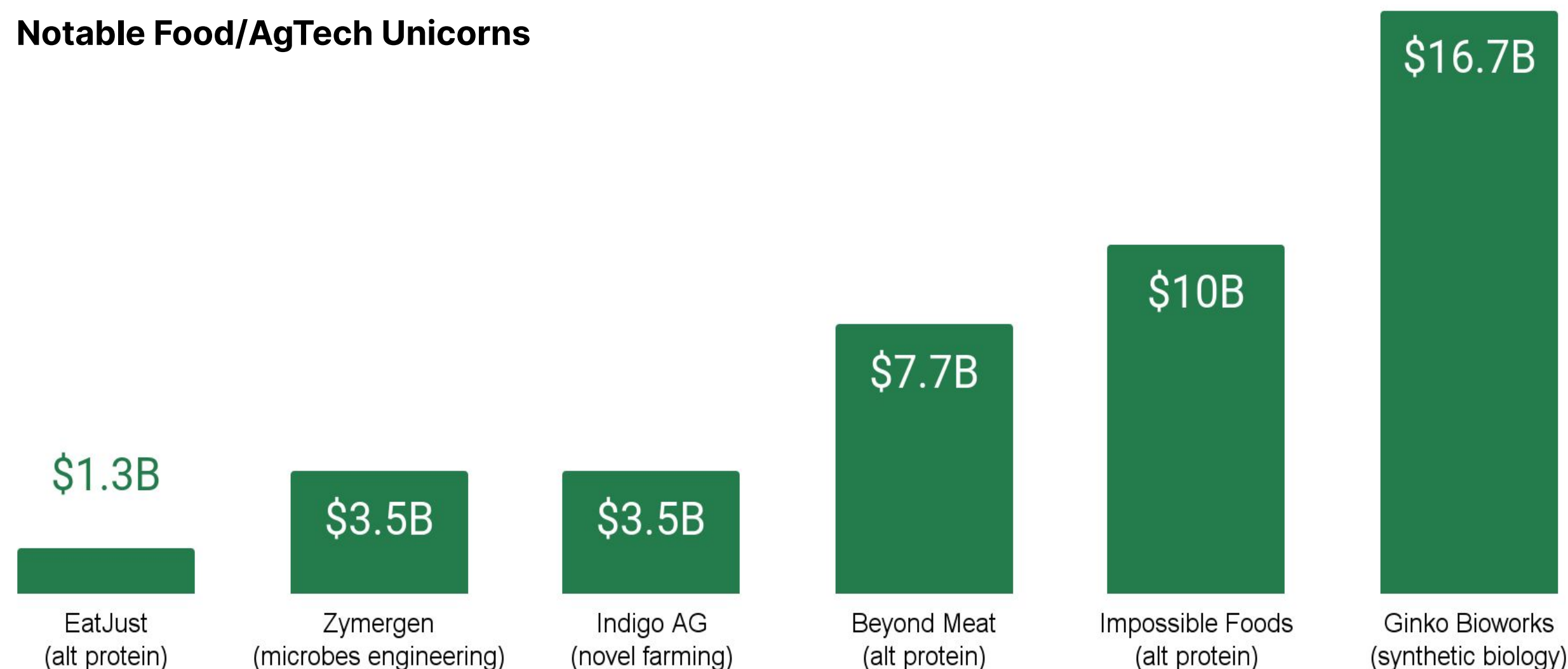
Areas of focus: alternative proteins, cell-cultured products, Ag-Biotech, biomaterials.

Source: Pitchbook, CB Insights, Finistere Ventures AgriFood Tech Investment Review 2020
Valuation information status-end of July 2021

Global VC Food/AgTech Activity



Notable Food/AgTech Unicorns



Energy

Global energy investment reached \$1.7T in 2020, and is set to rise to \$1.9T in 2021.

Natural gas investments show the highest growth of 24.5% in 2021 among both fossil fuels and renewables.

Hydrogen investment was a bullish trend in 2020: Plug Power grew by +10x, and Bloom Energy by +5x. We have benefited from this trend with [Zeroavia](#), who raised \$73M over 10 months in 2 investment rounds.

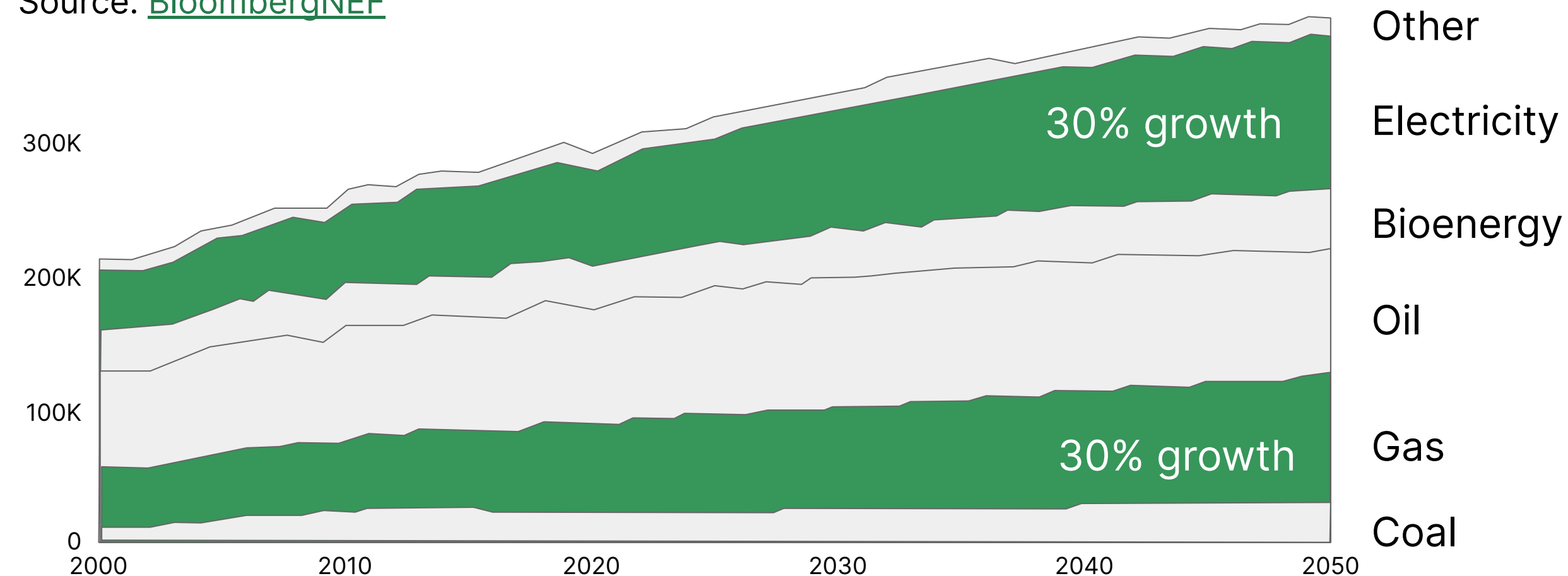
\$60B of VC was invested in climate tech between 2013-19, with a +84% CAGR.

Areas of focus: natural gas, hydrogen, digital oilfield, CO2 capture, nuclear power.

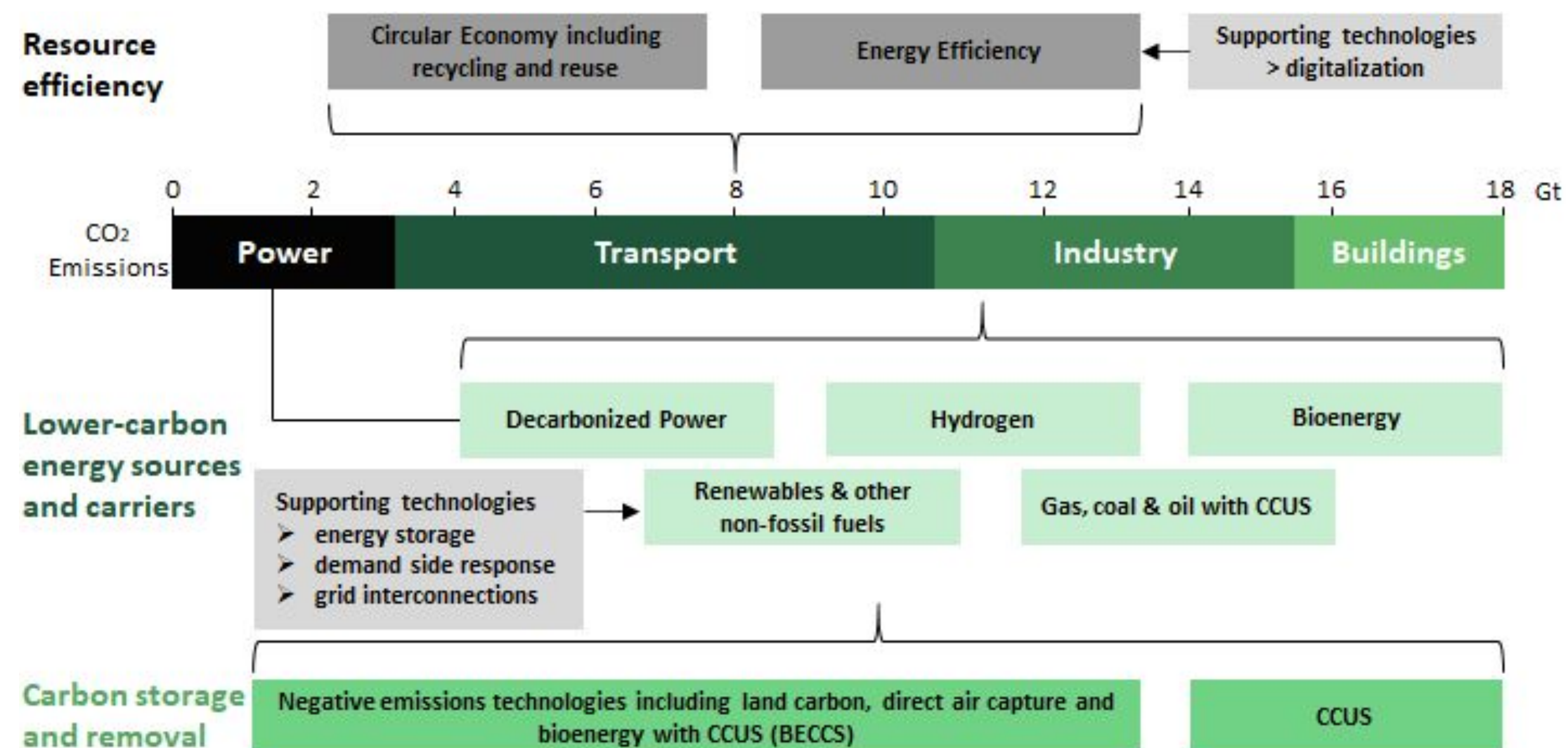
Source: Bloomberg New Energy Finance, Yahoo Finance, IEA World Energy Outlook, BP Energy Outlook 2019

Energy Consumption by Type: 30% Growth in Gas and Electricity

Source: [BloombergNEF](#)



Map of Investments in Efficiency of Energy Industry



Mobility

The robotized mobility market reached \$50B in 2020 (drones, industrial robotics, self-driving cars)

The Arrival of Denis Sverdlov prompted a decacorn valuation in 2020. E-mobility is thus visibly on the rise.

Passenger air mobility startups have raised \$3.8B during the first half of 2021.

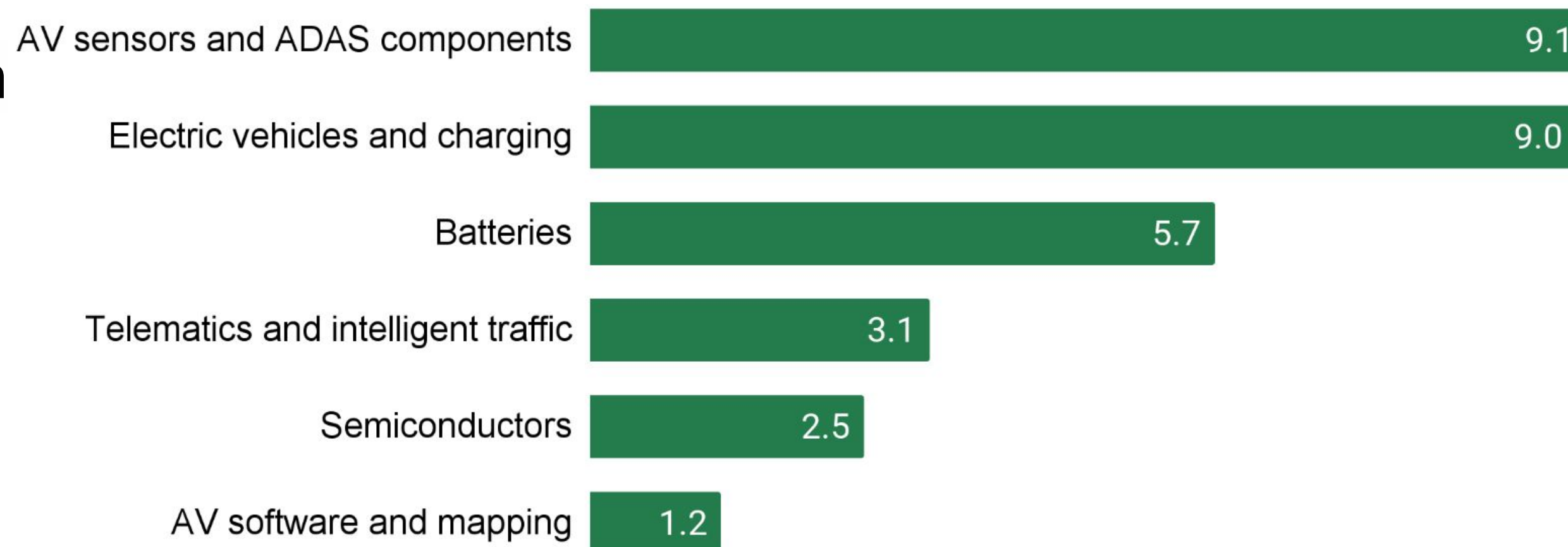
Drone startups have raised \$3.5B of VC funding in the last 3 years.

Areas to focus: heavy payload drones, self-driving systems, multi-robot systems, EV infrastructure, additive manufacturing.

Source: The Robot Report, McKinsey
Valuation information status-end of July 2021

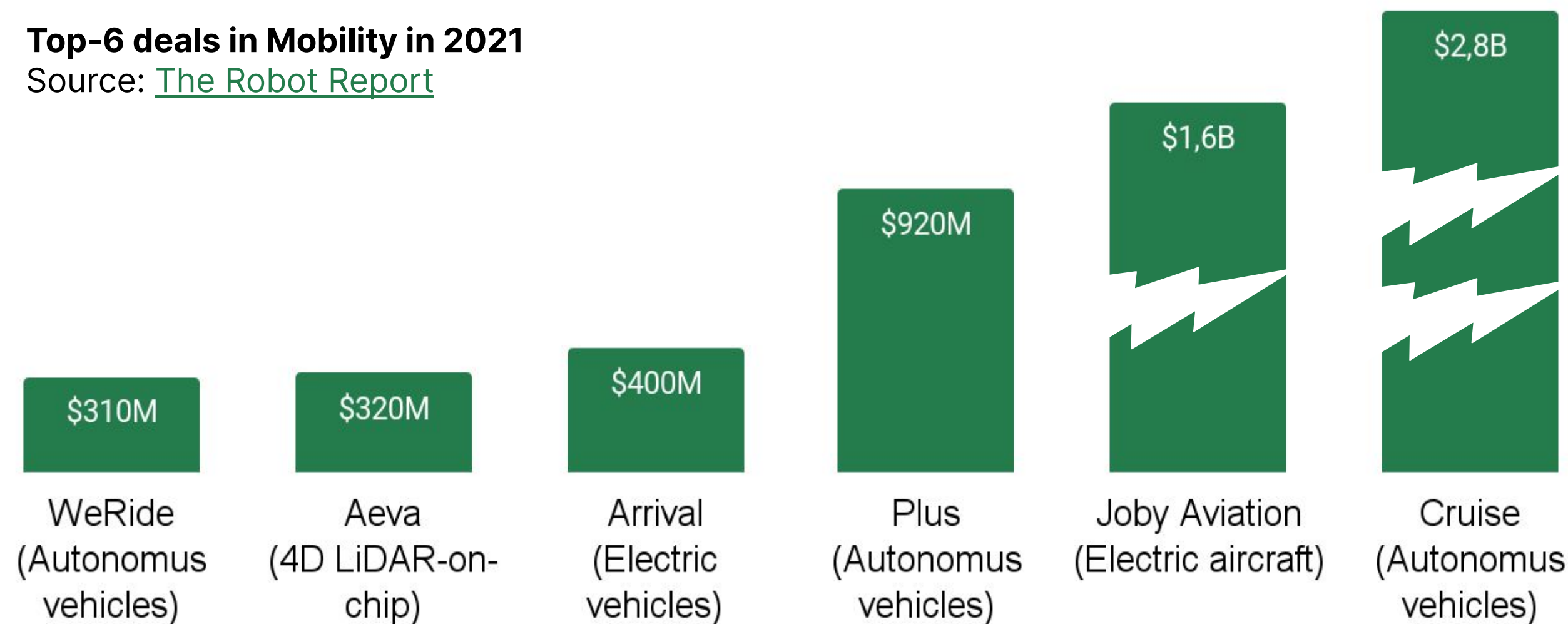
Total number of patents since 2010, thousands

Source: [McKinsey](#)



Top-6 deals in Mobility in 2021

Source: [The Robot Report](#)



Space

\$15B has been invested in space tech in 1H'21, with \$941M raised by early stage companies. 2021 will be another record year.

Pain point: propulsion systems account for ~60% of all launch failures. No solution yet.

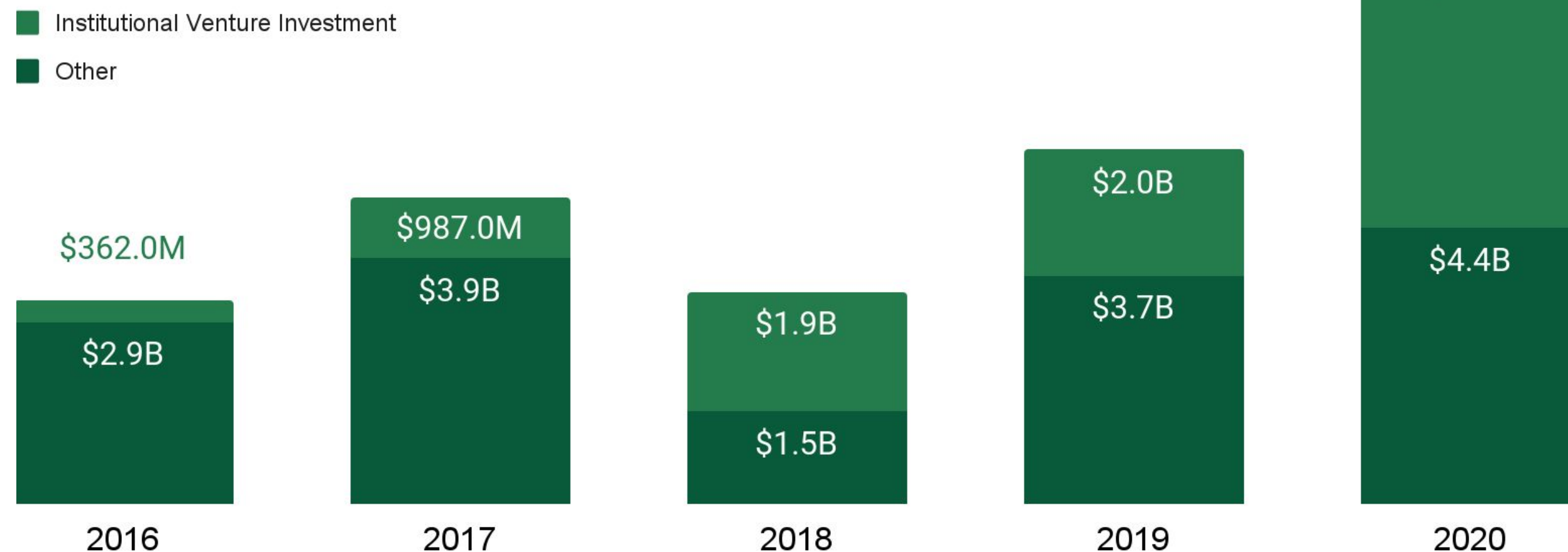
Satellite launches into low orbits are growing exponentially, with a 34% CAGR.

Starlink/SpaceX dominates 100kg+ payloads, with 1.6K deployed, and 12K approved. This is 3x+ all existing satellites in all orbits now.

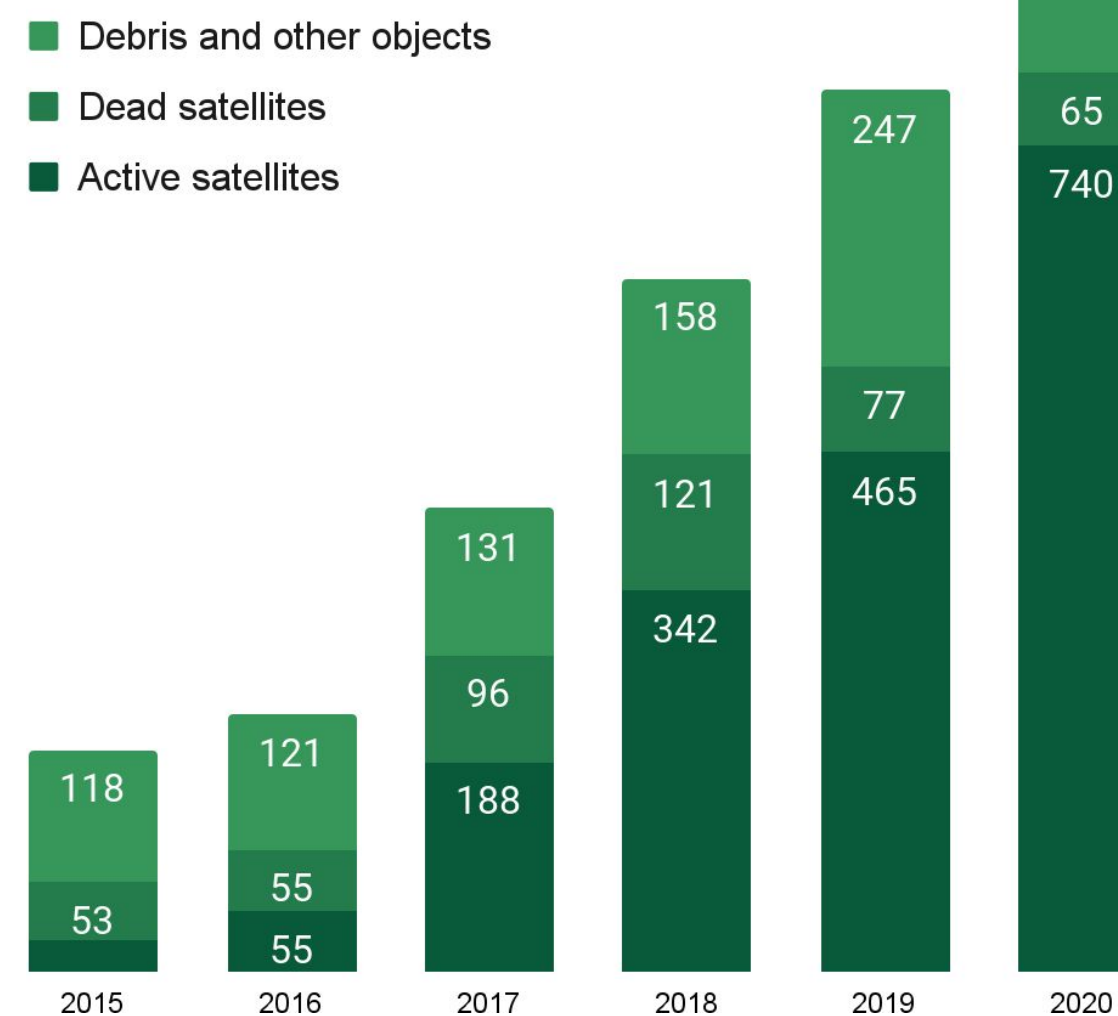
OneWeb plans to add 48K satellites to low orbit, with Amazon adding 3K.

Areas of focus: propulsion/deorbiting, nanosats, high-res imaging.

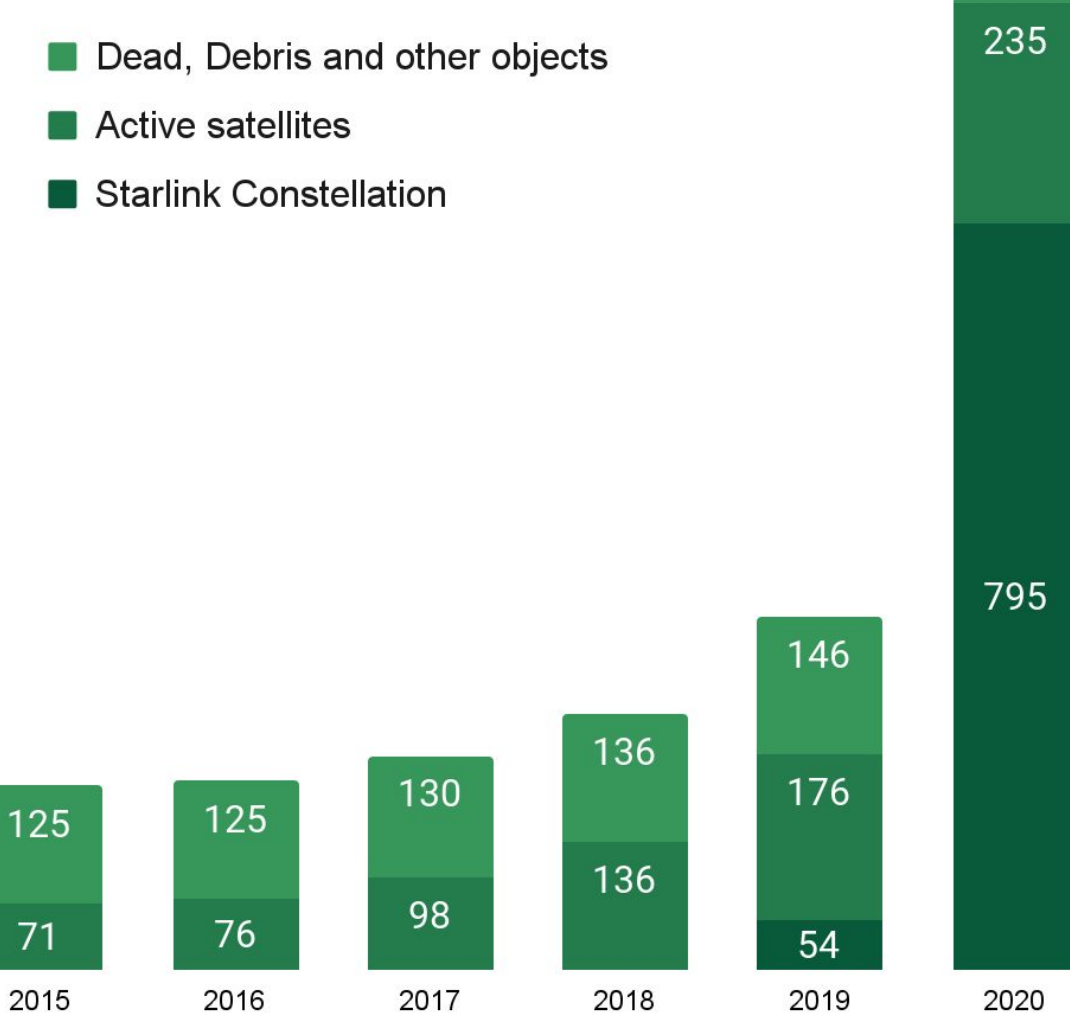
Venture Funding of Space Companies



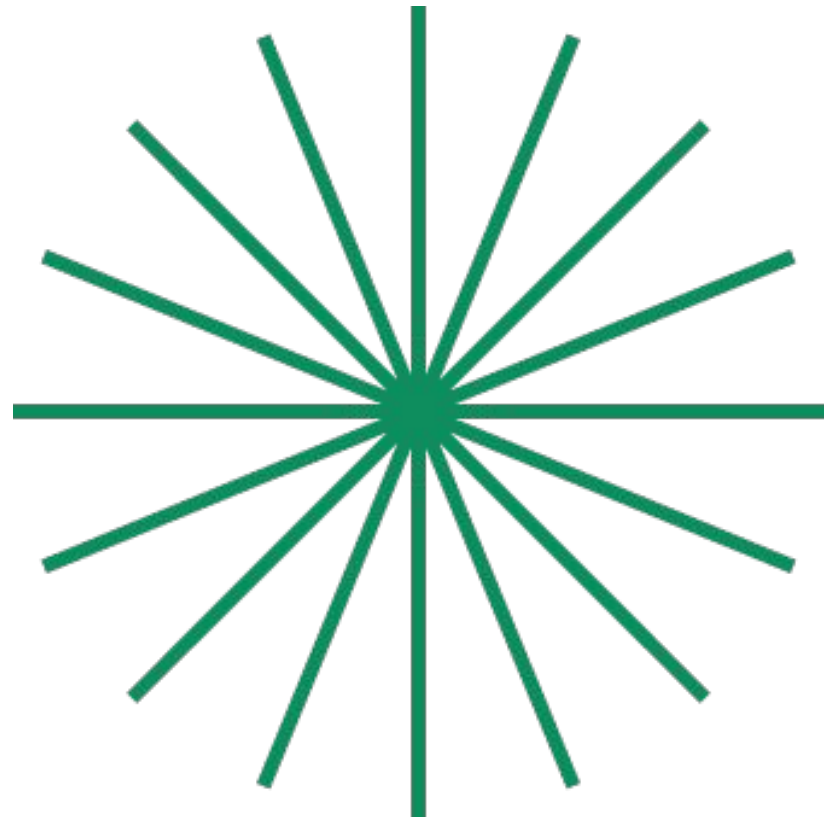
Objects Under 100kg in Orbits Below 600km Altitude



Objects Over 100kg in Orbits Below 600km Altitude



Source: Space Capital Quarterly Astrophysical Journal Letters, Starlink deployment data



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