Manufacturing Energy Challenges and Opportunities

November 2023

Energy Price Sensitive Products are Essential for Economic Growth

Building Block Industries	Convert to	Commercial & Consumer Products
Chemicals	→	Food Production
Plastics	→	Automobiles
Fertilizer	→	Consumer goods
Glass / ceramics	→	Construction
Steel	→	Medical Supplies
Aluminum	→	Energy Production
Pulp and Paper	→	Appliances
Cement	→	Household products
Food Processing	→	Defense industries
	→	Telecommunication

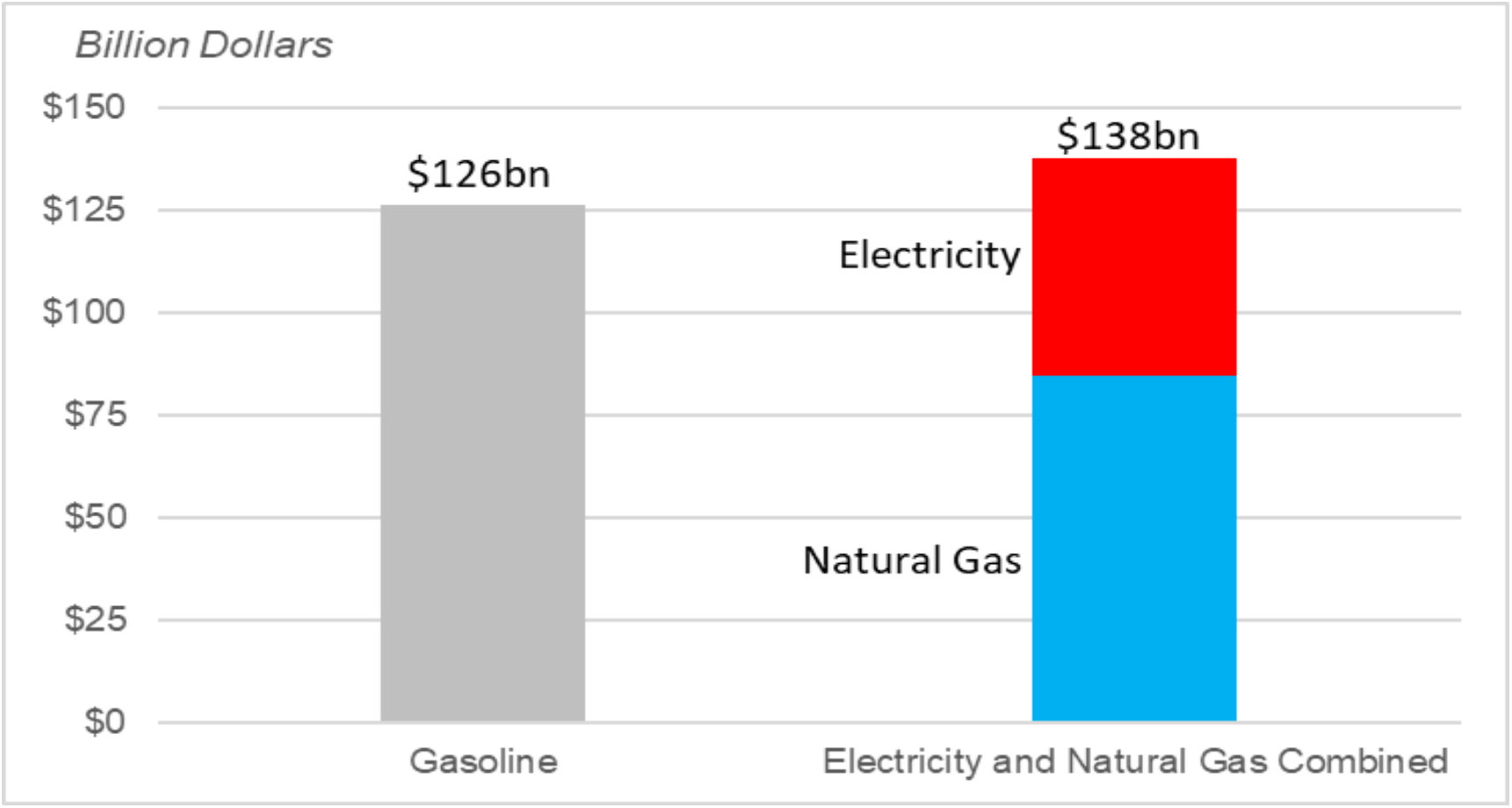
IECA is 100% Focused On Energy

1. Cost and reliability of natural gas and electricity.
2. Natural gas pipeline capacity and costs.
3. Energy/environmental regulations that impact competitiveness. (PM2.5)
4. Climate: Carbon Border Adjustment Mechanism. (CBAM)

IECA is Unique

- "Exclusively" represents manufacturing companies on electricity and natural gas regulatory and legislative issues.
- Focus: FERC, Congress, DOE, DOI, EPA, CFTC and the White House.
- **Companies that cannot be IECA members:**
  - **Producers of natural gas, feedstock, petroleum, coal**
  - **Natural gas pipeline companies**
  - **Electric utilities**
  - **Electric transmission companies**

Natural Gas and Electricity a $138 Billion Market, (EIA) (2022)



Top Policy Issues 2023/2024

1. EPA lowering the NAAQS PM2.5 standards.
2. Competitive bidding of new electricity transmission projects.
3. Making sure that only transmission projects that are needed are built.
4. Declining electricity reliability.
5. Insufficient growth of natural gas pipeline capacity.
6. Accelerating LNG exports. Potential impact to reliability and price when inventories are low.
7. Support for natural gas production.
8. Federal and state policies that distort energy market signals.

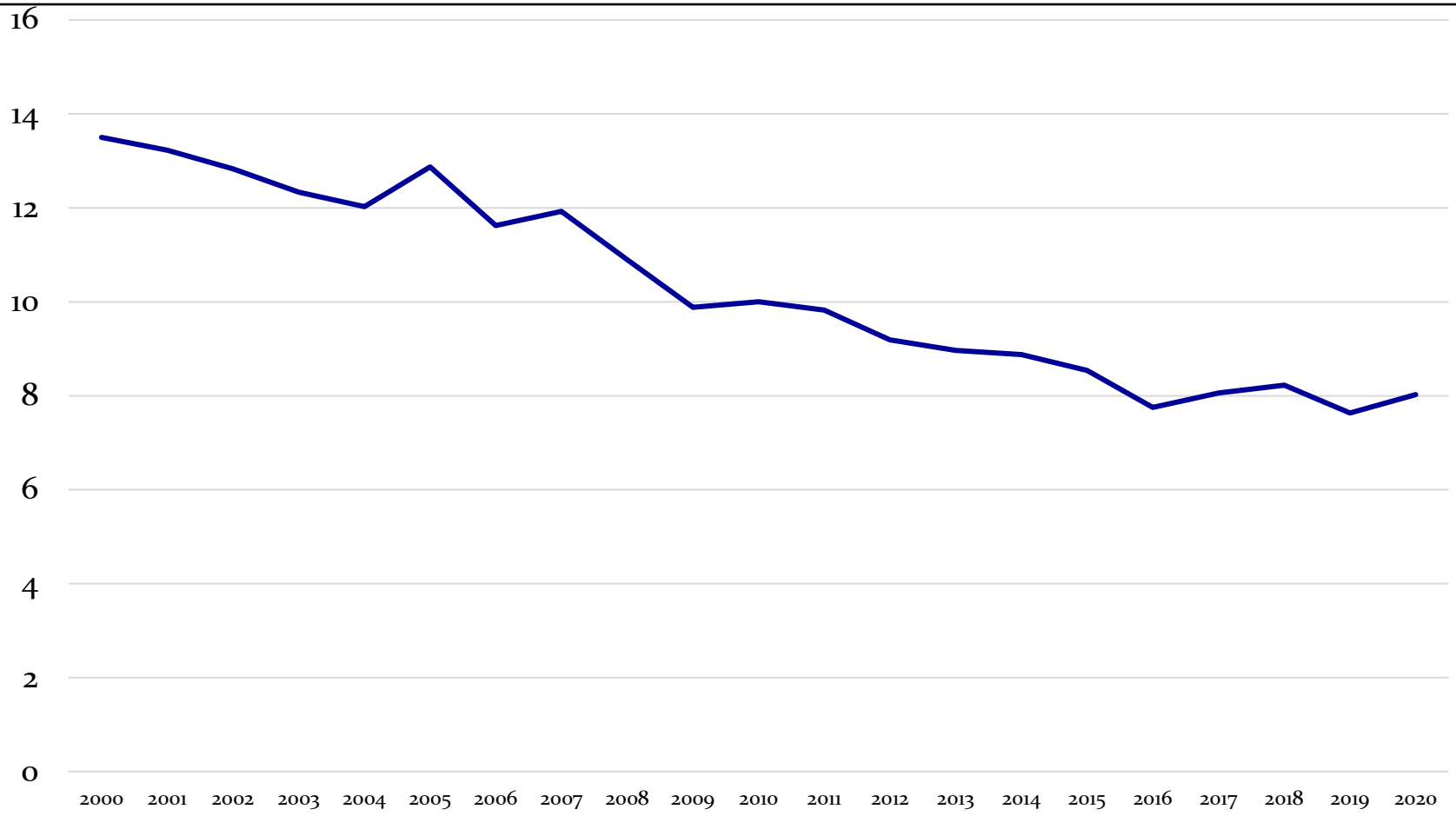
Top Policy Issues 2023/2024

1. EPA Clean Air Act: PM 2.5, National Ambient Air Quality Standards

- Serious implications: Inability to permit facilities.
- EPA back-door action to force GHG reductions.
- EPA proposing a discretionary reconsideration of the standards two years before the PM2.5 NAAQS would begin a new review.
- Existing standard: 12 mg/m.
- Considering: 8 or 9 mg/m.
- **IECA Actions**

U.S. $PM_{2.5}$ Concentrations (ug/m³)

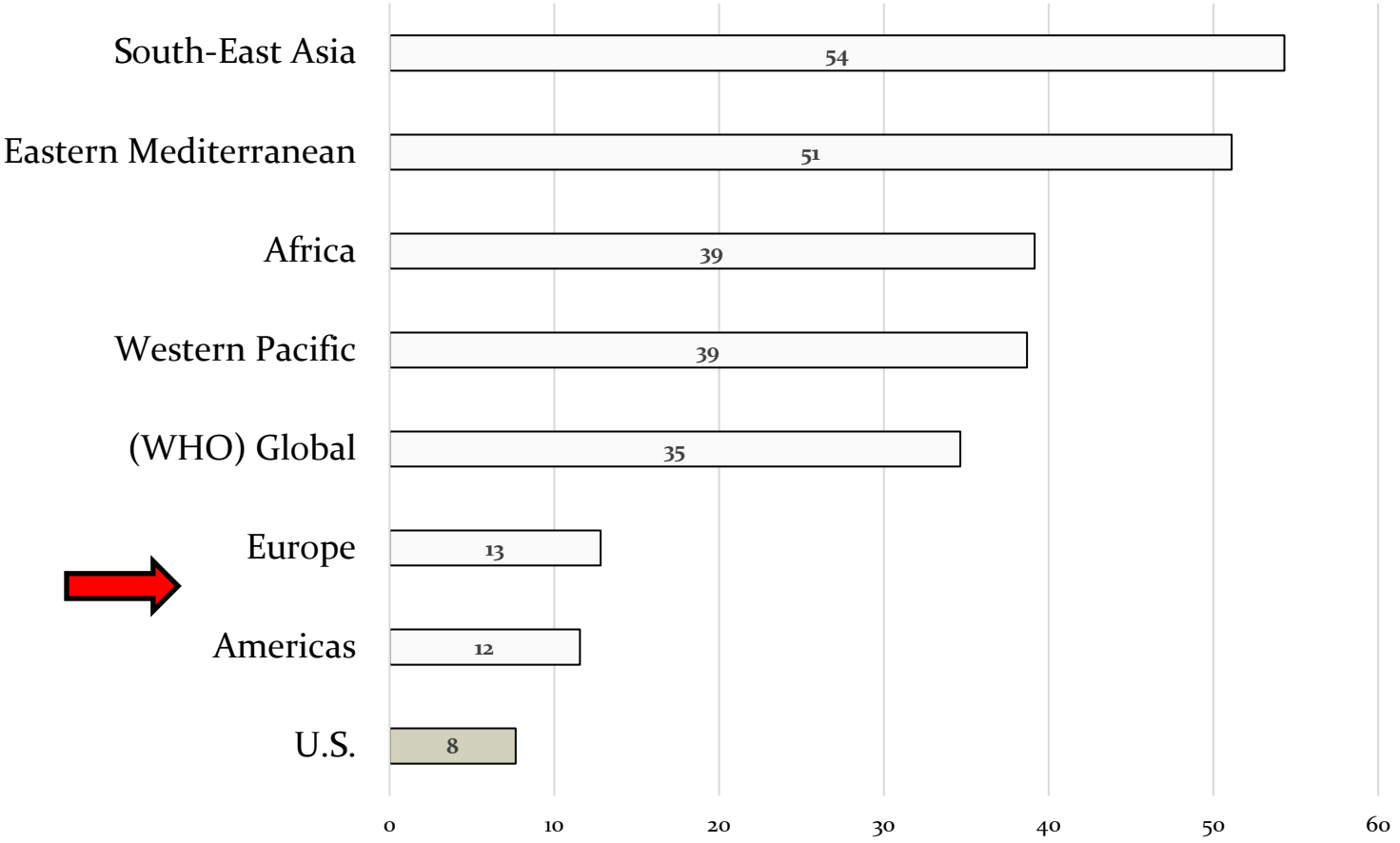
(Seasonally-Weighted Annual Average)



Industrial Energy Consumers of America (IECA)
The Energy Voice of Industrial Energy Consumers

Source: U.S. EPA's Particulate Matter ($PM_{2.5}$) Trends: https://www.epa.gov/air-trends/particulate-matter-pm25-trends

World Health Organization Global Ambient Concentrations of $PM_{2.5}$ (ug/m³)



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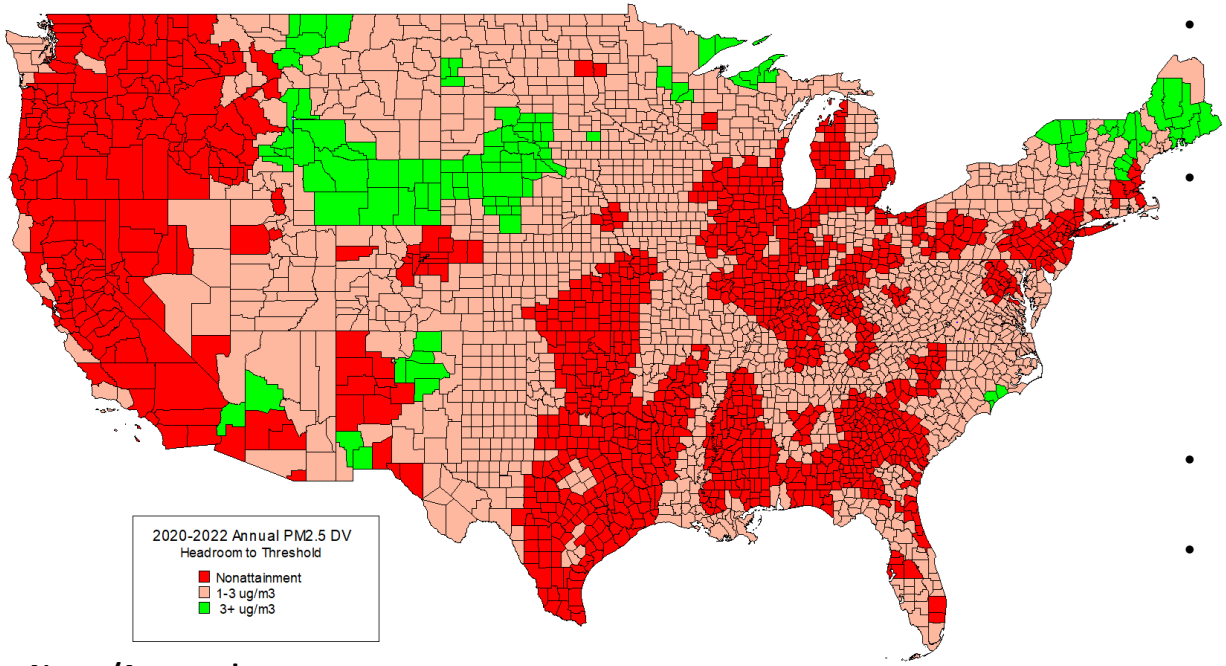
Immediate Impact of $PM_{2.5}$ NAAQS at 8.0 µg/m³

New or expanded manufacturing projects unachievable in red/pink colored areas



Map Notes/Approach:

- Used maximum $PM_{2.5}$ Design Values (DVs) for each monitored county
- Calculated non-monitored counties values using geospatial statistical interpolation ("kriging") "fills-in" estimates for locations between the monitors.
- Five (5) closest monitored values used to estimate non-monitored county values using inverse-distance weighted averaging method.

- Before construction is permitted, new projects must use EPA models to show attainment with the NAAQS.
- EPA's modeling guidelines require assuming **continuous** operation of **all** new and modified sources at the **maximum** allowable emission rate using best available controls and typically simulate a project's future annual average $PM_{2.5}$ ambient concentration to be 1-3 ug/m3.
- Many $PM_{2.5}$ "attainment" areas have background levels of 6 to 9 ug/m³.
- With a standard of 8 ug/m³, areas with background as low as 5 ug/m³ will not have enough "headroom" to accommodate the ambient concentration conservatively simulated for the project (e.g., 3 ug/m³).
- **Impact:** A violation of the NAAQS is predicted which effectively stops the project.

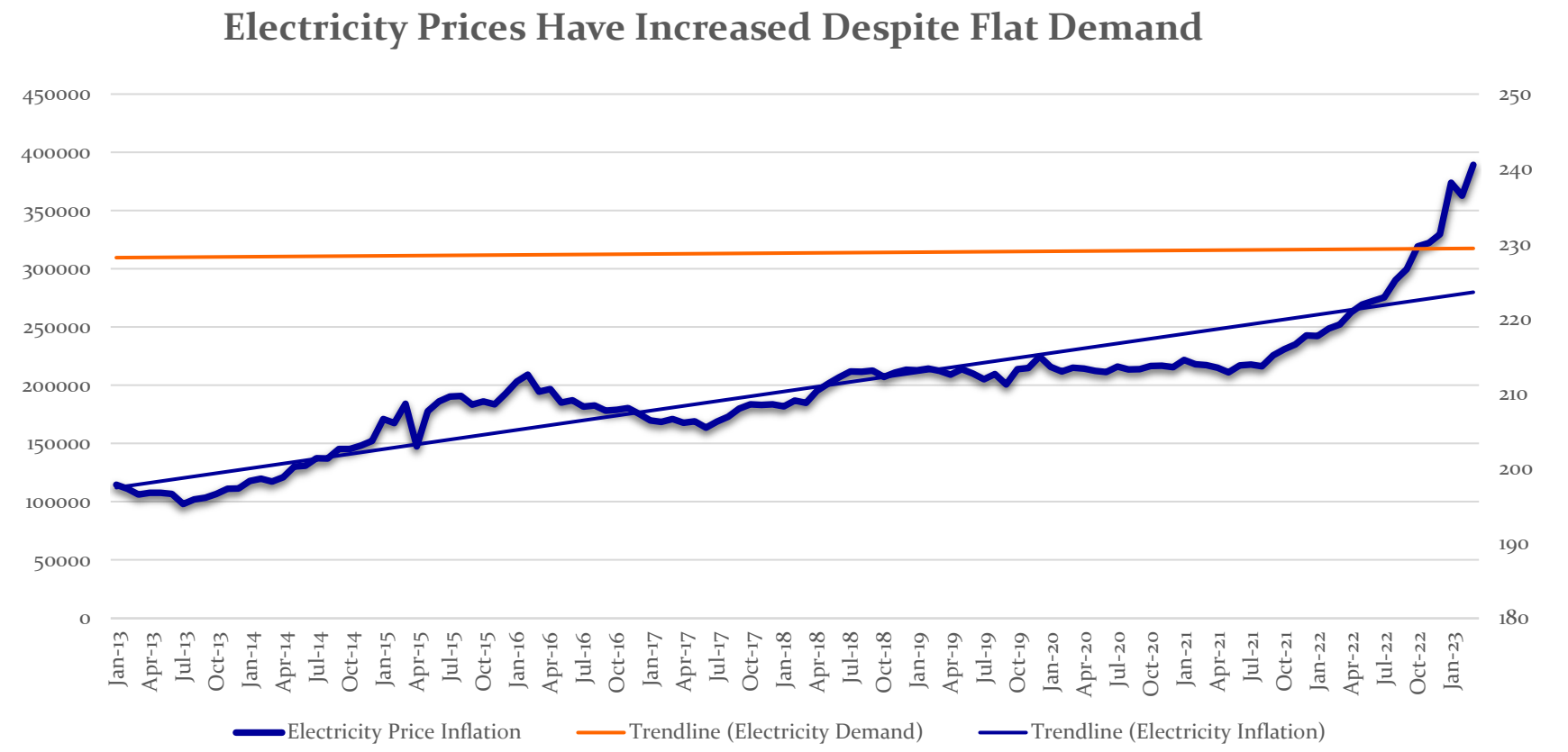
2. Electricity Transmission Competition

- Competitive bidding of large transmission projects can avoid an average of 40% of costs.
- A FERC and state issue.
- Regionally, only 3-8% of all electric transmission projects are competitively bid.
- Princeton University Study: $2.1 trillion in new transmission needed by 2050.
- FERC's Transmission NOPR – backs away from requiring competition!

U.S. Transmission Spending has Almost Doubled in 6 Years, $MM

Year	CAISO	FRCC	ISO-NE	MISO	NYISO	PJM	SERC	SPP	WECC	Yearly Total
2014	$7,964	$1,646	$6,347	$15,373	$22,896	$20,373	$7,504	$6,015	$7,044	$95,163
2015	$11,533	$2,228	$7,043	$17,187	$23,858	$24,957	$8,007	$6,622	$7,395	$108,831
2016	$13,015	$2,472	$7,665	$20,072	$24,303	$29,554	$8,616	$7,265	$7,859	$120,821
2017	$15,137	$2,700	$8,259	$22,846	$25,645	$33,877	$9,003	$7,832	$8,227	$133,526
2018	$15,594	$2,851	$8,823	$25,197	$26,660	$37,542	$10,067	$8,508	$8,543	$143,784
2019	$16,217	$3,030	$9,545	$27,206	$27,740	$42,319	$10,834	$8,931	$8,950	$154,773
2020	$17,481	$3,115	$10,269	$30,532	$29,796	$48,799	$11,568	$9,292	$9,240	$170,092
Grand Total	$96,941	$18,042	$57,950	$158,414	$180,899	$237,421	$65,600	$54,465	$57,257	$926,989

Since 2013, US Electricity Prices Substantially Increased While Demand was Flat



PJM Transmission Costs Increase 182% in 10 Years

PJM Transmission costs – going up

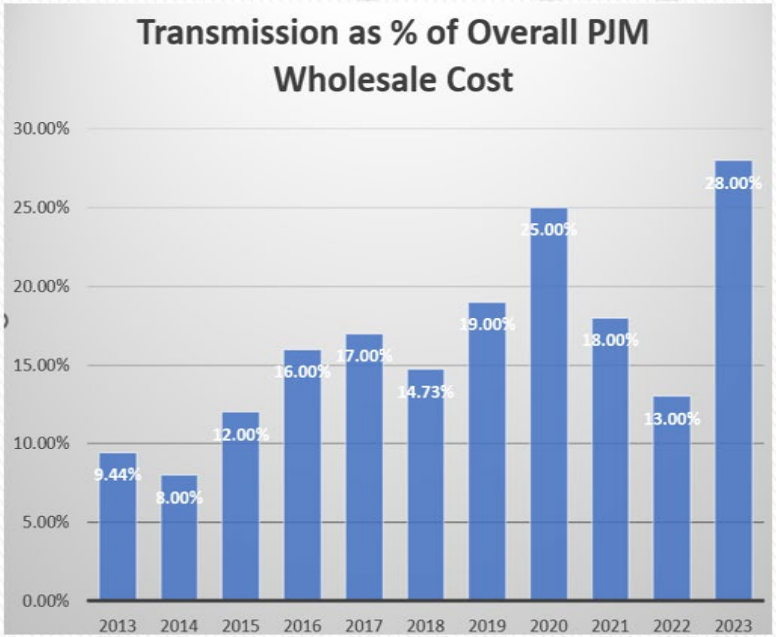
PJM transmission cost increases

Transmission cost increase - 10 years:
2013 - 2023 = 182%

Transmission cost increase - 5 years:
2018 - 2023 = 59%

Transmission cost increase - 3 years:
2020 - 2023 28%

Transmission cost increase - 1 year:
2022 - 2023 13%



*The data is based on the PJM Markets Report, presented during PJM MC Information webinars. (Approximately 10 times a year.). The information was compiled using the "PJM Wholesale Cost" Bar chart slide. The data is annual data except for 2023, which is year-to-date information.

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Transmission Spending is a Significant Money Maker for Utilities

- Transmission is hugely profitable for utilities.
- Utilities receive guaranteed ROE between 10-12% for 40 years or more.
- Some utilities get cost recovery for projects never completed.

Competition Drives Down Costs

- If only 1/3 of $2.1 trillion in projects are competitively bid with 40% cost savings - nets $277 B.
- How it works: Competitors offer fixed price; lower ROEs; penalties if project is not completed on time; etc.
- Who are the competitors? Other utilities.

State of Play - FERC

- In 2022, FERC issued a Transmission Planning Notice of Proposed Rulemaking…for purposes of accelerating transmission investment.
- Instead of embracing Order 1000 and competition, the NOPR steps away from it. Utilities cheered.
- The NOPR is still a draft. No timing on its release.

State of Play- State Legislatures

- Incumbent utilities are taking action to protect their monopoly.
- Utilities push for 'Right of First Refusal' legislation (ROFRs).
- KS, MS, IN, MO, MT, MI, WS, IL, IA, OK.
- We can expect more ongoing action.

Electricity Transmission Competition

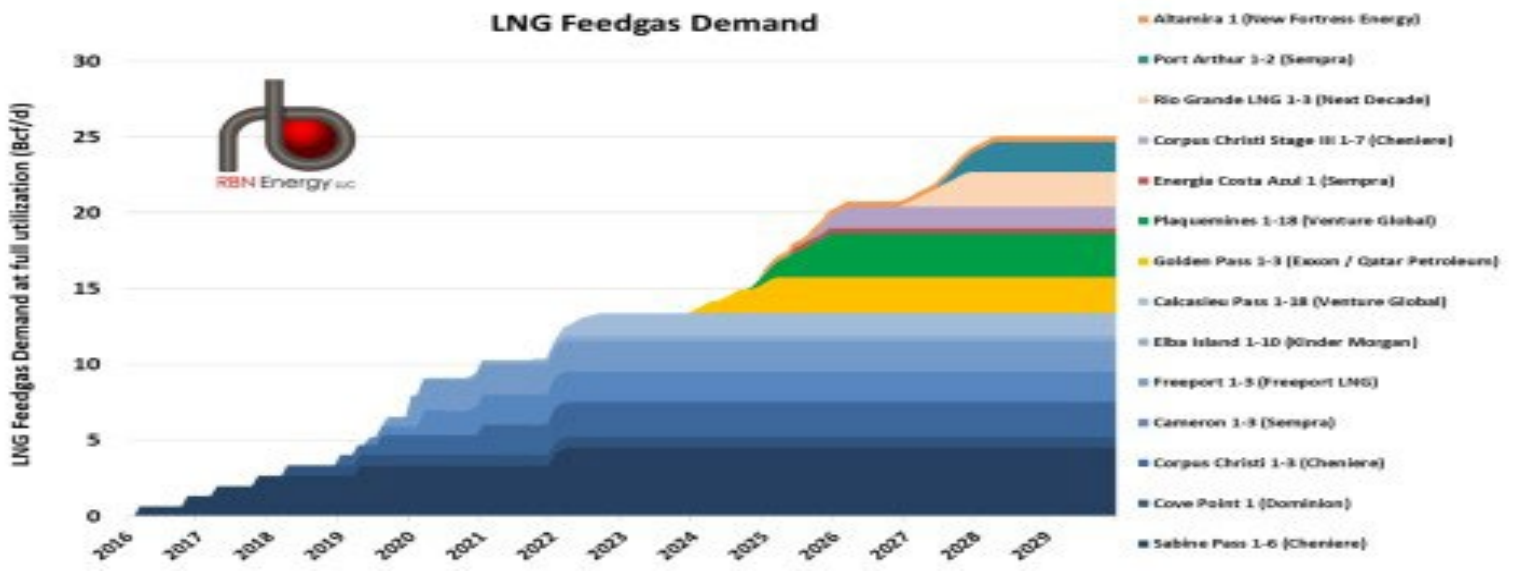
- IECA launched the "Electricity Transmission Competition Coalition" (ETCC).
- ETCC members: 92 organizations in 50 states.
- ETCC goal: All transmission projects that are 100 kV or larger - be competitively bid!
- Requires legal action at FERC; political pressure. (FTC/DOJ)

3. Insulate U.S. Natural Gas Market from Impacts of LNG Exports

- **IECA Policy Initiative:** Billions in avoided costs for NG and electricity at stake (DOE).
- LNG exports are insensitive to price, "market power."
- The U.S. is vulnerable when inventories are low.
- Much more vulnerable than crude or gasoline.

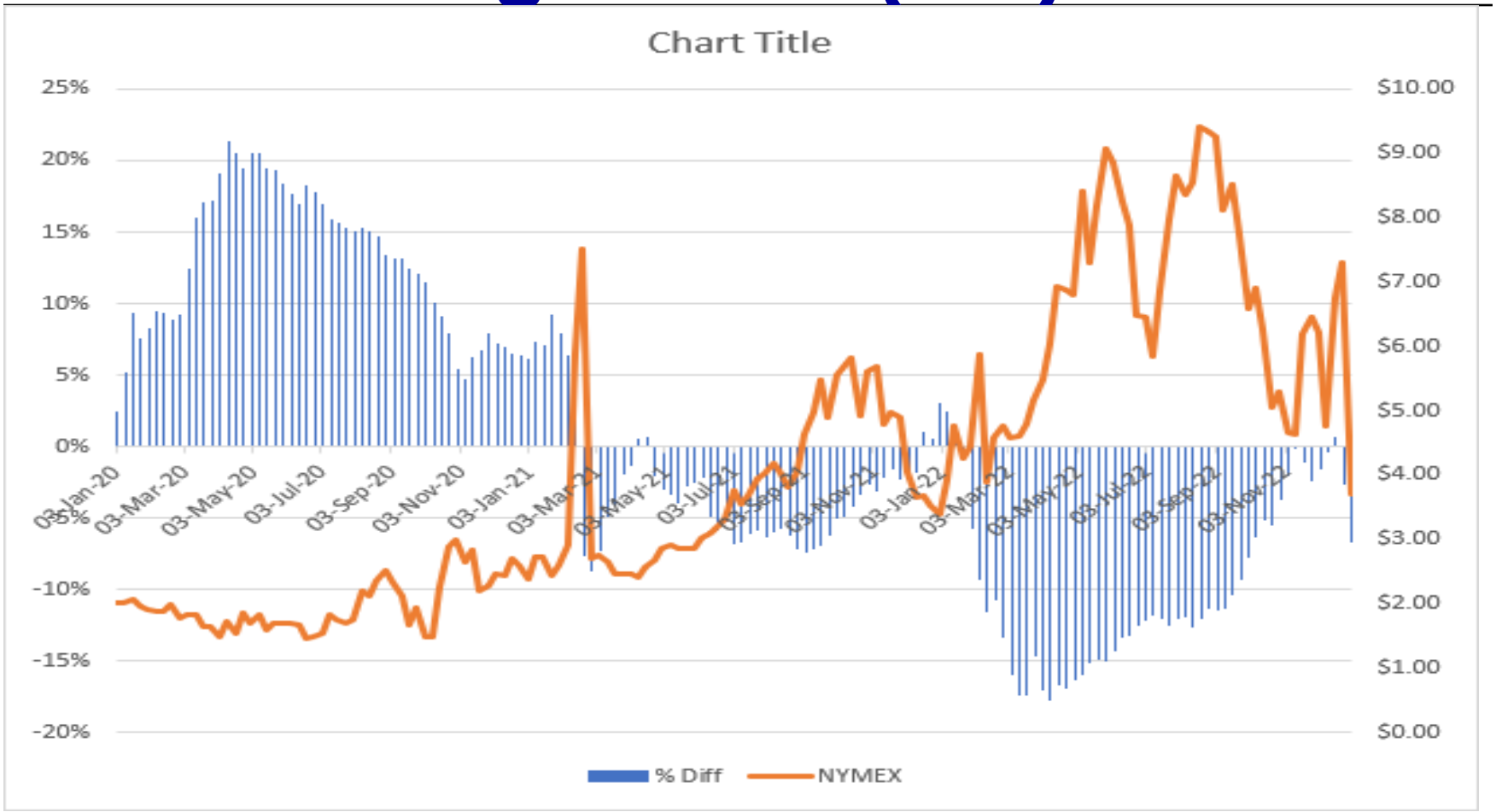
LNG Exports to Increase From 13 Bcf/d to 25 Bcf/d by 2028

LNG Feedgas Demand at Full Utilization of Terminals

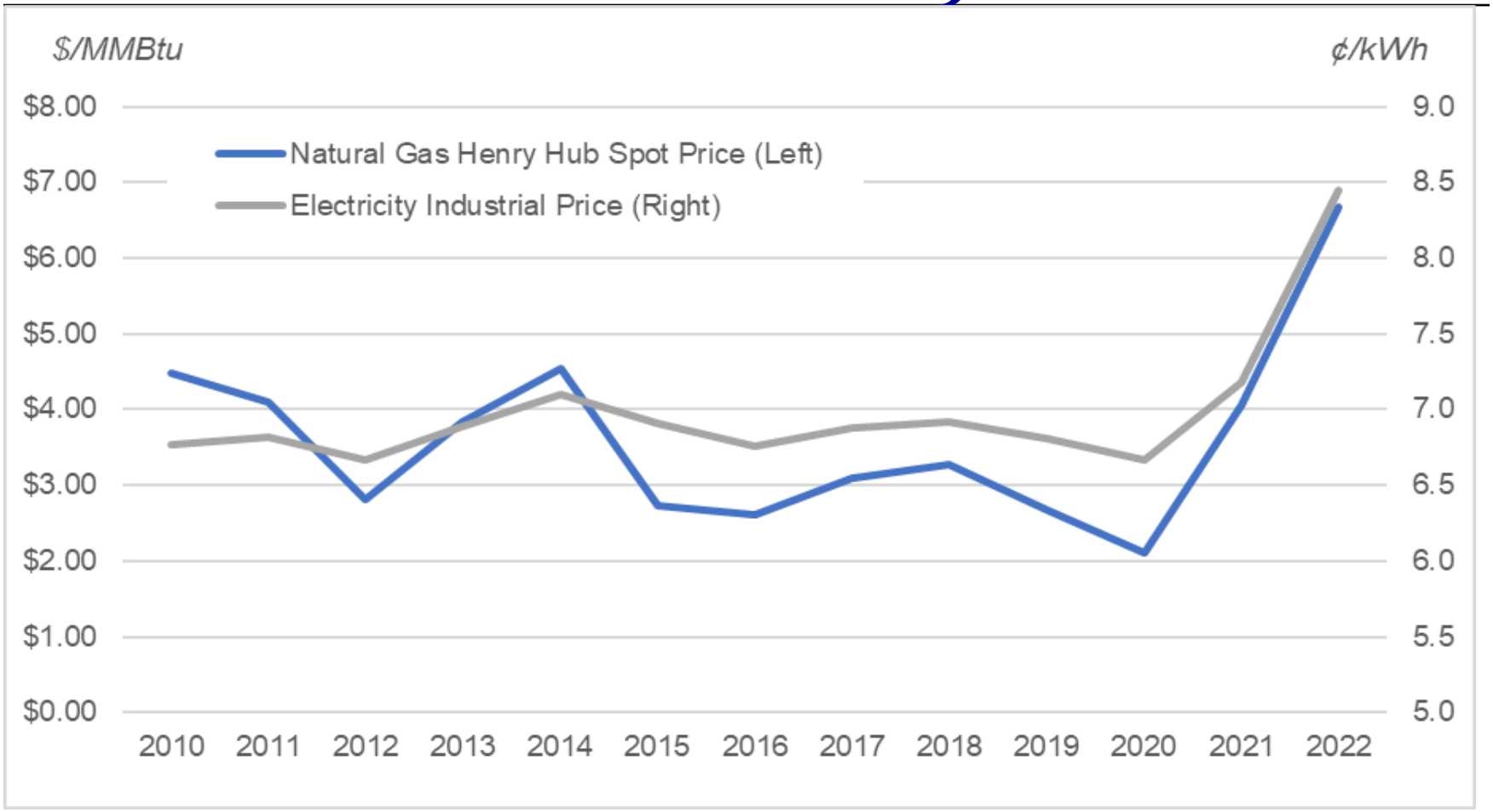


Source: RBN Energy

Low Natural Gas Inventory Results in High Prices (EIA)



Monthly Average Prices Rose from $2 to $8.40 MM Btu During Winter of 2021/2022. Electricity Prices Increased 30%



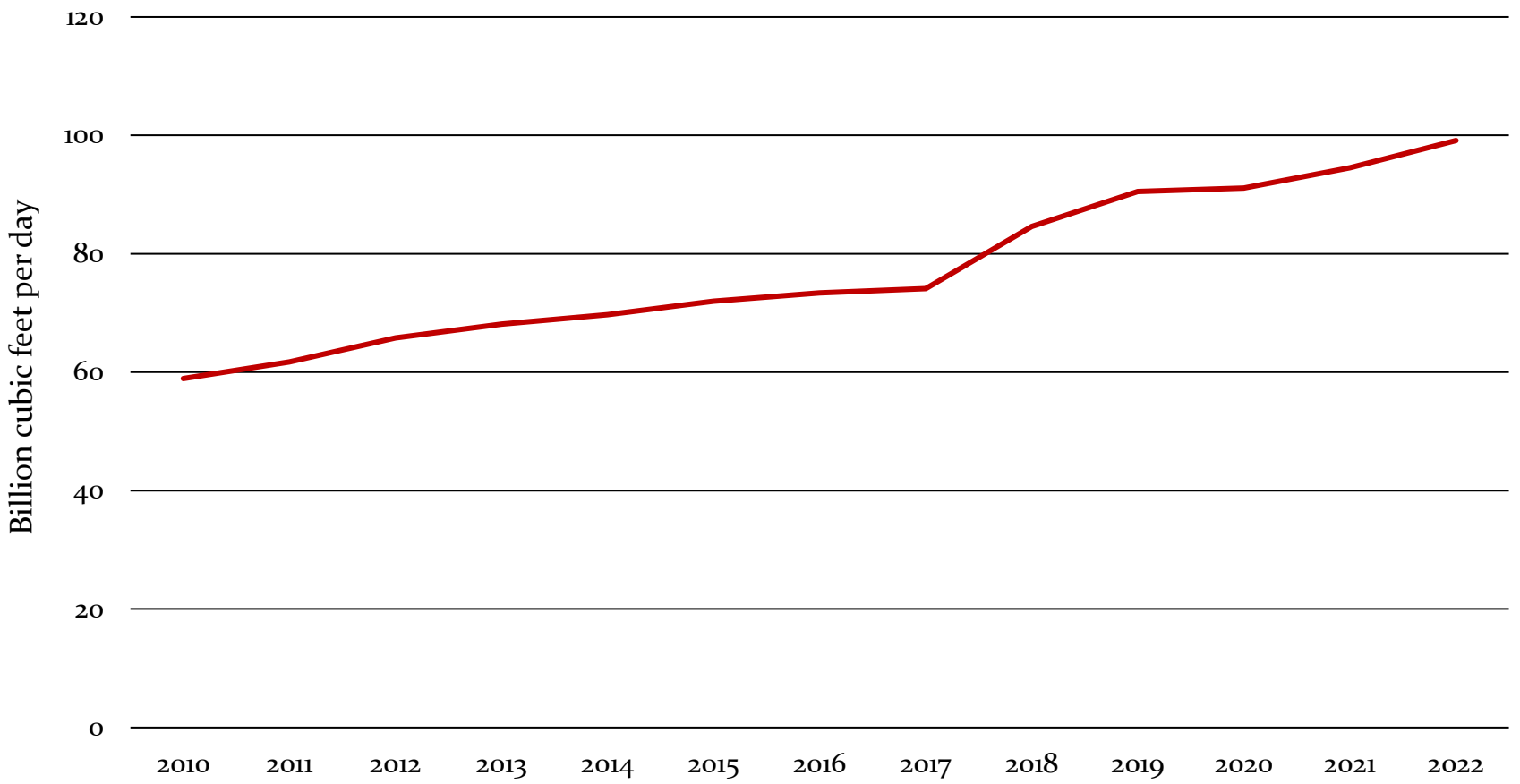
Insulate US Market from Impacts of LNG Exports

- **Policy Solution:** DOE authority under the Natural Gas Act.
- DOE: Issue orders to LNG facilities.
- In the event that U.S. inventories fall 5% below the previous year, DOE has the option to require export volume reductions.
- Assures NG and electricity reliability, national security and supply chains.

What I Worry About!

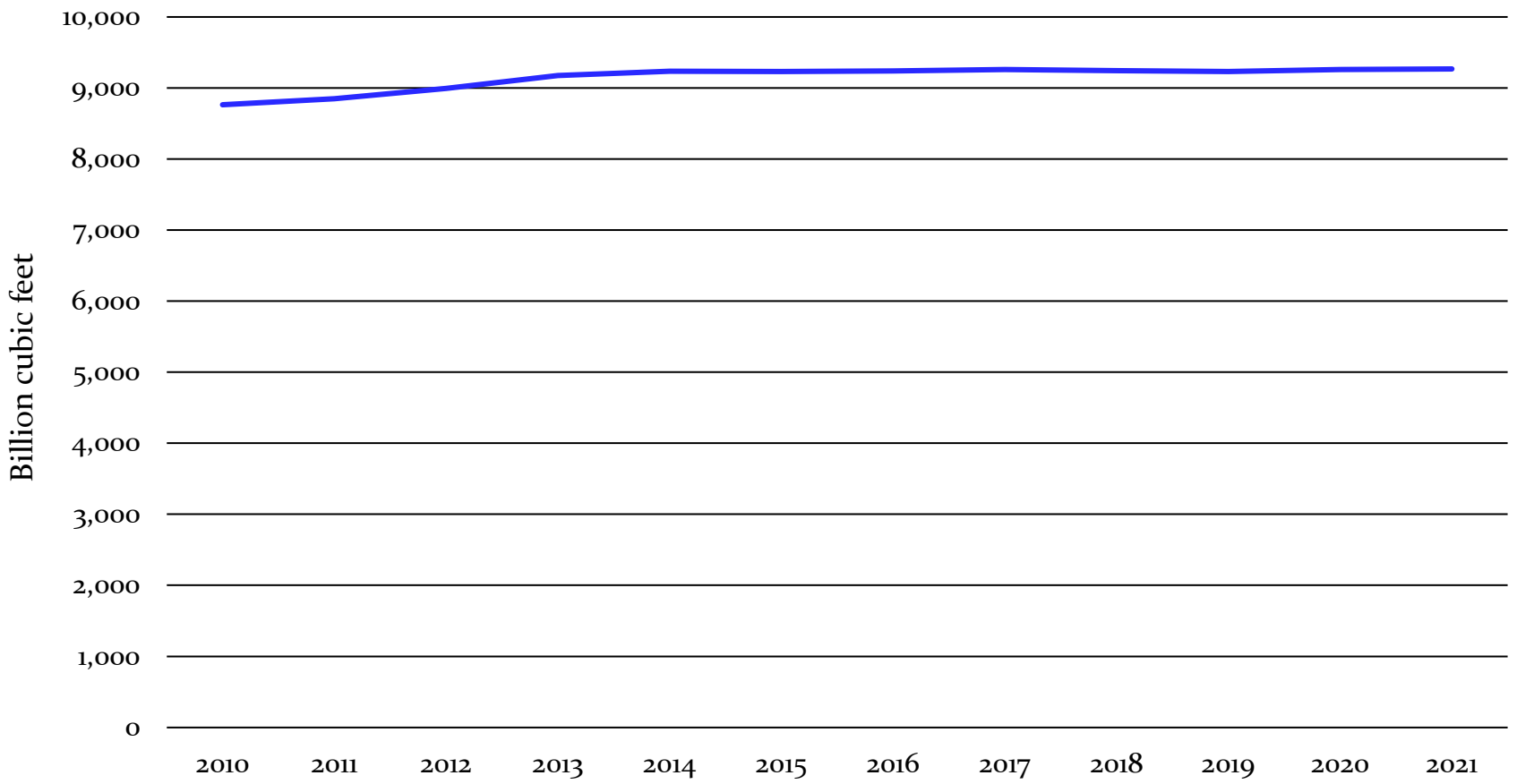
U.S. Natural Gas Consumption

Since 2010, 68% Increase



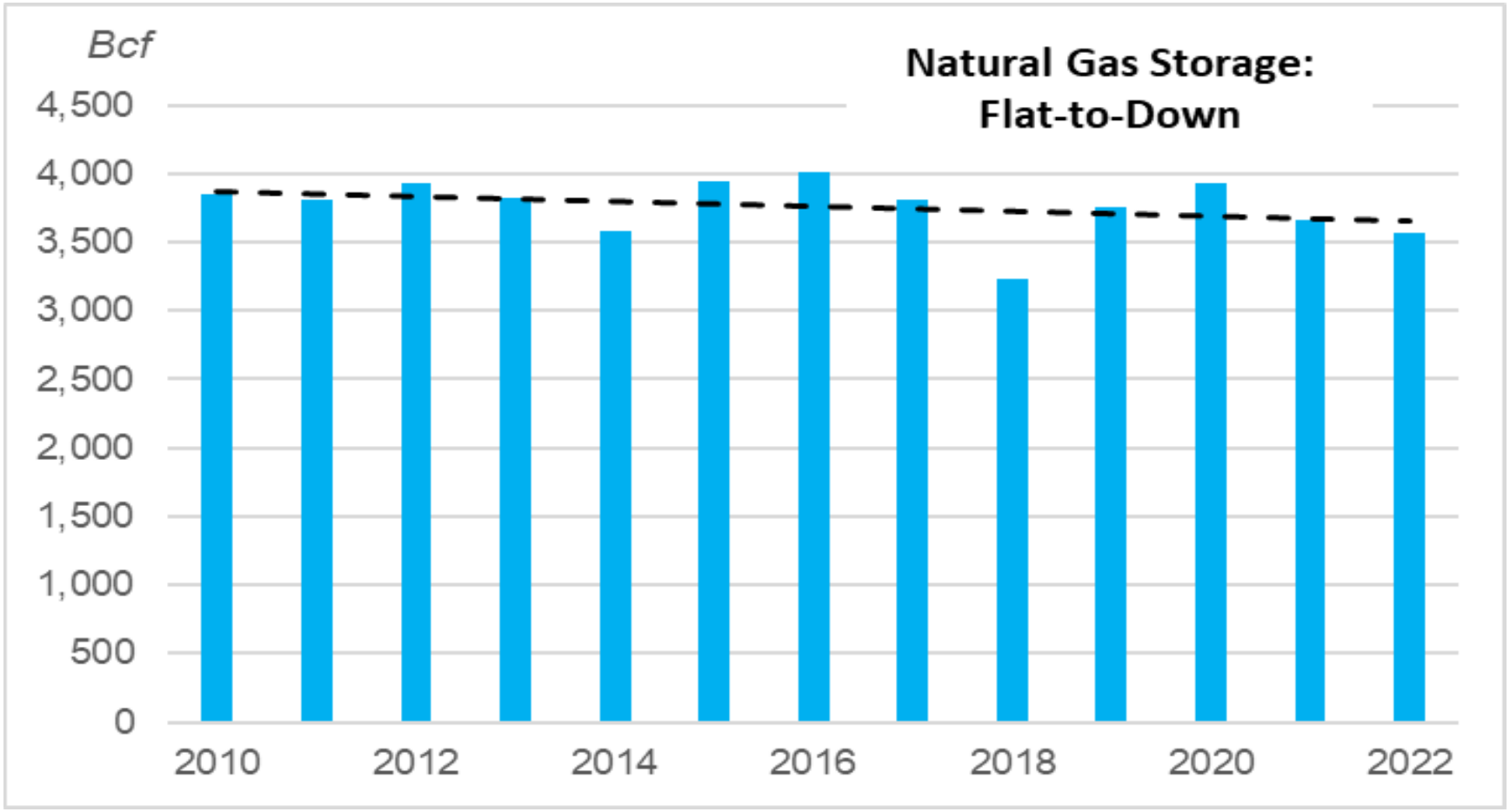
Source: Natural Gas, U.S. Energy Information Administration

U.S. Natural Gas Underground Storage Capacity Since 2010, 5.7% Increase

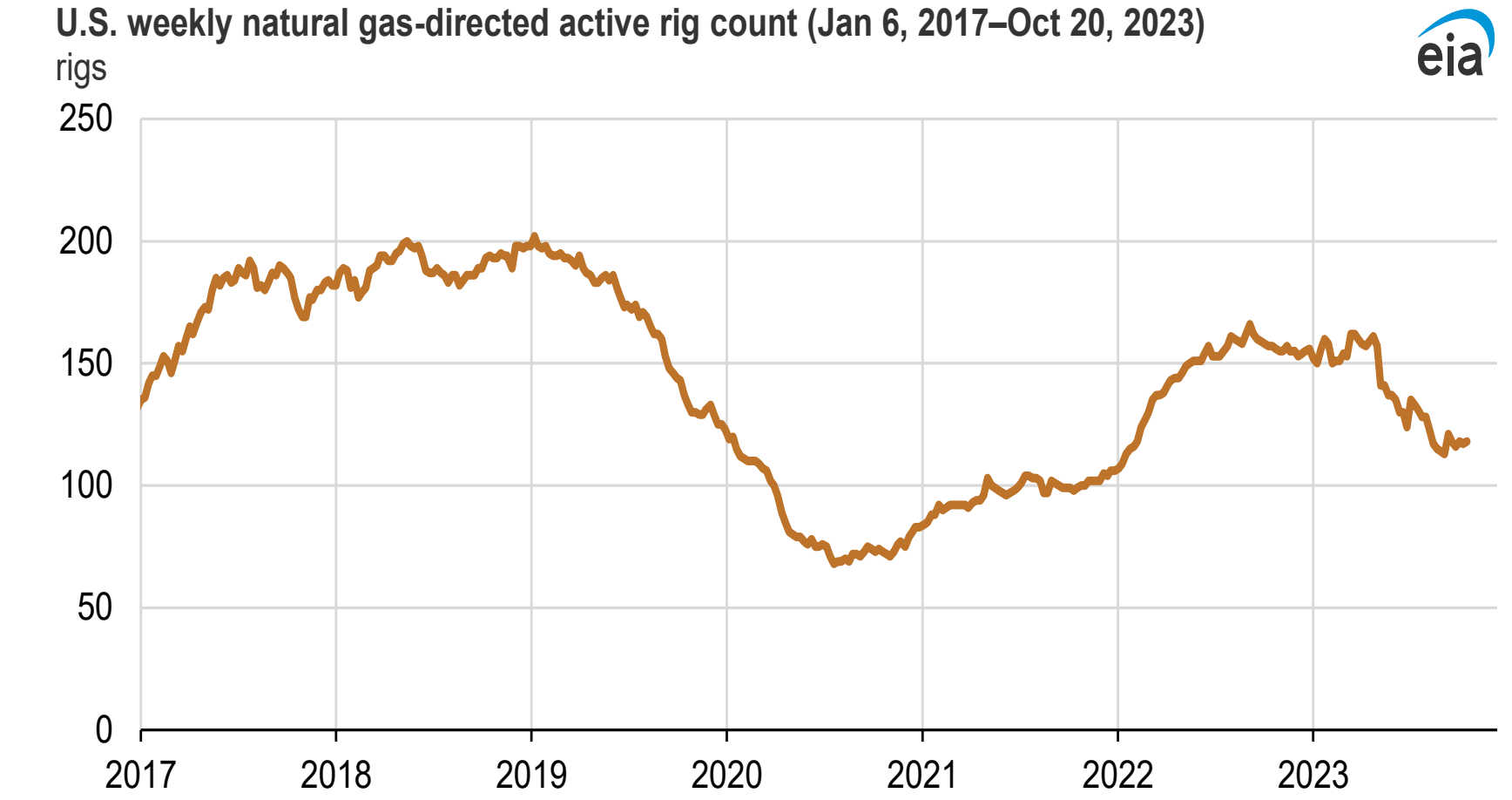


Source: Natural Gas, U.S. Energy Information Administration

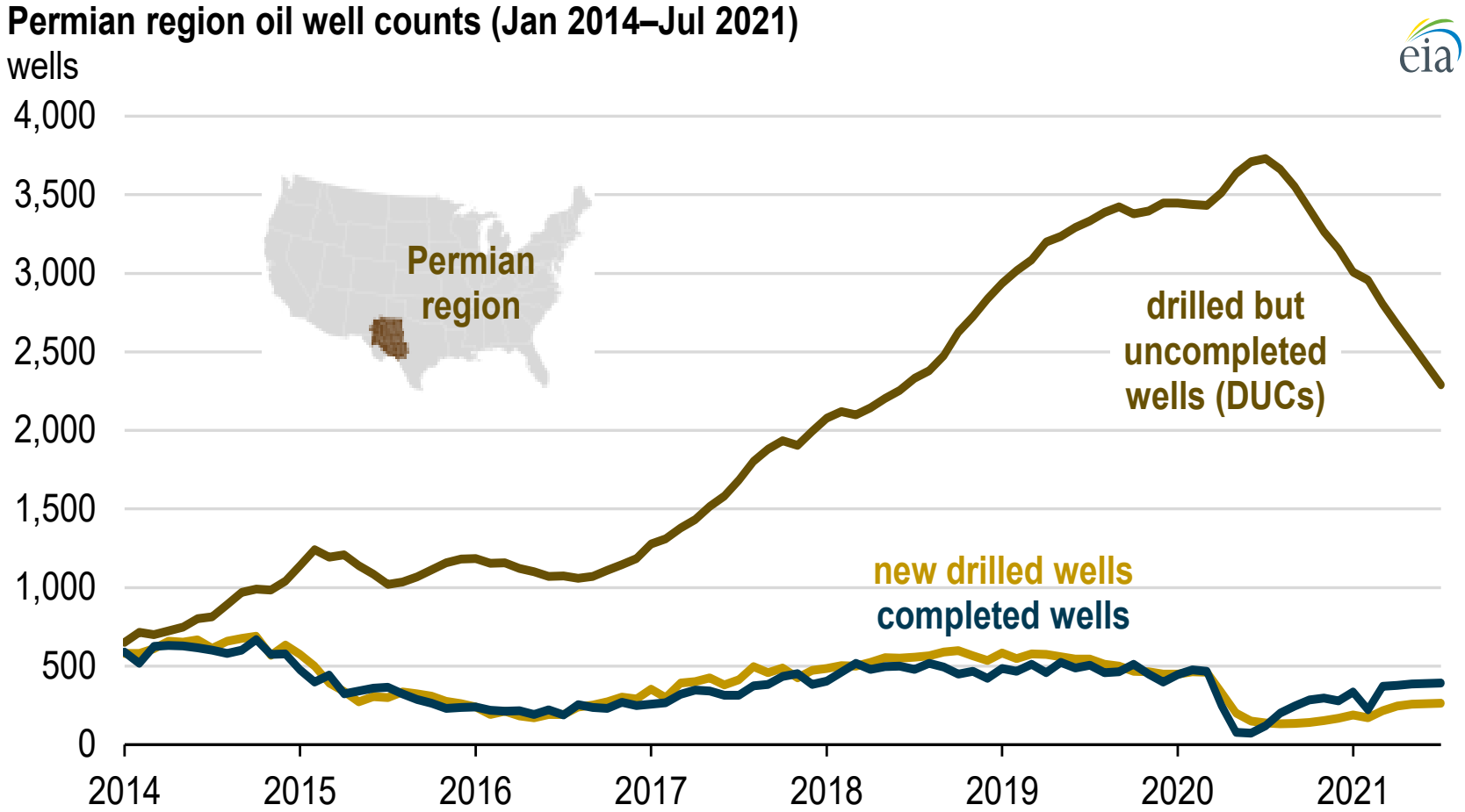
Peak Natural Gas October Storage Inventories (EIA)



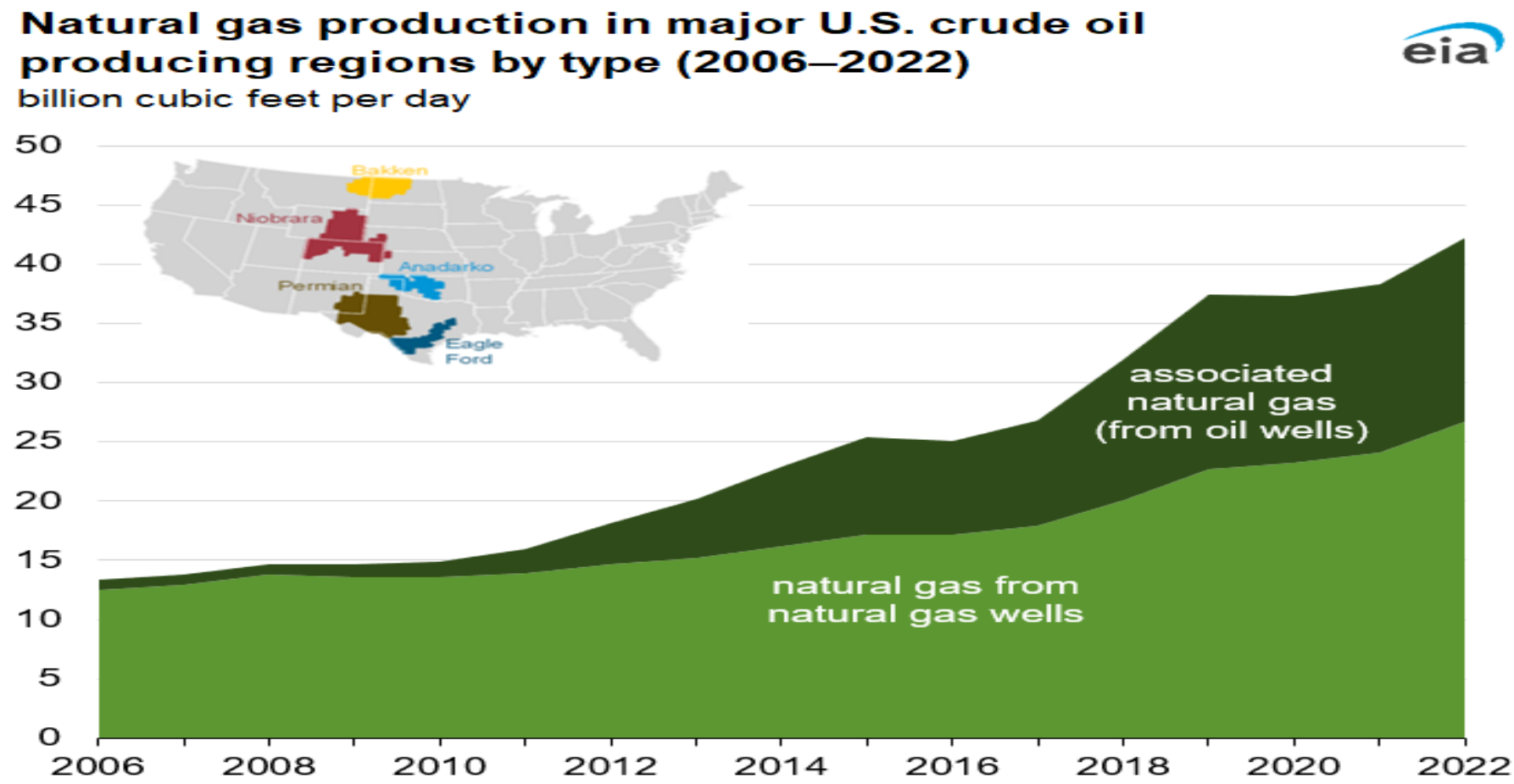
US Natural Gas Rigs Declined 24% Since Start of 2023



Falling Drilled but Uncompleted Wells



Associated natural gas production increased 9%
--What happens if crude oil production falls?--

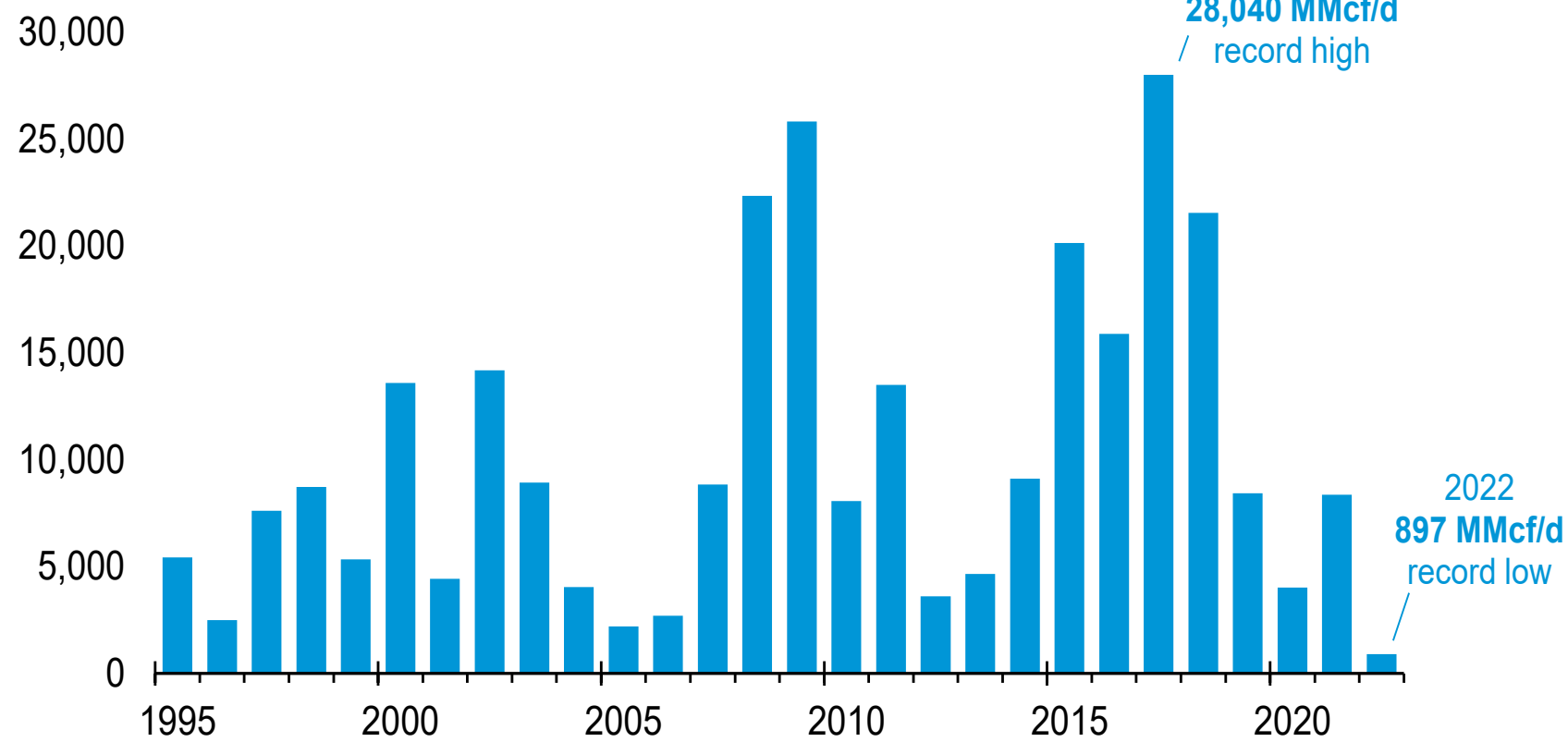


4. Insufficient NG Pipeline Capacity

- Natural gas demand is accelerating faster than new pipeline capacity additions.
- FERC: Chairman Phillips is supporting increases. Democrat Commissioner Clements is not. 2/2
- Democrats: Biden/Congress do not support increased pipeline capacity.
- Activists successfully use legal action to slow and stop pipelines.

Interstate Pipeline Capacity
-Record Low Additions-

Annual interstate natural gas pipeline capacity additions (1995–2022)
million cubic feet per day (MMcf/d)



Insufficient NG Pipeline Capacity

- **Example:** Manufacturing unable to secure firm pipeline capacity on east coast. SC to NY. (Transco Pipeline)
- At peak demand: Mfg'ing curtailments.
- **Problem:** Electric utility voluntary actions to pre-maturely shut down coal fired power generation. Consuming limited NG pipeline capacity. Nothing left for manufacturing.
- **IECA:** Requested FERC to hold Technical Conference.
- **IECA:** Files at FERC in support of pipeline expansions.

Transco Pipeline

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Insufficient NG Pipeline Capacity

- **Problem:** No federal agency in charge of natural gas reliability!
- October 2023 FERC Meeting: FERC/NERC report on grid reliability problems:

  Recommendation: FERC and NERC requests that Congress put someone in charge of natural gas reliability. (IECA made this request to Congress in 2021.)

5. Carbon Border Adjustment Mechanism (CBAM)

- **CBAM: The most consequential climate policy for manufacturing!!**
- The U.S imports more embedded carbon in products than any country in the world.
- U.S. manufacturing: low carbon intensive.
- Would impose a carbon tariff on imported products with higher carbon intensity.

Carbon Border Adjustment Mechanism (CBAM)

- Focused primarily on EITE products: chemicals, steel, aluminum, glass, cement, paper, etc.
- EU in implementation phase.
- Senator Cassidy (R-LA) legislation
- Senator Whitehouse (D-RI) legislation

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