

Overview of the Nanotechnology Industry in California

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American Chemistry Council

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Nanotechnology
Panel

ACC Nanotechnology Panel

Vision. To be the primary forum and leading advocate for the responsible development of nanotechnology among nanomaterial manufacturers and users.

Members. Composed of companies with business interests in nanotechnology products and applications.



ACC Nanotechnology Panel

1. Promote the responsible development of nanotechnology by advancing knowledge of good product stewardship practices among nanomaterial producers and users.
2. Support the development of appropriate, science- and risk-based regulations, nomenclature and definitions for nanotechnology that foster safety and innovation.
3. Engage with other stakeholders to address environmental, health and safety issues regarding nanotechnology and respond to public concerns.
4. Support research needed to assess and manage potential health and environmental risks associated with nanoscale materials.
5. Engage in public outreach highlighting innovative and sustainable applications and improving public awareness of societal benefits of nanotechnology.

Organization for Economic Cooperation and Development

- Intergovernmental organization of 36 member countries
- OECD's Chemicals Committee has a subsidiary body, the Working Party on Manufactured Nanomaterials
- Testing and assessment protocols for nanomaterials
 - Mutual Acceptance of Data (MAD)
- Exposure assessment methods
- Nanomaterials and sustainability

<http://www.oecd.org/science/nanosafety/>

International Organization for Standards (ISO)

ISO Technical Committee 229/Nanotechnologies

- Measurement and Characterization
- Health, Safety and Environment
- Materials Specifications
- Products and Applications
- Terminology and Nomenclature
- Consumer and Societal Aspects
- Nanotechnology and Sustainability

<https://www.iso.org/committee/381983.html>

ISO/DTR 21386 [Under development]

Considerations for the measurement of nano-objects, and their aggregates and agglomerates (NOAA) in the environment

ISO/AWI TR 22293 [Under development]

Evaluation of methods for assessing the release of nanomaterials

ISO/NP TS 10798 [Under development]

Characterization of carbon nanotubes using scanning electron microscopy and energy dispersive X-ray spectrometry from commercial, nanomaterial-containing polymer composites

Overview of the “Nanotechnology Industry”

2008 Butras Inc.

2008

Fast Stochastic: %K(5) 77.33 %D(3) 75.31

Volume 3,820,00

MA(13) 4,898,306



“Nanotechnology Industry”

The term “nanotechnology industry” is not included in statistical systems (e.g., NAICS) that track information on the business economy.

Companies that make or use nanomaterials may describe themselves as being part of the industries their products and/or services serve.

“Nanotechnology Industry” is a catch-all phrase that attempts to draw a circle around a diverse set of materials and uses.

Definitions and Caveats

In these slides, “nanotechnology industry” loosely refers to the creation and use of nanotechnology materials, devices, and systems.

- Nanomaterials, nanotools (nanolithography tools and scanning probe microscopes), and nanodevices (nanosensors and nanoelectronics)

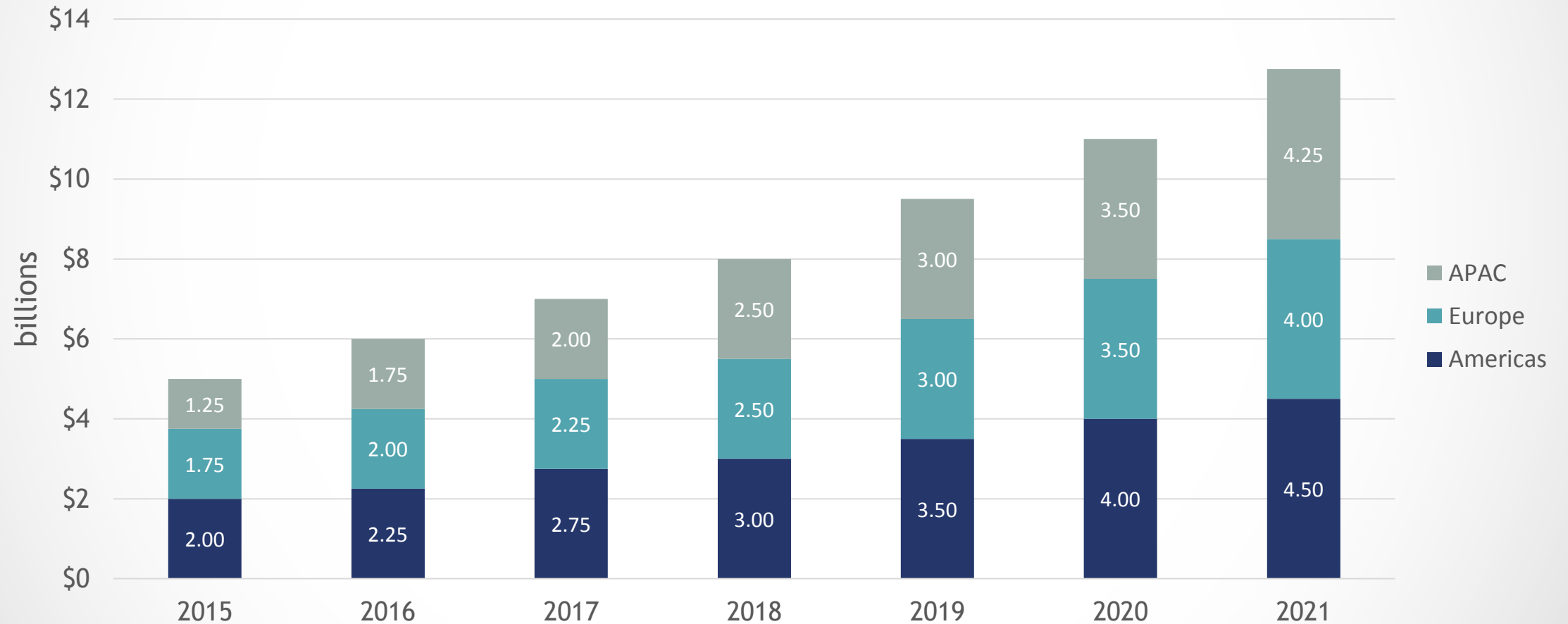
“Nano-enabled products” refers to final products that incorporate nanotechnology in some way.

The slides that follow contain estimates based on numbers and trends from multiple sources.

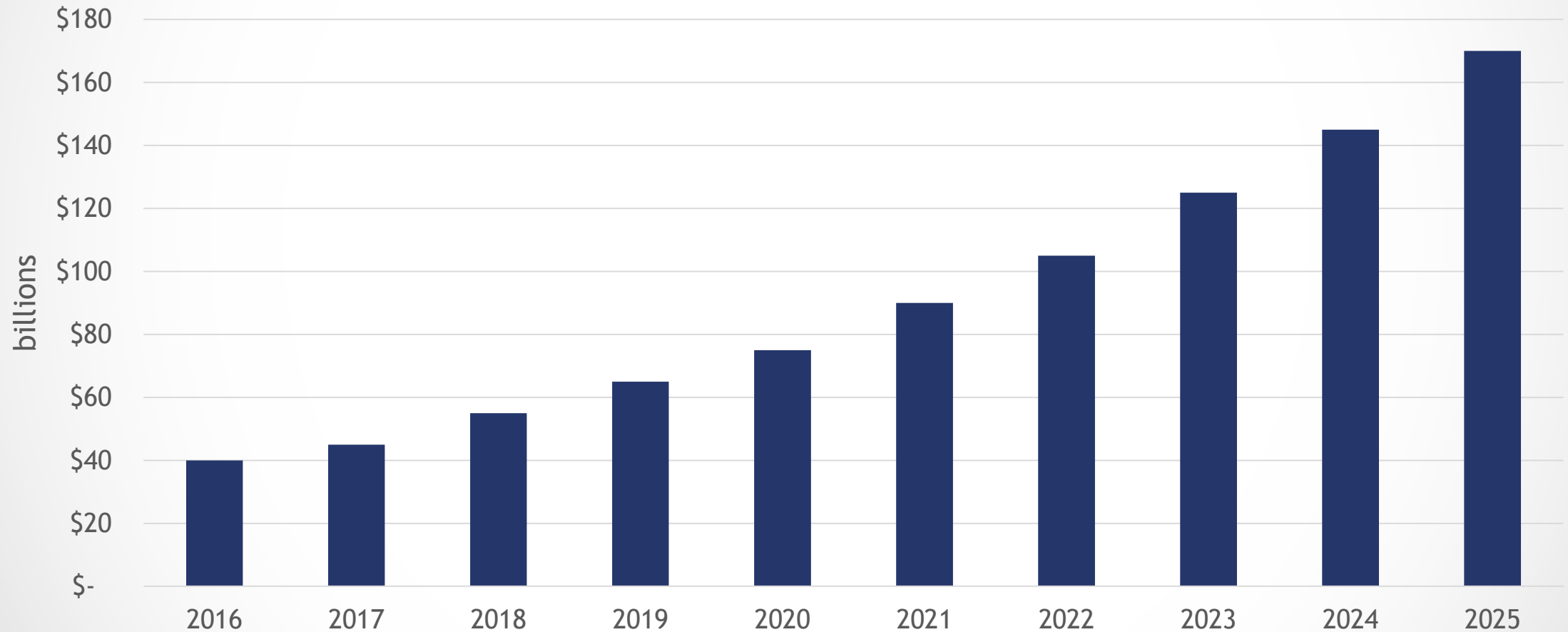
The goal is to present an overall picture and illustrate trends over time.

The analysis was done by ACC and has not been independently verified.

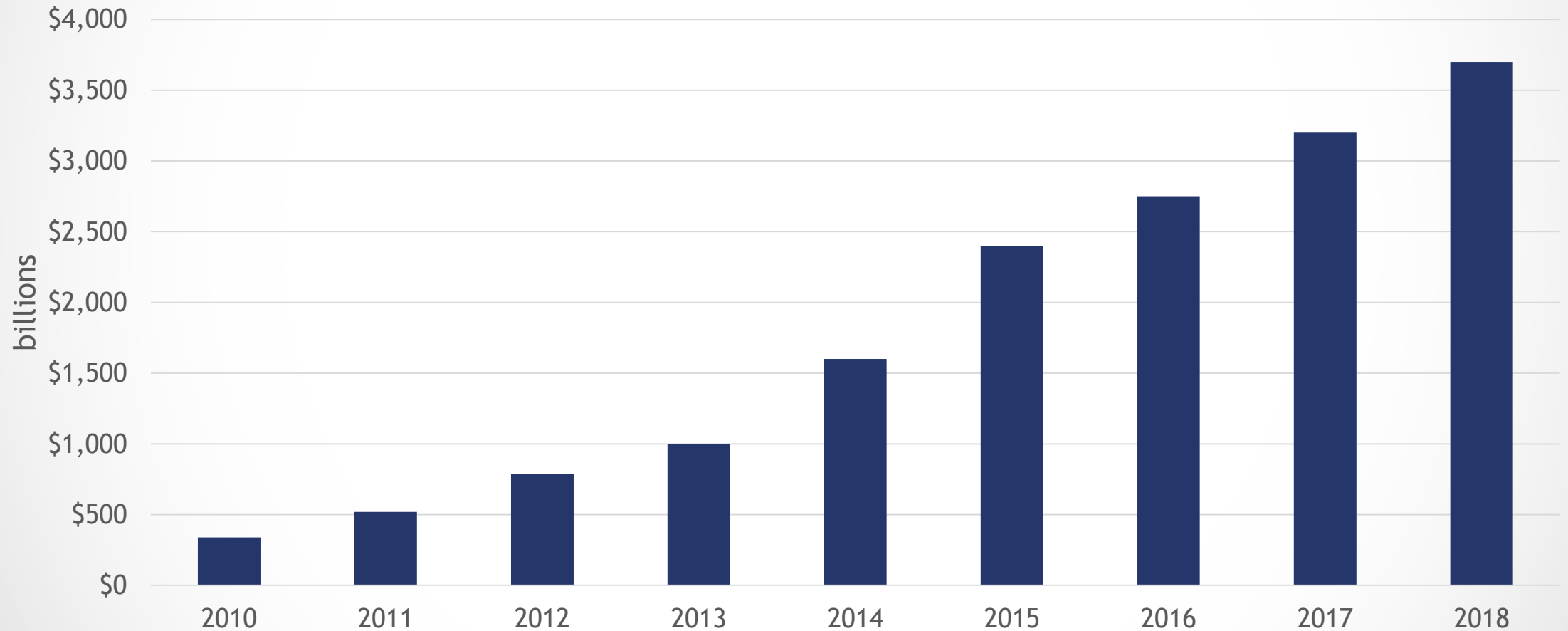
Global Nanotechnology Industry Revenues



Value of the Global Nanotechnology Industry



Global Revenues from Nano-Enabled Products



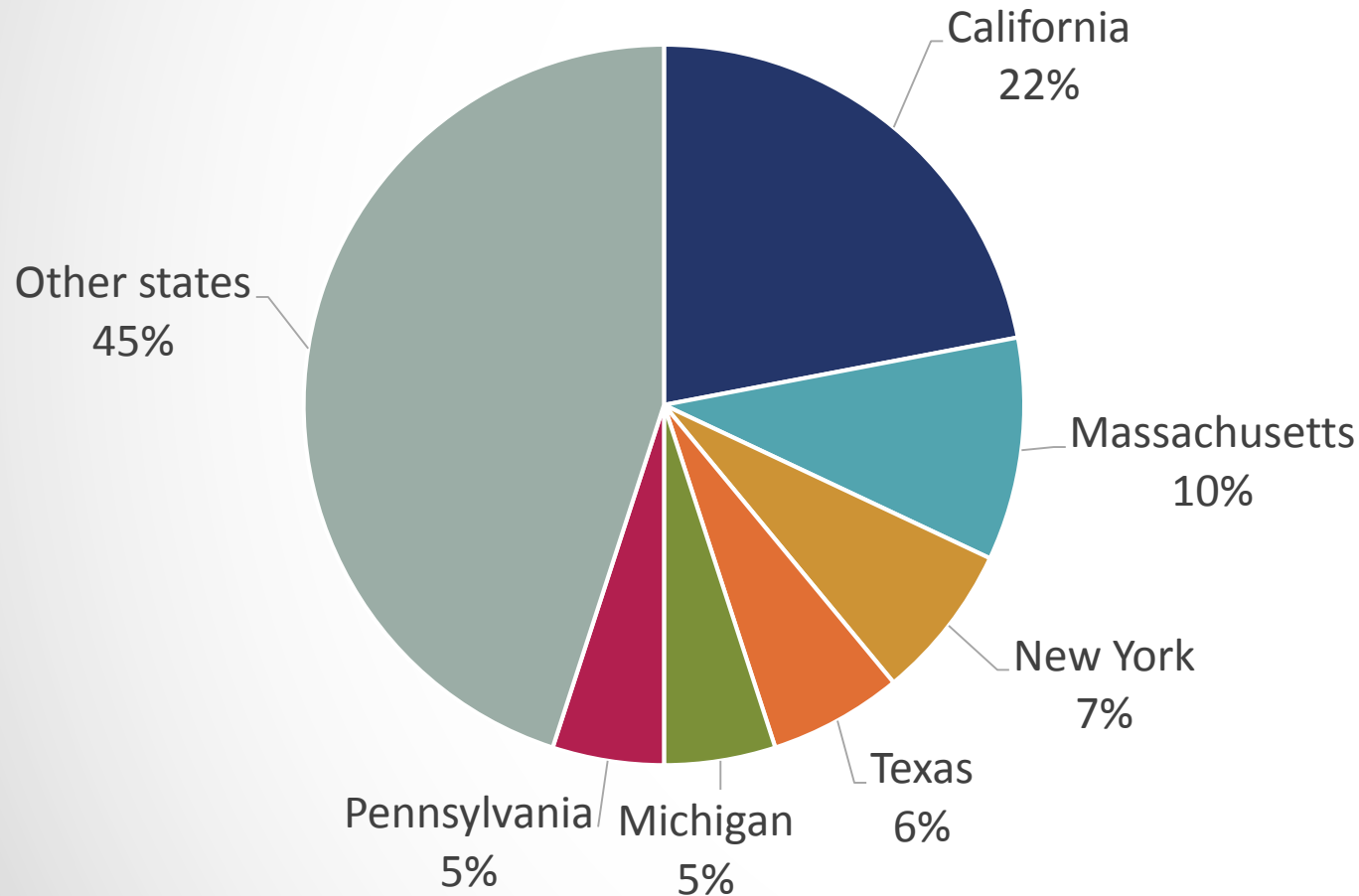
ACC analysis based on estimates and from National Science Foundation, Lux Research, National Nanotechnology Initiative

“Nanotechnology Industry” in California



- Unable to identify any up-to-date economic reports with information specific to California.
- Can use surrogate data and information to understand where California stands relative to other states.
- Surrogate data can also help to understand California’s role in fostering nanotechnology innovation
- Employment websites give a rough idea of importance of nanotechnology in California’s job market

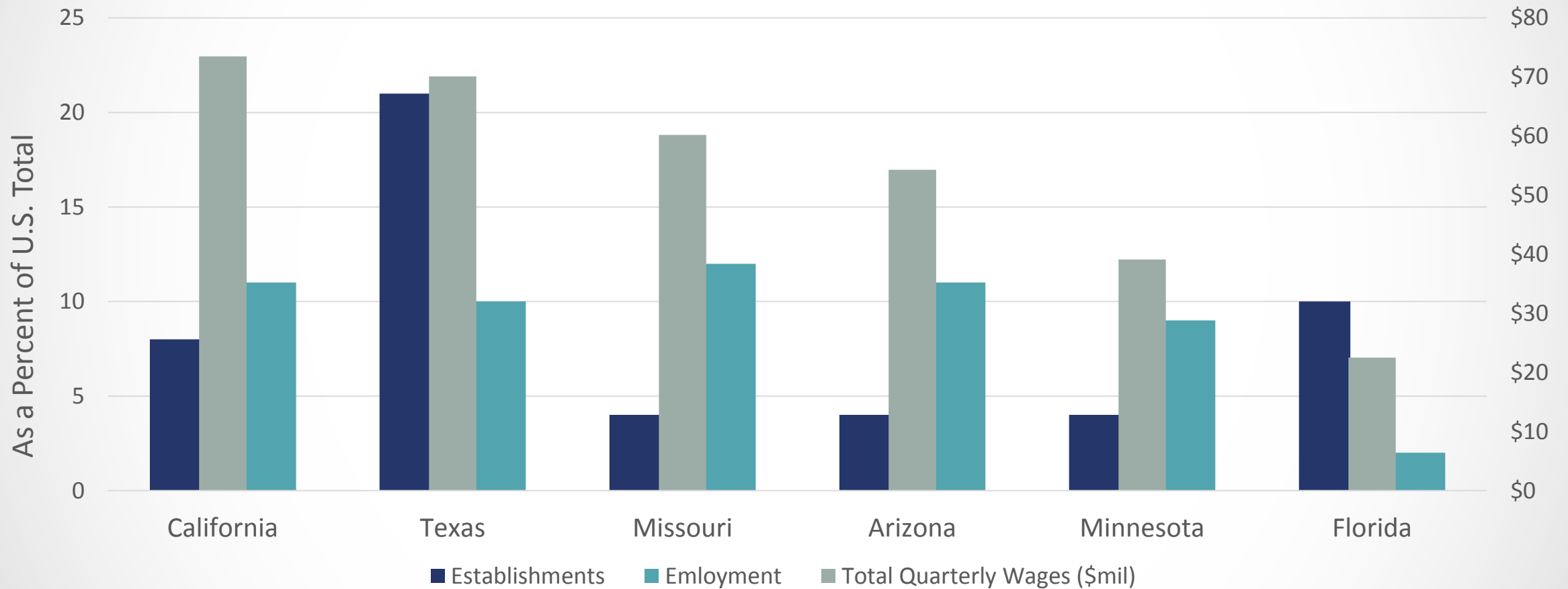
Nanotechnology Companies



More than one-fifth (22%) of U.S. companies engaged in nanotechnology are located in California.

This estimate includes companies that produce nanotechnology products and applications, provide nanotechnology services, are engaged in nanomedicine, and engage in nanotechnology R&D, among others.

U.S. R&D in Nanotechnology

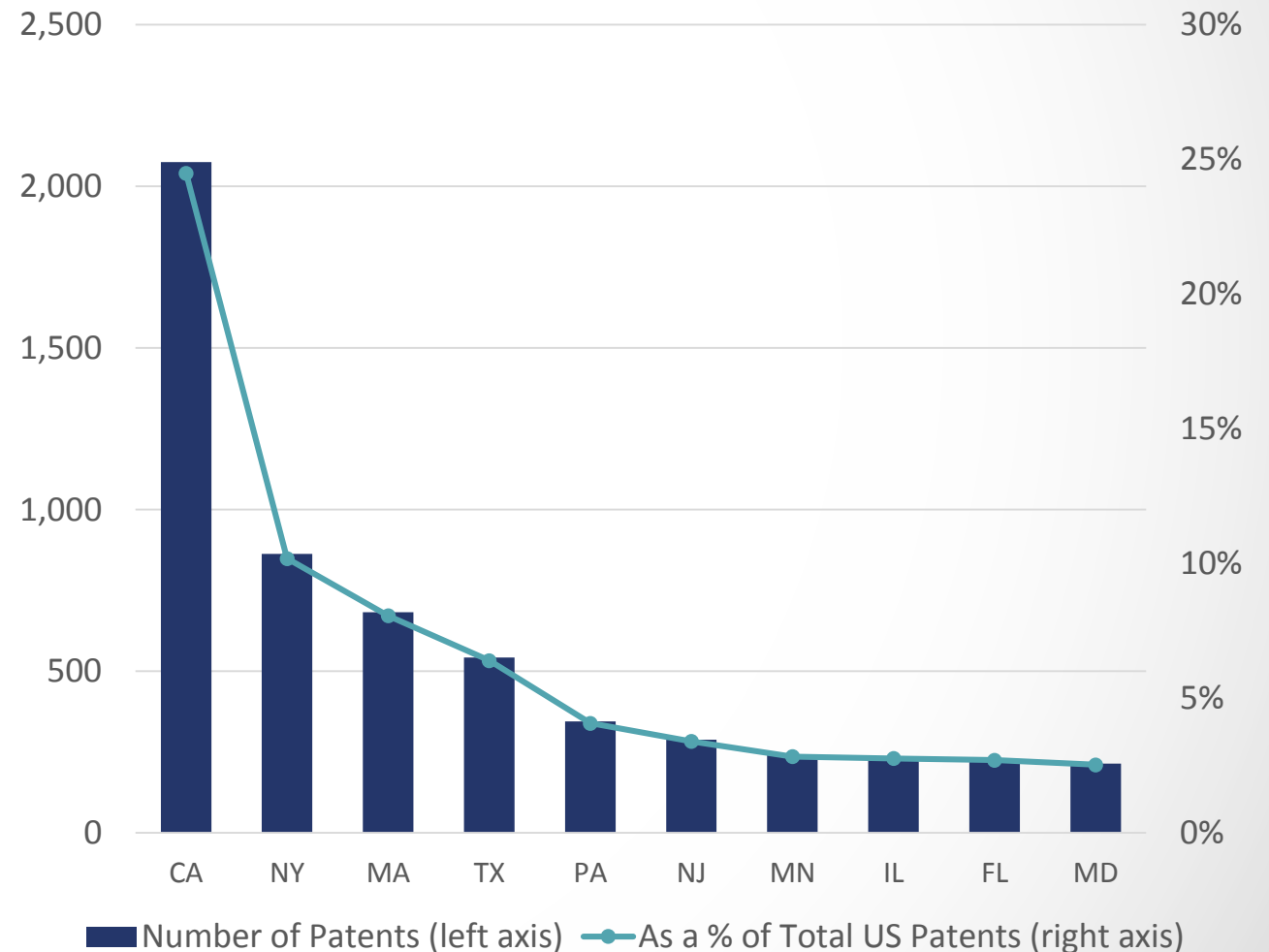


Source: Quarterly Census of Employment and Wages - Bureau of Labor Statistics, 3rd Quarter 2017

Note: Due to the nature of nanotechnology, which is used in a range of industries, it is not fully captured under a single code in the North American Industry Classification System (NAICS). This chart shows data based on NAICS 541713: Research and development in nanotechnology.

U.S. Nanotechnology Patents

- California has applied for the most nanotechnology-related patents, according to data from the U.S. Patent and Trademark Office (USPTO).
 - 2,075 patent applications
 - 24% of total U.S. (for nanotech)
- More than double that of NY, the state with the second highest number of patent applications.
- Numbers are from the USPTO entire database as of April 2018.



Jobs in Nanotechnology



19% of people on LinkedIn who selected “nanotechnology” as their primary industry were located in California.

Percent of job listings that included nanotechnology as part of the job description located in California.

47%



40%



13%



Conclusions

- Significant investments by global organizations on various aspects of nanotechnology (i.e., potential risks, standardization)
- “Nanotechnology industry” is a catch-all phrase used to encompass a broad array of materials and applications.
- The value of nanotechnology companies (material manufacturers, users, and services) is projected to increase.
- California is a leader in nanotechnology, as evidenced by the number of companies, R&D, the number of patents, and the number of job descriptions that mention “nanotechnology.”

Thank you!



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Investments in Nanotechnology

