



16-18 April 2024. Juan Les Pins, Nice, France

EPIC AGM & SUMMIT 2024

# SPIE.

The international society for optics and photonics

## Global Photonics Market Trends



Dr. Andrew Brown  
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Global Business Development  
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20  
YEARS



We Are Here!  
Thanks Carlos 😊



Juan Les Pins, France

AGM & SUMMIT 2024



Friends

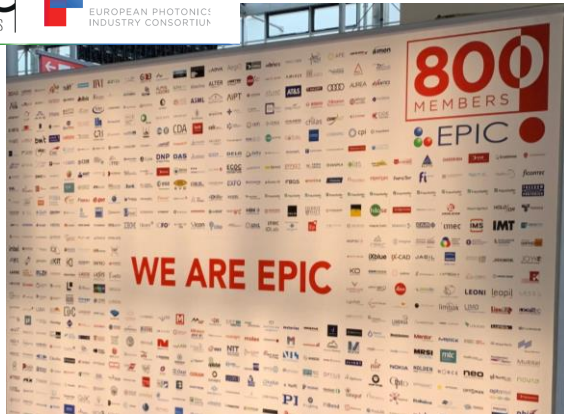
Andrew Brown  
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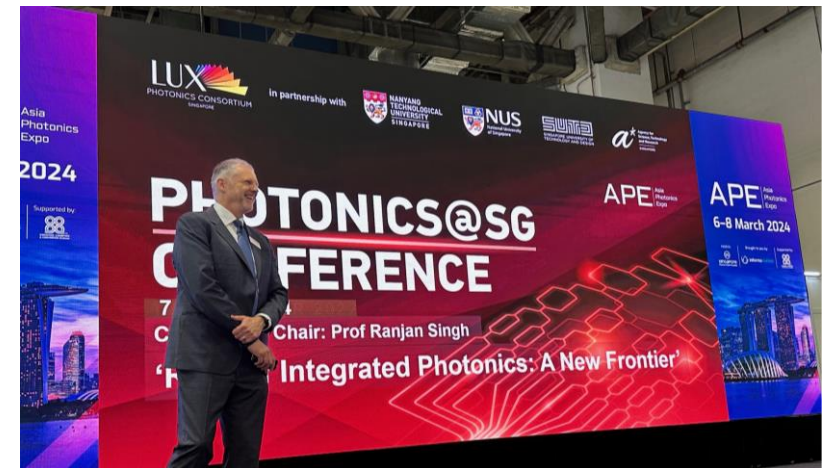
# Congratulations EPIC - 20 years of growth and global reach



Tom Pearsall - Founder



20 years of growth



# Overview

- SPIE overview
- Global trends
- Core components
- Enabled marketplace
- Closing comments



# SPIE At a Glance



**SPIE is a not-for-profit international professional society advancing the science and application of light.**



## **Membership:**

- >24,000 individuals globally | 6600 Students
- >1000 Fellows | 1400 Senior Members



## **Community Support:**

- More than \$22M provided over the last 5 years.
- Continued our support throughout the pandemic



## **SPIE Digital Library**

- More than 570,000 technical papers online with 15 peer-reviewed journals, e-books, and proceedings.



## **Support growth and success of photonics, globally**

- SPIE provides worldwide industry support and advocacy
- Optics.Org is an international news source for photonics industry
- Prism Awards recognize innovation in our industry

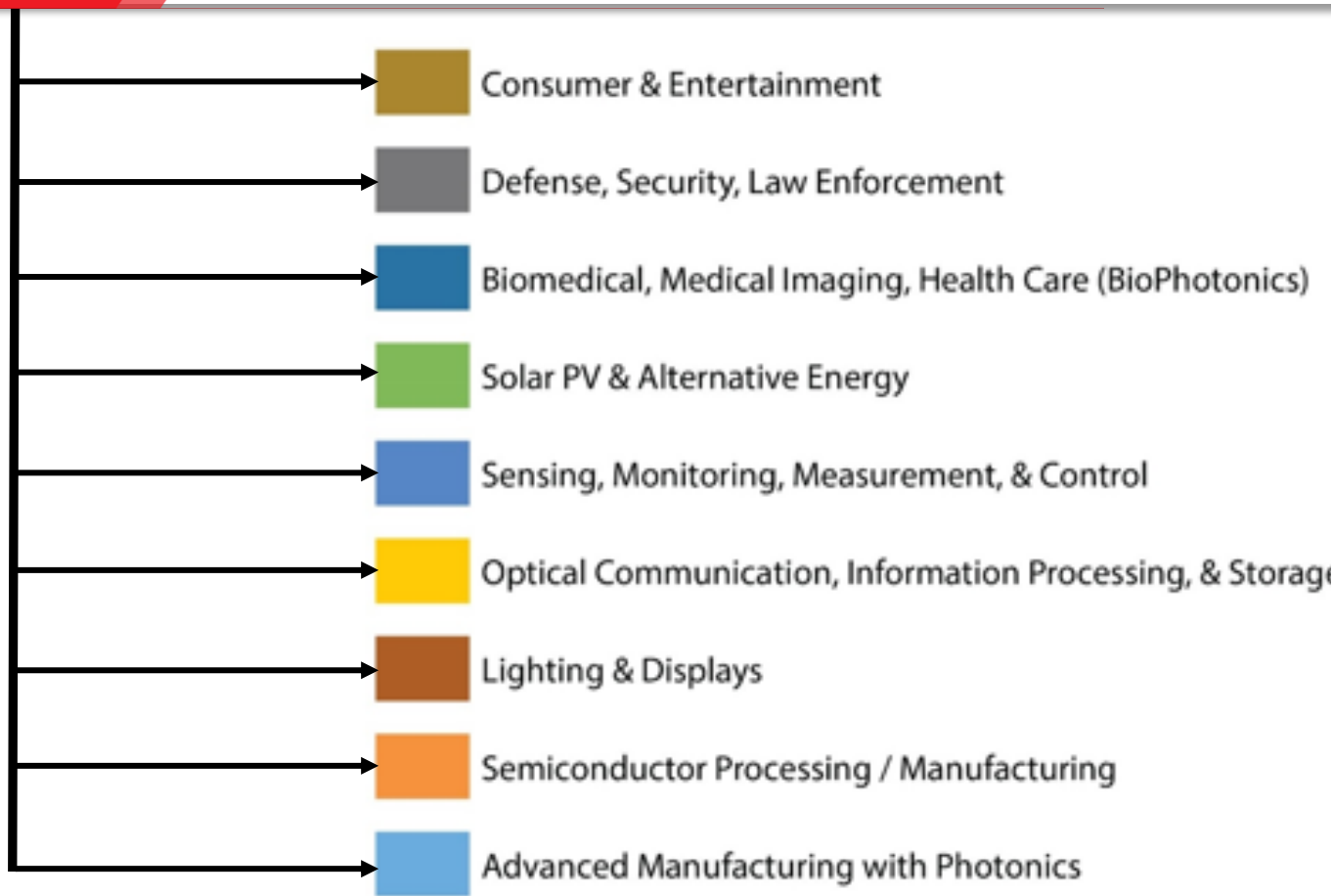


## **Conferences, Exhibitions, Digital Forums**

- Annually, 35,000 attendees from more than 100 countries meet and do business with >2,000 exhibitors at SPIE's global meetings.



# SPIE activities cover all major photonics markets



## Upcoming SPIE conferences and exhibitions



**Find the event to meet your needs**  
Use the calendar below to find the best match for your research presentations across the range of technologies and application areas. Find exhibitions where you can find the latest technologies in our fast-changing industry.

Filter by:     [View SPIE-related events](#)

Filters:

**SPIE Smart Structures + Nondestructive Evaluation** 25 - 28 March 2024 **SPIE. SMART STRUCTURES+ NONDESTRUCTIVE EVALUATION**

Hilton Long Beach Hotel  
Long Beach, California, United States

**SPIE Optical Systems Design** 7 - 11 April 2024 **SPIE. OPTICAL SYSTEMS DESIGN**

Palais de la Musique et des Congrès  
Strasbourg, France

SPIE Optical Systems Design Exhibitors: 9 - 10 April 2024

**SPIE Photonics Europe** 7 - 11 April 2024 **SPIE. PHOTONICS EUROPE**

Palais de la Musique et des Congrès  
Strasbourg, France

SPIE Photonics Europe Exhibitors: 9 - 10 April 2024

**Photomask Japan 2024** 16 - 18 April 2024 **Photomask Japan 2024**

Pacific Yokohama  
Yokohama, Japan

**SPIE Defense + Commercial Sensing** 21 - 25 April 2024 **SPIE. DEFENSE+ COMMERCIAL SENSING**

Gaylord National Resort and Convention Center  
National Harbor, Maryland, United States

SPIE Defense + Commercial Sensing Exhibition: 24 - 25 April 2024

**SPIE Future Sensing Technologies** 22 - 24 April 2024 **SPIE. FUTURE SENSING TECHNOLOGIES**

Pacific Yokohama  
Yokohama, Japan

**Optics and Photonics International Congress** 22 - 26 April 2024 **OPIC 2024**

Pacific Yokohama  
Yokohama, Japan

**SPIE Astronomical Telescopes + Instrumentation** 16 - 21 June 2024 **SPIE. ASTRONOMICAL TELESCOPES+ INSTRUMENTATION**

Pacific Yokohama  
Yokohama, Japan

SPIE Astronomical Telescopes + Instrumentation Exhibition: 18 - 20 June 2024

**Photonics for Quantum** 17 - 20 June 2024 **PHOTONICS FOR QUANTUM**

University of Waterloo  
Waterloo, Ontario, Canada

SPIE. PHT 2022™

# SPIE CONFERENCES AND EXHIBITIONS

## NORTH AMERICA

2024
<b>SPIE. MEDICAL IMAGING</b> 18-22 February 2024 San Diego, California, USA
<b>SPIE. ADVANCED LITHOGRAPHY+ PATTERNING</b> 25-29 February 2024 San Jose, California, USA Exhibition: 27-28 February 2024
<b>SPIE. HIGH-POWER LASER ABLATION</b> 26 February-1 March 2024 Santa Fe, New Mexico, USA
<b>SPIE. SMART STRUCTURES+ NONDESTRUCTIVE EVALUATION</b> 25-28 March 2024 Long Beach, California, USA
<b>SPIE. DEFENSE+ COMMERCIAL SENSING</b> 21-25 April 2024 National Harbor, Maryland, USA Exhibition: 23-25 April 2024
<b>PHOTONICS FOR QUANTUM</b> <b>SPIE. RIT</b> 17-20 June 2024 Waterloo, Ontario, Canada

2025
<b>SPIE. OPTICS+ PHOTONICS</b> 18-22 August 2024 San Diego, California, USA Exhibition: 20-22 August 2024
<b>SPIE. TRANSLATIONAL BIOPHOTONICS+ADDITIVE MANUFACTURING</b> 16-18 September 2024 Houston, Texas, USA
<b>SPIE. PHOTONICS INDUSTRY SUMMIT</b> 25 September 2024 Washington DC, USA
<b>SPIE. PHOTOMASK TECHNOLOGY + EUV LITHOGRAPHY</b> 29 September-3 October 2024 Monterey, California, USA Exhibition: 1-2 October 2024
<b>SPIE. LASER DAMAGE</b> 7-10 October 2024 San Ramon, California, USA
<b>SPIE. PHOTONICS WEST</b> 25-30 January 2025 San Francisco, California, USA PW Exhibition: 28-30 January 2025 BiOS Expo: 25-26 January 2025 Quantum West Expo: 28-29 January 2025
<b>SPIE. AR VR MR</b> 27-29 January 2025 San Francisco, California, USA Exhibition: 28-29 January 2025
<b>SPIE. GLOBAL BUSINESS FORUM</b> 27 January 2025 San Francisco, California, USA
<b>SPIE. OPTIFAB</b> 20-23 October 2025 Rochester, New York, USA Exhibition: 21-23 October 2025 Biennial event

## EUROPE/UNITED KINGDOM

2024	2025
<b>SPIE. OPTICAL SYSTEMS DESIGN</b> <i>Co-located with SPIE Photonics Europe</i> 7-11 April 2024 Strasbourg, France Triennial event Exhibition: 9-10 April 2024	<b>SPIE. OPTICS+ OPTOELECTRONICS</b> 7-11 April 2025 Prague, Czech Republic Exhibition: 9-10 April 2025
<b>SPIE. PHOTONICS EUROPE</b> <i>Co-located with SPIE Optical Systems Design</i> 7-11 April 2024 Strasbourg, France Biennial event Exhibition: 9-10 April 2024	<b>SPIE. DIGITAL OPTICAL TECHNOLOGIES</b> 23-26 June 2025 Munich, Germany
<b>SPIE. SENSORS+ IMAGING</b> 16-19 September 2024 Edinburgh, Scotland Exhibition: 17-18 September 2024	<b>SPIE. OPTICAL METROLOGY</b> 23-26 June 2025 Munich, German
<b>SPIE. PHOTONEX</b> Exhibition: 30-31 October 2024 Manchester, United Kingdom	<b>EUROPEAN CONFERENCES ON BIOMEDICAL OPTICS OPTICA   SPIE.</b> 25-29 June 2025 Munich, Germany Biennial event

## ASIA-PACIFIC

2024
<b>SPIE. PHOTONICS ASIA</b> October 2024 China
<b>OPIC 2024</b> <i>Co-located with SPIE Future Sensing Technologies 2024</i> 22-26 April 2024 Yokohama, Japan Exhibition: 24-26 April 2024
<b>SPIE. FUTURE SENSING TECHNOLOGIES</b> <i>Co-located with OPIC24 and OPIE24</i> 22-24 April 2024 Yokohama, Japan
<b>PMJ Photomask Japan</b> 16-18 April 2024 Yokohama, Japan
<b>SPIE. ASTRONOMICAL TELESCOPES + INSTRUMENTATION</b> 16-21 June 2024 Yokohama, Japan Exhibition: 18-20 June 2024
<b>SPIE. ASIA-PACIFIC REMOTE SENSING</b> 2-4 December 2024 Biennial event

[www.spie.org/conferences](http://www.spie.org/conferences)





**Photonics West/BiOS/AVR/Quantum West  
24,000 registered attendees, 1600 exhibitors  
Plan now for 2025!**



# New Global Business Forum



SPIE and our partners are pleased to announce a brand new business forum for executives, investors, entrepreneurs, and stakeholders across the global photonics industry. Held in cooperation with leading global analyst organizations, the forum will take place on Monday 29 January 2024, co-located with Photonics West,

Join leading executives to hear expert presentations covering the most current data and trends impacting the photonics industry. The forum will feature new and exclusive data on the global photonics market, covering relevant business information, market trends, regional breakdowns, and hot technologies driving the photonics industry.

The Forum will include multiple networking opportunities where attendees can interact with presenters and connect with other industry leaders to explore partnerships and business opportunities.

[spie.org/gbf](https://spie.org/gbf)

Please email questions to: [andrewb@spie.org](mailto:andrewb@spie.org)

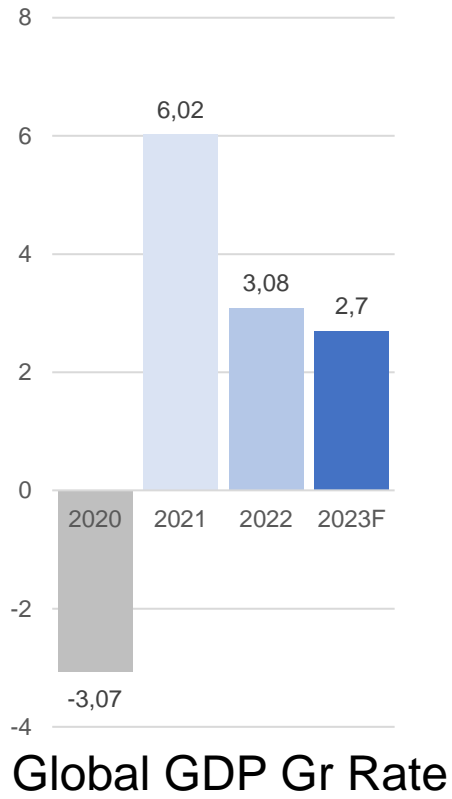
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# GBF 24: Global economic trends

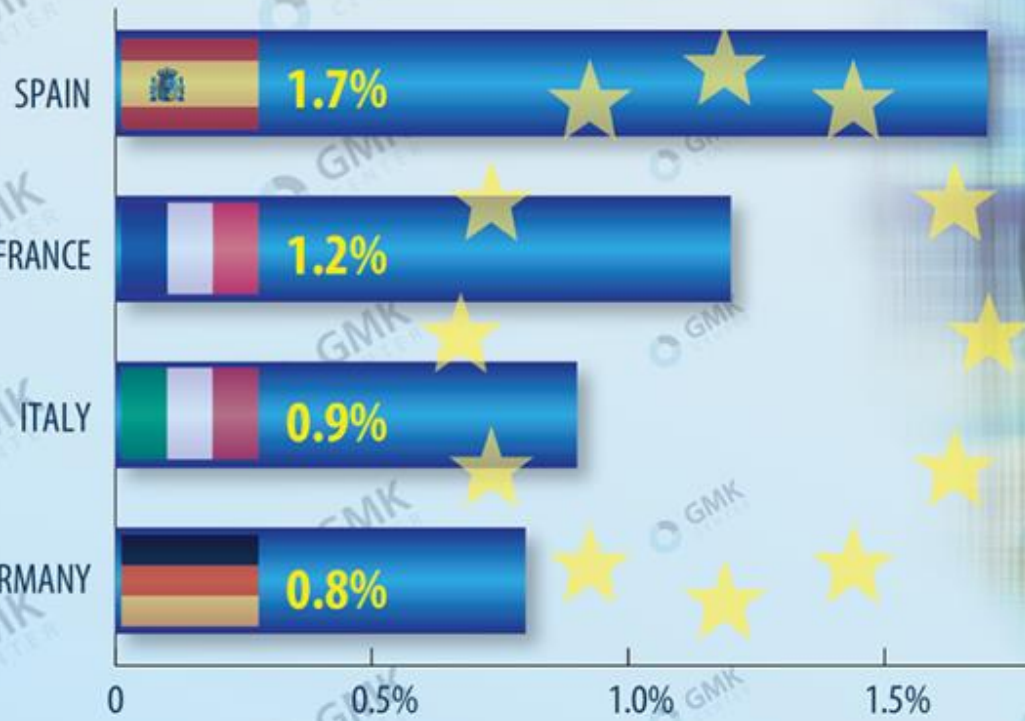
Sedate global growth due to high interest rates, but no recession and elusive soft landing.



- Recession averted
- 2023 GDP projection ~2.7% with mild slowdown in 2024
- Interest rates likely to peak mid-2024
- Inflation coming down
  - Likely won't be back to 2% target before 2025
  - Geopolitical tensions continue to influence economic outlook
    - US China rivalry
    - Russia/Ukraine
    - Israel/Gaza
    - Red Sea conflict
  - Energy prices remain a major source of uncertainty
    - Drought in Panama canal impacts oil shipments

# GDP forecasts for 2024

## EU countries GDP growth for 2024



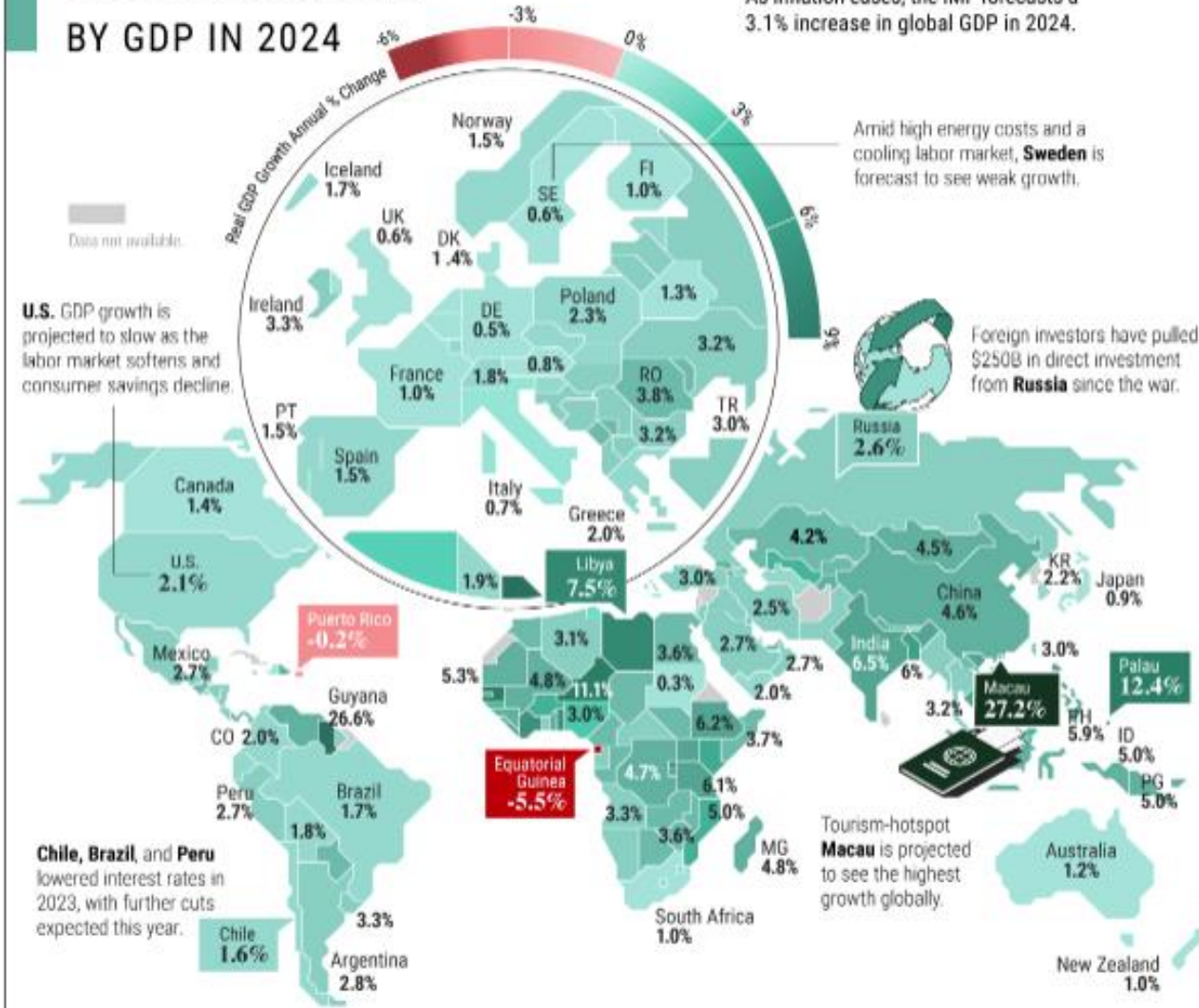
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# Global Growth Forecasts

BY GDP IN 2024

Due to the resilience of major economies, achieving a soft landing looks increasingly likely.

As inflation eases, the IMF forecasts a 3.1% increase in global GDP in 2024.



Source: IMF World Economic Outlook (Oct 2023 and Jan 2024 Update), Peterson Institute for International Economics, The Economist



# US economy - soft landing....?

HOME / REAL ESTATE NEWS / Expect a 'Soft Landing' in 2024, Say Economists

## EXPECT A 'SOFT LANDING' IN 2024, SAY ECONOMISTS

*Strong jobs report and growth rate could also delay Fed's rate cuts*

BY EDDIE RIVERA, EDITOR, WEEKENDR MAGAZINE

PUBLISHED ON APR 11, 2024



**A** soft landing is looking more and more likely for the economy in 2024, said a report from the California Association of Realtors (CAR) this week.

The report added that a strong jobs report for the third month in a row and a decent growth rate in economic activity are also keeping inflation elevated and delaying the Federal Reserve's move to cut rates any further soon.

## *Soft Landing or No Landing? Fed's Economic Picture Gets Complicated.*

Stubborn inflation and strong growth could keep the Federal Reserve wary about interest rate cuts, eager to avoid adding vim to the economy.

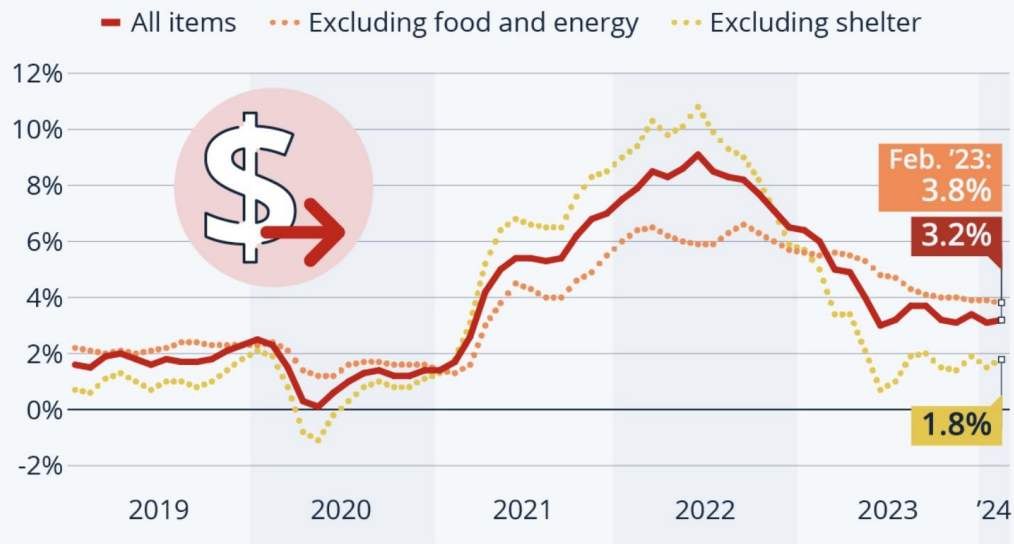


Jerome H. Powell, the Federal Reserve chair, and his colleagues have taken an increasingly cautious tone when they talk about when and how much they might lower borrowing costs. Kenny Holston/The New York Times

# Inflation rises, investors react

## Inflation Progress Stalls as Housing Costs Continue to Rise

Year-over-year change in the Consumer Price Index for All Urban Consumers in the U.S.\*



\* Not seasonally adjusted  
Source: Bureau of Labor Statistics

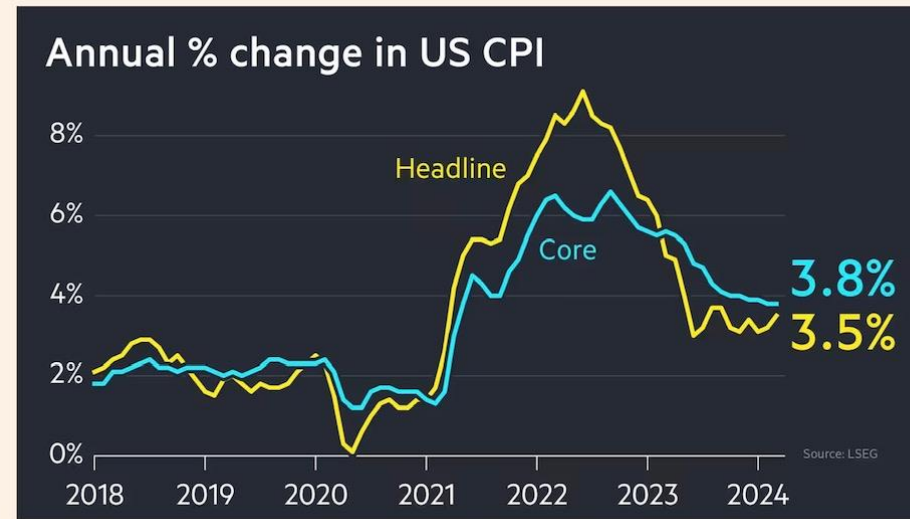
## FINANCIAL TIMES

US COMPANIES TECH MARKETS CLIMATE OPINION WORK & CAREERS LIFE & ARTS HTSI

US inflation [+ Add to myFT](#)

## Markets slash bets on rate cuts after US inflation rises to 3.5%

Figures for consumer prices and core inflation exceed expectations



UPDATED FRI, APR 12 2024 - 4:18 PM EDT

### Dow tumbles 475 points, S&P 500 suffers worst day since January as inflation woes erupt: Live updates

Hakyong Kim | Lisa Kallal Han

Traders work on the floor at the New York Stock Exchange (NYSE) in New York City, U.S., March 7, 2024.  
Byron Lee/Reuters

TRENDING NOW

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# Bumpy road ahead.... or worse!

## Inflation Progress Housing Costs

Year-over-year change in the  
Urban Consumers in the U.S.

— All items    - - - Excluding food and



\* Not seasonally adjusted  
Source: Bureau of Labor Statistics



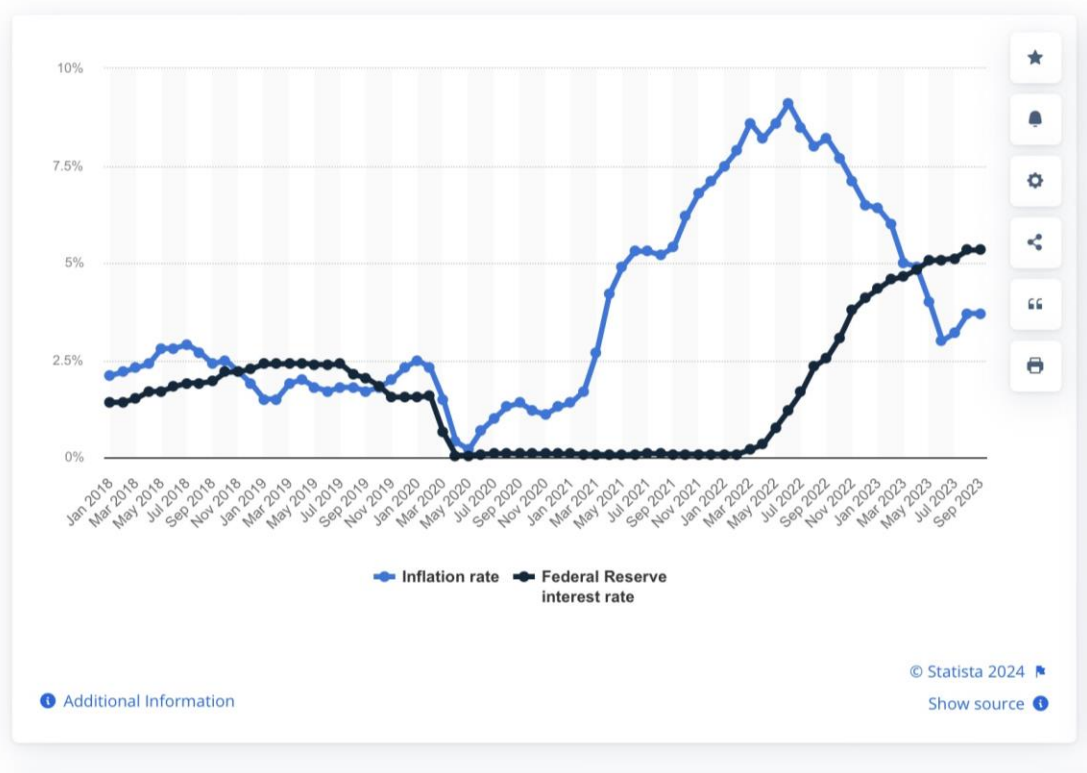


# Interest rates remain high – but not really

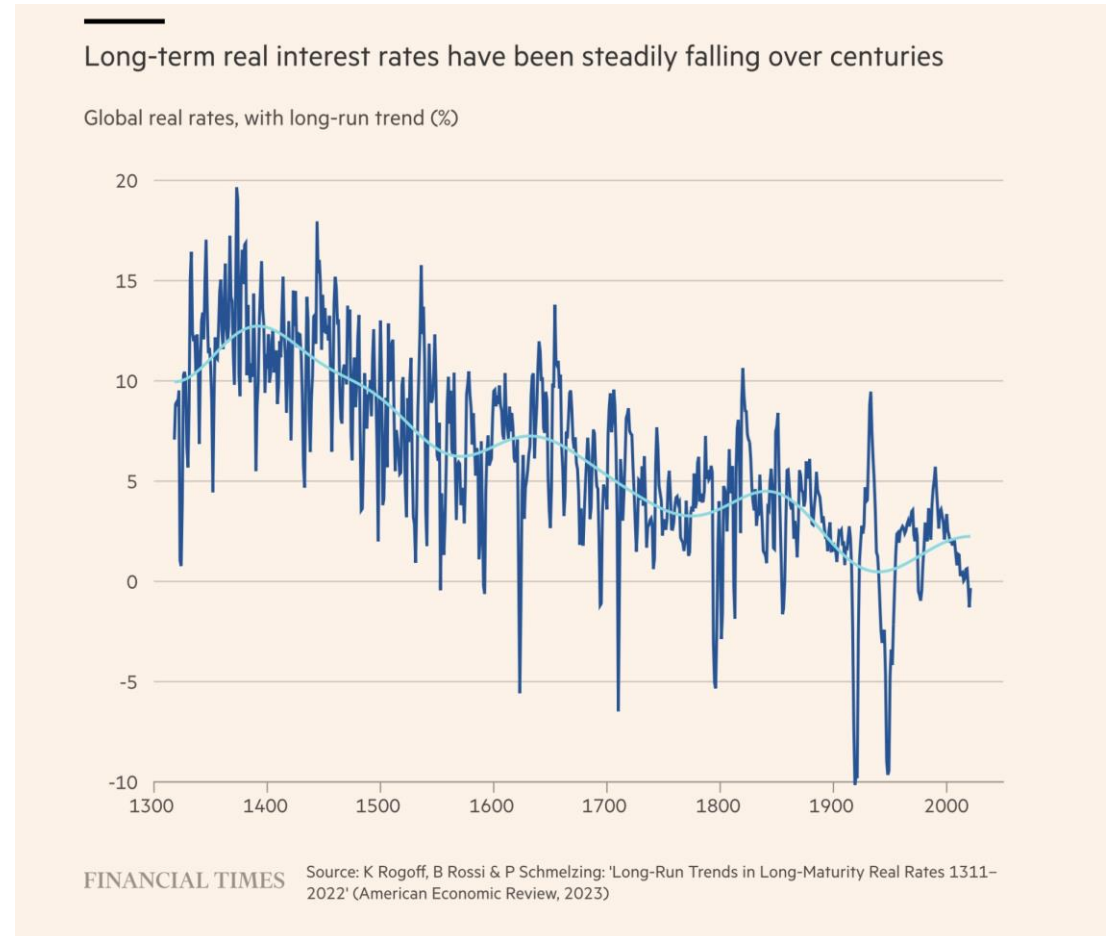
## We just got used to cheap money!

Finance & Insurance > Financial Institutions


Inflation rate and Federal Reserve interest rate monthly in the United States from January 2018 to September 2023



Monthly inflation rate and Federal Reserve interest rate in the U.S. 2018-2023



# Impact on M&A in Photonics



M&A ADVISORY SERVICES WITH A FOCUS ON PHOTONICS

**Linda Smith** · 1st  
 CERES Technology Advisors | M&A Advisor | SPIE Fellow  
 Needham, Massachusetts, United States · [Contact info](#)  
 6,291 followers · 500+ connections

CERES Technology Advisors, Inc.  
 University of Rochester

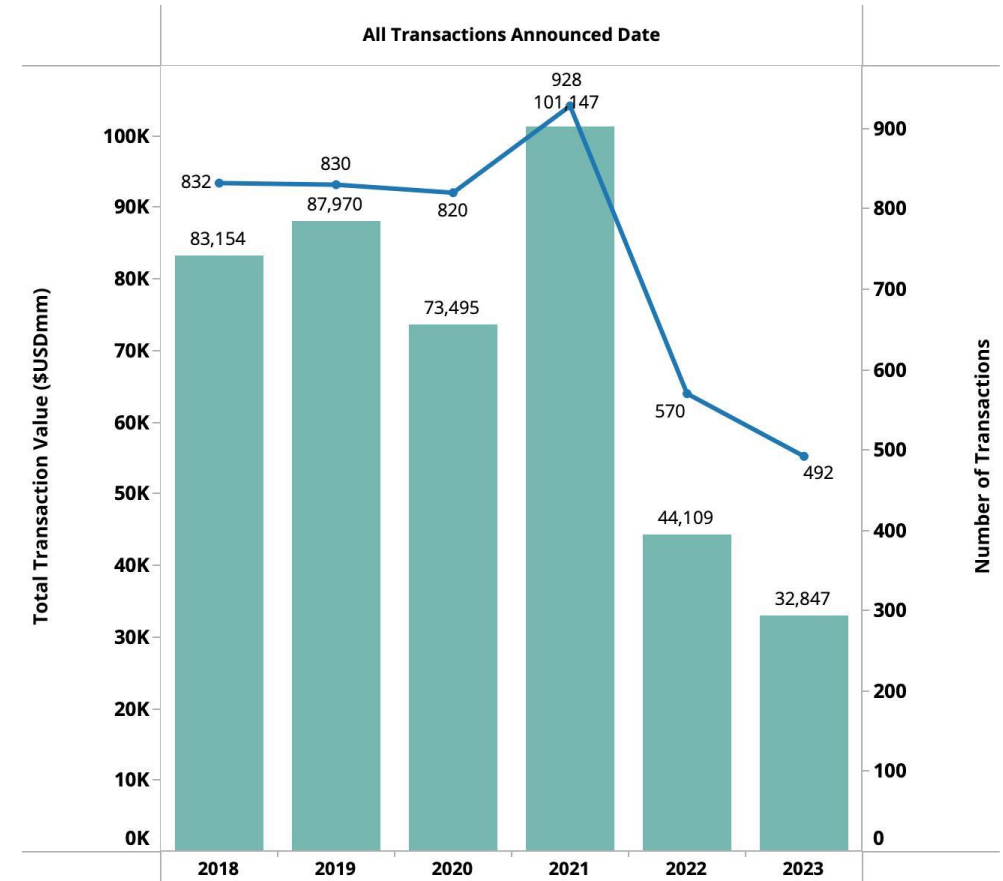


Simply Red - Money's Too Tight (To Mention) (Official Video) [Watch >](#)

**U.S. Q1 2024 venture capital investments fall 29% to \$36.6B | NVCA**

PitchBook Q1 2024  
 US Venture First Look

NVCA and Pitchbook have released Q1 2024 venture investment report. Image Credit: NVCA



\$USDmm as of announce date, historical currency conversion

(Total Consideration to Shareholders ÷ Percent Sought) + Other Consideration + Total Earnouts + Total Rights/Warrants/Options + Adjustment Size + Net Assumed Liabilities = **Implied Enterprise Value (IEV)**

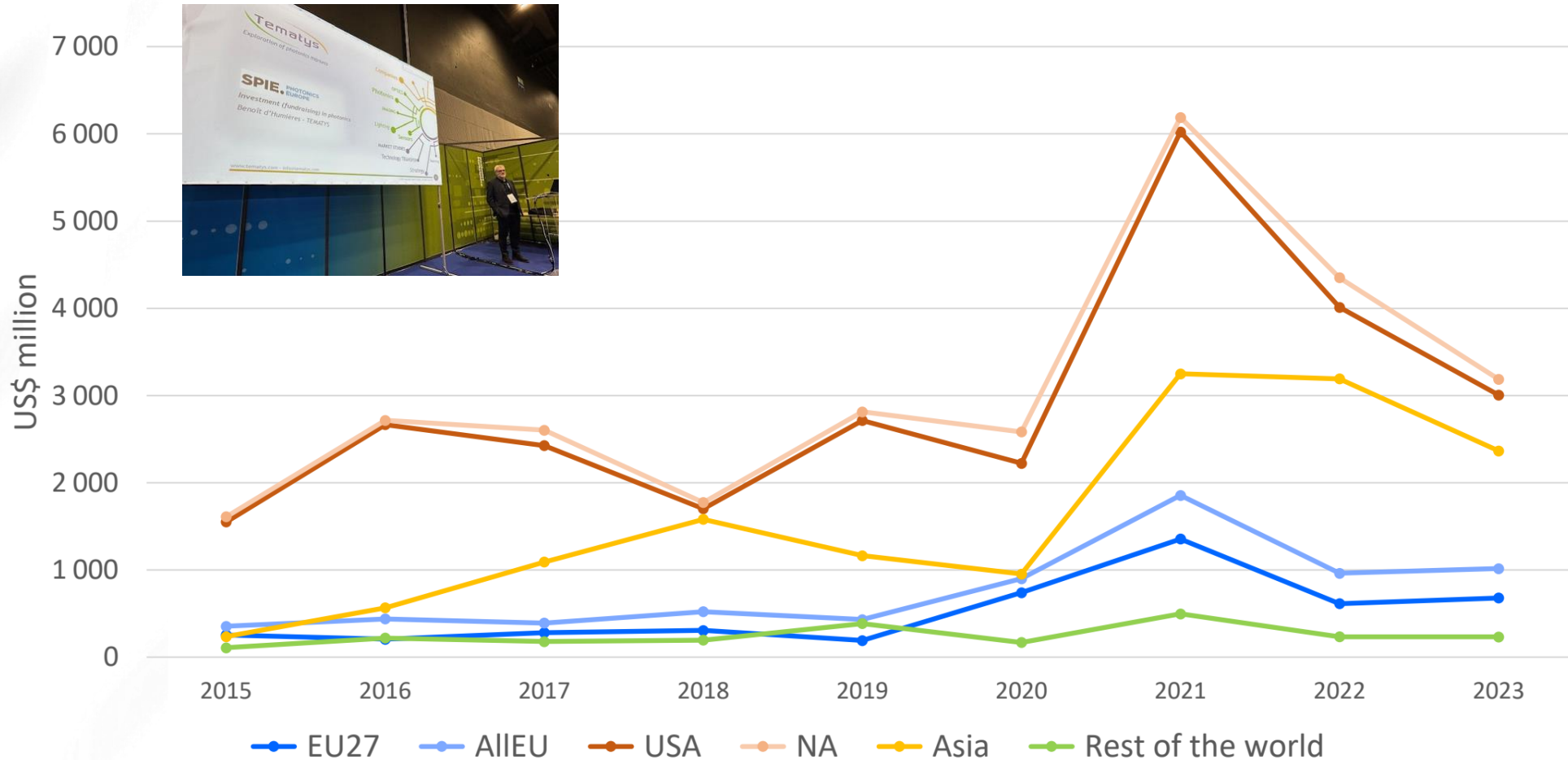
[2023 Mergers & Acquisitions in Photonics – CERES \(cerescom.net\)](https://cerescom.net)

# Impact on fund raising in photonics

SPIE MARKET PLACE 2024



## Funds raised by photonic companies

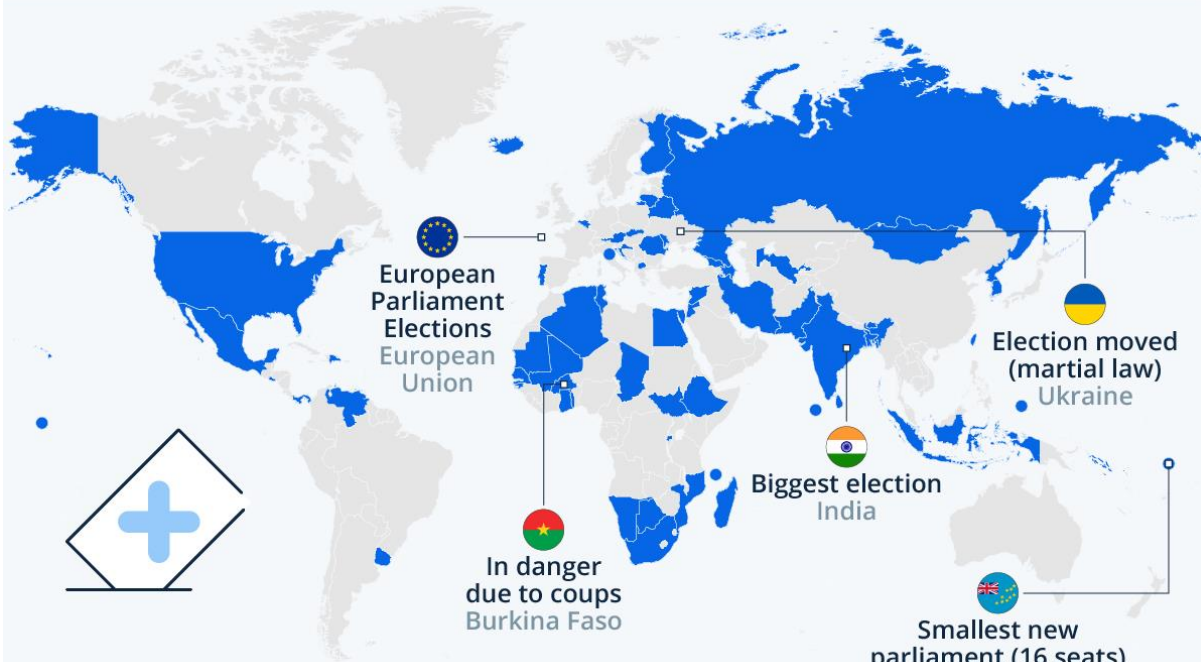


# But wait, there's more.....

## 2024: The Super Election Year

Countries where a national election is/was held in 2024

Expected number of voters: **2B** (~25% of world pop.) Share of free elections\*: **38%**



\* Free and partially free: 75%

General, parliamentary, presidential and economic union elections

Sources: Anchor Change Election Cycle Tracker, Statista research

statista



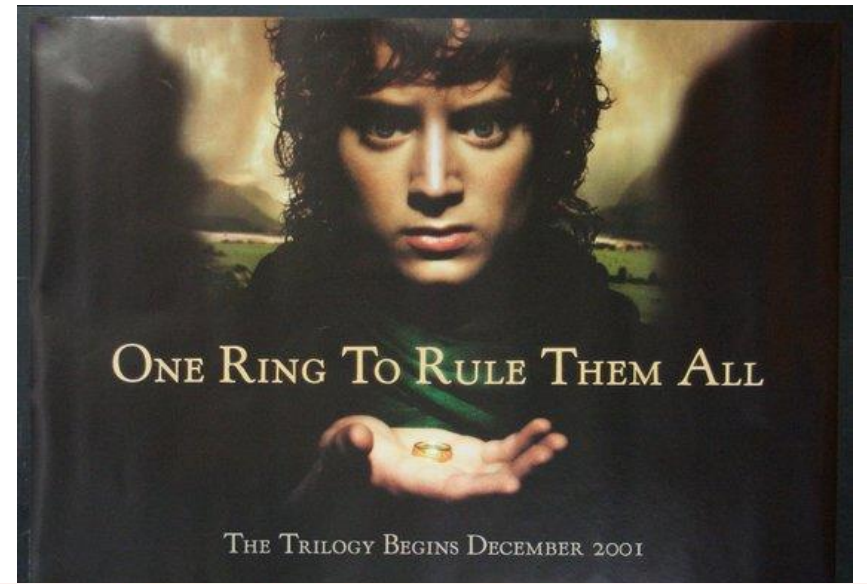
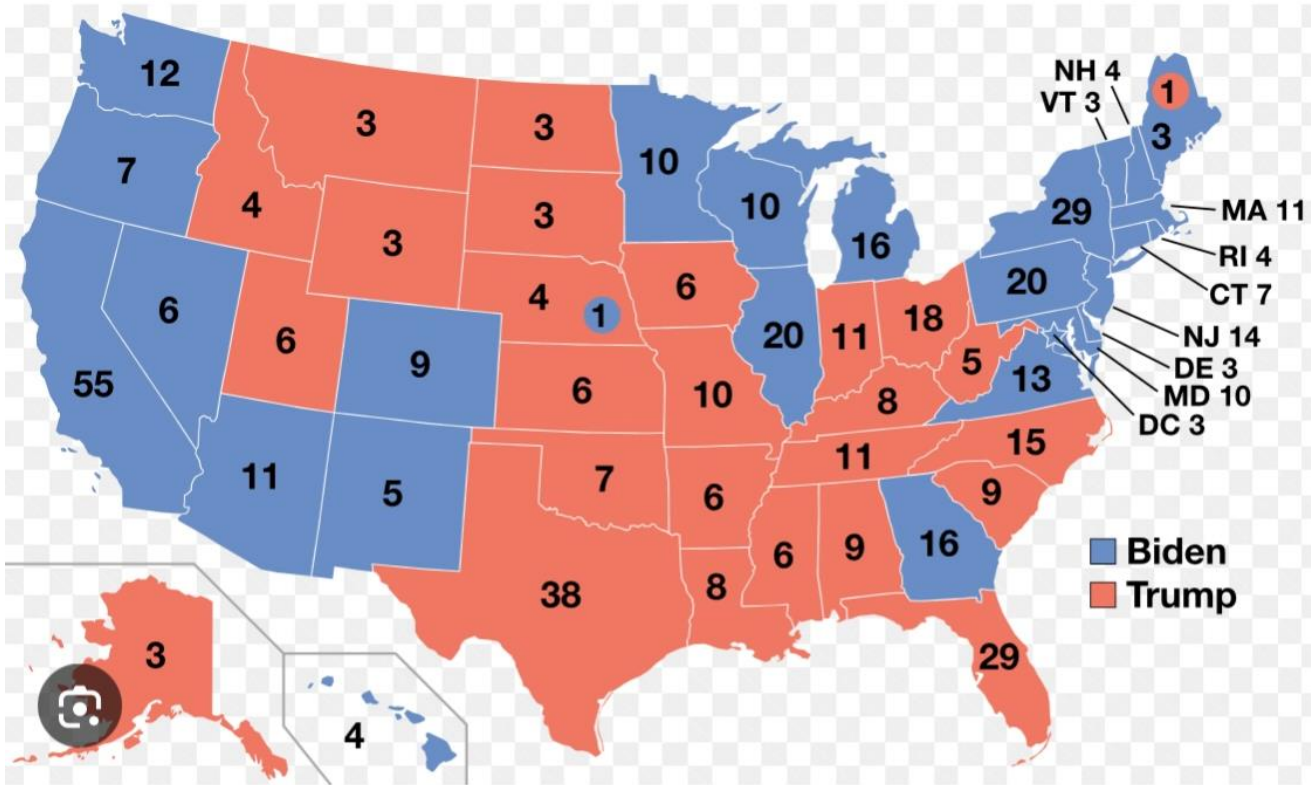
KLAWE RZECZY ILLUSTRATION FOR FOREIGN POLICY

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**U.S. President Joe Biden frequently frames global politics today as a “battle between democracy and autocracy,”** often in reference to such varied issues as U.S. competition with China, Russia’s war in Ukraine, and even Israel’s war with Hamas.



# Didn't we just do this?



Joe Biden, left, and Donald Trump. UBS analysts wrote they 'wouldn't be surprised to see some pick up in equity market volatility' as the election draws closer © FT montage/Bloomberg

# A challenging political world to navigate



**IRAN ATTACKS ISRAEL  
HOW THE WORLD REACTED**



### 2024: The US-EU AI Trade War Will Heat Up While the Big Tech Regulatory Divide Widens

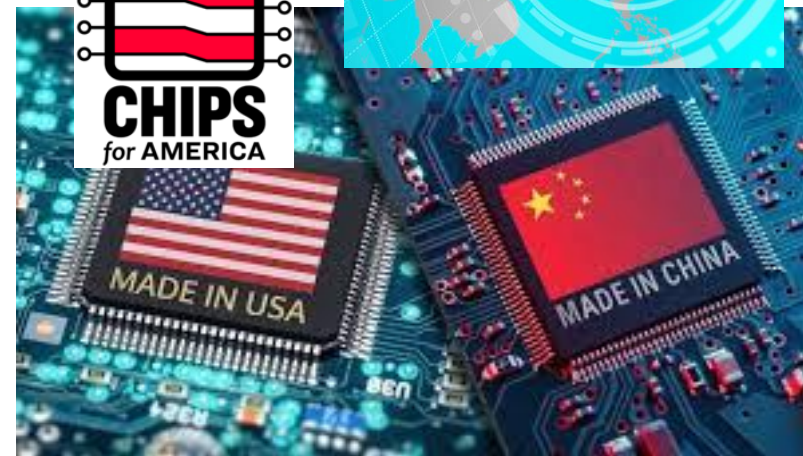
CAPSTONE



### EUROPEAN CHIPS ACT



### CHIPS for AMERICA



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# Global photonics industry – core components

Online Services



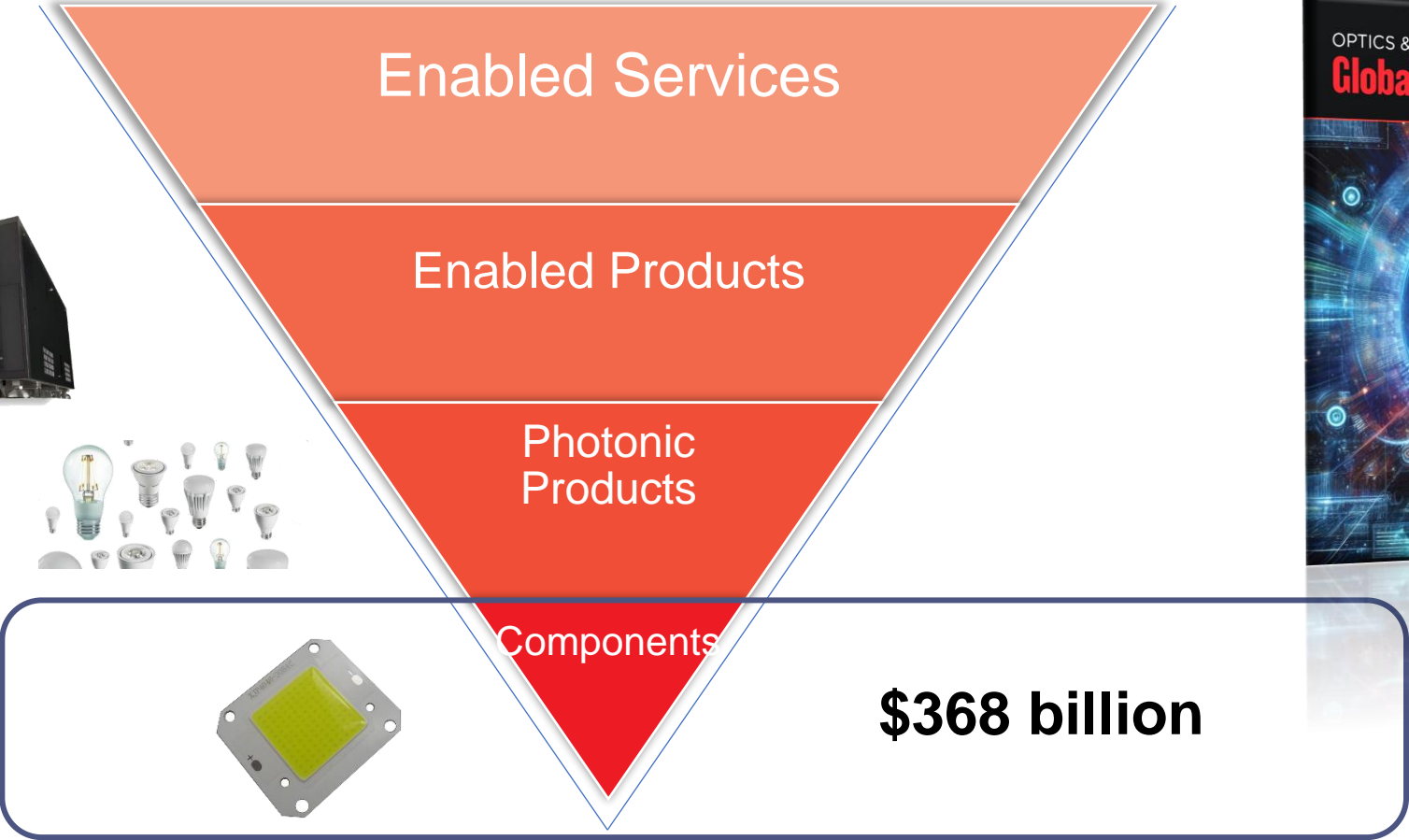
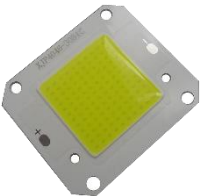
Systems



Sub-Assembly



Components

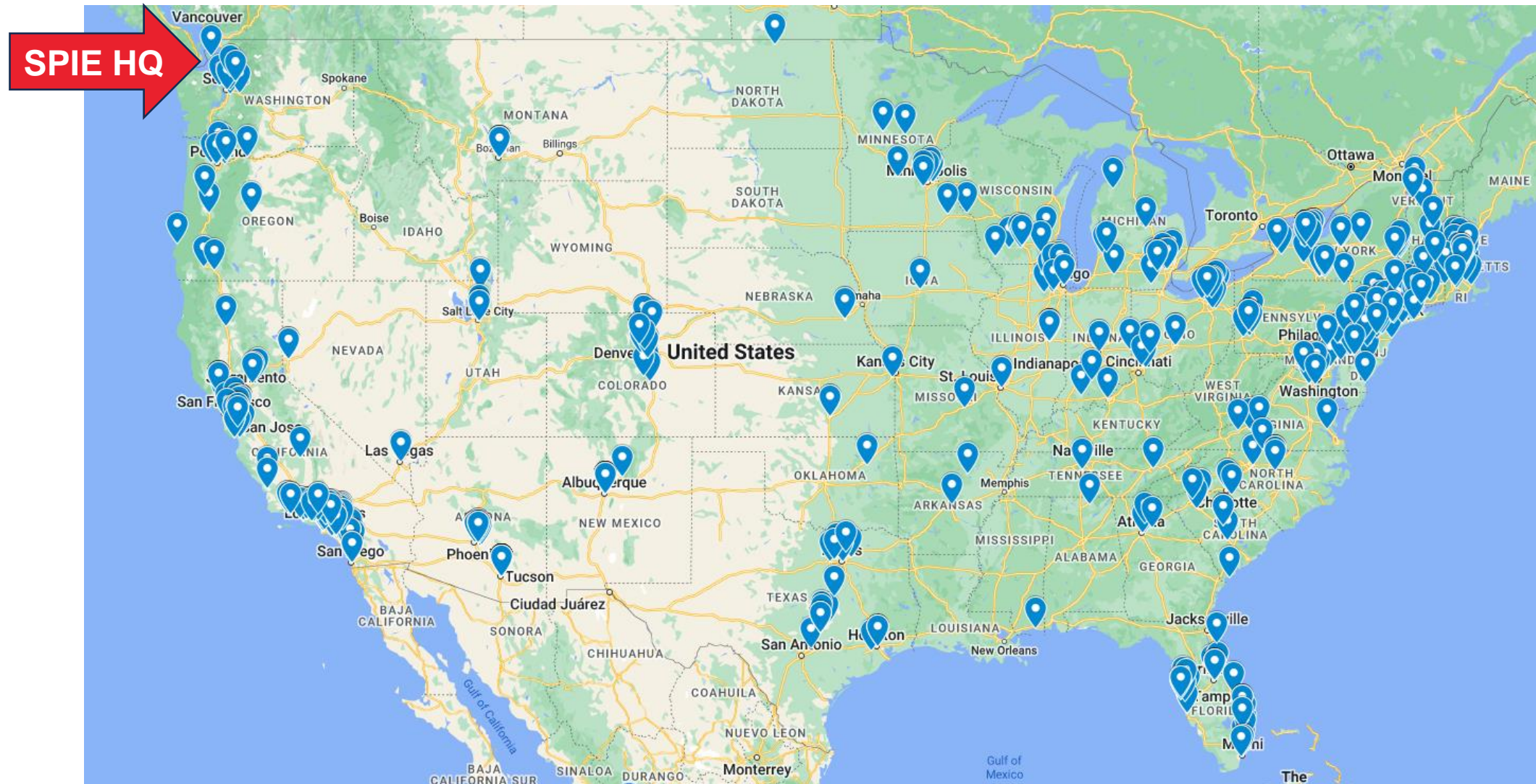


**Revenues roll up to HQ country, converted to USD for analysis**

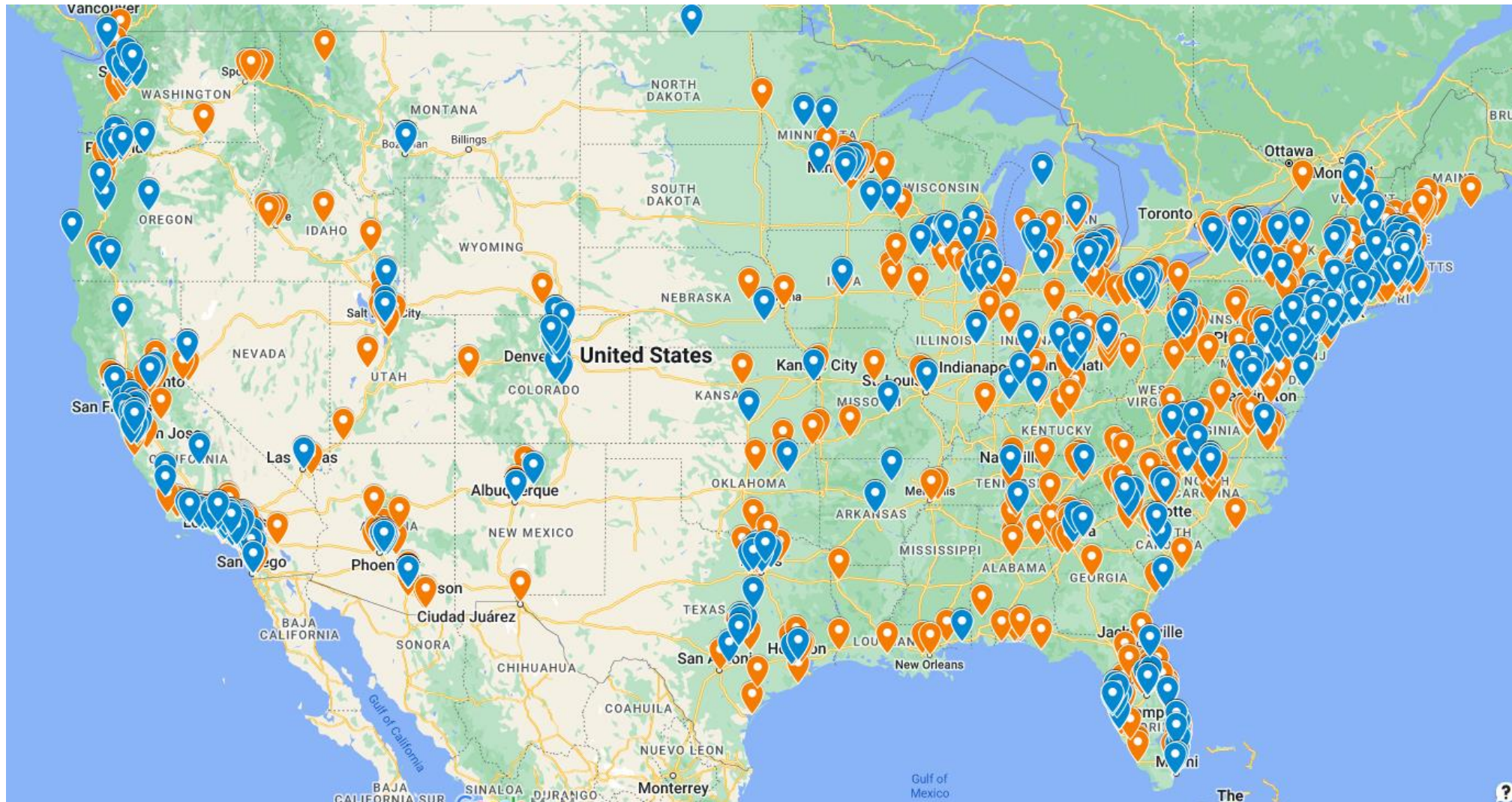
Details for Methodology:  
<https://spie.org/industry-resources/information/market-intelligence>





# US core companies - HQ by state (934)

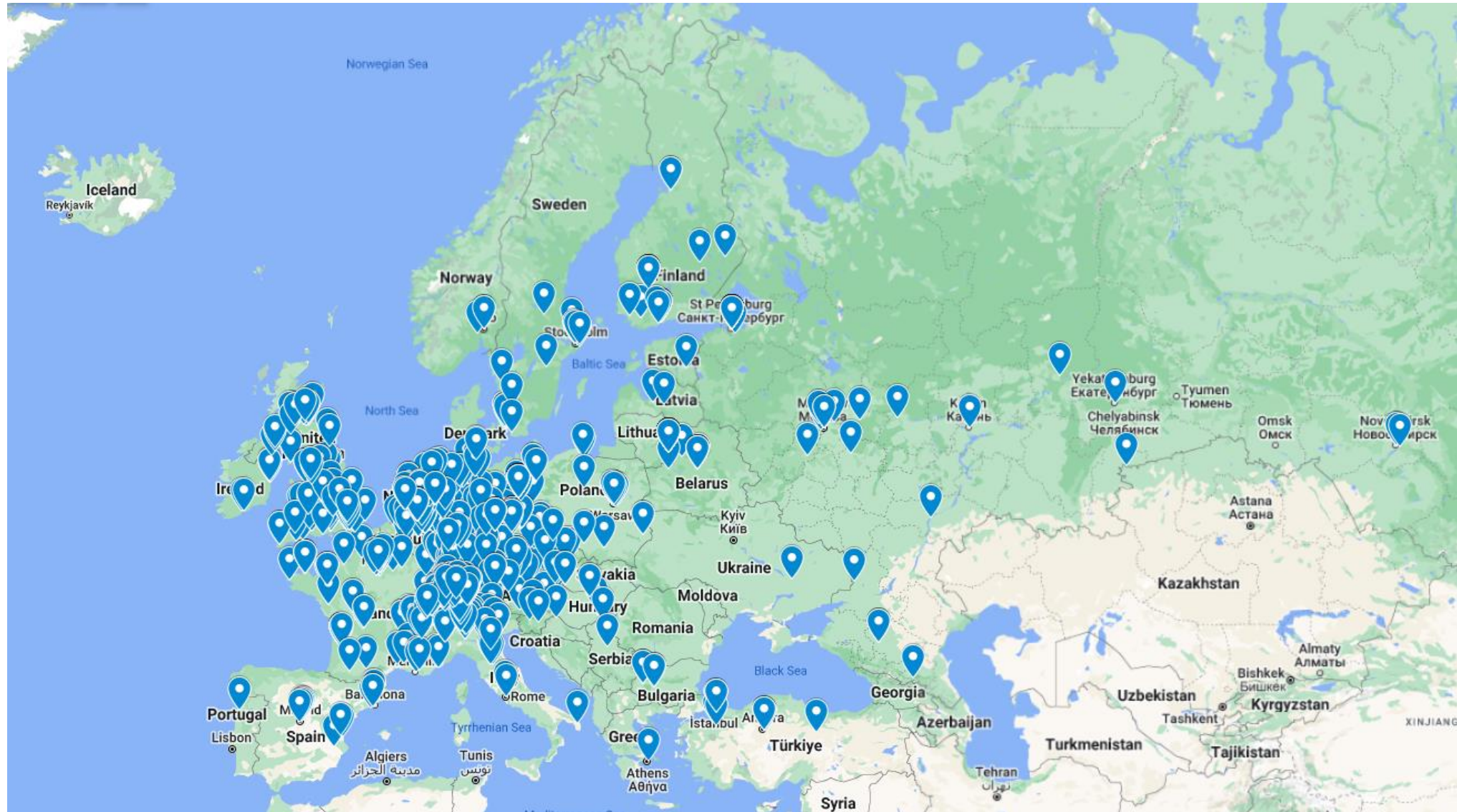


# Add international subsidiaries – it's complex

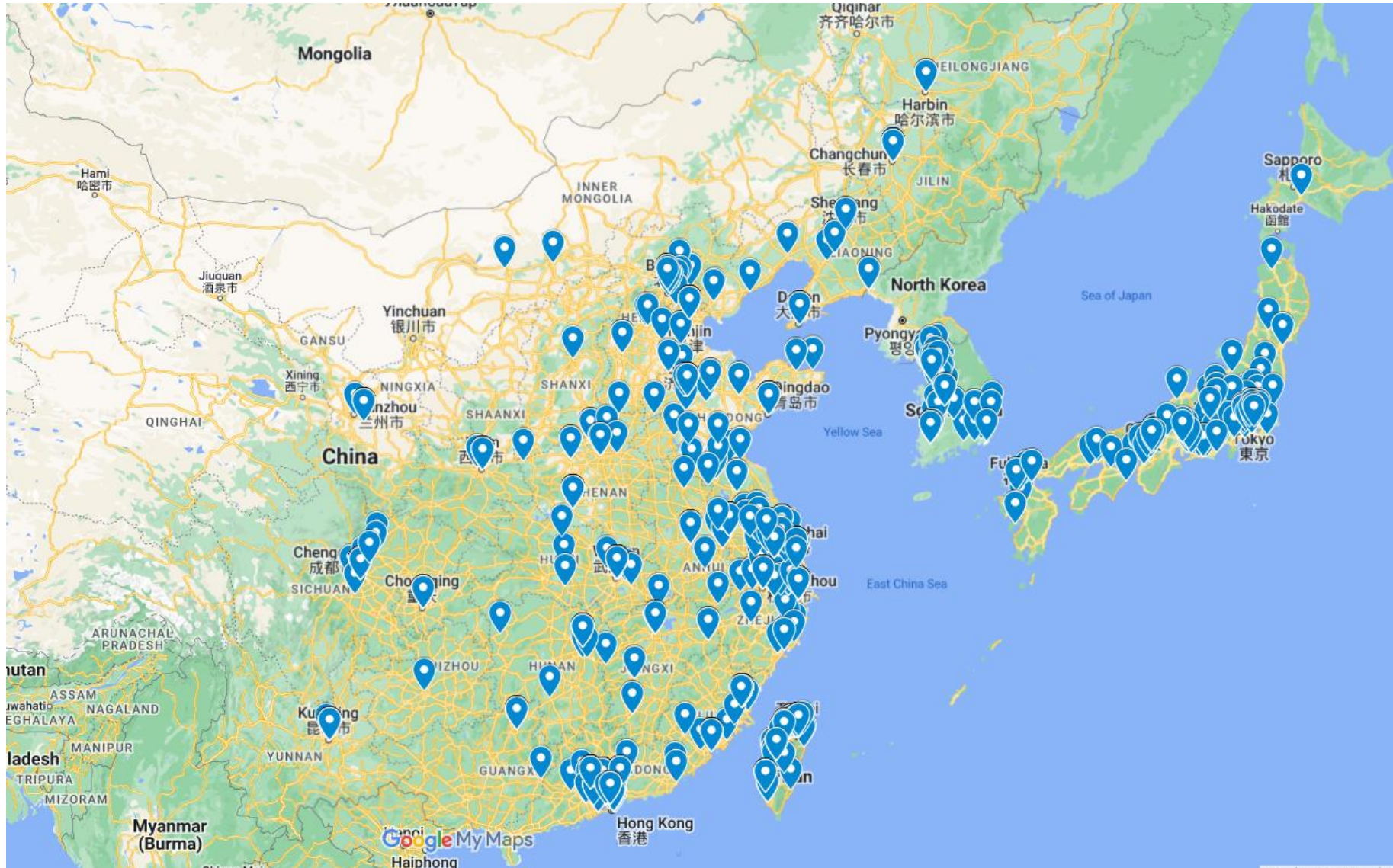


-  Headquarters (934)
-  Subsidiary (5120)

# Europe HQ locations (1173)



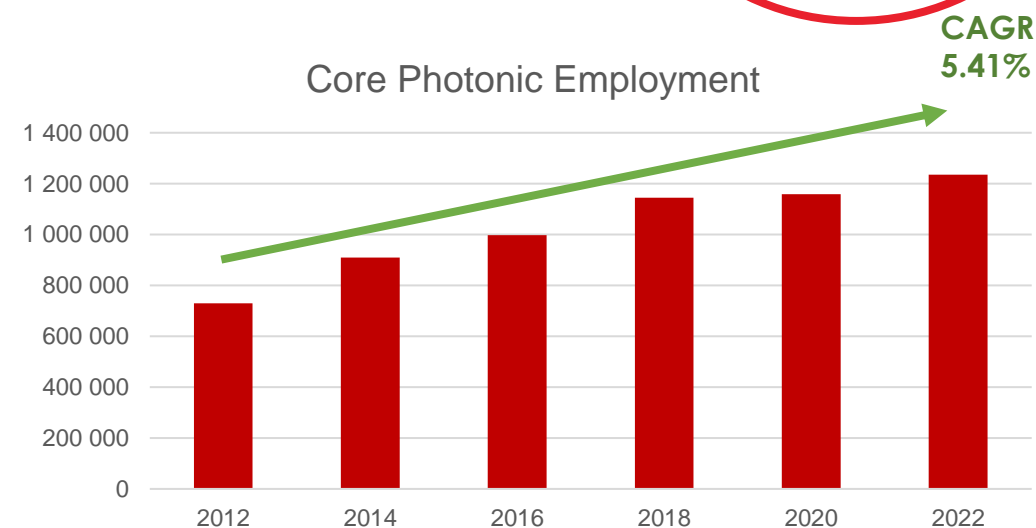
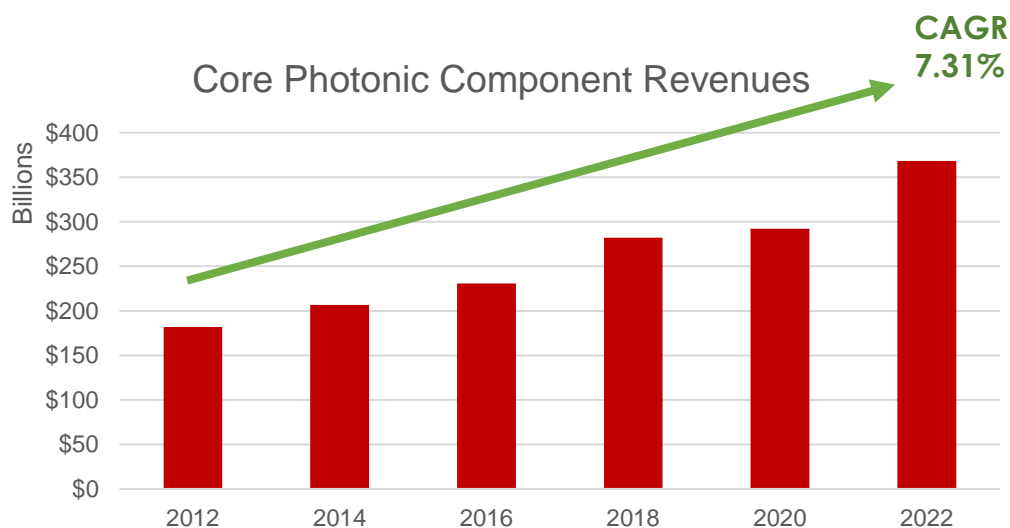
# Asia (~2500 companies with HQ in Asia)



Country	HQ Companies
China	1,622
Japan	383
Korea	196
Taiwan	183
India	33
Singapore	17
Hong Kong	13
Australia	7

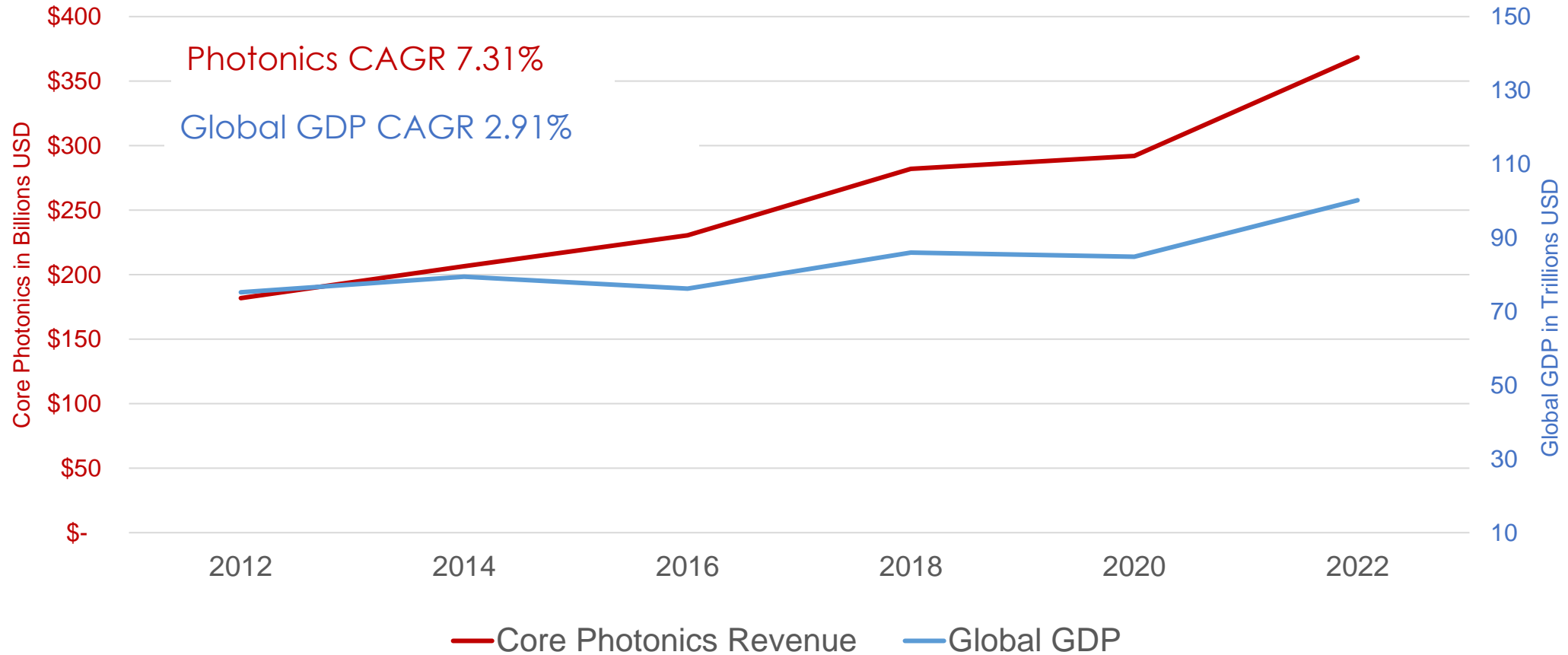
# Global core components market

	2012	2014	2016	2018	2020	2022	10-YEAR CAGR
Photonics revenues	\$182B	\$206B	\$230B	\$282B	\$292B	<b>\$368B</b>	7.31%
Photonics Jobs	729K	910K	997K	1,144K	1,145K	<b>1,235K</b>	5.41%



Source: SPIE analysis of over 4,000 companies

# Growth in core photonics outpaced global GDP for a decade

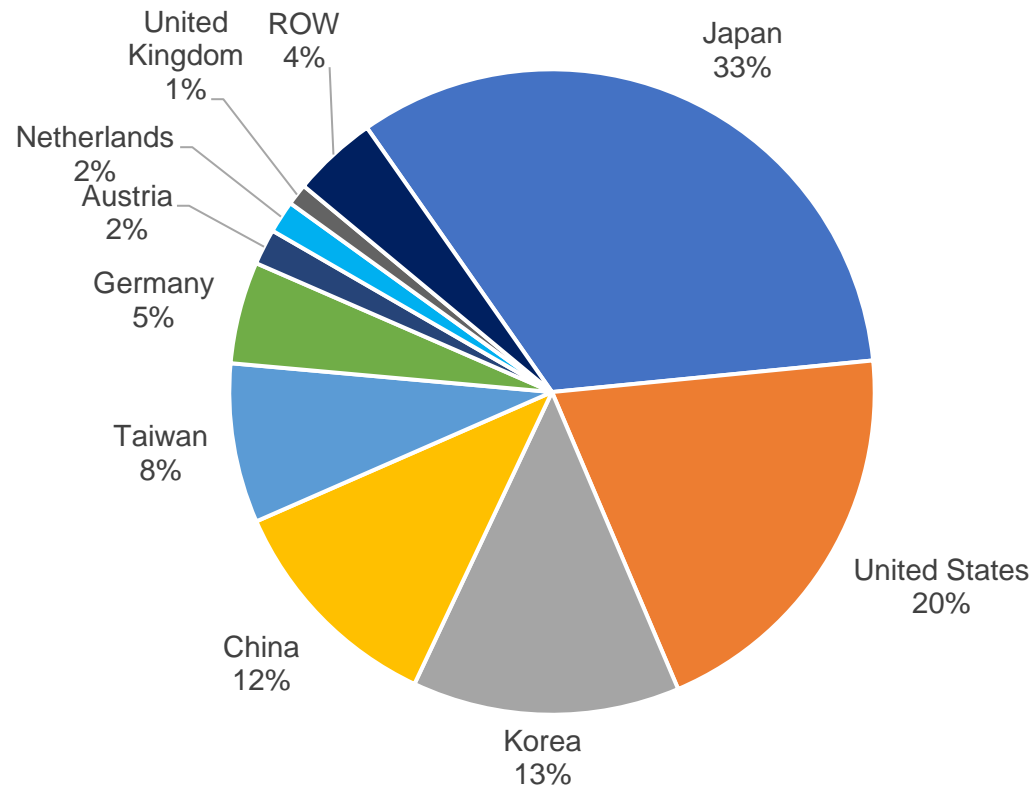


GDP Source: IMF Oct 2023 World Economic Outlook  
Photonics Source: SPIE 2024

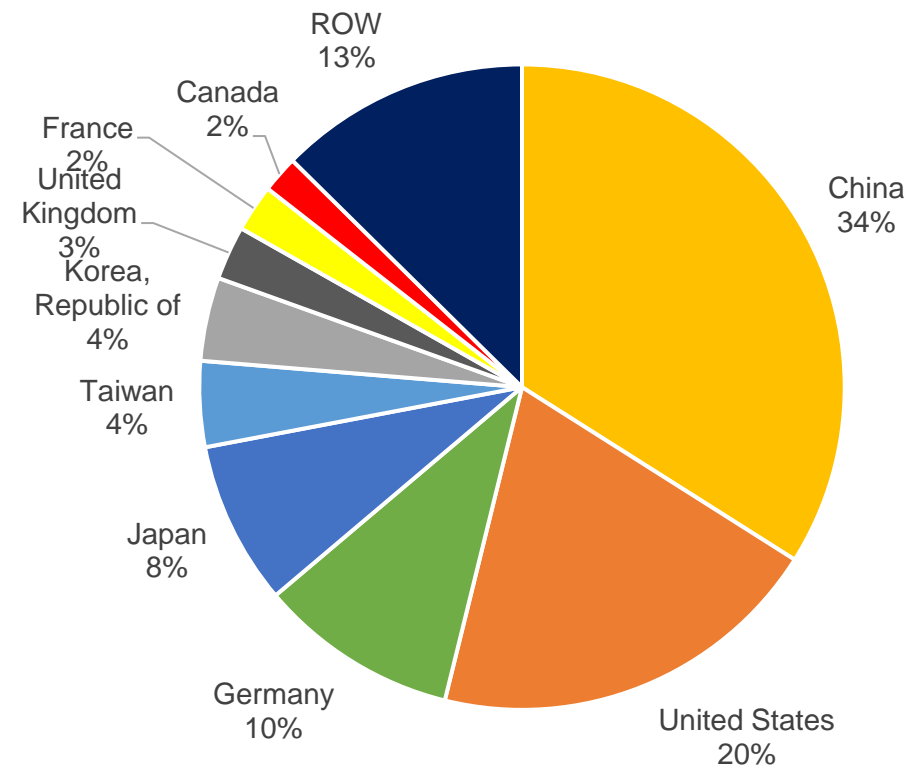
# Japan - highest % of HQ revenues

# China - largest # of companies tracked

## Revenues by HQ Country



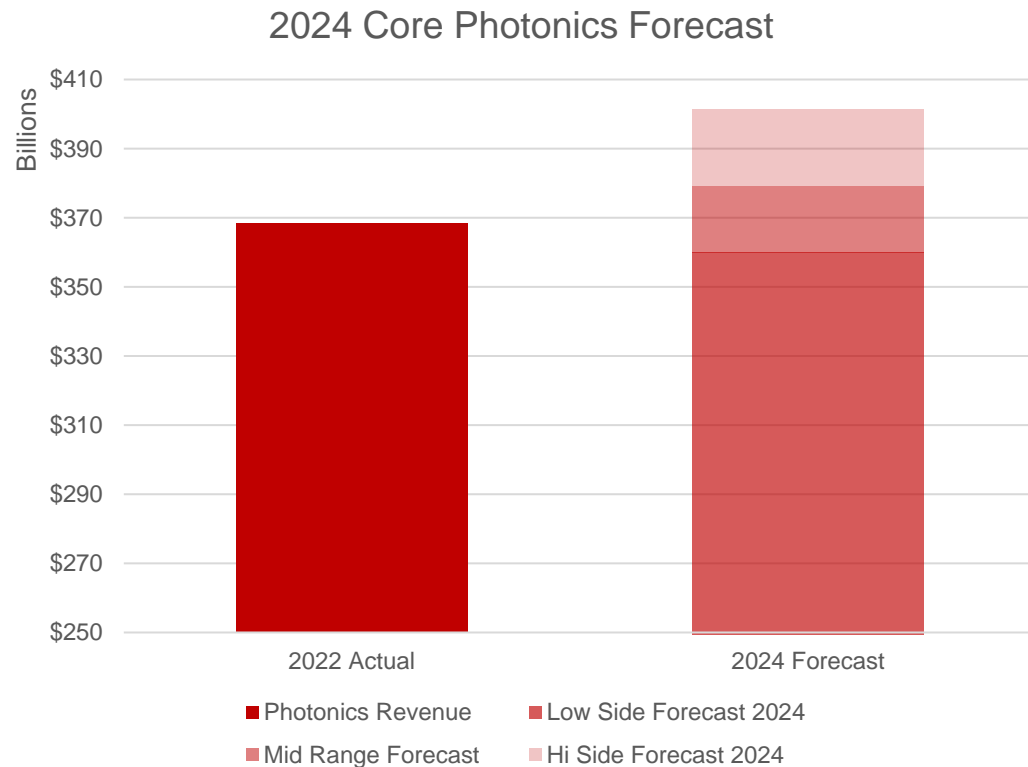
## Companies Count by HQ Country



R4

# Forecast for 2024 core photonics revenue

## FY 2022 to 2024



## 2024 Projection Details

- \$401B – High Side forecast paints a rosy 8.9% growth
- \$379B – Mid Range weak growth of 2.9% over 2022
- \$359B – contraction of 2.5%
  - Industry has always beaten low-side predictions in aggregate
- Data captured in Fall 2023

F1

Forecast derived from analysts' predicted growth for >370 public companies

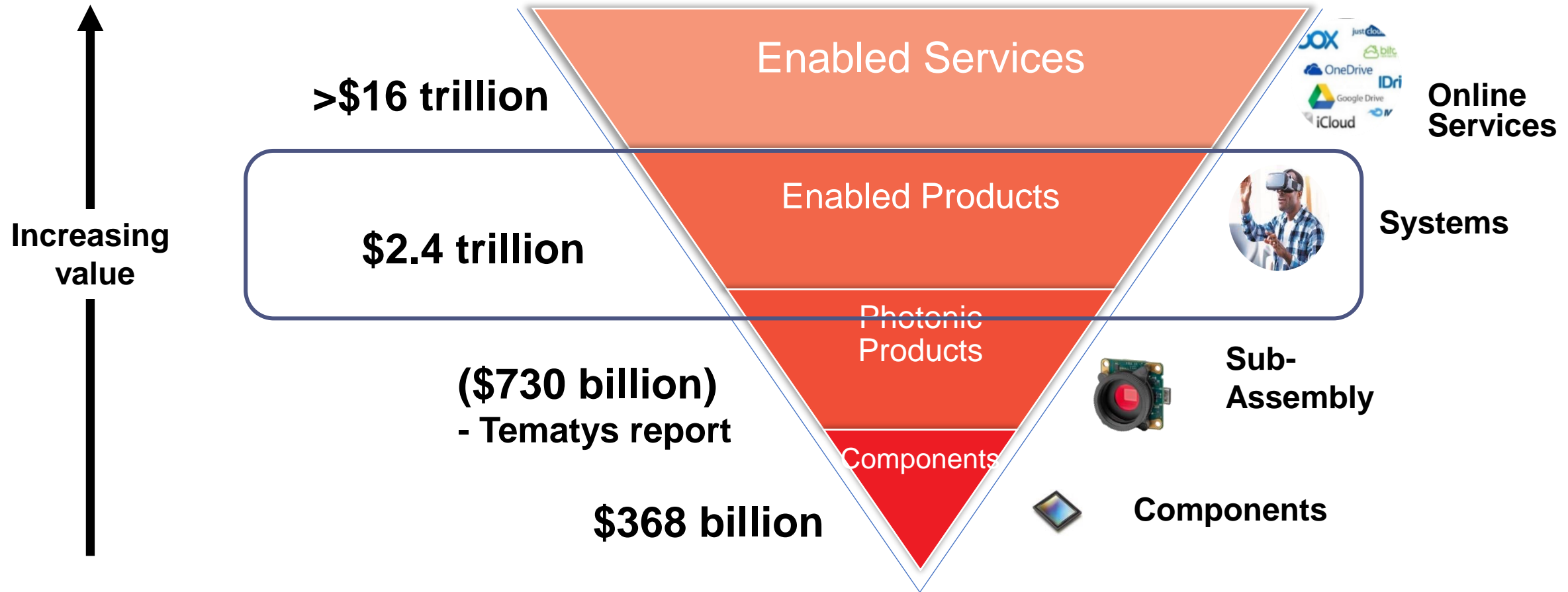


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# Global photonics - enabled products



Details for Methodology:

<https://spie.org/industry-resources/information/market-intelligence>

EN ←

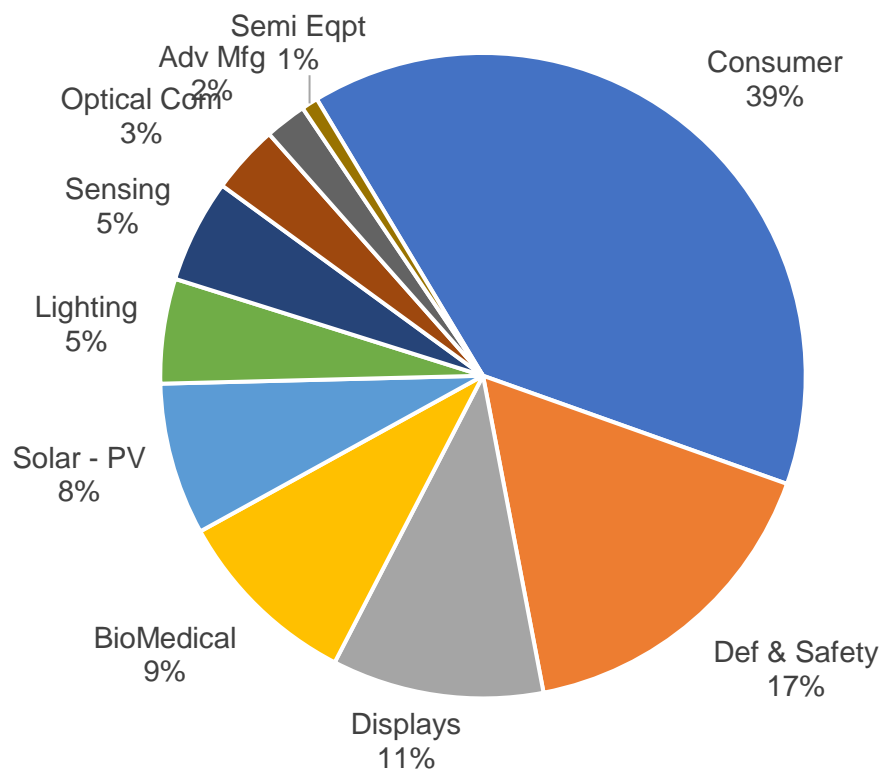
# Aggregation of reports covering more than 100 photonic-enabled applications

- Consumer & Entertainment
- Defense, Security, Law Enforcement
- Biomedical, Medical Imaging, Health Care (BioPhotonics)
- Solar PV & Alternative Energy
- Sensing, Monitoring, Measurement, & Control
- Optical Communication, Information Processing, & Storage
- Lighting & Displays
- Semiconductor Processing / Manufacturing
- Advanced Manufacturing with Photonics

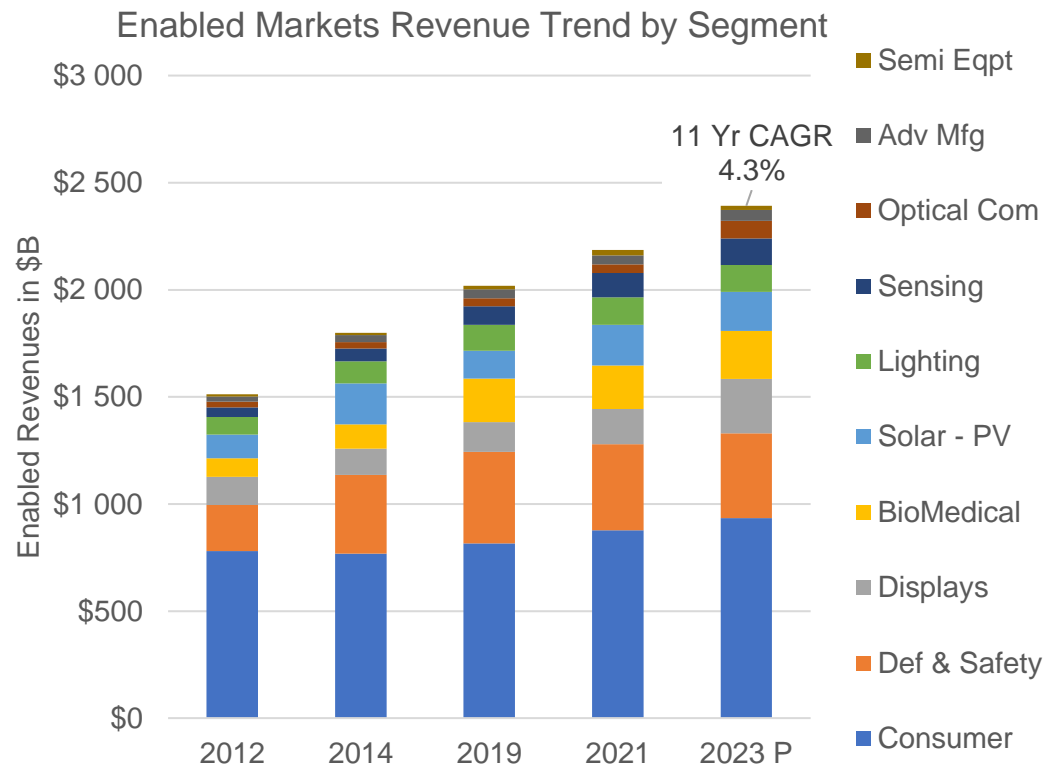


# Enabled market summary

## \$2.4 Trillion Economic Impact



## 4.3% CAGR Steady Growth



EN3

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# Artificial Intelligence and Photonics

\*\*\*  
home.dartmouth.edu

## Artificial Intelligence Coined at Dartmouth

1956

The Dartmouth Summer Research Project on Artificial Intelligence was a seminal event for artificial intelligence as a field.



Overall, photonics offers various opportunities to advance AI by enabling faster communication, more efficient computing, enhanced sensing capabilities, and novel approaches to neural network architectures. Integrating photonics with AI technologies holds the promise of unlocking new levels of performance and efficiency in a wide range of applications.

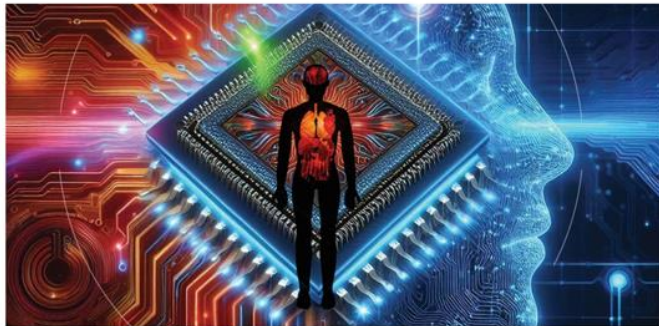


## The virtuous circle of AI and photonics

01 January 2024

By Benjamin Skuse

Technology



## Chasing the \$7 trillion AI semiconductor dream: What's in it for photonics?

Advances in artificial intelligence (AI) processors will require innovations that improve memory and communications circuit performance.

John Dexheimer

Feb. 19, 2024



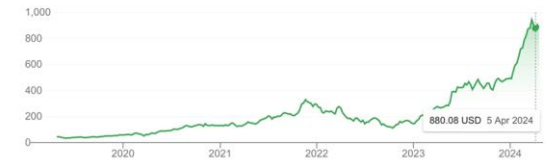
Market Summary > NVIDIA Corp

881.86 USD

+837.34 (1,880.82%) ↑ past 5 years

Closed: Apr 12, 19:59 EDT • Disclaimer  
After hours 875.25 -6.61 (0.75%)

1D 5D 1M 6M YTD 1Y 5Y Max



Open	896.99	Mkt cap	2.20T	52-wk high	974.00
High	901.75	P/E ratio	73.90	52-wk low	262.20
Low	875.30	Div yield	0.018%		

More about NVIDIA Corp →

Feedback

OPEN ACCESS PEER-REVIEWED CHAPTER

## Photonics for AI and AI for Photonics: Material and Characteristics Integration

Submitted: 05 April 2021, Reviewed: 19 April 2021,  
Published: 10 June 2021

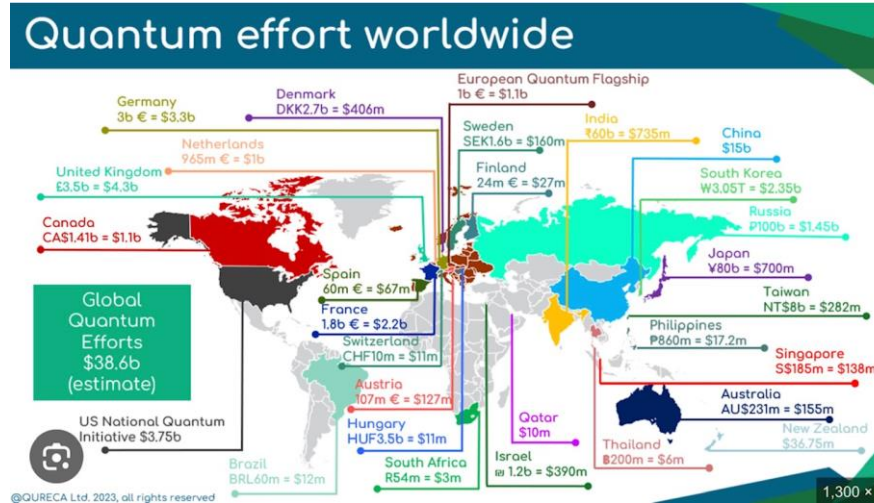
DOI: 10.5772/intechopen.97781

WRITTEN BY

Sunil Sharma and Lokesh Tharani

# AI, CHIPS, Quantum and global talent shortage

AI engineers are charging a high premium for their skills amid a talent shortage



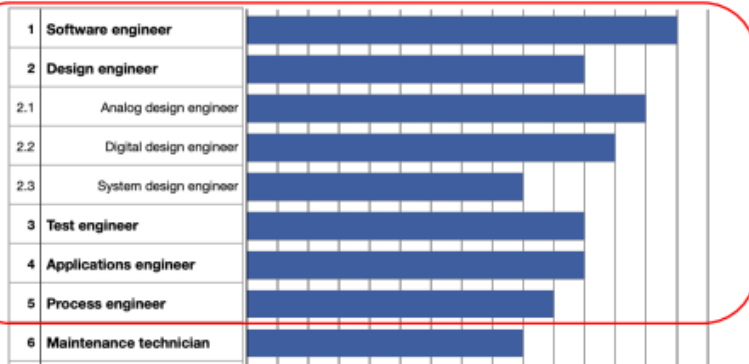
Confronting the skilled labor crisis in optics and photonics

[Visit >](#)

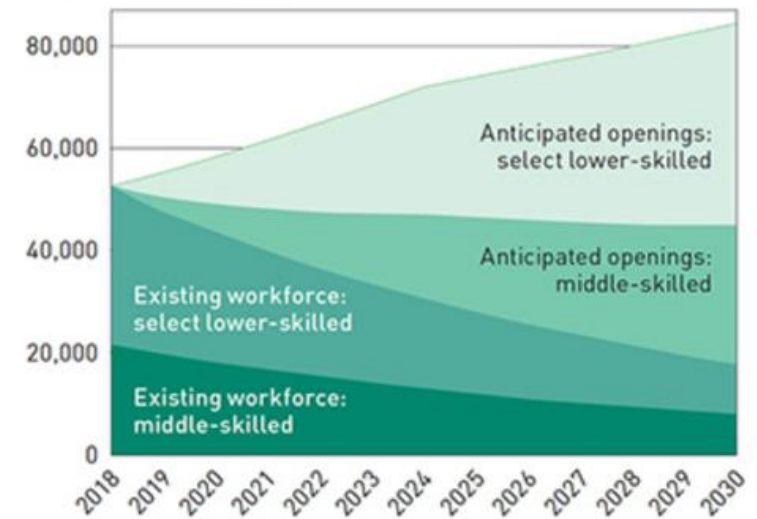
2022: the 13 job profiles identified as the most difficult to find in the European microelectronics industry

Number of stakeholders indicating the profile as the most scarce:  
 • From interviews / survey

**EE Times**  
EUROPE



US photonics industry positions



# Summary



- Core photonics revenues reached \$368B for the first time
  - CAGR >7.31%
- Enabled market is estimated at \$2.4Trillion
  - Analyzed 10 market segments
- Photonics technologies underpin a >\$16Trillion global services market
- Post-pandemic the photonics industry remains strong
- AI will have a major impact on photonics
- Photonics industry facing a global talent shortage

Please email questions to: [andrewb@spie.org](mailto:andrewb@spie.org)



# Questions?



# The SPI(C)E Data Team



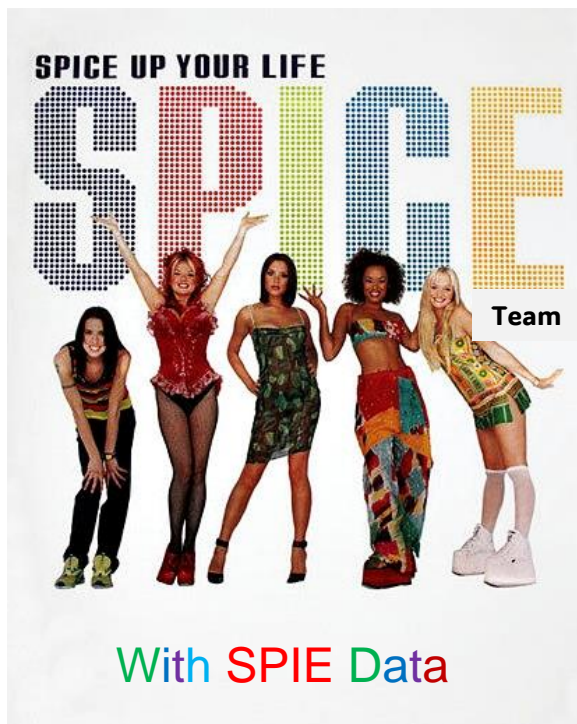
Carrie Binschus - Ginger



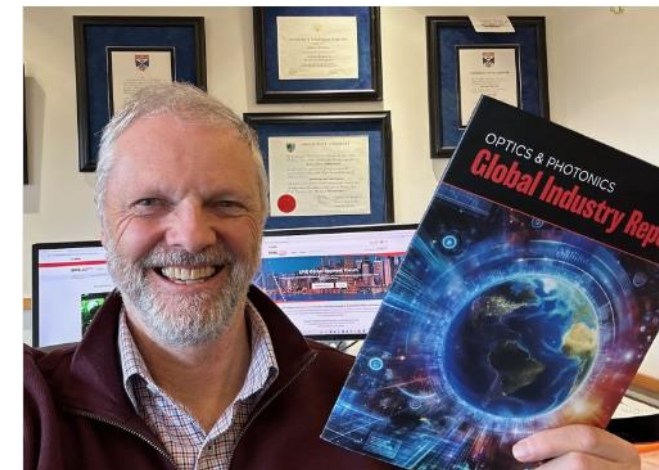
Lynnore Abbot - Sporty



John Lincoln - Posh



Steve Anderson  
– Baby



Scary?

# Global Photonics Methodology



- All companies active in space are identified
  - Leverages SPIE's comprehensive industry database
- Companies are determined to be core, product, enabled, not photonic, or out of business
- Company data is collected and given a “photonics factor”
- “Out of range” or anomalous data reviewed in-depth
- **Revenues roll up to HQ country, converted to USD for analysis**

Source:

<https://spie.org/industry-resources/information/market-intelligence>

# New Jersey Core Photonics Companies

# of Companies	Total Global Revenues	Photonic Global Revenues
<b>HQ in New Jersey</b>		
24	\$96B	\$1.6B
<b>Subsidiaries</b>		
200*	\$2.3T	\$161B

\*includes subsidiaries which may be closed but are still in the SPIE DB

HQ Companies	Subsidiaries
Johnson & Johnson Edmund Optics Inc. Thorlabs, Inc. Princetel, Inc. Inrad Optics Denton Vacuum Inc. Esco Optics, Inc. Intelligent Material Solutions Inc. ThinFilms, Inc. Norland Products Inc.	SAMSUNG Group (Prod. Mgt, Sales, Mktg) Koch Industries, Inc. / Molex Nippon Telegraph and Telephone Corp. Sony Corp. Hitachi(Prod Mgt, Sales, Mktg) BASF SE Siemens AG Panasonic Corp. (Prod Mgt, Sales, Mktg) LG Corp. (Prod Mgt, Sales, Mktg) Hanwha Corp. (Prod Mgt, Sales, Mktg) Hamamatsu

