

A person in a white cape and helmet stands in the foreground, looking towards a rocket launch in a desert landscape. The rocket is ascending into a sky filled with large, white clouds. The background is a dark, starry night sky. The overall scene is a mix of science fiction and real-world imagery.

# *THE* **MOVING WORLD REPORT** *2025*

**A TECHNO-OPTIMIST PERSPECTIVE**

Innovation, Geopolitics, and the Road Ahead

# THE MOVING WORLD REPORT 2025



## PRE FLIGHT BRIEFING

Everything. Everywhere. All at once. Is changing. As technology accelerates, keeping pace can feel overwhelming. The Moving World Report cuts through the noise, offering a clear narrative that captures the most significant trends shaping our world. This year, our analysis spans an evolving global order, breakthroughs in flight and space, strides in humanoid robotics and artificial intelligence, the energy revolution, and the dynamic realm of defense-adjacent innovations.

Our report also shines a light on cultural and political shifts that are influencing the technology and investment landscapes. At UP.Partners, we are deeply committed to supporting the groundbreaking innovations that are redefining our future by the companies we invest in. By creating this report, we aim to do more than just refine our own insights—we're fostering a collective dialogue among entrepreneurs, investors, and policymakers. Sharing our analysis empowers the broader community to make informed decisions and fuels a shared vision of progress that transcends individual pursuits.

Amid the rapid pace of change, maintaining a spirit of techno-optimism isn't just a choice — it's a responsibility. By building and supporting technologies that enhance our quality of life, we lay the foundation for a future that excites and unites us all.

We don't predict the future — we create it.

Cyrus Sigari  
Co-Founder



# TABLE OF CONTENTS

THE  
MOVING  
WORLD  
REPORT  
2025

INTRODUCTION

04



TIME TO GET TO WORK

11



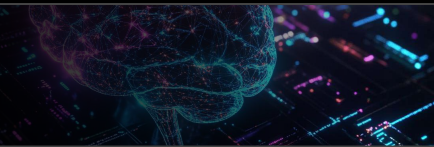
GLOBAL ECONOMY

17



AI

35



HUMANOIDS

49



SPACE

59



FLYING THINGS

85



DEFENSE

109



ELECTRIC &  
AUTONOMOUS VEHICLES

127



NEW ENERGY

148

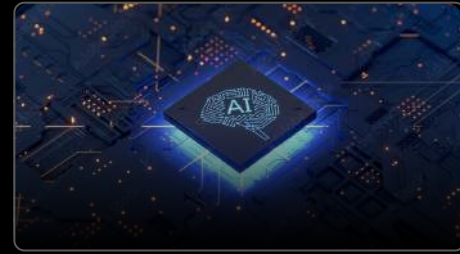


KEY POINTS: TL;DR

170

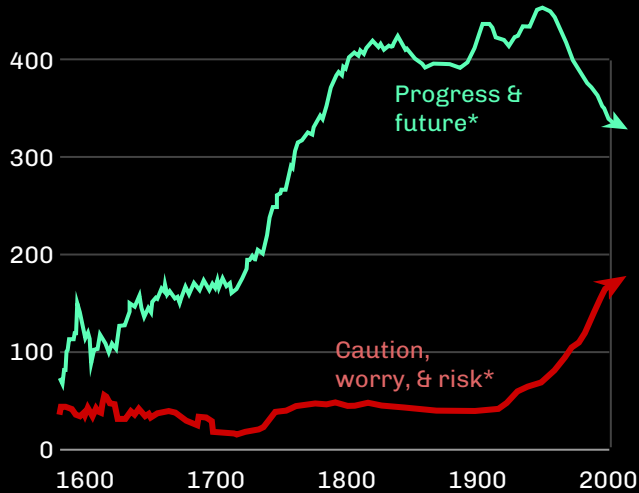


# THE GOLDEN AGE OF TECHNO OPTIMISM IS HERE... AND WE'RE JUST GETTING STARTED



# YET, WE'VE BEEN IN A SUPERCYCLE OF PESSIMISM

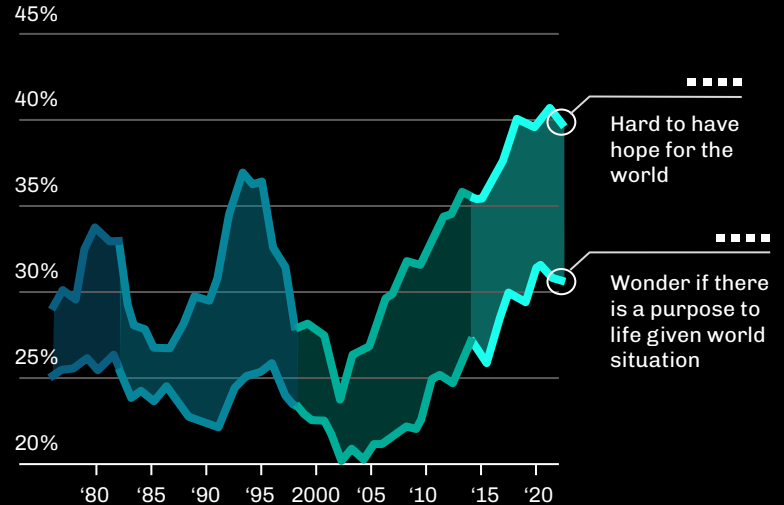
The west has shifted away from a culture of progress in recent decades and towards one of caution, worry, and risk-aversion



Words per million related to themes of **progress** vs **caution** in English, French, and German books

Source: \*Progress, advance, improvement, rise, future. †Threat, worry, warning, caution, at risk (all terms also translated) Almelhem et al (2023); Google Books Ngram Viewer; Maddison Project Database. FT graphic: John Burn-Murdoch / @burnmurdoch.

## Pessimism Among U.S. 12th Graders



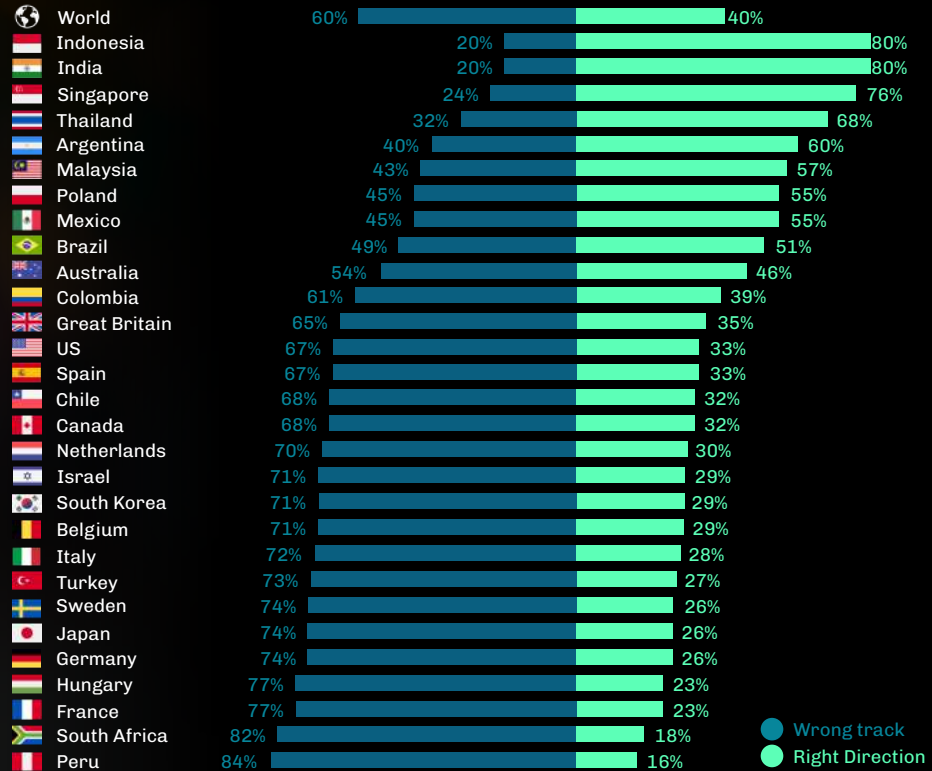
### Baby Boomers Millennials



Source: Monitoring the Future, compiled and analyzed by Jean M. Twenge for 'Generations' (pessimism); Pew Research Center (generations).

# PESSIMISM IS HEAVILY CONCENTRATED IN THE WEST

Q: Would you say things in this country are heading in the right direction, or are they off on the wrong track?

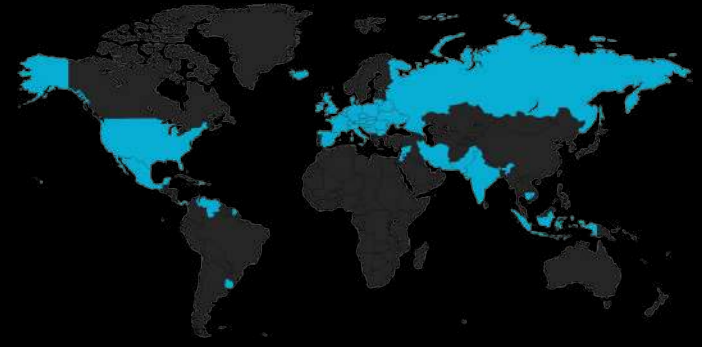


Balaji @balajis



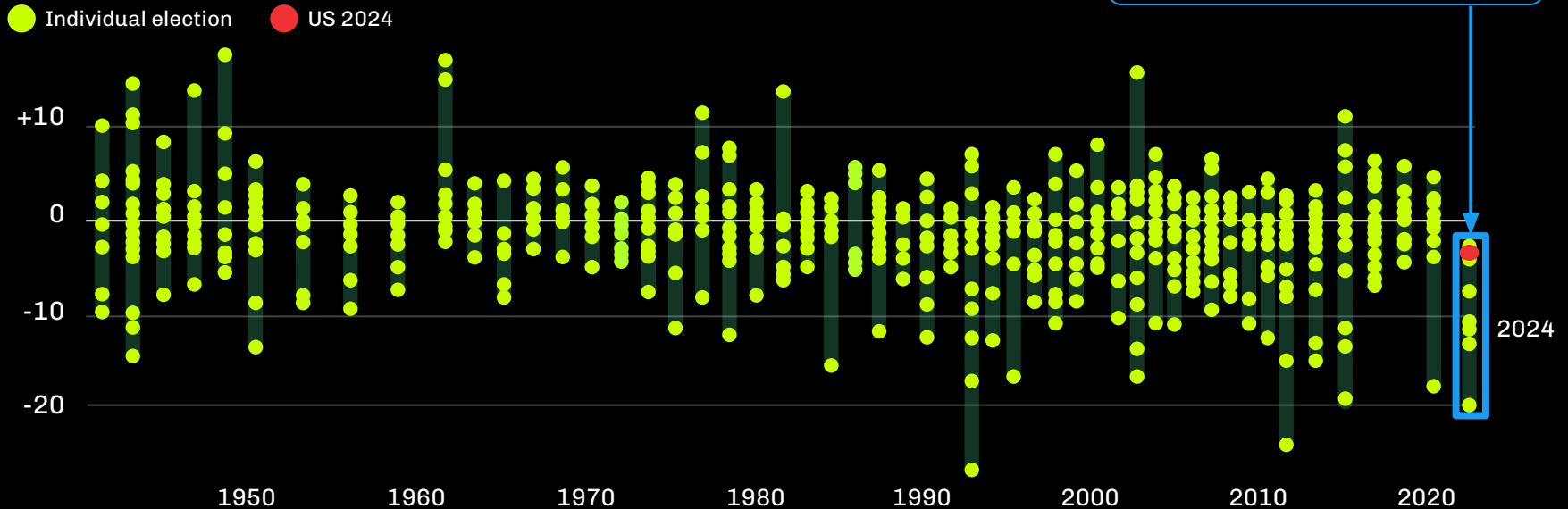
The West is pessimistic.  
But asia is optimistic.  
80% think things are on the  
right track in India.

# 2 BILLION PEOPLE IN 64 COUNTRIES REPRESENTING 40% OF GLOBAL GDP HAD NATIONAL ELECTIONS IN 2024



# VOTERS HAVE SPOKEN: ALMOST ALL INCUMBENTS AROUND THE WORLD LOST THEIR ELECTIONS

Rise/fall in vote share for governing parties in national elections (% pts), by year



Note: Excludes years where fewer than five countries had elections. Source: ParlGov, FT research. FT graphic: John Burn-Murdoch / @jburnmurdoch.

# THE WEST: 2024 G7 NET FAVORABILITY



# NEW WESTERN LEADERS HAVE BEEN CALLED TO REACT

## NAYIB BUKELE

| TOOK OFFICE 2019

**HOMICIDE REDUCTION:** Over 92% drop.

**GANG MEMBERS JAILED:** 81,000+

**SAFETY RANKING:** From most dangerous to safest country in the west in three years.

**FINANCIAL INDEPENDENCE:** No external debt for budget.

**TOURISM GROWTH:** Fastest growing in Latin America.

## JAVIER MILEI

| TOOK OFFICE 2023

**INFLATION:** 25% to 3.5% monthly.

**APPROVAL:** 50% public support.

**GDP GROWTH:** Projected 8.5%.

**SURPLUS:** First in 120 years.

**REGULATIONS CUT:** 3,000+ in 6 months.

## DONALD TRUMP

| TAKES OFFICE 2025

Here we go...



**TIME TO GET  
TO WORK**

# AMERICA'S TECH AVENGERS



**JARED**

Isaacman

**DAVID**

Sacks

**ELON**

Musk

**JD**

Vance

**PETER**

Thiel

# PATHWAY TO TECHNO OPTIMISM



**TAXES**

**CUT REGULATIONS**

(increase speed to market,  
reduce cost to develop products)



**DISCARD TRADITIONAL SACRED COWS**

(manned fighter jets)



**FUND THINGS THAT SHOULD BE FUNDED**

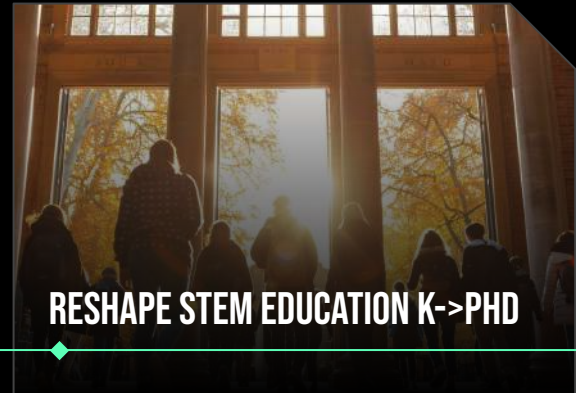
(DoD, infrastructure, telecom)



**SUPERCHARGE THE AMERICAN ENTREPRENEURIAL SPIRIT**



**REDEFINE AND CELEBRATE THE CULTURE OF BUILDING THROUGH AMERICAN DYNAMISM**



**RESHAPE STEM EDUCATION K->PHD**

# AMERICAN INNOVATION IS A LOVE STORY OF LIBERTY, PEACE, AND CO-INSPIRATION



PEACE

DEFENDING  
LIBERTY













































COMMERCIAL

DEFENSE

Cybertruck was inspired by the F-117 design, first drive-by-wire, first 48V architecture car, first steel exoskeleton, symbol of American exceptionalism

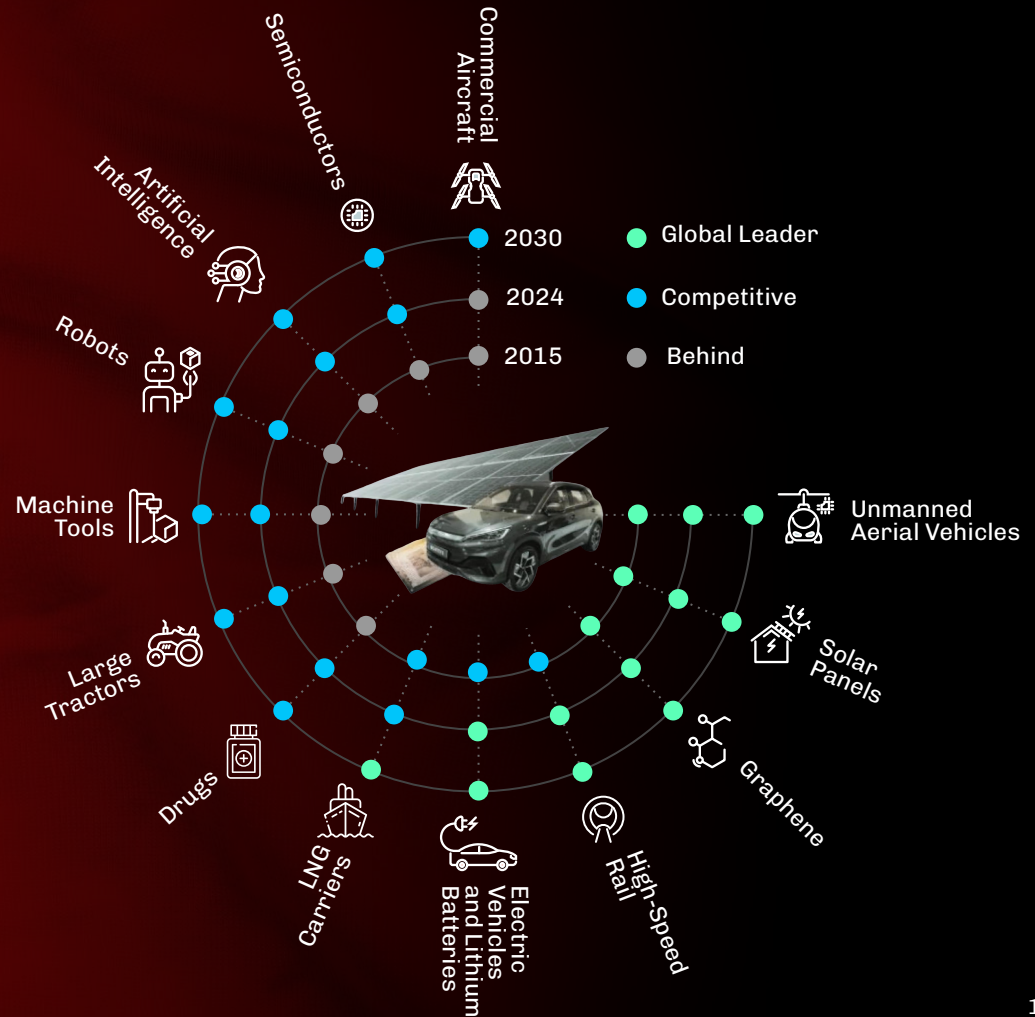
First stealth aircraft, fly-by-wire, stunning visual design, symbol of American exceptionalism

# TIME FOR THE USA TO REVERSE THESE TRENDS, FROM THE TOP DOWN

Artificial intelligence, computing, and communications	Advanced material and manufacturing	Energy and environment	Defense, space, robotics, and transportation
 High Performance Computing	 Nanoscale materials	 Hydrogen and ammonia	 CubeSats
 Circuit design	 Coatings	 Supercapacitors	 Space launch
 Natural Language Processing	 Smart materials	 Electric batteries	 Hypersonics
 Advanced RF communication	 Advanced composites	 Photovoltaics	 Drone swarming
 Advanced optical communication	 Novel metamaterials	 Nuclear waste management	 Advanced robotics
 AI	 High-specification machining	 Directed energy	 Autonomy
 Blockchain	 Advanced explosives	 Biofuels	<b>Quantum</b>
 Advanced data analytics	 Critical minerals extraction	 Nuclear energy	 Quantum computing
 Machine learning	 Superconductors	<b>Biotechnology, gene technology, and vaccines</b>	 Post-quantum cryptography
 Cybersecurity	 Advanced protection	 Vaccines	 Quantum communications
<b>Sensing, timing, and navigation</b>	 Chemical synthesis	 Biological manufacturing	 Quantum sensors
 Photonic sensors	 Additive manufacturing	 Synthetic biology	

# CHINA'S ACHIEVING GROWING CLOUT IN KEY MADE-IN-CHINA 2025 INDUSTRIES

China has achieved a global leadership position in five key technologies



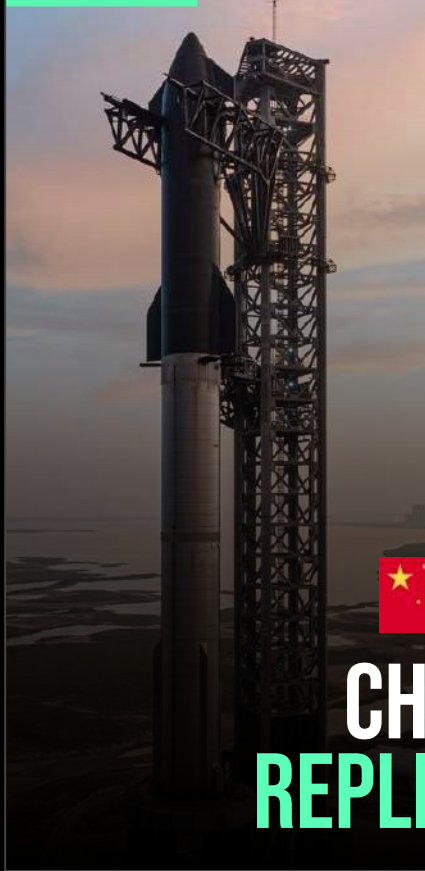


# GLOBAL ECONOMY



**AMERICA  
INNOVATES**

SpaceX Starship



Long March 9 rocket



**CHINA  
REPLICATES**

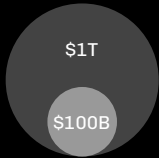
As of July 3, 2024, European single-use plastic bottles must now have their caps or lids attached.



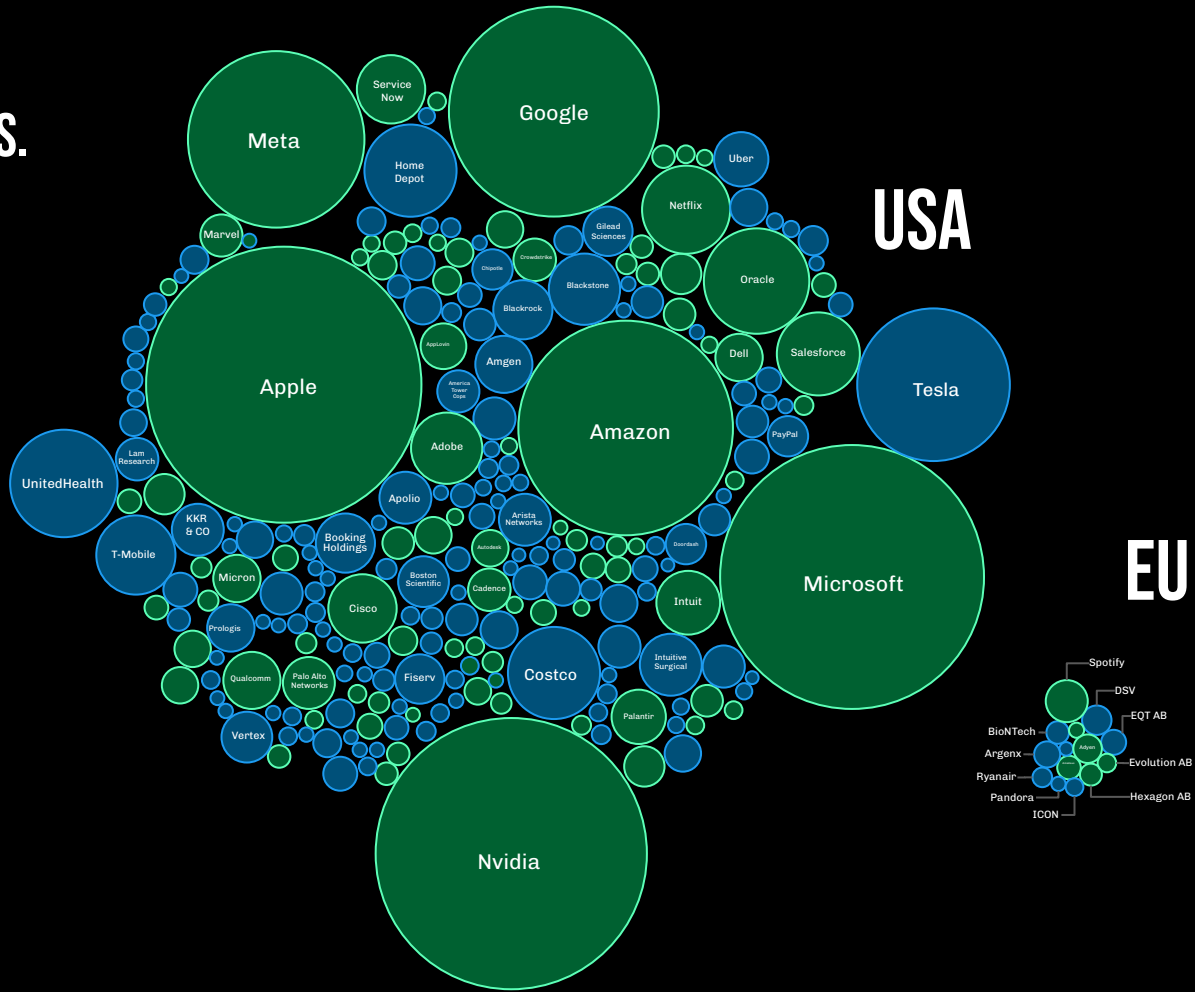
**EUROPE  
REGULATES**

# LET'S START WITH THE EU: PUBLIC FROM-SCRATCH U.S. AND EU COMPANIES LESS THAN 50 YEARS OLD WITH \$10B+ MARKET CAP

- High-tech
- Other

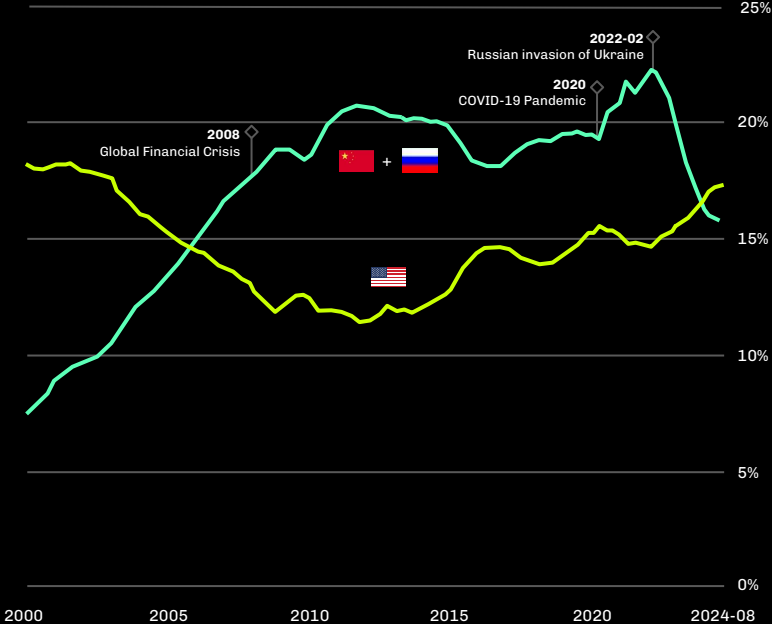


Bubble area proportional to market cap.  
Companies grouped by HQ at time of IPO.  
Market cap in 2023 USD, assessed at November 26th, 2024.  
Green bubble indicates a company in a "tech" industry: Software, Internet Software/Services, Information Technology Services, Data Processing Services, Interactive Media & Services, Internet Retail, Direct Marketing Retail, Telecommunications Equipment, Electronic Equipment/Instruments, Computer Processing Hardware, Computer Peripherals, Semiconductors, Semiconductors Equipment. Blue bubble indicates all the other industries.

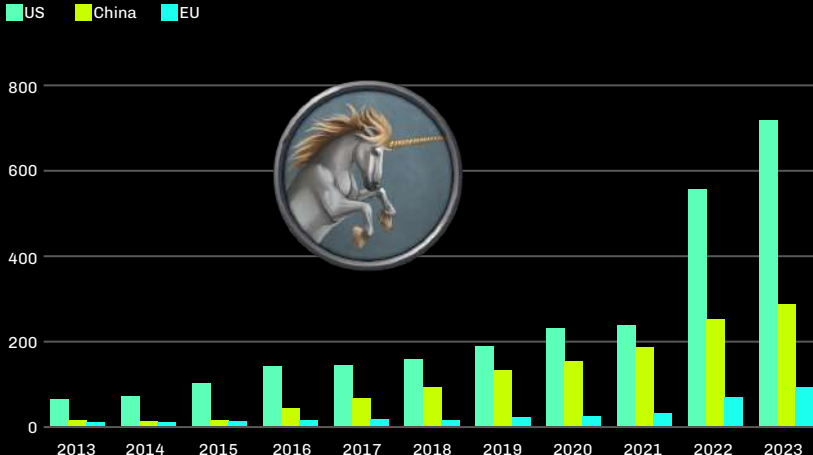


# U.S. BECOMES LEADING EU TRADE PARTNER, WHILE DWARFING THE CONTINENT IN UNICORN BIRTHS

Share of Total Trade (12-Month Rolling Sum)



The EU lags behind the U.S. and China hugely in the number of active “unicorns” (\$1B+ valuation companies)

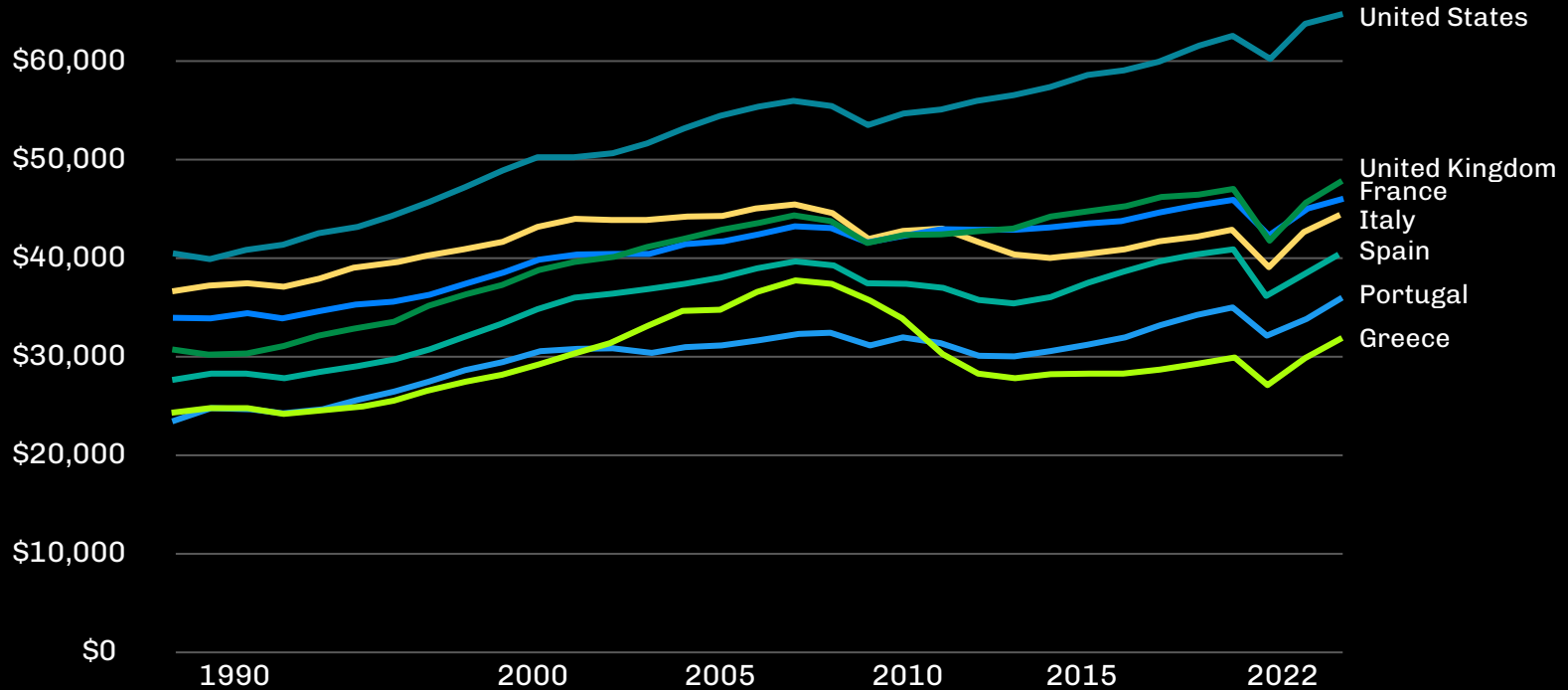


Source: Soltani, Ehsan. "U.S. Becomes Leading EU Trade Partner, Surpassing China and Russia." 14 November 2024. Voronoi by Visual Capitalist.

Source: Financial Times, 17 September 2024; Pitchbook; European Commission

# EUROPE APPROACHING 20 YEARS OF ALMOST ZERO GROWTH

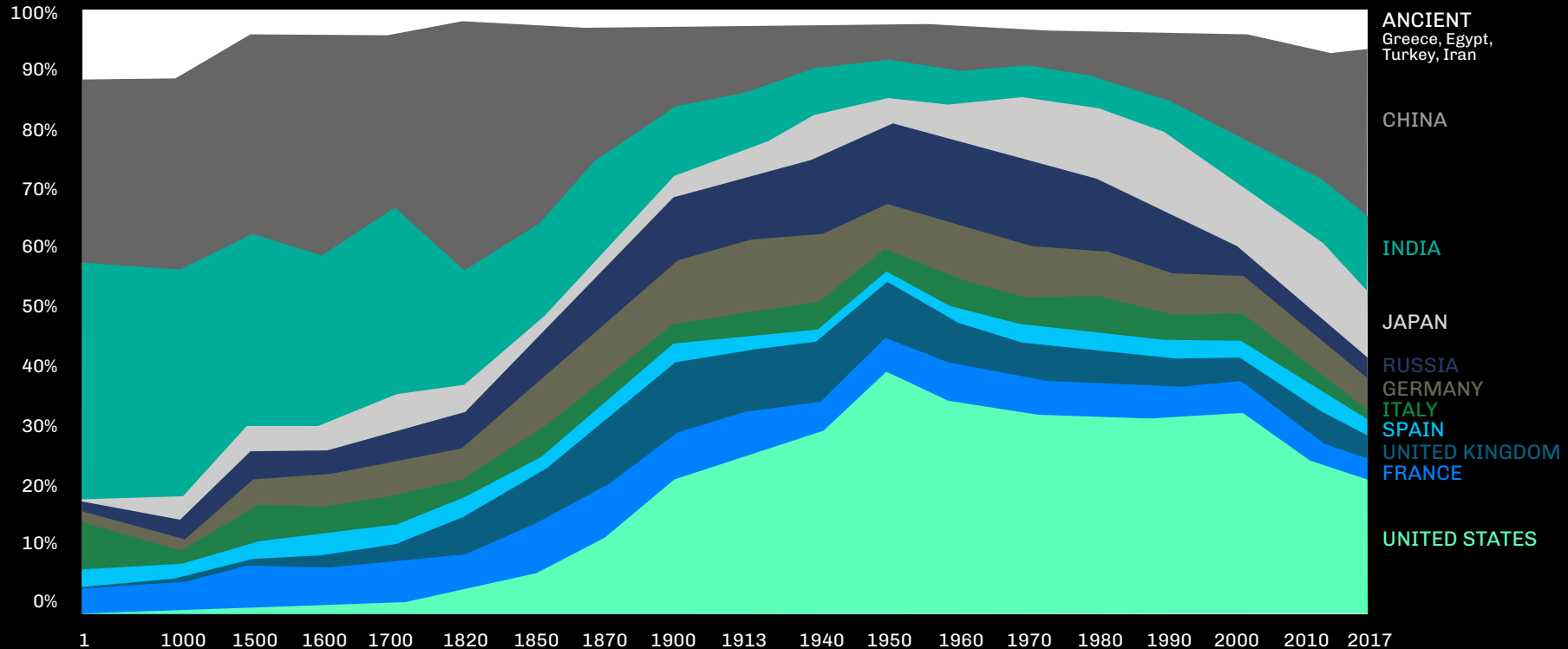
GDP per capita



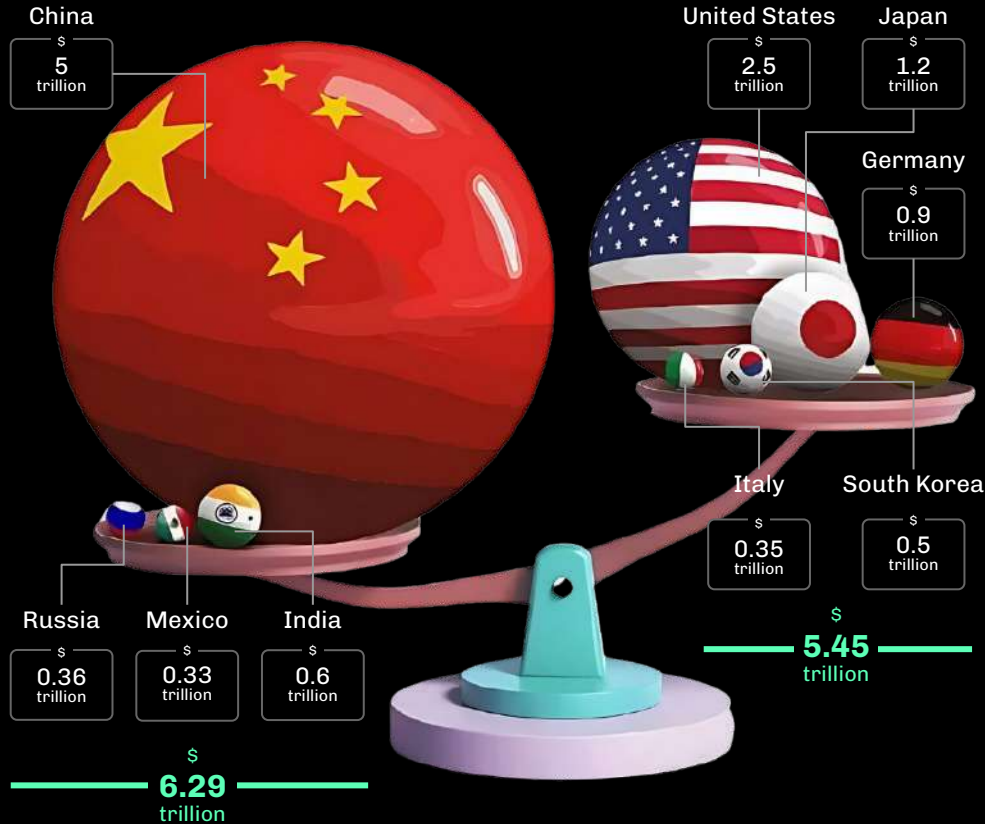
# 2,000 YEARS OF ECONOMIC HISTORY IN ONE CHART

All major powers compared by GDP from the year 1 AD

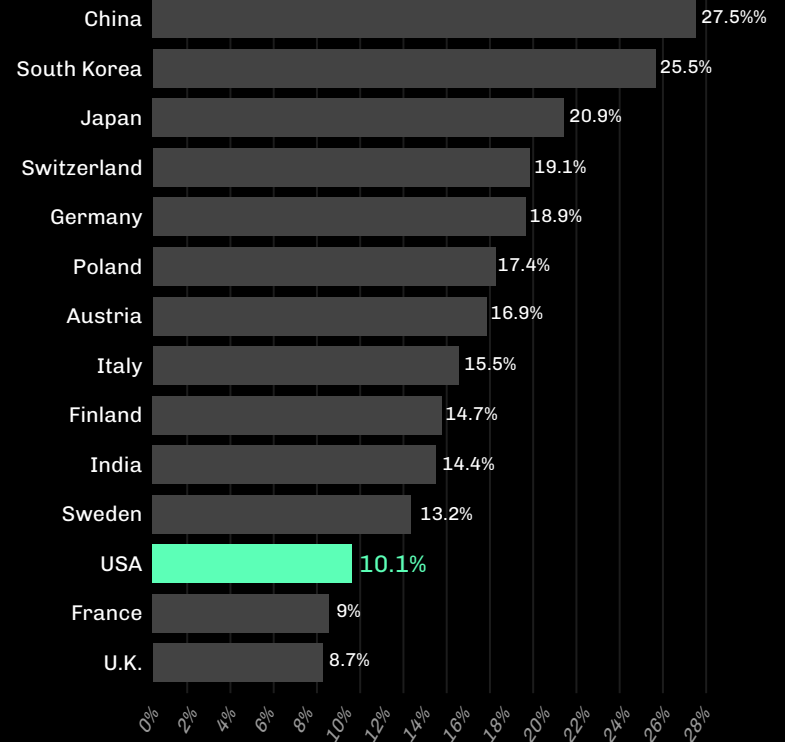
## Share Of GDP (World Powers)



# CHINA — KING OF GLOBAL MANUFACTURING: CHINA 31.6%, U.S. 15.9%



## U.S. Manufacturing as % of GDP Far Below Most Other Industrialized Countries

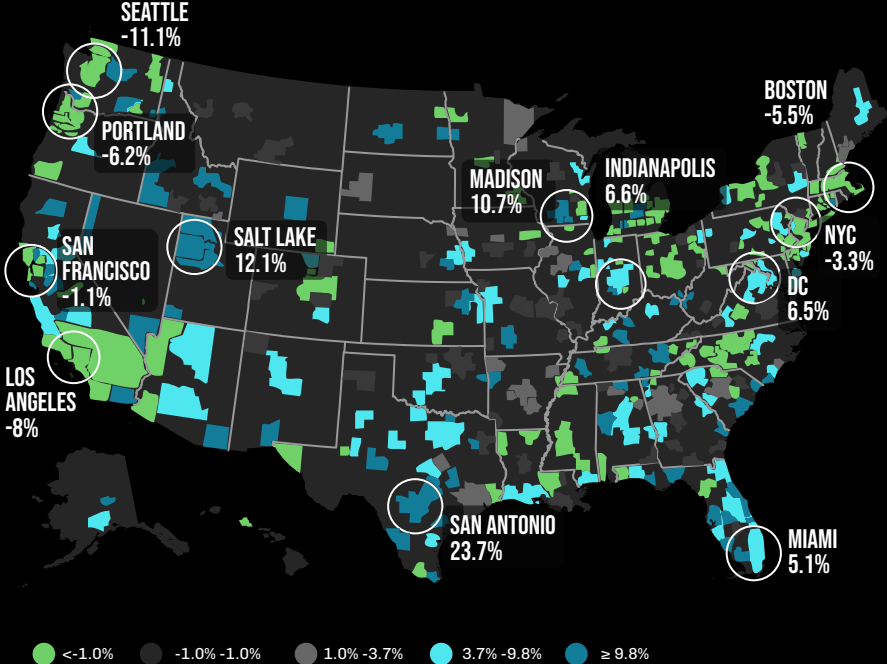


Manufacturing, value added (% of GDP, 2021)

Sources: Safeguard Global, "Top 10 Manufacturing Countries in the World in 2024," August 28, 2024; Andrew Rechenberg, "U.S. Manufacturing's Shrinking Share of GDP and How to Catch Up," Coalition for a Prosperous America, November 8, 2024.

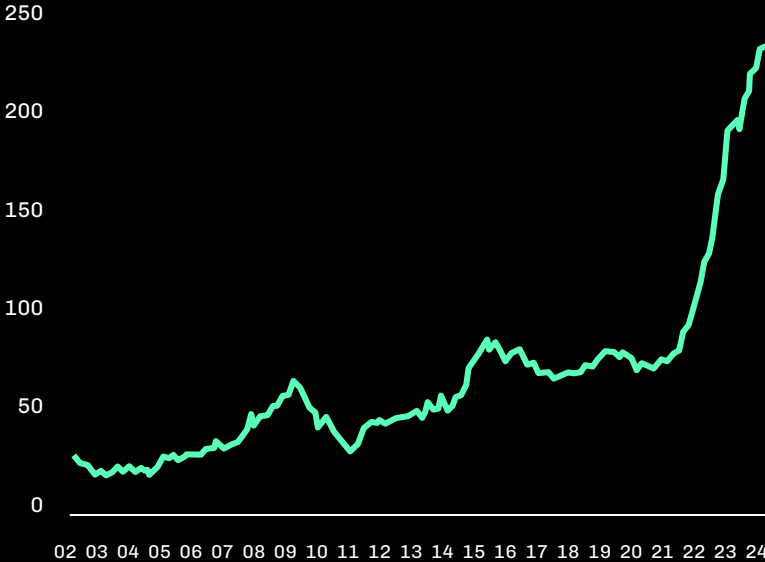
# U.S. RESHORING AND REINDUSTRIALIZATION IS ROCKING AND ROLLING

**Manufacturing growth, December 2019-24, all U.S. metro areas**



**Construction Spend on U.S. Manufacturing +40% y/y in 2023**

Construction spending on manufacturing (\$bn) (as of 7/24)



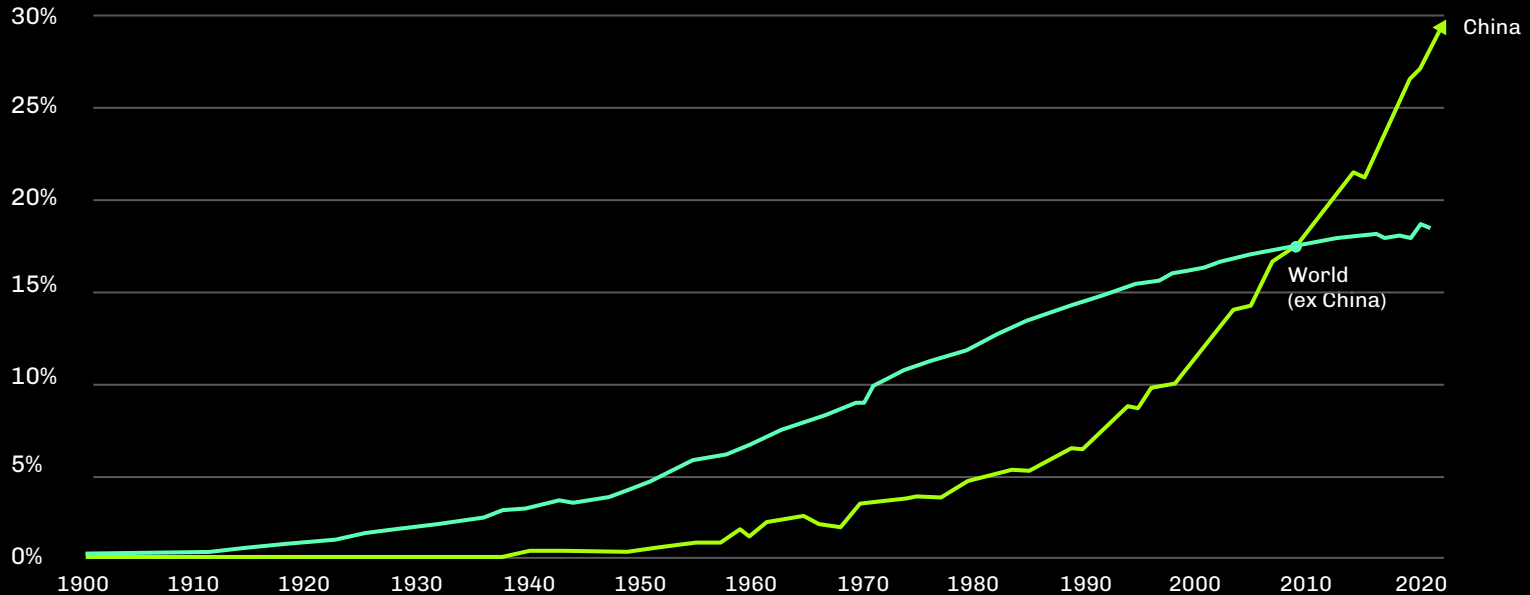
Map: Economic Innovation Group - Source: Bureau of Labor Statistics

Source: BofA GLOBAL RESEARCH; Haver, BofA US Equity & Quant Strategy.

# CHINA HAS BECOME THE FIRST MAJOR ELECTROSTATE

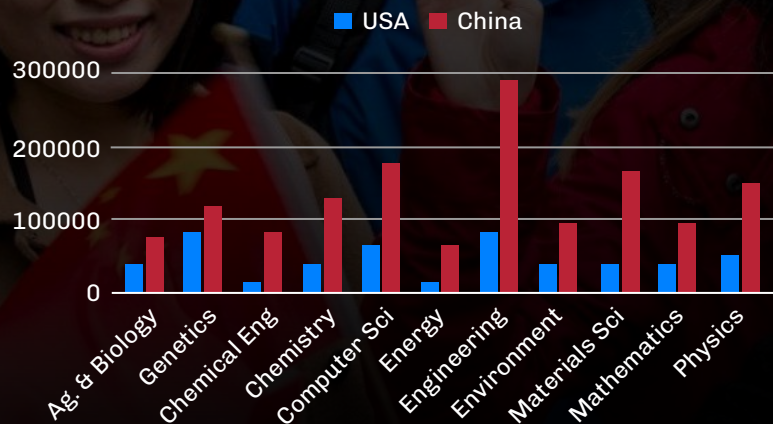
China uses electricity for over 30% of final energy consumption, a metric that includes things like gas for heating appliances and petrol for cars.

Electricity share of final energy



# IN SCIENCE & RESEARCH, 8 OF TOP 10 TOP UNIVERSITIES WERE CHINESE

Citable, peer-reviewed research papers



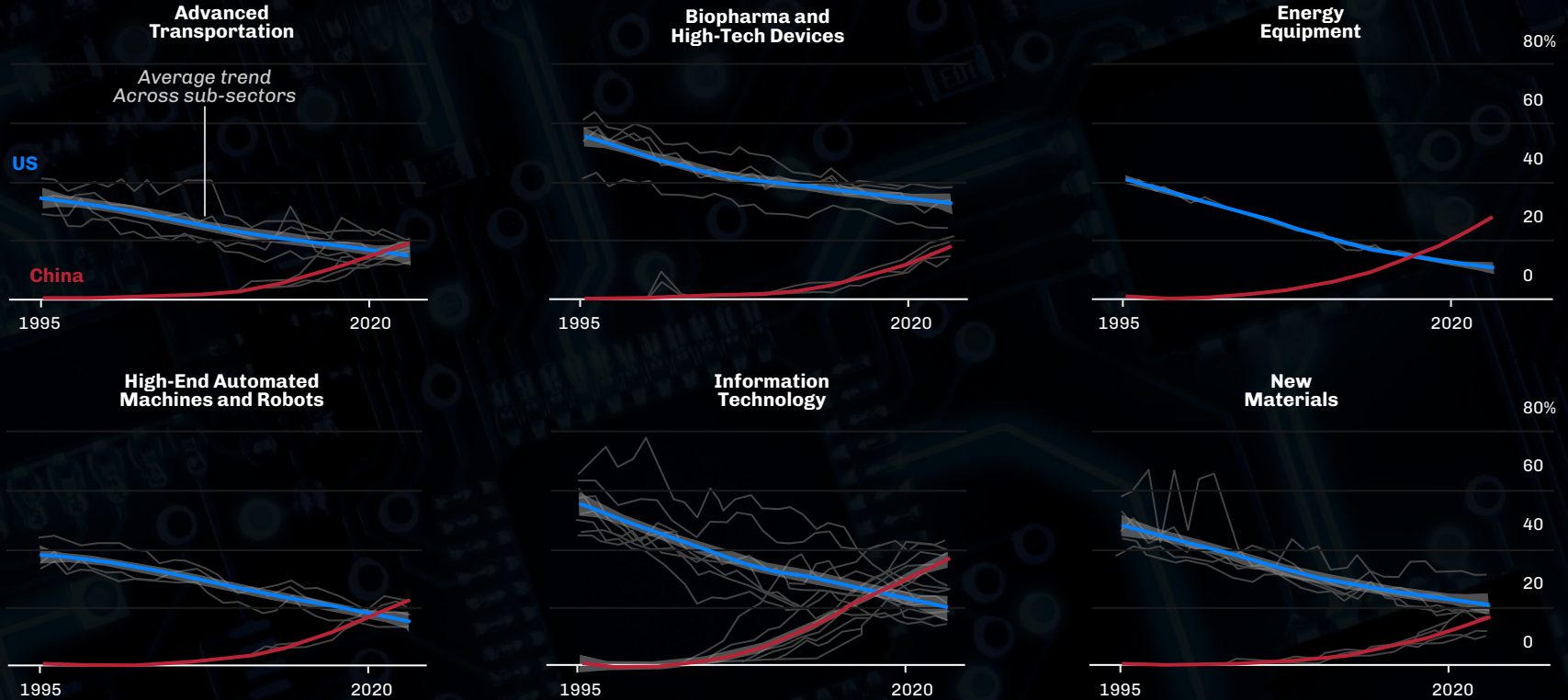
CWTS Leiden Ranking  
Universities

Number of  
Publications

1	Harvard Univ	 36355
2	Zhejiang Univ	 33090
3	Shanghai Jiao Tong Univ	 31789
4	Sichuan Univ	 25356
5	Univ Toronto	 25295
6	Huazhong Univ Sci & Technol	 24435
7	Cent S Univ	 23497
8	Tsinghua Univ	 23152
9	Sun Yat-sen Univ	 22795
10	Xi'an Jiaotong Univ	 21616

# CHINA'S PATENTS ARE INCREASING ACROSS TECHNOLOGIES

Percentage of world's Patent Cooperation Treaty patent publications by sector



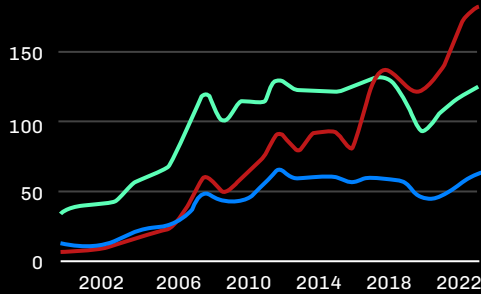
Source: Bloomberg News. "US Efforts to Contain Xi's Push for Tech Supremacy Are Faltering." 30 October 2024; World Intellectual Property Organization and Bloomberg Economics

# CHINA HAS SEIZED EXPORT MARKETS DOMINATED BY WESTERN COUNTRIES

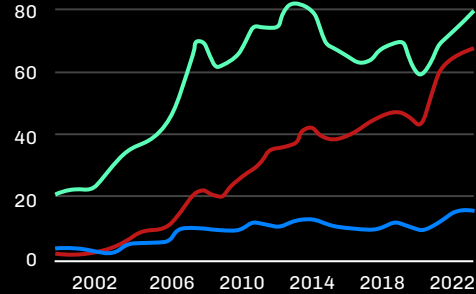
Exports to regions (\$bn)

China U.S. Eurozone

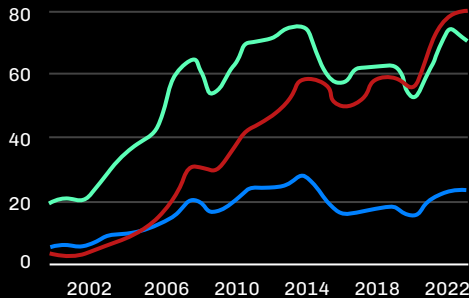
Middle East



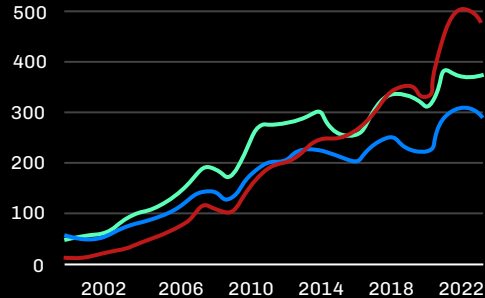
Central Asia



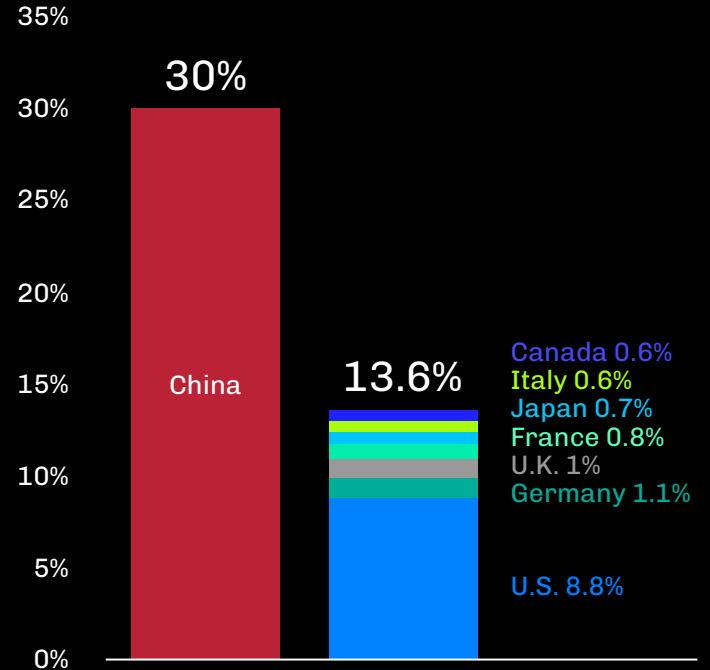
Sub-Saharan Africa



Emerging and Developing Asia



China contributed **more** to world economic growth than G7 **combined** (2013-2023)  
Share of 10-years global growth

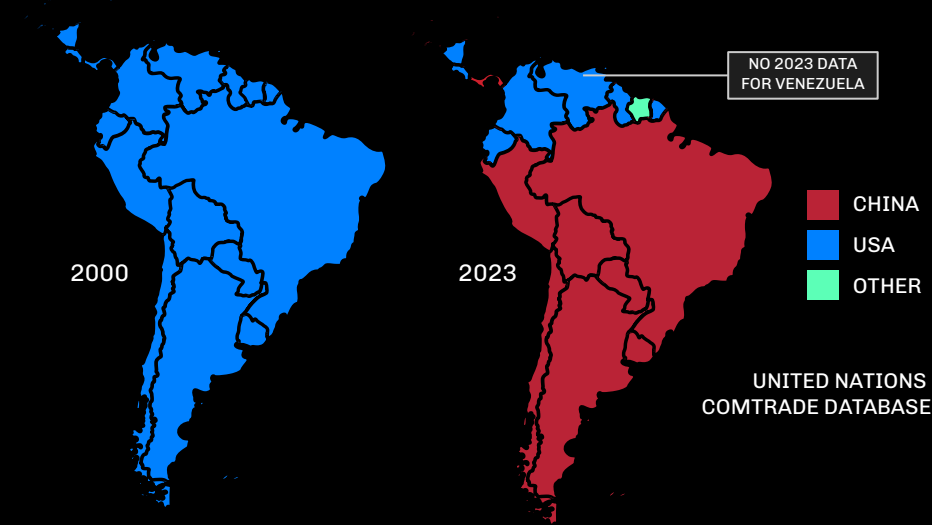


Source: Financial Times, IMF, World Economics Database.

# CHINA LEADS TRADE IN SOUTH AMERICA

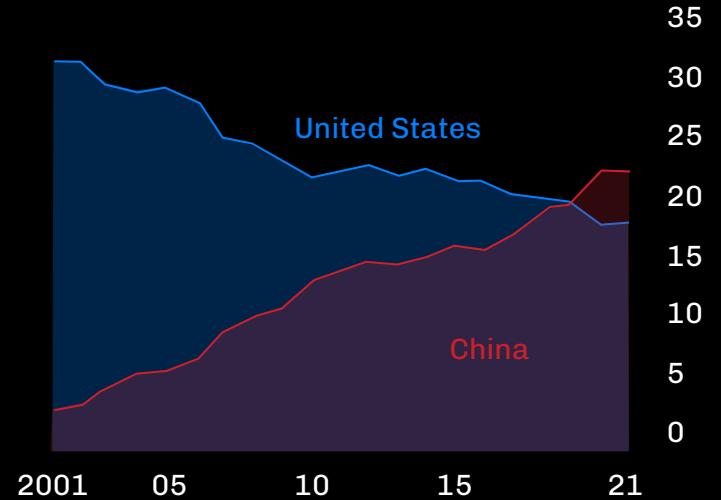
## U.S. vs China

LARGEST EXTRAREGIONAL TRADING PARTNERS



## Swapping Superpowers

LATIN AMERICA (EX MEXICO) GOODS TRADE  
*% of total*










# CHINA IS NOW LESS RELIANT ON U.S.

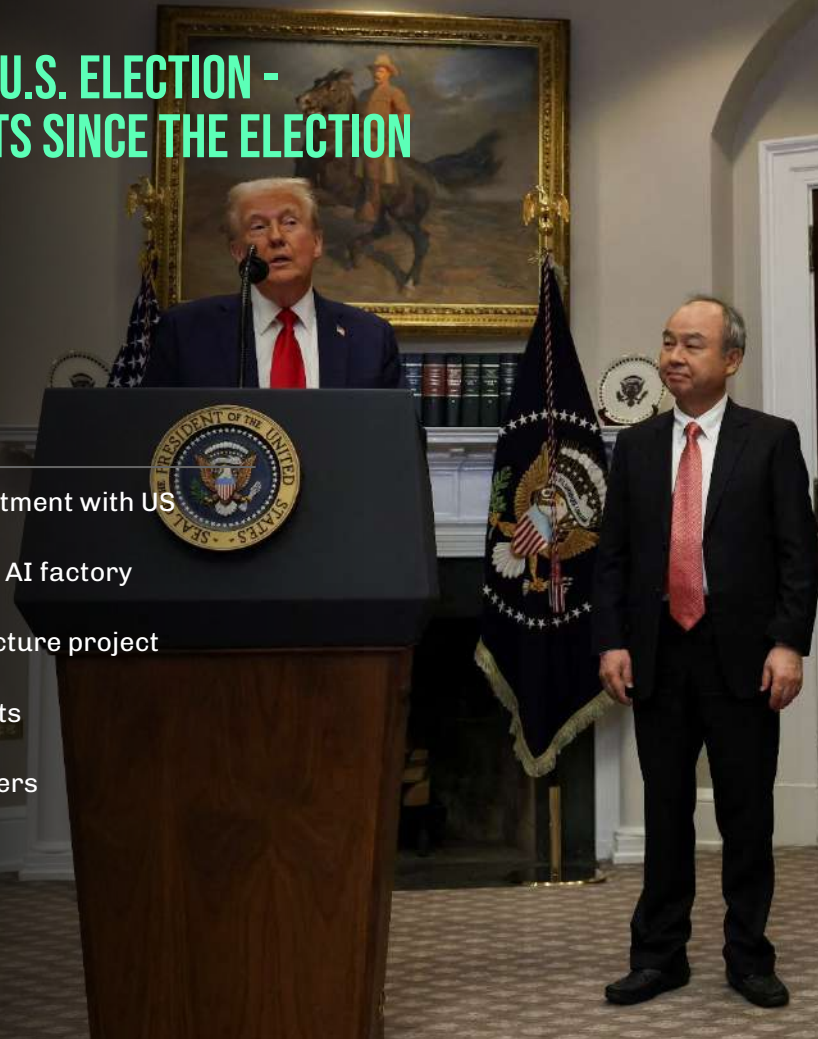
(Share of manufacturing input sourcing, indexed to 2003 level)



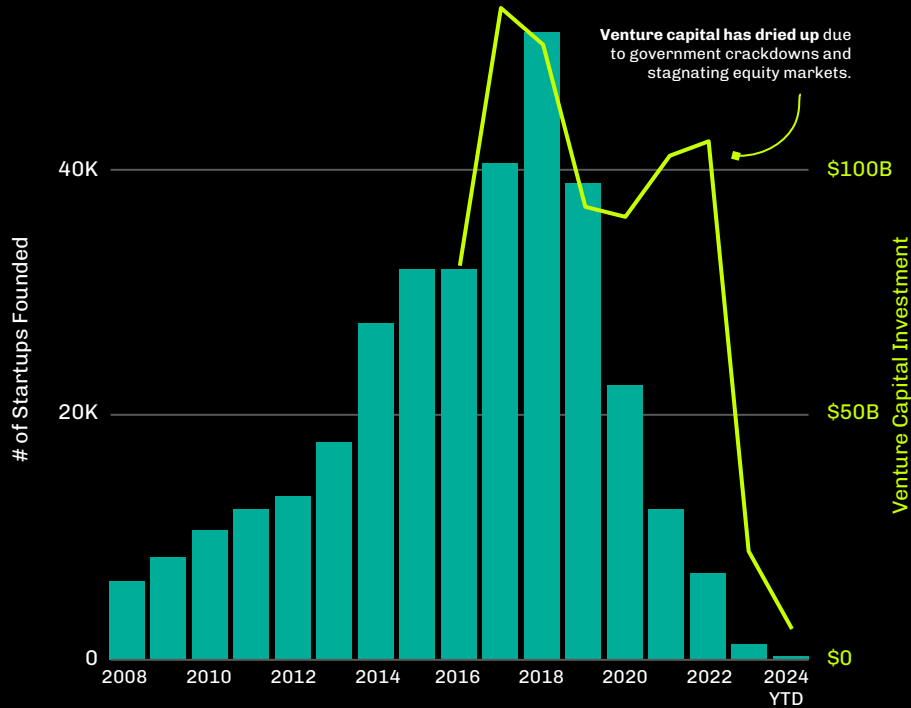
Source: Xie, Stella Yifan, and Grace Li. "For Xi Jinping, 'Made in China 2025' Has Been Worth Every Penny." Nikkei Asia, 20 December 2024; Organization for Economic Co-operation and Development Trade in Value-Added database

# YES, BUT... HOW FAST THE TIDES CAN SHIFT SINCE THE U.S. ELECTION - ~\$2T IN LARGE SCALE NEW INVESTMENT COMMITMENTS SINCE THE ELECTION

AMOUNT (In billion USD)	ENTITY	DESCRIPTION
\$600	 Saudi Arabia	Trade/investment with US
\$500	 Apple	US facilities, AI factory
\$500	   Stargate (OpenAI, SoftBank & Oracle)	AI infrastructure project
\$100	 TSMC	US chip plants
\$80	 Microsoft	AI data centers



# WHILE CHINA'S ENTREPRENEURIAL ECOSYSTEM IS SUFFOCATING



2024 data as of August. 'Companies founded' includes startups that have received VC backing, plus some in areas that are a focus for VCs even if they have not received funding.

Source: Preqin, ITJuzi (Accessed via Financial Times), CNN Business (Published July 12, 2023).



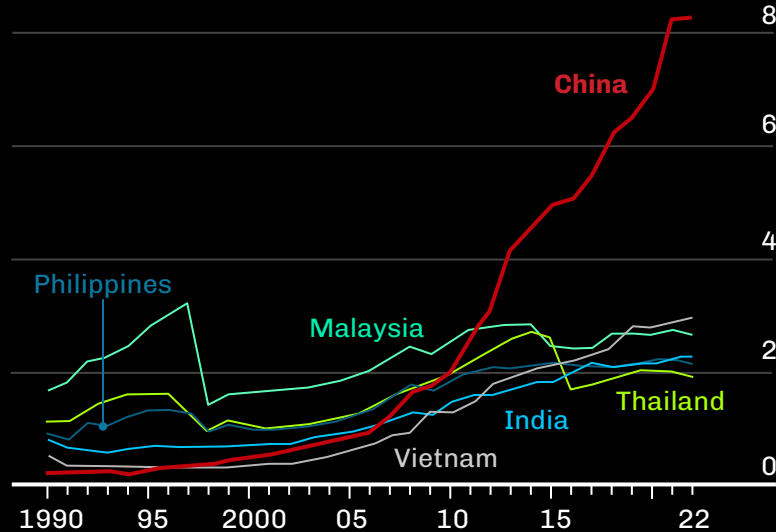
CNN Business

**Jack Ma loses more than half of his wealth after criticizing Chinese regulators**

# CHINA IS GETTING EXPENSIVE AND FACTORIES ARE SITTING EMPTY AS THE TIDE SHIFTS

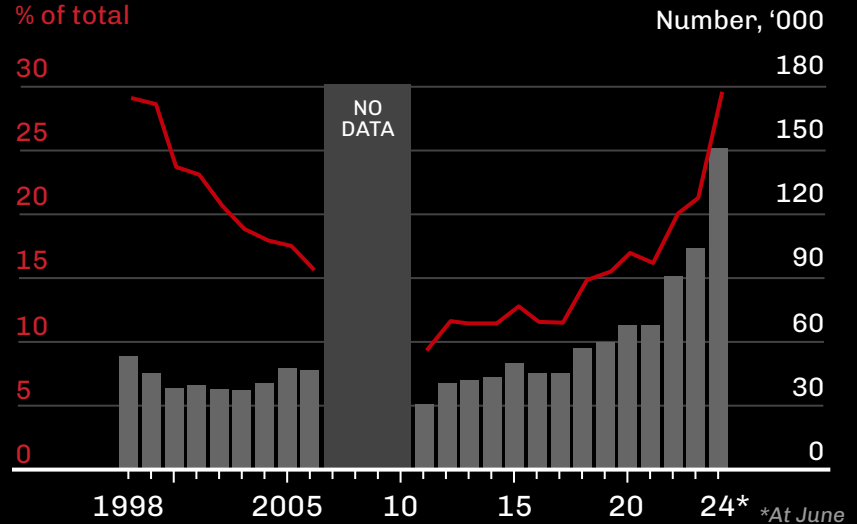
## Pay as you grow

Manufacturing unit labour cost, \$ per hour



## Newly unproductive forces

China, loss-making industrial enterprises



**CHINA'S MANUFACTURERS ARE GOING BUST**

~30% of China's industrial firms are recording losses, more than during Asian financial crisis in 1998

Public support is unlikely; local govns are highly indebted, central gov calls for industrial consolidation

# CHANGING WORLD ORDER AND GLOBAL ECONOMY

- **Global Sentiment:** The West is emerging from a supercycle of pessimism. In 2024, only 33% of people in the U.S. believed their country was on the right path, compared to 80% in India.
- **Election Trends:** 2024 elections saw every governing party in developed countries lose vote share, indicating a shift in political landscapes.

## U.S. Economic Performance:

- **Tech Leadership:** The U.S. has surpassed China as the EU's leading trade partner.
- **Manufacturing Resurgence:** U.S. factory construction investment soared by 40%, marking a peak in manufacturing activity.
- **U.S. dominates global innovation:** Home to nearly all \$10B+ high-tech giants under 50 years old, leaving Europe far behind in scaling new industry leaders.
- **Investment Flows:** Just in the first three weeks post-U.S. election, \$140 billion flowed into U.S. stock funds, contrasting with capital outflows from China, Japan, and Europe.

## China's Economic Dynamics:

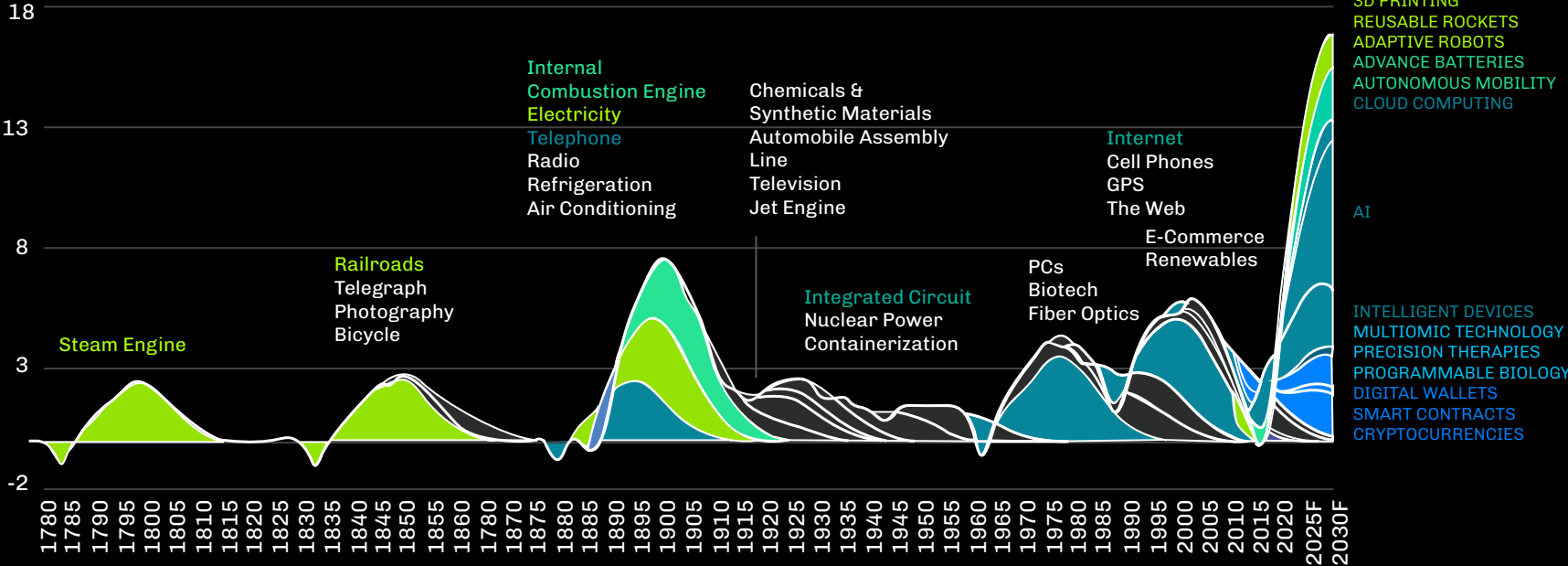
- **Manufacturing Dominance:** China leads in EVs, batteries, solar, rail, and drones, with 31.6% of global manufacturing output, double that of the U.S. (15.9%).
- **Electrification Milestone:** China, the first "electrostate," uses electricity for over 30% of final energy consumption, a metric that includes things like gas for heating appliances and petrol for cars.
- **Research Excellence:** Eight of the top ten universities for peer-reviewed publications are in China, showcasing its academic strength.
- **Economic Pressures:** Labor costs exceed \$8/hour, making China less competitive against India, Vietnam, and Malaysia, with 30% of industrial Chinese firms recording losses.
- **Startup Ecosystem:** China's startup scene is shrinking due to reduced venture capital directed towards the country.

# AI



# ESTIMATED ECONOMIC IMPACT OF GENERAL PURPOSE TECHNOLOGIES

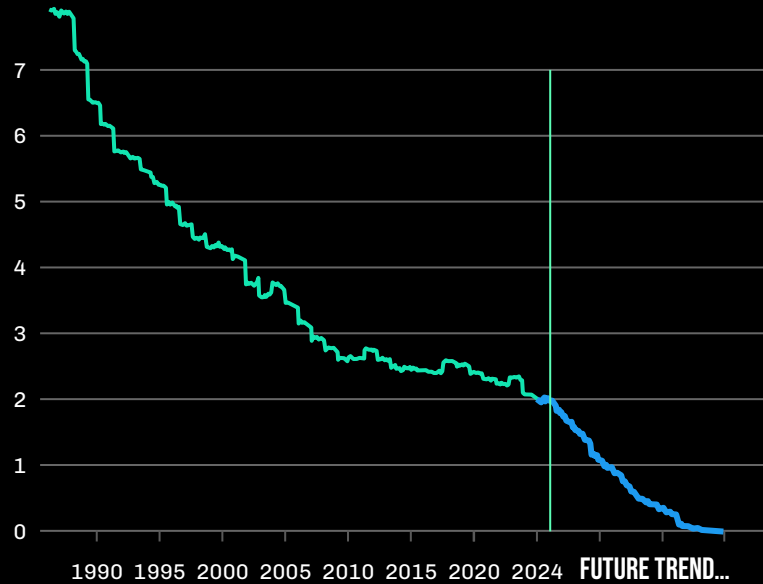
(Approximate annual percentage point additions to the economy, inclusive of consumer surplus)



Source: ARK Investment Management LLC, 2024. This ARK analysis is based on a range of underlying sources, which are available upon request. Data as of December 5, 2023. Forecasts are inherently limited and cannot be relied upon. For informational purposes only and should not be considered investment advice or a recommendation to buy, sell, or hold any particular security or cryptocurrency. Past performance is not indicative of future results.

# COMPANIES ARE MAKING MORE WITH FEWER EMPLOYEES

Workers needed at S&P 500 companies to generate \$1 million in revenue:



"In my little group chat with my tech CEO friends, there's this betting pool for the first year that there is a one-person billion-dollar company."

**SAM ALTMAN**



# PREDICTIONS FOR AGI -SOON!!



  
**SAM ALTMAN**  
CEO of OpenAI

**Prediction:**  
2025



**AI**

**DARIO AMODEI**  
CEO of Anthropic

**Prediction:**  
2026-2027



  
**TESLA**

**ELON MUSK**


**Prediction:**  
2026



  
**Meta**

**YANN LECUN**  
Meta's Chief AI Scientist

**Prediction:**  
2029-2034



  
**Google Brain**

**GEOFFREY HINTON**  
AI Pioneer

**Prediction:**  
2029-2044

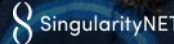


**Google**

**SHANE LEGG**  
Google DeepMind Co-Founder

**Prediction:**  
2028



  
**SingularityNET**

**BEN GOERTZEL**  
CEO of SingularityNET

**Prediction:**  
2027-2032



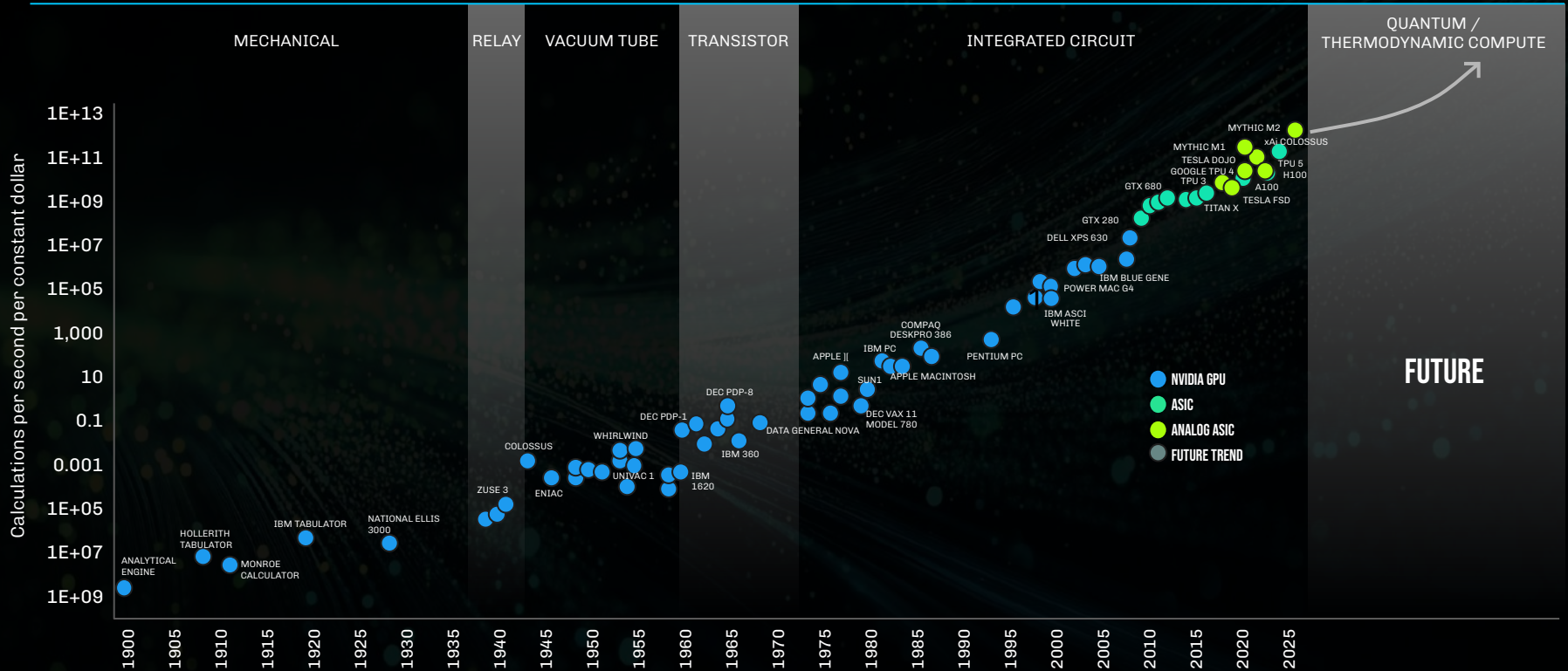
**Google**

**RAY KURZWEIL**  
Google's Principal Researcher and AI Visionary

**Prediction:**  
2029

# 1,000,000,000,000,000,000,000 (1 SEXTILLION) X IMPROVEMENT IN COMPUTATION/\$

## 128 YEARS OF MOORE'S LAW



Source: Ray Kurzweil, updated since 2008 by Steve Jurvetson, Future Ventures and UP.Partners analysis.

# THE COST OF COMPUTE AND STORAGE IS GOING TO ZERO

Average cost for 1 gigabyte of storage:

45 years ago: \$438,000

40 years ago: \$238,000

35 years ago: \$48,720

30 years ago: \$5,152

25 years ago: \$455

20 years ago: \$5

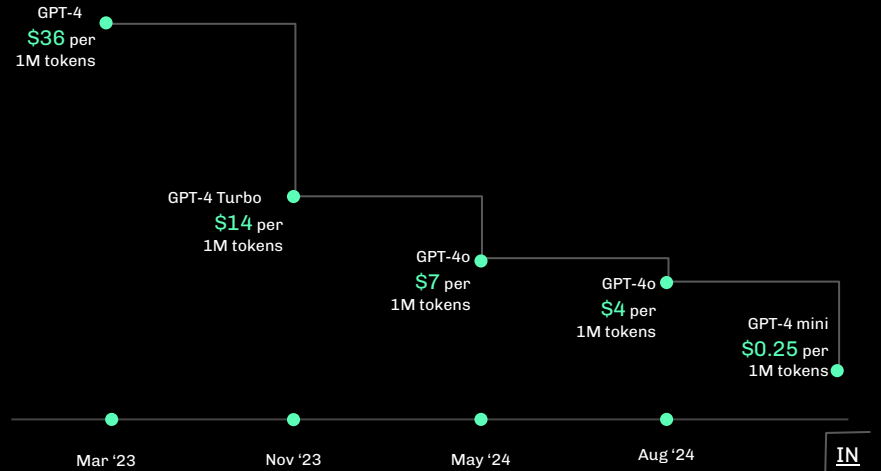
15 years ago: \$0.55

10 years ago: \$0.05

5 years ago: \$0.03

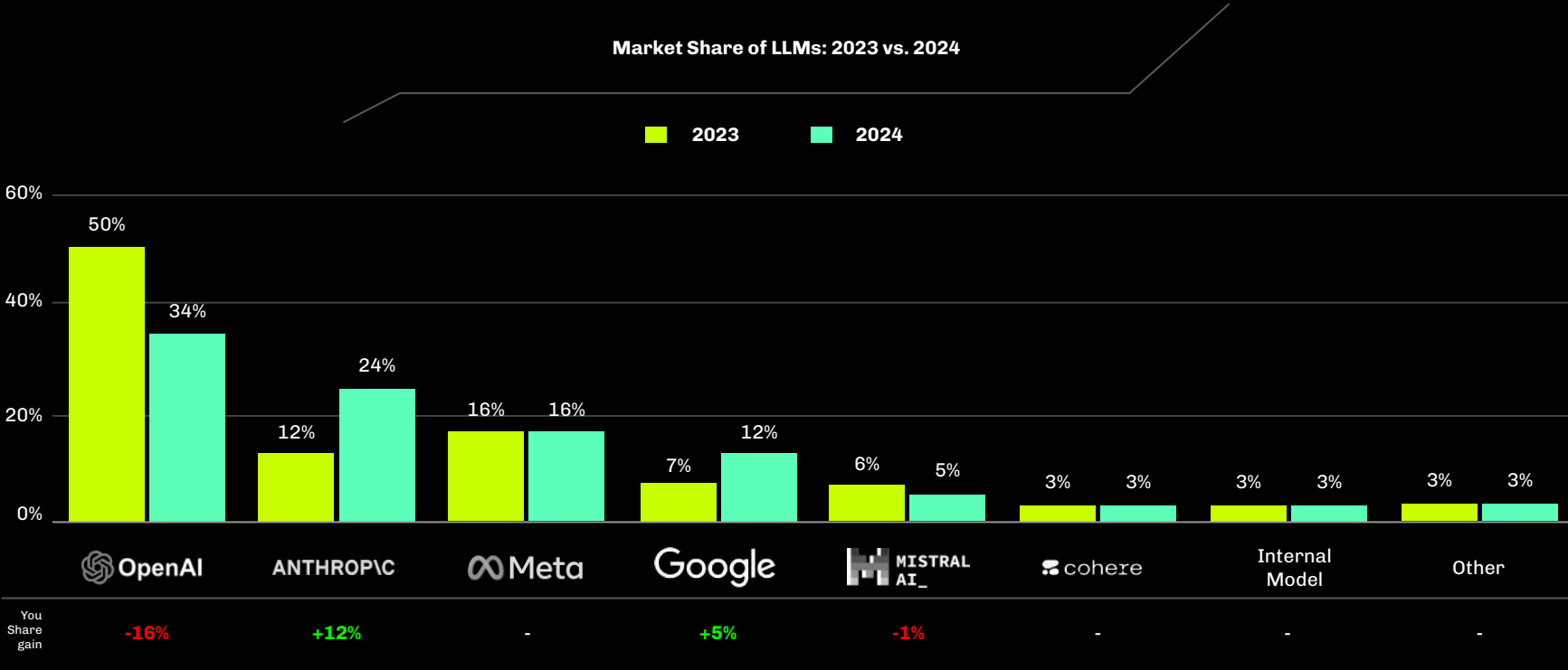
**Today: \$0.01**

The cost per million tokens has fallen from \$36 to \$0.25 in the past 18 months.



Microsoft CEO Satya Nadella says computing power is now doubling every six months, as the Scaling Laws paradigm has taken over from Moore's Law, and the new currency is tokens per dollar per watt.

# OPENAI LOSING SHARE TO ANTHROPIC... BUT WHAT ABOUT XAI?



Source: Tully, Tim, Joff Redfern, and Derek Xiao. "2024: The State of Generative AI in the Enterprise." Manlo Ventures, 20 November 2024.

# XAI HAS A HUGE TRAINING DATA ADVANTAGE



5 million cars

>2 billion miles of training data (as of 3Q24)



Insights into brain functions and human cognition

Understanding of neural processes

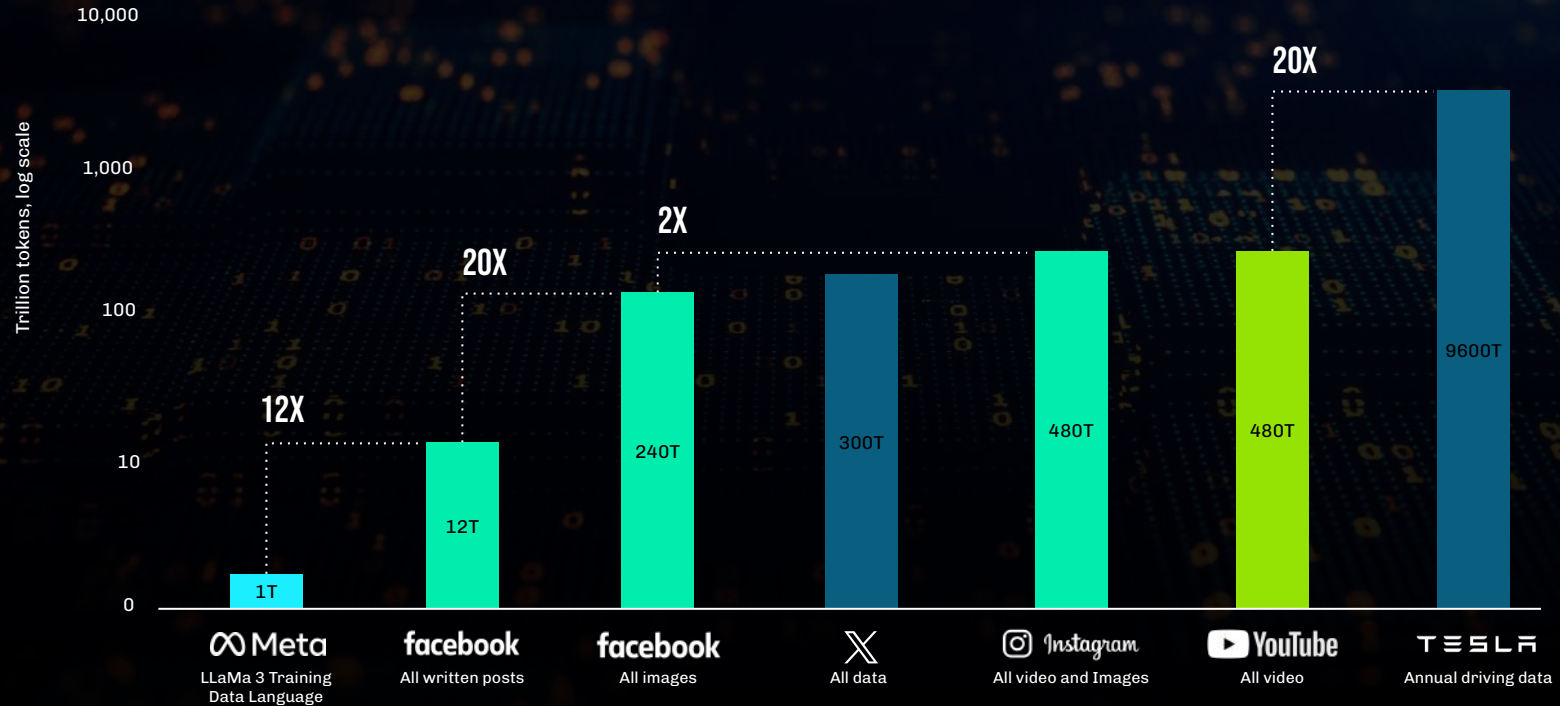


340M active users

~1 TRILLION TWEETS

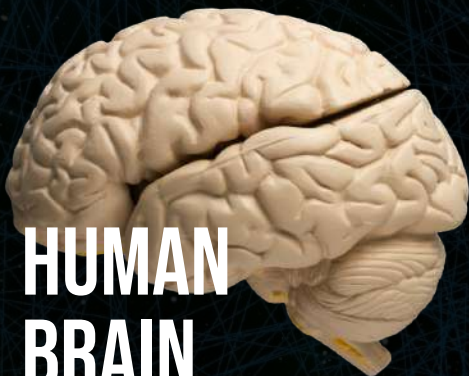
# TRAINING DATA REALLY IS THE NEW GOLD

Very Large Data Repositories (Trillion of Tokens)



Assumes Tesla tokenizes image data at the same data per pixel rate of multimodal models sampling at 1 frame per second. This is consistent with the Gemini model video understanding product. 1 frame per second is clearly too infrequent but there are almost certainly tokenization efficiencies in moving from stills into video. | Source: ARK Invest Estimates, Company disclosures, and UP.Partners research.

# HUMAN BRAIN STILL OVER ~8000 TIMES MORE ENERGY EFFICIENT THAN NVIDIA H100



**HUMAN  
BRAIN**

1 Watt -> 50 petaFLOP  
of compute



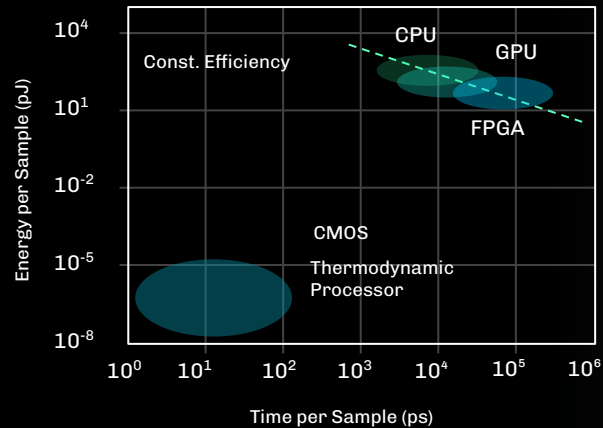
**NVIDIA  
H100**


175 Watts -> 1 petaFLOP  
of compute

# THERMODYNAMIC COMPUTE MAY GET US THERE

## EXTROPIC

Extropic may be the next NVIDIA, building thermodynamic computational chips that will create chips that mimic the human brain. No need for nuclear power plants to power AI.



Beff - e/acc   
@BasedBeffJezos



We are all just thermodynamic computer programs on biochemical substrates

# GOOGLE AND MICROSOFT MAKE MAJOR QUANTUM BREAKTHROUGH - UNLOCKING SOLUTIONS TO THE UNSOLVED PROBLEMS OF THE WORLD

WILLOW CAN SOLVE IN FIVE MINUTES A PROBLEM  
THAT WOULD TAKE SUPERCOMPUTERS AROUND  
10,000,000,000,000,000,000 YEARS



MAJORANA 1 IS A GROUNDBREAKING QUANTUM CHIP  
BUILT ON A NEW CLASS OF MATERIALS: TOPOCONDUCTORS

# CHINA'S DEEPSEEK AI IS A SPUTNIK MOMENT... GAME ON

DeepSeek-V3 was trained in 2.79 million GPU hours at a cost of approximately \$5.6 million, which is a fraction of what was used for models like Llama 3.1 405B (which required 30.8 million GPU hours)

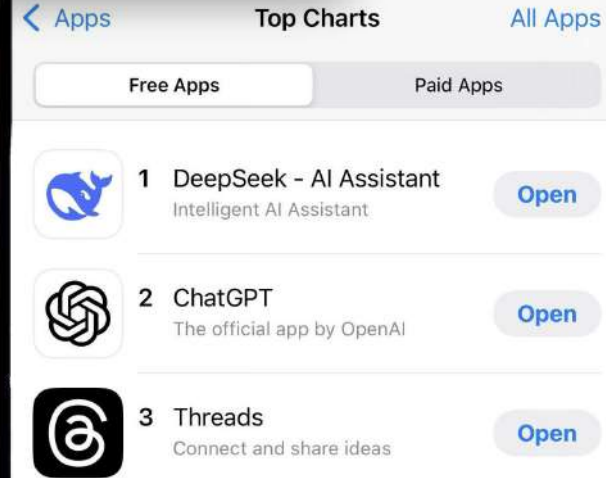
DeepSeek-V3 is priced at \$0.27 per million tokens for input and \$1.10 for output, which is notably lower than OpenAI's pricing for models like GPT-4o (\$2.50 for input, \$10.00 for output).

NVIDIA lost \$500B in EV the first trading day after the announcement

Questions remain if DeepSeek used distillation from OpenAI's model

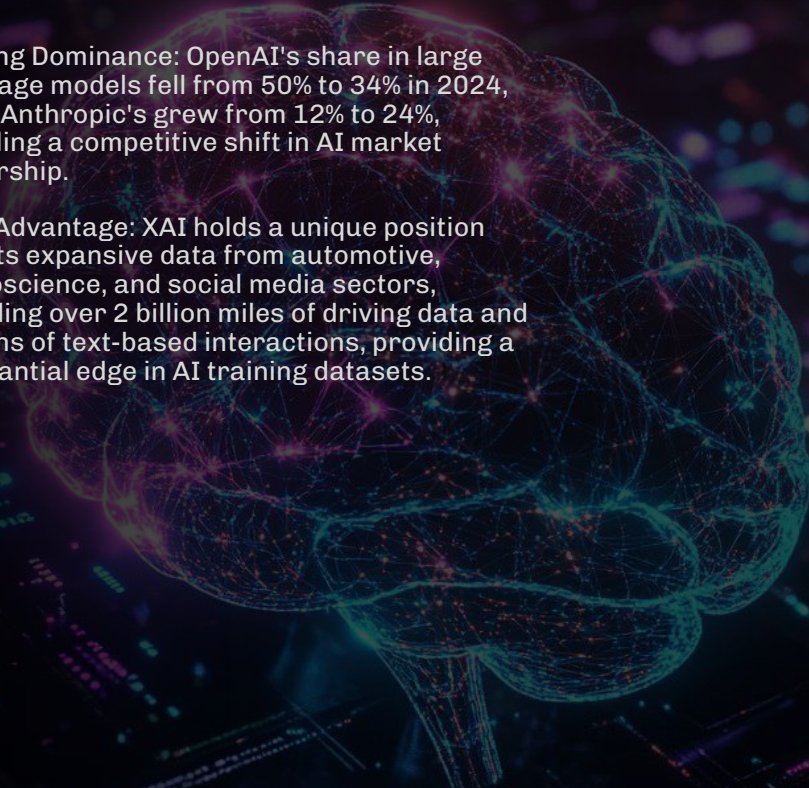


Became #1 app in App store in 3 days



# ARTIFICIAL INTELLIGENCE

- **Economic Efficiency:** S&P 500 companies are now generating \$1M in revenue with just two employees, compared to seven in 1990, pointing towards a future where AI-driven automation might see one-person billion-dollar companies.
- **AGI Timeline:** AI leaders predict the arrival of Artificial General Intelligence (AGI) imminently.
- **Compute and Storage:** Costs have dramatically decreased, with 1GB of storage now costing just \$0.01 from \$438,000 forty-five years ago. AI token processing costs have also dropped from \$36 to \$0.25 per million tokens in 18 months.
- **Energy Efficiency:** The human brain is still 8000 times more energy-efficient than current AI chips, performing at 50 petaFLOPs per watt compared to 1 petaFLOP per 175 watts for AI. New thermodynamic and quantum chips aim to close this efficiency gap.
- **Shifting Dominance:** OpenAI's share in large language models fell from 50% to 34% in 2024, while Anthropic's grew from 12% to 24%, signaling a competitive shift in AI market leadership.
- **Data Advantage:** XAI holds a unique position with its expansive data from automotive, neuroscience, and social media sectors, including over 2 billion miles of driving data and trillions of text-based interactions, providing a substantial edge in AI training datasets.





# HUMANOIDS

## JENSEN SEES HUMANOIDS AS THE NEXT BIG THING IN THE BUILT WORLD



“

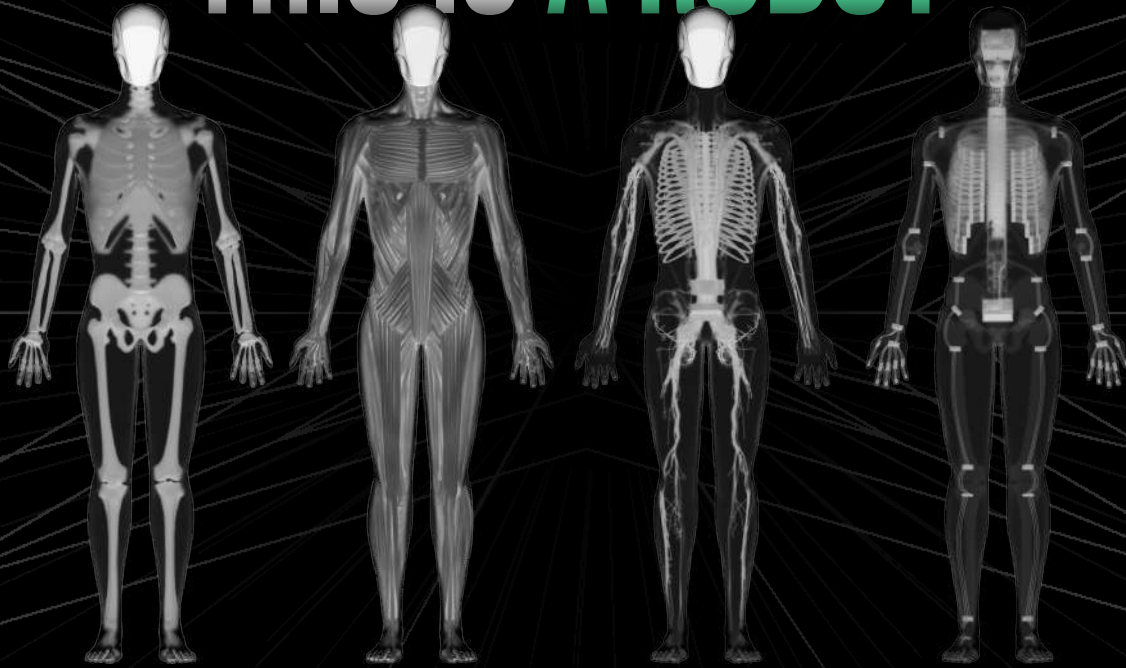
Cars, drones, and humanoids are the only three types of robots that can scale to extremely high volumes because they can be deployed to the world as it is.”

—Jensen Huang, President and CEO of Nvidia



NVIDIA

# THIS IS A ROBOT



CLONE

# HUMANOIDS ARE **ACCELERATING** DUE TO THESE CONVERGING EXPONENTIAL TECHNOLOGIES



**AUTONOMOUS SYSTEMS**



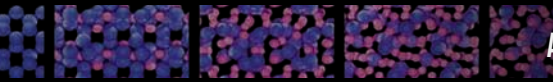
**ELECTRIFICATION**



**CONNECTIVITY**



**ARTIFICIAL INTELLIGENCE**



**ADVANCED MATERIALS AND MANUFACTURING**



**SENSORS AND ADVANCED NAVIGATION SYSTEMS**



**BATTERY TECHNOLOGY AND ENERGY STORAGE**



**PROPULSIVE TECHNOLOGIES**



**RENEWABLE ENERGY SOURCES**



**COMPUTING POWER**



A composite image featuring Elon Musk in the foreground, looking directly at the camera. In the background, a man in a white lab coat and glasses is working on a humanoid robot. The robot is white and black, with a sleek, modern design. The setting appears to be a laboratory or a factory floor.

# TOTAL ANNUAL PRODUCTION OF HUMANOIDS COULD EXCEED GLOBAL CAR PRODUCTION AT SCALE ~100M/YR

**“I actually think the market for humanoid robots is in excess of 10 billion units, more than the number of humans.”**

—Elon Musk during 2024 Future Investment Initiative Conference

# WHAT AMERICA LACKS IN PEOPLE CAN BE SUPPLANTED BY HUMANOIDS

SOLDIERS



FACTORY WORKERS



FARM HANDS



SANITATION



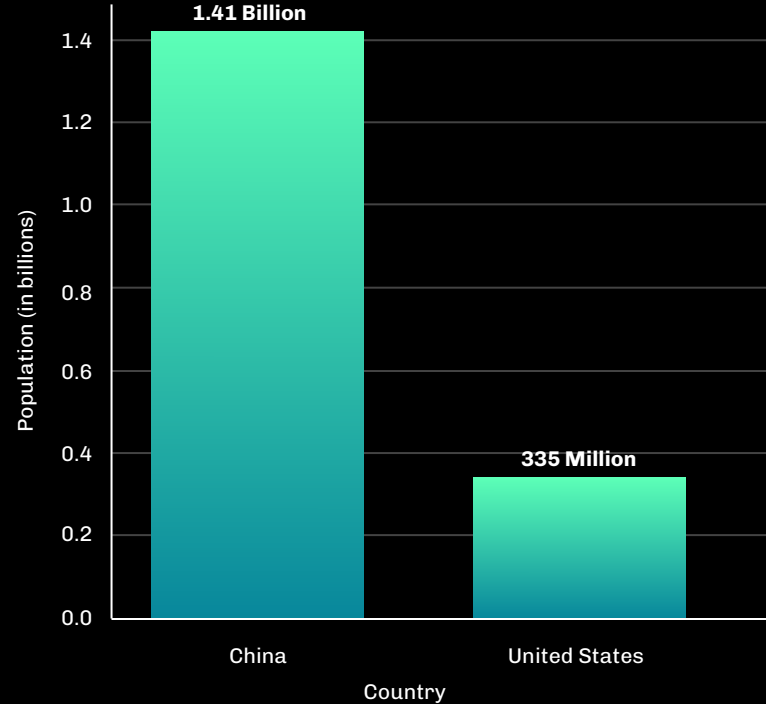
POLICE OFFICERS



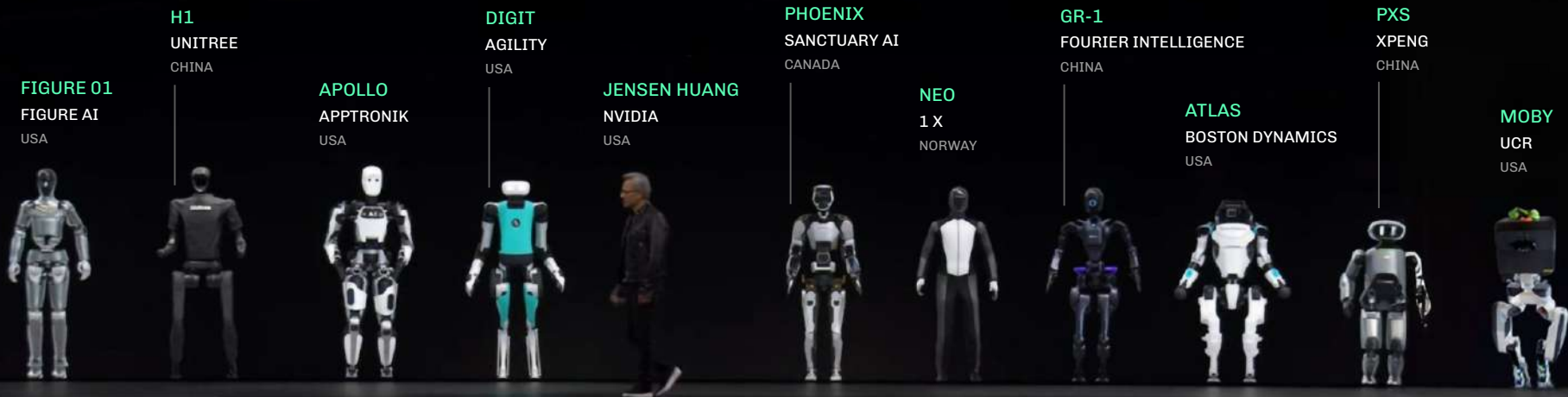
FIRE FIGHTERS






Population Comparison: China vs. United States (2024)

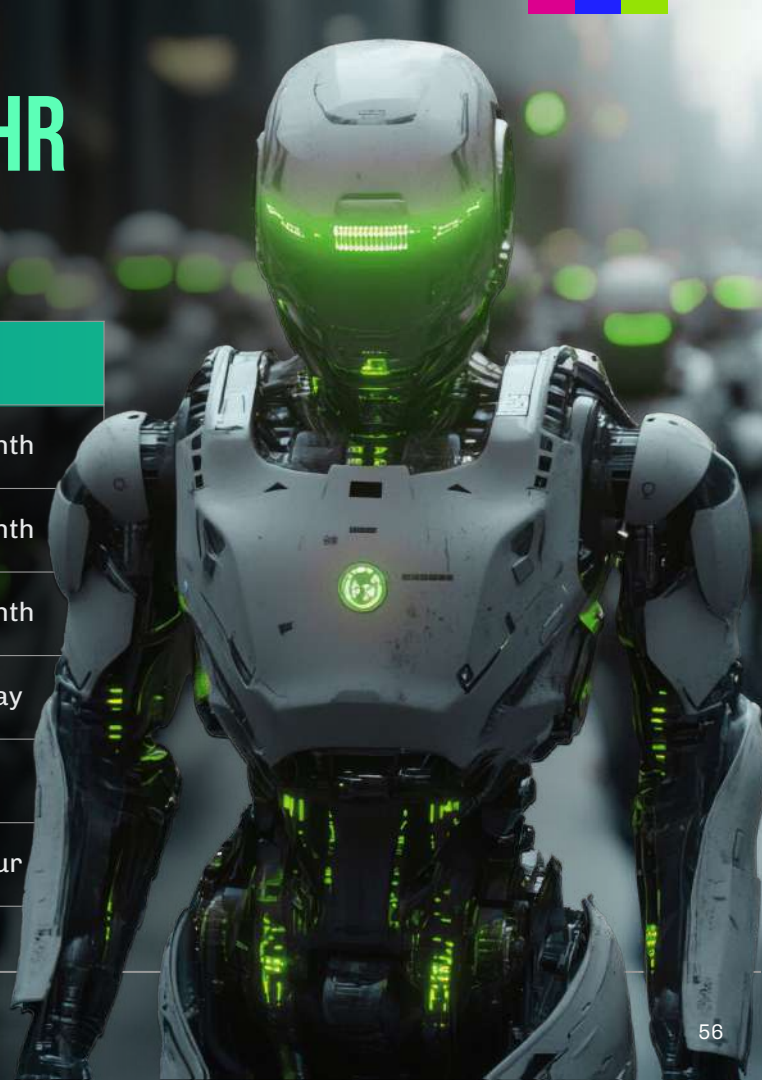


# OVER 60 HUMANOID ROBOT COMPANIES ARE CHASING THE PRIZE



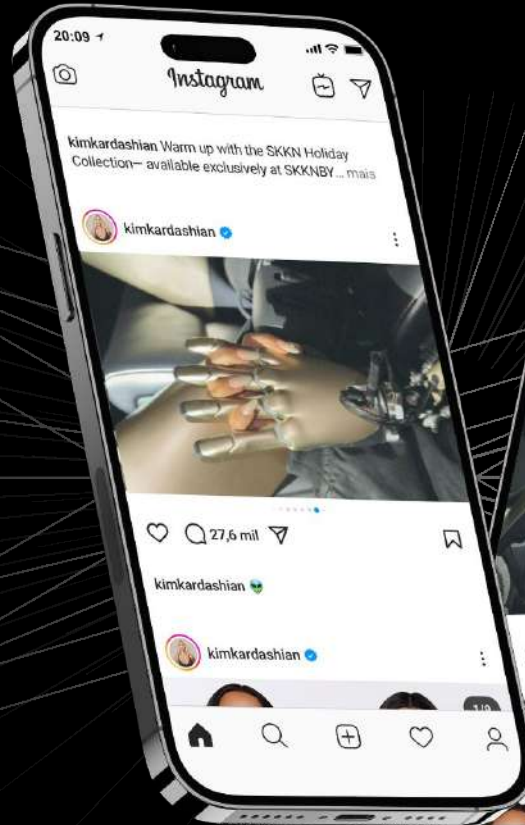
# HUMANOID LABOR COST OF ~ \$1/HR

 Factor	 Details	 Cost
Purchase Price	\$30k Amortized over 5 years	\$500/month
Software Fee	Monthly Subscription	\$199/month
Total Monthly Cost		\$699/month
Daily Cost	Assuming 30-day month	\$23.30/day
Hours Available/Day	75% of 24 hours	18 hours
Cost per Hour		\$1.29/hour



THE SOCIAL EDUCATION  
CAMPAIGN IS BEGINNING

FROM KIM  
KARDASHIAN  
TO OPTIMUS.



# HUMANOIDS

- **Technological Convergence:** The acceleration of humanoid development is driven by exponential growth in AI, autonomous systems, electrification, advanced materials, navigation sensors, battery technology, propulsion, renewable energy, and computing power.
- **Market Scale:** Humanoid robot production might outstrip global car manufacturing, potentially reaching ~100M units annually, with a market potential exceeding 10 billion units, outnumbering the global human population.
- **Competitive Landscape:** Over 60 companies worldwide, including major players like Boston Dynamics, Tesla, Appteronik, Nvidia, Agility, Figure AI, and Sanctuary AI from the U.S., China, Canada, and Norway, are in a race to dominate this burgeoning market.
- **Labor Shortage:** The U.S., with a population of 335 million, faces a labor shortfall compared to China's 1.41 billion, where humanoids could address workforce gaps in sectors such as the military, law enforcement, sanitation, and other industrial sectors.
- **Cost Efficiency:** The projected labor cost for humanoids is about \$1.29/hour

A photograph taken from inside a space station, looking out through a large circular window. The Earth is visible as a bright blue and white curved horizon against the blackness of space, which is filled with stars. The interior of the station is dimly lit, showing some equipment and structural elements.

# SPACE

# SPACE AND THE UNITED STARS OF AMERICA



PAST

FUTURE






A tall, slender rocket is being transported on a mobile launcher platform by a crawler-transporter. The scene is set at a launch complex, likely NASA's Kennedy Space Center, during a sunset or sunrise. The sky is a mix of orange, yellow, and blue. The ground is a mix of dirt, gravel, and some water. In the background, there are some buildings and a large body of water.

*Who said we don't build cathedrals anymore?*

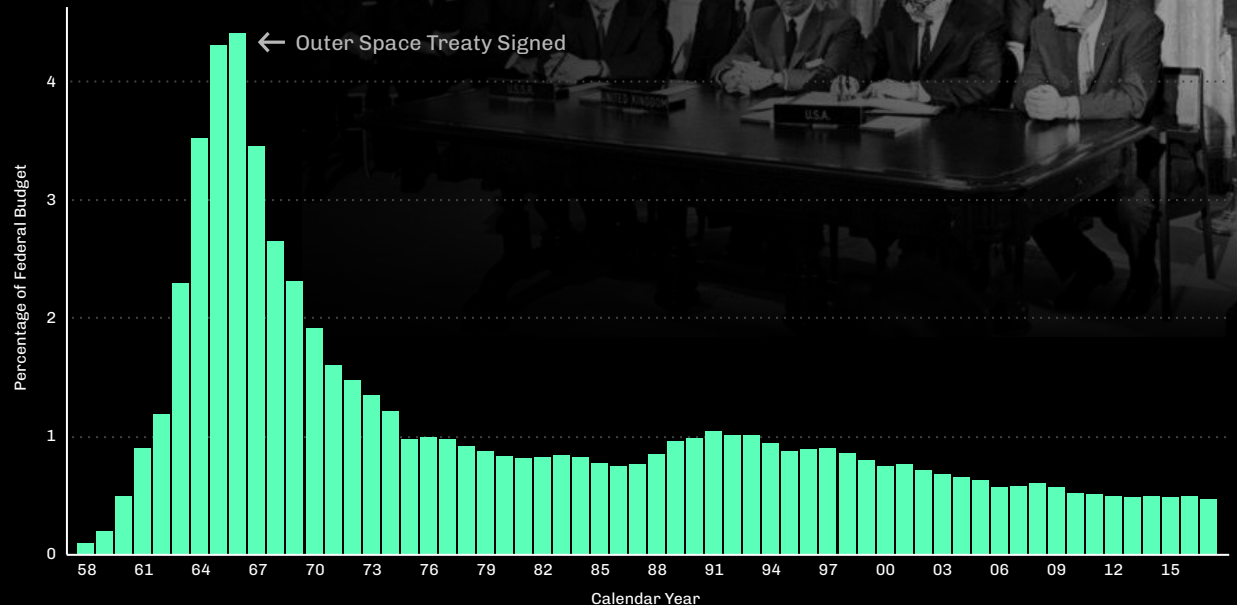
# AMERICA'S CATHEDRALS TO SPACE HAVE ARRIVED

# A LITTLE HISTORY: SIGNING OF THE OUTER SPACE TREATY OF 1967 HALTED OUR COLLECTIVE PUSH FOR THE STARS... UNTIL SPACEX

The Outer Space Treaty of 1967 is an international agreement that established the basic framework for international space law. The treaty's main goals are to:

-  Promote the peaceful use of space
-  Prevent the establishment of military bases in space
-  Prohibit the testing of weapons in space
-  Ensure that space is accessible to all countries
-  Prevent national claims of ownership in space

NASA Budget as a Percentage of Federal Budget



Source: U.S. Office of Management and Budget, Air Force Association's Air Force Magazine, NASA Budget.

# TIME TO WITHDRAW FROM THE OST AND MAKE THE MOON A STATE?



China and Russia agree to develop a moon station together.



The flag of the People's Republic of China is already planted on the far side of the moon!!

# THE CHINESE SPACE TIGER IS AWAKE



LONG MARCH 5



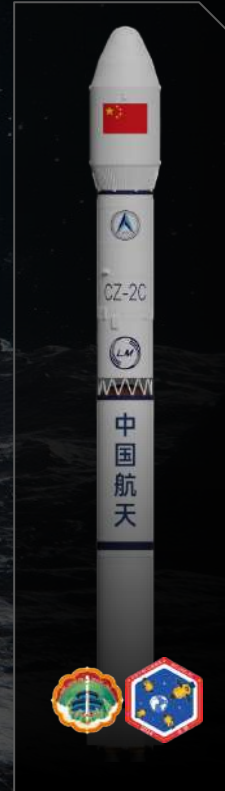
LONG MARCH 6C



LONG MARCH 3B



LONG MARCH 4C

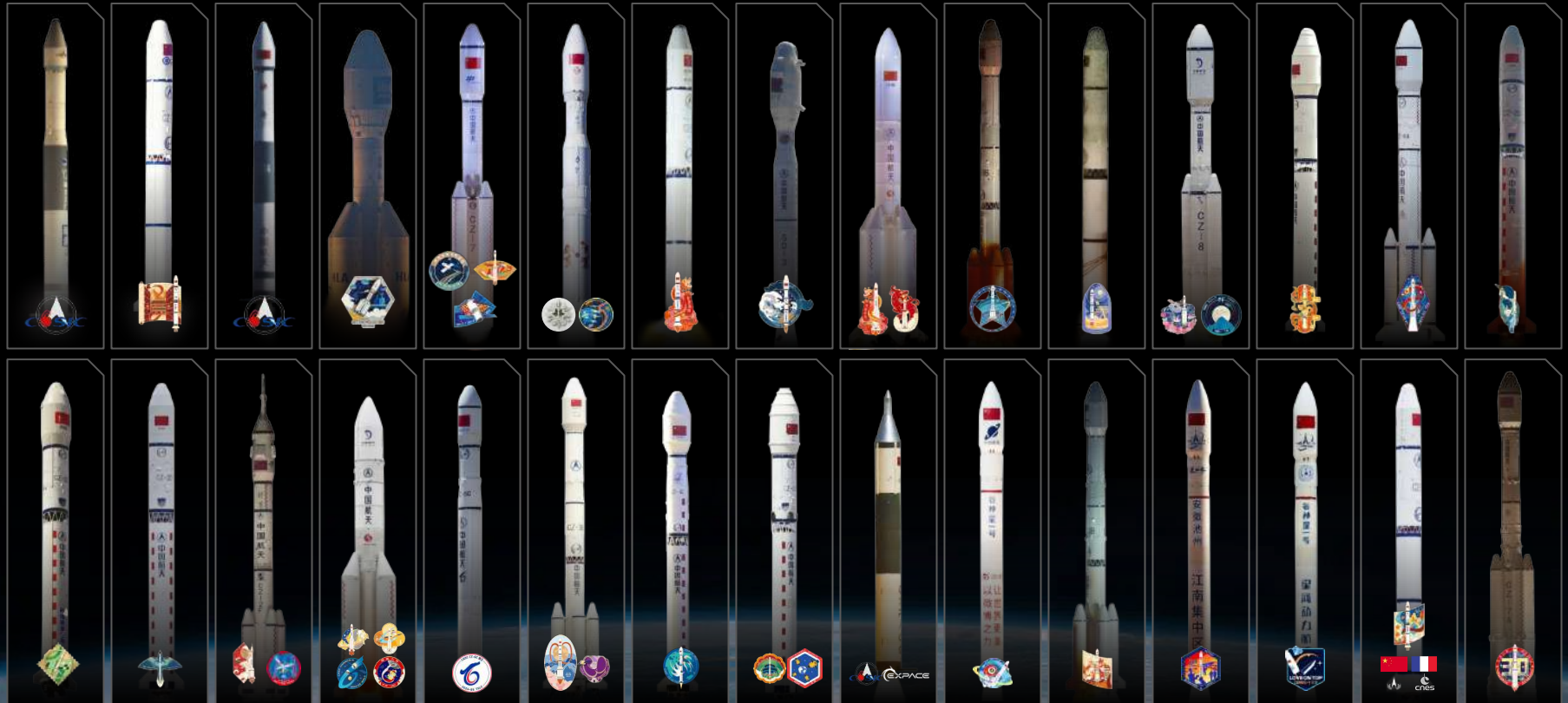


LONG MARCH 2C



KUAIZHOU-1A


# CHINA LAUNCHED 30 ROCKETS IN THE FIRST HALF OF 2024



Source: UP.Partners research of publicly available information.

# CHINA HAS TWO COMPANIES THAT ARE REPLICATING THE STARSHIP ARCHITECTURE




Steve Jurvetson   
@FutureJurvetson



Don't forget Cosmoleap  They even copied the Starbase pad and chopsticks in their render.

The Chinese simulation is strong. Execution is still hard. From: [youtube.com/watch?v=NsKo\\_T...](https://www.youtube.com/watch?v=NsKo_T...)



Space Sudoer   
@spacesudoer




The Chinese has already built a booster catch tower.  
Major FAA reform is needed if America wants to win.



# CHINA BROKE THE LONGEST SPACEWALK RECORD



Livinlavidaluke   
@96Stats



China just broke a world record in space! A 9-hour spacewalk outside the Tiangong space station smashing the previous record in 2001 by NASA.

4:06 AM - DEC 18, 2024 - 2,658 Views

THE MANHATTAN PROJECT

THE MANHATTAN  
PROJECT

# STARSHIP IS OUR EQUIVALENT MODERN-DAY MANHATTAN PROJECT

SPACEX STARSHIP

LOS ALAMOS, NM 1940S

BOCA CHICA, TX 2020S

ROBERT OPPENHEIMER

ELON MUSK

# IMPACT OF A WORLD WITH STARSHIP OPERATING AT SCALE

1

Make Life  
Multi-Planetary

2

Reduction in  
Space Travel  
Costs

3

Acceleration of  
Space Exploration  
and Science

4

Economic  
Impacts and  
New Industries

5

Technological  
Advancements

6

Global  
Cooperation  
and Competition

# 1 STARSHIP MISSION = 6X FALCON 9 MISSIONS AT ~\$1M/FLIGHT IN FUEL



1X

Starship  
SpaceX

=

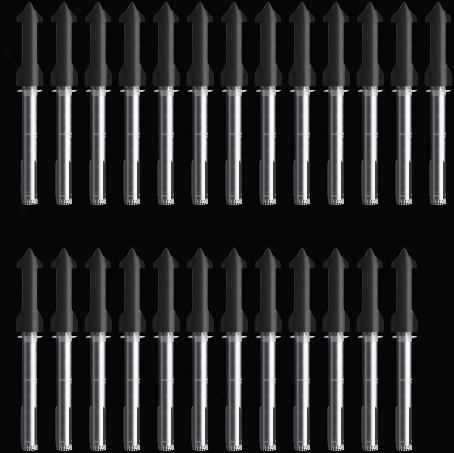


6X

Falcon 9  
SpaceX

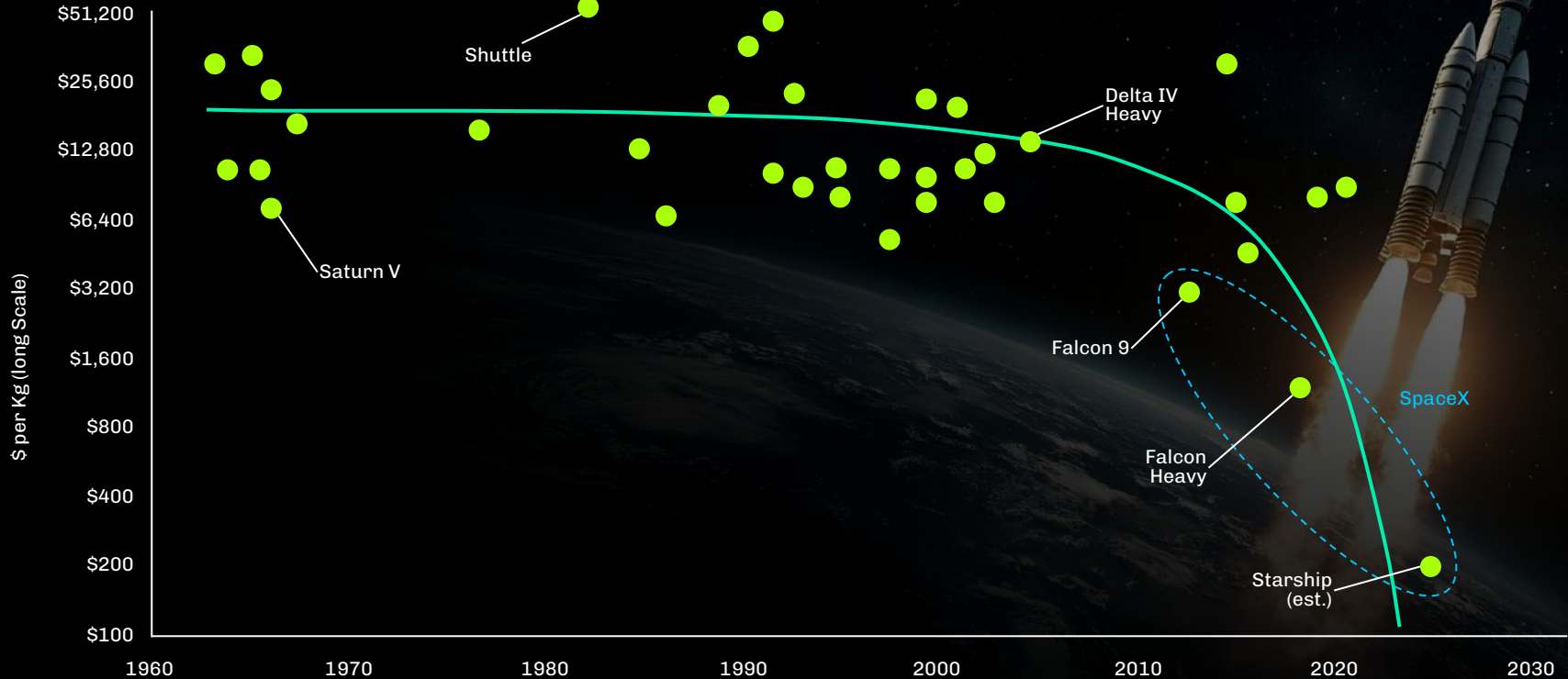
Component	Mass (MT)	\$/kg (\$)	Cost \$
Methane (CH4)	1,012	0.50	\$506,000
Liquid Oxygen (LOX)	3,588	0.15	\$538,200
<b>Total</b>	<b>4,600</b>		<b>\$1,044,200</b>

2025 PLAN ~  
25 STARSHIP LAUNCHES



# COST OF SPACE TRAVEL PLUMMETS

## Falling Launch Costs to Orbit: Cost Per Kilogram

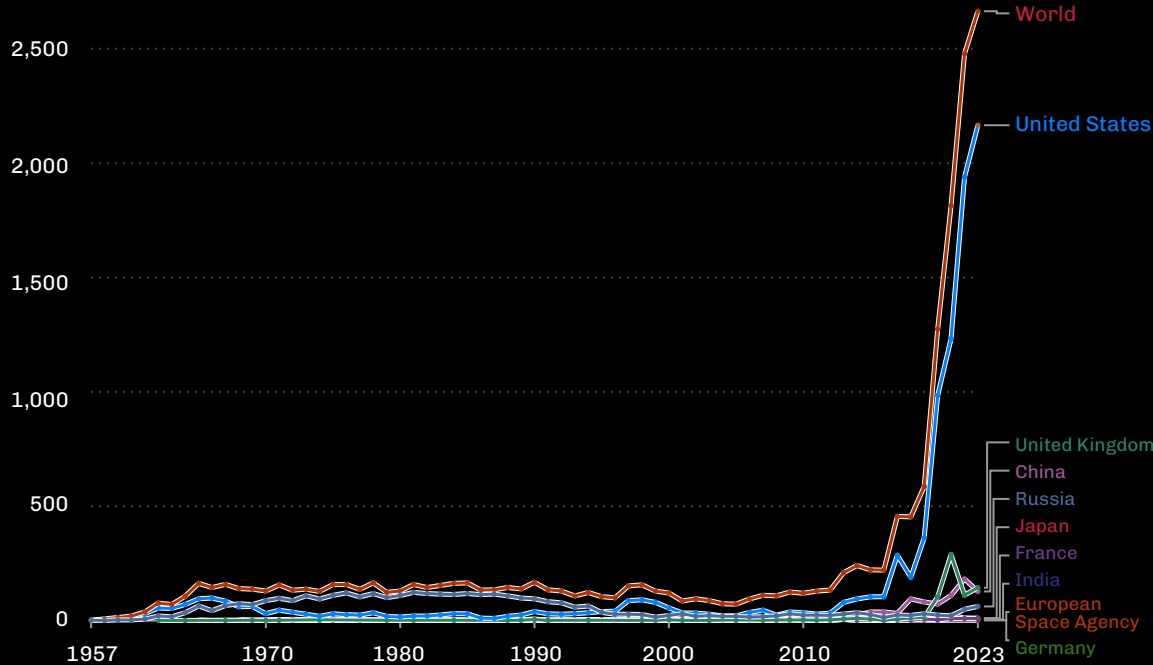


Source: CSIS Aerospace Security Project, PayloadResearch estimates. 2024.

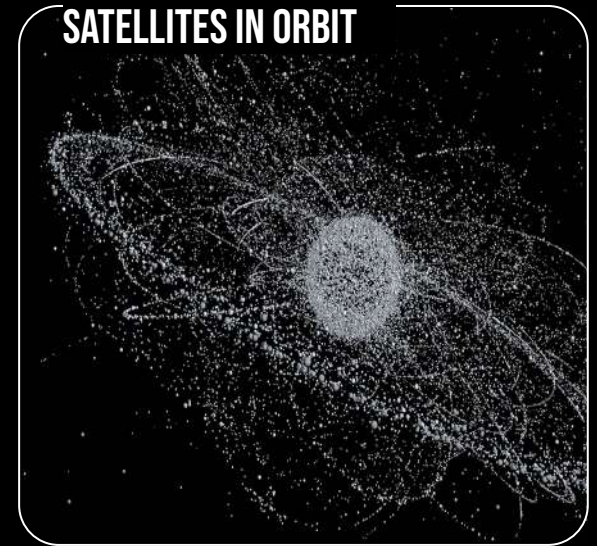
# EXPONENTIAL INCREASE IN OBJECTS IN SPACE

## Annual number of objects launched into space

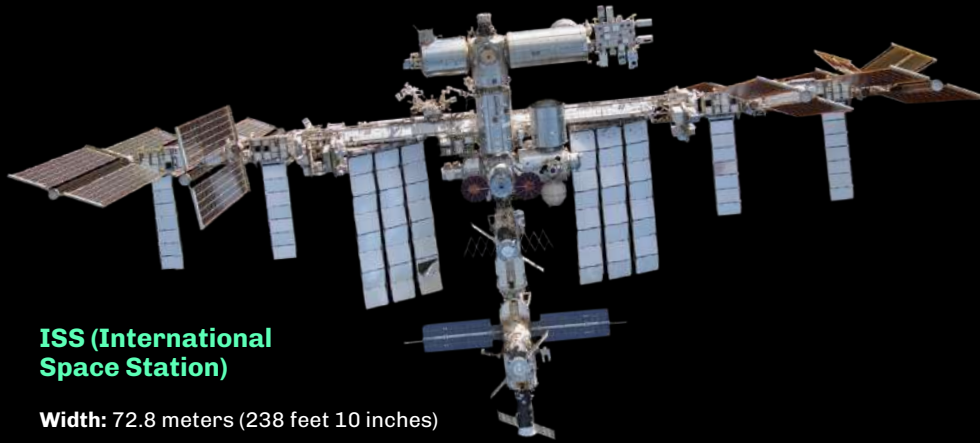
This includes satellites, probes, landers, crewed spacecrafts, and space station flight elements launched into Earth orbit or beyond.



## CURRENT TRACKING OF SATELLITES IN ORBIT



# STARSHIP HAS NEARLY THE SAME PAYLOAD VOLUME AS THE ISS: ~1,000 CUBIC METERS



## ISS (International Space Station)

**Width:** 72.8 meters (238 feet 10 inches)

**Length:** 108.5 meters (356 feet 9 inches)

**Pressurized Volume:** 916 cubic meters



## Starship

**Height:** 121 meters (397 feet)

**Diameter:** 9 meters (30 feet)






**Payload Volume:** 1,000 cubic meters

# STARSHIP FACTORY AT SCALE WILL PRODUCE ABOUT THE SAME AS BOEING 737 PRODUCTION (~1/DAY)



# ELON ALGORITHM AT WORK ON RAPTOR ENGINE REDEVELOPMENT

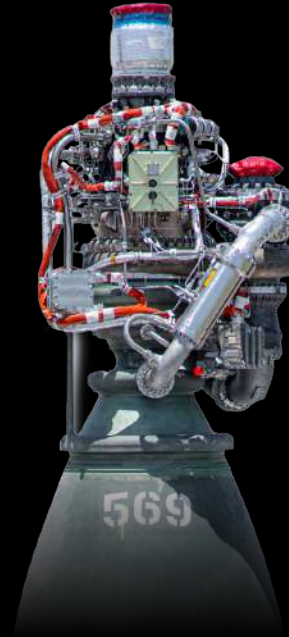
## MUSK'S STEP DESIGN PROCESS

- 1  Make the Requirements Less Dumb
- 2  Delete the Part or Process
- 3  Simplify or Optimise the Design
- 4  Accelerate Cycle Time
- 5  Automate

RAPTOR 1



RAPTOR 2



RAPTOR 3



# THE UNEXPECTED TECHNOLOGIES DEVELOPED FOR FIRST SPACE RACE THAT WE USE IN OUR DAILY LIVES. WHAT WILL COME NEXT?



**MEMORY FOAM**



**SCRATCH-RESISTANT LENSES**



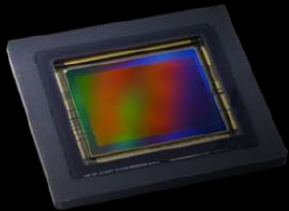
**WATER FILTRATION SYSTEMS**



**FREEZE-DRIED FOOD**



**CORDLESS TOOLS  
(LIKE THE DUSTBUSTER)**



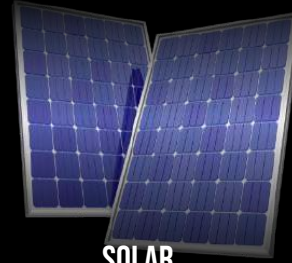
**CMOS IMAGE SENSORS**



**INFRARED EAR THERMOMETERS**



**WIRELESS HEADSETS**



**SOLAR CELLS**



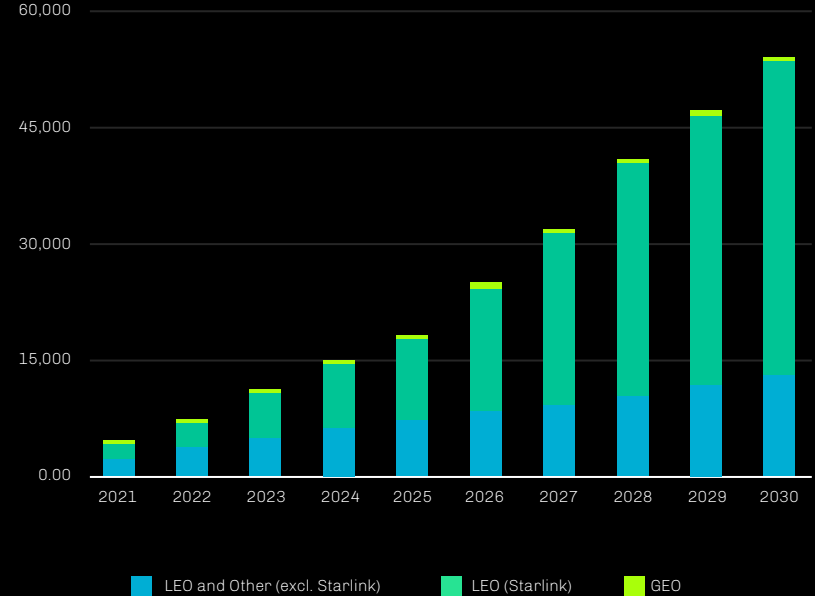
**GROOVED PAVEMENT**

# AS OF THE 1980S, MAJORITY OF COMMUNICATION SATELLITES WERE BUILT BY FORD → TODAY, IT'S TESLA/SPACEX



## Projected total number of satellites in orbit

Projected number of satellites in GEO and non-GEO orbits, 2021-2030. Increasing rate of launch will lead to increased congestion, especially in LEO.



GEO: Geostationary Satellites  
LEO: Low Earth Orbit

## STARLINK TO FUND MISSION TO MARS

“Starlink factory in Bastrop will be the largest printed circuit board manufacturing facility in the United States...

**1M customers - Dec 2022**  
**2M customers - Sept 2023**  
**4M customers - May 2024”**

—Gwynne Shotwell, President and COO, SpaceX

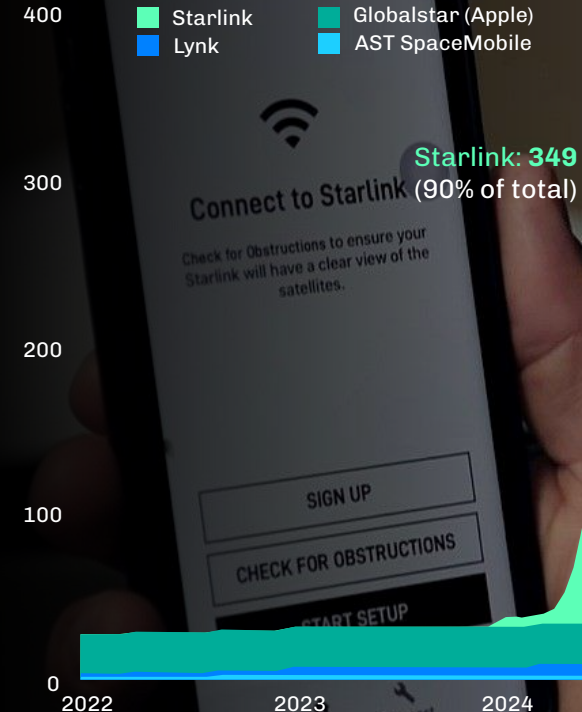


# STARLINK DIRECT TO CELL

Country	Company	Service Details
 USA	T-Mobile	Exclusive for the first year; SMS, voice, and data planned.
 Canada	Rogers	Aimed at 100% mobile network coverage.
 New Zealand	One NZ	Full mobile coverage; SMS in 2024, voice & data in 2025.
 Australia	Optus	Improving connectivity in remote areas.
 Japan	KDDI	Enhancing rural mobile connectivity.
 Switzerland	Salt	Extending mobile services.
 Chile & Peru	Entel	Improving mobile connectivity in South America.

## Starlink dominates satellite direct-to-device (D2D) launches

Global launches of D2D capable satellites, Starlink, AST SpaceMobile, Lynk, and Globalstar\*



\*Includes test satellites from Lynk Asd AST SpaceMobile.  
\*Not all GlobalStar satellites Included, only those used by Apple.



# NASA'S NEW BOSS JARED ISAACMAN

TWO TIME SPACEX  
ASTRONAUT



FIRST CIVILIAN TO  
PERFORM AN EVA



SELF-MADE BILLIONAIRE  
AND ENTREPRENEUR



HIGHLY  
EXPERIENCED PILOT



STARTED A  
DEFENSE COMPANY



RAISED \$250M  
FOR ST. JUDES

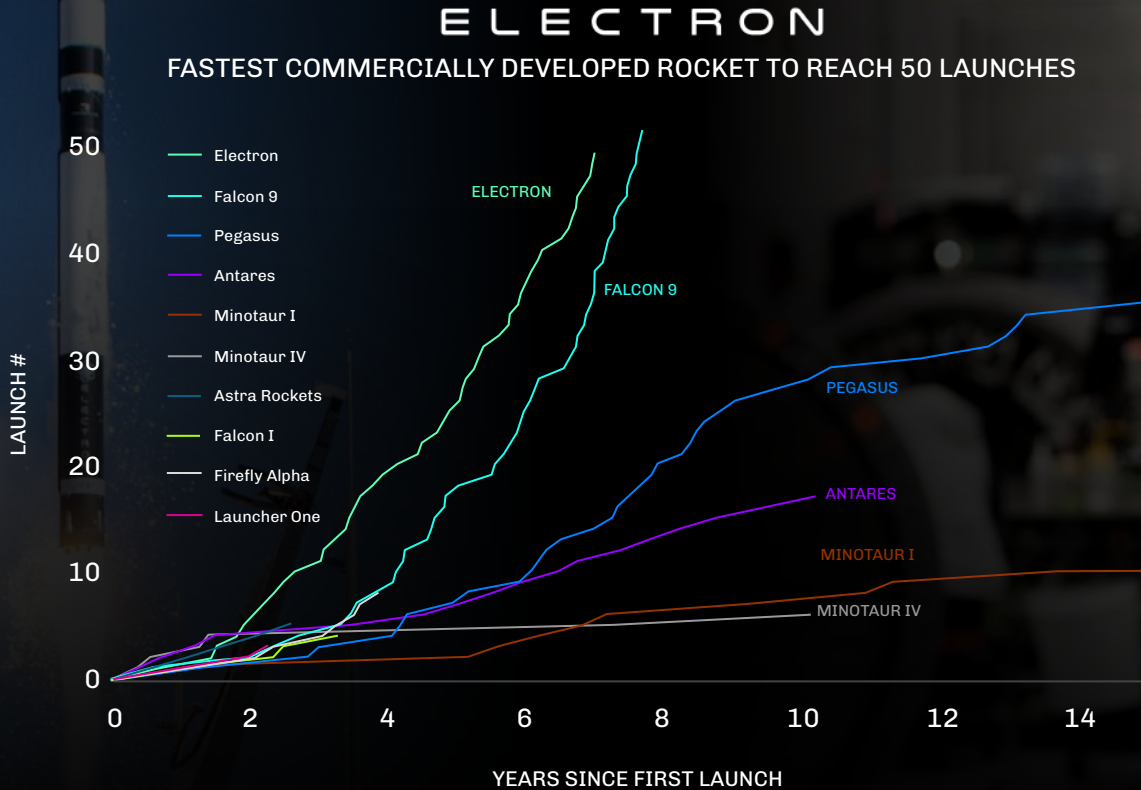


"We will never again lose our ability to journey to the stars and never settle for second place. We will inspire children, yours and mine, to look up and dream of what is possible."

—Jared Isaacman, entrepreneur and commercial astronaut



# DON'T SLEEP ON ROCKETLAB, FASTER ONRAMP THAN SPACEX TO 50 LAUNCHES

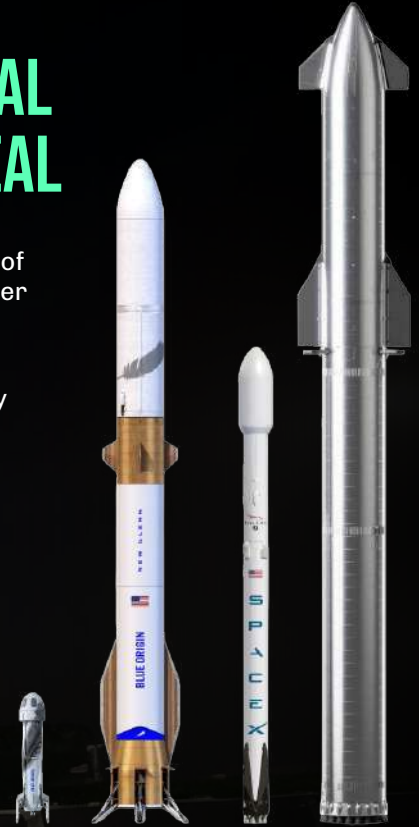


“When I'm having a bad day, I just go down and stroke the rocket.”  
—Peter Beck, CEO of Rocketlab

# BLUE ORIGIN: SUCCESSFUL ORBITAL LAUNCH IS A BIG DEAL

The successful first launch to orbit of Blue Origin New Glenn brings another major player into the segment

While second stage did successfully reach orbit, the first stage was not able to return



# WILL BOEING DIVEST SPACE AND FOCUS ON CORE AIRLINER BUSINESS?

NBC NEWS

## What went wrong with Boeing's spaceship

The Starliner capsule faced two issues: one with a set of thrusters and the other involving helium leaks in the vehicle's propulsion system.



"Clearly, our core of commercial airplanes and defense systems are going to stay with the Boeing company for the long run."

—Kelly Ortberg, Boeing CEO

# SPACE

- The Outer Space Treaty of 1967 restricts territorial claims and military use in space, coinciding with a historical decrease in NASA's budget. China and Russia's lunar ambitions challenge the treaty's contemporary relevance.
- China's space program is accelerating with 30 rocket launches in the first half of 2024, alongside companies mimicking SpaceX's advanced launch systems, and a record nine hour spacewalk.
- With 25 planned Starship launches for 2025, SpaceX is slashing launch costs from \$51,000/kg during the Space Shuttle era to potentially below \$100/kg, democratizing space access.
- Starship is likened to the Manhattan Project for space, poised to reduce costs, accelerate exploration, spawn new industries, and advance humanity towards multi-planetary existence.
- If scaled, Starship production could match that of the Boeing 737, at approximately one per day, ushering in an era of mass-produced, reusable space vehicles.
- By 2030, nearly a 4X increase in number of satellites in orbit expected, raising from 15,000 to 55,000 satellites.
- Starlink holds a 90% share in satellite direct-to-device connectivity, with 349 satellites launched in 2024, partnering with telecom giants like T-Mobile, Rogers, and Optus to extend mobile coverage globally.
- Blue Origin's New Glenn reaching orbit signifies a significant step forward in commercial spaceflight capabilities.

“I want to ensure that  
America, not China, leads  
this revolution in  
(advanced) air mobility.”

—President Donald J. Trump

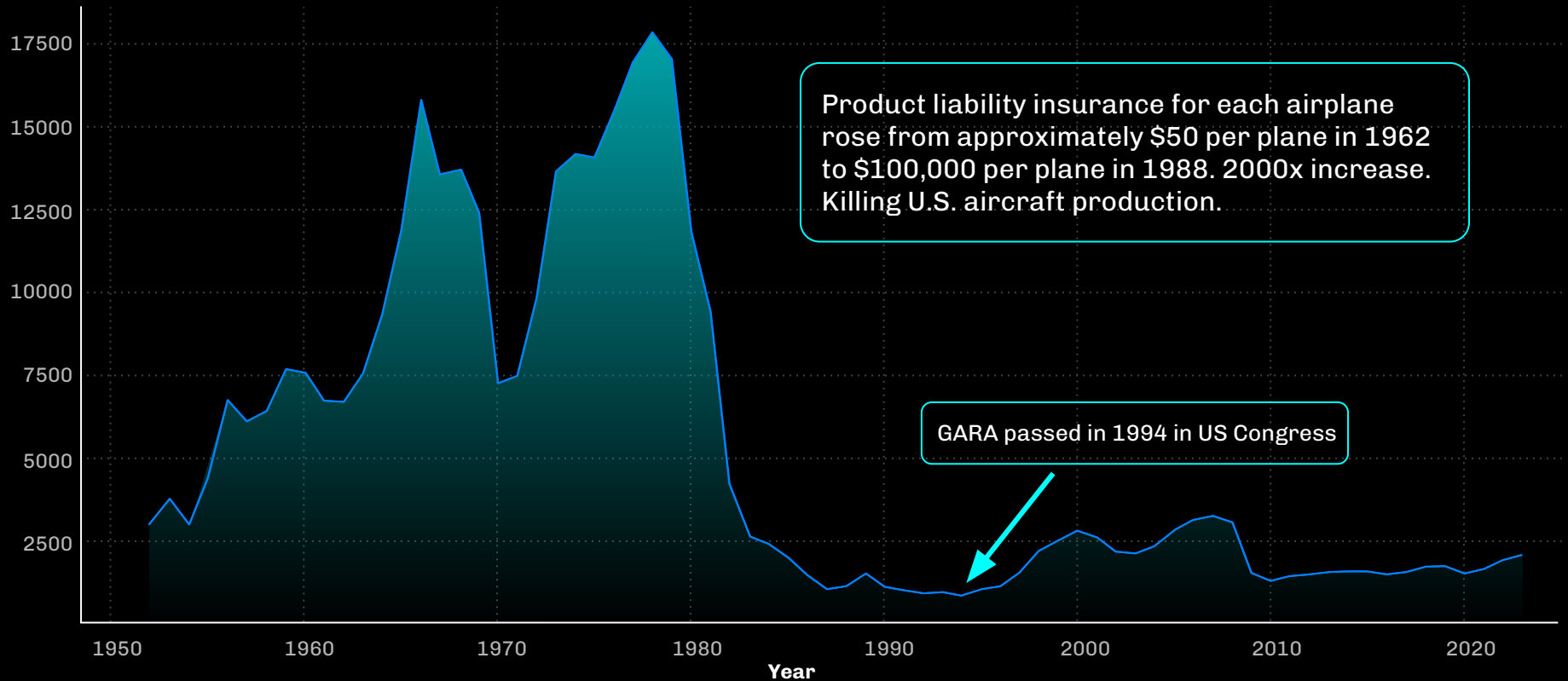


# FLYING THINGS



# A LITTLE HISTORY: GENERAL AVIATION AIRPLANE UNITS SHIPPED (1952-2023)

Units Shipped



Product liability insurance for each airplane rose from approximately \$50 per plane in 1962 to \$100,000 per plane in 1988. 2000x increase. Killing U.S. aircraft production.

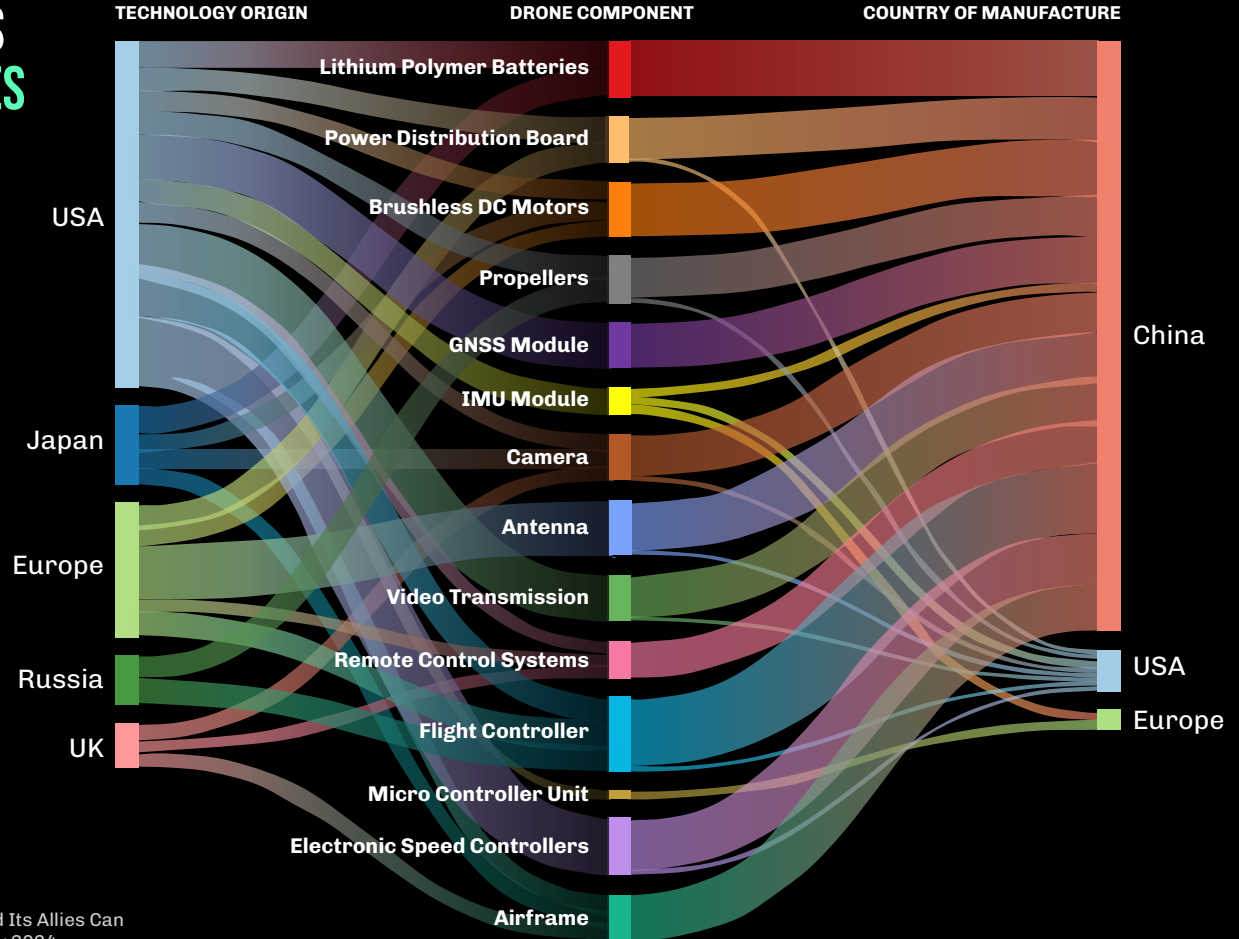
GARA passed in 1994 in US Congress

# HOW THE U.S. AND ITS ALLIES LOST THE BATTLE FOR DRONES

Most components of commonly used drones were invented in the U.S., Japan, and Europe but almost all are now made in China.

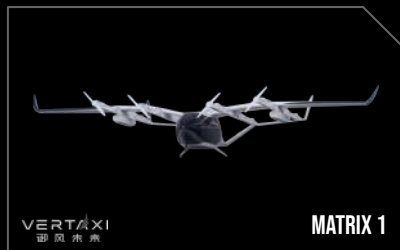
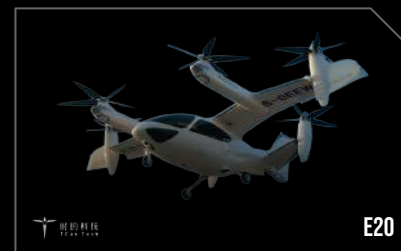
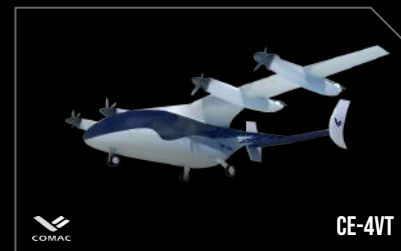
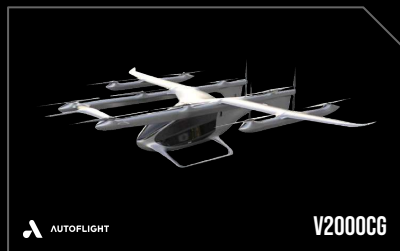
Here are the six reasons:

- 1 Manufacturing Scale and Cost Efficiency
- 2 Regulatory Environment
- 3 Market Access and Consumer Market
- 4 Global Export Dominance
- 5 Innovation and Intellectual Property



Source: Levine, Edlyn V., and Fiona Murray. "How the US and Its Allies Can Rebuild Economic Security." MIT Technology Review, 30 July 2024.

# FROM LITTLE DRONES TO BIG ONES, CHINA'S EVTOL LANDSCAPE HAS EXPLODED



# CHINA'S EVTOL CHAMPIONS



**AUTOFLIGHT**



- 1 Certified in China for unmanned cargo carrying
- 2 Long-range capability ~250 km demonstrated
- 3 Low bill of materials and labor cost to build
- 4 Very capable CEO and partners (CATL)



**eHANG | 亿航**

- 1 Certified in China for carrying paying passengers autonomously
- 2 Delivering to paying customers around the world
- 3 Learning with constrained low distance use cases
- 4 First U.S. listed eVTOL company: 2017

# CHINA PREPARING INFRASTRUCTURE FOR EVTOLS

URBAN AIR  
MOBILITY  
NEWS.COM


Shenzhen “announces plans for over 1,200 drone/eVTOL take off and landing platforms”

THIS IS REAL



CN Wire  
@Sino\_Market



 #CHINA's AIR TRAFFIC MANAGEMENT COMMISSION TO LAUNCH EVTOL PILOTS IN SIX CITIES

MKTNews.net

News Feed

Nov 18 14:32:49

Monday

CHINA'S AIR TRAFFIC MANAGEMENT COMMISSION TO LAUNCH EVTOL PILOTS IN SIX CITIES

Market News for Traders

Long press to recognize QR code



# CHINA'S CATL CLAIMS MAJOR BREAKTHROUGHS IN BATTERY TECH

Chinese battery giant CATL successfully flew a 4-ton plane using its ultra-high density "condensed batteries."

Collaborating with China's COMAC

Expects to have an 8-ton electric aircraft with a range of 2,000-3,000 km (1,240-1,865 miles) by 2028

Advertising 500 Wh/kg battery density

# AMERICA INNOVATES, CHINA REPLICATES – LITERALLY



# CHINA'S INNOVATION ISN'T LIMITED TO EVTOLS



## Specifications



PAYLOAD

**5** TONNES



MTOW

**10.8** TONNES



LENGTH

**22.9** M



WINGSPAN

**22.7** M



CARGO AREA

**65** M<sup>3</sup>



CRUISE SPEED

**526** KT



SERVICE CEILING

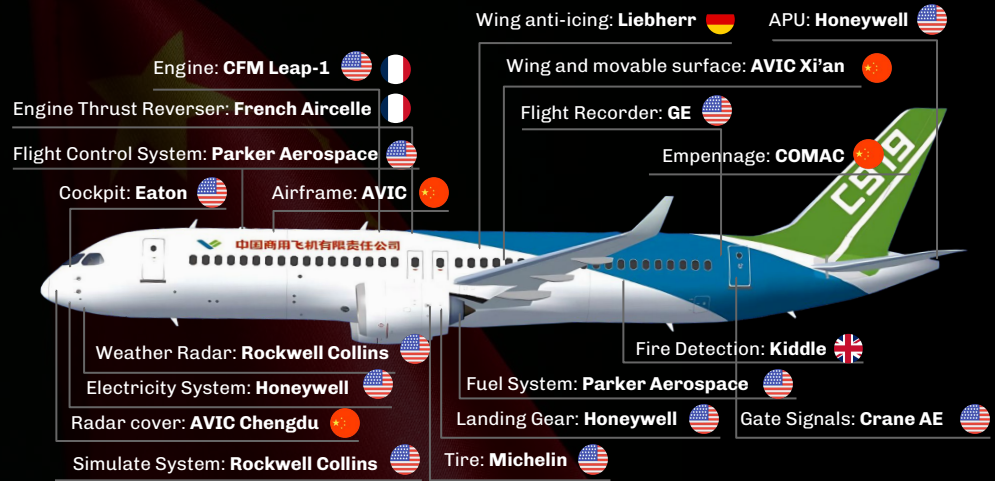
**6,000** M



RANGE

**2,600** KM

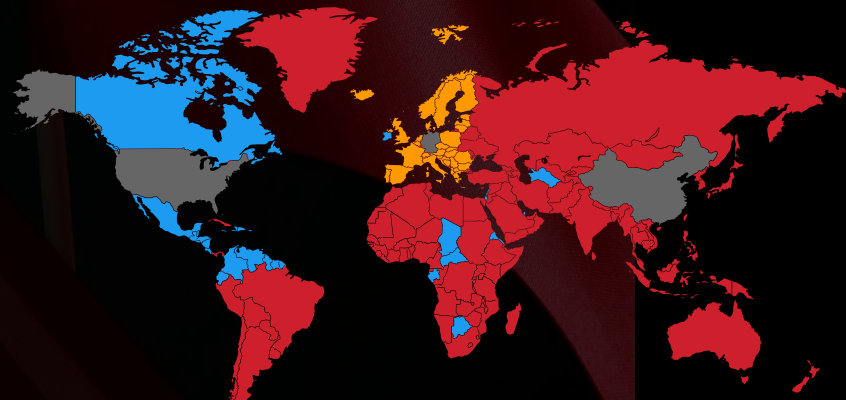
# CHINA'S COMAC DELIVERED 12 C919S IN 2024, 1000S ON ORDER — YET HEAVILY DEPENDENT ON U.S. SUPPLIERS



China leading trade in 128 of  
190 countries — lots of captive  
customers for their airliners


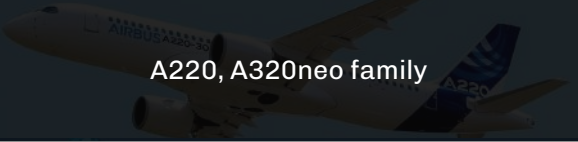



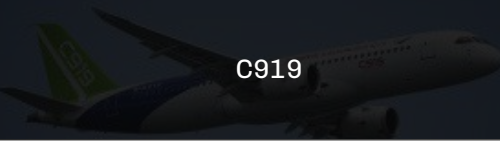
Imports More From:

- China
- Germany
- United States



Source: Lowy Institute, Rajah and Albayrak (2025) IMF Direction of Trade Statistics Database. UP.Partners research of publicly available information.

# CHINA'S COMAC IS COMING FOR BOEING AND AIRBUS

Manufacturer	Backlog Size	Primary Competing Product	Market Focus
	8,697 aircraft	 A220, A320neo family	Global
	6,268 aircraft	 737 MAX family	Global
	998 aircraft	 C919	Primarily China

# MEANWHILE, WE HAVE AN INNOVATION PROBLEM IN COMMERCIAL AVIATION

1903



Wright Flyer

1964




737-100

2024



737-MAX8



Patrick Collison  @patrickc

As of later this year (October 5, specifically), the commencement of the design of the Boeing 737 will be closer to the Wright brothers' Kitty Hawk flight than it will to the present day.

*Posted January 13, 2024*

# BLENDED WING BODY IS FIRST MAJOR AIRFRAME INNOVATION IN 70 YEARS; 50% REDUCTION IN FUEL BURN



In 2023 USAF Awarded U.S. startup JetZero \$250MM to develop BWB demonstrator for air-to-air refueling.


In 2024, company received commitments from Alaska Airlines and continues to be well received by both commercial and defense communities.




China is also exploring the possibility of creating a BWB

In 2023, NPU in partnership with COMAC, flew a 1/10th scale demonstrator BWB.

# US EVTOL CHAMPIONS



A white Joby Aviation aircraft with four large propellers is shown in flight against a clear blue sky. The aircraft has a sleek, modern design with a glass cockpit and a high-wing configuration.

 **Joby**



An Archer Aviation aircraft, a white electric vertical takeoff and landing (EVTOL) aircraft, is shown in flight against a clear blue sky. The aircraft has a high-wing configuration and four propellers. The registration number N302AX is visible on the side.

 **ARCHER**



A Beta Aviation aircraft, a white electric vertical takeoff and landing (EVTOL) aircraft, is shown in flight against a clear blue sky. The aircraft has a high-wing configuration and four propellers.

 **BETA**



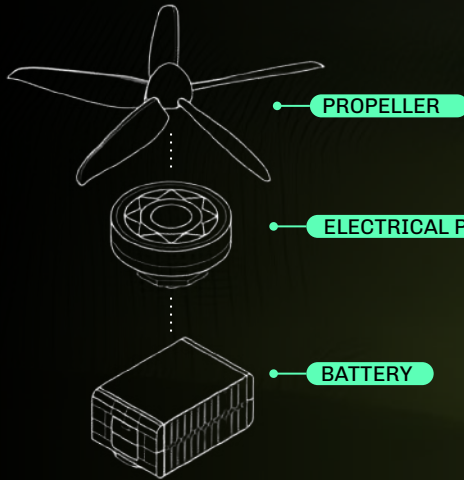
A Pivotal Aviation aircraft, a white electric vertical takeoff and landing (EVTOL) aircraft, is shown in flight against a clear blue sky. The aircraft has a high-wing configuration and four propellers. The word "PIVOTAL" is visible on the side.

**PIVOTAL**

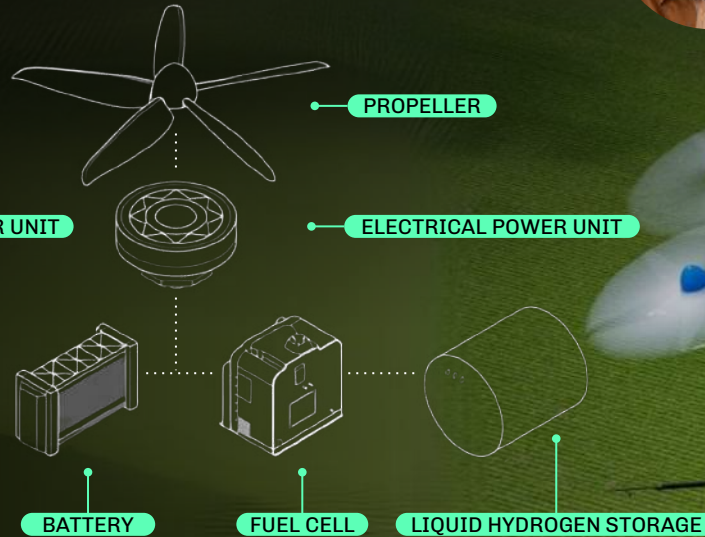
Source: UP.Partners research and analysis of publicly available information.

# JOBY COMPLETES LANDMARK 523 NM FLIGHT POWERED BY HYDROGEN

## Battery-Electric Power System



## Hydrogen-Electric Power System



“Imagine being able to fly from San Francisco to San Diego, Boston to Baltimore, or Nashville to New Orleans without the need to go to an airport and with no emissions except water.”

—JoeBen Bevirt, Founder and CEO of Joby Aviation



# BETA PIVOTS TO CONVENTIONAL VARIANT, WITH PATHWAY TO EVTOL

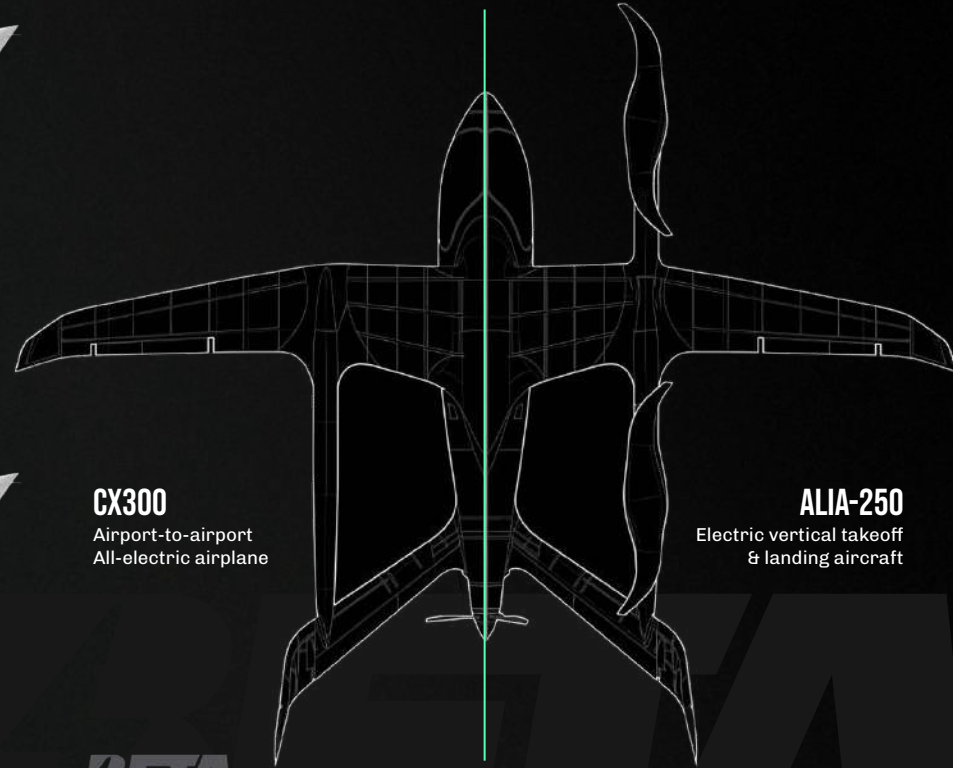
## ALIA CTOL

Conventional takeoff & landing all-electric aircraft



## ALIA VTOL

Vertical takeoff & landing all-electric aircraft



## CX300

Airport-to-airport  
All-electric airplane

## ALIA-250

Electric vertical takeoff  
& landing aircraft

**BETA**  
TECHNOLOGIES

# PIVOTAL/AKUTE STARTING EMS OPS IN 2025 IN OREGON

## Air medical rapid response

From take off to curb in <4 minutes

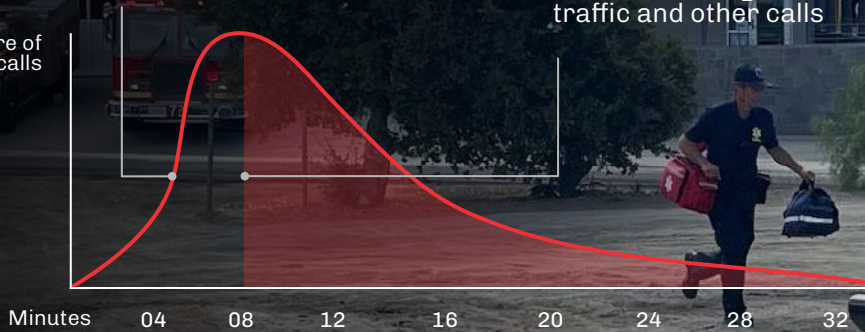
## 911 Response time is not reliable and almost never as fast as is needed to survive the most sensitive emergencies

Sudden cardiac arrest has a 10% survival rate in the U.S.

Full recovery is possible with CPR and EAD in <4 minutes

The 911 response time target is 6-8 minutes depending on location and often much longer, due to traffic and other calls

Share of 911 calls



# ARCHER PUSHES FURTHER INTO DEFENSE


Archer announces partnership  
with Anduril to create  
hybrid-electric military variant

Company raises \$300M in  
February 2025

Georgia manufacturing facility  
nearing completion




## ESTABLISHED OEMS CAUTIOUS BUT ACTIVE



A photograph of a white and blue Airbus eVTOL aircraft on a tarmac. A large, red, distressed-style stamp with the words "SHUT DOWN" in white capital letters is overlaid on the top left of the image.

**AIRBUS**

 Paused plans to bring its **CityAirbus** eVTOL to market



A photograph of a yellow Boeing Wisk Aero eVTOL aircraft on a tarmac under a blue sky with clouds.

 **BOEING**

 **Wisk Aero** developing an autonomous, all-electric eVTOL

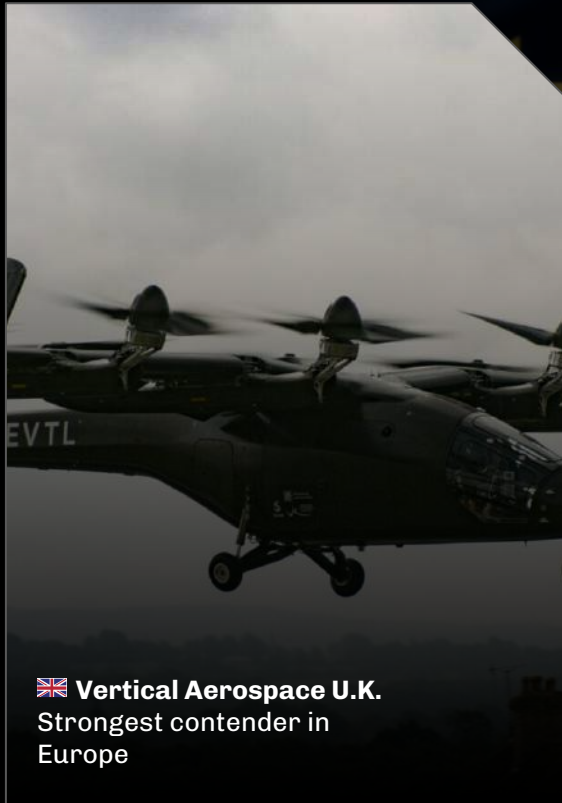



A photograph of a green and white Embraer EVE Air Mobility eVTOL aircraft in flight against a blue sky with clouds.

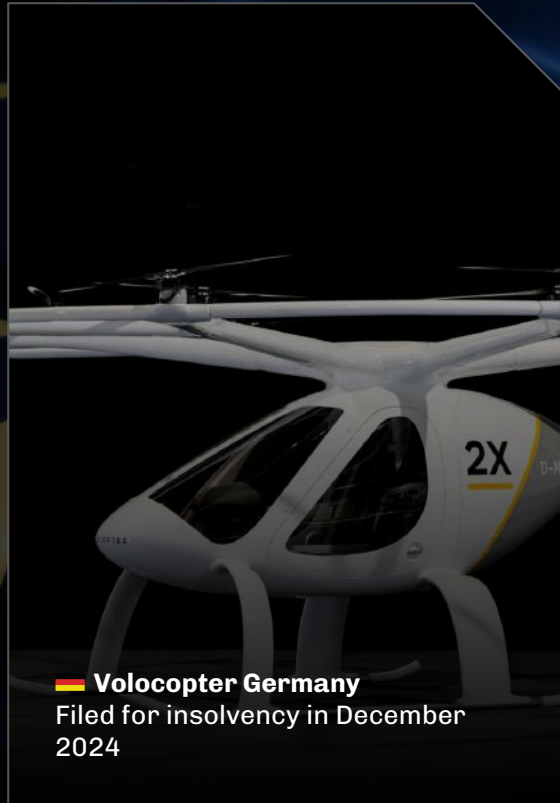
 **EMBRAER**


 **EVE Air Mobility** developing and commercializing its eVTOL aircraft

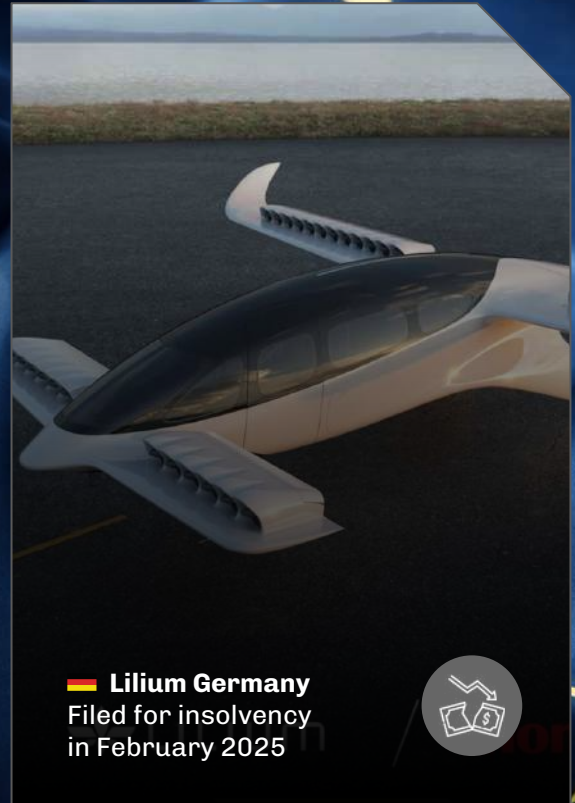
# EUROPEAN EVTOL PLAYERS STRUGGLE TO TAKEOFF




 **Vertical Aerospace U.K.**  
Strongest contender in Europe



 **Volocopter Germany**  
Filed for insolvency in December 2024



 **Lilium Germany**  
Filed for insolvency in February 2025



# HYDROGEN AIRLINERS: 1 DOWN, 1 LEFT — ZEROAVIA



**ZEROAVIA**  
ZERO EMISSION AVIATION



American Airlines in 100  
hydrogen-electric engines  
deal with startup ZeroAvia

Source: By Reuters July 2, 2024



U.S. start-up Universal  
Hydrogen runs out of cash  
and folds

Source: By FlightGlobal June 30, 2024



# BOOM COMPLETES FIRST SUPERSONIC FLIGHT OF CIVILIAN BUILT AIRCRAFT SINCE CONCORDE



# XB-1



# OVERTURE

XB-1 demonstrator completes first civilian supersonic flight

Vehicle to be retired, and focus to shift to production/airliner variant

Company raises an additional \$100M

Billions will be needed to see commercial variant brought to market




**BOOM + UNITED**



# U.S. DRONE DELIVERY DOMINATED BY WING & ZIPLINE

## Wing<sup>1</sup>



 **DOORDASH**

Wing launches with Doordash,  
following major Walmart success

## Zipline



Zipline launches Platform 2, following  
major medical delivery success

## FLYING THINGS

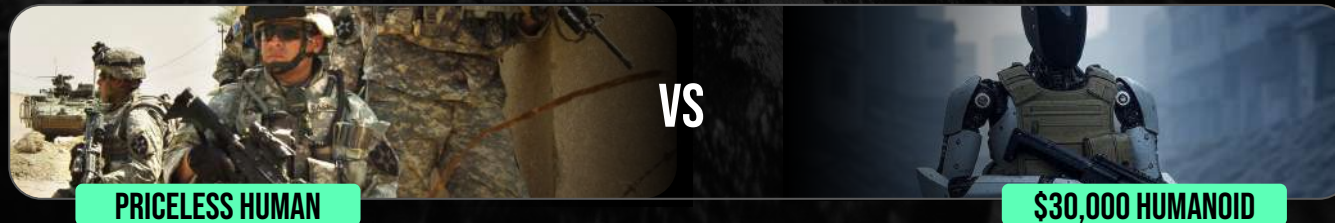
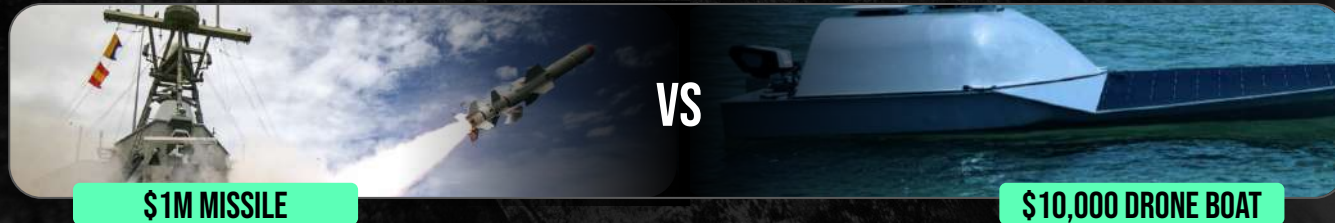
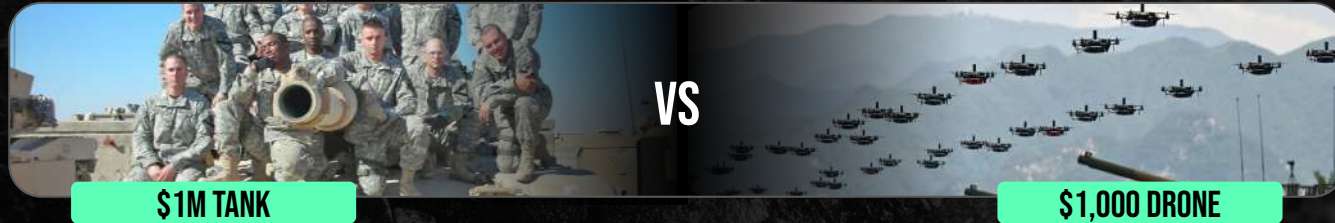
- U.S. general aviation production peaked at 17,500 units in the 1970s but plummeted due in part to a 2000x increase in product liability insurance costs from \$50 in 1962 to \$100,000 per airplane in 1988.
- Despite the U.S., Japan, and Europe inventing most modern drone components, nearly all production has shifted to China due to cost efficiency, regulatory constraints, market dominance, and export control advantages.
- China's eVTOL sector is surging, with a rapidly expanding ecosystem of manufacturers and long-range, cost-efficient designs positioning it as a global leader in urban air mobility.
- With 1,200+ planned landing sites and regulatory backing, China is fast-tracking eVTOL adoption, turning urban air mobility into reality.
- China's CATL is pushing the boundaries of electric aviation, successfully flying a 4-ton plane on high-density “condensed batteries” and targeting an 8-ton aircraft with 1,865-mile range by 2028.
- China leads trade in 128 of 190 countries, creating a captive market for its COMAC C919 airliner — despite heavy reliance on U.S. suppliers.
- Blended Wing Body (BWB) slashes fuel burn by 50% — JetZero advances in the U.S., while COMAC develops its own in China.
- U.S. eVTOL leaders — Joby, Archer, Beta, and Pivotal — are pushing electric air mobility forward with FAA-certified aircraft, commercial & defense partnerships, and operational testing.
- eVTOL Market Shakeout: Established aerospace giants tread cautiously — Airbus halts its program, while Boeing and Embraer continue development — while European startups struggle, with Lilium declared insolvent and Volocopter facing financial distress, opening the door for potential Chinese acquisitions.
- Hydrogen Aviation Narrows: Universal Hydrogen collapses due to financial struggles, leaving ZeroAvia as the last major U.S. player.
- Supersonic Revival: Boom's XB-1 completes the first civilian supersonic test flight since Concorde.
- Drone Delivery Expands: Wing partners with DoorDash after Walmart success, while Zipline advances logistics with Platform 2, building on its medical delivery expertise.

A futuristic military control room with a fighter jet model and data screens. The scene is dimly lit with blue light. In the center, a fighter jet is displayed on a platform. Behind it, a large screen shows a wireframe model of the jet and various data panels. Two people are visible in the foreground, looking at the screens. The overall atmosphere is high-tech and professional.

# DEFENSE

# ARSENAL OF THE FUTURE IS ATTRITABLE, LOW COST, AND AUTONOMOUS

THE NEW ECONOMICS OF WAR

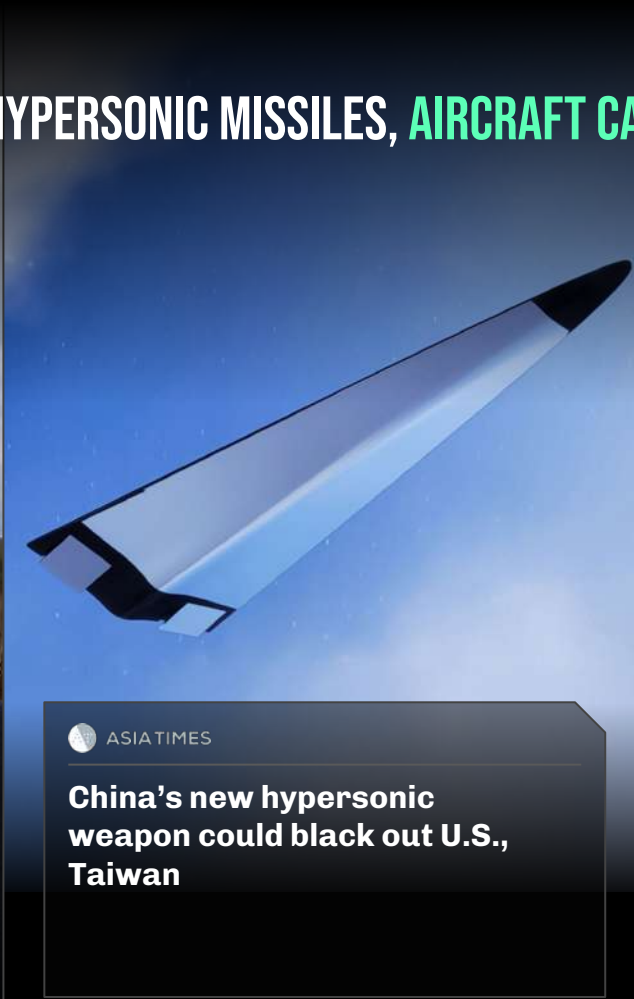


# WITH THE RAPID GROWTH OF HYPERSONIC MISSILES, AIRCRAFT CARRIERS DON'T WORK



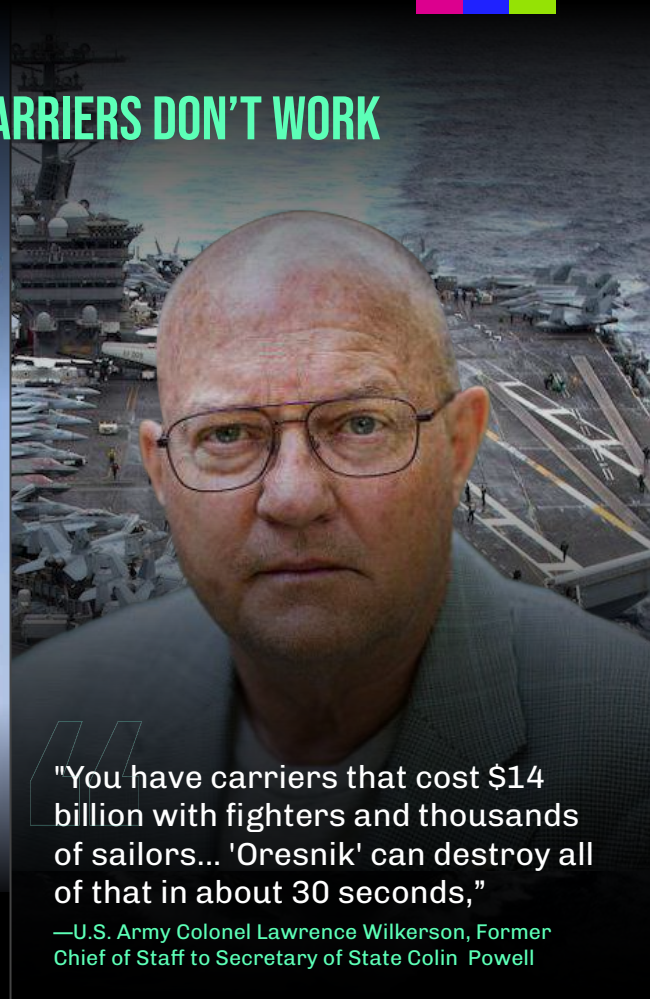
## POLITICO

**Russia to mass-produce new hypersonic ballistic missiles, Putin says**



## ASIATIMES

**China's new hypersonic weapon could black out U.S., Taiwan**



**"You have carriers that cost \$14 billion with fighters and thousands of sailors... 'Oresnik' can destroy all of that in about 30 seconds,"**

**—U.S. Army Colonel Lawrence Wilkerson, Former Chief of Staff to Secretary of State Colin Powell**

# THE TROLLING BY CHINA IS NEXT LEVEL — F-35 VS. J-35

 **F-35C**



Dimensions | Length: 51.4ft | Wingspan: 43ft  
Height:


 P&W F135 Engines	 28,000 lbs (dry) Power	 43,000 lbs (afterburner) Power	 March 1.6 Top Speed	 65K + lbs Max Wt
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 **C-17 Globemaster III**  
Unit Cost - \$340 million








Dimensions | Length: 53m | Wingspan: 51.8m  
Height: 19.79m | Wing area: 350m<sup>2</sup>


 830 km/h Maximum Speed	 265,352 kg Max Takeoff Weight	 128,140 kg Empty Weight	 11,540 km Travel Range	 45,000 ft Service Ceiling
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 **J-35**





Dimensions | Length: 56.75ft | Wingspan: 37.75ft  
Height:

 WS-13E (x2) Engines	 25,520 lbs (dry) Power	 42,000 lbs (afterburner) Power	 March 1.6 Top Speed	 61K + lbs Max Wt
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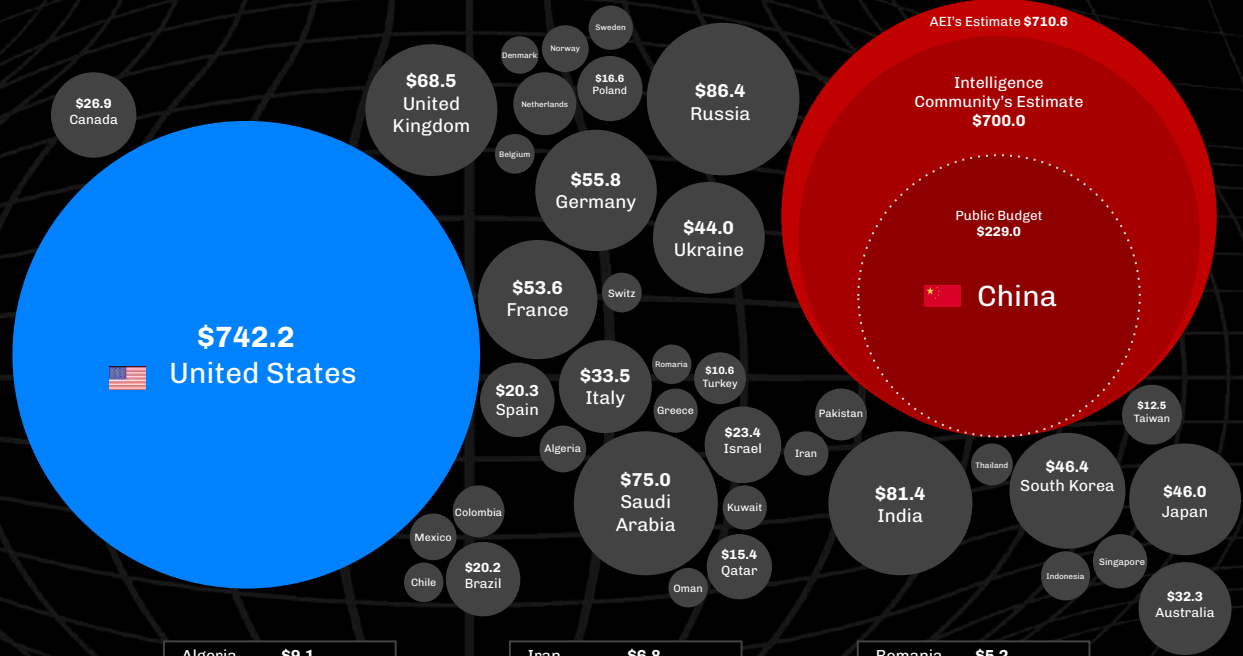
 **Xi'an Y-20**  
Unit Cost - \$100-200 million



Dimensions | Length: 47m | Wingspan: 50m  
Height: 15m

 926 km/h Maximum Speed	 220,000 kg Max Takeoff Weight	 100,000 kg Empty Weight	 10,000 km Travel Range	 43,000 ft Service Ceiling
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# CHINA AND U.S. DEFENSE SPEND LIKELY AT PARITY



Algeria	\$9.1
Belgium	\$6.9
Chile	\$5.6
Colombia	\$9.9
Denmark	\$5.5
Greece	\$8.1
Indonesia	\$9.0

Iran	\$6.8
Kuwait	\$8.2
Mexico	\$8.5
Netherlands	\$15.6
Norway	\$8.4
Oman	\$5.8
Pakistan	\$10.3

Romania	\$5.2
Singapore	\$11.7
Sweden	\$7.7
Switzerland	\$6.1
Thailand	\$5.7

Note: All dollar amounts are in billions.

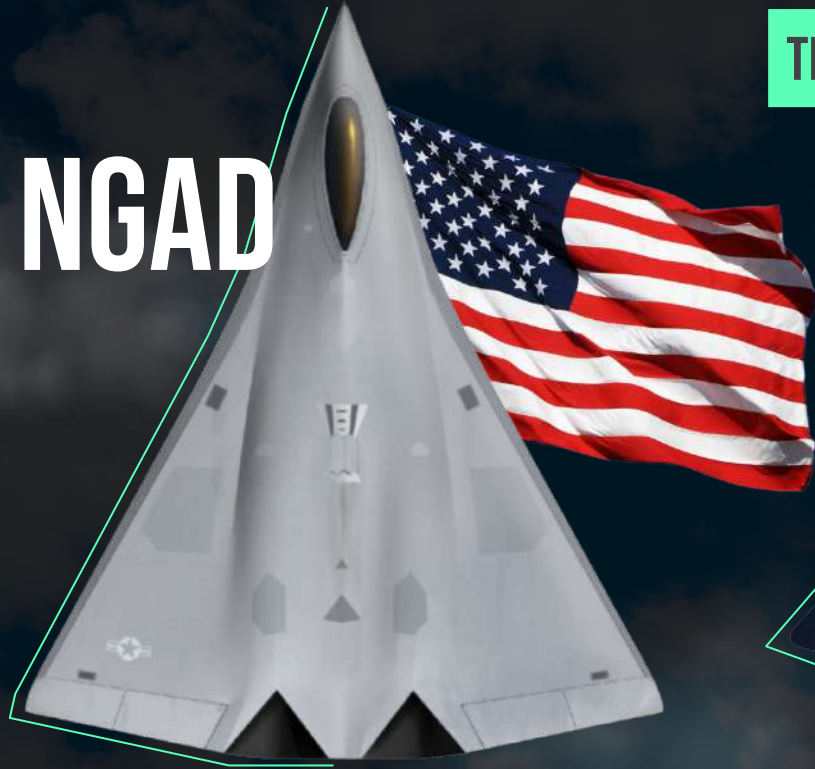
Source: : AEI.org April 2024 Report. Data on budgets are from Nan Tian et al., "Trends in World Military Expenditure, 2022," Stockholm International Peace Research Institute, April 2023, [https://www.sipri.org/sites/default/files/2023-04/2304\\_fs\\_milex\\_2022.pdf](https://www.sipri.org/sites/default/files/2023-04/2304_fs_milex_2022.pdf); US Department of Defense, Office of the Under Secretary of Defense (Comptroller), National Defense Budget Estimates for FY 2024, May 2023, 29, [https://comptroller.defense.gov/portals/45/documents/defbudget/fy2024/fy24\\_green\\_book.pdf](https://comptroller.defense.gov/portals/45/documents/defbudget/fy2024/fy24_green_book.pdf); and 169 Cong. Rec. S1865 (daily ed. June 1, 2023) (statement of Sen. Sullivan).

WHILE U.S. PLANS NEXT GEN FIGHTER, CHINA FLIES THEIRS

NGAD

THIS IS REAL

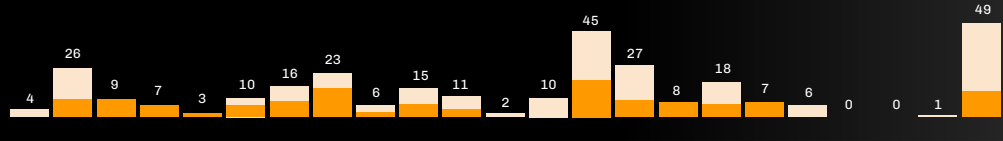
J-36



# XI JIPING HAS SAID CHINA WILL TAKE TAIWAN BY 2027

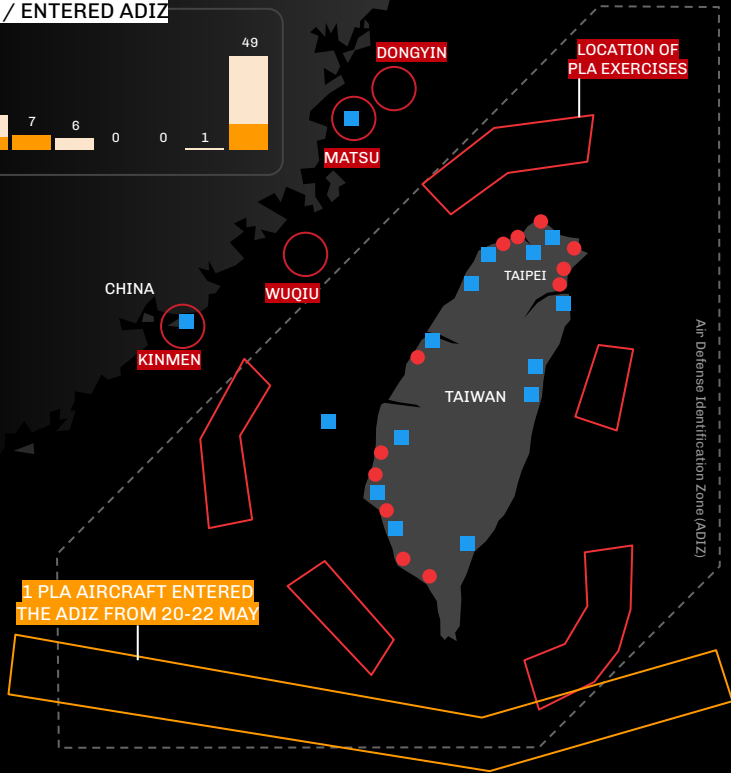
## EXERCISE JOINT SWORD-2024A

PLA AIR ACTIVITY AROUND TAIWAN IN MAY 2024 (AIRCRAFT DETECTED / ENTERED ADIZ)



## China Launches Military Exercises Surrounding Taiwan

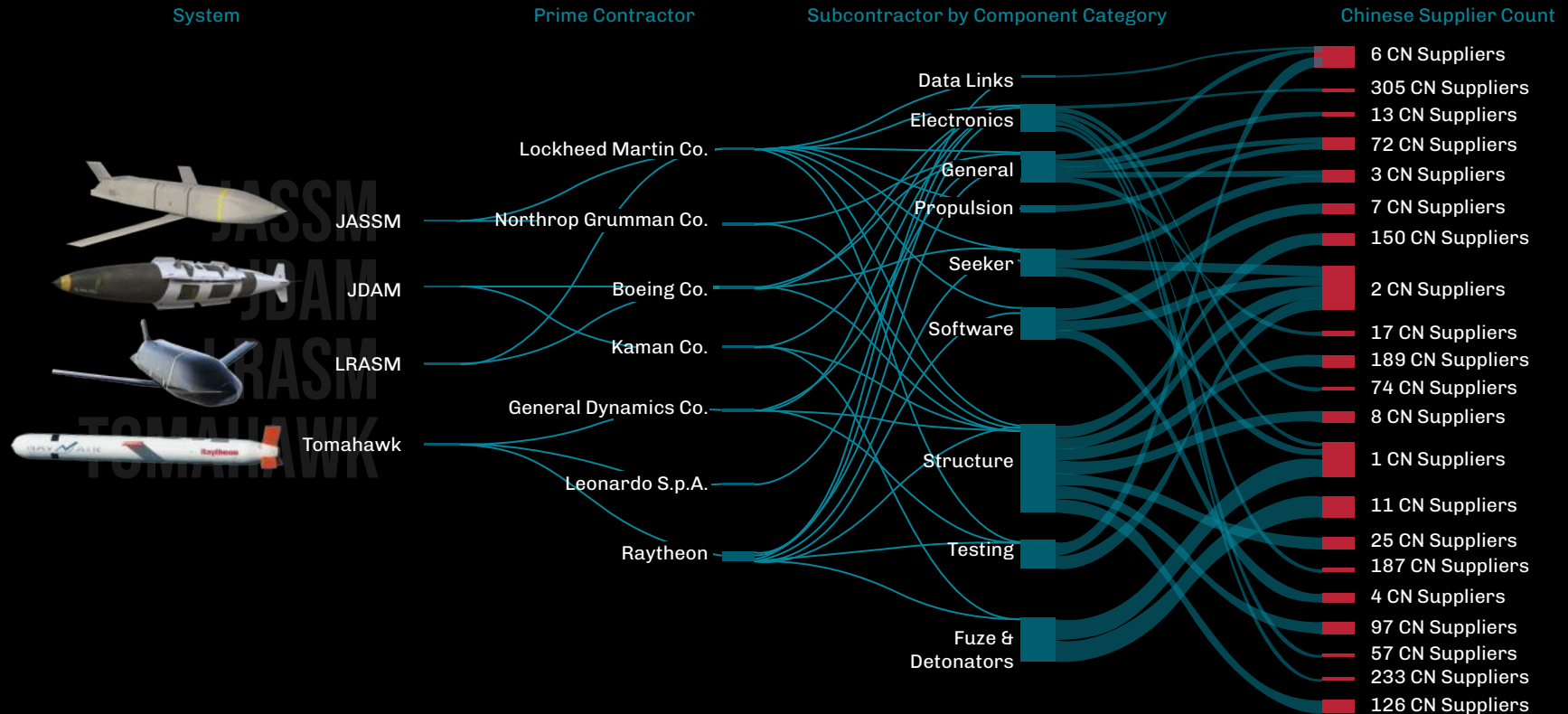
According to U.S. intelligence, Xi Jinping has told his military to "be ready by 2027" to invade Taiwan (CIA Director William Burns, Feb. 2, 2023)



- ▭ Joint Sword exercise Zones
- ▭ Air Defense Zone Violations
- Red (invasion) Beaches
- Taiwan Air & Naval Bases

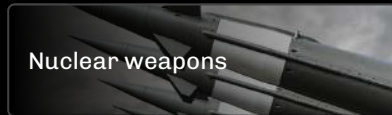
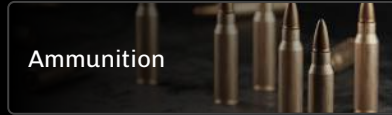
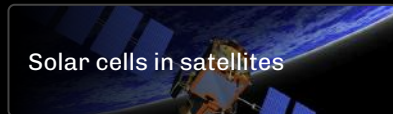
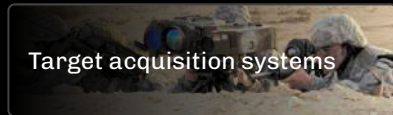
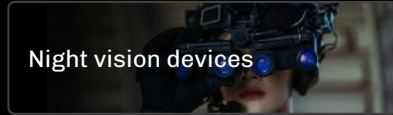
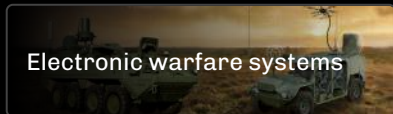
Source: Created by @ianellisjones X IEJ Media / 23 May 2024. Taiwan MND, Chinese media, OSINT / Locations approximate, change daily & not to scale / For illustrative purposes only / \*Active now or in 2024.

# CHINESE SUPPLIERS IN U.S. AIR-LAUNCHED ARMAMENT SUPPLY CHAINS, 2023



Source: UP.Partners research of publicly available information.

# CHINA HAS ALREADY STARTED **BANNING CRITICAL COMPONENTS** FOR EXPORT



China sanctions U.S. drone leader Skydio for sending drones to Taiwan; bans the sale of critical components to the company

# CHINA'S RARE EARTH DOMINANCE AND U.S. DEFENSE RELIANCE

## Breakdown of Rare Earth Material: U.S. Defense Systems

F-35



920 lbs

ARLEIGH BURKE DDG-51

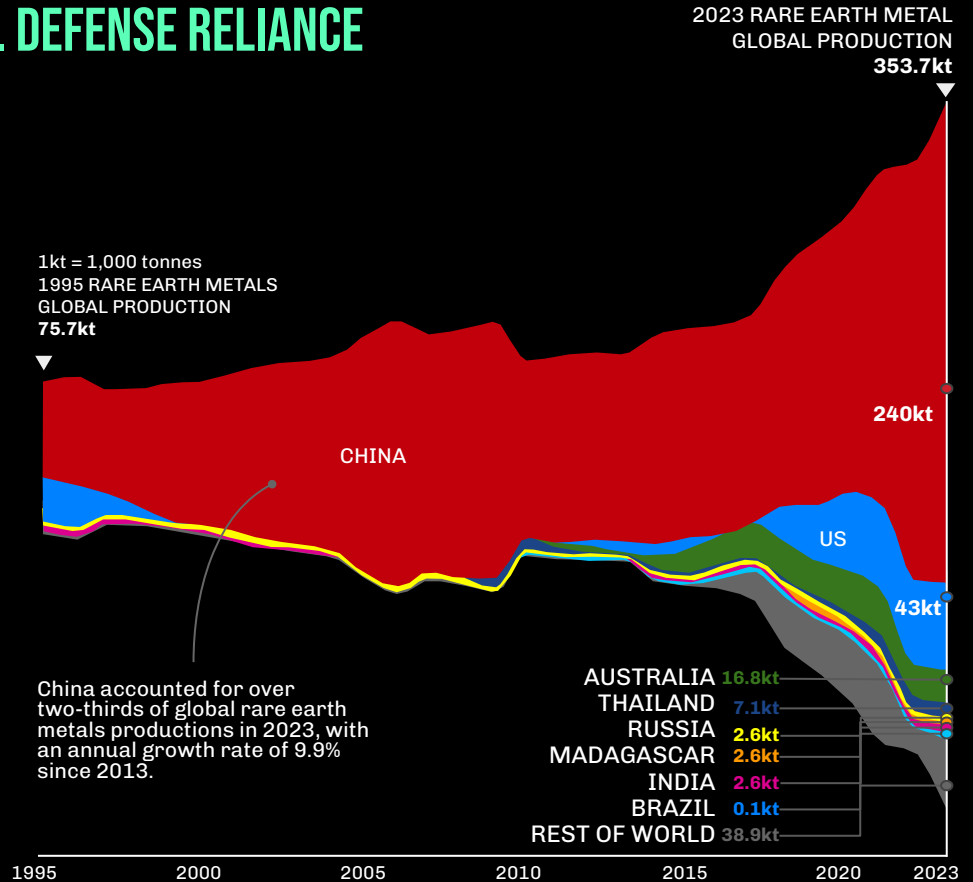


5,200 lbs

SSN-774 VIRGINIA-CLASS SUBMARINE



9,200 lbs



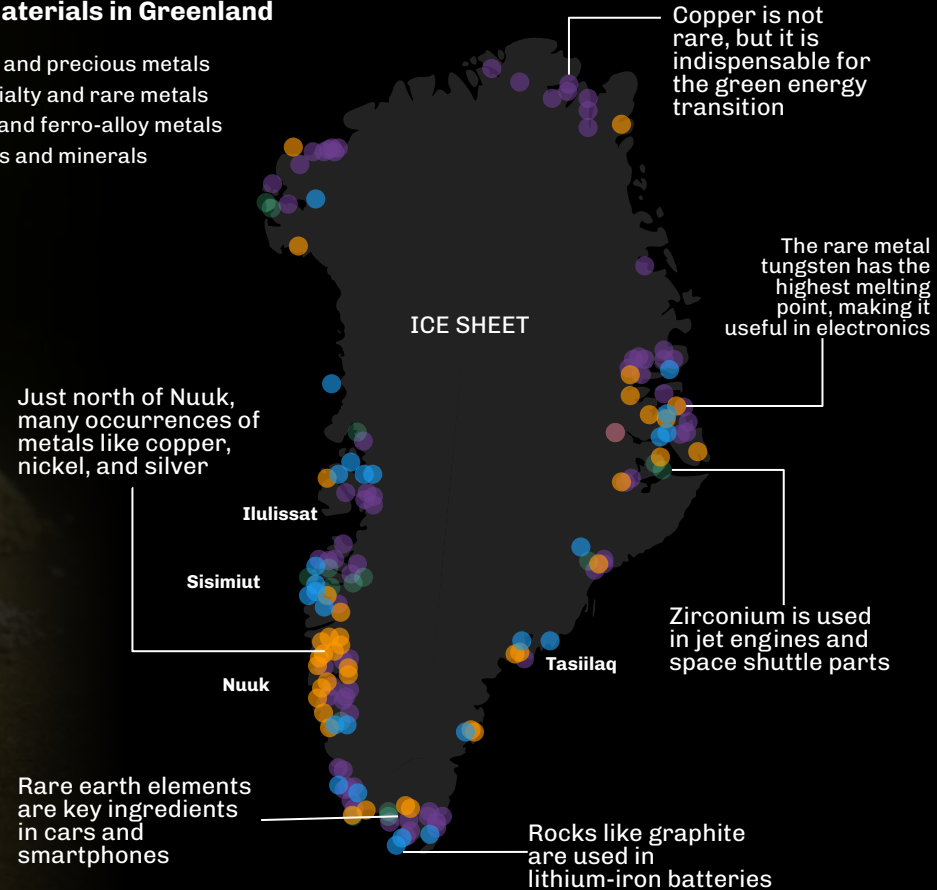
# THIS IS WHY GREENLAND IS SO IMPORTANT TO THE USA

Greenland has a lot of critical minerals



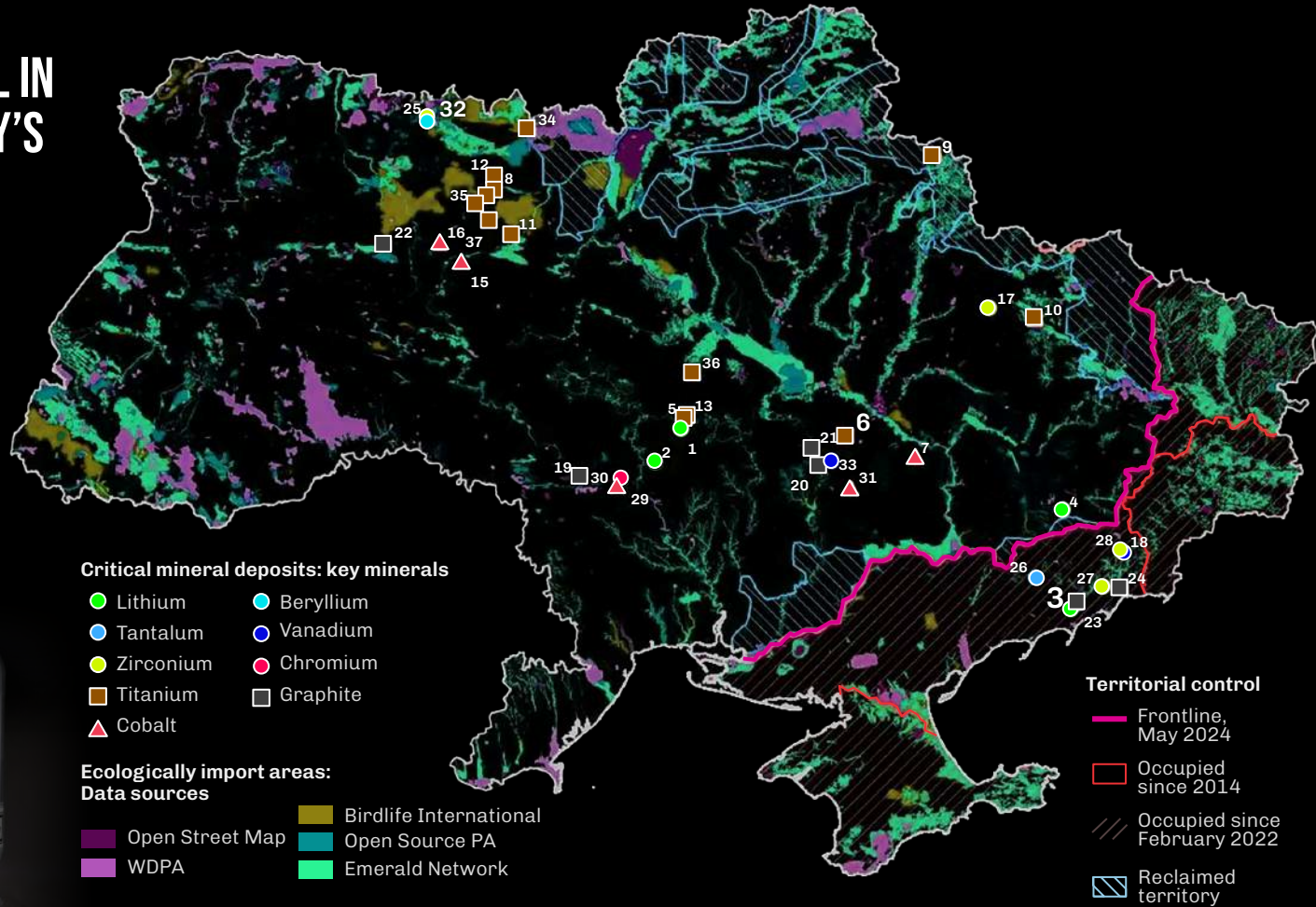
## Known deposits of critical raw materials in Greenland

- Base and precious metals
- Specialty and rare metals
- Iron and ferro-alloy metals
- Rocks and minerals
- Coal



# WITH A UKRAINE DEAL IN WORKS, THE COUNTRY'S CRITICAL MATERIALS BECOME EVEN MORE RELEVANT

Studied critical mineral deposits in Ukraine



Source: Data and map prepared by the Conflict and Environment Observatory (CEOBS), drawing on the following sources: Mineral deposit data: Ukraine Geological Survey, Mykhailov et al., 2022 | Ecologically important areas: Various sources, compiled by CEOBS | Territorial control data: CEOBS, Project Owl

# THE PRIMES ARE IN FOR A MASSIVE DISRUPTION BY THE NEWCOMERS

Top Six Traditional Prime Contractors (By Contract Value & Revenue)

2024 Market Cap: \$587.7B

Value: \$116B	\$122B	\$70.7B	\$157B	\$76B	\$46B
Founded: 1916	1912	1939	1922	1952	1895

Next-Gen Aerospace & Defense Leaders

\$210B 2002	\$30B 2000	\$1.6B 2015	\$4.2B 2015	\$5.3B 2021	\$1B 2016
\$14B 2017	\$130B 2003	\$2.8B 2015	\$6B 2017	\$6.1B 2006	\$1.3B 2013

Defense & Public Safety

Propulsion Systems

In-Orbit Services & Space Manufacturing

Launch Vehicles

Satellites

Space Power

Space Exploration & Robotics

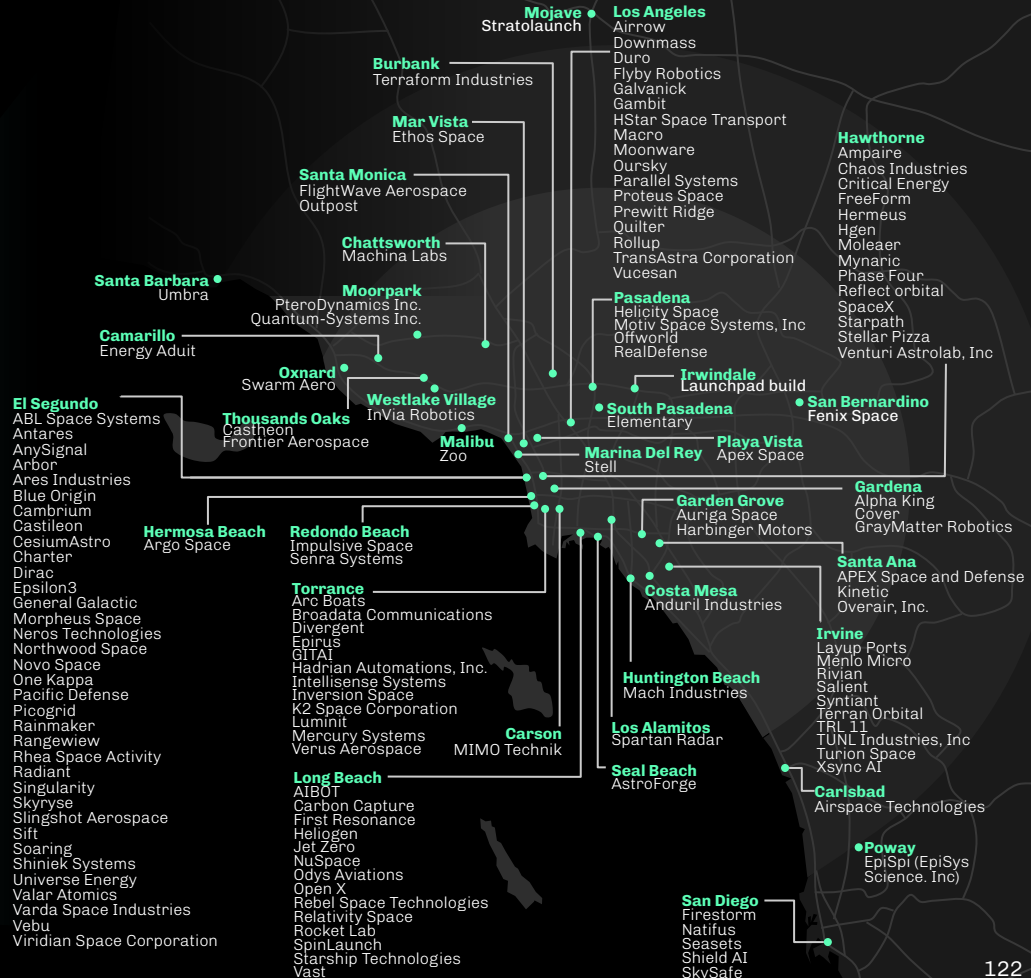
In-Space Transport

Software

Re-Entry Services

Private Sector Space Stations

# SOUTHERN CALIFORNIA HAS BECOME THE HEART OF DEFENSE TECH



Source: SoCal Hard Tech Landscape by CREA (@CREAreal\_estate).








# PALANTIR: MOST VALUABLE DEFENSE CONTRACTOR WITH 2% THE EMPLOYEES OF RTX — **JUST WOW.**

"The actual large language model is essentially a commodity that you can value and use depending on costs and veracity. We learned [...] that what makes AI valuable is the ability to manage algorithms or large language models."

Alex Karp,  
CEO, Palantir



## Defense companies by market cap

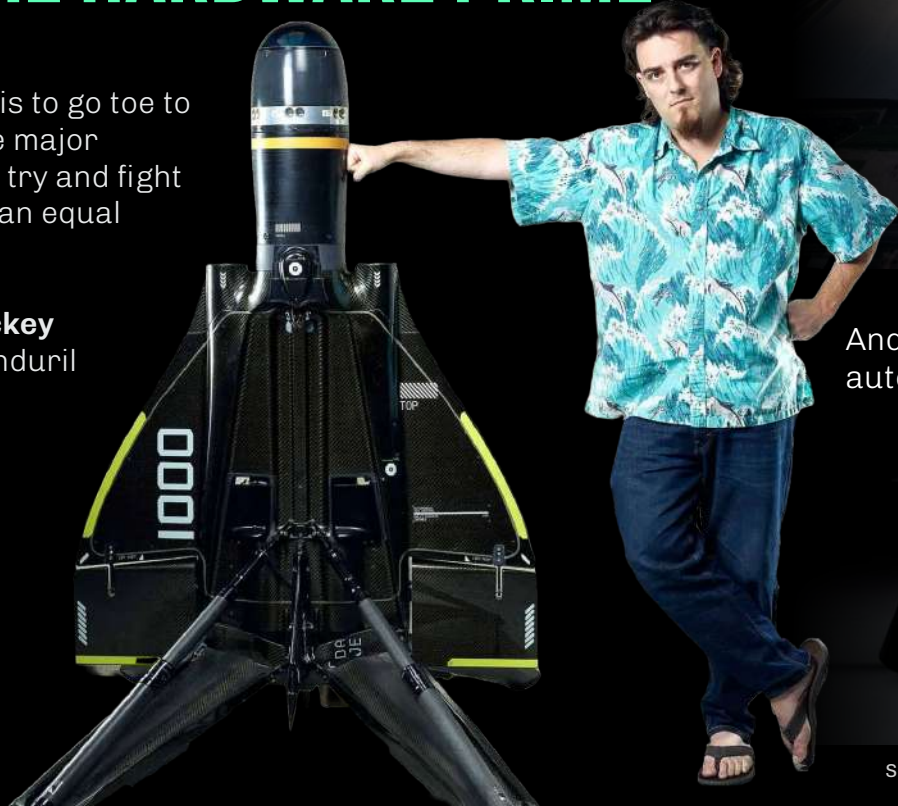
COMPANY	MARKET CAP	EMPLOYEES	FOUNDED
 Palantir	\$173,827,400,000	3,892	2003
 RTX	\$157,046,600,000	185,000	1934
 LOCKHEED MARTIN	\$121,606,200,000	122,000	1912
 BOEING	\$115,012,000,000	171,000	1934
GENERAL DYNAMICS	\$74,736,470,000	111,600	1952
 NORTHROP GRUMMAN	\$69,008,600,000	101,000	1939
 L3HARRIS	\$44,503,790,000	50,000	1926
 Huntington Ingalls Industries	\$7,354,361,000	44,000	1886

Source: Data as of December 2024 from public sources.

# ANDURIL WORKING HARD TO BE THE HARDWARE PRIME

"The intent is to go toe to toe with the major primes and try and fight our way to an equal footing."

**Palmer Luckey**  
Founder, Anduril



Anduril Arsenal-1  
factory in Ohio



Anduril, CCA  
autonomous fighter



# MULTIPLE VIABLE ATTEMPTS AT NOVEL AND DIFFERENT APPROACHES TO HYPERSONIC PROPULSION IN WORK



**HERMEUS** 

Turbine-Based Combined Cycle (TBCC), combine a turbojet and ramjet into one engine



  
**VENUS**  
AEROSPACE

Rotating Detonation Rocket Engine (RDRE) design



  
ASTRO  
MECHANICA

Three mode turbo adaptive engine, combining an electrically driven compressor for turbojet and ramjet operations



# DEFENSE

- The Economics of War Are Shifting: Low-cost, autonomous systems — \$1K drones, \$10K drone boats, and \$30K humanoids — are redefining military strategy, challenging traditional million-dollar assets.
- Hypersonic Missiles Render Aircraft Carriers Obsolete: Russia ramps up production, China's weapons threaten U.S. defenses, and experts warn carriers could be destroyed in seconds.
- China continues mirroring U.S. tech, unveiling the J-35 and J-36 — strikingly similar to America's F-35 and NGAD — while also fielding a lower-cost C-17 lookalike (Y-20).
- U.S. air-launched weapons rely heavily on Chinese suppliers, with critical components — electronics, software, propulsion, and testing — sourced from hundreds of Chinese firms.
- China tightens its grip on strategic materials, banning exports of gallium, germanium, and antimony — critical for defense tech — while sanctioning U.S. drone maker Skydio for supplying Taiwan.
- Defense Giants Face Disruption: Palantir, with just 2% of RTX's workforce, now leads in market cap, while Anduril scales aggressively to challenge legacy primes.
- Southern California Emerges as Defense Tech Hub: A new wave of agile, tech-driven players is reshaping the U.S. defense industry, clustering around Southern California's innovation ecosystem.
- Hypersonic Propulsion Innovation Accelerates: Startups like Hermeus, Venus Aerospace, and Astro Mechanicala are pioneering next-gen engines, from turbine-based combined cycles to rotating detonation and adaptive turbojet-ramjet designs.



# ELECTRIC & AUTONOMOUS VEHICLES

# THE RACE TO FULLY AUTONOMOUS VEHICLES — TWO LEFT

cruise



Shut down by GM in 2024  
after \$10B of collective  
investment



WAYMO



Alphabet owned Waymo has  
cracked the nut, expanding  
into major markets

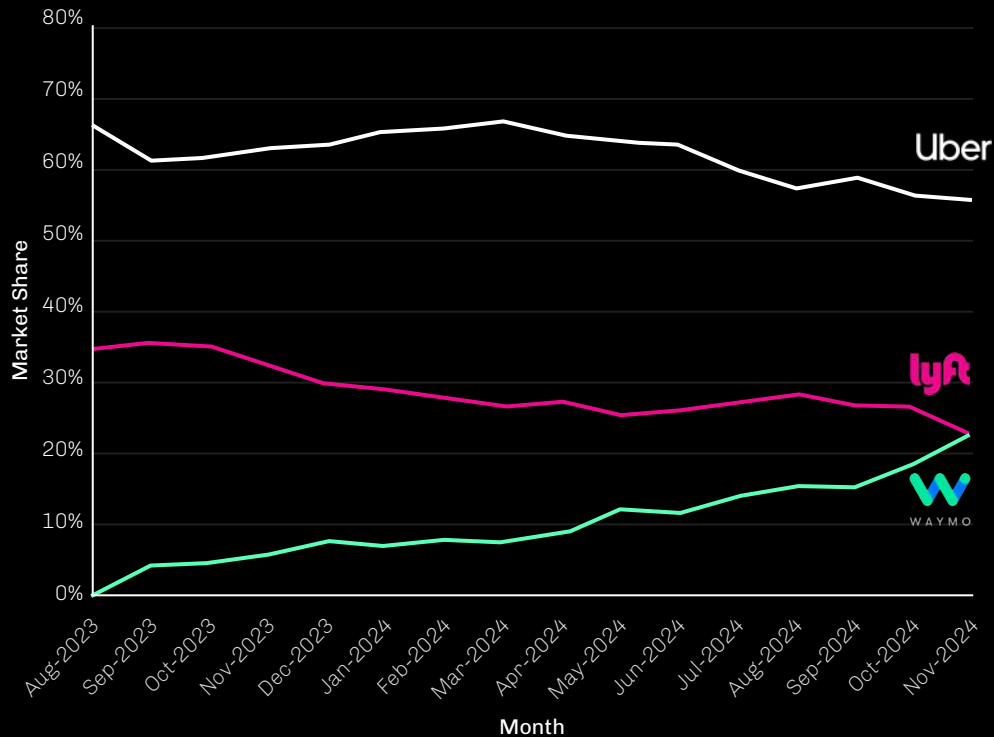


TESLA



Tesla Robocab expected to  
start operations in 2025,  
rolling out tech across  
properly equipped fleet

# WAYMO MARKET SHARE EXCEEDS LYFT IN SAN FRANCISCO



Source: YipitDATA.



WAYMO

Los Angeles  
**LIVE**

San Francisco  
**LIVE**

Phoenix  
**LIVE**

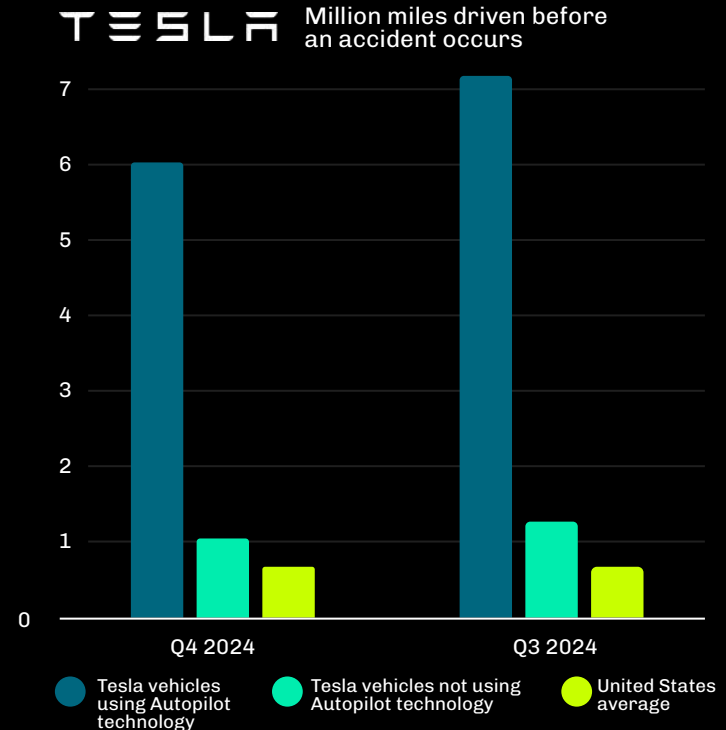
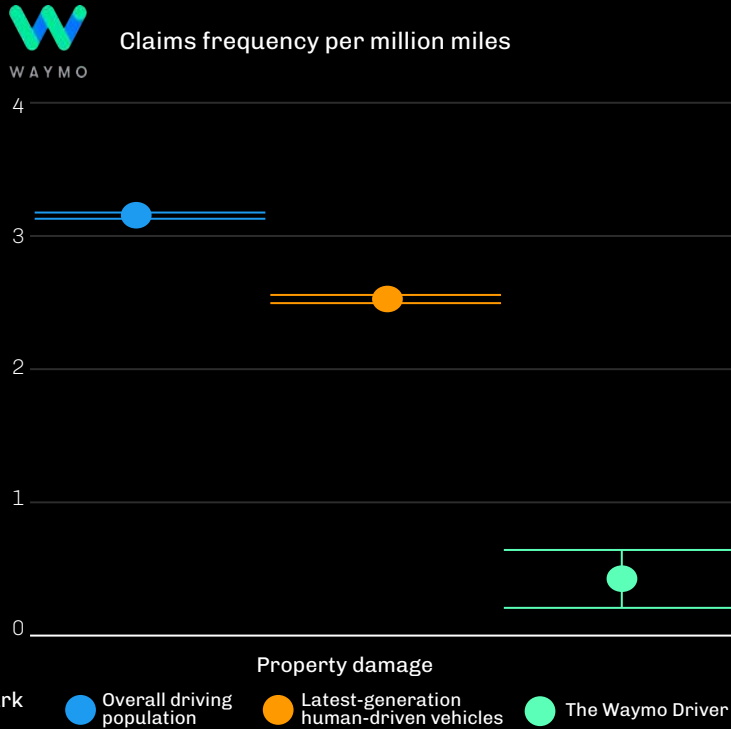
Austin  
LAUNCHING SOON

Miami  
LAUNCHING SOON

Atlanta  
LAUNCHING SOON

# AFTER 25.3 MILLION MILES WITH WAYMO, 88% REDUCTION IN PROPERTY DAMAGE CLAIMS

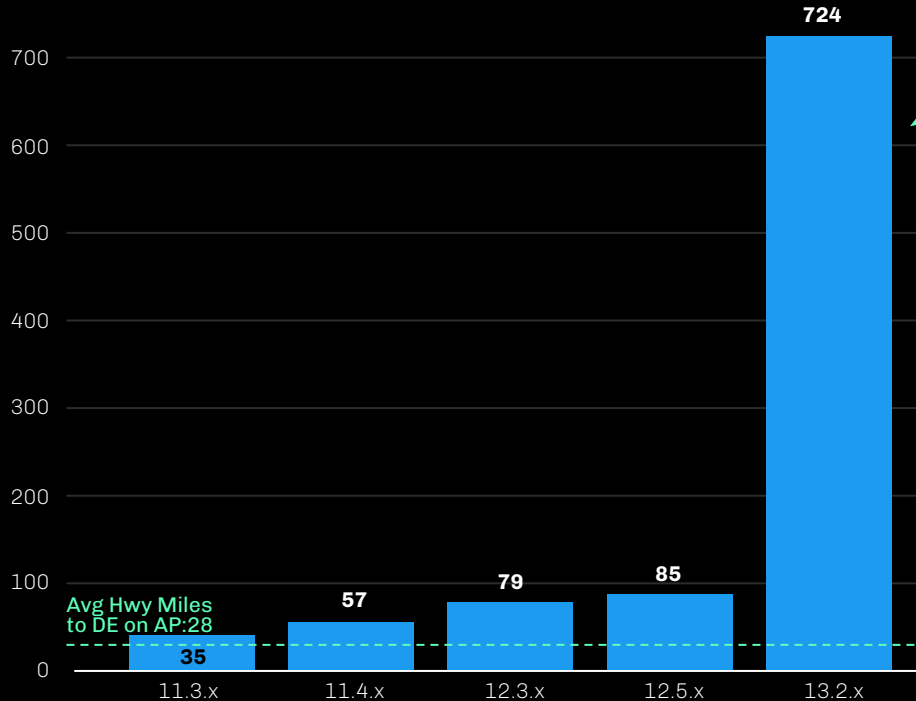
Comparison of Swiss Re overall driving population and latest-generation human-driven vehicle baselines with Waymo's liability insurance claims for property damage (left) and bodily injury (right)



Source: Waymo study and article by Repairer Driven News. Tesla.

# MEANWHILE, TESLA CONTINUES TO PERFECT FULL SELF DRIVING, FSD 13.2.X SEES 750% IMPROVEMENT IN DISENGAGEMENTS

Highway Miles to Disengagement on FSD (>500 hwy miles reported total)



Elon Musk   
@elonmusk

This is what exponential improvement looks like



# TESLA ROBOTAXI BUSINESS ALONE COULD BE WORTH ~\$1T

1

Later this year, **Tesla will launch a rideshare service** powered by driverless Model 3 & Y in Texas & California

2

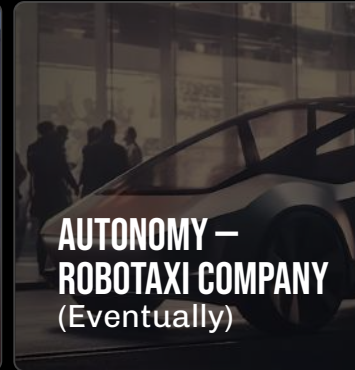
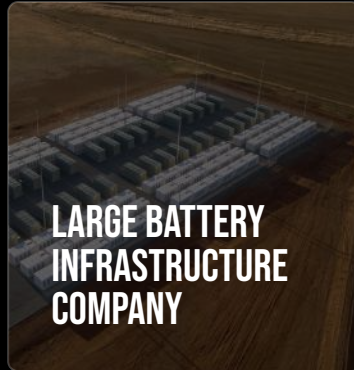
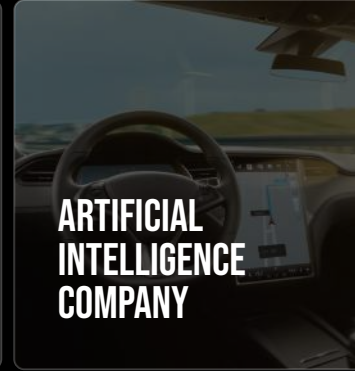
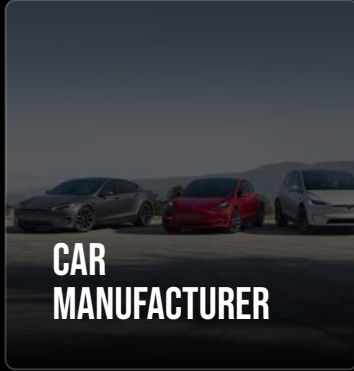
Towards the end of next year **Cybercab will start production**

### Robotaxi and Uber



# TESLA IS NOT A CAR COMPANY. IT'S A MULTI-INDUSTRY TECHNOLOGY CONGLOMERATE

TESLA



# THE BEST WEAPON AGAINST INFLATION IS INNOVATION



## 2012 TESLA MODEL S 85

- 💰 **Price:** \$78,570
- 🕒 **0 to 60:** 5.6 seconds
- 📏 **Range:** 265 miles
- 🔌 **Peak Charging:** ~120kW
- ⚙️ **Power:** 362 HP
- 🚦 **ADAS:** None



## 2024 TESLA MODEL S

- 💰 **Price:** \$76,630
- 🕒 **0 to 60:** 3.1 seconds
- 📏 **Range:** 402 miles
- 🔌 **Peak Charging:** 250kW
- ⚙️ **Power:** 670 HP
- 🚦 **ADAS:** FSD Computer

# TESLA'S FUTURE IS A COMBINATION OF OPTIMUS AND ROBOTAXI

NOW

EVs

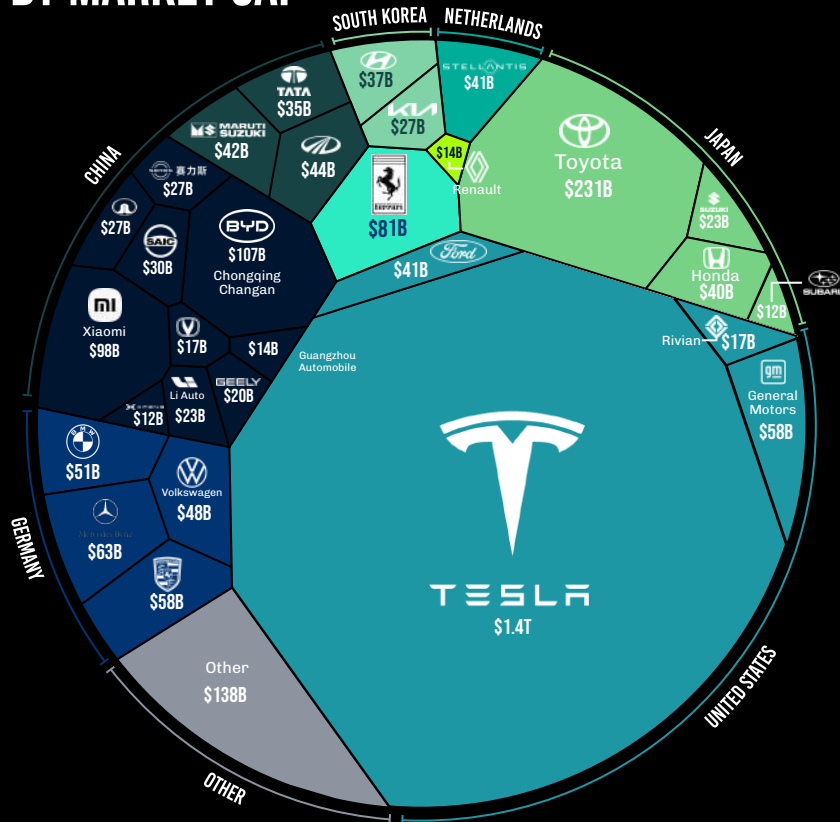
Energy

FSD/Robotaxi

Optimus

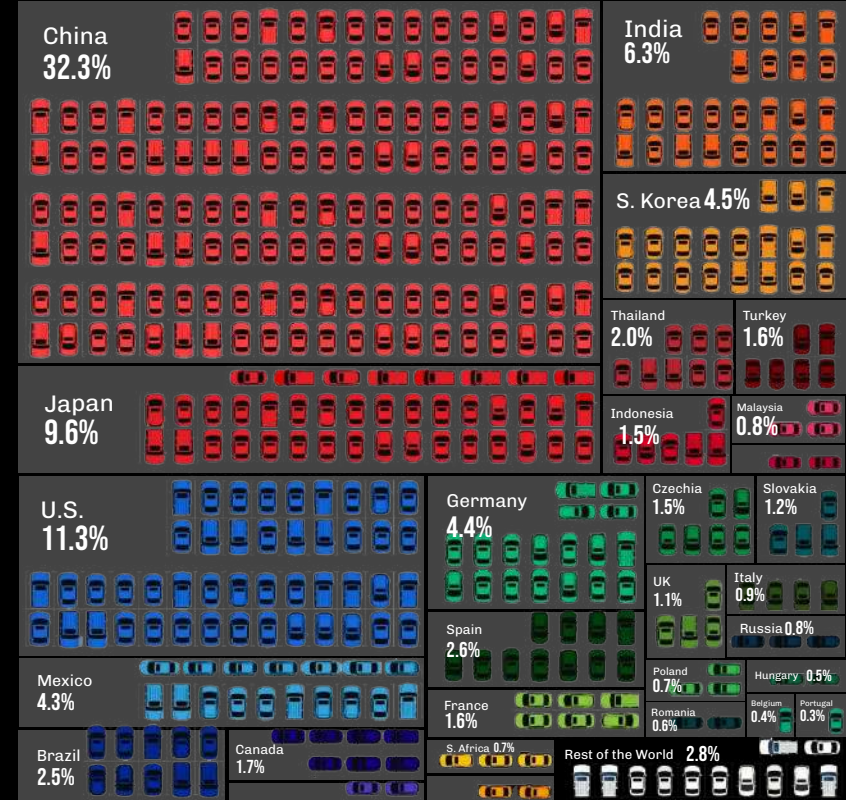


# THE GLOBAL AUTOMOTIVE INDUSTRY BY MARKET CAP



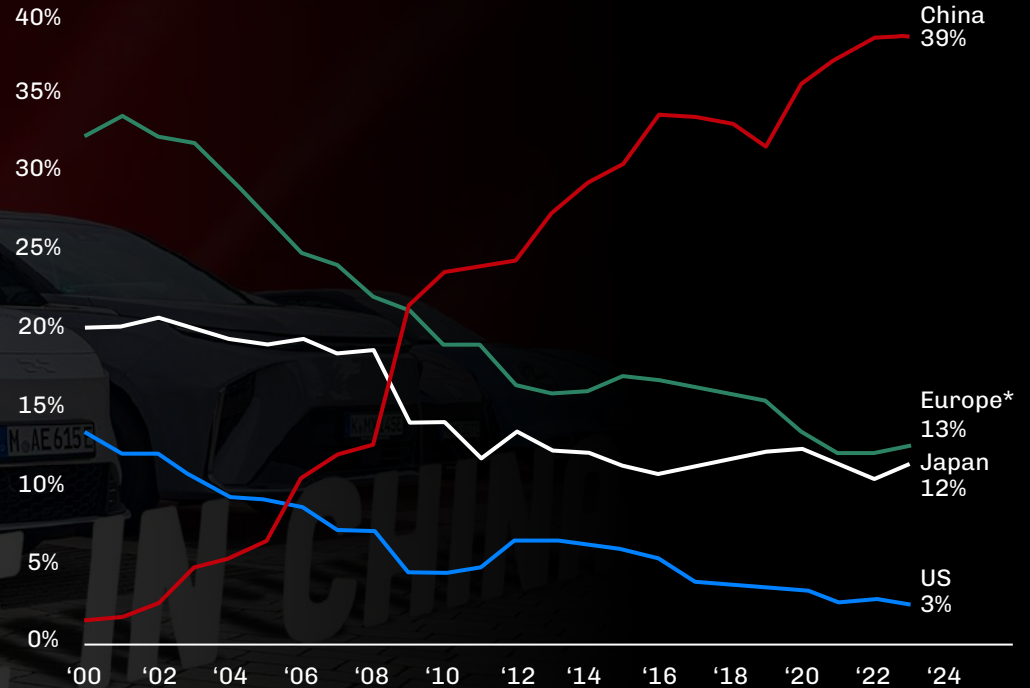
# GLOBAL CAR PRODUCTION

GLOBAL CAR PRODUCTION IN 2023: 93.5M



Source: International Organization of Motor Vehicle Manufacturers.

# CHINA GOES FROM 1% TO 39% IN CAR PRODUCTION SHARE IN 20 YEARS

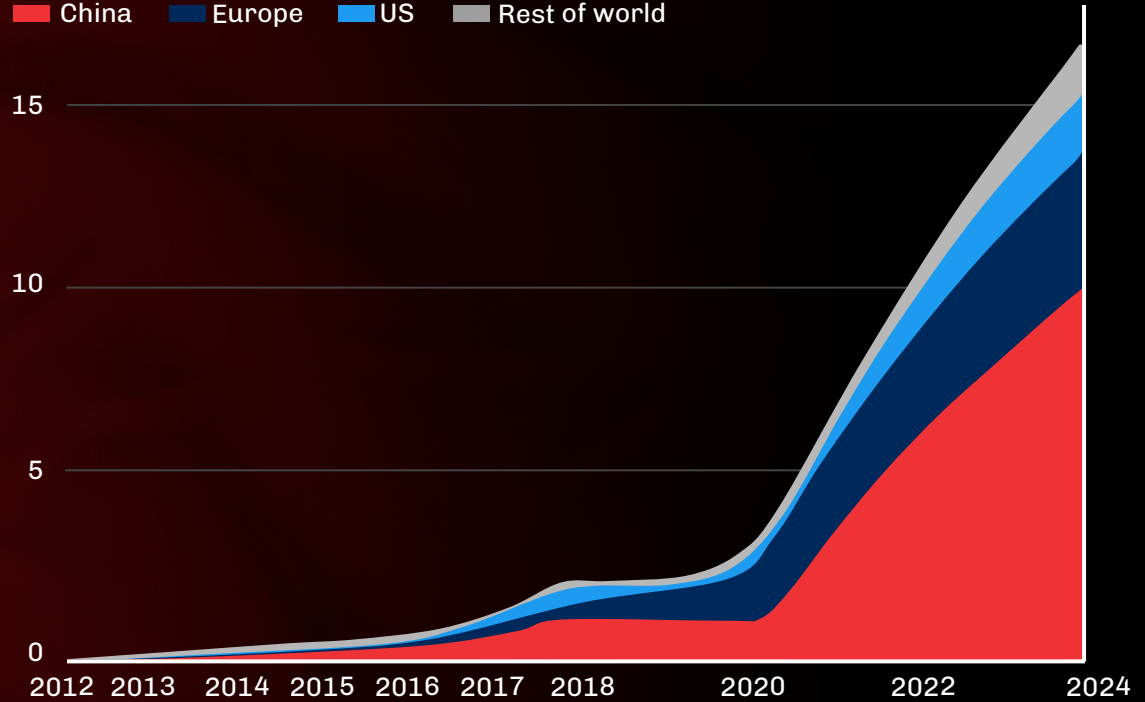


**HOWEVER, WHEN  
IT COMES TO EVS,  
CHINA SHARE  
RISES TO 76%!**

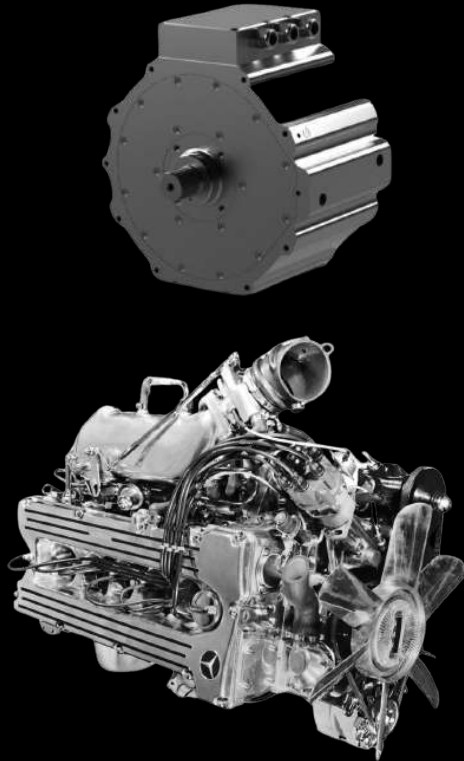
### China has come to dominate the EV market

Unit sales, electric cars (mn)

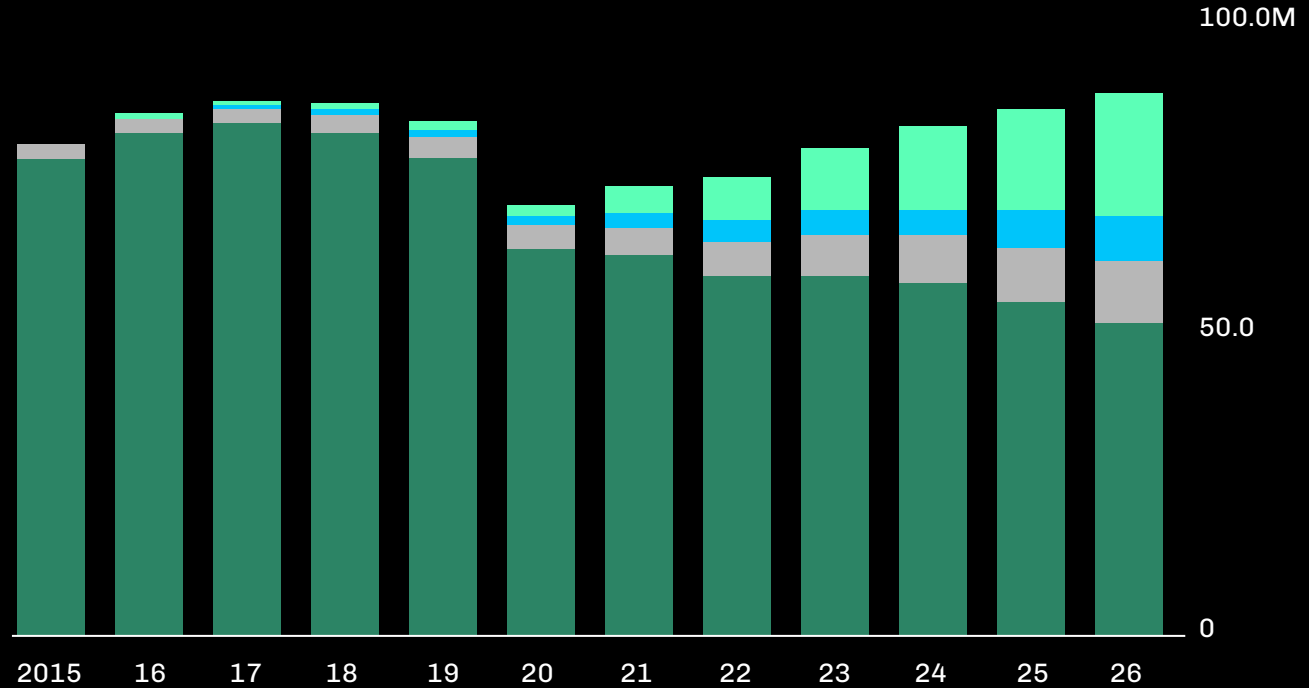
China Europe US Rest of world



# THE WORLD HIT PEAK GAS POWERED VEHICLE SALES IN 2017

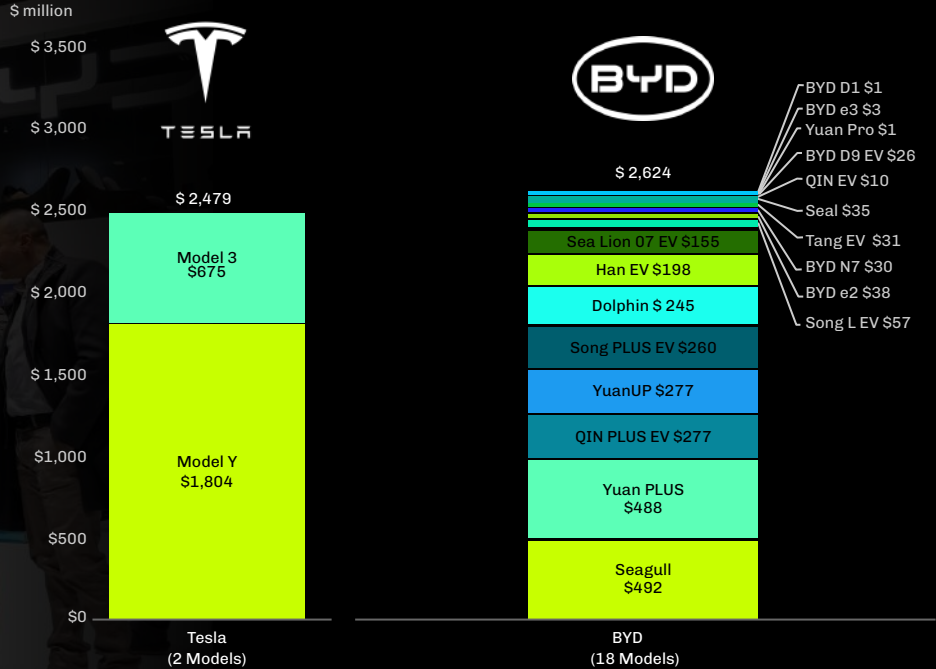


Internal combustion Hybrid Plug-in hybrid Electric



China EV Sales Revenue | August 2024

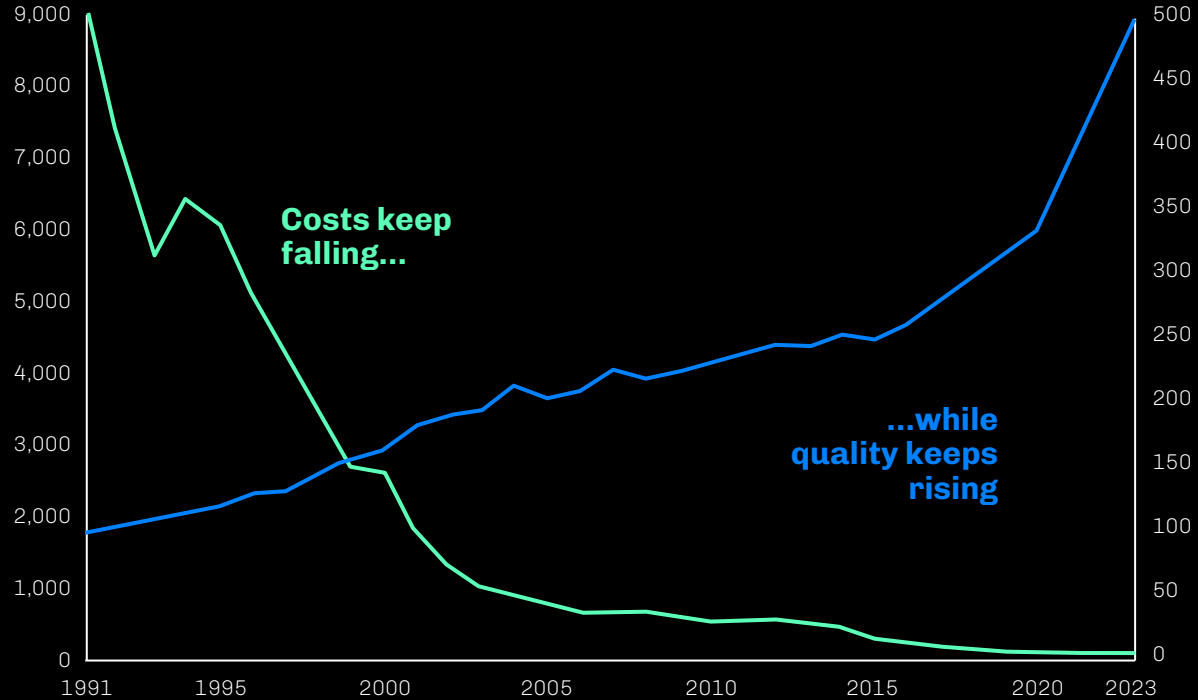
**BYD GENERATED ONLY 6% MORE REVENUE THAN TESLA WITH 18 MODELS VS. TESLA'S 2 MODELS**



# BATTERY COST CONTINUES TO DROP, PARTICULARLY IN CHINA

## Battery cost

\$/kWh

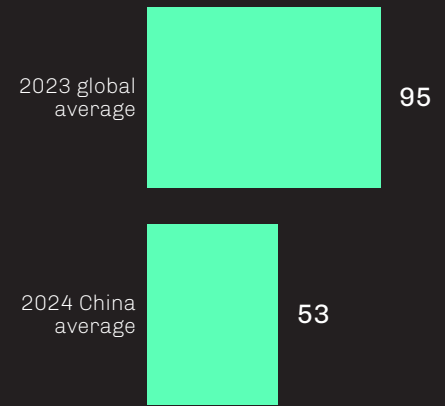


## Top-tier battery energy density

Wh/kg

## China's Much Cheaper Batteries

Cost of lithium iron phosphate cell batteries in \$/kWh

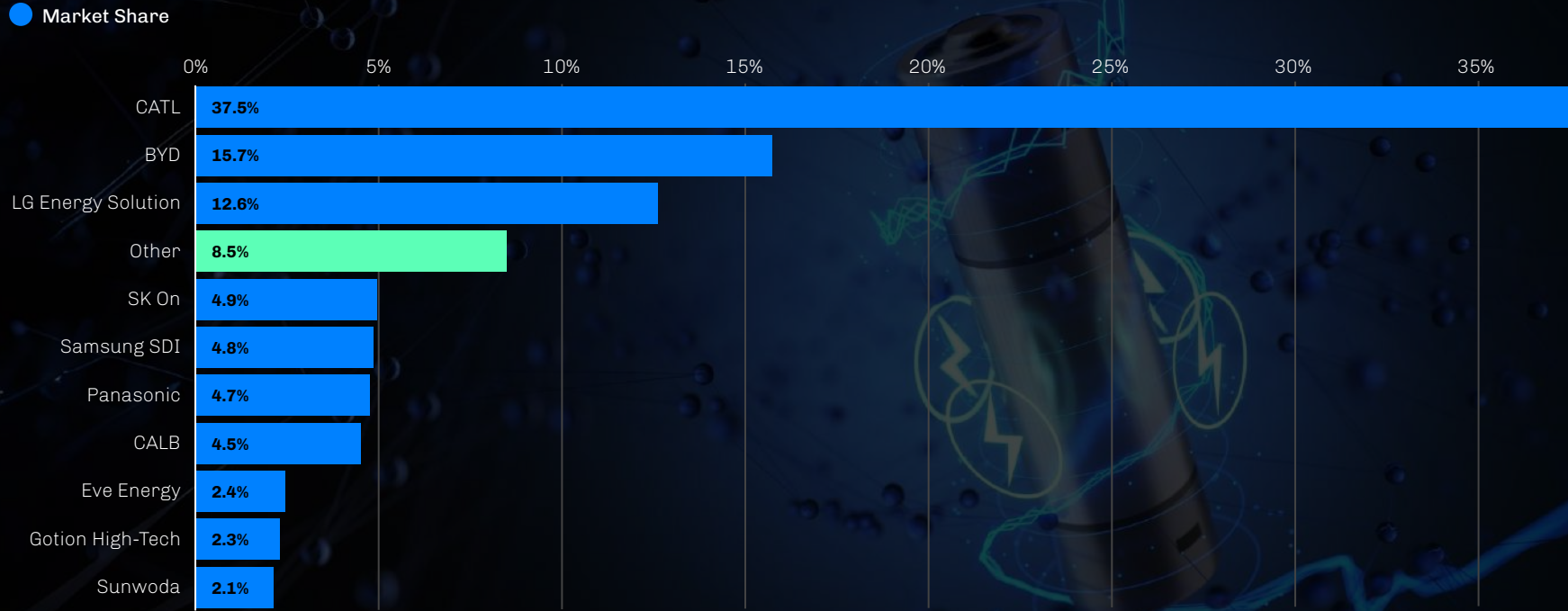


Note: 2023 price from BNEF's Lithium-ion Battery Price Survey. 2024 price from January to April from ICC Battery.

# HIGH CONCENTRATION OF BATTERY MANUFACTURING IN CHINA

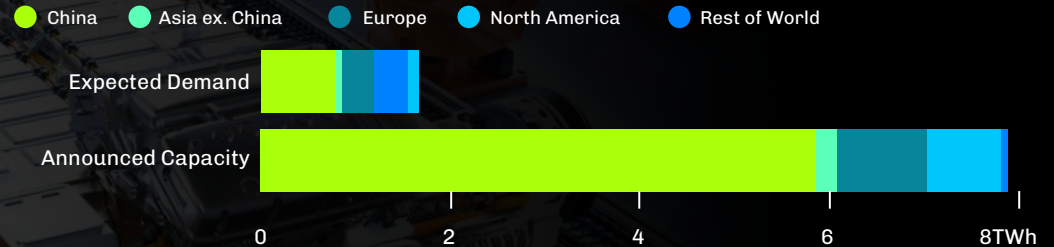
## World's Top 10 EV Battery Producers

Market share of top EV battery producers, January-May 2024



# GLOBAL EXUBERANCE IN EVS HAS RESULTED IN TREMENDOUS OVERCAPACITY

Announced lithium-ion battery manufacturing capacity and demand in 2025



# THE CASUALTIES OF THE OVERCAPACITY ARE SIGNIFICANT

NORTHVOLT WAS EUROPE'S HOPE TO  
COMPETE IN THE BATTERY ECONOMY

RAISED \$15B

FILED FOR BANKRUPTCY 11 NOV 2024

northvolt®

**BANKRUPT**

# EUROPE'S WOES CONTINUE: 1/3 OF EU AUTO PLANTS AT 50% CAPACITY

## A Third of Europe's Major Car Plants at Half Capacity or Less

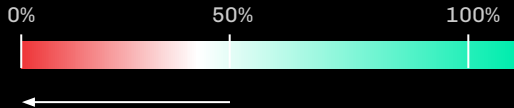
Auto factories producing passenger vehicles for BMW, Mercedes, Renault, Stellantis, and Volkswagen (2023 data)

### Production capacity



### Share of capacity used

Utilization rate



← More underutilized



**Osnabrück, VW**  
This smaller plant has been ordered to help out in times of capacity bottlenecks, meaning it has less work now.

**Wolfsburg, VW**  
One of the world's largest factories; costs are high due to strong union and political support that has resulted in generous worker perks

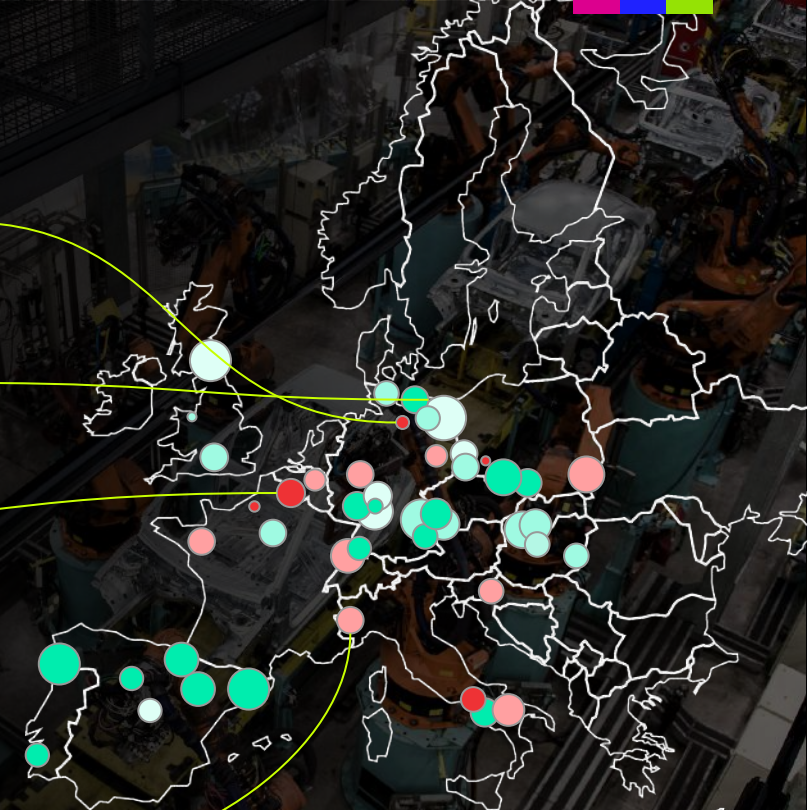


RENAULT

**Douai, Renault**  
This plant has recently been retooled to make EVs; in 2023, it was ramping up output and preparing for new models coming to market in 2024



**Mirafiori, Stellantis**  
Output fell 63% in the first half of 2024 due to tepid demand for the electric Fiat 500



Source: Bloomberg analysis of Just Auto data.

Note: A utilization rate of less than 50% is likely loss-making, according to Bloomberg Intelligence. Utilization rates of more than 100% can be achieved with overtime or by increasing number of shifts. Plants that mostly produce commercial vehicles are excluded.

# THIS ISN'T A CRISIS, IT'S AN IMPLOSION FOR EU AUTO

## Q3 2024 VS Q3 2023 PROFITS



Profits  
dropped  
**64%**



Profits  
dropped by  
**91%**

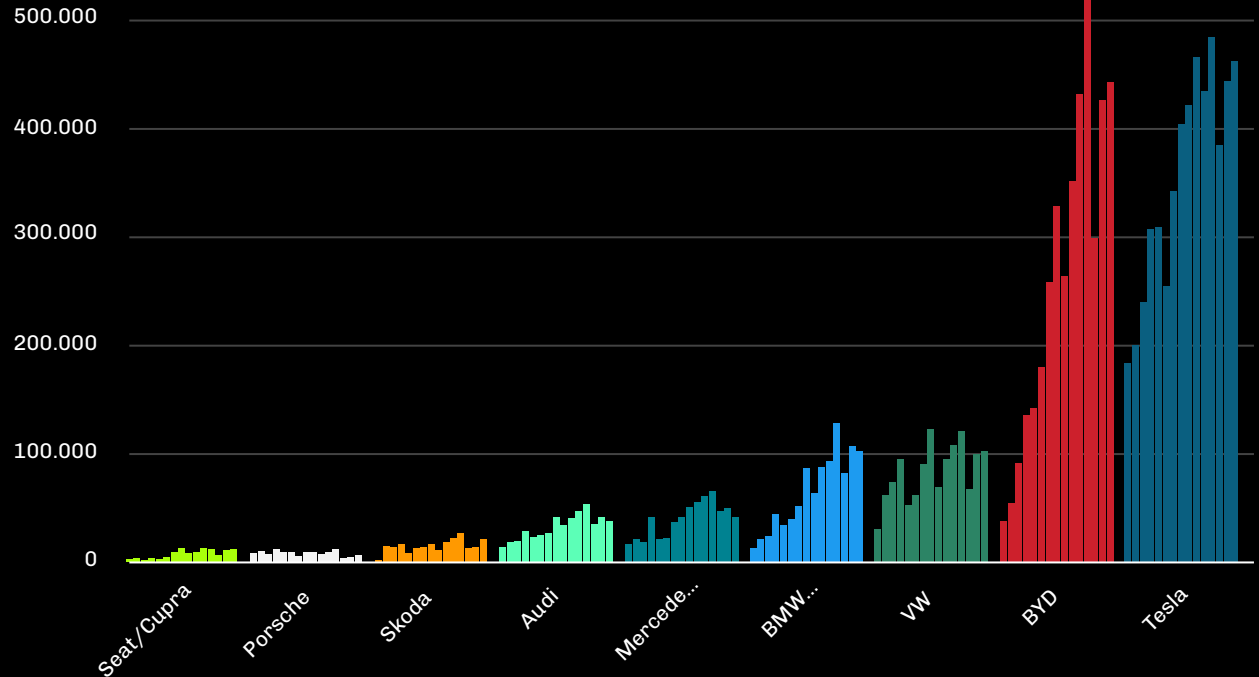


Profits  
dropped by  
**84%**



Profits  
dropped by  
**54%**

All German Automakers are falling in Q3 further behind BYD and Tesla  
**Global Quarterly BEV Sales per Brand Q1 2021-Q3 2024**



# AUTO

- GM shuts Cruise after \$10B investment, leaving Waymo and Tesla as the last major contenders in the fully autonomous vehicle space.
- Waymo solidifies its position as the leading current autonomous ride-hailing service, surpassing Lyft in San Francisco market share while expanding to new cities, including Los Angeles, Austin, and Miami.
- Tesla's Full Self-Driving (FSD) technology sees exponential progress, with version 13.2.x showing a 750% improvement in disengagement rates, highlighting the rapid evolution of its AI-driven driving system.
- Tesla prepares to launch a rideshare service and ramp up production of its "Cybercab," aiming for a \$1 trillion market opportunity with ultra-low-cost per-mile pricing.
- China Is Rapidly Taking over Global Auto Production: Rising from just 1% in 2000 to 39% today, China has become the world's top car producer. Its grip is even stronger in EVs, where it now controls 76% of the market, outpacing Europe and the U.S.
- The Internal Combustion Engine Has Peaked: Global gas-powered vehicle sales topped out in 2017 and have been declining since, with EVs steadily eating into their market share — positioning electric as the future of mobility.
- China Dominates Global EV Battery Supply: CATL and BYD alone control over 50% of the market, cementing China's lead in battery production. With lower costs and increasing scale, China's influence over the global EV supply chain continues to grow.
- EV Battery Overcapacity Is Hitting Hard: A surge in global battery production — far exceeding demand — is straining the market.
- Northvolt's Collapse Signals the Fallout: Northvolt raised \$15B but filed for bankruptcy in November 2024, underscoring the financial strain of oversupply and intense competition.
- Europe's Auto Industry Is Unraveling: 1/3 of EU plants are running at half capacity or less, and German automaker profits are in freefall (VW -64%, BMW -84%, Audi -91% comparing 3Q23 vs 3Q24 results).



# NEW ENERGY

# HUMANITY'S USE OF THE UNIVERSE'S ENERGY IS MEASURED BY THE **KARDASHEV SCALE**; WE RANK **0.72** OUT OF 4

TYPE I:

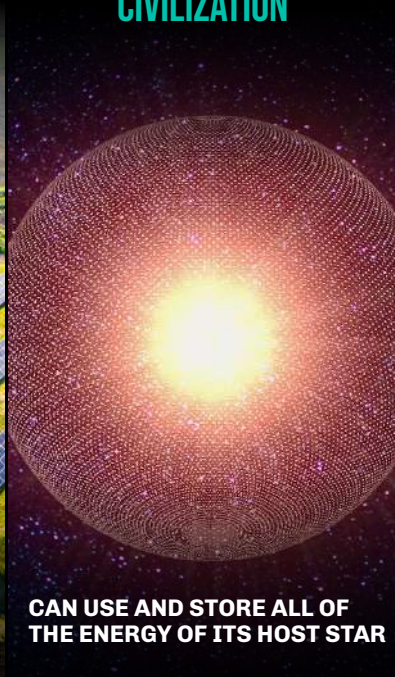
**PLANETARY  
CIVILIZATION**



**CAN USE AND STORE ALL OF  
THE ENERGY OF ITS PLANET**

TYPE II:

**STELLAR  
CIVILIZATION**



**CAN USE AND STORE ALL OF  
THE ENERGY OF ITS HOST STAR**

TYPE III:

**GALACTIC  
CIVILIZATION**



**CAN CONTROL ENERGY AT THE  
SCALE OF ENTIRE GALAXY**

TYPE IV:

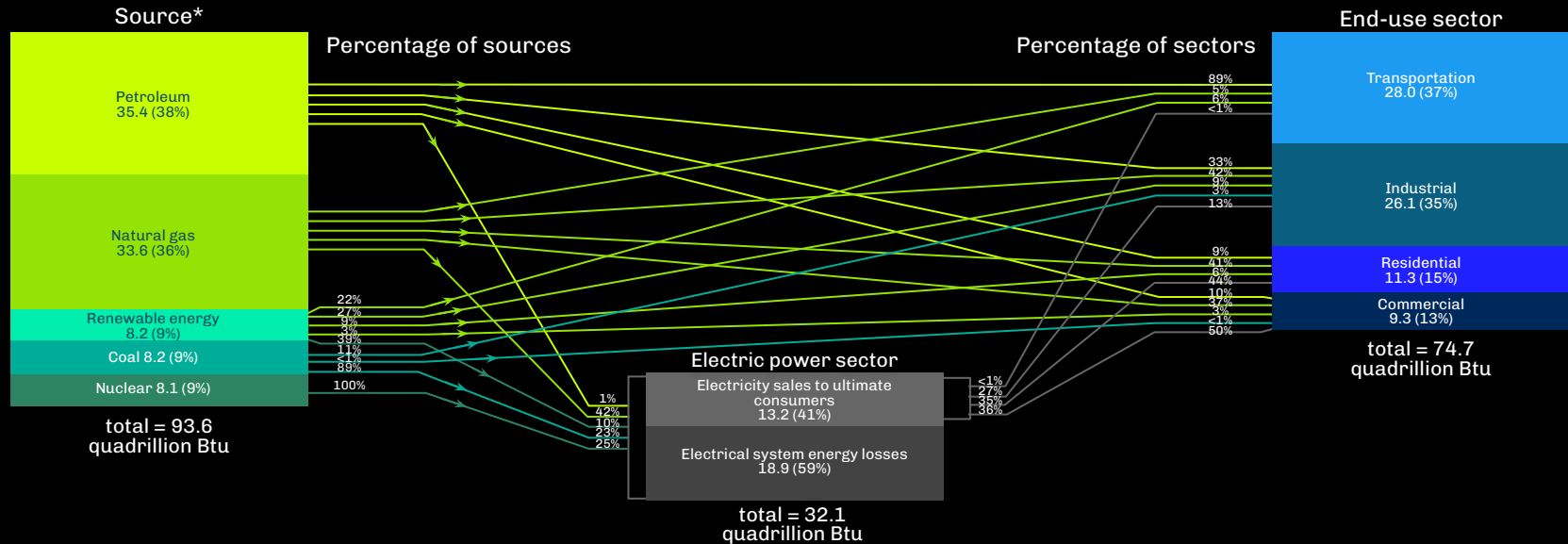
**UNIVERSAL  
CIVILIZATION**



**CAN CONTROL ENERGY AT THE  
SCALE OF ENTIRE UNIVERSE**

# U.S. ENERGY CONSUMPTION BY SOURCE AND SECTOR, 2023

Quadrillion British thermal units (Btu)



Sources: U.S. Energy Information Administration (EIA), *Monthly Energy Review* (April 2024); Tables 1.3, 1.4c, and 2.1a-2.6.

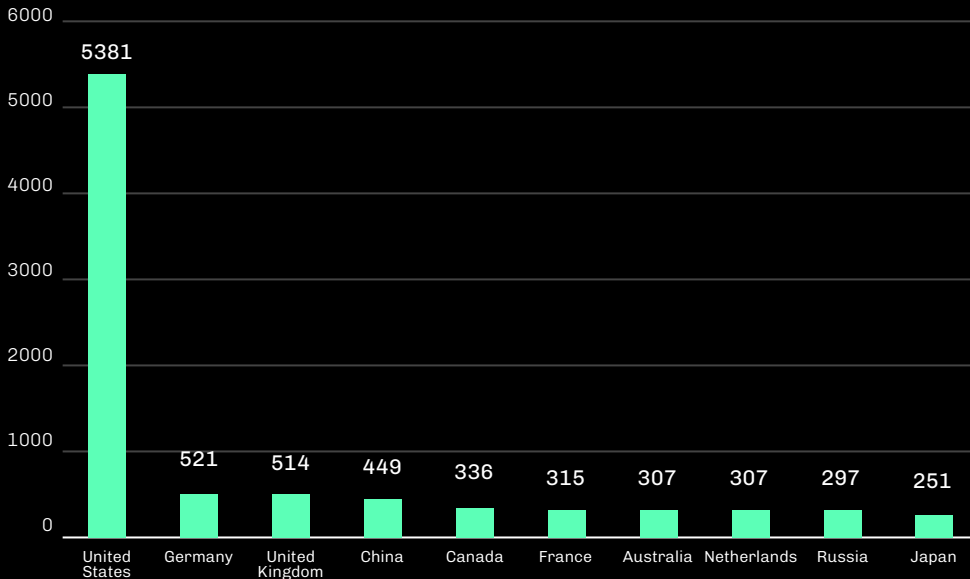
Note: Sum of components may not equal total due to independent rounding. All source and end-use sector consumption data include other energy losses from energy use, transformation, and distribution not separately identified. See "Extended Chart Notes" on the next page.

- **Primary energy consumption.** Each energy source is measured in different physical units and converted to common British thermal units (Btu). See EIA's *Monthly Energy Review (MER)*, Appendix A. Generation from noncombustible renewable energy sources are converted to Btu using the "Captured Energy Approach." See *MER Appendix E*.
- The **electric power sector** includes electricity-only and combined-heat-and-power (CHP) plants whose primary business is to sell electricity, or electricity and heat, to the public. **Energy** consumed by these plants reflects the approximate heat rates for electricity in *MER Appendix A*. The total includes the heat content of net electricity imports, not shown separately. Electrical system energy losses are calculated as primary energy consumed by the electric power sector minus the heat content of electricity sales to ultimate consumers. See Note 1, "Electrical System Energy Losses," at the end of *MER Section 2*.
- **End-use sector consumption** of primary energy and electricity sales to ultimate consumers, excluding electrical system energy losses. Industrial and commercial sectors' consumption includes primary energy consumption by CHP and electricity-only plants contained within the sector.

# ON THE TOPIC OF ENERGY, DATA CENTERS ARE HUNGRY! WE COULD RUN OUT OF ENERGY BY 2028, SAYS ERIC SCHMIDT


There are more data centers in the U.S. than in all other major countries combined

Number of data centers



Source: International Energy Agency (IEA); UP.Partners research, Statista, Cloudscene, Apollo Chief Economist. Note: Data as of March 2024 Bloomberg analysis of BloombergNEF and DC Byte data.



Tsarathustra   
@tsarnick

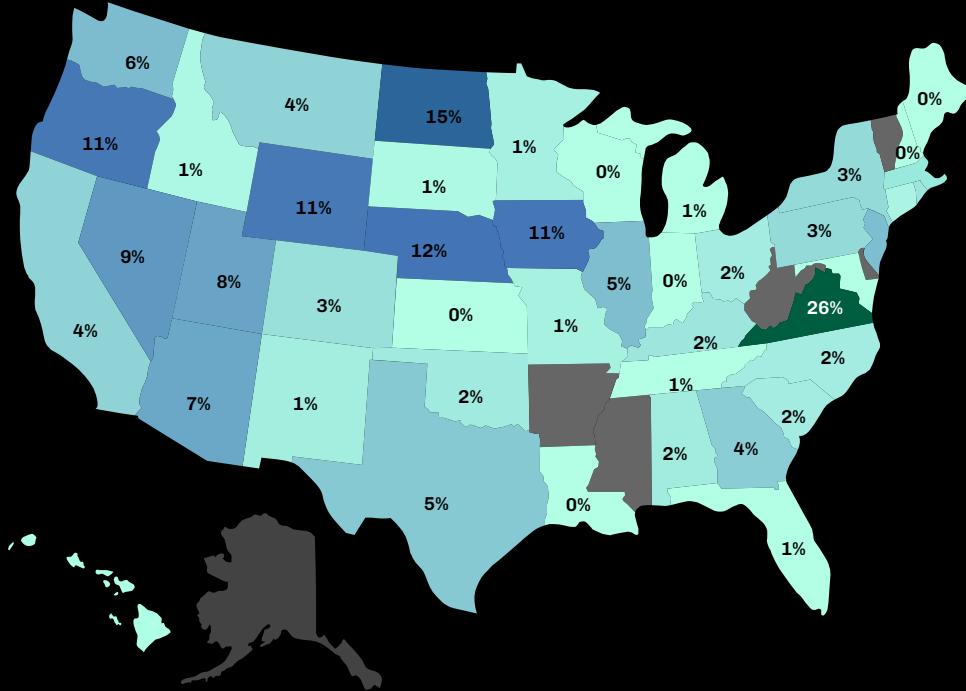
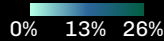


Ex-Google CEO Eric Schmidt says America could run out of energy by 2028 due to power-hungry AI data centers and there could be a deal whereby the government agrees to provide energy infrastructure faster in return for access to internal models and security guarantees.



# 26% OF VIRGINIA'S ENERGY CONSUMPTION IS FOR DATA CENTERS; VA GREENLIGHTS CWF FUSION REACTOR!

Data centers' share of total power consumption, 2023



Commonwealth Fusion Systems   
@CFS\_energy



ARC, the world's first grid-scale fusion power plant, is coming to Chesterfield County, Virginia. When we start generating power in the early 2030s, it'll be a colossal moment that'll open the grid to new clean, zero-carbon power that's available on demand.

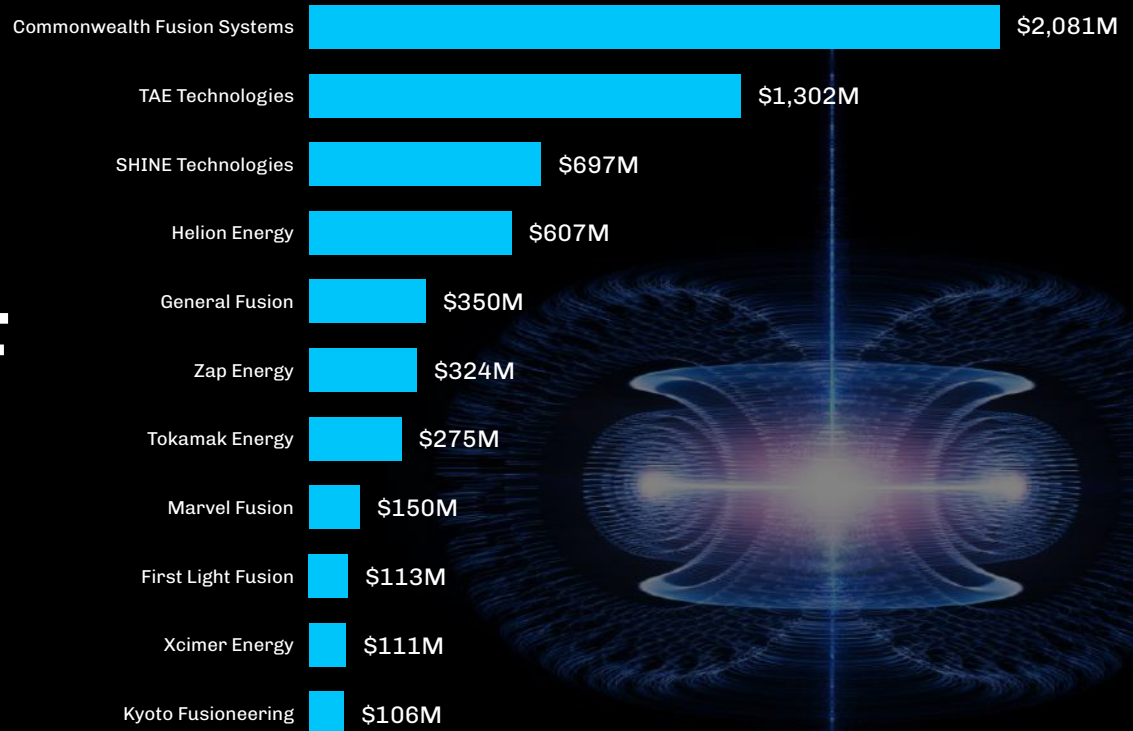
## Fusion



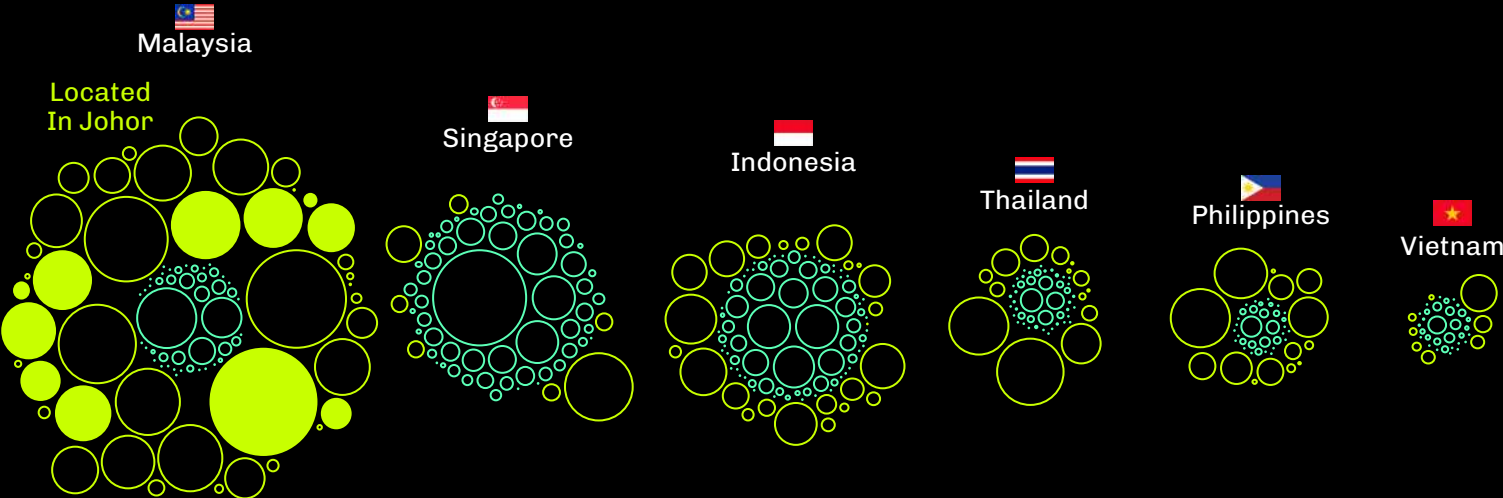
## Firsts

**50 FUSION  
STARTUPS HAVE  
RAISED \$13B TO  
DATE, WITH 80% OF  
THAT BEING IN THE  
PAST FOUR YEARS**

### Private Sector Fusion: Equity Capital Received to end 2024



# MALAYSIA IS THE NEXT VIRGINIA OF ASIA



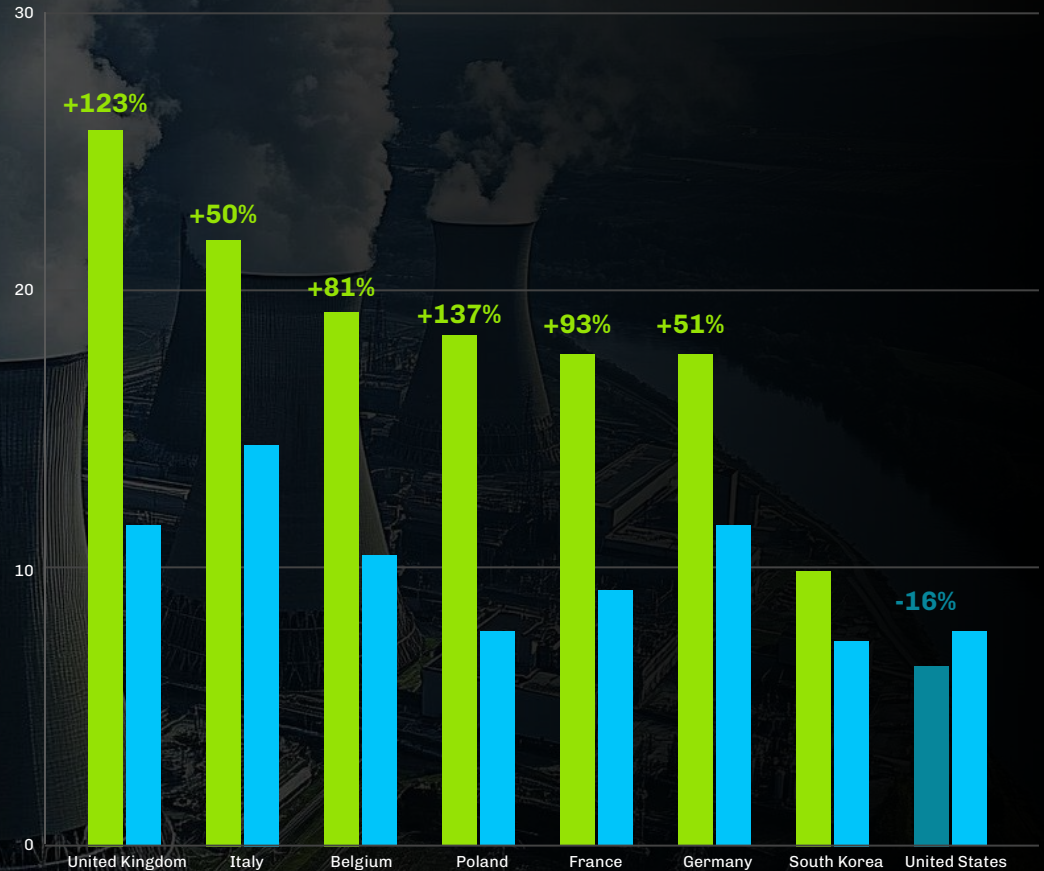
Located  
In Johor

Malaysia is adding  
**2,855 MW**  
Of capacity by 2026 — a tenfold increase.  
More than a third of that new capacity is  
located in the state of Johor

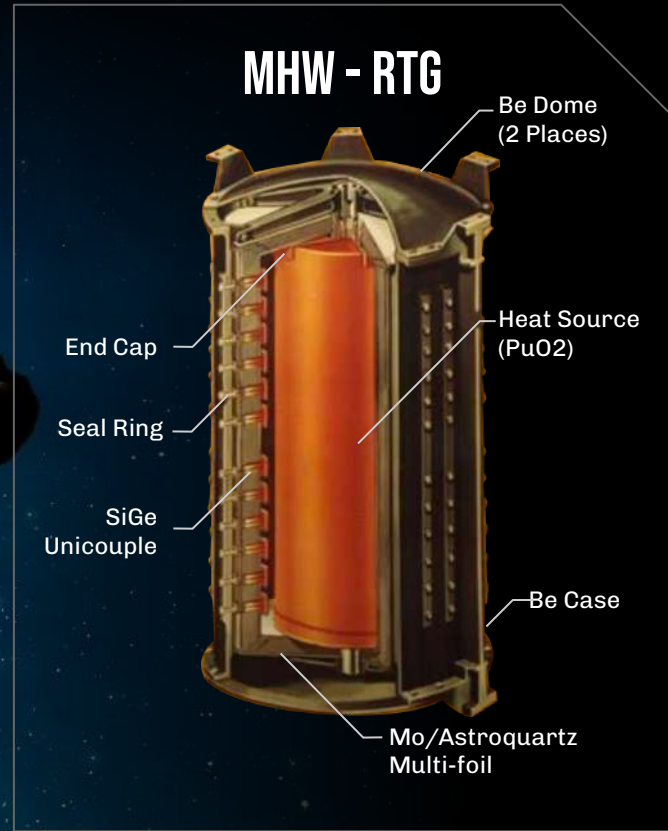
Source: Bloomberg analysis of DC Byte data.

# HOW DO YOU OPERATE DATA CENTERS IN EU WHILE IN AN ENERGY CRISIS?

Industrial electricity prices incl. taxes, 2019 vs. 2023 (pence per kWh)



# A LITTLE HISTORY: VOYAGER 1 SATELLITE, LAUNCHED IN 1977, IS STILL OPERATING TODAY ON A COMPACT NUCLEAR REACTOR



# TECH COMPANIES ARE THE CATALYST FOR NEW ENERGY

## Tech Companies and Nuclear Energy:

### amazon

Amazon (\$AMZN) has invested in X-energy for small modular reactors (SMRs) and is constructing nuclear capacity for its data centers.

### Google

Google (\$GOOGL) has secured 500 MW of nuclear energy from Kairos Power for carbon-free energy.

### Google

Future Google supplier Kairos gets approval to build two small nuclear reactors

### ORACLE

Oracle (\$ORCL) is building a nuclear-powered data center with SMRs.

### Microsoft

Microsoft (\$MSFT) is restarting the Three Mile Island reactor for AI needs.

### Meta

Accelerating the Next Wave of Nuclear to Power AI Innovation

# MICROSOFT TURNS ON THREE MILE ISLAND NUCLEAR POWER PLANT

One of the biggest power deals ever

~\$800 million/yr for 20 years  
\$16 BILLION for one nuclear reactor

From a 40-year-old reactor, just to  
get to age 60

We now have a market for new build

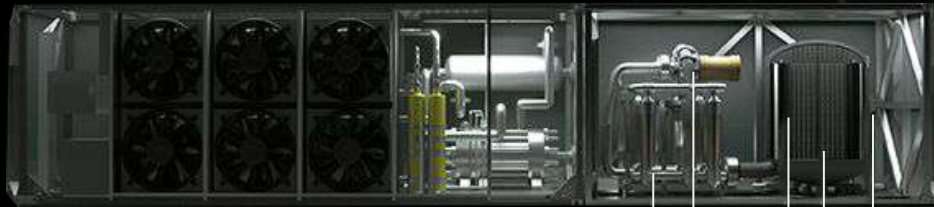
*The New York Times*

## Three Mile Island Plans to Reopen as Demand for Nuclear Power Grows

The infamous plant, closed since 2019, is getting a new lease on life after Microsoft agreed to buy its electricity to supply a growing fleet of data centers.

# A MARKET IS EMERGING FOR MODULAR NUCLEAR REACTORS

Kaleidos design, a transportable micro-reactor designed to generate 3MWth and approximately 1MWe



Primary Heat Exchangers   Helium Circulators   Control Drum   Core   Vessel Shell



# MONEY IS FLOWING INTO NUCLEAR AROUND THE WORLD







FINANCIAL TIMES

## World's biggest banks pledge support for nuclear power

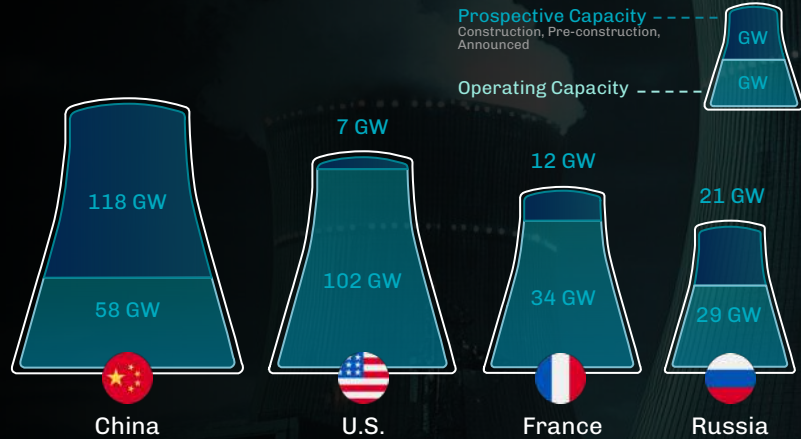
Names including Bank of America, Morgan Stanley, and Goldman Sachs boost COP28 goal of tripling capacity by 2050

# \$153.5B

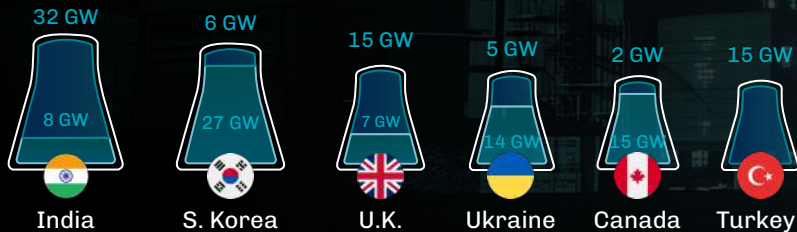
in financing, loans, and loans requests announced in Q3 2024 for new nuclear projects.

 \$31.0B	7 Hualong-One / 4 AP1000
 \$17B	2 APR-1000
 \$15.7B	1st of 3 Ap10000
 \$15.6B	2 APR1000
 \$9.20B	2 APR-1400
 \$65.0B	13 states request DoE loans

# CHINA LEADING NEW BUILD, WITH RECORD BUILD TIMES — 5 YEARS FOR HUALONG ONE REACTORS



If all this prospective capacity eventually comes online, global nuclear capacity could increase to 695 GW, a jump of over 75%.



Source: Visual Capitalist; Global Energy Monitor.



David Fishman @pretentiouswhat



On the morning of November 28, China's newest nuclear power plant, a Hualong One reactor at Zhangzhou in Fujian, connected to the grid just 61 months after construction.


How does China build these so fast? Let's review the timeline. 🕒



Dec. 3, 2024

# CHINA BY FAR GLOBAL LEADER IN NEW ENERGY



Science Is Strategic   
@scienceisstrat1

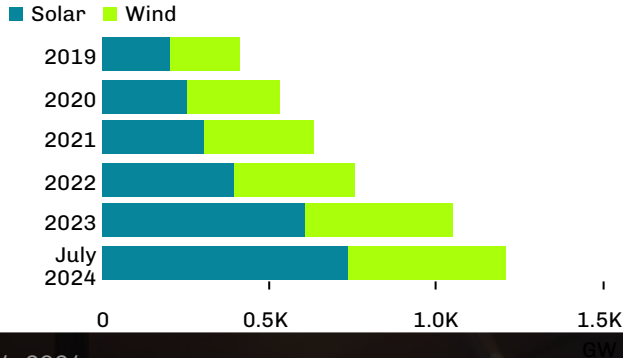


## Massive boom in China renewables

- ◆ China's installed solar and wind capacity hits 1,206 GW, hitting its 2030 goal of 1,200 GW six year early
- ◆ Solar and wind have generated 14% of the electricity in China this year

### China Hits 2030 Clean Energy Goal 6 Years Early

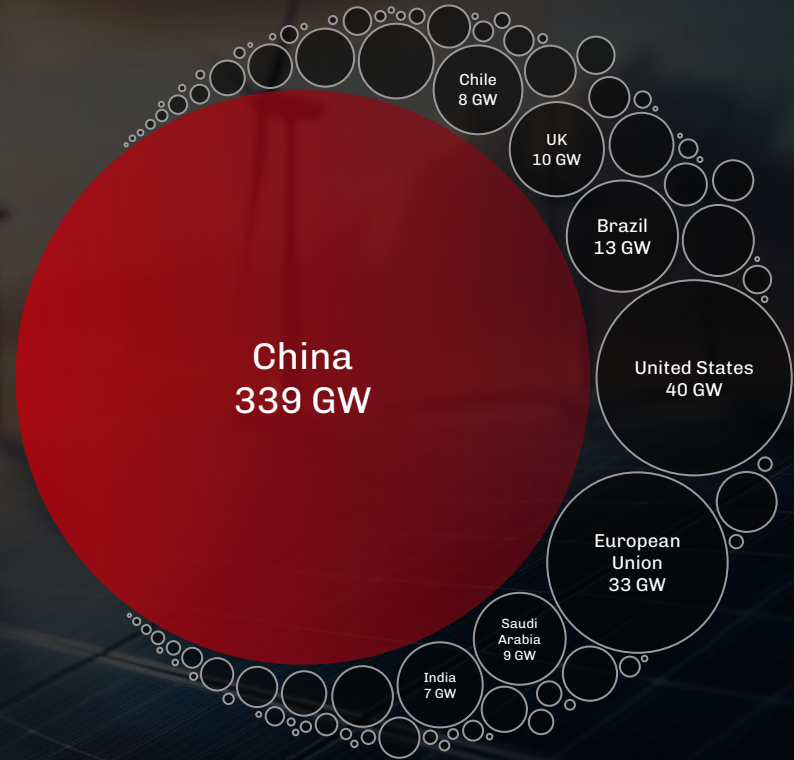
Xi Jinping targeted 1,200 GW of wind and solar by end of decade



Aug 24, 2024

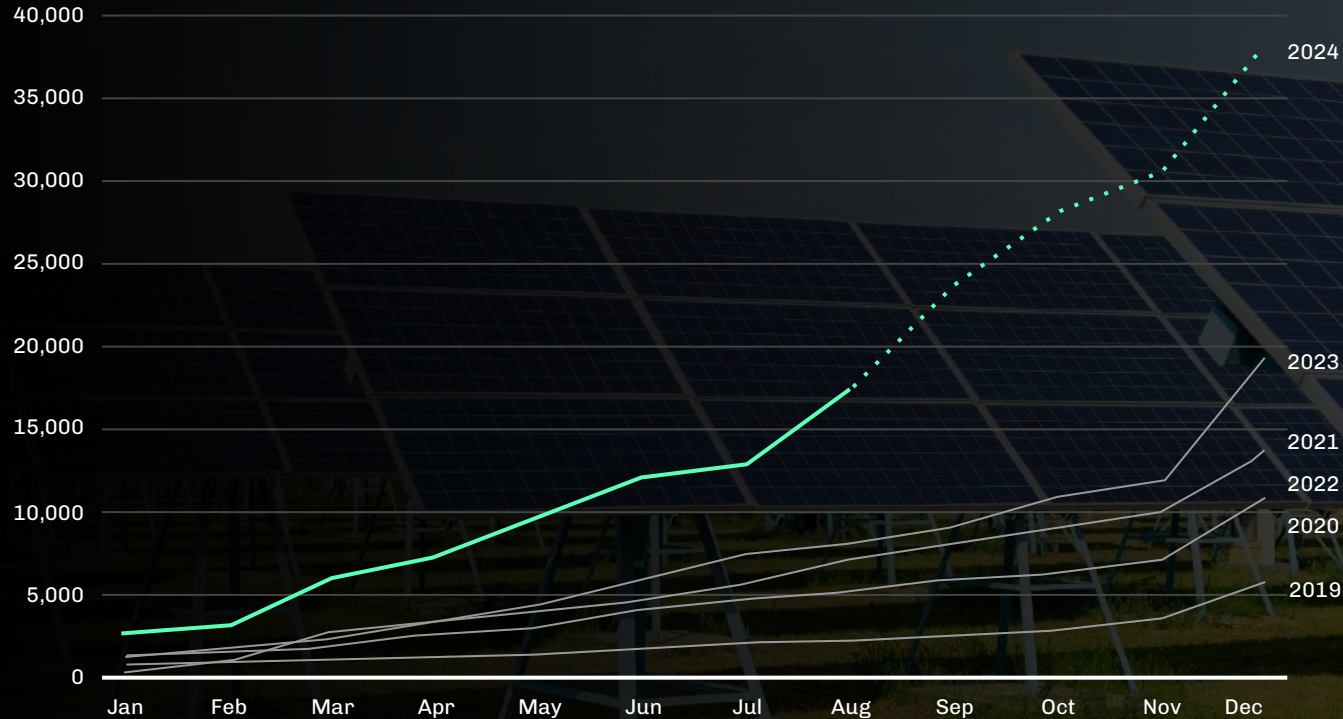
Note: Counts include large utility-scale solar farms with a capacity of 20 MW or greater and wind projects with a capacity threshold of 10 MW or greater.  
Source: Global Energy Monitor | Graphic: Hien An Ngo, CNN.

How China's wind and solar construction compares to other countries  
The country has 339 gigawatts of utility-scale wind and solar capacity currently under construction, which is two-thirds of the resources currently being built worldwide.



# SOLAR IS ON TRACK FOR ANOTHER RECORD BREAKING YEAR

The U.S. will add 38 GW of new utility-scale solar capacity in 2024 — twice as much as 2023.



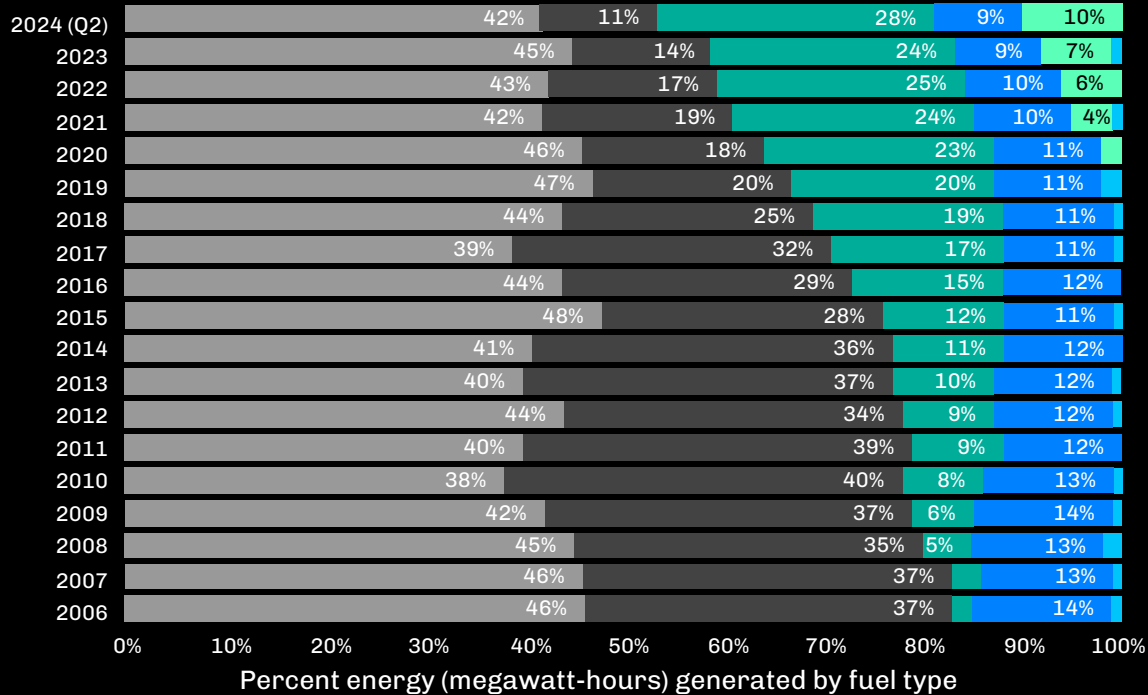
Note: Data shows cumulative utility-scale additions each month for years between 2019-2024. September-December 2024 data is based on planned operating dates of projects under construction | Chart: Michael Thomas | Source: Cleanview.

# TEXAS LEADS BATTERY STORAGE

## Texas electricity mix from 2006 to 2024

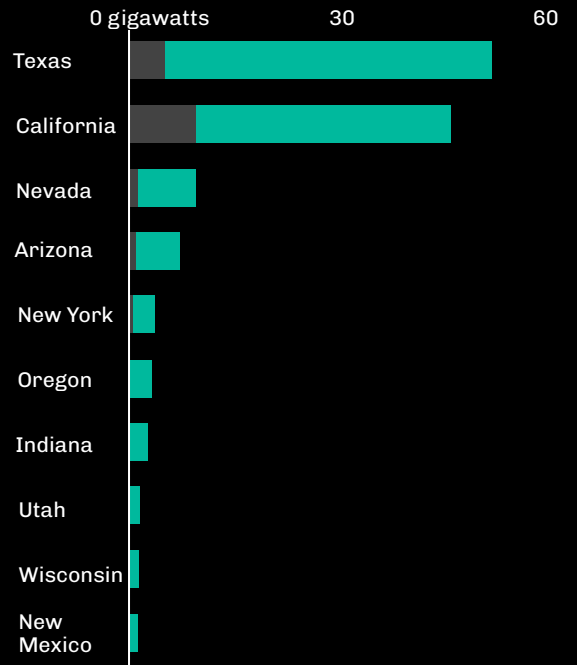
Renewables are growing steadily

■ Natural Gas ■ Coal ■ Wind ■ Nuclear ■ Solar ■ Other



## States with the most large-scale energy storage

■ Operating ■ Planned

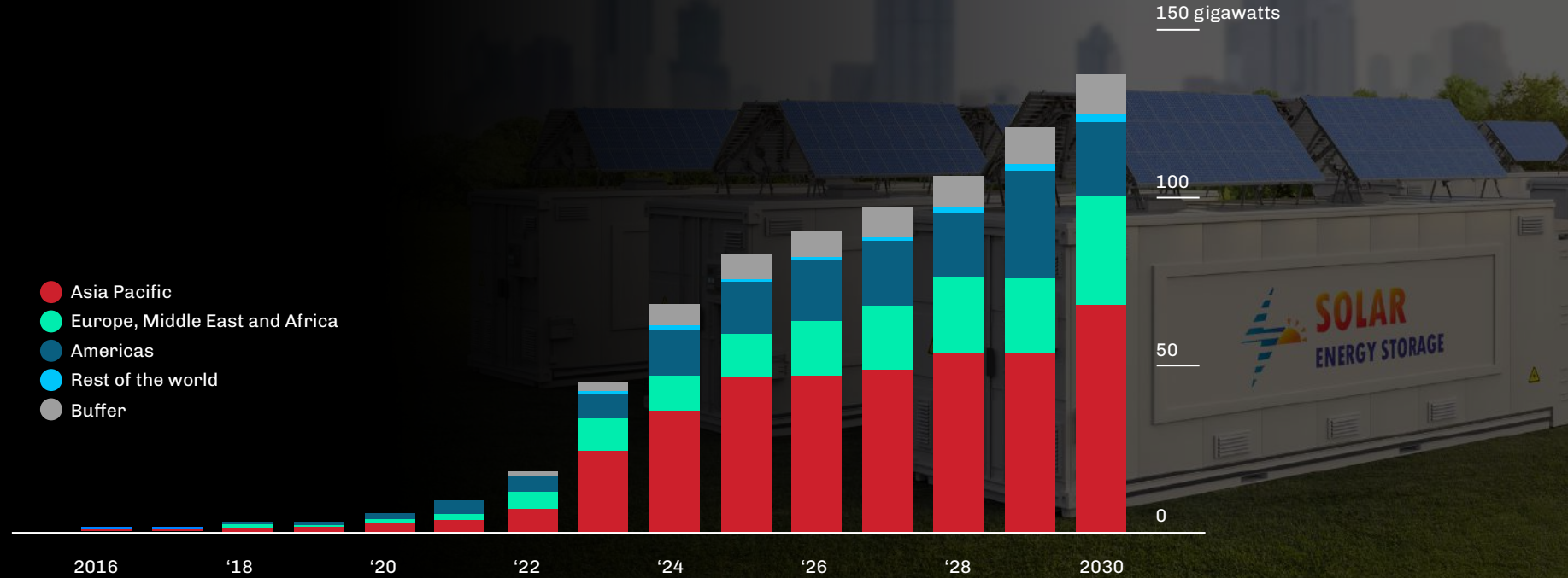


Source: Joshua D. Rhodes, PhD, The University of Texas at Austin & IdeaSmiths LLC drawn from ERCOT data \* Other includes solar, hydro, petroleum coke (pet coke), biomass, landfill gas, distillate fuel oil, net DC-tie and Block Load Transfer imports/exports and an adjustment for wholesale store load.

Notes: Includes standalone and co-located storage projects; excludes pumped hydro storage; minimum project size for inclusion in data is 200 kilowatts; data through late May | Source: S&P Global Market Intelligence 164

# GLOBAL ENERGY STORAGE ADDITIONS TO TAKE OFF THIS DECADE

Annual global energy storage installations, by region

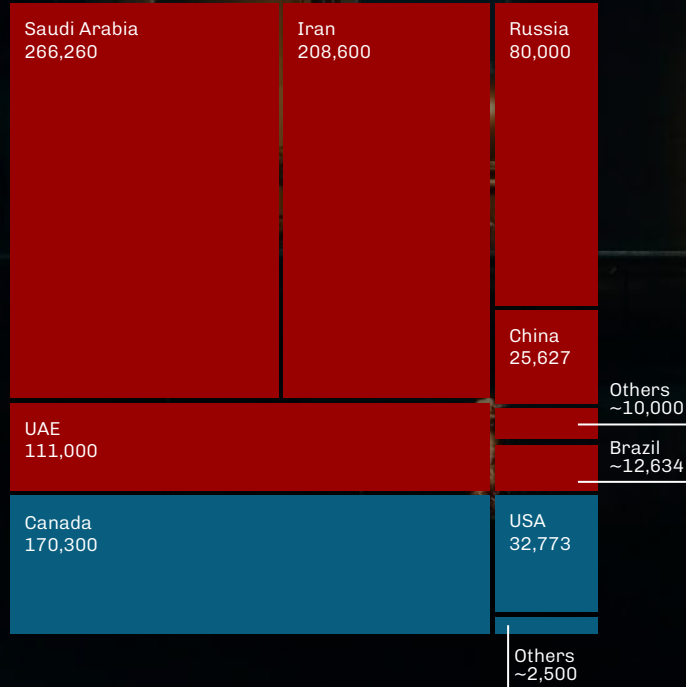


# ELECTRIC IS INTERESTING, BUT WE STILL USE A LOT OF OIL: G7 V BRICS+

BRICS G7

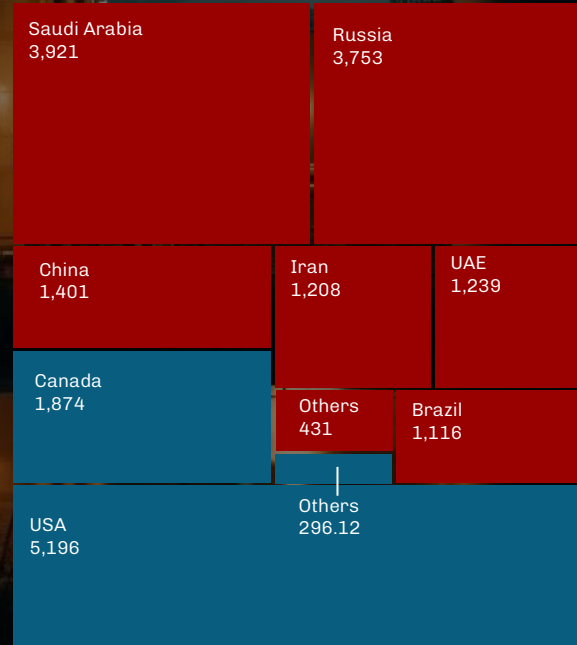
**BRICS+ & G7 Proven Oil Reserves**  
(millions of barrels)

BRICS+: 78%  
G7: 22%



**Oil Production, 2022**  
(millions of barrels)

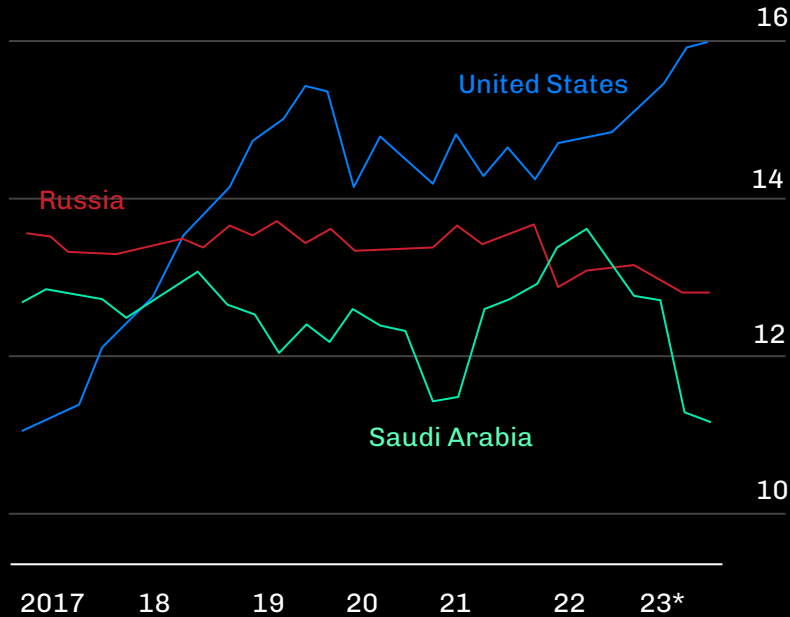
BRICS+: 64%  
G7: 36%



# U.S. MAKING MORE THAN CONSUMING FOR FIRST TIME

## The America of oil

Crude-oil production % of world total



\*Forecast for Q4 | Source: Rystad Energy.

## A fracking good time

United States, primary energy\*, exajoules



\*Energy obtained directly from natural resources | Source: EIA | Chart: The Economist.

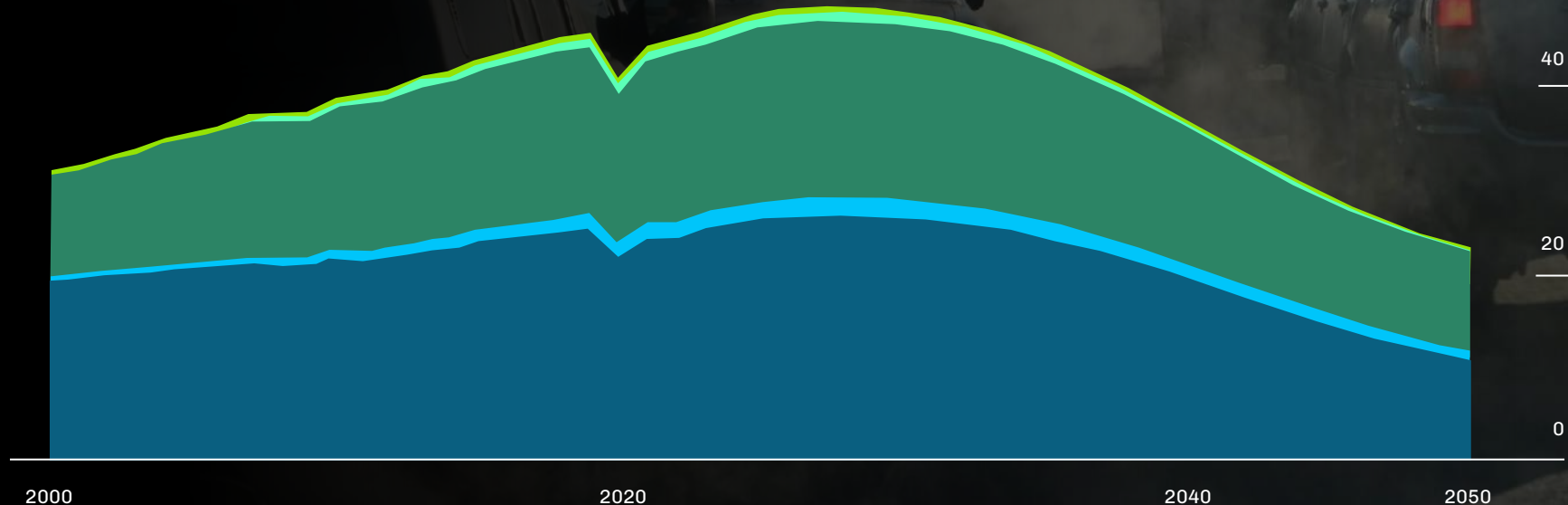
# ROAD FUEL DEMAND IS SET TO PEAK IN 2027 AS EVS AND ALTERNATIVES BITE

## Global road fuel outlook — Economic Transition Scenario

Electric vehicles are already displacing nearly 1.8 million barrels of oil every day, a number set to double by 2027 and triple by 2029, per BloombergNEF's Road Fuel Outlook.



60 million barrels per day



Note: Biodiesel includes both bio and renewable diesel. BNEF's Economic Transition Scenario models a market-led energy transition assumes no policy changes. Source: International Energy Agency, BloombergNEF.

# NEW ENERGY

- **Humanity Is Still an Energy Infant:** On the Kardashev Scale, we rank 0.72 out of 4 — far from a Type I planetary civilization.
- **The U.S. Energy Mix Is Still Dominated by Fossil Fuels:** In 2023, 74% of energy consumption came from petroleum and natural gas, while renewables made up only 8.2%. Transportation and industry remain the biggest consumers, underscoring the challenge of transitioning to cleaner energy
- **Data Centers Are Power-Hungry Giants:** The U.S. has more data centers than all major countries combined, and AI-driven demand is surging. America could run out of energy by 2028 unless infrastructure expands.
- **Virginia now dedicates 26% of its power to data centers,** prompting the approval of a Common Wealth Fusion reactor. Meanwhile, Malaysia is scaling up as Asia's data hub, boosting capacity tenfold by 2026, with Johor leading the charge.
- **Private Fusion Investment Is Surging:** 50 startups have raised \$13B, with 80% of funding coming in the past four years.
- **Europe Faces a Major Challenge in Competing for the Data Center Market:** Industrial electricity prices have skyrocketed up to 137% since 2019, while the U.S. has seen a 16% decline, making energy-intensive operations increasingly unviable.
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- **China Expanding Solar and Wind Energy:** With 1,206 GW of installed solar and wind capacity, China hit its 2030 target six years early. The country alone accounts for two-thirds of global wind and solar projects under construction.
- **Nuclear Surges Ahead:** Modular reactors gain traction, while \$153.5B floods into nuclear projects as global demand spikes.
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- **For the first time, U.S. domestic energy production exceeds consumption,** while oil output leads globally, surpassing Russia and Saudi Arabia.
- **Battery Storage Surging:** Asia leads global growth, while Texas dominates U.S. expansion.
- **Road fuel demand is set to peak in 2027 as EV adoption and alternative fuels displace nearly 1.8 million barrels of oil per day — set to double by 2027 and triple by 2029.**

A person in silhouette is seen from behind, looking at a vast, futuristic digital interface. The interface is filled with glowing blue and white data, code, and abstract patterns, creating a sense of depth and complexity. The overall color palette is dominated by deep blues and bright whites, with a slight glow from the digital elements. The person's silhouette is dark against the bright, glowing background.

# KEY POINTS: TL;DR

## CHANGING WORLD ORDER AND GLOBAL ECONOMY

- **Global Sentiment:** The West is emerging from a supercycle of pessimism. In 2024, only 33% of people in the U.S. believed their country was on the right path, compared to 80% in India.

- **Election Trends:** 2024 elections saw every governing party in developed countries lose vote share, indicating a shift in political landscapes.

### U.S. Economic Performance:

- **Tech Leadership:** The U.S. has surpassed China as the EU's leading trade partner.
- **Manufacturing Resurgence:** U.S. factory construction investment soared by 40%, marking a peak in manufacturing activity.
- **U.S. dominates global innovation:** Home to nearly all \$10B+ high-tech giants under 50 years old, leaving Europe far behind in scaling new industry leaders.
- **Investment Flows:** Just in the first three weeks post-U.S. election, \$140 billion flowed into U.S. stock funds, contrasting with capital outflows from China, Japan, and Europe.

### China's Economic Dynamics:

- **Manufacturing Dominance:** China leads in EVs, batteries, solar, rail, and drones, with 31.6% of global manufacturing output, double that of the U.S. (15.9%).
- **Electrification Milestone:** China, the first "electrostate," uses electricity for over 30% of final energy consumption, a metric that includes things like gas for heating appliances and petrol for cars.
- **Research Excellence:** Eight of the top ten universities for peer-reviewed publications are in China, showcasing its academic strength.
- **Economic Pressures:** Labor costs exceed \$8/hour, making China less competitive against India, Vietnam, and Malaysia, with 30% of industrial Chinese firms recording losses.
- **Startup Ecosystem:** China's startup scene is shrinking due to reduced venture capital directed towards the country.

## ARTIFICIAL INTELLIGENCE

- **Economic Efficiency:** S&P 500 companies are now generating \$1M in revenue with just two employees, compared to seven in 1990, pointing towards a future where AI-driven automation might see one-person billion-dollar companies.
- **AGI Timeline:** AI leaders predict the arrival of Artificial General Intelligence (AGI) imminently.
- **Compute and Storage:** Costs have dramatically decreased, with 1GB of storage now costing just \$0.01 from \$438,000 forty-five years ago. AI token processing costs have also dropped from \$36 to \$0.25 per million tokens in 18 months.
- **Energy Efficiency:** The human brain is still 8000 times more energy-efficient than current AI chips, performing at 50 petaFLOPs per watt compared to 1 petaFLOP per 175 watts for AI. New thermodynamic and quantum chips aim to close this efficiency gap.
- **Shifting Dominance:** OpenAI's share in large language models fell from 50% to 34% in 2024, while Anthropic's grew from 12% to 24%, signaling a competitive shift in AI market leadership.
- **Data Advantage:** XAI holds a unique position with its expansive data from automotive, neuroscience, and social media sectors, including over 2 billion miles of driving data and trillions of text-based interactions, providing a substantial edge in AI training datasets.

## HUMANOIDS

- **Technological Convergence:** The acceleration of humanoid development is driven by exponential growth in AI, autonomous systems, electrification, advanced materials, navigation sensors, battery technology, propulsion, renewable energy, and computing power.
- **Market Scale:** Humanoid robot production might outstrip global car manufacturing, potentially reaching ~100M units annually, with a market potential exceeding 10 billion units, outnumbering the global human population.
- **Competitive Landscape:** Over 60 companies worldwide, including major players like Boston Dynamics, Tesla, Apptronik, Nvidia, Agility, Figure AI, and Sanctuary AI from the U.S., China, Canada, and Norway, are in a race to dominate this burgeoning market.
- **Labor Shortage:** The U.S., with a population of 335 million, faces a labor shortfall compared to China's 1.41 billion, where humanoids could address workforce gaps in sectors such as the military, law enforcement, sanitation, and other industrial sectors.
- **Cost Efficiency:** The projected labor cost for humanoids is about \$1.29/hour

## SPACE

- The Outer Space Treaty of 1967 restricts territorial claims and military use in space, coinciding with a historical decrease in NASA's budget. China and Russia's lunar ambitions challenge the treaty's contemporary relevance.
- China's space program is accelerating with 30 rocket launches in the first half of 2024, alongside companies mimicking SpaceX's advanced launch systems, and a record nine hour spacewalk.
- With 25 planned Starship launches for 2025, SpaceX is slashing launch costs from \$51,000/kg during the Space Shuttle era to potentially below \$100/kg, democratizing space access.
- Starship is likened to the Manhattan Project for space, poised to reduce costs, accelerate exploration, spawn new industries, and advance humanity towards multi-planetary existence.
- If scaled, Starship production could match that of the Boeing 737, at approximately one per day, ushering in an era of mass-produced, reusable space vehicles.
- By 2030, nearly a 4X increase in number of satellites in orbit expected, raising from 15,000 to 55,000 satellites.
- Starlink holds a 90% share in satellite direct-to-device connectivity, with 349 satellites launched in 2024, partnering with telecom giants like T-Mobile, Rogers, and Optus to extend mobile coverage globally.
- Blue Origin's New Glenn reaching orbit signifies a significant step forward in commercial spaceflight capabilities.

## FLYING THINGS

- U.S. general aviation production peaked at 17,500 units in the 1970s but plummeted due in part to a 2000x increase in product liability insurance costs from \$50 in 1962 to \$100,000 per airplane in 1988.
- Despite the U.S., Japan, and Europe inventing most modern drone components, nearly all production has shifted to China due to cost efficiency, regulatory constraints, market dominance, and export control advantages.
- China's eVTOL sector is surging, with a rapidly expanding ecosystem of manufacturers and long-range, cost-efficient designs positioning it as a global leader in urban air mobility.
- With 1,200+ planned landing sites and regulatory backing, China is fast-tracking eVTOL adoption, turning urban air mobility into reality.
- China's CATL is pushing the boundaries of electric aviation, successfully flying a 4-ton plane on high-density "condensed batteries" and targeting an 8-ton aircraft with 1,865-mile range by 2028.
- China leads trade in 128 of 190 countries, creating a captive market for its COMAC C919 airliner — despite heavy reliance on U.S. suppliers.
- Blended Wing Body (BWB) slashes fuel burn by 50% — JetZero advances in the U.S., while COMAC develops its own in China.
- U.S. eVTOL leaders — Joby, Archer, Beta, and Pivotal — are pushing electric air mobility forward with FAA-certified aircraft, commercial & defense partnerships, and operational testing.
- eVTOL Market Shakeout: Established aerospace giants tread cautiously — Airbus halts its program, while Boeing and Embraer continue development — while European startups struggle, with Lilium declared insolvent and Volocopter facing financial distress, opening the door for potential Chinese acquisitions.
- Hydrogen Aviation Narrows: Universal Hydrogen collapses due to financial struggles, leaving ZeroAvia as the last major U.S. player.
- Supersonic Revival: Boom's XB-1 completes the first civilian supersonic test flight since Concorde.
- Drone Delivery Expands: Wing partners with DoorDash after Walmart success, while Zipline advances logistics with Platform 2, building on its medical delivery expertise.

## DEFENSE

- The Economics of War Are Shifting: Low-cost, autonomous systems — \$1K drones, \$10K drone boats, and \$30K humanoids — are redefining military strategy, challenging traditional million-dollar assets.
- Hypersonic Missiles Render Aircraft Carriers Obsolete: Russia ramps up production, China's weapons threaten U.S. defenses, and experts warn carriers could be destroyed in seconds.
- China continues mirroring U.S. tech, unveiling the J-35 and J-36 — strikingly similar to America's F-35 and NGAD — while also fielding a lower-cost C-17 lookalike (Y-20).
- U.S. air-launched weapons rely heavily on Chinese suppliers, with critical components — electronics, software, propulsion, and testing — sourced from hundreds of Chinese firms.
- China tightens its grip on strategic materials, banning exports of gallium, germanium, and antimony — critical for defense tech — while sanctioning U.S. drone maker Skydio for supplying Taiwan.
- Defense Giants Face Disruption: Palantir, with just 2% of RTX's workforce, now leads in market cap, while Anduril scales aggressively to challenge legacy primes.
- Southern California Emerges as Defense Tech Hub: A new wave of agile, tech-driven players is reshaping the U.S. defense industry, clustering around Southern California's innovation ecosystem.
- Hypersonic Propulsion Innovation Accelerates: Startups like Hermeus, Venus Aerospace, and Astro Mechanica are pioneering next-gen engines, from turbine-based combined cycles to rotating detonation and adaptive turbojet-ramjet designs.

## AUTO

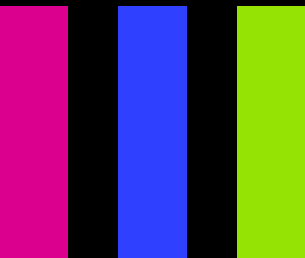
- GM shuts Cruise after \$10B investment, leaving Waymo and Tesla as the last major contenders in the fully autonomous vehicle space.
- Waymo solidifies its position as the leading current autonomous ride-hailing service, surpassing Lyft in San Francisco market share while expanding to new cities, including Los Angeles, Austin, and Miami.
- Tesla's Full Self-Driving (FSD) technology sees exponential progress, with version 13.2.x showing a 750% improvement in disengagement rates, highlighting the rapid evolution of its AI-driven driving system.
- Tesla prepares to launch a rideshare service and ramp up production of its "Cybercab," aiming for a \$1 trillion market opportunity with ultra-low-cost per-mile pricing.
- China Is Rapidly Taking over Global Auto Production: Rising from just 1% in 2000 to 39% today, China has become the world's top car producer. Its grip is even stronger in EVs, where it now controls 76% of the market, outpacing Europe and the U.S.
- The Internal Combustion Engine Has Peaked: Global gas-powered vehicle sales topped out in 2017 and have been declining since, with EVs steadily eating into their market share — positioning electric as the future of mobility.
- China Dominates Global EV Battery Supply: CATL and BYD alone control over 50% of the market, cementing China's lead in battery production. With lower costs and increasing scale, China's influence over the global EV supply chain continues to grow.
- EV Battery Overcapacity Is Hitting Hard: A surge in global battery production — far exceeding demand — is straining the market.
- Northvolt's Collapse Signals the Fallout: Northvolt raised \$15B but filed for bankruptcy in November 2024, underscoring the financial strain of oversupply and intense competition.
- Europe's Auto Industry Is Unraveling: 1/3 of EU plants are running at half capacity or less, and German automaker profits are in freefall (VW -64%, BMW -84%, Audi -91% comparing 3Q23 vs 3Q24 results).

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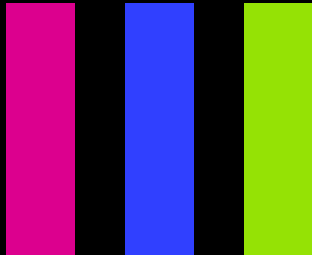
# THE END

For questions or media inquiries, please  
reach out to [press@up.partners](mailto:press@up.partners)



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