

Energy Chokepoints: National/International Physical, Political and Regulatory

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One-Year Forward Strip

NYMEX Henry Hub	\$ 7.725
LNG Delivered Price to Europe	\$97.993

Comparative Forward Strips as of October 31, 2022

One-Year Forward Strip

NYMEX Henry Hub	\$ 5.343
LNG Delivered Price to Asia	\$31.903
LNG Delivered Price to Europe	\$37.956

Three-Year Forward Strip

NYMEX Henry Hub	\$ 4.838
LNG Delivered Price to Asia	\$27.501
LNG Delivered Price to Europe	\$30.834

* Settled price as of October 31, 2022

One-Year Forward Strip

NYMEX Henry Hub	\$ 3.22
LNG Delivered Price to Asia	\$15.88
LNG Delivered Price to Europe	\$14.99

Three-Year Forward Strip

NYMEX Henry Hub	\$ 4.16
LNG Delivered Price to Asia	\$14.43
LNG Delivered Price to Europe	\$13.87

* Comparative Forward Natural Gas Price Strips, Settled price as of November 10, 2023, prices in \$/MMBtu

One-Year Forward Strip

NYMEX Henry Hub	\$ 2.90
LNG Delivered Price to Asia	\$13.47
LNG Delivered Price to Europe	\$41.08

Three-Year Forward Strip

NYMEX Henry Hub	\$ 3.65
LNG Delivered Price to Asia	\$11.88
LNG Delivered Price to Europe	\$35.02

* Comparative Forward Natural Gas Price Strips, Settled price as of November 8, 2024, prices in \$/MMBtu

But first, an update
on last year's talk

- A Chinese ship, the NewNew Polar Bear, drags a 6-ton, 12,000 lb. anchor over 100 nautical miles, through the Baltic Sea while shadowed by a Russian nuclear powered cargo ship, taking out 2 critical fiber optic cables and the Balticconnector Pipeline (the only natural gas pipeline serving Finland)
- Is this a case of asymmetric hybrid Russian maritime warfare?
- Doesn't this constitute an attack on NATO's critical energy infrastructure?

A 6-ton, 12,000 lb. anchor



Container ship damaged key Baltic gas pipeline 'by accident', says China probe

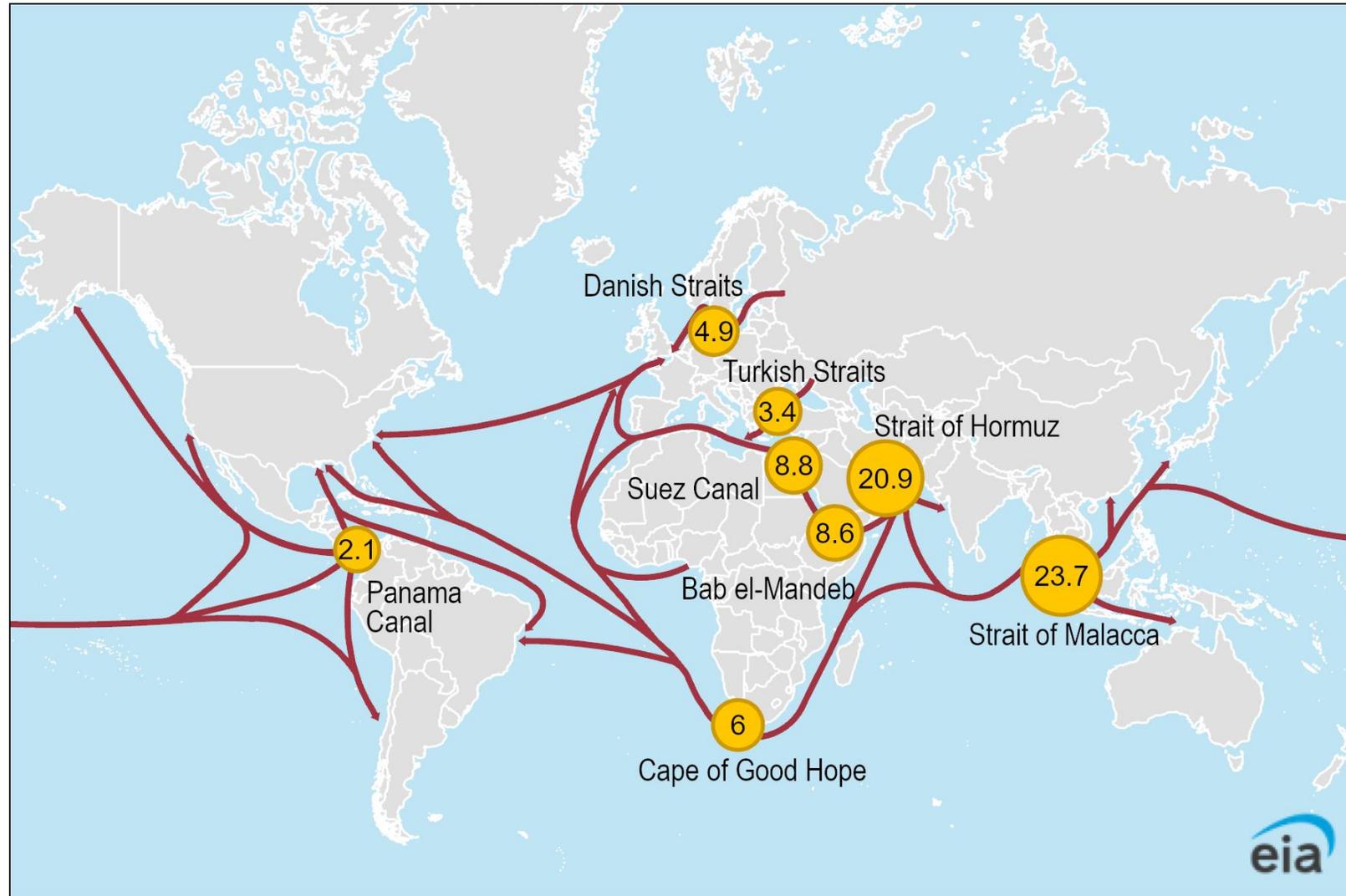


Russian Ship SS-750



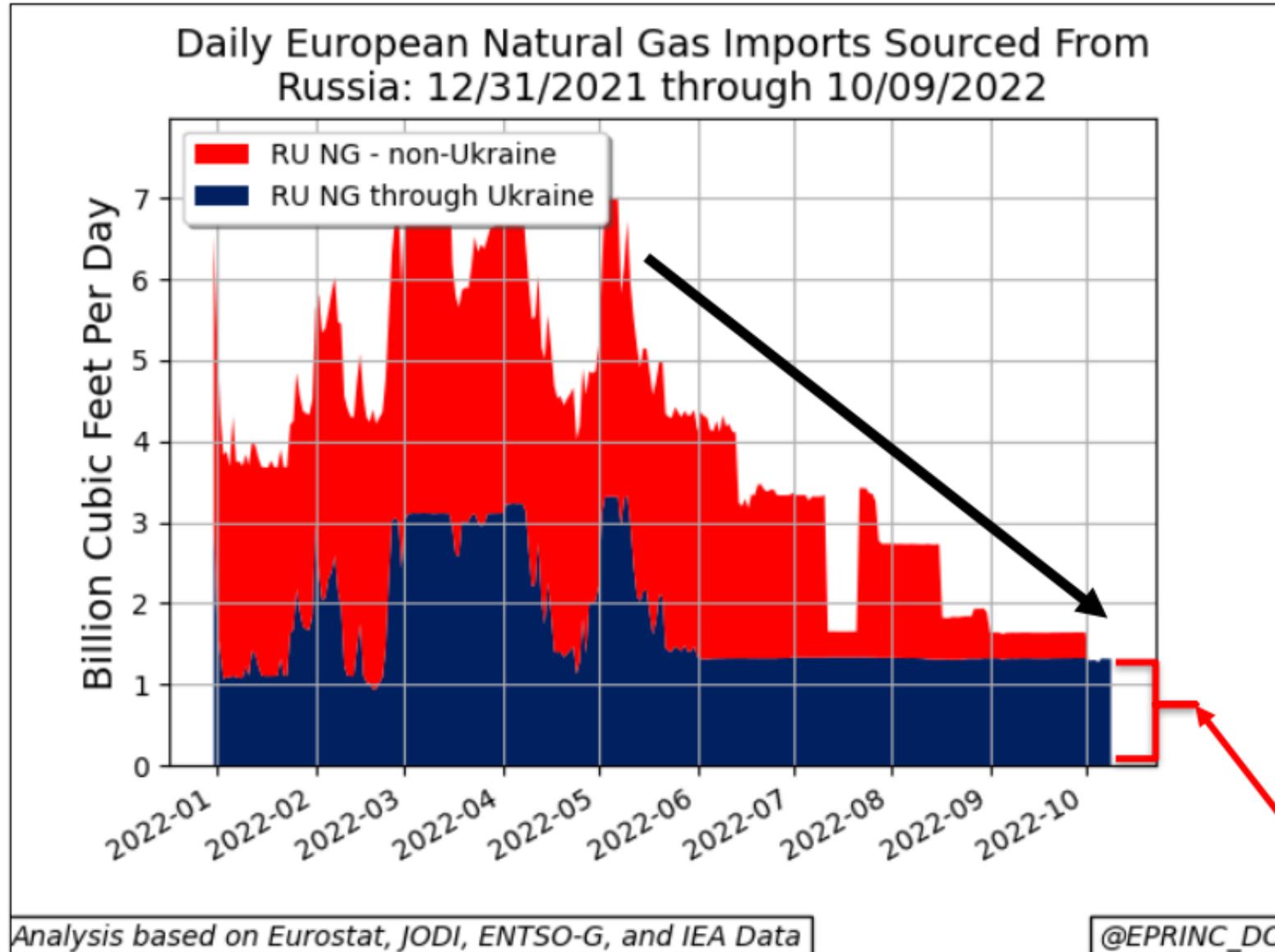
Worldwide Physical Chokepoints for Maritime Trade

Daily transit volumes of petroleum and other liquids through world maritime oil chokepoints (million barrels per day) (2023)



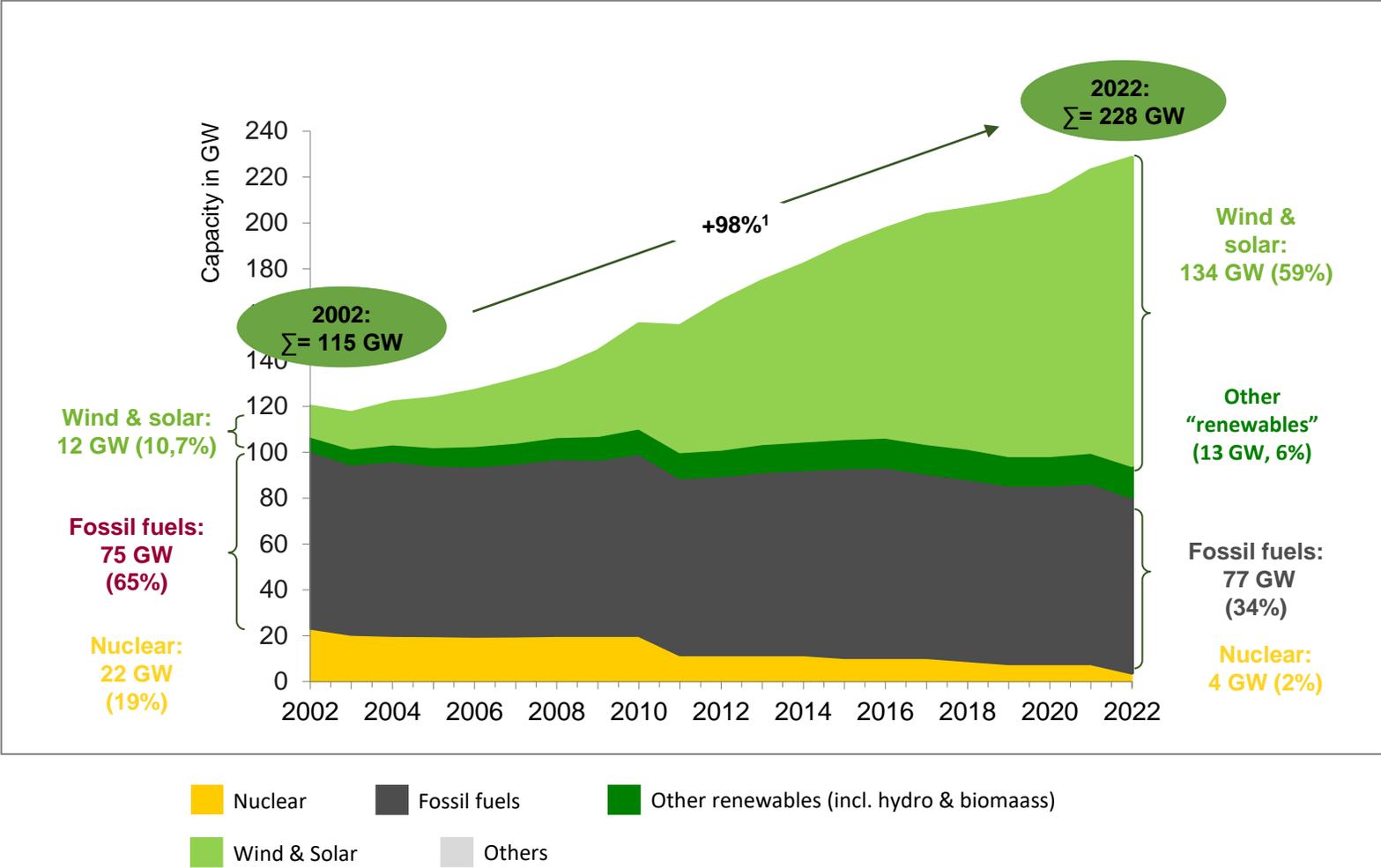
Source: "World Oil Transit chokepoints," EIA, June 25, 2024

Europe – Daily Natural Gas Receipts During 2022



- Over reliance on renewables
- Retired coal plants too early
- Retired nuclear plants too early
- Under reliance on fossil fuels
- Over reliance on Gazprom for natural gas

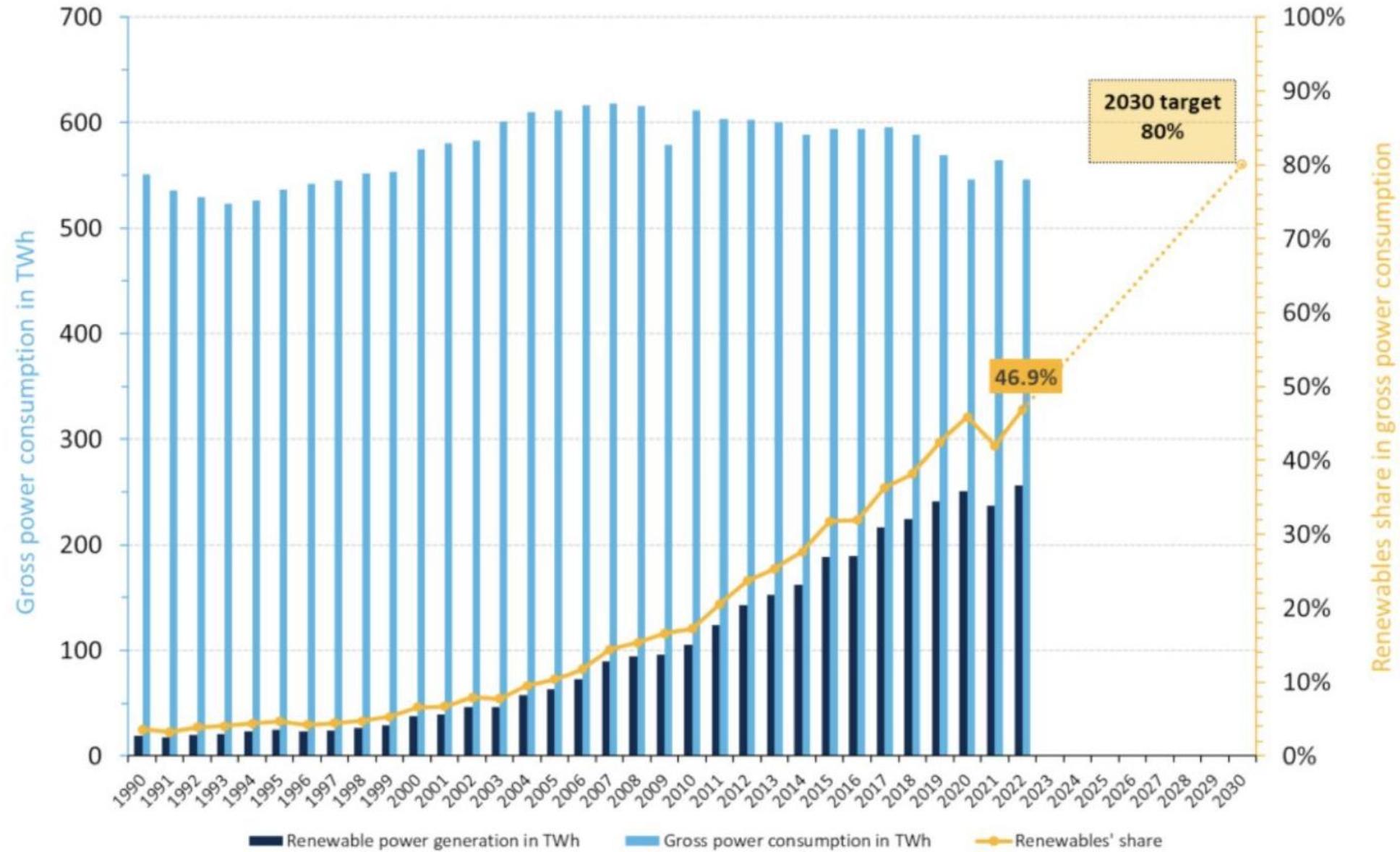
Installed Net Power Generation Capacity in Germany (2002-2022)



Source: Schernikau on Energy Policy

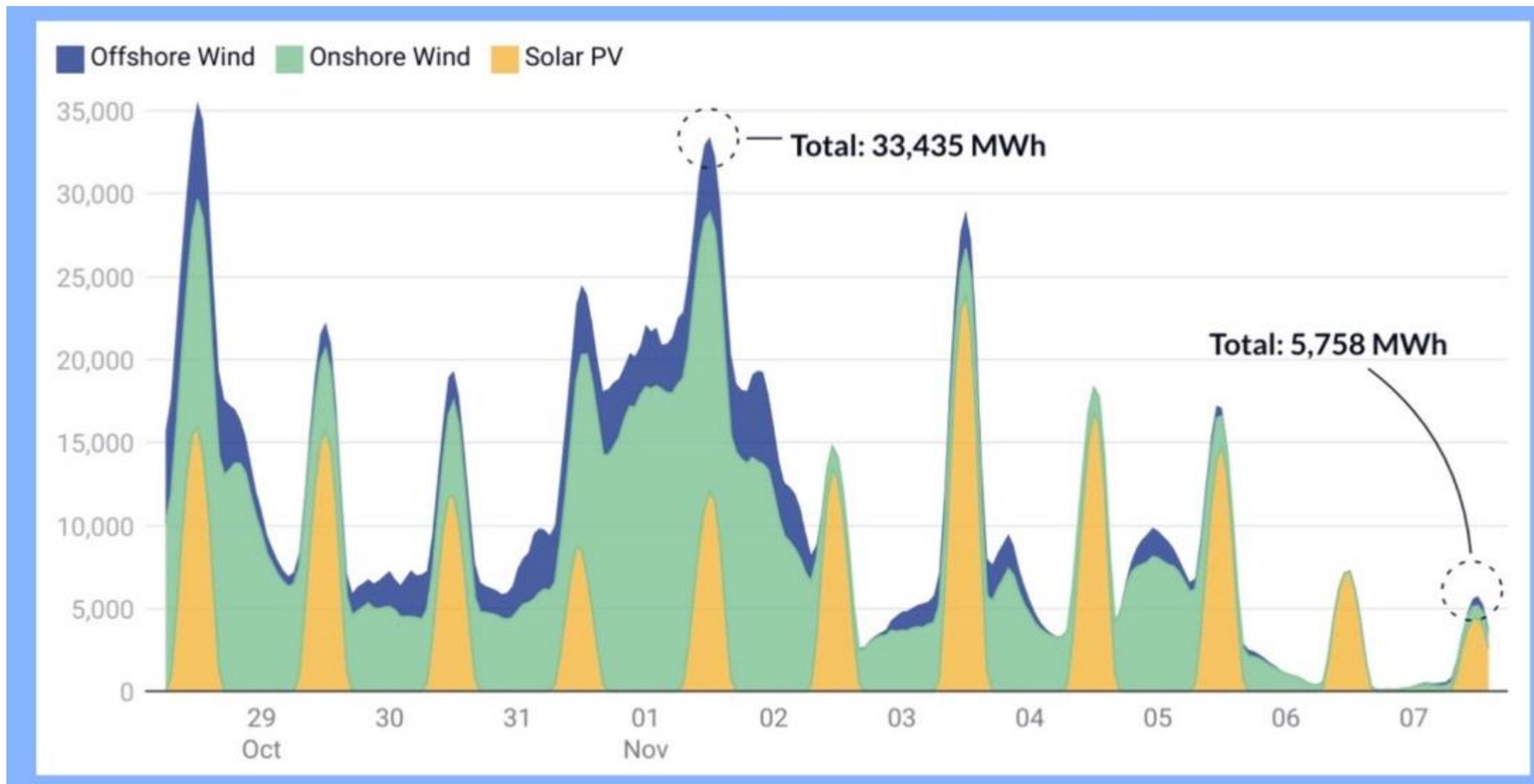
(1) CAGR: +3,5%; (2) CAGR: +0,1%; (3) CAGR -0,9%; (4) Including hydro & biomass
 Sources: Schernikau Research and Analysis based on Fraunhofer Institute ([link](#)), Agora Energiewende (https://static.agora-energiewende.de/fileadmin/Projekte/2022/2022_01_DE-JAW2021/A-EW_247_Energiewende-Deutschland-Stand-2021_WEB.pdf), AG Energiebilanzen (<https://ag-energiebilanzen.de/daten-und-fakten/primaerenergieverbrauch/>) and <https://ag-energiebilanzen.de/daten-und-fakten/zusatzinformationen/>); Statista for industrial power prices <https://www.statista.com/statistics/1050448/industrial-electricity-prices-including-tax-germany/>

Renewables' share in gross power consumption in Germany 1990-2022



Source: "Why Everything They Said About The Environment Was Wrong," Michael Shellenberger speech to the Alliance for Responsible Citizenship (ARC) in London, October 31, 2023

The *Energiewende* in action: power prices hit \$879/MWh during the Dunkelflaute



Germany hourly renewable generation, Oct. 28 to Nov. 7, 2024

German power prices jumped to over two-year highs this week as dark and calm ‘Dunkelflaute’ weather exposed the grid reliability risks of anti-nuclear/anti-fossil ‘Energiewende’ transition policies.



- Mobius Risk Group, November 7, 2024



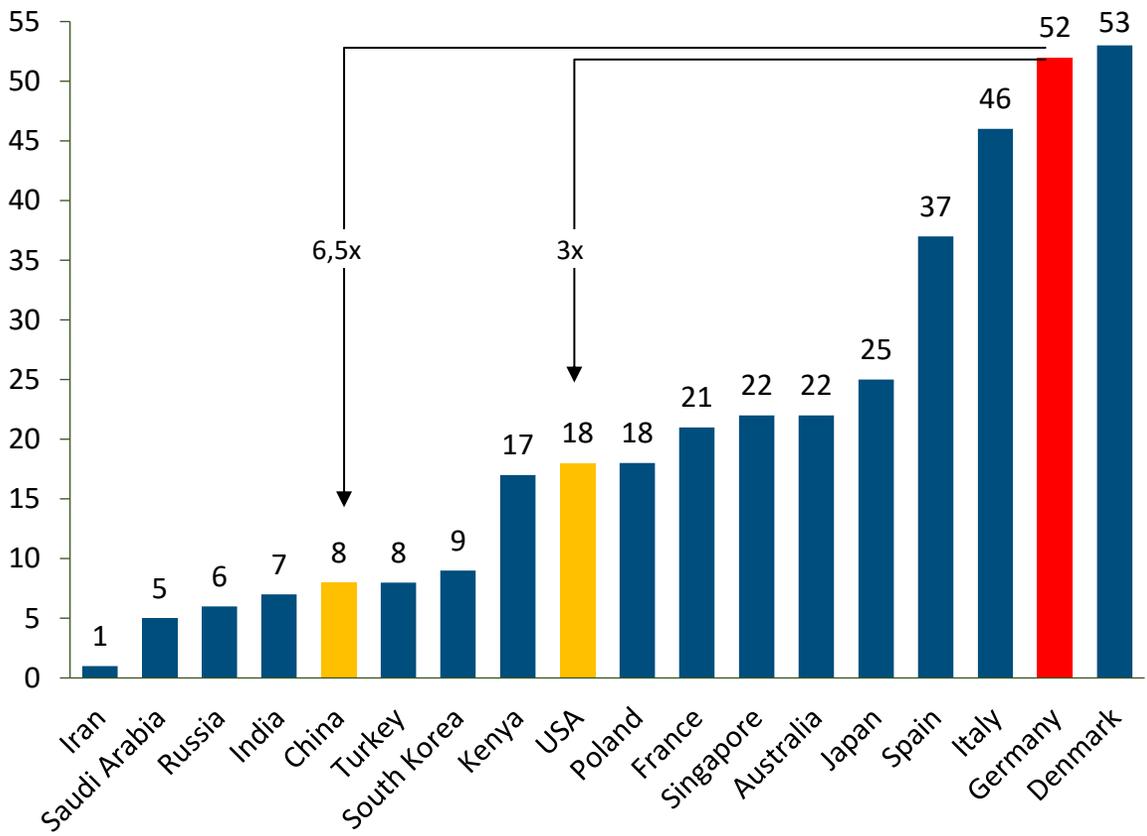
“Over and out: Germany switches off its last nuclear plants”

Apr 15, 2023 – Germany has switched off its three remaining nuclear power plants as part of a long-planned transition toward renewable energy.

- AP News

Germa Industrial Electricity Prices:
 2002: 7 ct / kWh
 2023: 40 ct / kWh

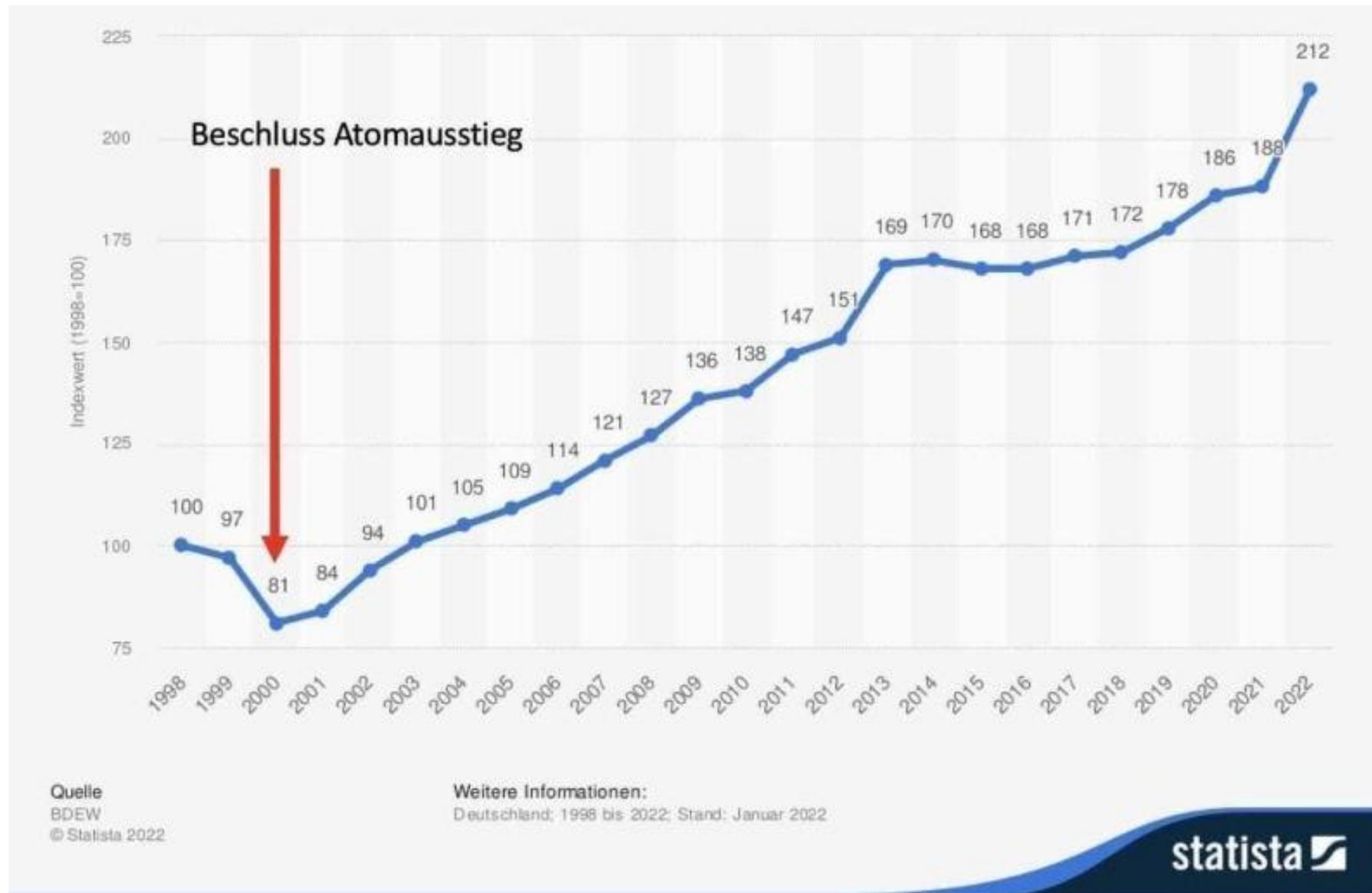
Consumer electricity prices
 by country in 2022 (US\$/kWh)



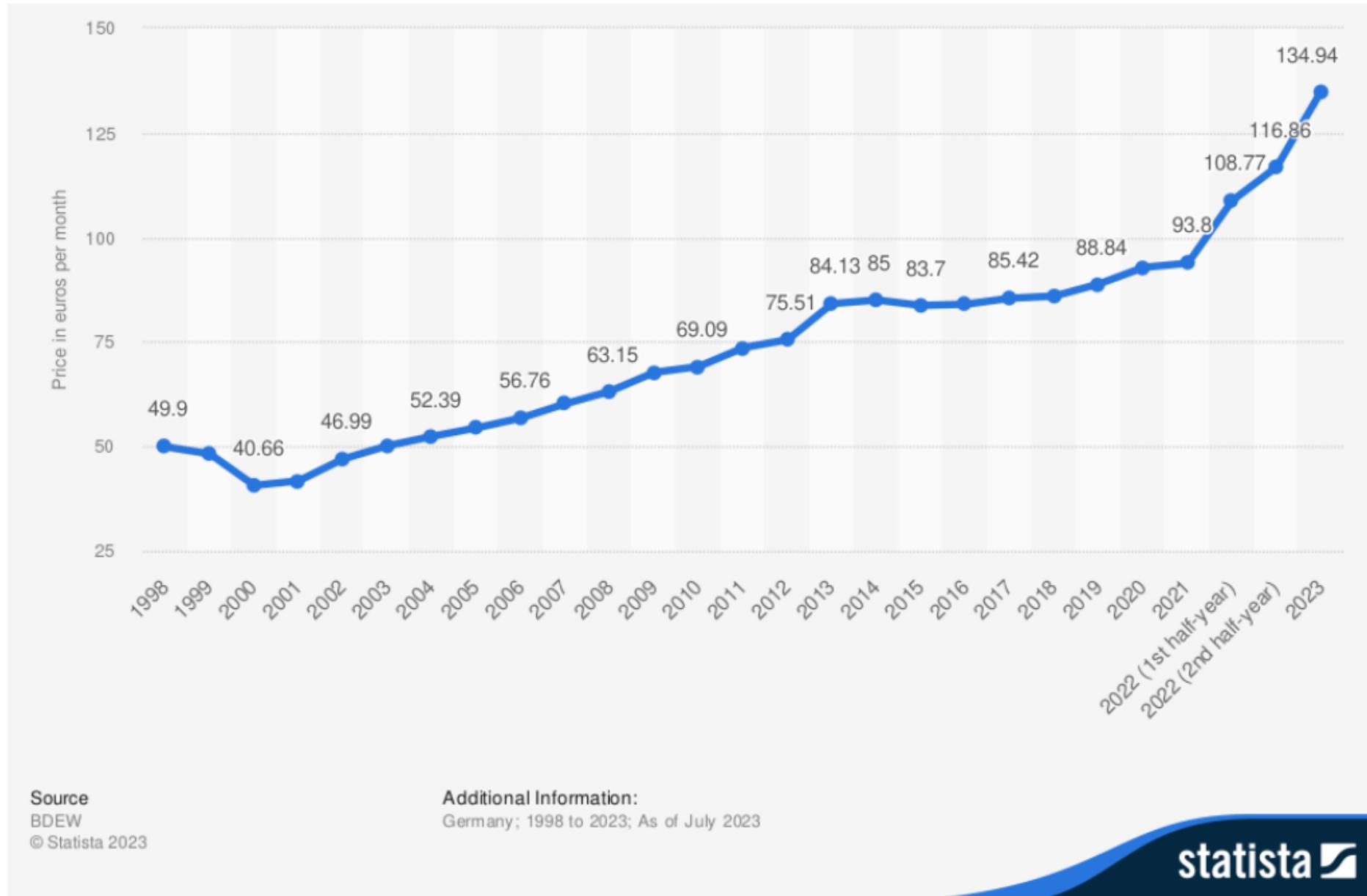
Source: Schernikau on Energy Policy

(1) CAGR: +3,5%; (2) CAGR: +0,1%; (3) CAGR -0,9%; (4) Including hydro & biomass
 Sources: Schernikau Research and Analysis based on Fraunhofer Institute ([link](https://static.agora-energiemende.de/fileadmin/Projekte/2022/2022_01_DE-JAW2021/A-EW_247_Energiemende-Deutschland-Stand-2021_WEB.pdf)), Agora Energiewende (https://static.agora-energiemende.de/fileadmin/Projekte/2022/2022_01_DE-JAW2021/A-EW_247_Energiemende-Deutschland-Stand-2021_WEB.pdf), AG Energiebilanzen (<https://ag-energiebilanzen.de/daten-und-fakten/primaerenergieverbrauch/> and <https://ag-energiebilanzen.de/daten-und-fakten/zusatzinformationen/>); Statista for industrial power prices <https://www.statista.com/statistics/1050448/industrial-electricity-prices-including-tax-germany/>

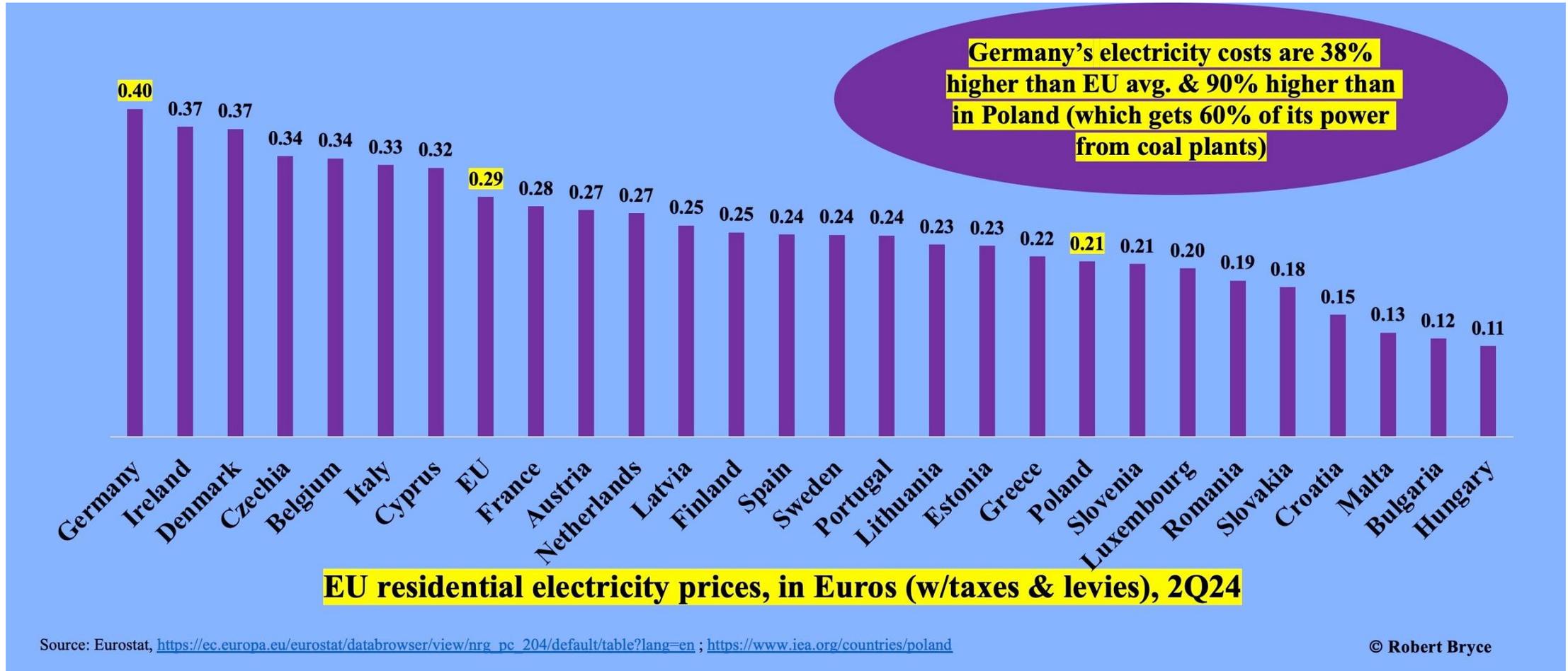
Electricity price index in Germany from 1998 to 2022.



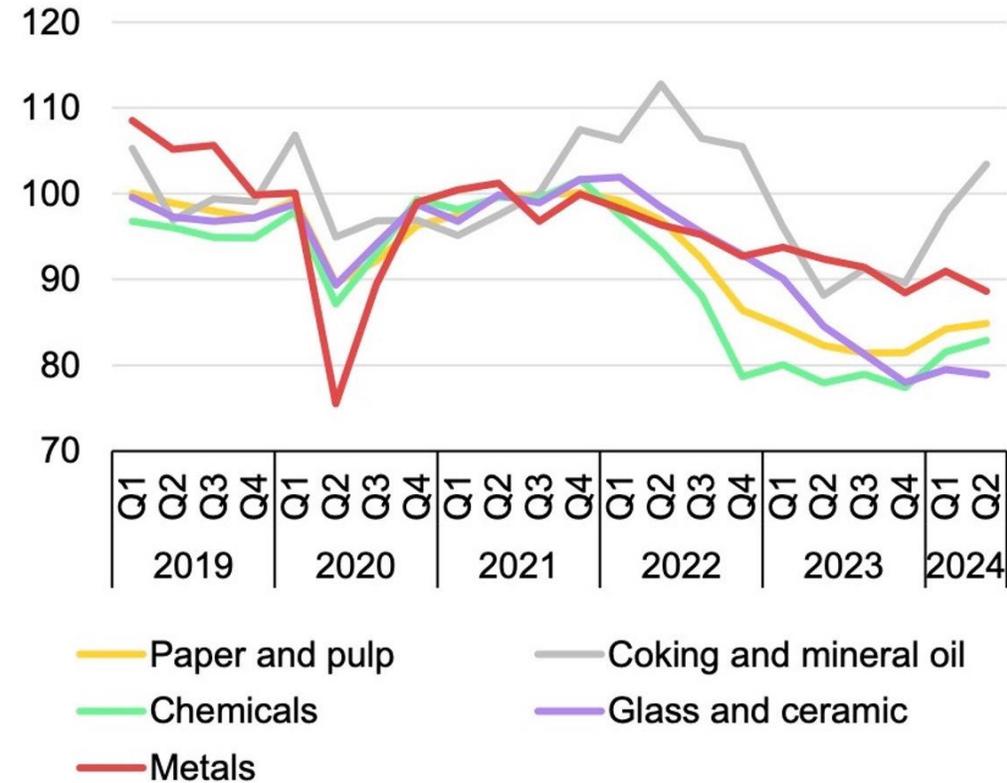
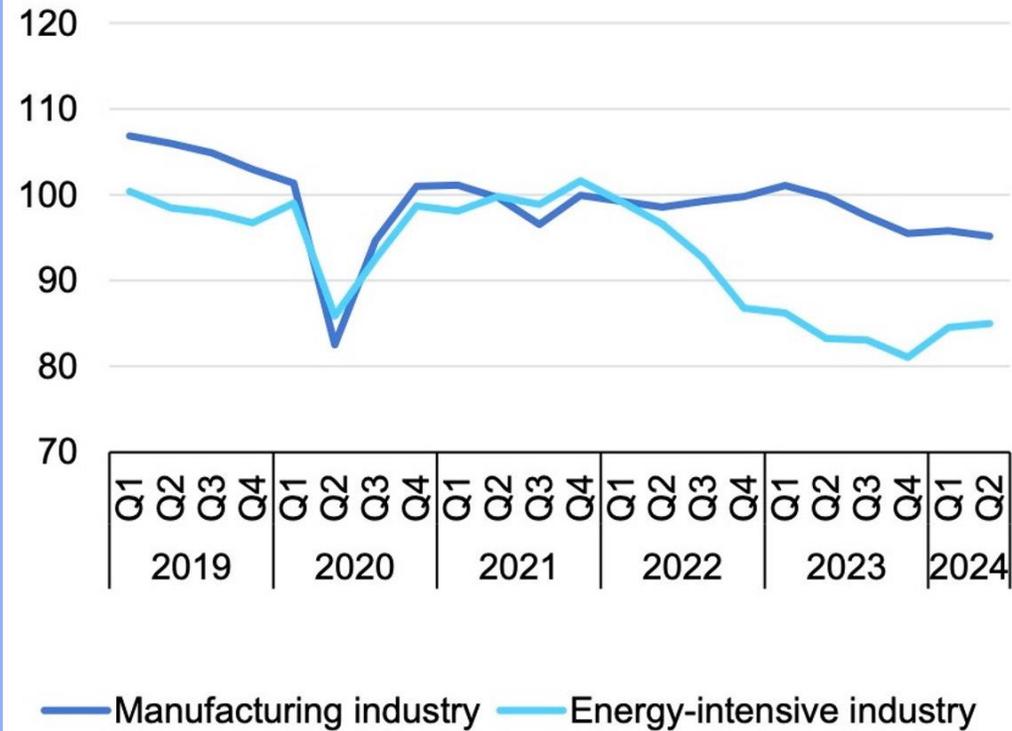
Average electricity bill for a 3-person household in Germany from 1998 to 2023 (in euros per month)



Germany Has the Highest Residential Electricity Prices in the EU



German Industrial Output is Declining



Production indices of selected industries in Germany, 2019-2024

Source: IEA, https://iea.blob.core.windows.net/assets/234d0d22-6f5b-4dc4-9f08-2485f0c5ec24/ElectricityMid-YearUpdate_July2024.pdf, 15

© Robert Bryce

Germany's three-party coalition government is finished after the partners could no longer agree on a joint policy.



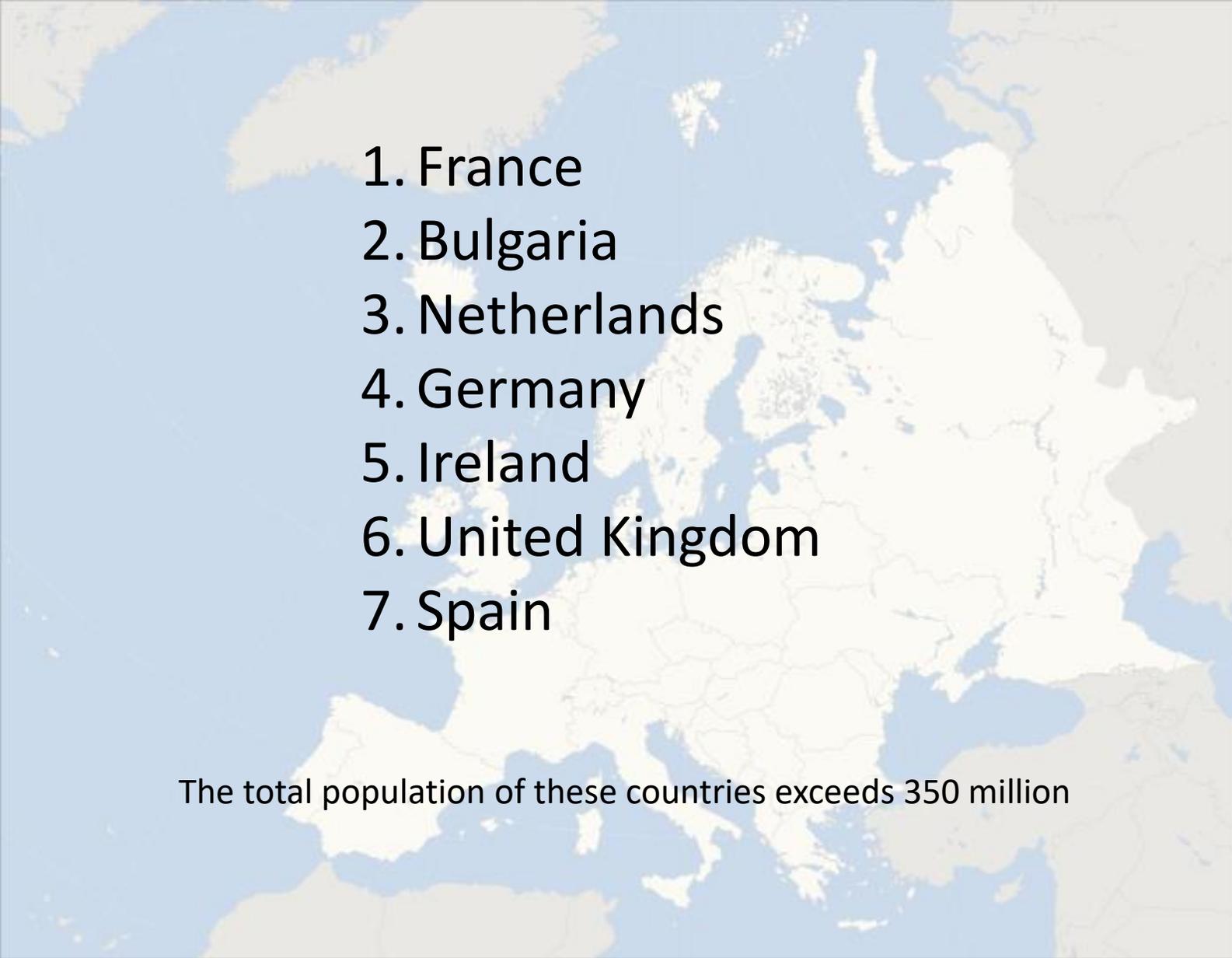
- “Following a 5.8% decline in 2022, we estimate electricity consumption in the EU industrial sector fell **6% year-on-year in 2023.**”
- Electricity demand “has fallen to levels last seen two decades ago, predominantly **due to lower consumption in the industrial sector...chemicals, steel, and aluminum are more exposed to increasing energy cost.**”

- IEA, January 2024

German Deindustrialization Should be a Wake-up Call for the U.S.



Source: Forbes, Jim Vinoski, Contributor, March 4, 2024

- 
1. France
 2. Bulgaria
 3. Netherlands
 4. Germany
 5. Ireland
 6. United Kingdom
 7. Spain

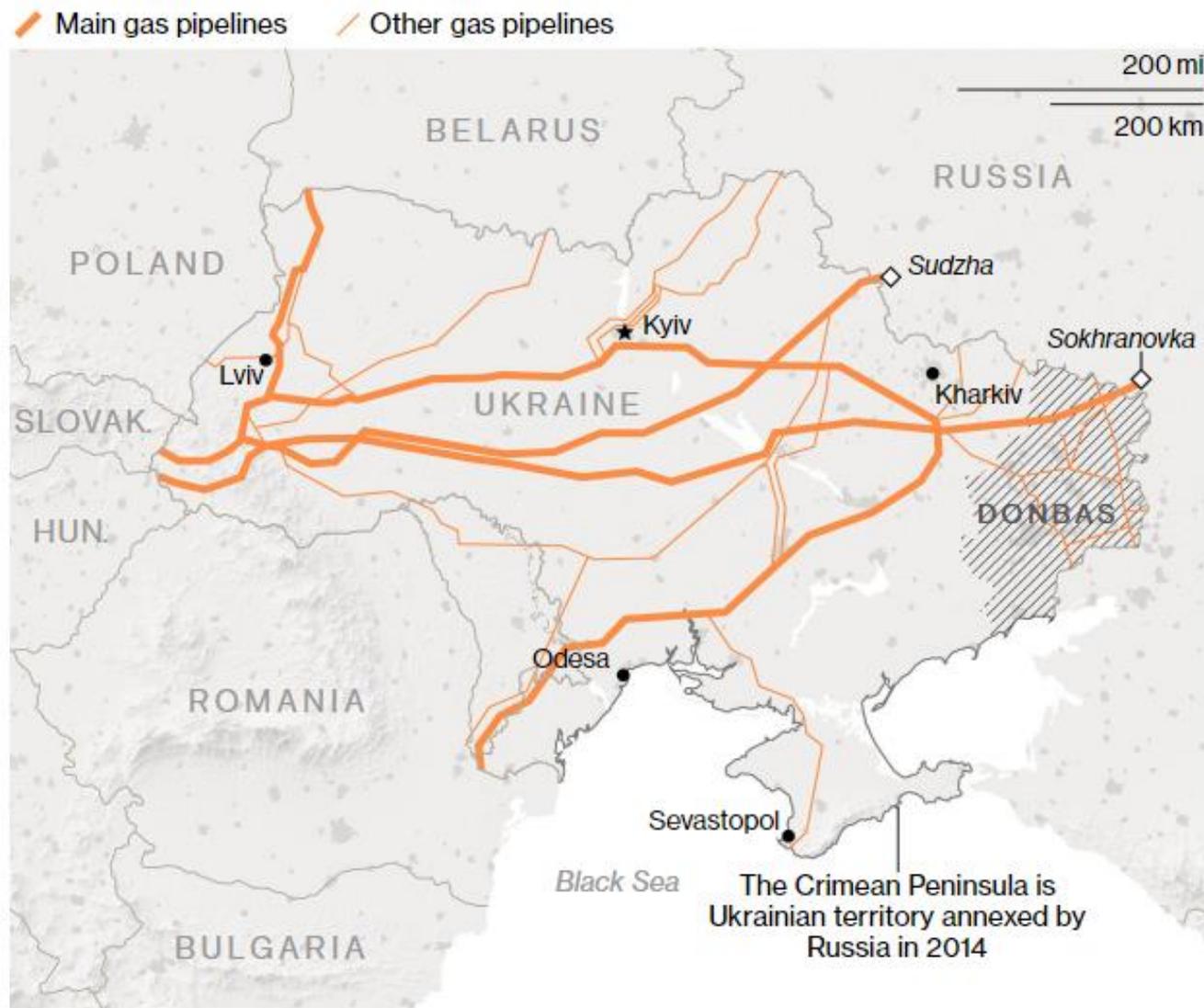
The total population of these countries exceeds 350 million

Former NATO Secretary General Anders Fogh Rasmussen backs up the Romanian claim. He said in London recently,

“Russia, as part of their sophisticated information and disinformation operations, engaged actively with so-called nongovernmental organizations – environmental organizations working against shale gas – to maintain [Europe’s] dependence on imported Russian gas.”

- Former NATO Secretary General Anders Fogh Rasmussen

Natural Gas Runs Through Ukraine – Transit k expires 1/1/25



Source: The Oxford Institute for Energy Studies

Note: Only the portion of pipelines that run through Ukraine are displayed on the map

Will Russia attack Ukraine's gas pipeline infrastructure post 1/1/2025?



1. Putin's Shadow Fleet
2. Formation of BRICS

1. Shadow Fleet or Dark Fleet

“a fleet of between **300 and 600 tankers** primarily comprised of older ships, including some not inspected recently, having **substandard maintenance, unclear ownership and a severe lack of insurance**, was currently operated as a ‘dark fleet’ or ‘shadow fleet’ to circumvent sanctions and high insurance costs”



1. Northern Sea Route/Putin's Shadow Fleet

“... the KSE Institute, found that 307 shadow tankers had carried Russian crude oil in at least one of the six quarters between January 2023 and June 2024.”

“Shadow fleet ‘tops 700 ships’ as sanctions squeeze out Western players (8% of active global fleet)”

“Russian has circumvented all sanctions with a shadow fleet of vessels whose ownership is organized to obscure links to Moscow.”



1. Shadow Fleet Tactics Exposed – Ship to Ship Transfer (STS)



1. Would a Global Oil Registry be the Solution?

- There is a new DNA identification technology available to the global oil industry that uniquely bio-identifies oil and natural gas.
- Why not start a global registry that IDs every single global producing oil and gas field in its unique bio-identity?
- This could eliminate the mystery behind what oil arrives at any particular custody transfer point in the pathway from wellhead to consumption.
- Any takers?

“EU bans 27 ships from its ports in fresh crackdown on Russia trade”

“US sanctions seven shadow LNG carriers linked to Russian Arctic business”

“US adds two LNG carriers to lengthening Russian sanctions list”

“‘Under cover’ LNG carrier becomes first caller at Russia’s sanctioned Arctic LNG2”

“Russia’s emerging LNG shadow fleet changes dynamics for sector”

“Economic Sanctions on Russia: Ineffective or Insufficient?”

2. BRICS (Brazil, Russia, India, China, South Africa)

- BRICS leaders Russia and China aim **to construct an alternative** to Western-led security and financial architectures and see expanding the group as an important step to that end.
- Countries impacted by U.S. sanctions and export controls – like BRICS leaders Russia and China, new members like Iran and wannabes like Venezuela – **want to weaken the dollar's power in order to evade sanctions and tamp down U.S. influence**
- China has been at the **forefront** of this de-dollarization effort
- Beijing is **coordinating with several major** Middle East oil producers to ramp up the use of yuan to settle oil transactions





Dramatic pictures show fire burning on tanker hit by brutal Houthi attack. Oil still onboard

“Sailing through Houthi Red Sea hotspot now is ‘insane’, says shipowner”

“Western governments powerless to stop Houthi attacks and end Red Sea crisis, insurers told”

“Oil spill from Houthi-hit tanker could land insurers with \$600m plus bill”

“Red Sea and Panama Canal disruptions cost economy \$1.25trn, says Russell Group”

Houthi attacks in the Red Sea have disrupted key maritime routes posing a growing threat to the international economy



Represents 12% of Global Maritime Trade

- The Strait of Hormuz is a critical oil transit point that carries 20-30% of the world's daily oil consumption.
- Qatar and UAE are the only 2 Mideastern countries that use the Straits of Hormuz to transit their LNG.
- That represents 20% of the world's LNG market.
- 60% of that LNG flows to Asia or 18% of that goes specifically to China
- Qatar alone sends 100 LNG tankers per month through the Straits of Hormuz
- Qatar currently has 110 new LNG tankers on order at a cost of more than \$80 billion
- All of this while LNG efforts in the U.S. are “on pause for further study.”

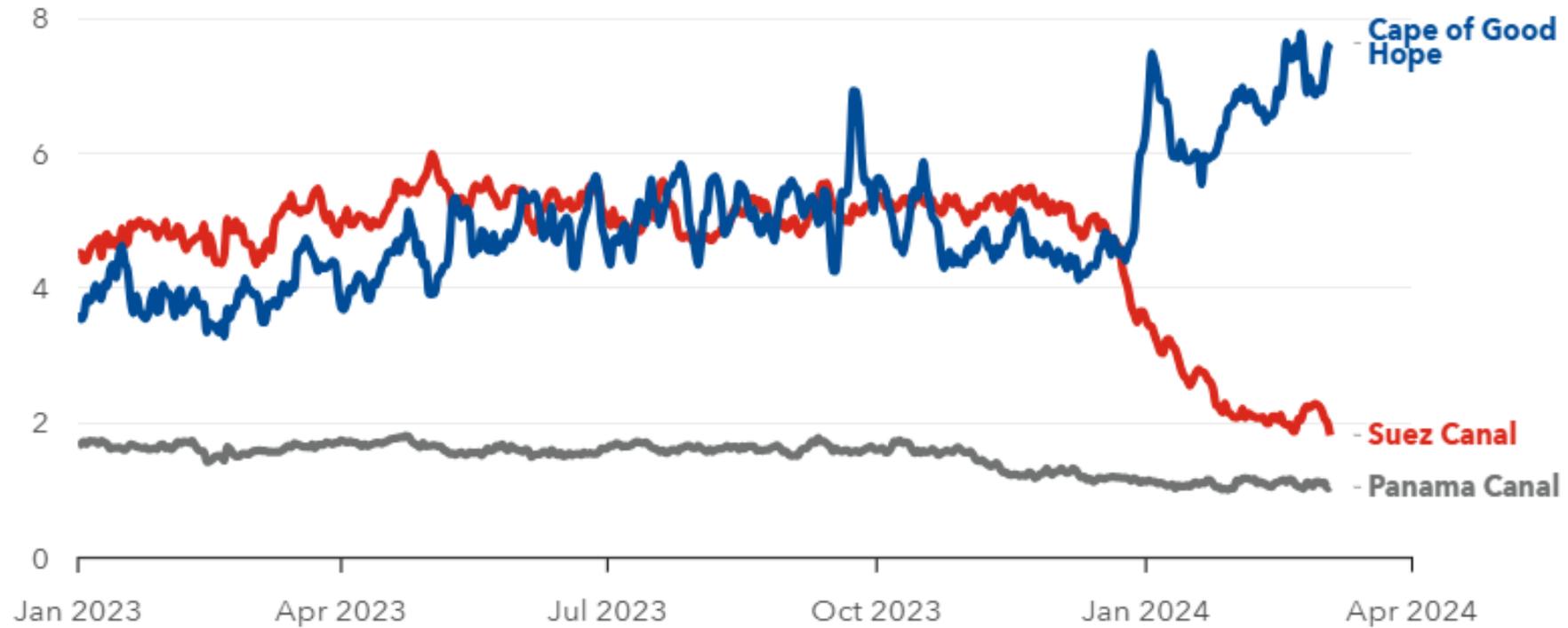
- Tasnim News Agency, affiliated with Iran's Revolutionary Guard (IRGC), reported on Wednesday (May 29, 2024) that Iran has supplied the Houthi rebels in Yemen with the Ghadr ballistic missile
- The missile, described as the first Iranian anti-ship ballistic missile, is now in the hands of Yemeni fighters, enhancing their capability to target maritime vessels.



Red Sea Attacks Disrupt Global Trade

Daily transit trade volume

(million metric tons, 7-day moving average)



Sources: UN Global Platform, [IMF PortWatch](#).



Egypt's Suez Canal revenue has dropped 40-50% in 2024

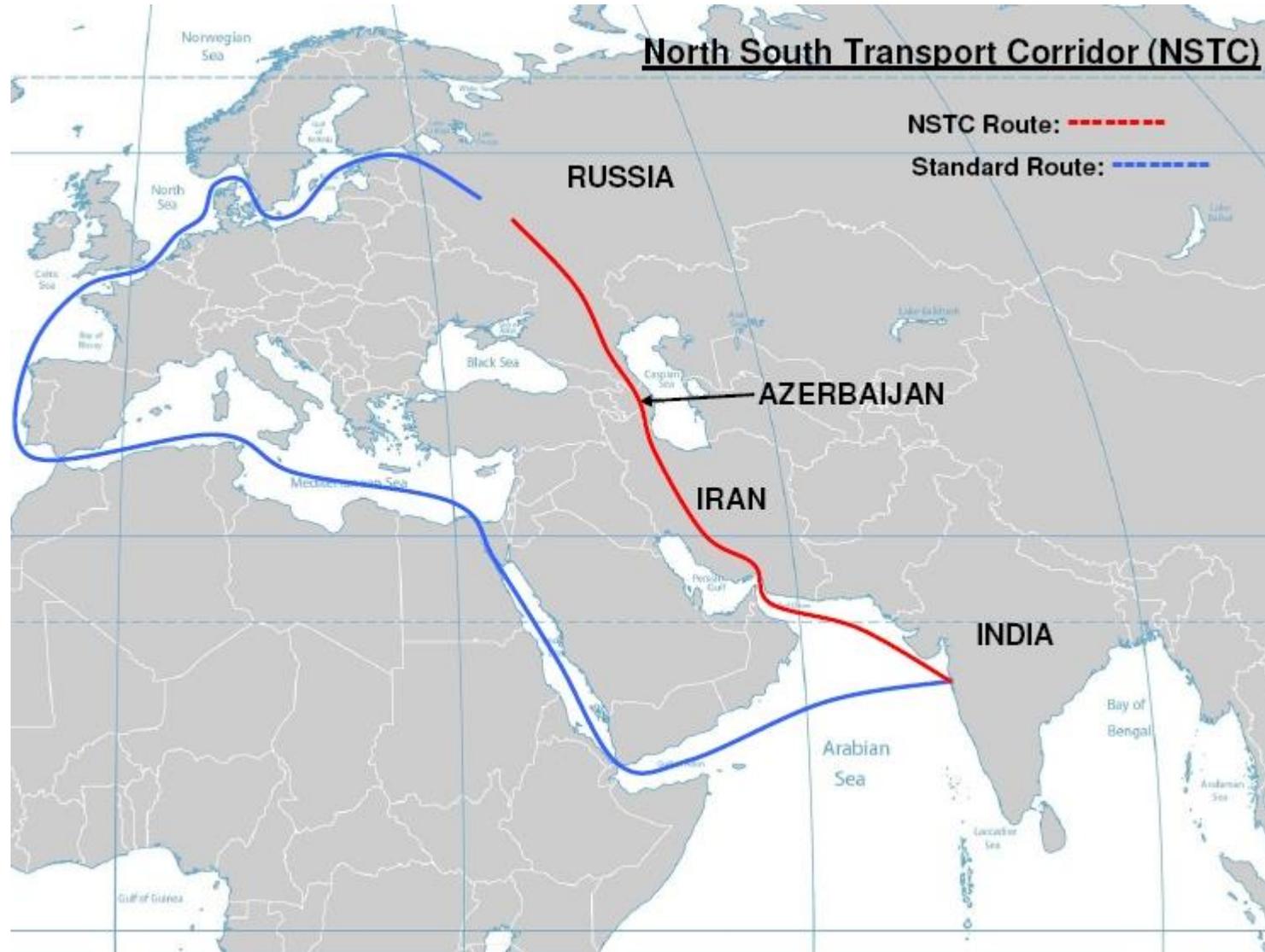
- 2022/2023 fiscal year: \$9.4 billion (record-breaking)
- 2024: number of vessels passing through the Suez Canal dropped to 544 in the first two weeks of January, down from 777 in the same period of 2023
- Dollar revenues from the Suez Canal have decreased by 40 percent and the loads shrank by 41 percent during the same period.



Russia and Iran sign rail deal for corridor intended to rival Suez Canal



International North South Transport Corridor



“New record shaping up for 2024 Northern Sea Route transits”

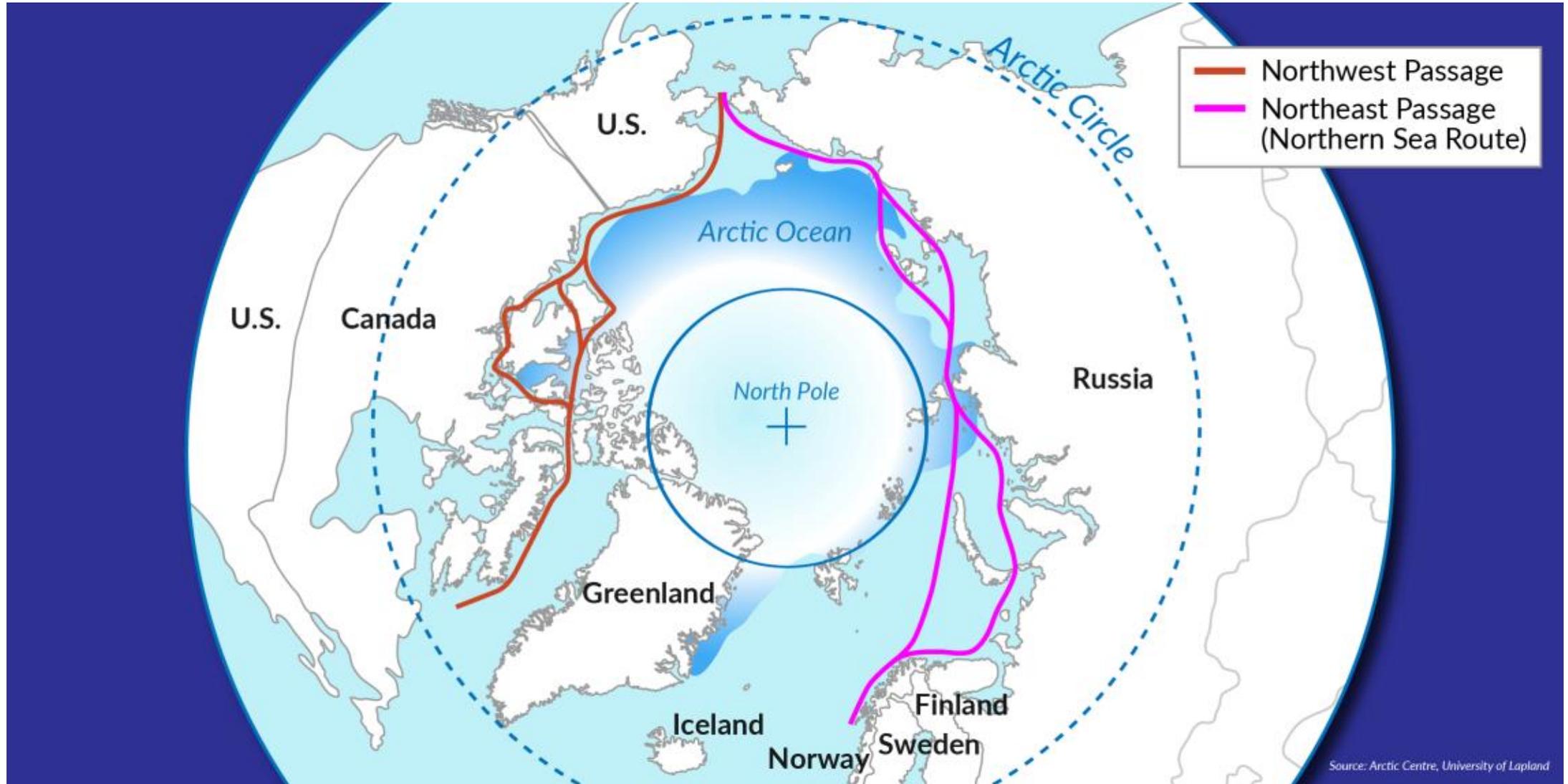
“Russia and China strike fresh deal to drive year-round container shipping through the Arctic”

“Northern Sea Route crossings dominated by crude oil cargoes last year”

“Russia sends elderly non-ice-class LNG carried through Arctic”

“Blacklisted oil tanker charts Kremlin's Arctic path to China”

Northern Sea Route



Russia and China strike fresh deal to drive year-round container shipping through the Arctic

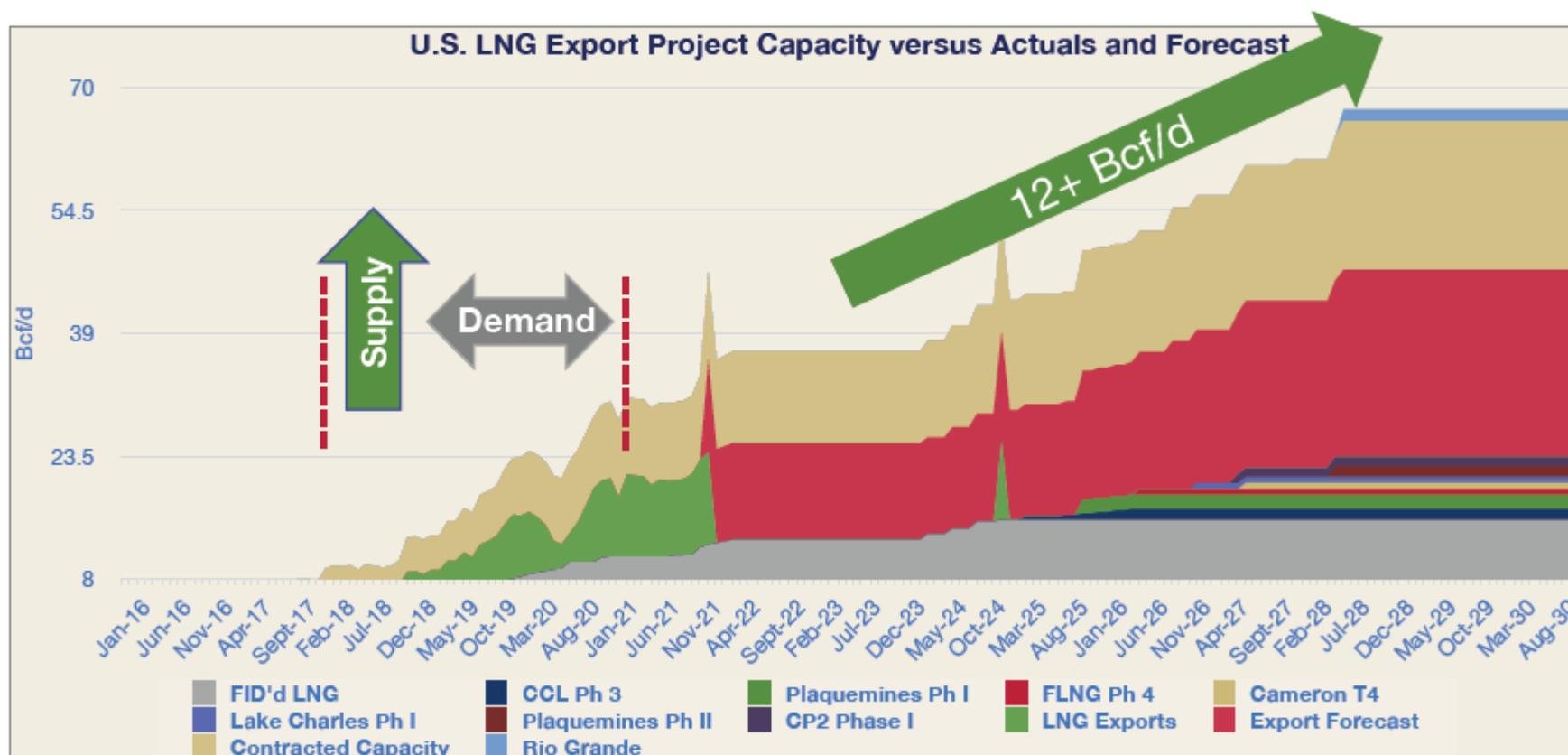


Agreement with NewNew Shipping includes joint venture to design and build ice-class boxships

How does the U.S. fit in
as the world's largest
exporter of oil and
natural gas?

Demand Increase for LNG Export Volumes

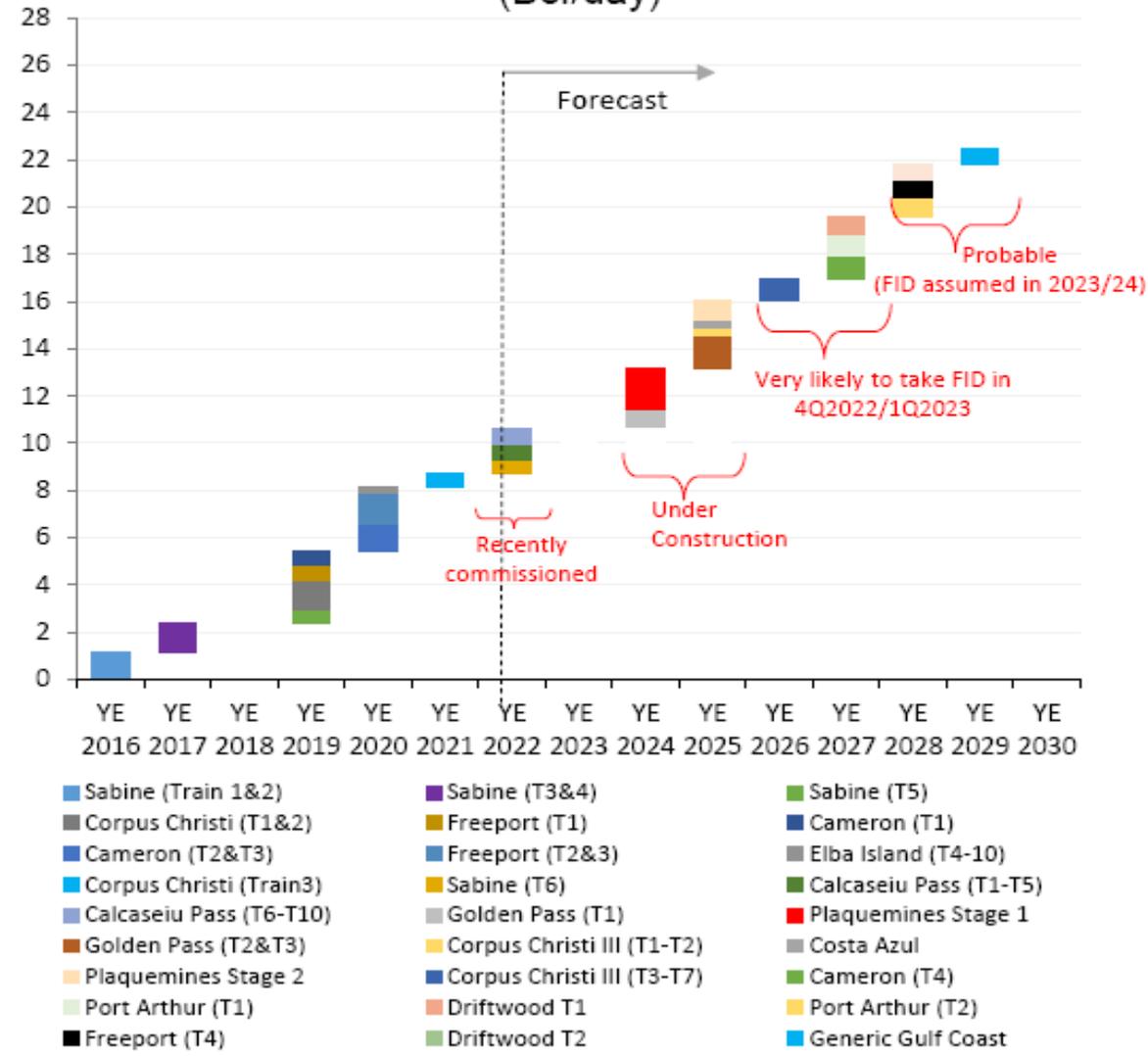
2024 to 2030



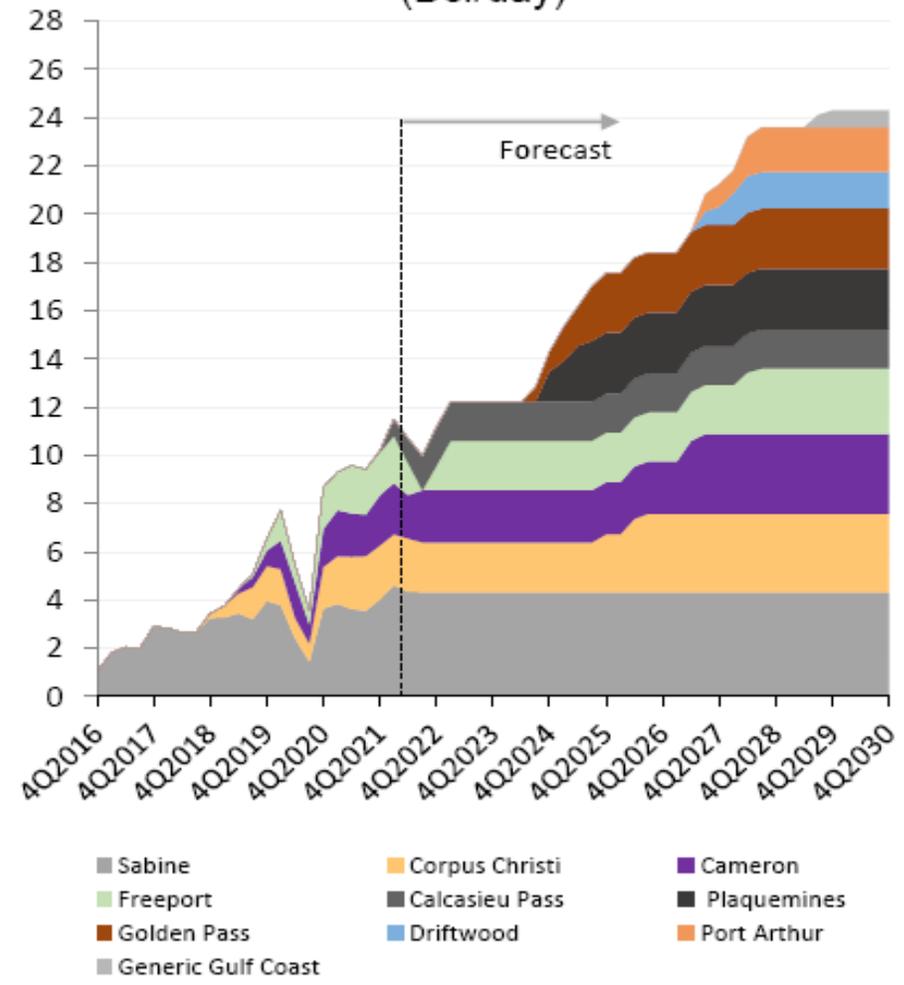
Where will all the gas come from to meet this massive increase in Demand?

USGC LNG feed gas is expected to reach ~24 Bcf/d by 2030, adding ~14 Bcf/d to regional demand (from 2021 average of ~10 Bcf/d)

USGC LNG Export Nameplate Capacity Forecast (Bcf/day)



USGC LNG Feed Gas Volume Forecast (Bcf/day)



Demand increase for U.S.
data centers could equal
LNG export growth

- Goldman Sachs: data centers **will use 8% of US power by 2030**, up from 3% in 2022, require \$50B in new gen capacity
- Kinder Morgan: **power burns for AI will be 10 Bcf/d by 2030**
- AMZN, MSFT, & ORCL betting on nuclear
- Morningstar: **16 Bcf/d by 2030**
- J.P. Morgan: **6 Bcf/day for AI & 9 Bcf/d for LNG exports by 2030**

- A ChatGPT query consumes about **four times more energy** than an email and 10 times more than a Google search, according to data by an energy researcher
- Since 2023, there is 3.9 bcf/d of incremental data center demand
- Adding another 8,000 data centers by 2030, especially hyperscalers, whose **downtime amounts to about 26 minutes out of an entire year** and whose business model depends on operating near 100% uptime
- We could see as much as 6 bcf/day of incremental natural gas demand by 2030

Robust Natural Gas Demand Growth

30+ Bcf/d Demand Growth

LNG Exports:
+20 Bcf/d

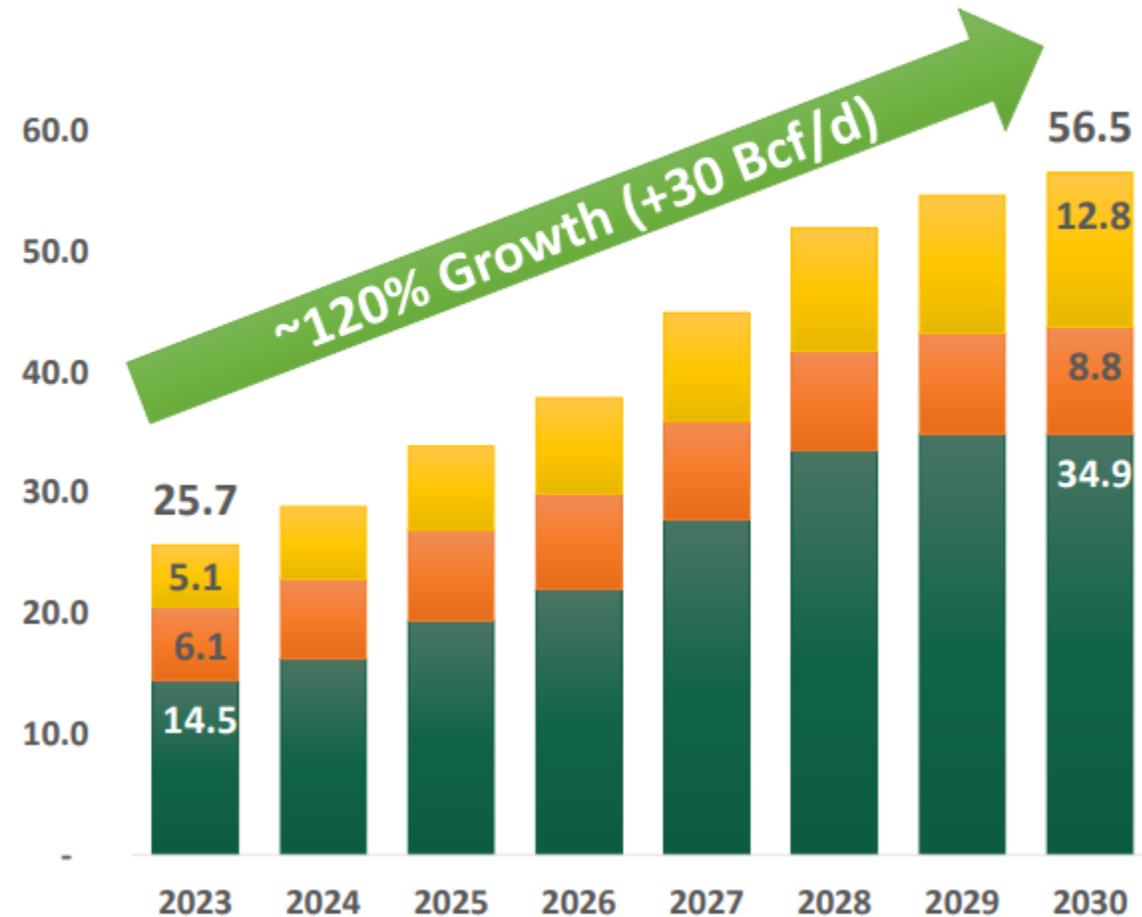
AI/Data Center; Crypto; EVs:
+7.7 Bcf/d

Mexico Exports:
+2.7 Bcf/d

Natural Gas Demand Forecasts

(Bcf/d)

■ LNG Exports ■ Mexico Exports ■ AI/Data Centers; Crypto; EVs



New life proposed for Three Mile Island supplying power to Microsoft



FERC rejects interconnection deal for Talen-Amazon data centers

Mon, Nov 4, 2024, 2:00PM | Nuclear News



The Susquehanna nuclear power plant. (Photo: Talen)

The Federal Energy Regulatory Commission has denied plans for Talen Energy to supply additional on-site power to an Amazon Web Services' data center campus from the neighboring Susquehanna nuclear plant in Pennsylvania.

Source: Nuclear Newswire, November 4, 2024

- Regardless of the data center opportunities, Kinder Morgan research estimates that between 2023 and 2033, the compound annual growth rate for North American gas production will be 2.2%, reaching 153 Bcf/d from 124 Bcf/d.



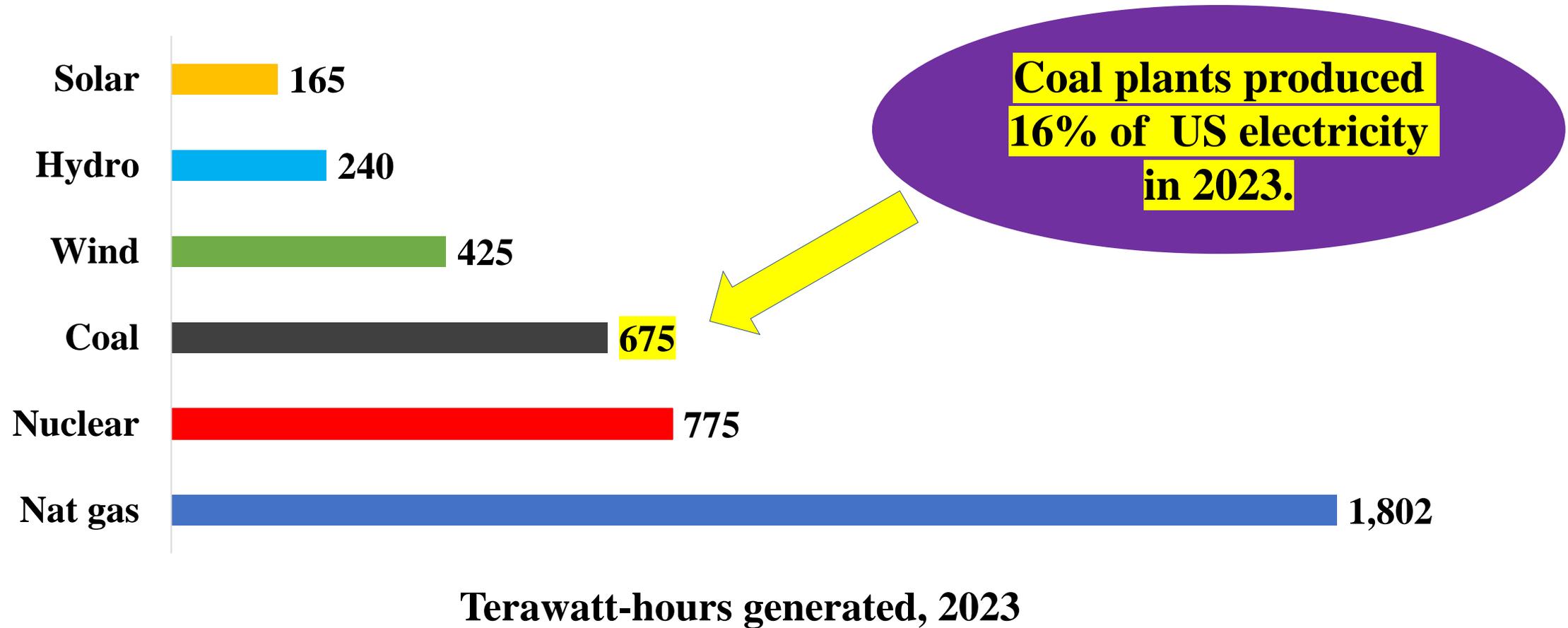
- Executive Orders and the EPA

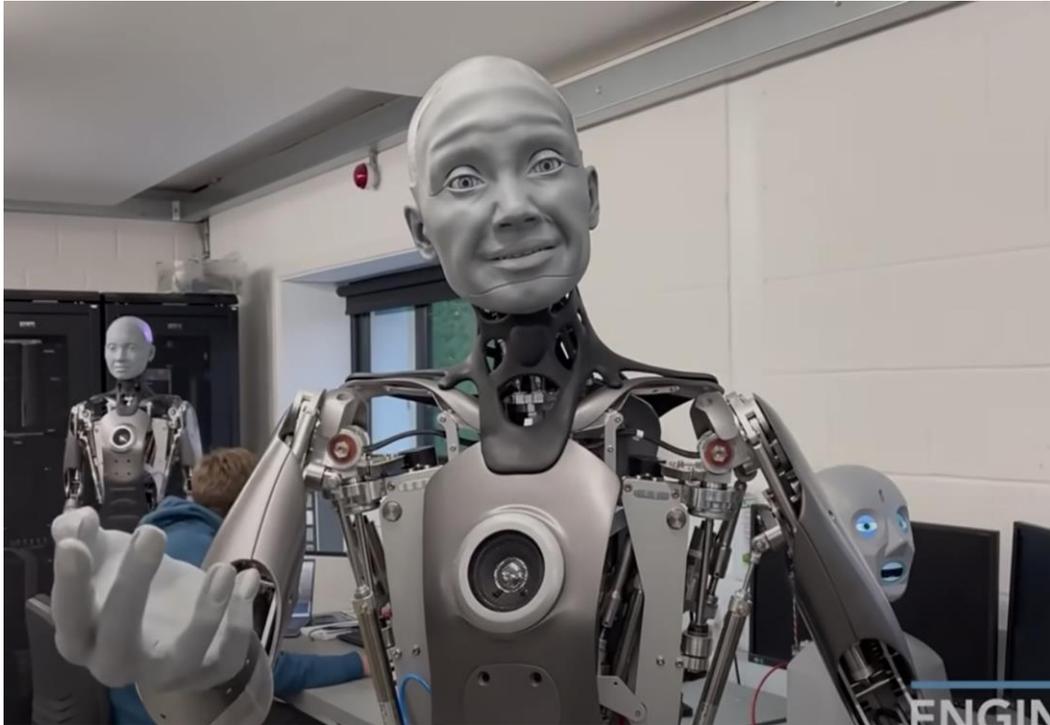


- On May 9, 2024 EPA published a GHG Rule outlawing coal-fired generation & new baseload gas w/out carbon capture and sequestration
- 27 states, APPA, TVPPA, EEI, & NRECA immediately filed lawsuits



The Rule Outlaws Coal-Fired Generation by 2032. That's 16% of U.S. Generation



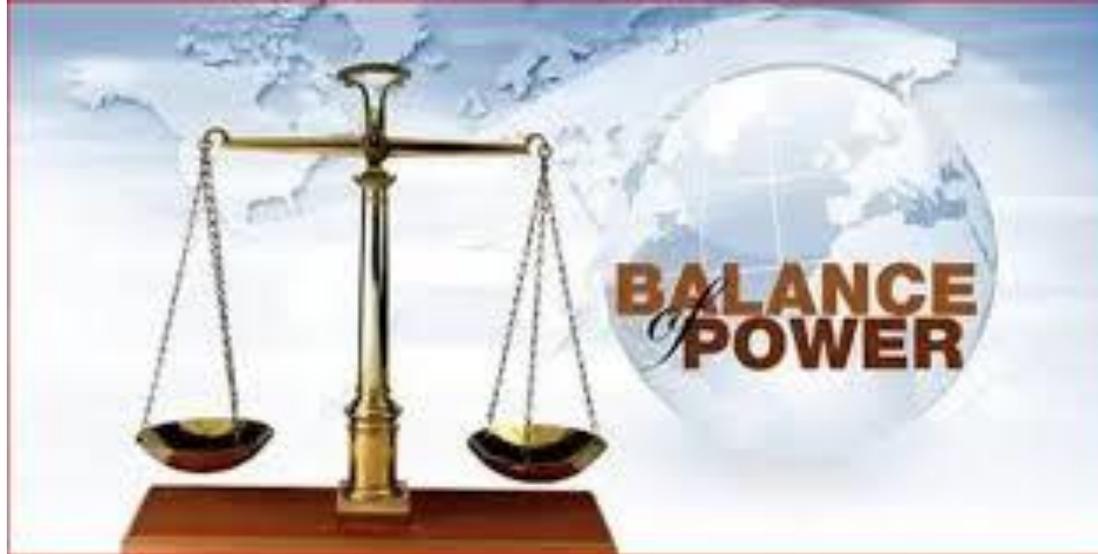


VS



Are the adults showing up on the room?

On Oct. 21, 2021, the U.S. Supreme Court agreed to hear three cases regarding the authority of the U.S. Environment Protection Agency (EPA) to steer litigation that challenges its actions away from regional appeals courts to a Washington court that hears regulatory disputes

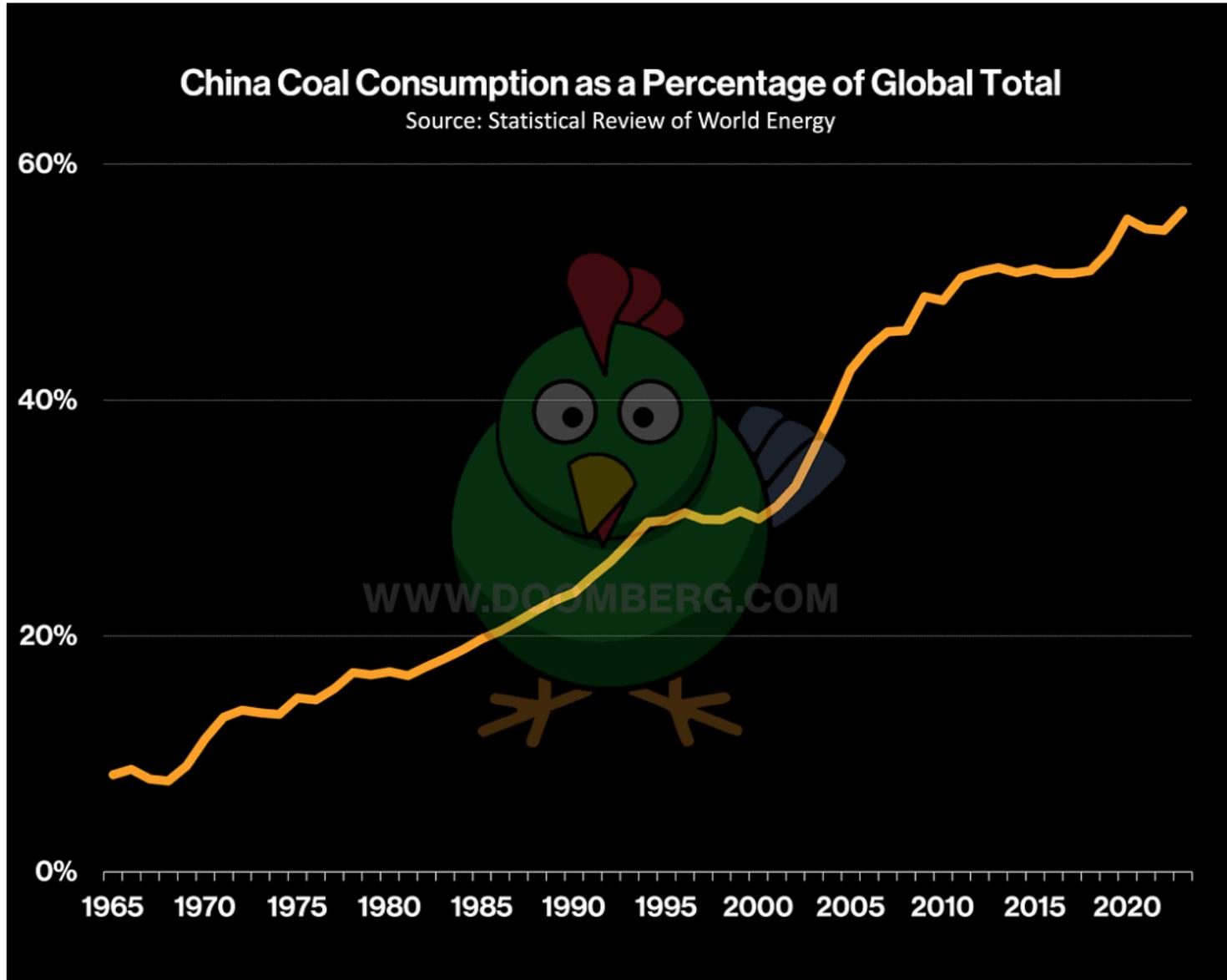


The Climatism Industry In The US Alone Is A \$4.7 Billion Per Year Business

Rockefeller Brothers Fund	\$838	Sierra Club Foundation	\$123
Natural Resources Defense Council	\$548	League of Conservation Voters	\$71
World Resources Institute	\$306	Union of Concerned Scientists	\$64
ClimateWorks Foundation	\$350	Center for American Progress	\$40
Environmental Defense Fund	\$385	Center for Biological Diversity	\$34
National Audubon	\$361	Greenpeace	\$33
Windward Fund	\$224	Climate Reality Project	\$30
Climate Imperative Foundation	\$289	EDF Action Fund	\$29
The Energy Foundation	\$133	Public Citizen Foundation	\$25
Earthjustice	\$198	350.org	\$23
Sixteen Thirty Fund	\$192	Friends of the Earth	\$20
Sierra Club	\$184	Nextgen Climate Action	\$20
Rocky Mountain Institute	\$164	Total	\$4,684

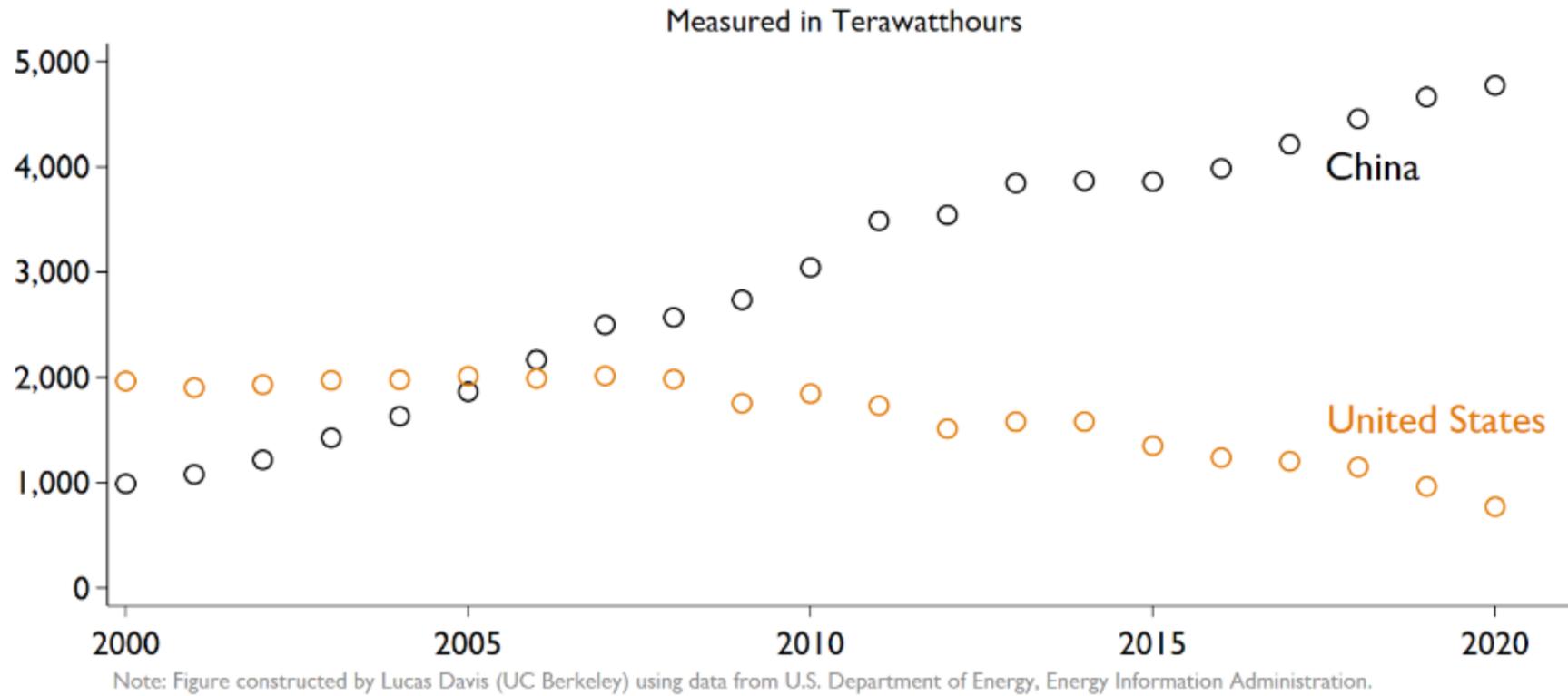
Gross receipts of top 25 Climate NGOs, in \$Millions

Can we really control worldwide CO2 emissions?

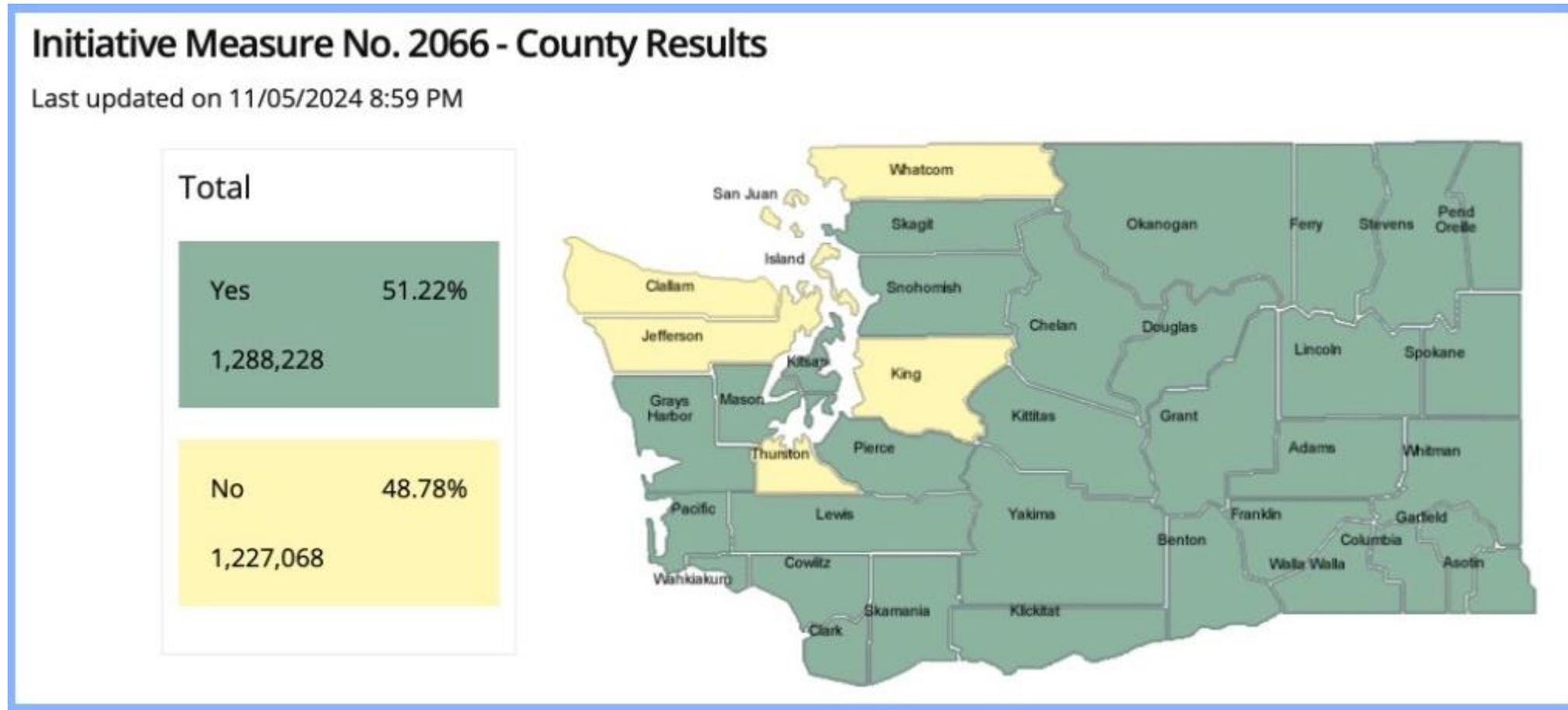


Source: www.Doomberg.com

Electricity Generation from Coal



A measure to repeal or prohibit certain laws and regulations that discourage natural gas use



- November 5th election shows that radical climate policy is a loser – even in Berkeley, CA

Measure GG: New tax on natural gas use in big buildings

Would impose a special tax on all buildings 15,000 square feet or larger that use natural gas, applying to an estimated 609 buildings next year and generating \$26.7 million. The tax rate would rise at 6% above inflation each year, expiring in 2050. ([Read more.](#))

Needs a simple majority to pass.

32 of 32 precincts reporting.

Measure GG	# of votes ▼	% of votes
No	11,625	68.7%
Yes	5,298	31.3%

Kamala Harris beat Donald Trump in CA 57% to 40%, and in Alameda County, she beat him 72% to 25%. But Berkeley's Measure GG, which aimed to tax natural gas in large buildings, lost 69% to 31%!

World leaders not attending the conference in Baku Azerbaijan:

President Joe Biden

European Commission President Ursula von der Leyen

French President Emmanuel Macron

German Chancellor Olaf Scholz

Brazilian President Luiz Inacio Lula da Silva

King Charles

Russian President Vladimir Putin

Canadian Prime Minister Justin Trudeau

Indian Prime Minister Narendra Modi

China's President Xi Jinping

South Africa's Cyril Ramaphosa

Australia's Prime Minister Anthony Albanese

The Church of Carbon does! (Doomberg Trademark)

“We are all going to die unless we do something.”

“Driving people insane with fear about their future is instrumental for the energy transition agenda.”

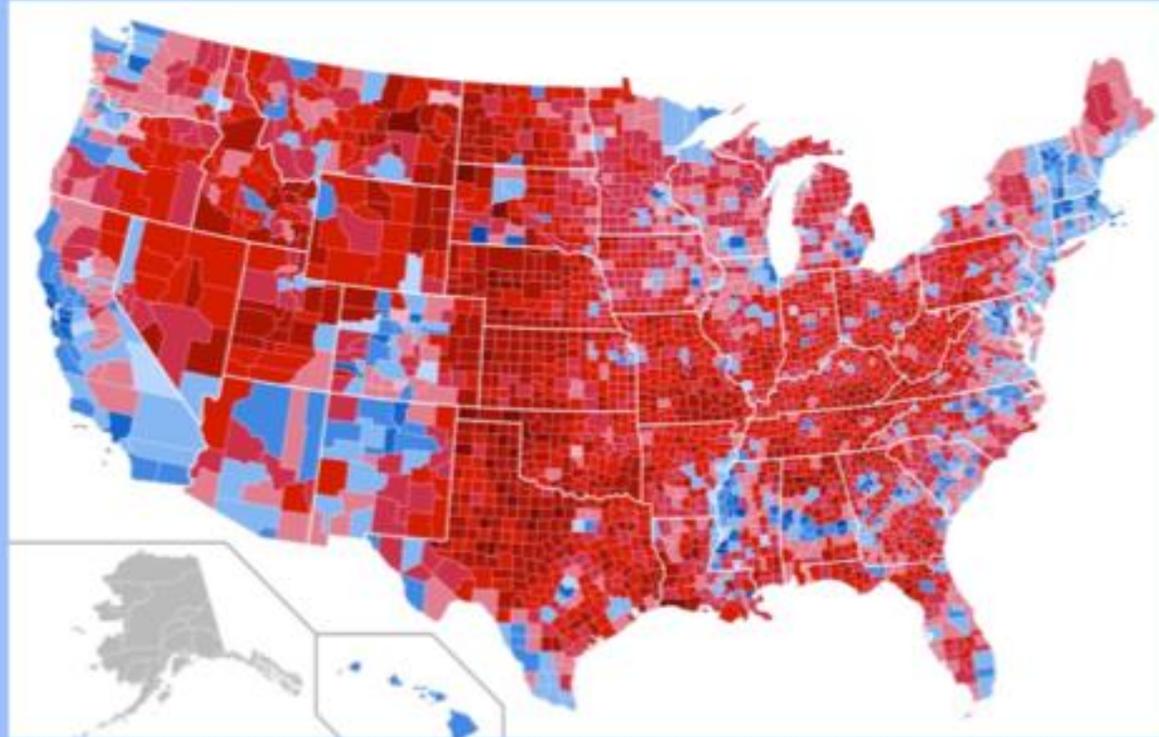
- Irena Slav



November 8, 2024: a 75 million vote mandate for Trump



The Urban-Rural Divide is Economic, Cultural, & Political



2020 Presidential election results, by county:



“In 2019, Harris said that there was ‘no question’ that she would pursue a federal ban on fracking”

In 2024, “What I have seen is that we can grow, and we can increase a clean energy economy without banning fracking,” she told CNN’s Dana Bash

The key issue in a key battleground swing state

To date, Biden is the only president in modern history not to have held a single oil and gas lease sale on federal lands despite clear direction from Congress to do so quarterly



Mission creep on climate change was found at the EPA, the Council on Environmental Quality, the Office of Comptroller of the Currency, the Securities and Exchange Commission and the Federal Energy Regulatory Commission

“We’re going through **an incredible transition that is taking place that, God willing, when it’s over, we’ll be stronger and the world will be stronger and less reliant on fossil fuels when this is over.”**

- **President Joe Biden, May 23, 2022**

“Transitioning to clean energy is reliable, less expensive & critical for climate goals.”

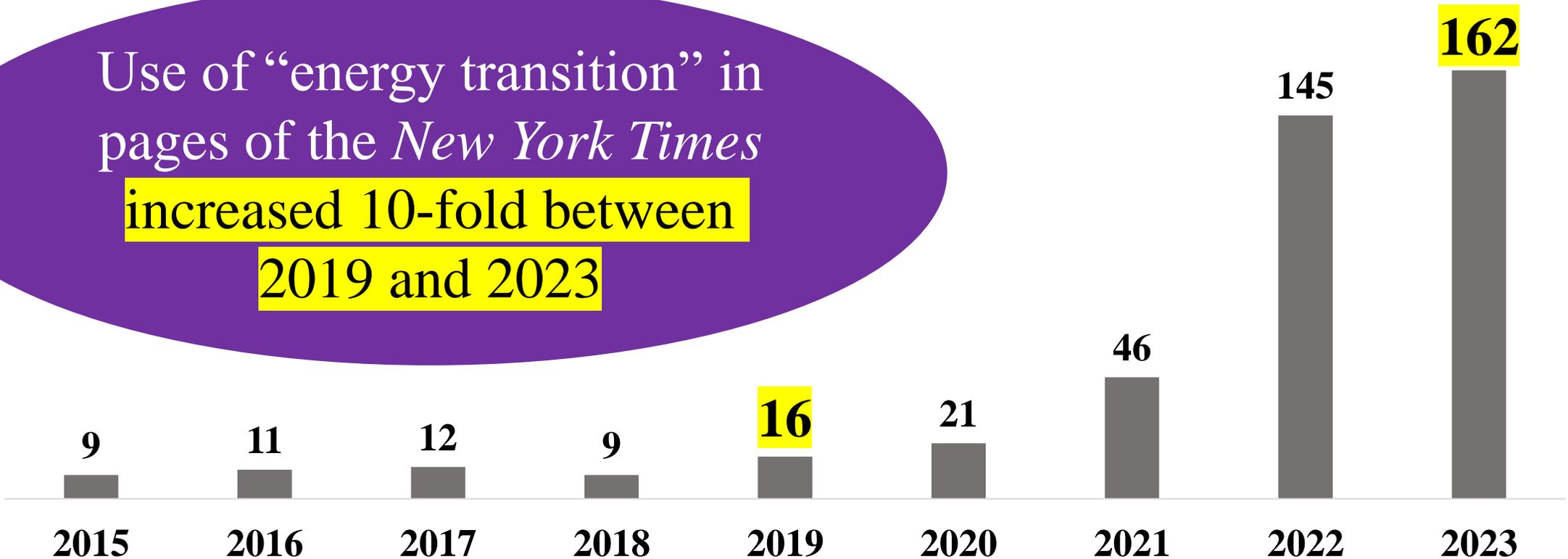
- **Sierra Club, July 5, 2023**

President Biden is “launching a new Clean Energy Supply Chain Collaborative to work with international partners to diversify supply chains that are critical to a clean and secure energy transition.”

- **White House Press release, April 22, 2024**

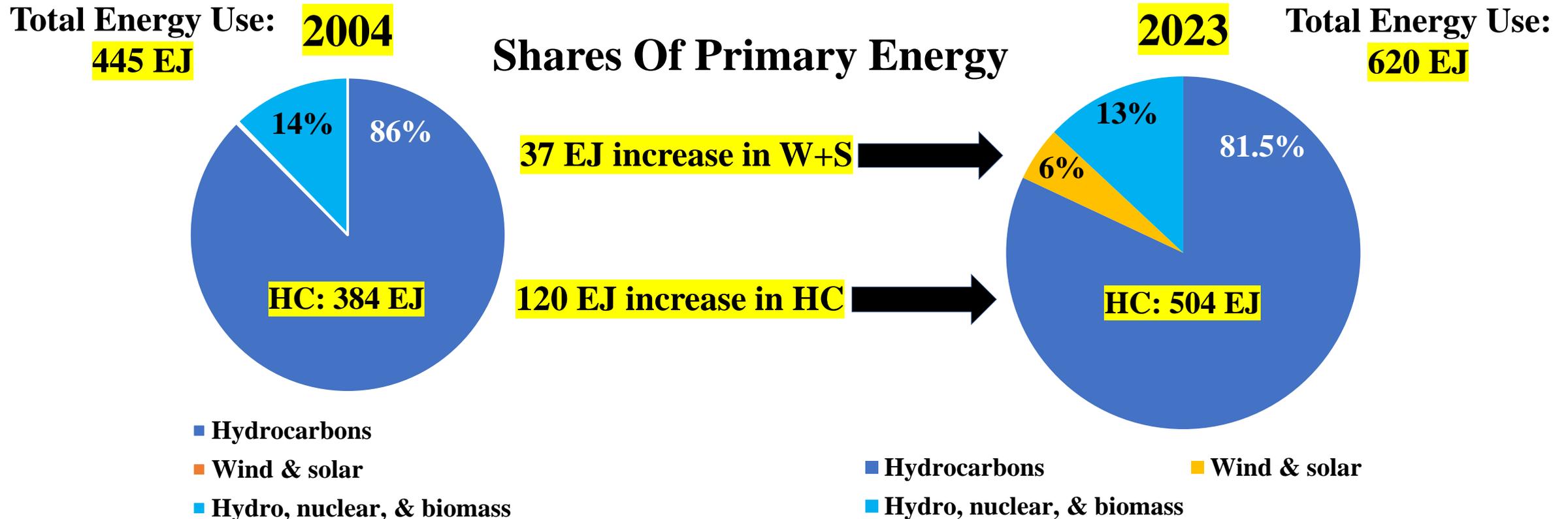
Appearance Of “energy transition” In *New York Times*, 2015 to 2023

Use of “energy transition” in
pages of the *New York Times*
increased 10-fold between
2019 and 2023

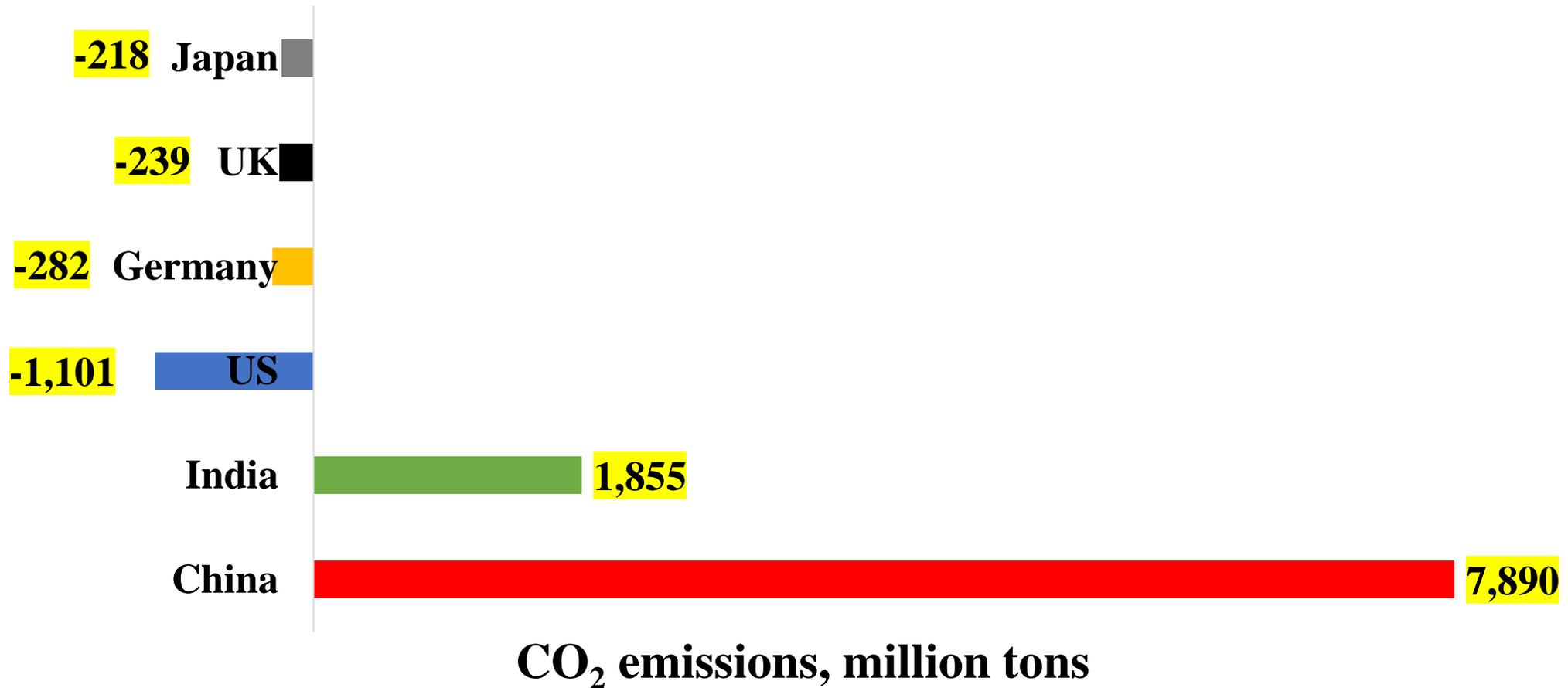


What Energy Transition? From 2004 to 2023, Global Spending On Wind + Solar Totaled \$4.7 Trillion

Yet Hydrocarbon Use Increased 3.2x Faster

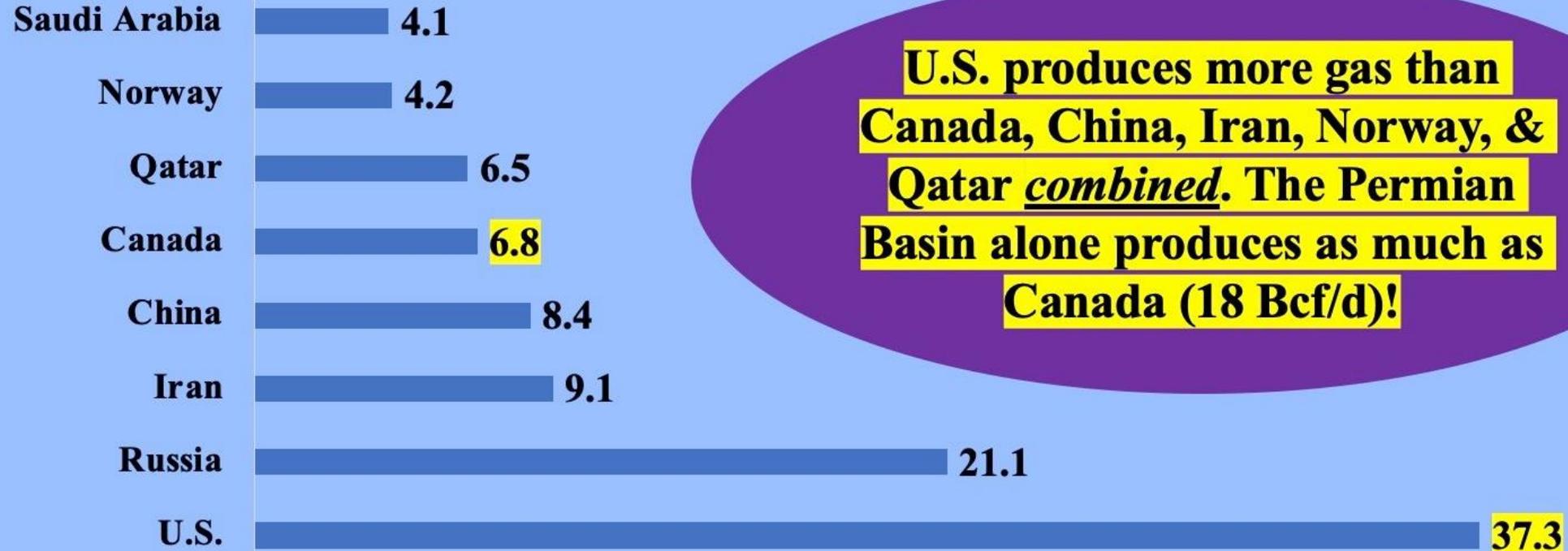


Change In CO₂ Emissions In The Six Largest Economies, 2000 to 2023



- Remove United States from the Paris Climate Accord
- Remove the United States from the entire United Nations' framework underpinning global climate negotiations
- Pull out of the 1992 UN treaty (that would require Senate approval)
- Roll back the EPA's Power Plant Emissions rule
- Attempt to rescind the Inflation Reduction Act
- Specifically eliminate the transportation electrification elements of the IRA
- Enhance Joe Manchin's Energy Permitting Reform Act bill
- Reverse the ban on new export approvals for LNG facilities
- Shrink the size of recently enlarged national land monuments and open the area up for federal oil and gas leasing
- Move the EPA out of Washington
- Endangered Species Act reform

The U.S. Is a Natural Gas Superpower



2023 gas production, in EJ

Source: Statistical Review of World Energy, <https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/natural-gas/043024-permian-basin-producers-undeterred-by-negative-natural-gas-prices-enterprise>

© Robert Bryce

- Can the U.S. learn from Germany's mistakes?
- How can we help Ukraine exit from its war with Russia intact?
- Should the U.S. continue to play the role of worldwide maritime policeman?
- What can the U.S. do to discourage additional countries from joining BRICS?
- What is the best way to deal with the Houthis in Yemen?
- Can Trump convince all interested parties in the U.S. to expand LNG exports to lower worldwide carbon emissions?
- Will the tech world and data centers prevail with all of their lobbyists and influence pedaling over the EPA and well-financed NGOs.
- Has an asymmetric version of World War III already started?

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RobertBryce.substack.com

Doomberg.substack.com

RogerPielkejr.substack.com

AlexEpstein.substack.com

“Energy and Civilization A History,” Vaclav Smil

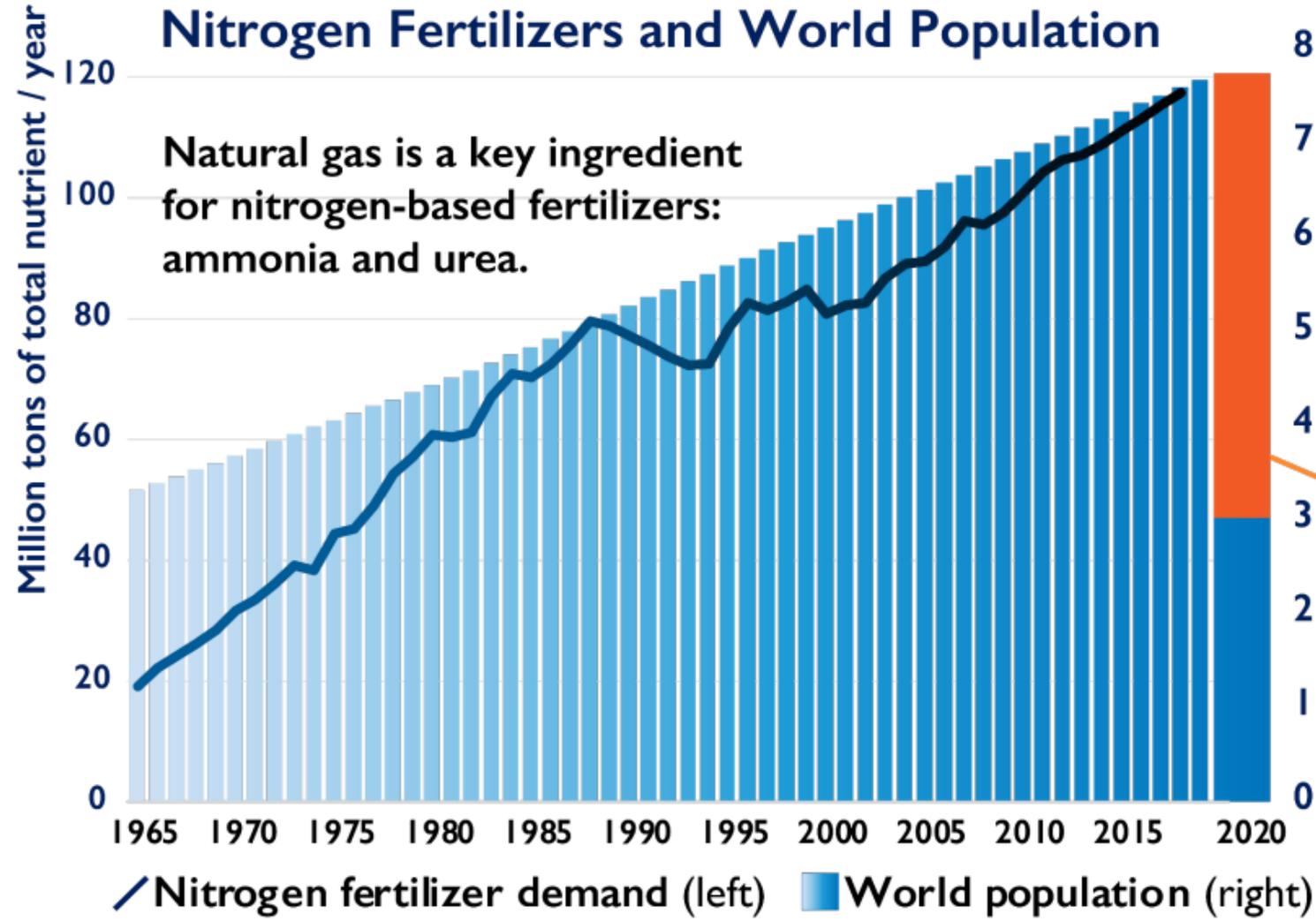
“Bettering Human Lives,” Chris Wright, Liberty Energy

@Shellenberger

Unreportedstorysociety.com

Committeetounleashprosperity.com

Food for Thought: Natural Gas is Critical for Global Food Production



Without fossil fuel-based fertilizers, agriculture can support, at most, 3 billion people on plant-based diets, vs. today's 8 billion on mixed diets.

Sources: Vaclav Smil, FAO, World Bank, Statista,

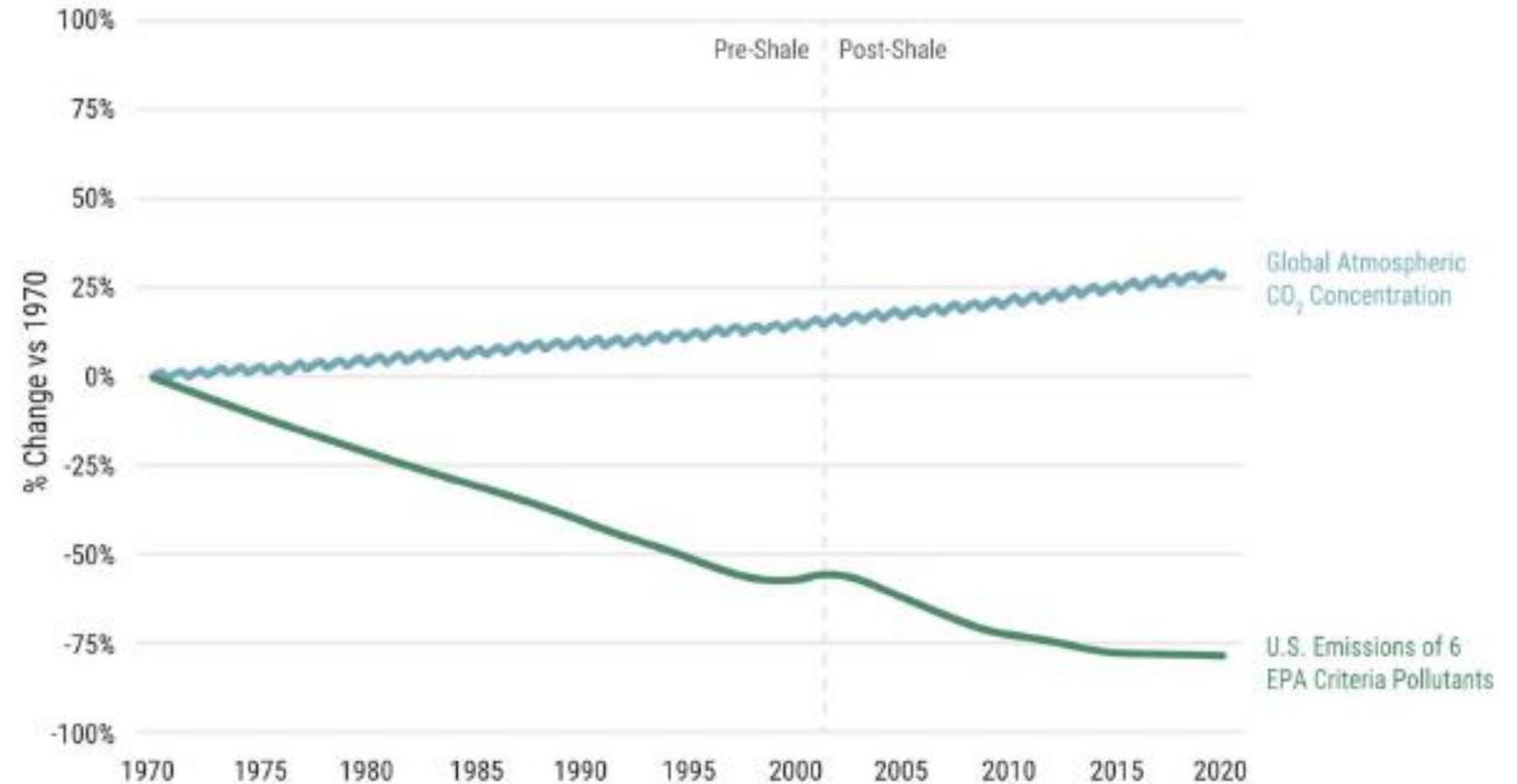
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CLIMATE CHANGE

Climate Change & Air Pollution

While global CO₂ concentration has been rising, U.S. air pollution has been on a steep decline.

Climate Change and Air Pollution % Change Since 1970



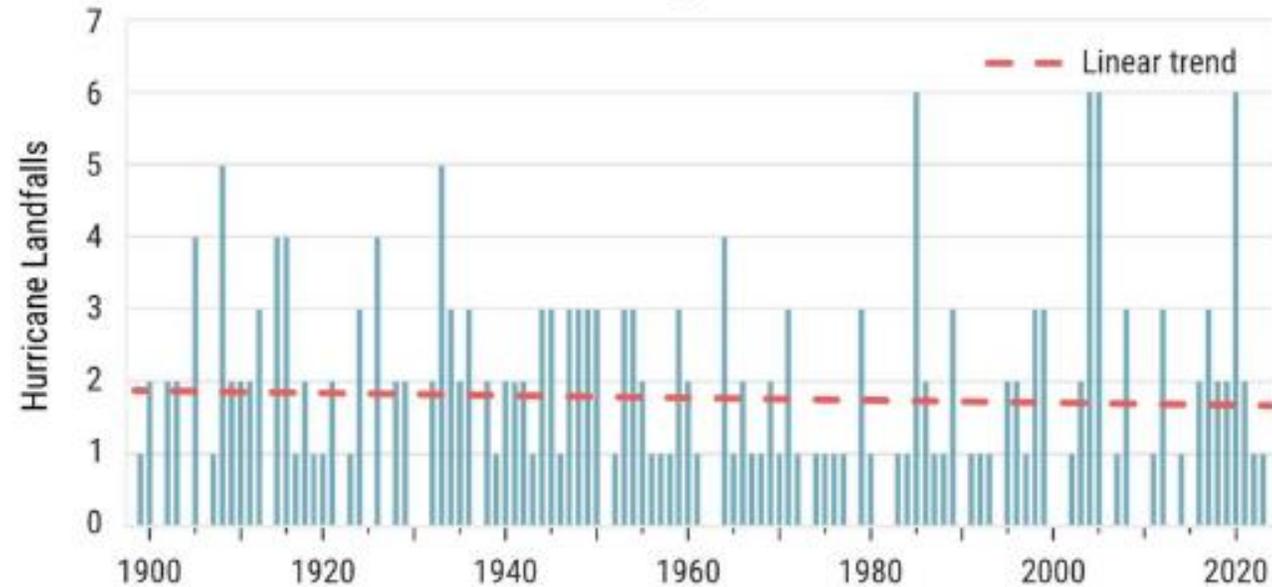
Source: Scripps Institution of Oceanography NOAA Earth System Research Laboratory, EPA, EIA & Bijou Insights

CLIMATE CHANGE

U.S. Hurricanes

Data shows large annual variability in hurricane activity but no obvious rising trend.

Figure 4.8
Continental U.S. Landfalling Hurricanes 1900–2023



Source: "U.S. Hurricane Landfalls." Atlantic Oceanographic and Meteorological Laboratories. ; Jr., Roger Pielke. "U.S. Hurricane Overview 2023."





360 substations out of service

“What the IPCC Actually Says About
Extreme Weather,” Roger Pielke, Jr.

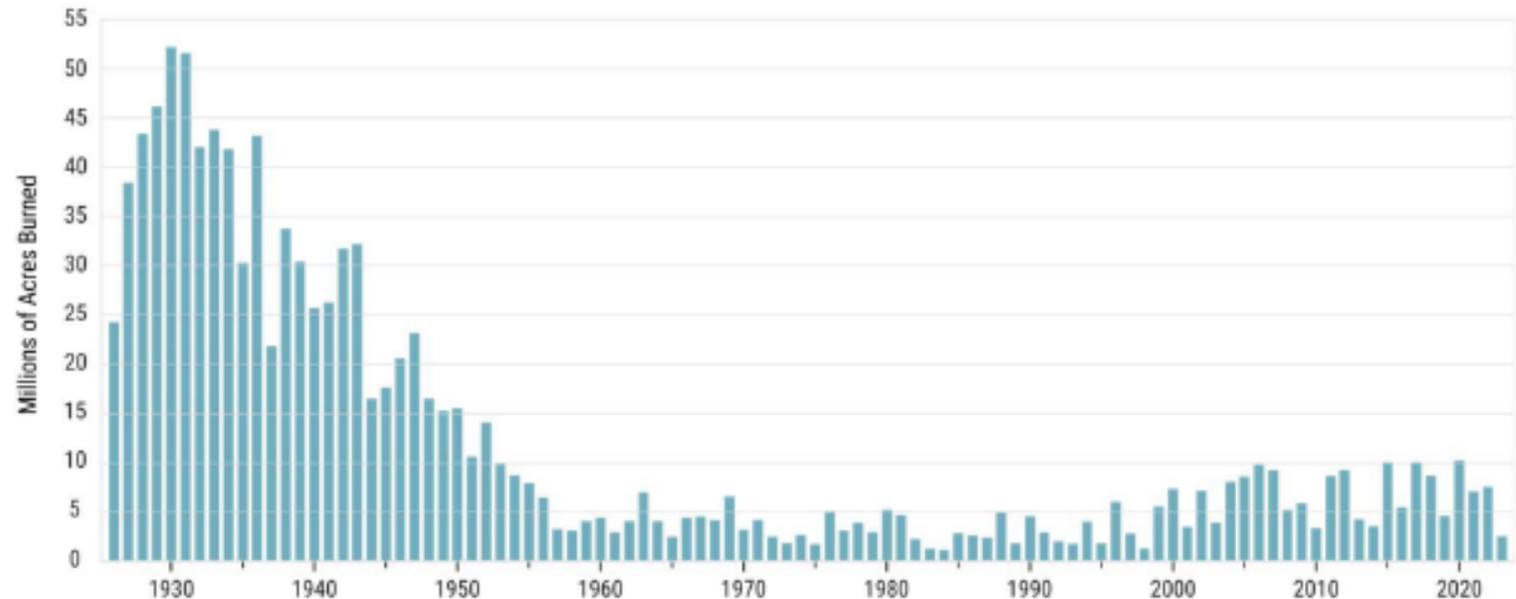
<https://rogerpielkejr.substack.com/p/what-the-ipcc-actually-says-about>

CLIMATE CHANGE

Wildfires & Forest Management

Forest Service scientists conclude that increased “live fuel” due to changing forest management practices was responsible for more than 50% of the recent increase in wildfires.

Figure 4.15
U.S. Wildfire Acres Burned 1926–2023



Source: National Interagency Fire Center, Roger Pielke, Jr.



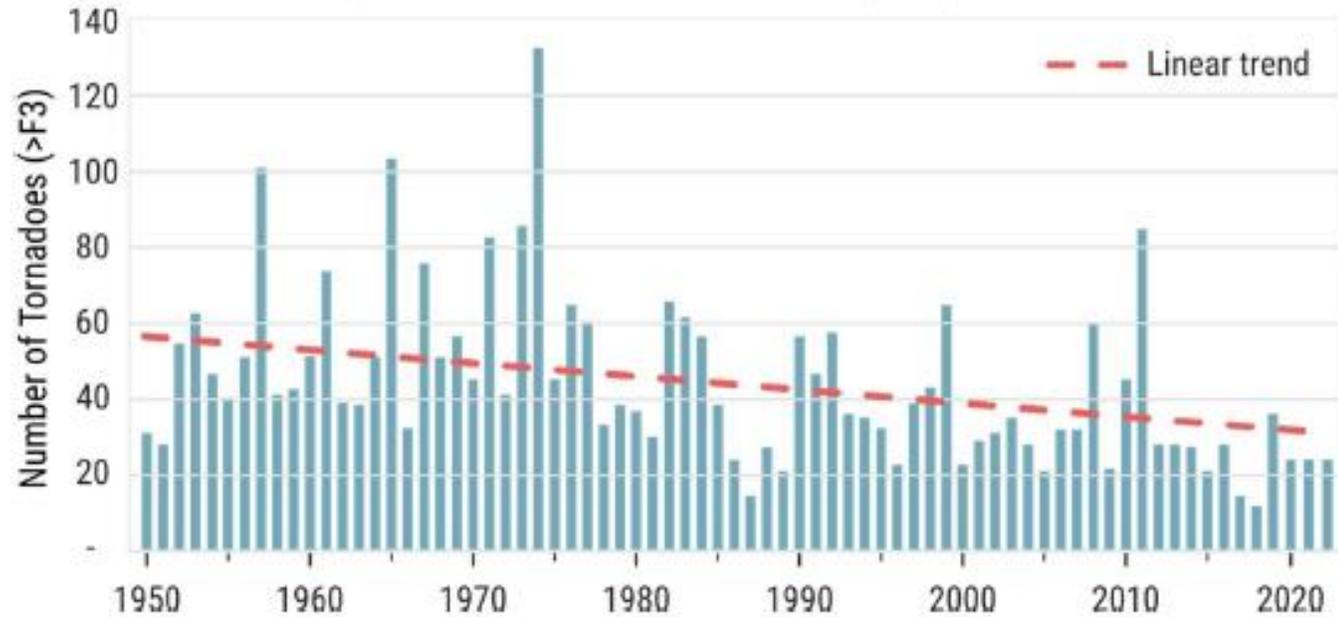
CLIMATE CHANGE

U.S. Tornadoes

The frequency of severe tornadoes in the United States since 1954 appears to trend downward.

Figure 4.9

U.S. Strong to Violent Tornadoes (>F3) 1950-2022



Source: "Storm Prediction Center WCM Page," Storm Prediction Center.

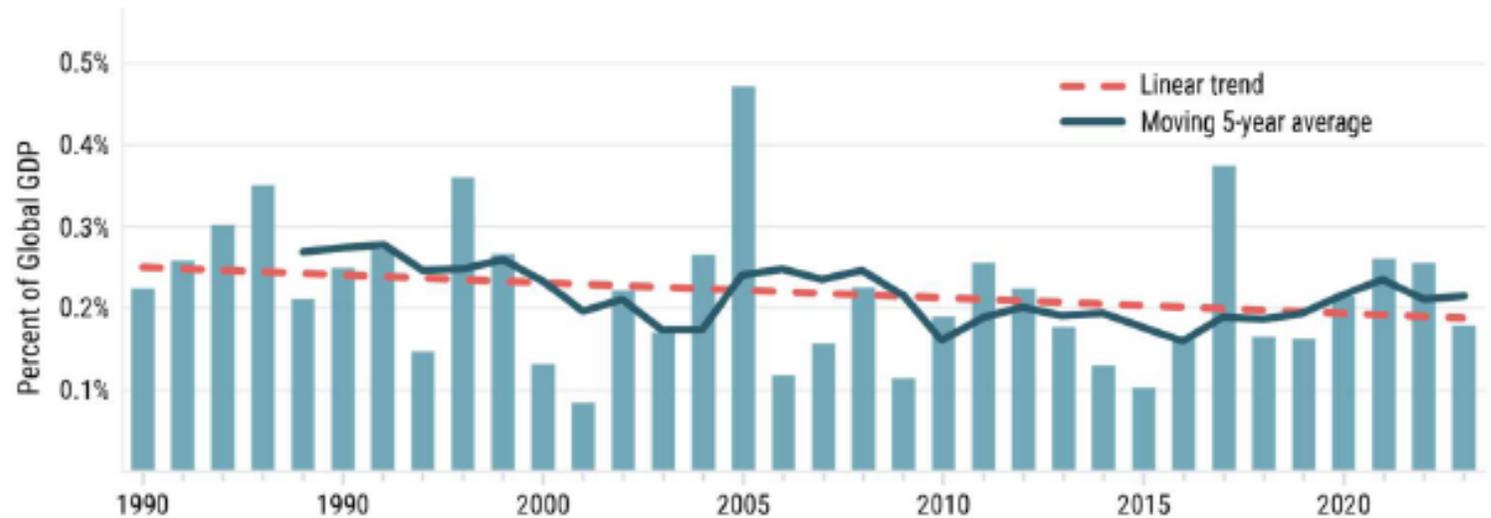


CLIMATE CHANGE

The Billion Dollar Storm Scam

Damages from extreme weather events as a percentage of global GDP have declined by roughly 20% over the last three decades.

Figure 4.14
Global Weather Disaster Losses as Percent of Global GDP 1990–2023



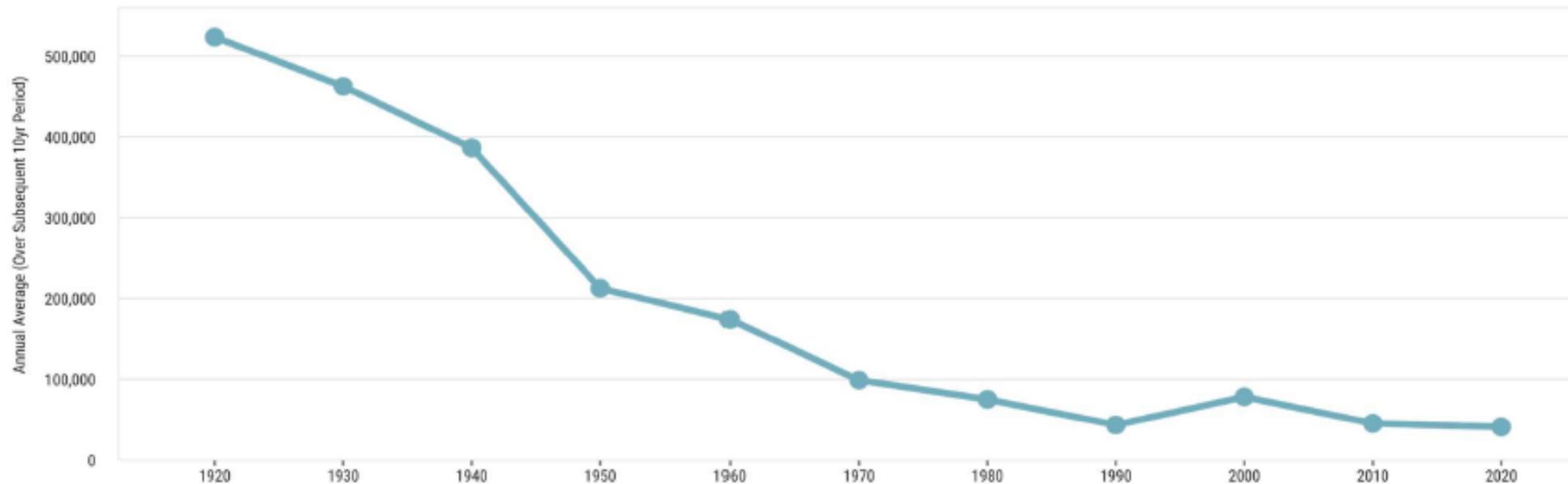
Source: Roger Pielke, Jr., Munch RE, 2023, NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2024).



World Has Become Dramatically Safer

CLIMATE CHANGE

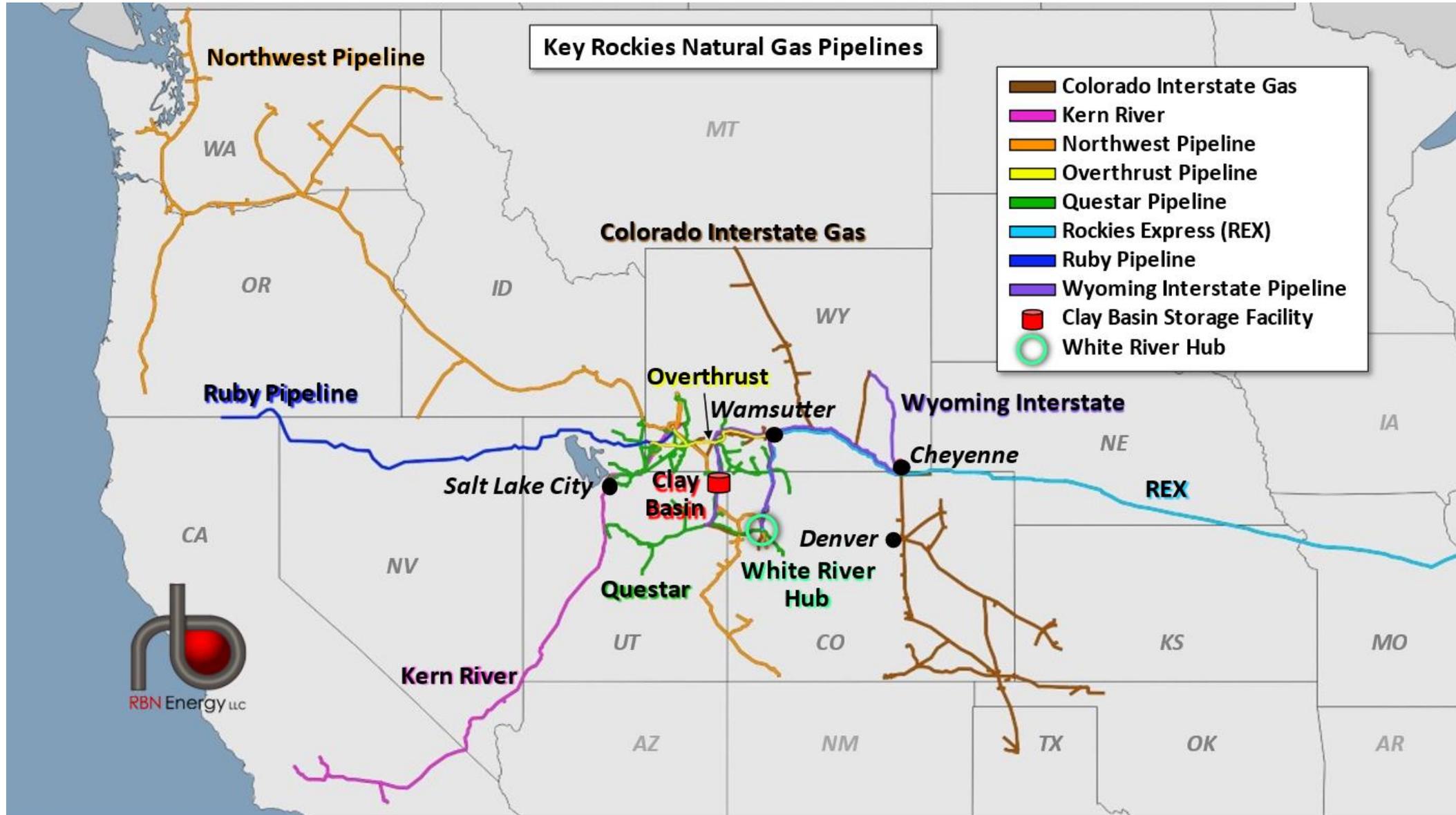
Figure 4.16
Global Deaths from Severe Weather 1920–2020



Source: "EM-DAT: The International Disasters Database." EM-DAT, Centre for Research on the Epidemiology of Disasters (CRED). ; Lomborg, Bjorn. "Welfare In the 21st Century: Increasing Development, Reducing Inequality, the Impact of Climate Change, and the Cost of Climate Policies." Technological Forecasting and Social Change, North-Holland, 24 Apr. 2020.



An Unbelievable Story – Xcel/CIG

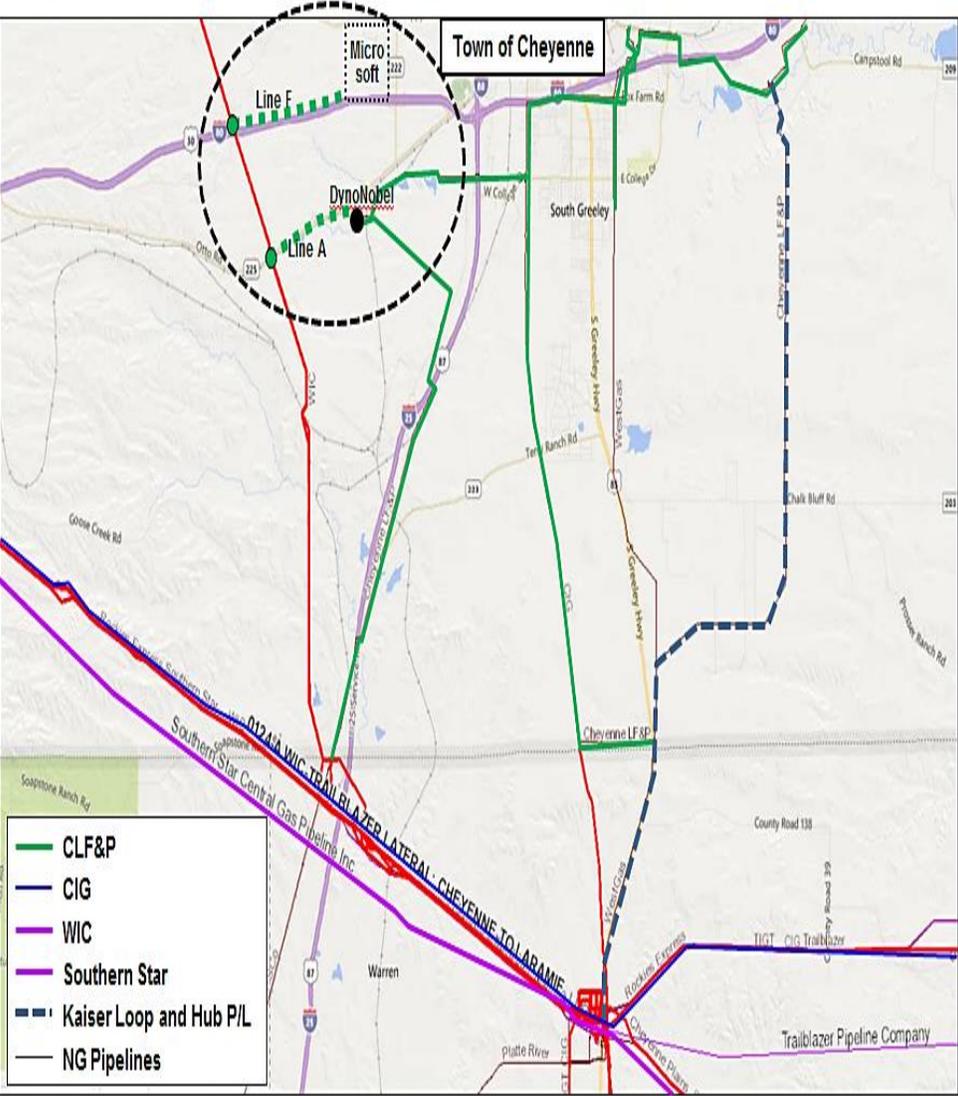


“On a chilly spring morning in March, British coast guards spotted something unusual around 100 kilometers off the Scottish shoreline: **a dark stain, stretching 23 kilometers into the North Atlantic Ocean.**”

“According to an internal analysis prepared by the coast guard’s satellite services and seen by POLITICO, the likely source of that stain was Innova, a tanker roughly the size of the Eiffel Tower that at the time was **hauling 1 million barrels of sanctioned oil from Russia on its way to a refinery in India.**”

Hyper Scaler Data Center

Data Center – KM Wyoming Interstate Pipeline



On-site Backup Generation

- 64 Diesel engines
- 20 gas-fired turbines (3.0 MW Kawasaki GPS3750-Z simple cycle gas-fired turbine @ 48.2 Dth/hr)
- 40 gas-fired IC engines (GE Jenbacher natural gas-fired IC engine @ 28.8 Dth/hr)
- Two Interconnects off of WIC’s Medicine Bow Laterals

In-service: Q4 2017



Israel's Leviathan, Tamar and Karish offshore natural gas fields

Israeli government figures show that in 2022, 63 percent of its gas exports went to Egypt and 37 percent to Jordan.

Key Israeli Gas Infrastructure and Potential Export Options

■ GAS FIELD/PIPELINE ■ POTENTIAL PIPELINE → PREWAR FLOWS 🚢 LNG TERMINAL 🏭 REFINERY ⚡ POWER PLANT
GW = gigawatts | mn cfd = million cubic feet per day | FLNG = floating liquefied natural gas



Source: Peter Stevenson, "Israel Halts Tamar & EMG Flows As Fight With Hamas Continues," MEES, October 13, 2023.



100 BCF	Average U.S. Daily Production and Demand
70 BCF	Russian Daily Production
50 BCF	European Union average daily usage
18 BCF	Russian export volume to Europe (2021)
12 BCF	U.S average daily LNG Export volume (2022)
12 BCF	Expected growth in U.S. LNG export capacity next 4 years
11 BCF	Worldwide daily volume of natural gas that is converted to fertilizer
11 BCF	Anticipated 24-hour swing in natural gas demand in California by 2035

- 7-8 BCF California peak day natural gas usage (2022)
- 4 BCF Colorado peak day natural gas usage
- 3 BCF Volume contained in the average LNG tanker
- 2.5 BCF Daily volume of natural gas managed by Mercator Energy
- 2 BCF Xcel Energy peak day natural gas usage (CO)
- 84 Dth Typical annual average use per U.S household
- 1 Dekatherm (Dth) = 1 MMBtu = 1 MCF (approx.)
- 10 Therms = 1 Dekatherm
- 4/10 of 1%: Percentage of total U.S. gas stove usage vs. total U.S. gas usage