Bridging the Gap Between Engineering and Policy:

My Experiences

***Dr. James Gover, IEEE Life Fellow**
jgover@kettering.edu

University of New Mexico
Department of Nuclear Engineering

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Student Center, First Floor UNM Farris Engineering Center, 2:00 P.M.

Acknowledgement: Dale Dekker for providing many references

***James Gover, Ph.D., UNM, is an IEEE Life Fellow, Kentucky Colonel, former IEEE-USA Congressional Fellow (US Senate and House of Representatives), former IEEE-USA Competitiveness Fellow (U.S. Senate and U.S. Department of Commerce), Recipient IEEE-USA Citation of Honor for policy research, Kettering University Professor Emeritus, and retiree Sandia National Labs. He was a principal researcher for the U.S. House of Representatives Technology Policy Task Force report, Technology and Its Effect on the National Economy, https://catalog.libraries.psu.edu/catalog/23471027. His research and publications showed the industrial policies of the Clinton administration were, at best irrelevant, and, at worst, anti-competitive.**

DeepSeek Has Upset U.S. Power Demand Projections

- **"It took just a single day's trading for Chinese artificial intelligence company DeepSeek to upend the US power market's yearlong hot streak premised on a boom in electricity demand for artificial intelligence.**
- **AI's energy needs have led companies such as OpenAI, Alphabet Inc. and Microsoft Corp. to seek new sources of power, such as shuttered nuclear plants. It has also complicated their ambitious climate goals. DeepSeek's model appears to be more efficient and can achieve the same results for a fraction of the energy use, which may mean AI will have a smaller climate impact than thought.**
- **The DeepSeek development "calls into question the significant electric demand projections for the US," analysts led by Julien Dumoulin-Smith at Jefferies wrote in a note on Monday. AI represents about 75% of overall US power demand forecasts through 2035 in most projections, Jefferies said."**

Michelle Ma and Mark Chediak, An AI emissions reprieve? Bloomberg, January 28, 2025.

Outline

- Purpose: Persuade YOU to engage in New Mexico policy development.
  - First, Nuclear Power Policy.
  - Next, Energy Policy
  - Later, Broader Technology-Based Policy Development.
  - Finally, National and International Technology-Based Policy That Could Impact Your Employer/Employment.
- Why is that important?
  - New Mexico Policy Decisions Will Impact the Future of Some of YOU!
  - YOU Have Unique, Problem-Solving Skills Needed to Make the Best Policy!
  - New Mexico's Political Leaders Need to Hear From YOU!
  - YOU May Someday Work for a Company that Pursues International Markets.
  - YOUR Ambitions May Include Becoming a Corporate CEO or CTO.
  - YOU May Be Underestimating Your Influence; You Are New Mexico's Future
- How?
  - Review Technology Trends: Data and Experts' Predictions.
  - Summarize Nation's and New Mexico's Economic Status.
  - Make the Case for a Nuclear Power Renaissance Largely Based on Powering Data Centers.
  - Describe My Policy Experiences: Policy Is Neither an Exact Science, nor Is It Prescriptive.
    - Failures Presented with the Primary Cause Identified.
    - Successes.
  - Determine What New Mexico Should Do to Capture the Economic Rewards of Modular Nuclear Power and Space Nuclear Power
- Determine What UNM Nuclear Engineering Students Can Do to Impact Nuclear Power Policy in New Mexico

Perspective from Governor Lujan-Grisham: AJ-01/26/2025

“I urge you to contact your legislators during this 60-day session. Share your stories and ideas. Tell them what your family and community need most. The legislative process works best when citizens are actively involved.

…

This year’s 60-day session gives us a critical opportunity to … tackle our toughest challenges head-on.”

NM's Top Business Chambers Are Advocating for Key Policy Changes in the 2025 Legislative Session, Focusing on Public Safety, Tax Relief, and Economic Growth. *NECESSARY BUT INSUFFICIENT*!

Greater Albuquerque Chamber of Commerce, Building a Competitive Economy:

1. **Public Safety:** Tougher penalties for firearm offenses, addressing repeat offenders, and investing in law enforcement.
2. **Tax Relief:** Opposing new business taxes and reducing the gross receipts tax.
3. **Health Care Access:** Eliminating the GRT on medical appointments, streamlining credentialing, and reforming medical malpractice laws to retain health care workers.

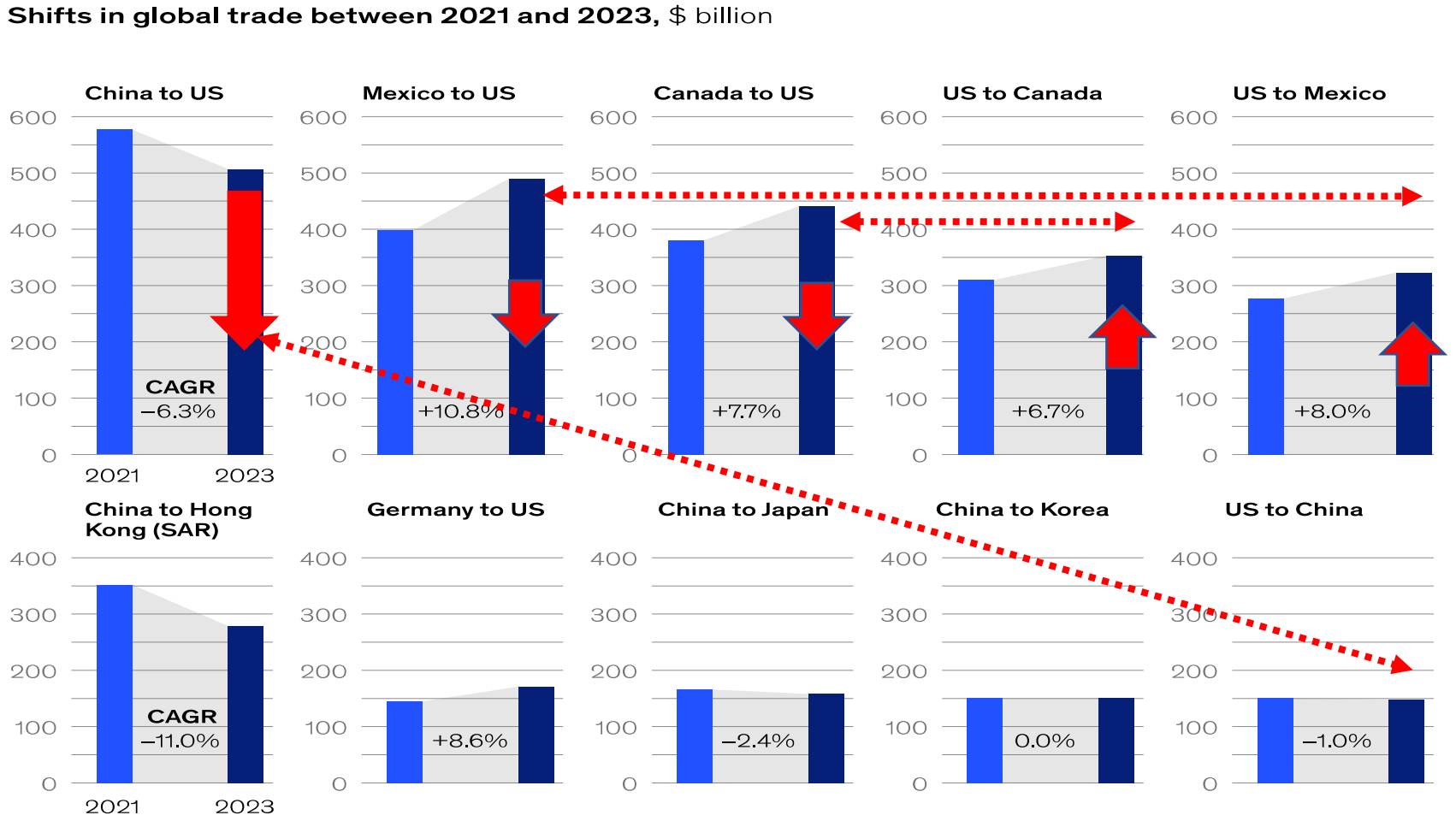
New Mexico Chamber of Commerce, Reducing Business Barriers:

1. **Regulatory Reform:** Simplifying regulations to ease compliance for businesses.
2. **Tax Code Improvements:** Encouraging investment with fair and competitive tax policies.
3. **Bipartisan Collaboration:** Working across political lines to address economic challenges.

Albuquerque Hispano Chamber of Commerce, Supporting Growth & Public Safety:

1. **Crime Reduction:** Increased law enforcement funding and tougher penalties for violent crimes.
2. **Health Care Access:** Recruiting and retaining medical professionals while reforming costly malpractice laws.
3. **Energy & Environment:** Promoting responsible energy development and water conservation.
4. **Business Advocacy:** Opposing mandates that increase operational costs, such as paid family leave and minimum wage hikes.

Shifts in International Trade (2021-2023)

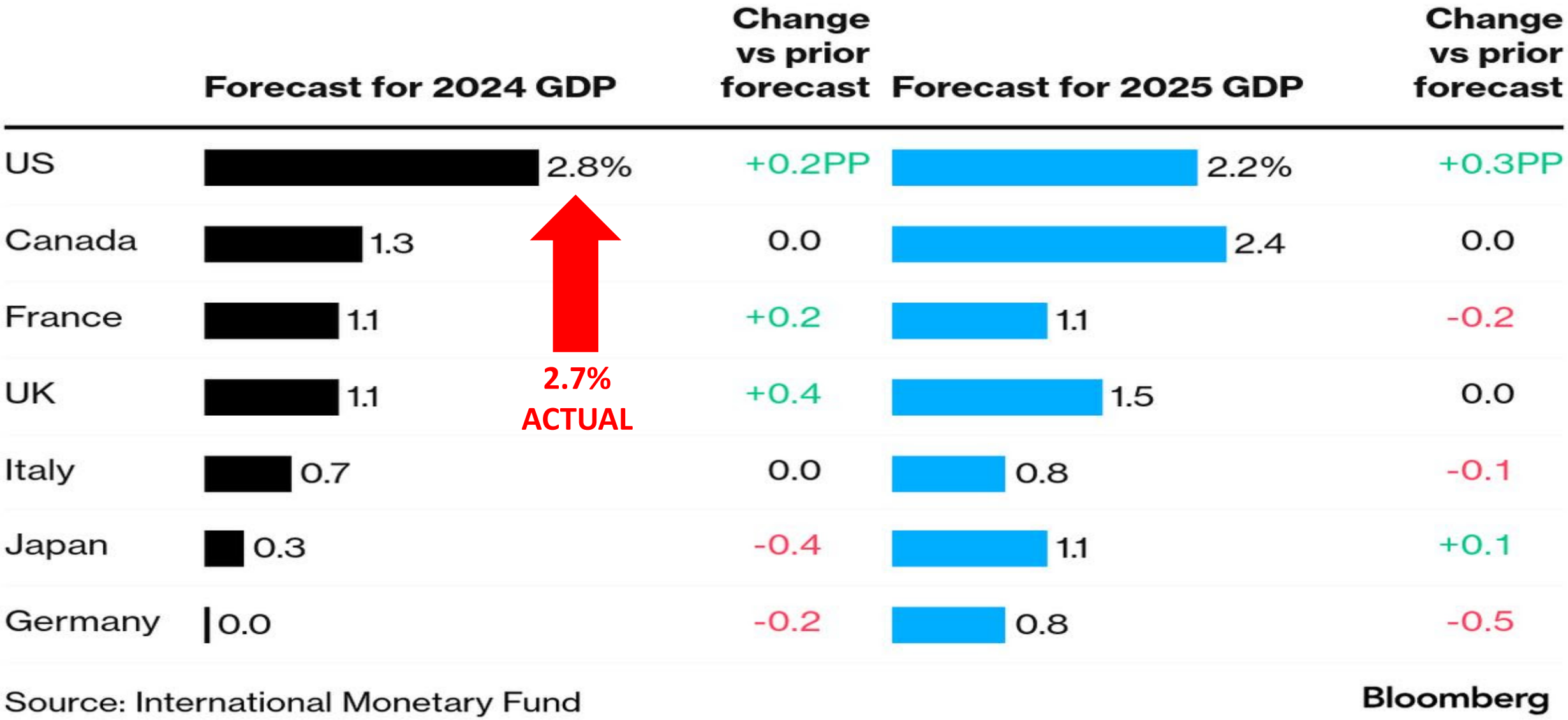


"Net foreign direct investment (FDI) inflows to China decreased from $344 billion in 2021 to $42.7 billion in 2023, the lowest FDI inflows in three decades. Analysts predict that this redirection of investment will likely accelerate over the next decade. It will be critical for business leaders to monitor where this funding lands."

Cindy Levy, Shubham Singhal, and Matt Watters, A proactive approach to navigating geopolitics is essential to thrive, McKinsey and Company, Nov. 12, 2024.

US Economic Growth Seen Outpacing Rich Peers in 2024

IMF projects US economy will fare better than other G-7 countries



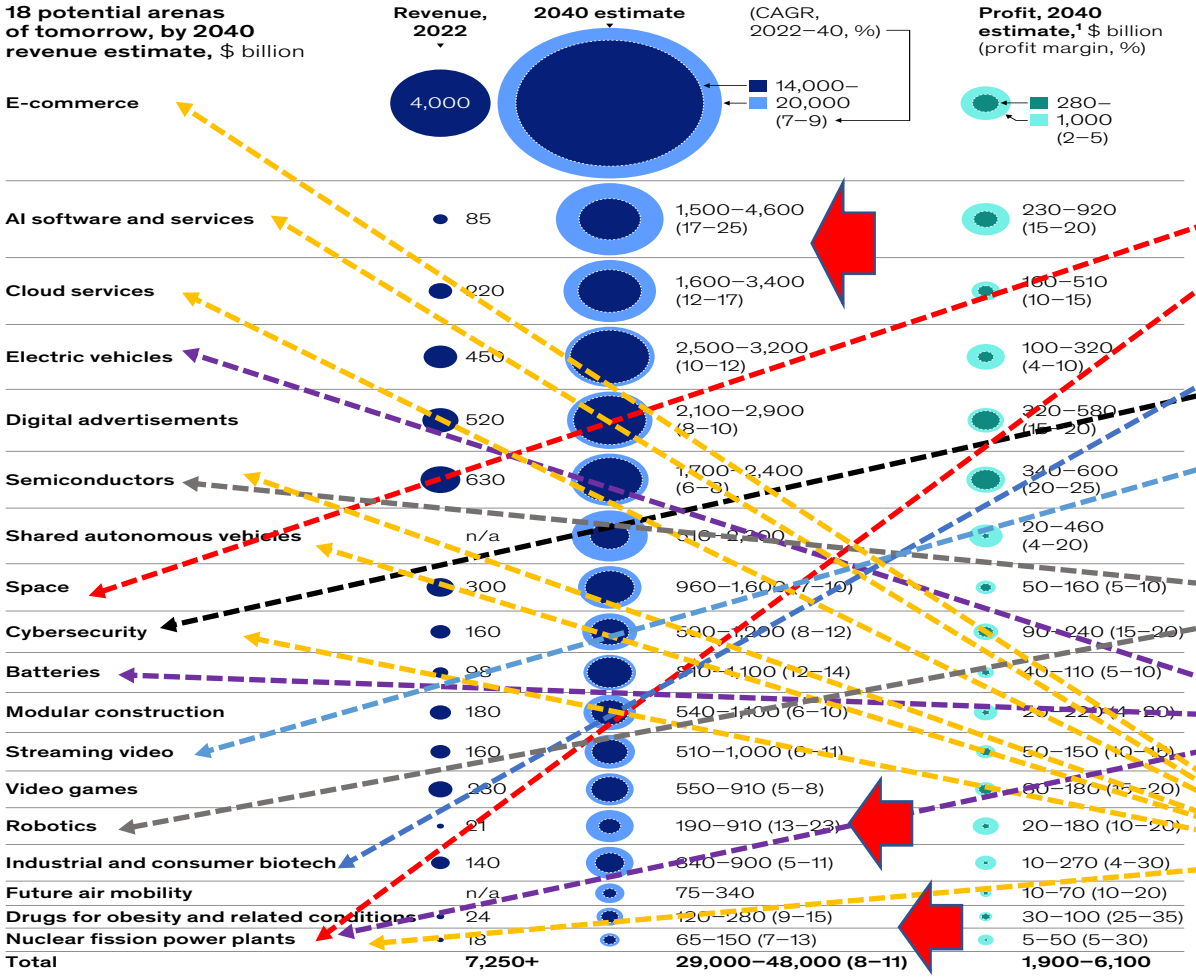
Source: International Monetary Fund

Bloomberg

McKinsey & Co. Predictions for Industrial Growth: Comparison to NM Strategic Industries

ENGINEERS FOUNDED

The 18 potential arenas of tomorrow could generate $29 trillion to $48 trillion in revenues and $2 trillion to $6 trillion in profits.



[1]Defined as net operating profit less adjusted taxes (NOPLAT). NOPLAT share based on most closely mappable industries from our database of 3,000 companies analyzed in chapters 1 and 2.
Source: Company annual reports; McKinsey Value Intelligence; McKinsey Global Institute analysis

New Mexico Strategic Industries

- **Aerospace**
  - SPACE NUCLEAR POWER
- **Biosciences**
- **Cybersecurity**
- **Film and Television**
- **Outdoor Recreation**
- **Sustainable and Value-Added Agriculture**
- **Intelligent Manufacturing**
- **Global Trade**
- **Sustainable and Green Energy**
  - MODULAR NUCLEAR POWER

DATA CENTERS?

- MODULAR NUCLEAR POWER

McKinsey and Company, Technology Trends Outlook 2024

- **Electrification, Energy and Climate ($334B 2023 Total Equity Investment)**
  - Electrification and Renewables: $183B 2023 Equity Investment.
  - Climate Technology Beyond Electrification and Renewables: $68B 2023 Equity Investment.
  - *Future of Mobility (EV, HEV, AV): $83B 2023 Equity Investment.*
- **Artificial Intelligence, Computing, Software ($237B 2023 Total Equity Investment)**
  - Applied Artificial Intelligence: $86B 2023 Equity Investment.
  - Cloud and Edge Computing: $54B 2023 Equity Investment.
  - Generative Artificial Intelligence: $36B 2023 Equity Investment.
  - Digital Trust and Cybersecurity: $34B 2023 Equity Investment.
  - Next Generation Software: $17B 2023 Equity Investment.
  - Immersive-Reality Technologies: $6B 2023 Equity Investment.
  - Industrializing Machine Learning: $3B 2023 Equity Investment.
  - Quantum Technologies: $1B 2023 Equity Investment.
- Future of Bioengineering: $62B 2023 Equity Investment.
- Advanced Connectivity: $29B 2023 Equity Investment.
- **Future of Space Technologies: $9B 2023 Equity Investment.**
- Future of Robotics: $6B 2023 Equity Investment.

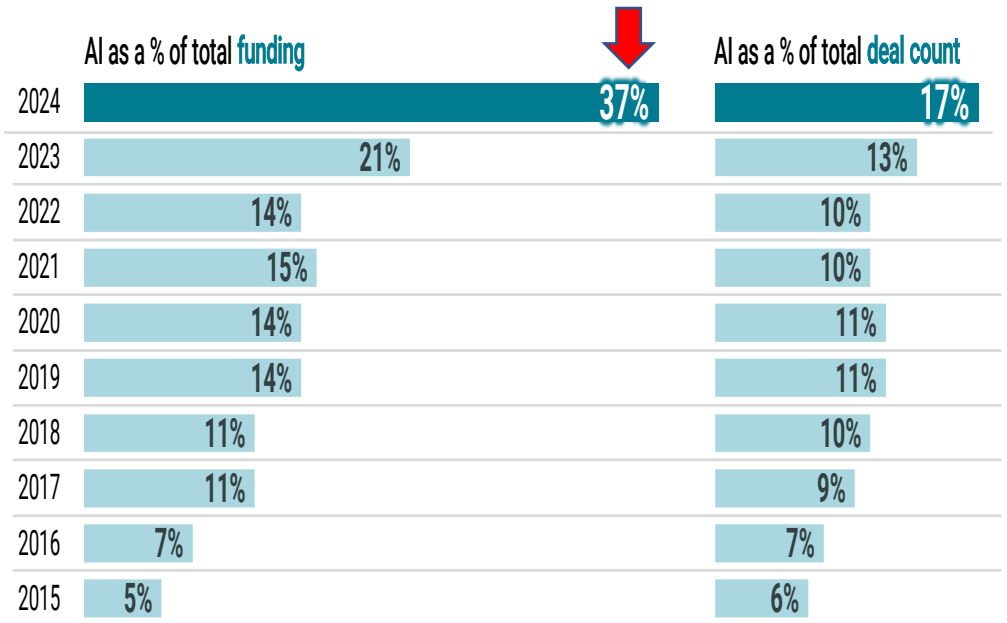
The global data center market was valued at $219.23 billion in 2023 & $260 billion in 2024. The market is expected to grow at a CAGR of 11.6% reaching $584.86 billion by 2032. The surge in AI development, particularly generative AI, is driving data center investment.

NUCLEAR POWER

AI Is Also the Preferred Investment Area for Venture Capitalists

The AI arms race reshapes venture activity

AI now captures 37% of venture funding and 17% of equity deals



The 5 largest deals in 2024 are for AI companies

1. databricks — $10.0B — Series J — 2024-12-17
2. OpenAI — $6.6B — Venture Capital — 2024-10-02
3. xAI — $6.0B — Series B — 2024-05-26
4. xAI — $6.0B — Series C — 2024-11-20
5. ANTHROPIC — $4.0B — Corporate Minority — 2024-11-22

Fastest-growing tech markets revolve around AI & automation

Market / Industry	Deal growth YoY	2023 deals	2024 deals
Autonomous agents & digital coworkers — Enterprise tech	150%	8	20
GenAI for customer support operations — Enterprise tech	150%	6	15
Water treatment systems — Industrials	113%	8	17
Edge AI processors — Enterprise tech	82%	11	20
Earth observation satellites — Industrials	60%	10	16
Industrial humanoid robots — Industrials	52%	25	38
Security operations center AI agents & copilots — Enterprise tech	50%	8	12
AI-derived biologics – proteins — Healthcare & life sciences	45%	11	16
Autonomous driving systems — Industrials	44%	18	26
Sustainable cement & concrete developers — Industrials	44%	9	13

CBInsights, State of Venture Global | 2024 recap

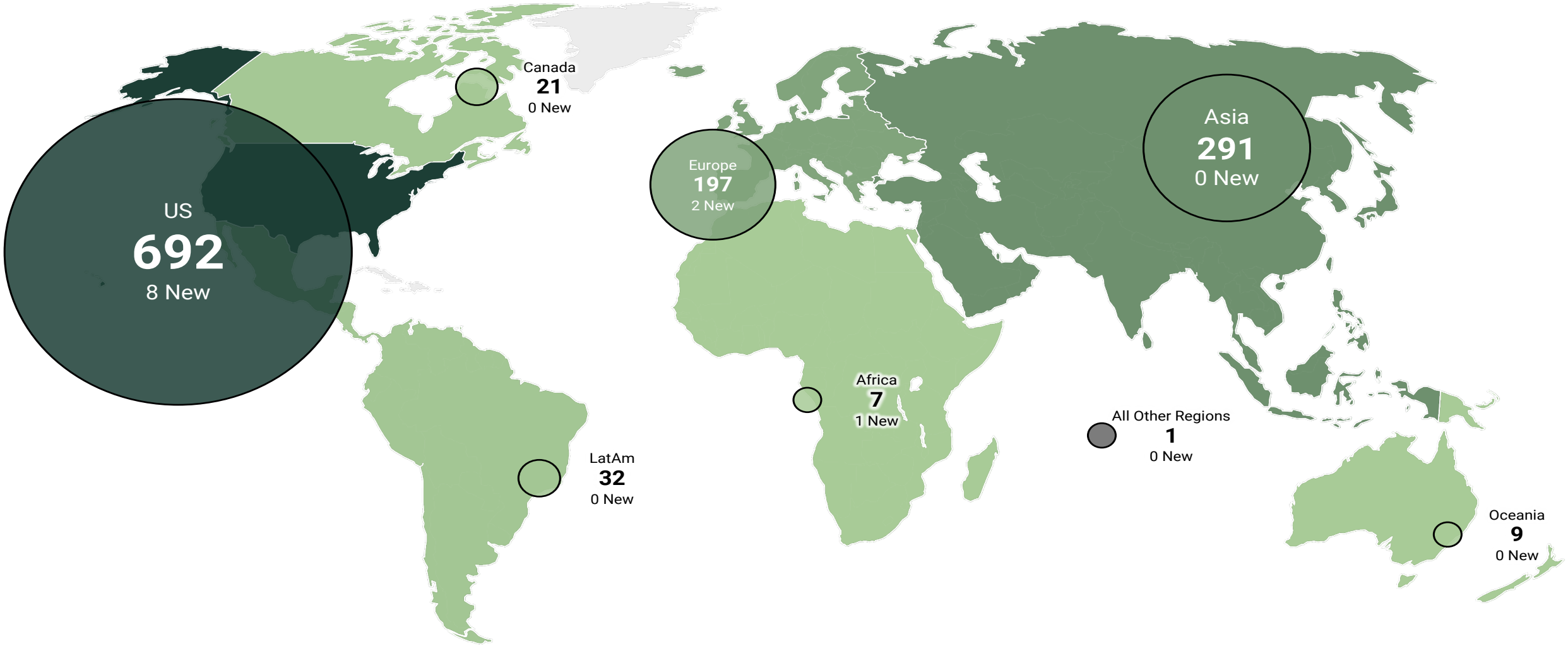
But X-Energy, Pacific Fusion and Intersect Power Were Among the Top Equity Deals

Global: Top equity deals in Q4'24

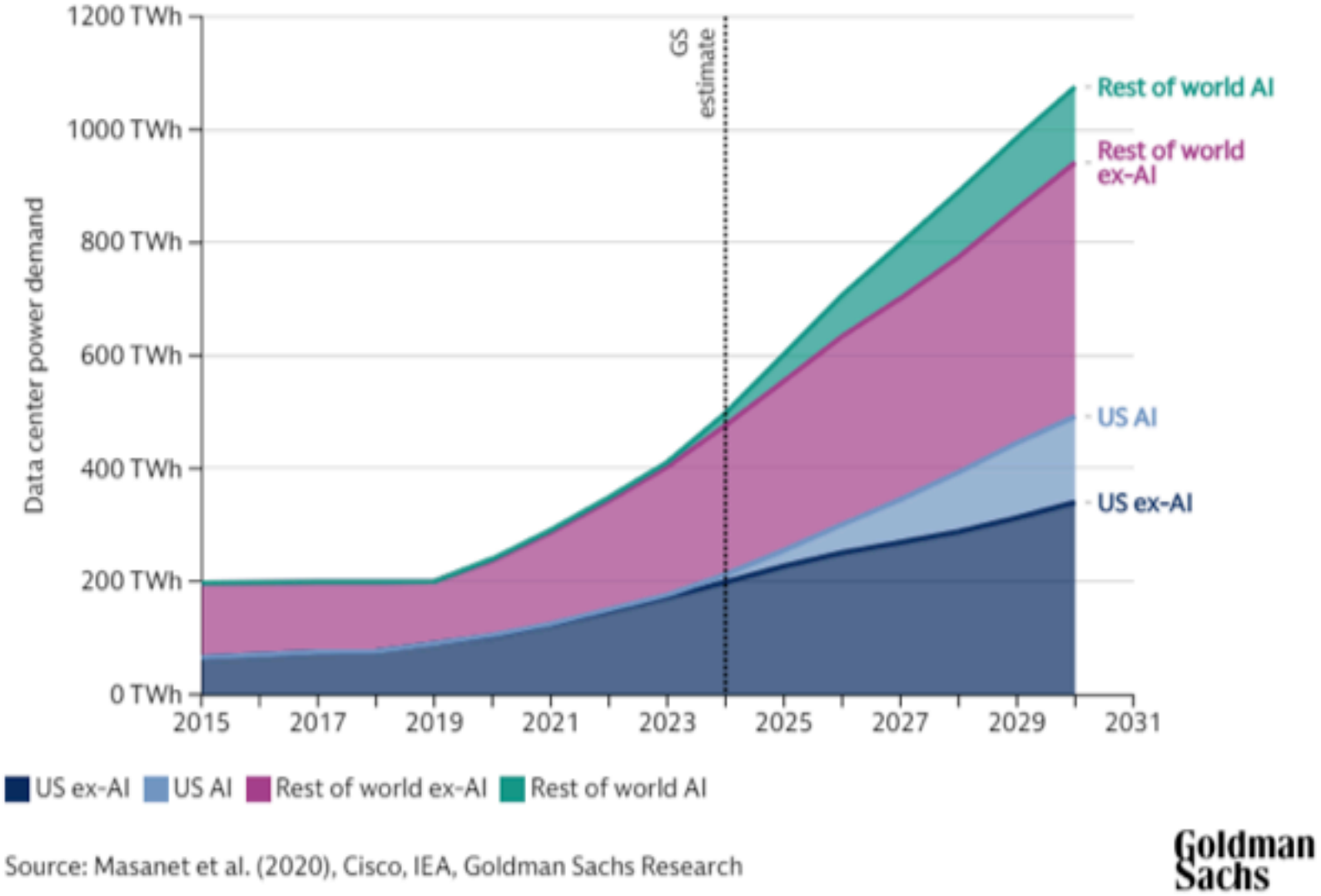
	Company	Round Amount	Round Date	Round Valuation	Select Investors	Country	Sector	Industry Subindustry	Mosaic Score
1	**Databricks**	**$10.0B**	**Series J** 2024-12-17	$62.0B	Andreessen Horowitz, DST Global, GIC, Insight Partners, Thrive Capital	United States	Internet	**Internet Software & Services** Application & Data Integration	950
2	**OpenAI**	**$6.6B**	**Venture Capital** 2024-10-02	$157.0B	Thrive Capital, Coatue, Khosla Ventures, Microsoft, Tiger Global Management	United States	Internet	**Internet Software & Services** Application & Data Integration	950
3	**xAI**	**$6.0B**	**Series C** 2024-11-20	$50.0B	Andreessen Horowitz, Lightspeed Venture Partners, Sequoia Capital, Fidelity Investments, Kingdom Holding Company	United States	Internet	**Internet Software & Services** Business Intelligence, Analytics & Performance Mgmt	920
4	**Anthropic**	**$4.0B**	**Corporate Minority** 2024-11-22	N/A	Amazon	United States	Internet	**Internet Software & Services** Application & Data Integration	950
5	**Pacific Fusion**	**$900M**	**Series A** 2024-10-25	N/A	General Catalyst, Breakthrough Energy, Eric Schmidt, John Doerr	United States	Energy & Utilities	**Renewables** N/A	830
6	**Vuori**	**$825M**	**Series D** 2024-11-08	$5.5B	General Atlantic, Stripes Group	United States	Internet	**E-Commerce** Apparel & Accessories	890
7	**Intersect Power**	**$800M**	**Private Equity** 2024-12-10	N/A	The Rise Fund, Climate Adaptive Infrastructure, Google Ventures, Greenbelt Capital Partners	United States	Energy & Utilities	**Renewables** Infrastructure	790
8	**Tenstorrent**	**$693M**	**Series D** 2024-12-02	$2.7B	AFW Partners, Samsung Securities, Hyundai Motor Company, Baillie Gifford, Bezos Expeditions	Canada	Computer Hardware & Services	**Computer Storage & Peripherals** N/A	810
9	**Crusoe**	**$600M**	**Series D** 2024-10-29	$2.8B	Founders Fund, Felicis, Long Journey Ventures, Valor Equity Partners, Mubadala	United States	Internet	**Internet Software & Services** Application & Data Integration	870
10	**Insider**	**$500M**	**Series E** 2024-11-01	N/A	General Atlantic	Turkey	Internet	**Internet Software & Services** Customer Relationship Management	930
10	**Perplexity**	**$500M**	**Series C** 2024-12-01	$9.0B	Institutional Venture Partners, New Enterprise Associates, NVentures, B Capital, T. Rowe Price	United States	Internet	**Internet Software & Services** Application & Data Integration	950
10	**Poolside**	**$500M**	**Series B** 2024-10-02	$3.0B	Bain Capital Ventures, DST Global, Redpoint Ventures, Felicis, Adams Street Partners	France	Internet	**Internet Software & Services** Web Development	790
10	**X-energy**	**$500M**	**Series C** 2024-10-16	N/A	Ken Griffin, The Climate Pledge, NGP, University of Michigan	United States	Energy & Utilities	**Electric** Nuclear	790

U.S. Is Breeding Ground for Unicorns

New & total unicorns by global region in Q4'24



Data Center Electric Power Consumption Is Expected to Grow 160% Between Now and 2030



Goldman-Sachs forecasts 85-90 gigawatts (GW) of new nuclear capacity would be needed to meet all of the data center power demand growth expected by 2030 (relative to 2023). But well less than 10% will be available globally by 2030. Wind and solar could serve roughly 80% of a data center's power demand, if paired with storage, but some sort of baseload generation is needed to meet the 24/7 demand. Nuclear is the preferred option for baseload power, but the difficulty of building new nuclear plants means that natural gas and renewables are more realistic short-term solutions.

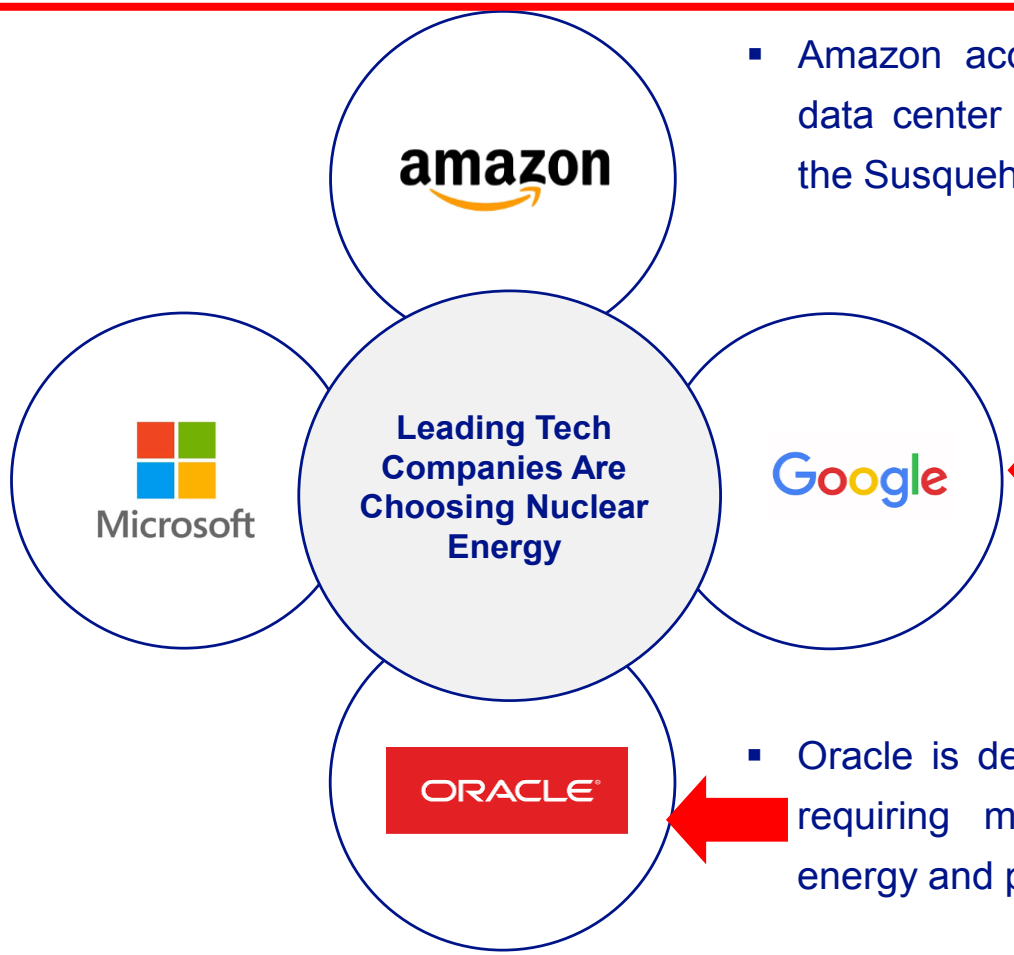
Participants at the COP28 conference in late 2023, an annual summit convened by the UN, agreed to triple global nuclear capacity by 2050.

Big Tech Building Data Centers and Nuclear Power

- Microsoft says it will spend $80B on data centers in 2025. It partnered with Constellation Energy to restart the decommissioned nuclear reactor at Three Mile Island in Pennsylvania and to fund the $1.6 billion investment required to bring the 835 MW reactor back into operation. Microsoft signed a 20-year power purchase agreement with Constellation.
- Amazon has partnered with Dominion Energy, Virginia's energy utility, to explore the development of a small modular nuclear reactor near its North Anna nuclear facility. Amazon has also partnered with Energy Northwest in Washington to finance the development, licensing and construction of in-state SMRs. Energy Northwest plans to build, own and operate the reactors, which will support Amazon's local facilities.
- Google partnered with Kairos Power to fund the construction of up to seven small modular reactors (SMRs), with the first planned for 2030 and the rest appearing by 2035. These reactors are expected to generate 500 megawatts of power across multiple locations.
- Meta stated that it intends to use nuclear power, actively seeking partners to develop nuclear energy and aiming to add 1-4 gigawatts of new nuclear generation capacity to power its AI data centers by the early 2030s.
- Other Related News:
  - The Palisades nuclear plant in Covert Township, Michigan, has received a $1.5 billion loan to restart operations. Palisades would be the first reactor to restart in U.S. history. Its owner, Holtec International, plans to restart the plant in 2025.
  - Los Alamos National Laboratory and the University of Michigan are partnering on a $1.2-billion project for two research centers near Ypsilanti, MI; one is for classified activities and the other for non-classified artificial intelligence computing and research. The UofMI Board approved $20 million for building construction.
  - Oklo and data center developer Switch closed out 2024 by announcing a new partnership to deploy 12 GW of advanced nuclear power. The two companies say they will deploy Oklo's Aurora sodium-cooled microreactors across the United States through a series of power purchase agreements. The Aurora system can deliver between 15 MW and 50 MW of power and be located on-site or near the facilities it would power, according to Oklo.
  - As demand for artificial intelligence and data centers grows, President Biden issued an executive order to ensure clean-energy power supply for the technology. The order directs the departments of Defense and Energy to lease federal land in places where the private sector can "build frontier AI infrastructure at speed and scale … in a way that enhances economic competitiveness, national security, AI safety, and clean energy," according to a White House news release. The outgoing president wants gigawatt-scale AI data centers and power facilities built quickly and tied into transmission networks—but power developers will be required to offset all of the electricity needs of the data centers with clean energy generation.
  - Westinghouse secured US $3 million for its eVinci microreactor, and Radiant Industries received $2 million for its Kaleidos microreactor, both in November from the U.S. Department of Energy (DOE).The eVinci and Kaleidos microreactors both run on uranium-based tristructural isotropic (TRISO) particles, which the DOE calls the "most robust nuclear fuel on earth" because it cannot melt inside a high-temperature reactor. Each poppy-seed-size particle of uranium, carbon, and oxygen is encased in protective carbon and ceramic layers engineered to withstand extreme temperatures.
  - The latest research indicates that emissions from uneconomically dispatched coal plants — coal plants that run when cheaper resources are available — cost communities $13–$26 billion in health costs each year. These costs are 13 times greater than what consumers are paying for that electricity, which is close to $1–$2 billion per year.
  - Santee Cooper, the big power provider in South Carolina, has tapped financial advisers to look for buyers that can restart construction on a pair of nuclear reactors that were mothballed years ago.
  - N.Y. Gov. Hochul announced $1 billion in climate investments, including nuclear initiatives, aiming for 100 percent renewable energy in state agencies by 2030.
  - At Davos 2025, panelists discussed challenges of tripling nuclear capacity by 2050. Key among them are supply chain, financing, and innovative frameworks like Terra Praxis's Ten-Terawatt Initiative for scaling SMRs.
  - A 1,300-acre site left undeveloped on the shores of Lake Ontario four decades ago could see new life as the home to a large nuclear facility. Ontario government officials have asked Ontario Power Generation to explore opportunities for nuclear development at its Wesleyville site in response to rising energy demands and interest from Port Hope and the Williams Treaties First Nations, according to a January 15 press release.

Tech Companies Are Choosing Nuclear Power

- Microsoft and BlackRock investing up to $100B in data center infrastructure and the energy to support these facilities
- Constellation Energy to restart the Three Mile Island nuclear plant and sell 100% of the power it generates to Microsoft



- Amazon acquired Talen Energy's data center campus connected to the Susquehanna nuclear station
- Google is seeking to use SMRs to generate the electricity for a large-scale data center expected to use more than 1 GW of power
- Oracle is designing a data center requiring more than 1 GW of energy and powered by SMRs

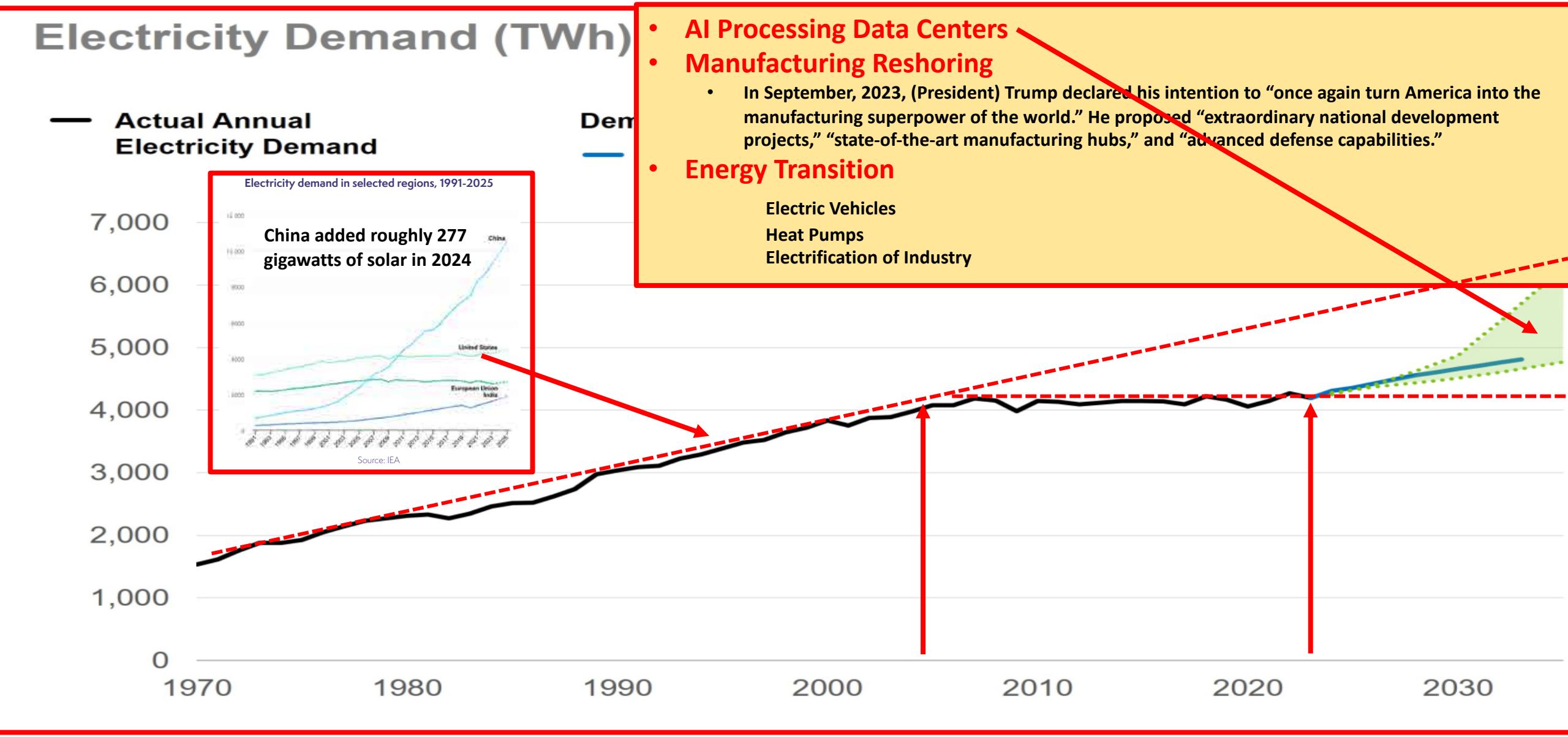
Microsoft has pledged to be carbon negative by 2030, Google to be 24/7 carbon free by 2030, Amazon net zero carbon emissions by 2040, and Oracle to achieve net zero emission by 2050

NUSCALE Power for all humankind

January 21 White House Announcement

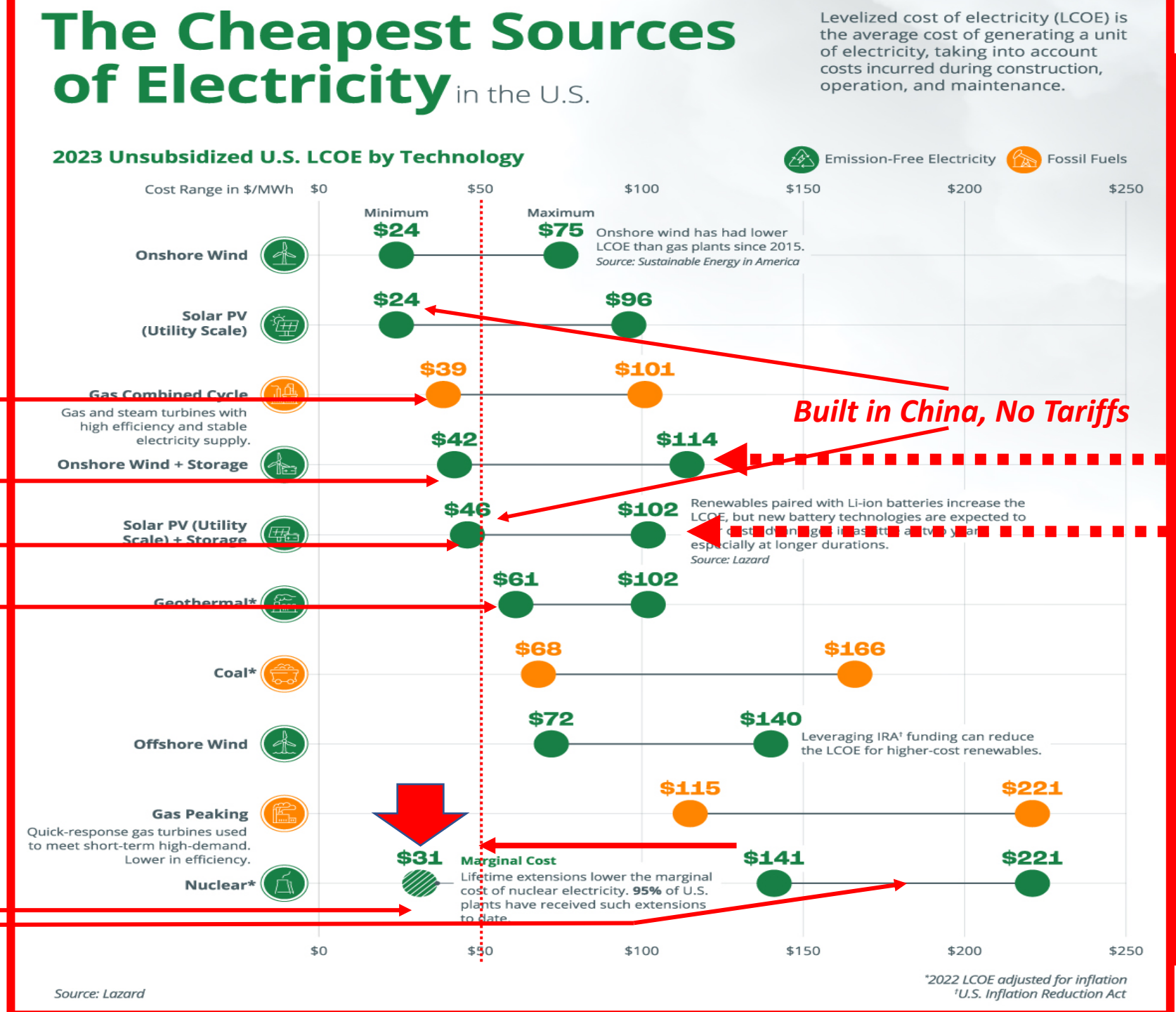
- **Jan 21 (Reuters) - U.S. President Donald Trump on Tuesday announced a private sector investment of up to $500 billion to fund infrastructure for artificial intelligence, aiming to outpace rival nations in the business-critical technology.**
- **President Trump said that ChatGPT's creator OpenAI, SoftBank and Oracle are planning a joint venture called Stargate, which he said will build data centers and create more than 100,000 jobs in the United States.**
- **Stargate plans construction of 20 data centers**
- **President Trump says project will create 100,000 jobs**

U.S. Annual Electric Energy Demand



- **AI Processing Data Centers**
- **Manufacturing Reshoring**
  - In September, 2023, (President) Trump declared his intention to "once again turn America into the manufacturing superpower of the world." He proposed "extraordinary national development projects," "state-of-the-art manufacturing hubs," and "advanced defense capabilities."
- **Energy Transition**
  - Electric Vehicles
  - Heat Pumps
  - Electrification of Industry

https://www.energy.gov/policy/articles/clean-energy-resources-meet-data-center-electricity-demand



COMPETITORS

Moss Landing, the world's largest grid battery, caught fire for the third time. Vistra's flagship energy-storage project in CA turned into a towering inferno, forcing evacuations and raising fresh concerns about large battery installations. Vistra's Moss Landing facility was one of a kind, conceived and designed before modern safety standards were adopted for large grid batteries. Battery safety standards have been updated multiple times since it was built. The grid battery industry has evolved at a rapid pace since Moss Landing was built — it's now the second-biggest source of new U.S. grid capacity, behind solar power. The storage industry has matured through a process of trial and error that has included several high-profile fires. None of these have killed anyone, but a pivotal battery explosion in Arizona in 2019 injured four emergency responders and forced a major reappraisal of grid storage plant design. The industry has also improved the batteries themselves since then, but those upgrades came after construction of Vistra's landmark battery behemoth.

Examples of Where Data Centers Are Driving U.S. Electric Energy Demand

- **In Northern Virginia's "Data Center Alley," the world's largest concentration of data centers could nearly quadruple its power demand from about 4 GW today to 15 GW by 2030.**
- **In Texas data centers could be responsible for roughly half of new power demand, which is expected to drive summer grid peaks from about 86 GW today to about 150 GW in 2030. In November, 2024 Oncor, the utility serving the Dallas–Fort Worth area, reported 103 GW of potential load— or demand — seeking to connect to its system, with artificial intelligence and data centers making up about 82 GW of that, up from 59 GW of data centers as of August.**
- **Georgia Power, Georgia's biggest utility, last month reported that its load forecast over the coming decade has tripled from 12 GW as of last year to 36.5 GW today, with large loads including data centers making up 34.6 GW of that expected demand.**

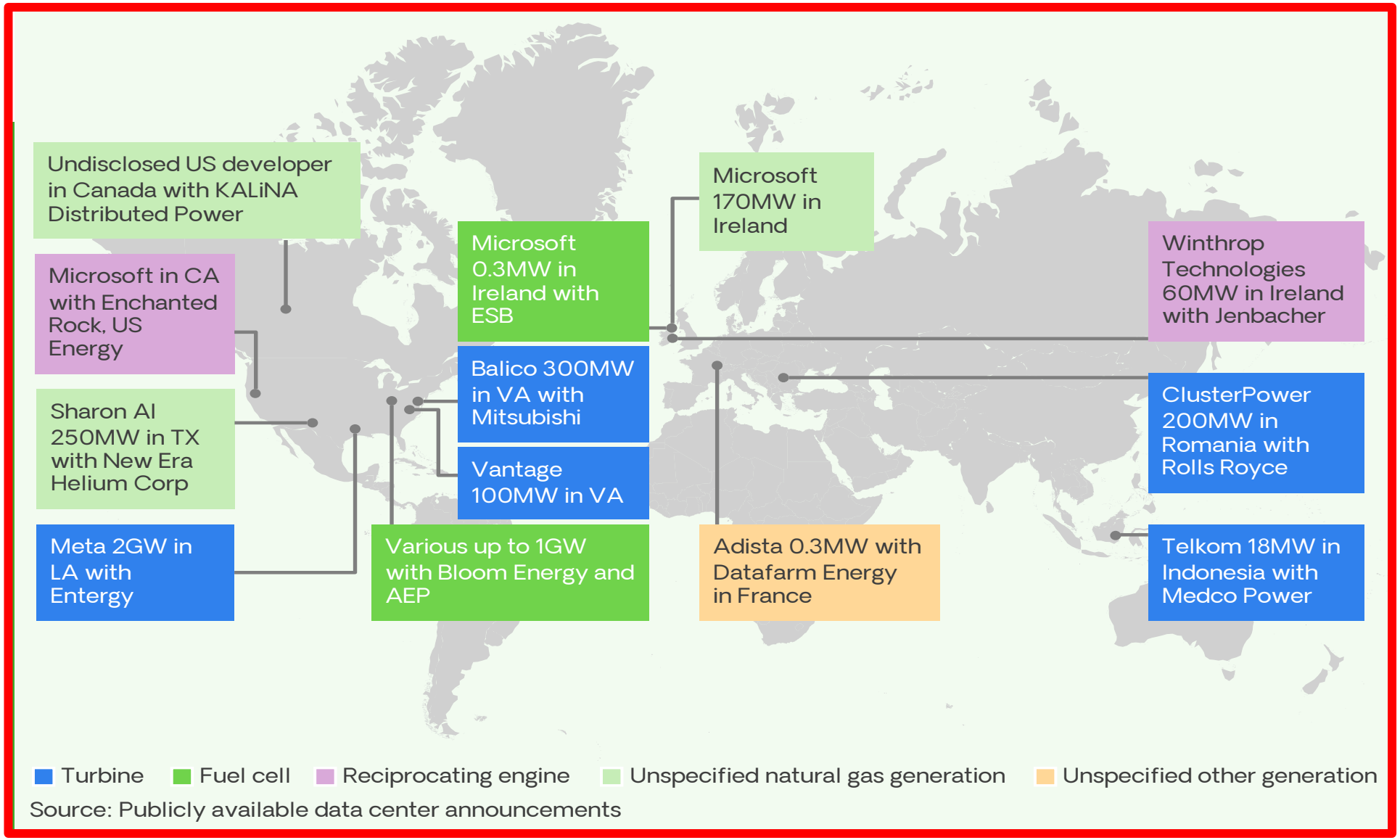
The Case for Decentralized Energy Systems:

Co-Locate Energy Generation and Demand and Connect with Microgrids

- **Transmission Congestion:** As more renewable energy sources like wind and solar are located far from population centers, the strain on existing transmission lines worsens.
- **Grid Cybersecurity** risks are rising, with an estimated 24,000 weak points in 2023 alone, according to the North American Electric Reliability Corporation (NERC).
- As regulated monopolies**, Utilities Move too Slowly for Big Tech.**
- **Power Outages Caused by Severe Weather Events** are on the rise, with the U.S. experiencing twice as many weather-related outages in the last 10 years compared to the previous ten. "The scale of the climate catastrophes suffered throughout this year reaffirms that it is no longer sufficient for governments and policymakers to focus on mitigation—in other words, developing strategies to reduce harmful pollutants emitted into the atmosphere, including carbon dioxide and methane. **The world must also pay more attention to adaptation, upgrading infrastructure and policies to withstand extreme weather."** *
- **Political Reaction to Power Transmission, Cybersecurity and Severe Weather Events May Be Worse Than the Event.**
- **Decentralized Energy Systems** present a compelling solution to meet data center energy needs while relieving grid stress. By building closer to demand centers, these systems allow for faster deployment and more flexible scaling of power supply.

*Alice Hill, Council on Foreign Relations, The Age of Climate Disaster Is Here: preparing for a future of extreme weather, Foreign Affairs, August, 2023, reprinted January 2025.

Some World-Wide Data Centers Have On-Site Power Generation



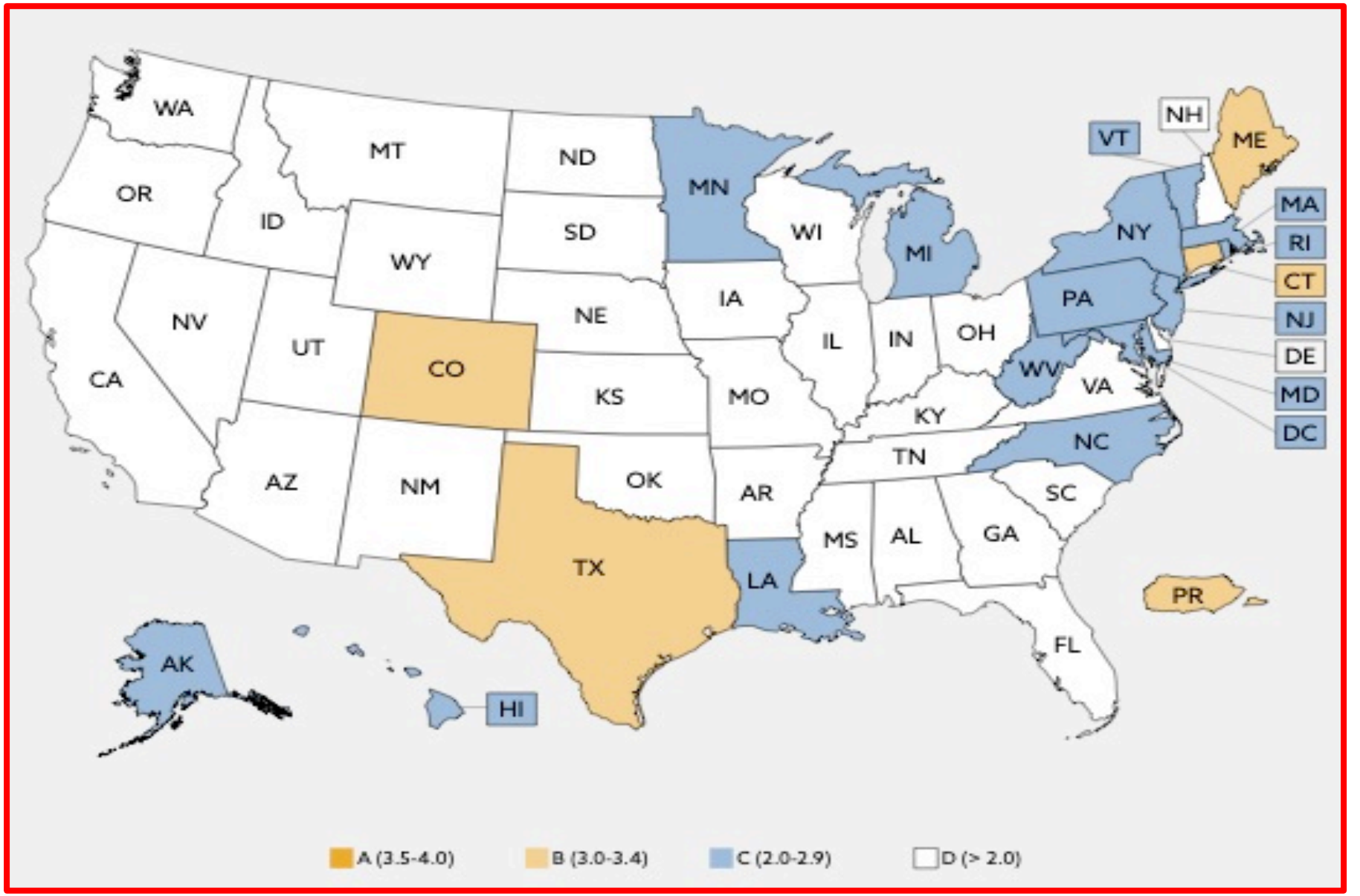
LANL Needs More Electricity

The Problem: **In 2027, Los Alamos will get a new supercomputer to accelerate the integration of AI into LANL's research. When the supercomputer goes online, it will exceed the capacity of LANL's electric power. That's a problem because LANL is required to have a redundant electric supply for its national security mission which includes Plutonium pit manufacturing.**

Today's Solution: **Los Alamos has plans for a new electric transmission line, to increase its electric power supply. The electric power capacity project is meant to increase the capacity, reliability and resiliency of the lab's electric supply; however, the line crosses religious grounds of native Americans.**

A Better Solution: **Partner with Google (public-private partnership) to build a data center in Los Alamos powered by a Modular Nuclear Power Plant that powers LANL, Los Alamos, and Google's Data Center. Heat Los Alamos and LANL with the waste heat from the data center and Nuclear Power Plant.**

State Microgrid Adoption Scorecard



https://mcusercontent.com/3dcda9a0dee5aecdf43892999/files/85942d6d-ee5c-454b-94d7-943314dd002c/2024_Think_Microgrid_Scorecard_final.pdf

New Mexico's Economic Vision*

"New Mexico will have a diverse and robust economy that:

- **engages local talent,**
- **cultivates innovation, and**
- **delivers PROSPERITY for *ALL* New Mexicans".**

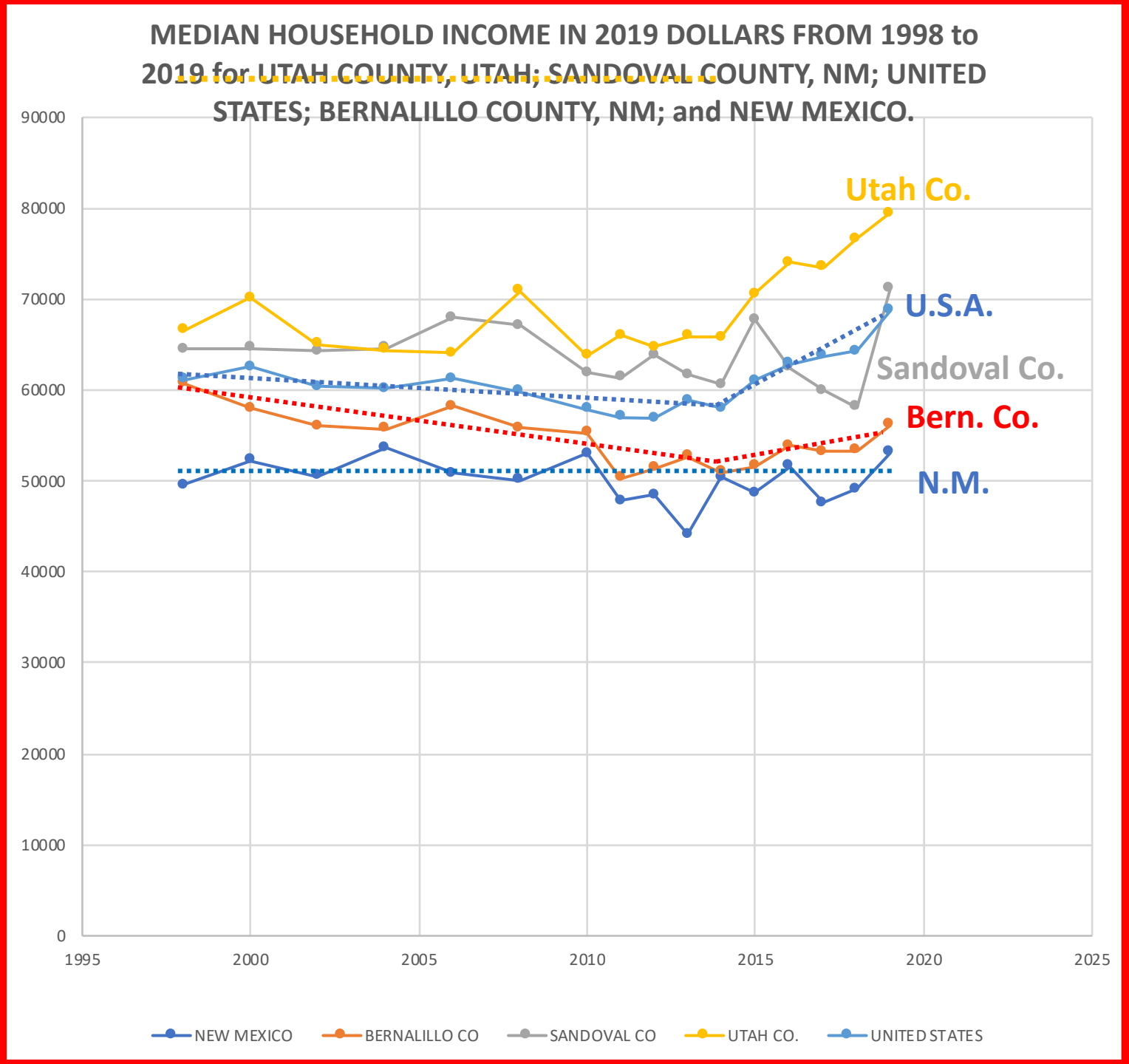
*https://edd.newmexico.gov/pubs/empower-collaborate-new-mexicos-path-forward-statewide-strategic-plan/

Has New Mexico Reached Its Economic Vision?

- **Robust Economy? YES! For Now!**
  - **$3.5 Billion Annual Budget Excess**
  - **$55 Billion Sovereign Wealth Fund**
- **Prosperity for All? NO!**
  - **The 47th Highest Crime Rate,**
  - **The Worst K-12 Education in the United States,**
  - **The Lowest Overall Education of Residents,**
  - **The Second Highest Poverty Rate,**
  - **Median Household Income Unchanged for 50 Years and Ranked 48th**
- **Diverse Economy?**
  - **New Mexico's GDP in 2024 was $107.9 billion, which was a 1.5% increase from 2023. 2024 U.S. GDP Grew 2.7%.**
    - **Oil and Natural Gas Recovery**
    - **Federal Defense Funding**

An Optimistic Perspective from Governor Lujan-Grisham: AJ-01/26/2025

- **“Government can’t solve difficult public safety and child welfare challenges alone. We need every New Mexican engaged in building safer, stronger communities. I urge you to contact your legislators during this 60-day session. Share your stories and ideas. Tell them what your family and community need most. The legislative process works best when citizens are actively involved. …This year’s 60-day session gives us a critical opportunity to … tackle our toughest challenges head-on.”**



- All data are inflation adjusted. (2019 $s).
- All except New Mexico saw an uptick in 2014; New Mexico saw an uptick in 2019.
- Bernalillo County and Sandoval County were similar in 1998 and both declined until 2014, but Bernalillo County declined much more rapidly. Bernalillo County's median household income was lower in 2019 than it was in 1998.
- The movie sector has had no observable impact on Bernalillo County median household income.
- After 2014 Utah County has the highest rate of growth. This shows the impact of its services-based, high-tech economy and demonstrates that high-tech growth pulls-up the entire economy. The state of Utah has the lowest income inequality in the U.S.
- From 1998 to 2013 Sandoval County's economy tracked that of Utah County; following 2014, Sandoval County failed to keep up with Utah County which has benefitted from BYU's spin-off of five unicorns, companies valued above $1billion.

My Policy Failures and Successes

- **Failures**
  - Airline Security
  - Restructuring of U.S. Intelligence Agencies
  - Creation of "Hsinchu-Like" Science Park at SNL
  - Flat Panel Program at SNL
  - Assessment of Federal Competitiveness Programs
  - Joined New Mexico Democratic Party and Indivisible
- **Successes**
  - Competitiveness/Technology Commercialization Modeling
  - NM Socio-Economic Indicators Compared to Neighboring States
  - Albuquerque Journal Opinion Columns
    - State Strategic Planning
    - NM Brain Drain
    - Importance of STEM Education for Economic Growth

New Mexico Already Hosts a Nuclear Industry Cluster: a critical feature of growing economies

- **NUCLEAR WEAPONS:**
  - **Los Alamos National Laboratory (LANL) is located northwest of Santa Fe; it is known for developing the first atomic bomb. Today, Los Alamos conducts multidisciplinary research in fields such as national security, space exploration, nuclear fusion, renewable energy, medicine, nanotechnology and supercomputing. LANL is home to the U.S. Plutonium Center of Excellence for Research and Development.**
  - **Sandia National Laboratory's (SNL) primary mission is ensuring the U.S. nuclear arsenal is safe, secure, reliable and can fully support U.S. deterrence policy; its overall mission is national security which has grown from Cold War threats to nuclear, chemical and biological weapons of mass destruction and other acts of terrorism. Sandia's main campus is in Albuquerque.**
- **URANIUM MINING: Between 1951 and 1980 the Grants Uranium District in northwestern New Mexico yielded more uranium than any other region in the United States. There are no producing operations in the Grants district today; however, numerous companies have acquired uranium properties and plan to explore and develop deposits in the Grants Uranium District in the future. Grants Energy has plan to revive uranium extraction using in-situ recovery, a method designed to be safer and more sustainable than traditional mining. This project is expected to operate for up to three decades. In 2019, 57% of world uranium mined was from in-situ leach (ISL) methods. Most uranium mining in the USA, Kazakhstan and Uzbekistan is now by ISL, also known as in situ recovery (ISR).**
- **URANIUM ENRICHMENT: Urenco USA (UUSA) is the only operating commercial uranium enrichment facility on U.S. soil. It is located in Eunice, New Mexico.**
- **DEFENSE TRANSURANIC WASTE RESPOSITORY: The Waste Isolation Pilot Plant (WIPP) is the nation's only deep geologic, long-lived radioactive waste repository. Located 26 miles southeast of Carlsbad, New Mexico, WIPP permanently isolates defense-generated transuranic (TRU) waste 2,150 feet underground in an ancient salt formation.**
- **ADVANCED REACTOR COOLANT AND LOW-ENRICHED NUCLEAR FUEL FABRICATION: Kairos Power is constructing a facility to produce high-purity molten salt coolant for advanced nuclear reactors at the company's Albuquerque campus alongside a TRISO Development Lab, where it will optimize fuel manufacturing techniques to be implemented in a new space the company is building at Los Alamos National Laboratory's Low-Enriched Fuel Fabrication Facility. The salt coolant and TRISO fuel produced in these facilities will be used in the Hermes demonstration reactor currently under construction in Tennessee.**
- **SPACE NUCLEAR POWER: The Institute for Space and Nuclear Power Studies (ISNPS) is a located in UNM's School of Engineering. Its focus is space power and propulsion technologies and related fields. ISNPS offers educational and professional training and conducts research in many fields of space nuclear power and space systems technology.**
- **NUCLEAR ENGINEERING EDUCATION: UNM offers BS, MS and Ph.D. studies in nuclear engineering.**
- **SPENT FUEL ROD STORAGE: In 2023 The U.S. Nuclear Regulatory Commission (NRC) licensed a multibillion-dollar complex to temporarily store spent nuclear fuel in New Mexico from commercial power plants around the nation. This allows the energy company Holtec International to build and operate the facility in southeastern New Mexico, if it is able to acquire additional permits from the state of NM.**
- **RADIATION TRANSPORT ANALYSIS: Hoonify, an Albuquerque-based company, provides radiation transport analysis and other nuclear power services using computing tools built on parallel-processing.**
- **Carlsbad has the NUCLEAR MATERIAL transportation infrastructure needed to support growth of its nuclear industry cluster.**

Ideas for How NM Can Build On Its Nuclear Cluster and Make NM the Center of the U.S. Nuclear Renaissance?

- **EDD, Governor, NM Members of Congress (MOCs) and NM Legislature:**
  - **Attract Manufacturers of Small and Micro Modular Reactors to Carlsbad Area**
  - **Build a Micro Modular Nuclear Power Plant in Carlsbad's Pecos Valley for Oil & NG Extraction**
    - **The Carlsbad Utility, Excel Energy, Operates Nuclear Power Plants in MN.**
    - **High Local Electricity Demand for Oil and NG Recovery in Carlsbad.**
  - **Create a National Center for Modular Microreactors' Technology, Research, Economics, Manufacturing, and Education at UNM**
    - **$8 Million for 2 Endowed Professorships and 4 Junior Faculty in NE and ME**
    - **$10 million/Year for 5 Years Operation.**
  - **Build a Modular Microreactor on the UNM Campus for Teaching, Research, Workforce Training, Development and Powering the UNM Campus. TAKE UNM OFF-LINE.**
  - **Augment Current Thrust in Space Nuclear Power Research, Outreach, and Education at UNM-SOE**
    - **$2 Million/year for 5 Years + 2-3 New Faculty**
  - **Promote Modular Small and Micro Nuclear Reactors Use in New Mexico for Baseload Power Generation and Energy Security for:**
    - **New Data and AI Centers, e.g., at Mesa Del Sol;**
    - **Mining and Remote Communities;**
    - **DOE and DoD Defense Facilities (Make These Energy Secure with Diverse On-Site Generation and Microgrids with LANL and Los Alamos Powered by Modular Nuclear Reactor);**
    - **Oil and NG Recovery;**
    - **State Facilities;**
    - **Brackish Water Recovery and Desalination with Rare Earth Materials Processing Including Lithium Extraction;**
    - **Green Hydrogen Production.**

Steps for You to Take

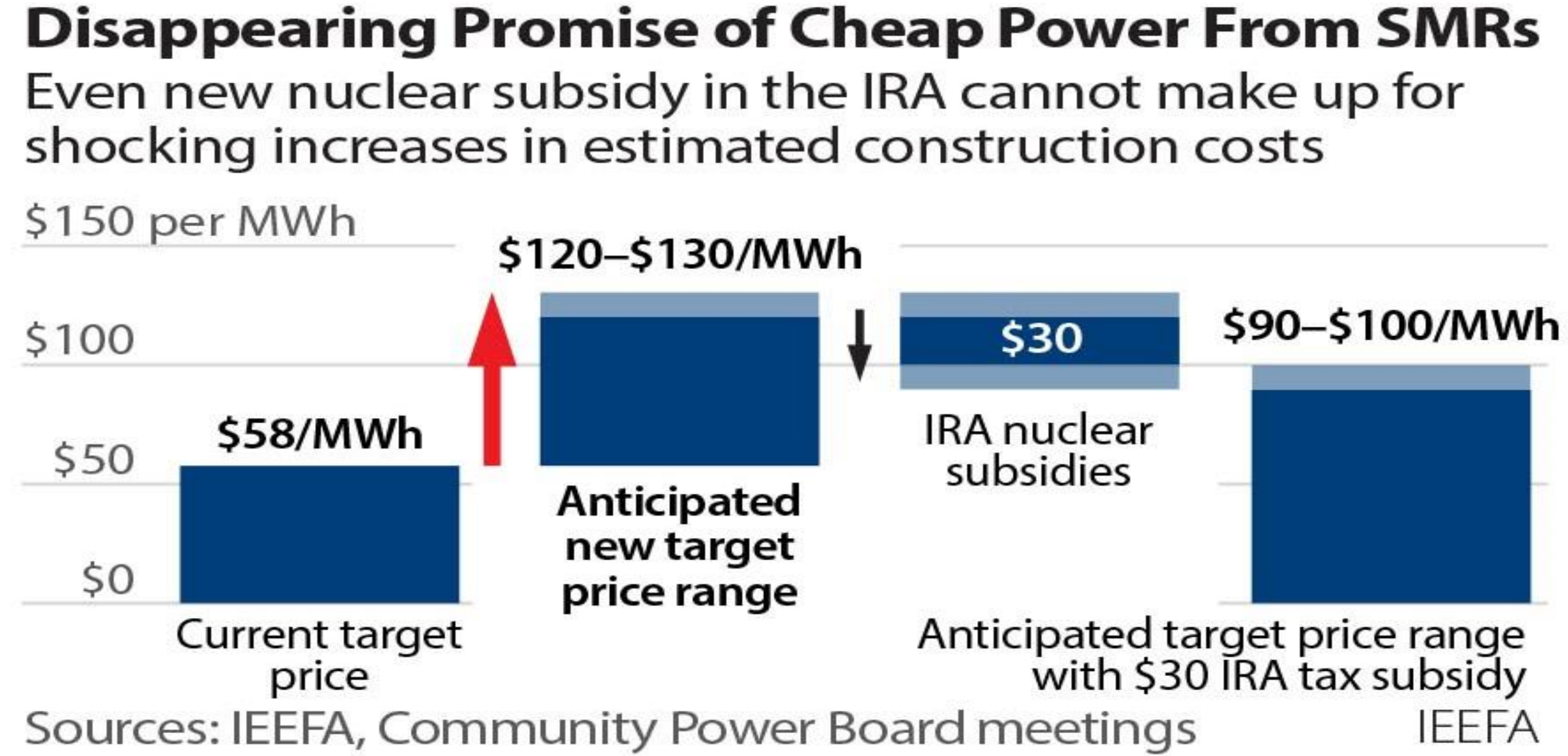
- **Make Your Recommendations for Nuclear Power in NM as a Group Based on Data, not Hyperbole**
- **Send to Business Community, Governor, Selected Members of Legislature, Members of Congress, etc.**
- **Write Recommendations for Major New Mexico Newspapers**

Example of Current NM Water Debate: note lack of quantitative information and anti-nuclear rhetoric

- ***DefendNMWater:** "We must step us and counter the Governor's and Cabinet Secretary of the Environment, James Kenney's Strategic Water Supply Act, HB 137, sponsored by Rep. Susan Herrera, because yes in fact, **strontium is a primary radioactive element in so-called "produced water" from the Permian** – along with **lots of other radioactive elements** (and PFAS, and dissolved mineral salts, organic compounds (e.g., volatile and semi-volatile organic compounds (VOCs and SVOCs), petroleum hydrocarbons, organic acids, and oils), other inorganic constituents (e.g., sulfide and ammonia), and chemical additives - **all of which are very dangerous to human health and the environment**). Their plan is to spend $75 million in perpetuity to "treat" (though there are no specific standards) oil and gas fluid waste and use it on "agriculture, irrigation, potable water supplies, aquifer recharge, industrial processes, or environmental restoration." (NMED's produced water reuse rule.) DefendNMWater, recently sent a letter signed by 53 organizations to all legislators opposing the Strategic Water Supply Act, with an accompanying evidence fact sheet. Now it's your turn. Click the button below to email the Governor, Representative Susan Herrera, and your own representatives in the legislature to tell them why you oppose the Strategic Water Supply Act."
- **Indivisible:** "Tell your Democratic governor to stand up against Trump's executive order (citizenship for U.S. born) by making sure children born in your state receive a birth certificate -- as required by the Constitution. Governor Pritzker of Illinois has set the tone with statements like this -- if he's your governor, thank him!"

*New Energy Economy, 300 E. Marcy St., | Santa Fe, New Mexico 87501. info@NewEnergyEconomy.org| 505-989-7262

The Elephant in the Nuclear Room: SMR Cost



Battery Storage Plant Catches Fire

The Moss Landing Battery Storage Facility burned for several days starting on Jan. 16, prompting the temporary closure of area schools and Highway 1.

PAUL HORN / Inside Climate News

The problems at Moss Landing could be used to boost safety fears about battery storage in general, with grave consequences for the energy transition. A significant fire risk factor is battery chemistry. The part of Moss Landing that caught fire housed lithium-ion batteries that used a nickel manganese cobalt, or NMC, technology. This kind of battery has high energy density, which is good in terms of the amount of energy that can be stored, but has downsides in terms of heat tolerance. NMC batteries have lost market share in favor of lithium iron phosphate, or LFP, a chemistry that has lower energy density. Among the other tradeoffs is that LFP can produce more flammable gas than NMC, although the severity of the fires is often less.

UNM Goals Are Linked to NM Economic Growth*

- **GOAL 1 - ADVANCE NEW MEXICO: Understand the needs and unique opportunities of our distinct New Mexican cultures and peoples, economic enterprises, and communities to address critical issues and opportunities facing humanity and contribute to the quality of life, growth, prosperity, and advancement of New Mexico and of human societies across the globe.**
- **GOAL 2 - STUDENT EXPERIENCE AND EDUCATIONAL INNOVATION: Transform the educational experience by creating supportive, intellectually challenging, exciting, diverse, joyful learning environments both inside and outside of the classroom to ensure the lifelong success, upward social mobility, and engagement of all learners. Through the education of people, our University will contribute to the growth of societies in New Mexico and across the globe.**
- **GOAL 3 - INCLUSIVE EXCELLENCE: Utilize an equity and inclusion lens to expand opportunity, cultivate the potential of students, faculty and staff, create new knowledge, and provide service to all New Mexicans by leveraging our assets as a highly research-intensive university and health system.**
- **GOAL 4 - SUSTAINABILITY: Create long-term sustainability and ensure the necessary resources —human, financial, and physical— to achieve our aspirations while protecting the natural environment that supports all people of the state and the world.**
- **GOAL 5 - ONE UNIVERSITY: As a foundation for achieving the other 2040 goals, align and integrate our distinctive academic, research, patient care, and service components, and enhance our administrative functions to strengthen the University and its impact.**

***https://opportunity.unm.edu/goals/goal5.html**

UNM's ADVANCE NEW MEXICO Objectives Support the Growth of Nuclear Power in NM *

- **ARID Institute**
- **Grand Challenges – The program aims to expand interdisciplinary research to address critical issues facing New Mexico and to build capacity for innovation and prosperity in the state. The three current level 2 teams are:**
  1. **Just Transition to Green Energy,**
  2. **Child Health, and**
  3. **Sustainable Space Research.**

NUCLEAR POWER

- **Enhance Patient Experience**
- **Quantum NM**
- **Comprehensive Substance Use Disorder Center of Excellence**
- **Center for Advancing Dissemination and Implementation Science**
- **Workforce Utilization**

*https://opportunity.unm.edu/goals/goal5.html

Introducing the Largest

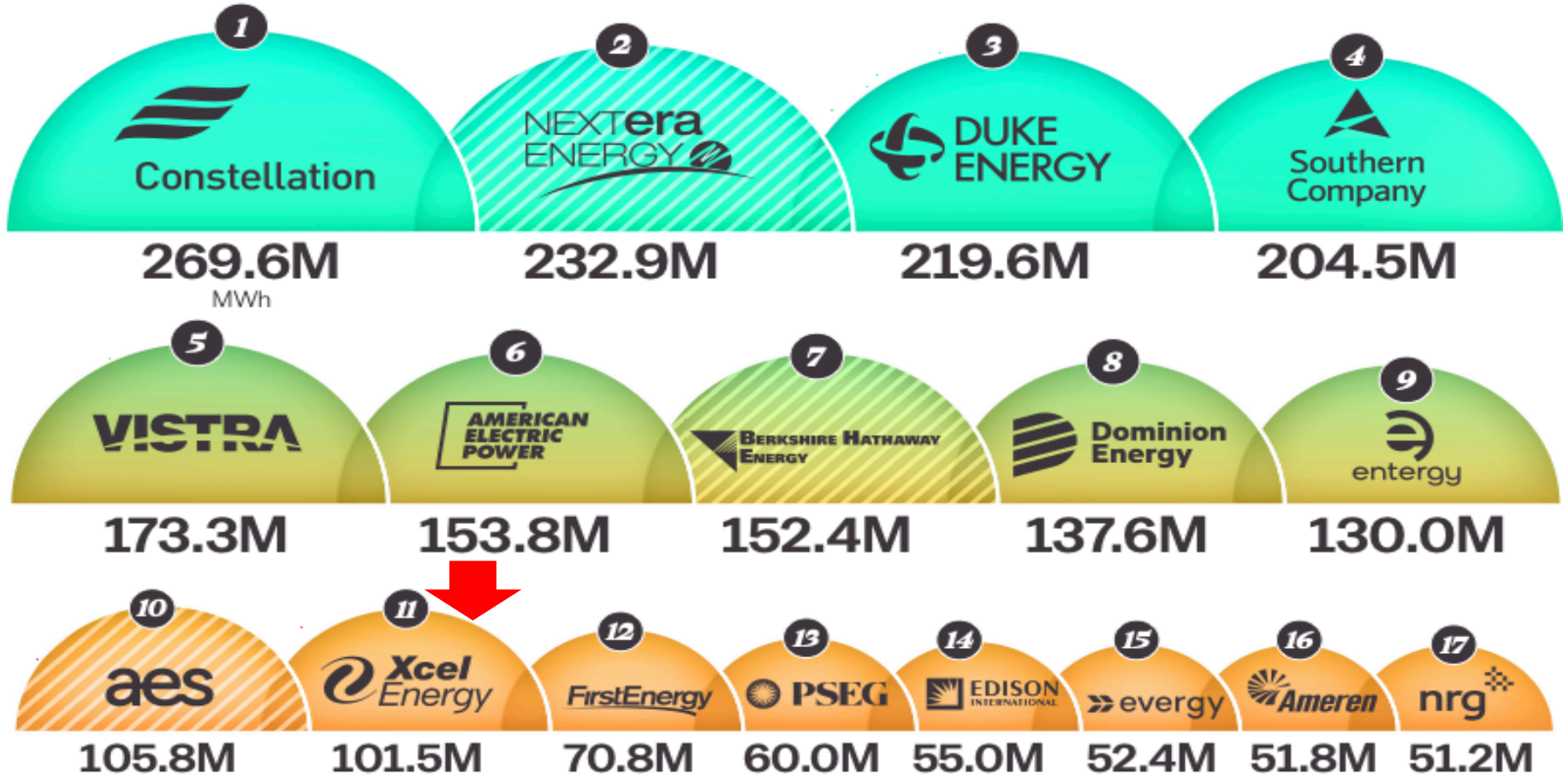
Investor-Owned Utilities In The U.S.

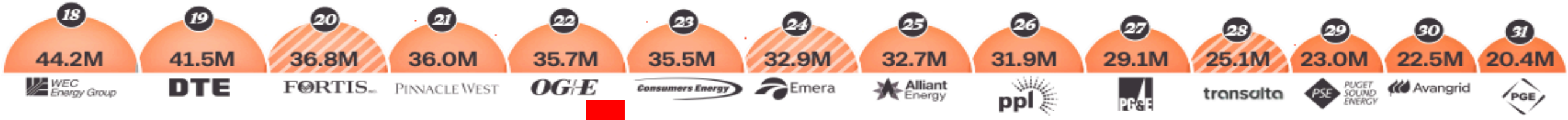
By 2022 Net Owned and Purchased Electricity Generation, MWh

International & U.S. Operations

U.S. Operations Only

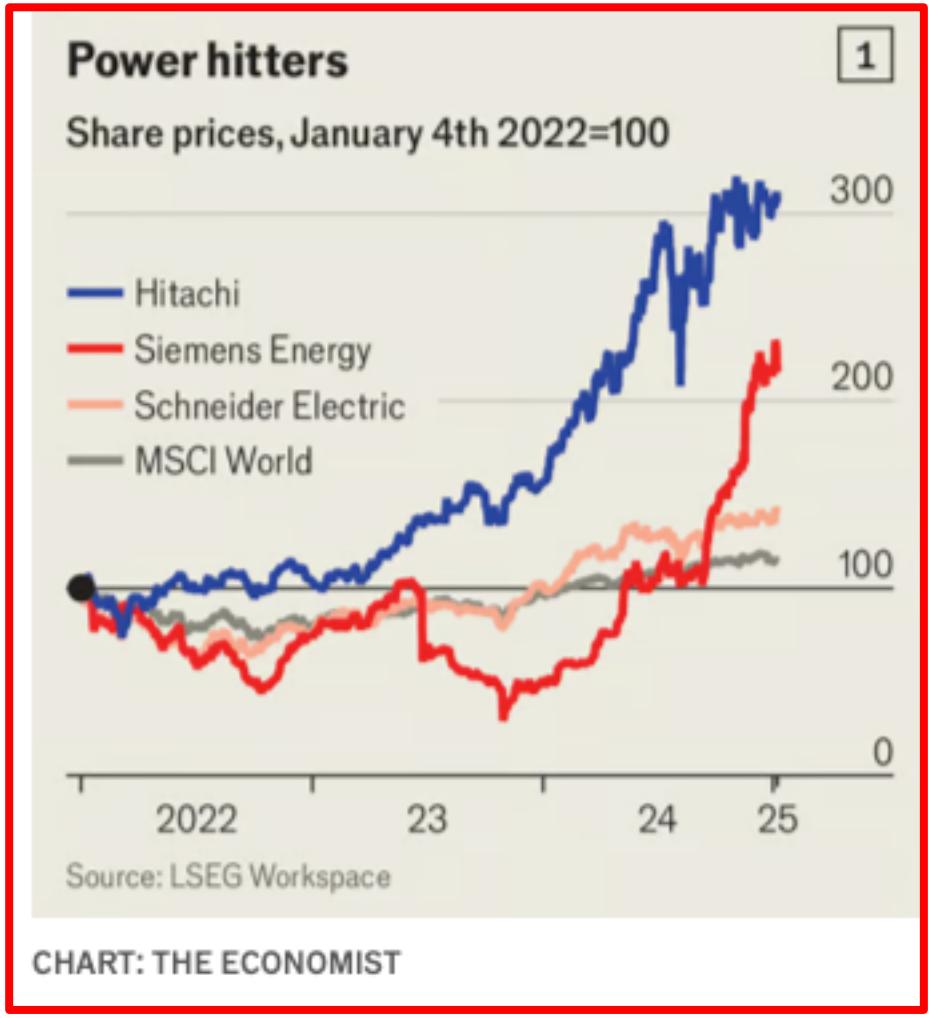
Data updated December 2024.





Shows U.S. generation only.

The Electricity Super-cycle



A new electricity super-cycle is under way: Why spending on power infrastructure is surging around the world, The Economist, Jan. 5, 2025.