
PHILLIPS 66
2023
Gulf Coast Energy Outlook
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2023 Gulf Coast Energy Outlook

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Outline

1. Introduction & Uncertainties
2. Oil & Gas Production
3. Mid-stream Constraints
4. Power Sector
5. Energy Exports
6. Energy Manufacturing Activity
7. Employment
8. Conclusions

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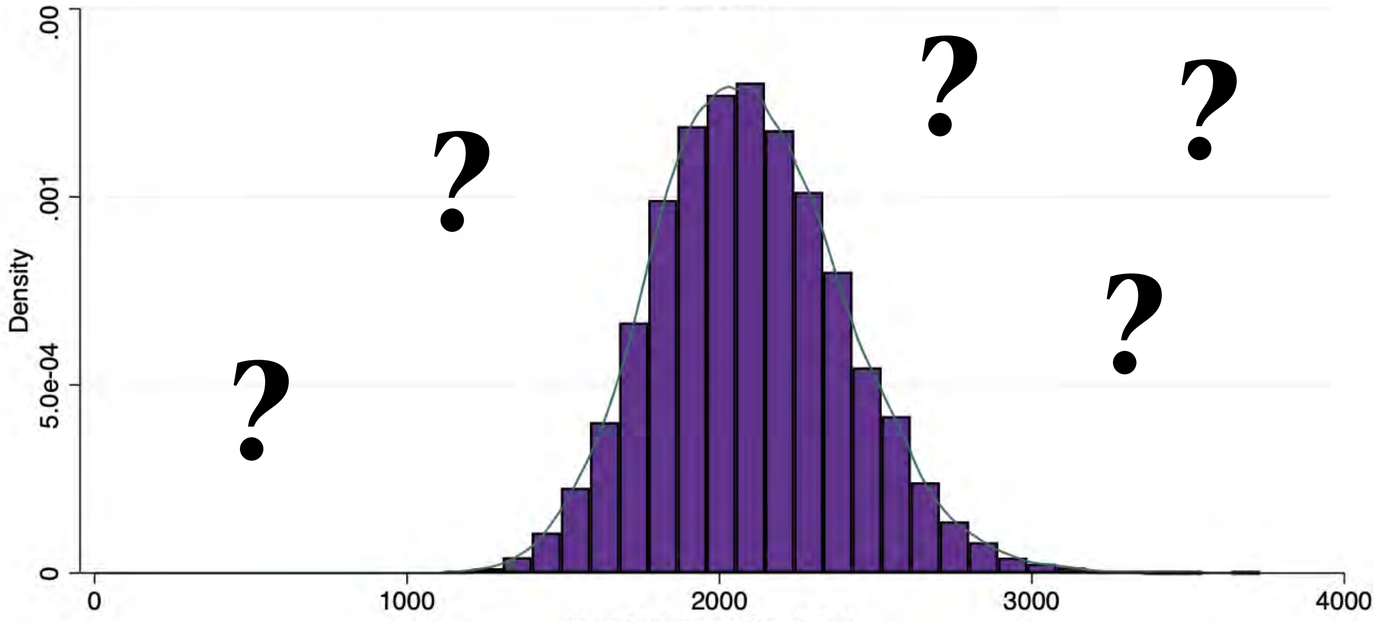
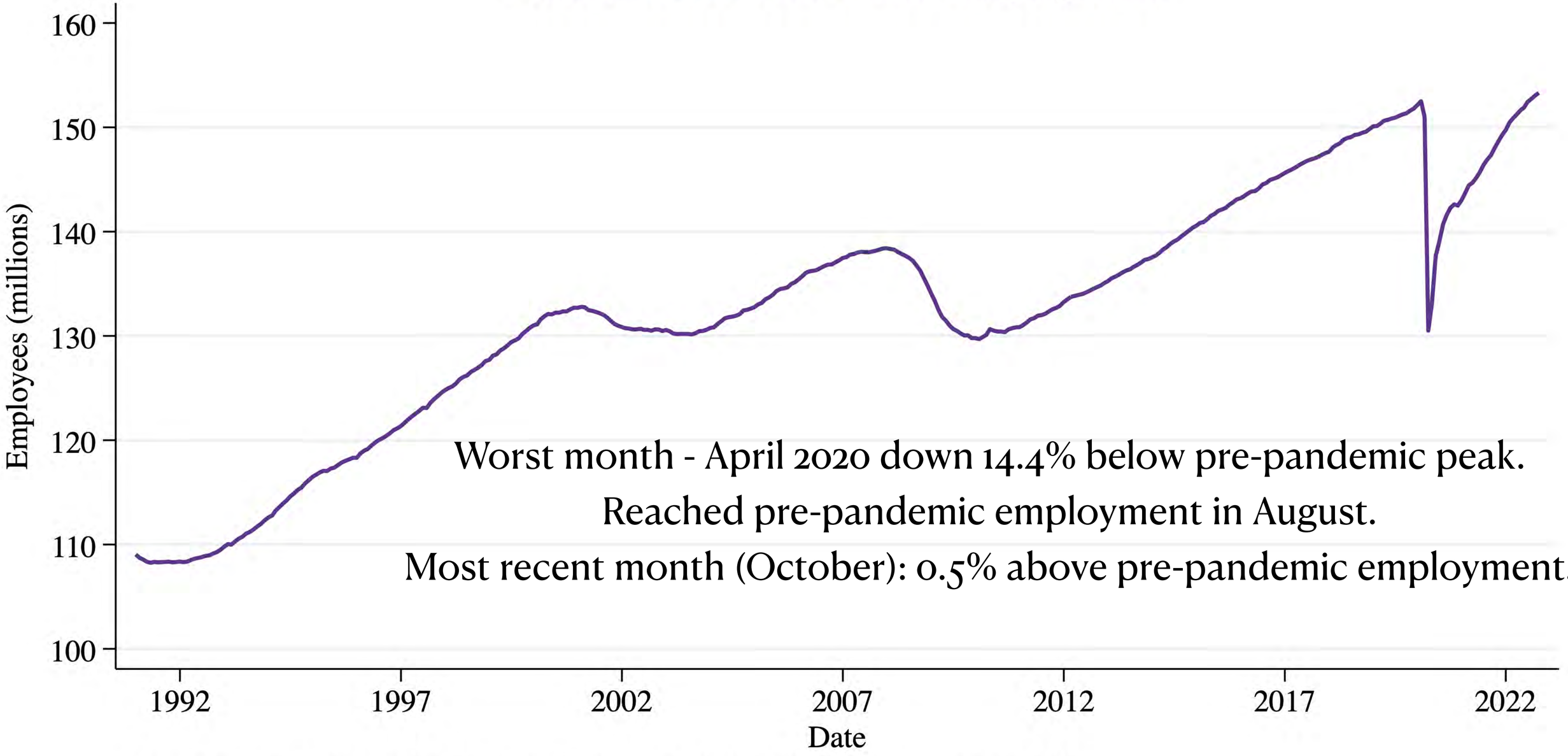
Uncertainties

1. Inflationary Pressure & Economic Performance
2. Russian Invasion of Ukraine
3. Supply Chain Constraints
4. Decarbonization
5. Uncertainty Resolved? Offshore Leasing



United States Non-Farm Employment



Worst month - April 2020 down 14.4% below pre-pandemic peak.

Reached pre-pandemic employment in August.

Most recent month (October): 0.5% above pre-pandemic employment.

Source: Bureau of Labor Statistics. Current Employment Statistics (CES). Retrieved from FRED.

Inflationary Pressure and Economic Performance

(1) The U.S. is currently at "**full employment**" from traditional measures:

- Unemployment rate below 4%.
- U.S. employment surpassed pre-pandemic peak.

(2) But, labor force participation rate and employment-population ratio still ***below*** **pre-pandemic peak**.

- Labor force participation rate:
  - Feb. 2020, 63.4%.
  - October 2022, this is 62.2%
- Thus, although employment has re-bounded, some people likely permanently exited the labor force due to the pandemic (i.e. early retirements, joint income households, etc).

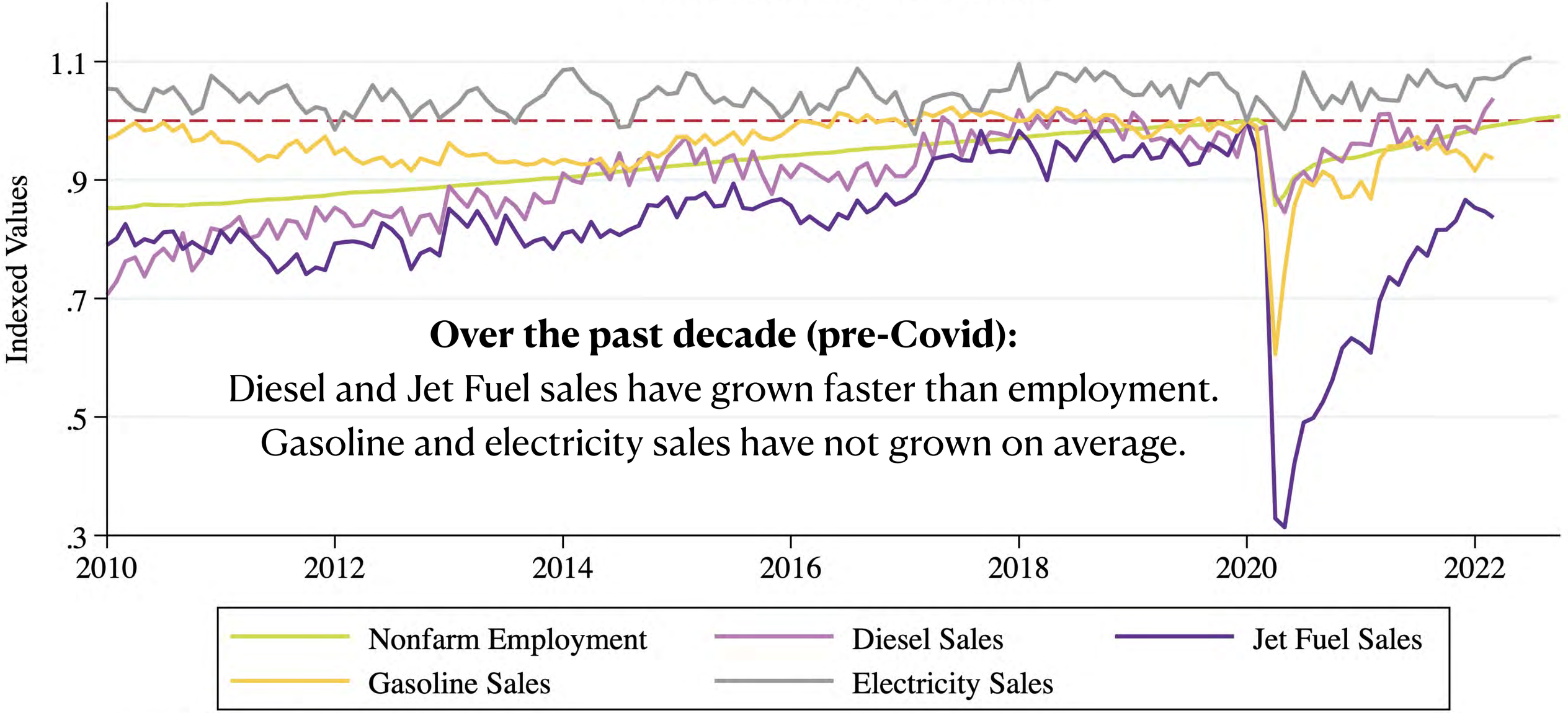
(3) Inflation has reared its head for the first time in decades:

- 1 year inflation rate has not been at levels experienced this past year since 1981.
- Real hourly earnings decreased by ~2.8% over the last year (Oct 21-Oct 22).
- Interest rates rising ⇒ making borrowing more expensive and encouraging saving.
- The stock market is down ~15% over the last year.

With high commodity prices, are there **enough workers** to **fulfill growing global demand**? Or perhaps is a **recession on the horizon**, leading to demand reduction and also alleviation of hard to find workers?

Employment vs. Sales

Indexed to January 2020 Values



Source: U.S. Energy Information Administration

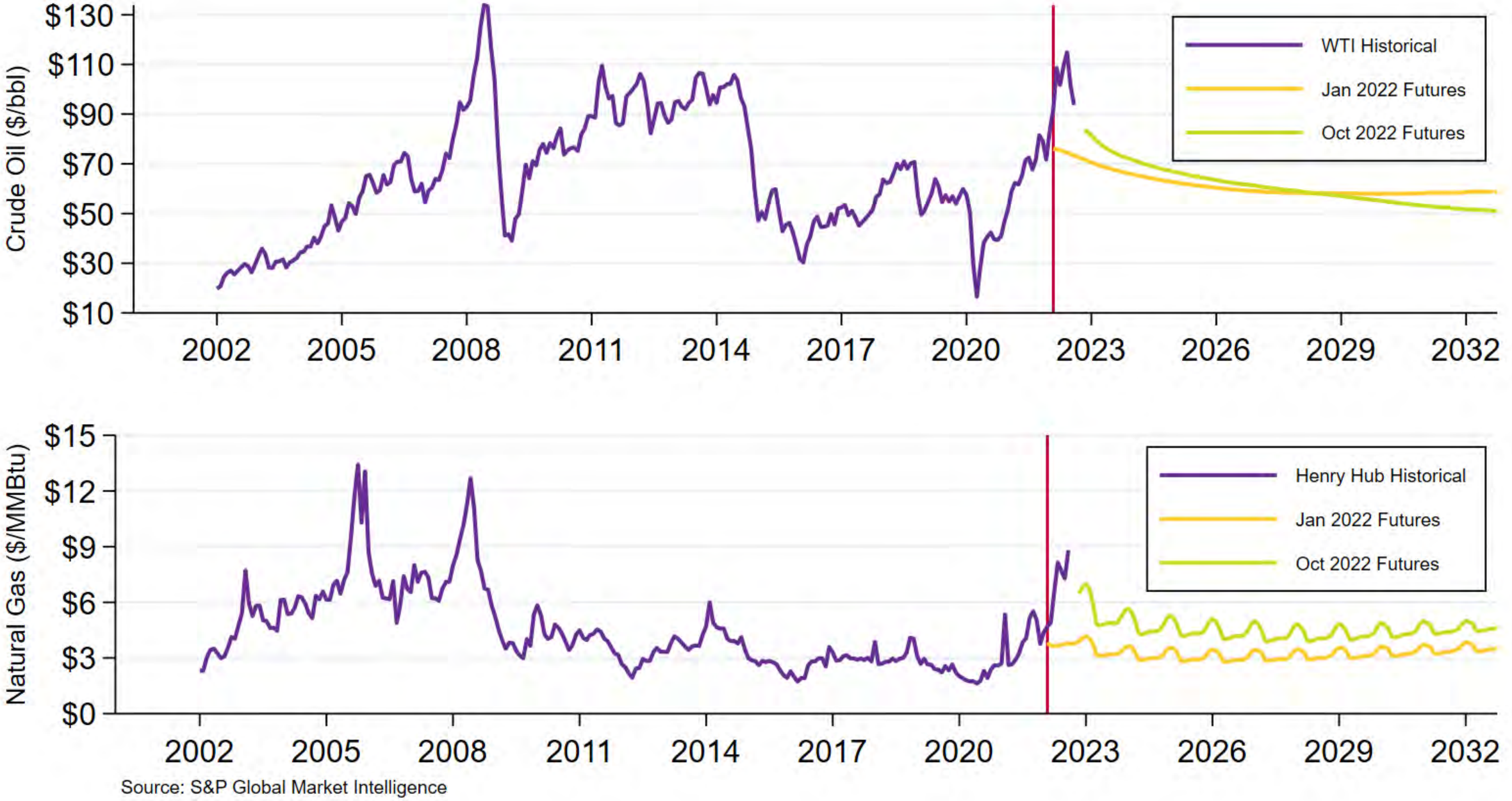
Inflationary Pressure and Economic Performance

This year's GCEO modeling will assume that inflation begins to slow, and regional economic activity will gradually expand over the forecast horizon. This year's GCEO, much like last year's, anticipates that long-run energy demand growth will lead to increased U.S. energy exports, especially to the growing developing world. If the global economy enters a recession, this will reduce demand for energy products making these forecasts too optimistic.

Uncertainty 2: Russian Invasion of Ukraine

Russo-Ukrainian War Timeline

- Early February 2022: Brent Crude at ~$97/bbl and TTF natural gas at ~$37/mcf. Futures markets anticipating prices to go down over the next year.
- February 24, 2022: Russia launches a military invasion of Ukraine.
  - Germany suspends certification of Nord Stream 2 pipeline that was anticipated to begin shipping natural gas to Europe in coming months.
- March 2022: Brent crude surpasses $117/bbl and TTF natural gas surpasses $45/mcf.
- August 31, 2022: Russia suspends natural gas supplies to Germany via Nord Stream 1 for three days to perform repairs.
- September 3, 2022: Gazprom announces Nord Stream 1 will be shut down due to maintenance, citing Western sanctions.
- Worries mount over Europe's natural gas availability as winter looms.


Crude Oil ($/bbl)
$130
$110
$90
$70
$50
$30
$10
2002
2005
2008
2011
2014
2017
2020
2023
2026
2029
2032
WTI Historical
Jan 2022 Futures
Oct 2022 Futures
Natural Gas ($/MMBtu)
$15
$12
$9
$6
$3
$0
Henry Hub Historical
Jan 2022 Futures
Oct 2022 Futures
Source: S&P Global Market Intelligence

Uncertainty 2: Russian Invasion of Ukraine

This year's GCEO modeling will assume that the war in Ukraine continues, as does Western economic sanctions on Russia. The ongoing nature of the conflict will force global energy supply adjustments. Crude oil prices will gradually attenuate over the next several years, while Gulf Coast natural gas prices will likely remain elevated (relative to post-2008 historic trends) due to LNG export pressures.

Uncertainty 3: Supply Chain Constraints

Four sources of supply chain constraints:

1. Economic recovery from COVID
2. Full employment economy + economic stimulus
3. Russian invasion of Ukraine and resulting sanctions
4. "Deglobalization"

The current GCEO modeling assumes that supply chain constraints continue to bind for the next year or so before beginning to attenuate gradually. These supply chain constraints likely come from a combination of four sources: (1) the economic recovery from COVID-19; (2) an economy that is currently at full employment alongside significant stimulus; (3) the war in Ukraine and the resulting sanctions, and (4) a continuation of Trump-era trade policies with China.

Uncertainty 4: Decarbonization

- This year, the tension between decarbonization and energy security has been front and center.
- Last year, most of the focus on decarbonization as to meet **company specific ESG goals** and in preparation for a potential future of **carbon border adjustments**.
- This year, two pieces of legislation passed that will impact the energy industry:
  - **Infrastructure Investment and Jobs Act (IIJA)** - $1.2 trillion.
  - **The Inflation Reduction Act (IRA)** of 2022 was signed by President Biden in August. Despite its name, the bill was largely a **stimulus bill** for the energy industry.

Photo credit: Drew Angerer/Getty Images. Sourced from ABC News.

Infrastructure Investment and Jobs Act (IIJA)

Relevant Spending on Energy

- $7.5 billion for EV charging.
- $65 billion in electric grid upgrades.
- $21 billion for Superfund and brownfield site cleanup.
  - Includes $4.7 billion for oilfield site restoration.

Inflation Reduction Act

- Extension of tax credits for wind and solar.
- Increase in 45Q from **$50 per ton** to **$85 per ton**.
- $1/gal federal biomass-based diesel blending credit extended.
  - $1.25/gal sustainable aviation fuel (SAF) blending credit with increase possible.
- $2.9 billion in loans and subsidies for transmission.
- $7,500 tax credit for EVs with caveats for domestic manufacturing.
- Expand deduction for qualifying energy efficiency improvements in commercial buildings.

TOTAL REVENUE RAISED	**$737 billion**
15% Corporate Minimum Tax	*222 billion**
Prescription Drug Pricing Reform	*265 billion****
IRS Tax Enforcement	*124 billion***
1% Stock Buybacks Fee	*74 billion**
Loss Limitation extension	*52 billion**
TOTAL INVESTMENTS	**$437 billion**
Energy Security and Climate Change	*369 billion**
Affordable Care Act Extension	*64 billion***
Western Drought Resiliency	*4 billion****
TOTAL DEFICIT REDUCTION	**$300+ billion**

* = Joint Committee on Taxation estimate
** = Congressional Budget Office estimate
*** = Senate estimate, awaiting final CBO score

Source: Summary: The Inflation Reduction Act of 2022. Updated: August 11, 2022.

84 percent of spending

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Risk or Opportunity?

Decarbonization will challenge existing Gulf Coast energy manufacturing, but it will also create an opportunity for regional leadership in the development of the production capacity for liquid fuels, chemicals, plastics, fertilizers, and other products historically derived from fossil fuels, with lower, or even net zero GHG emissions. Industrial decarbonization can also lead to competitive advantages for Gulf Coast industries, particularly if trade policies and global tariffs become tied to environmental attributes. The IRA is likely to speed the region's industrial decarbonization given the important financial incentives supporting hydrogen and CCS. Over the forecast horizon, the GCEO sees decarbonization creating considerable regional capital investment opportunities.

Offshore Leasing Timeline

- **2020 campaign trail:** Candidate Biden said he would ban "new oil and gas permitting" on public lands and waters.
- **January 2021 executive order:** "pauses new oil and gas leases" on public lands and waters during "comprehensive review and reconsideration" of leasing practices.
  - March Gulf of Mexico Lease Sale cancelled.
- **June 2021**: Preliminary injunction granted in Federal court that the Bureau of Land Management (BLM) and Bureau of Ocean Energy Management (BOEM) continue leasing while review is completed.
- **November 2021:** Gulf of Mexico Lease Sales 257 conducted.
  - ~81 million acres leased for ~$192 million
- **January 2022:** Washington, D.C. Court vacated results of Lease Sale 257.
- **June 2022:** Department of the Interior announces that all lease sales remaining in current five year program are cancelled.
  - Offshore leasing in the Gulf of Mexico effectively discontinued.
- **August 2022:** Inflation Reduction Act signed into law.
  - Lease Sale 257 reinstated.
  - Offshore leasing resumed and tied to offshore wind developments.

GCEO modeling will consider that offshore leasing has been reinstated and that the offshore industry is returning to a "business as usual" scenario, driven by the economics of offshore oil and gas activity.

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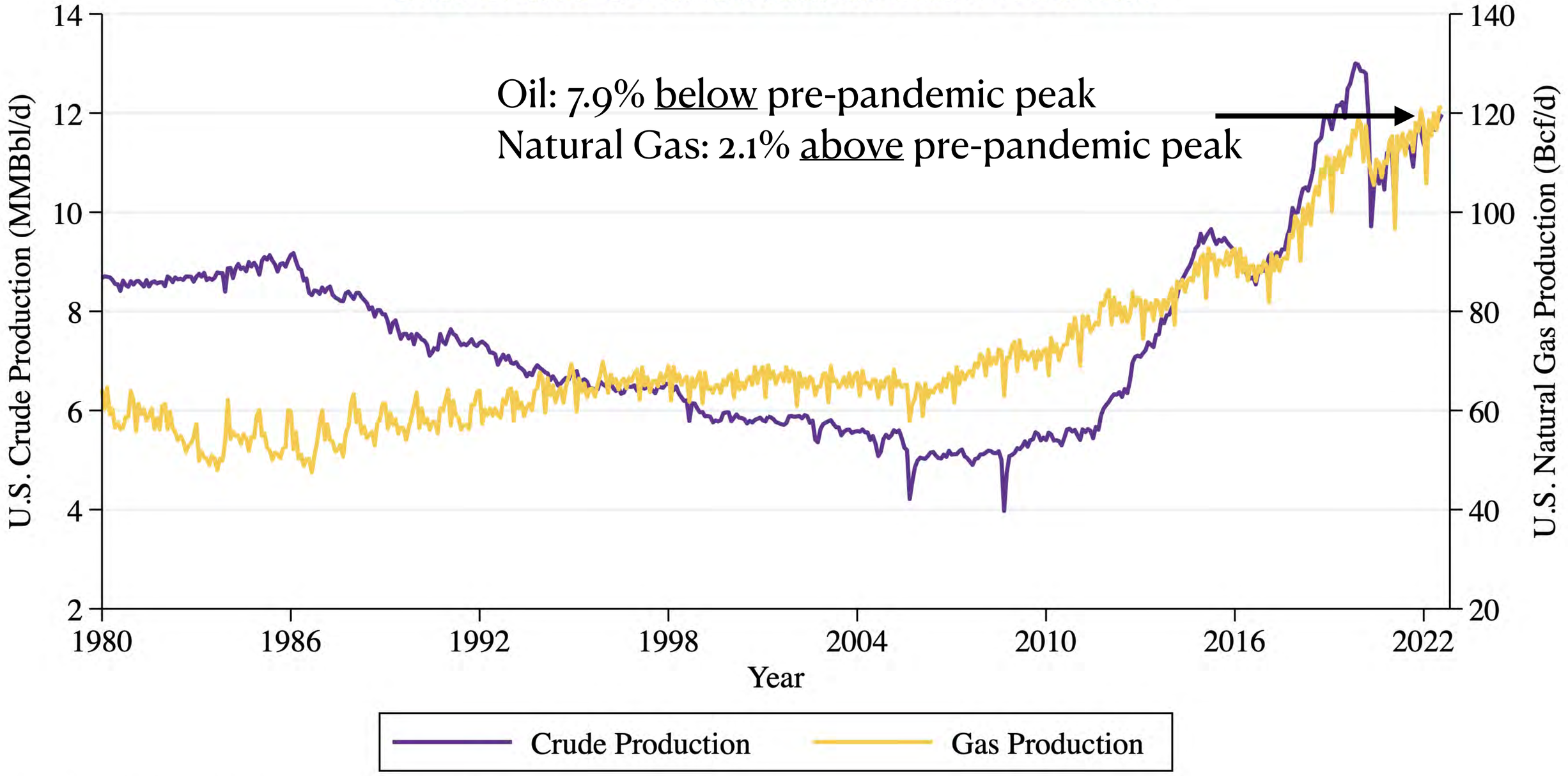
U.S. Crude Oil and Natural Gas Production



Source: Energy Information Administration, U.S. Department of Energy.

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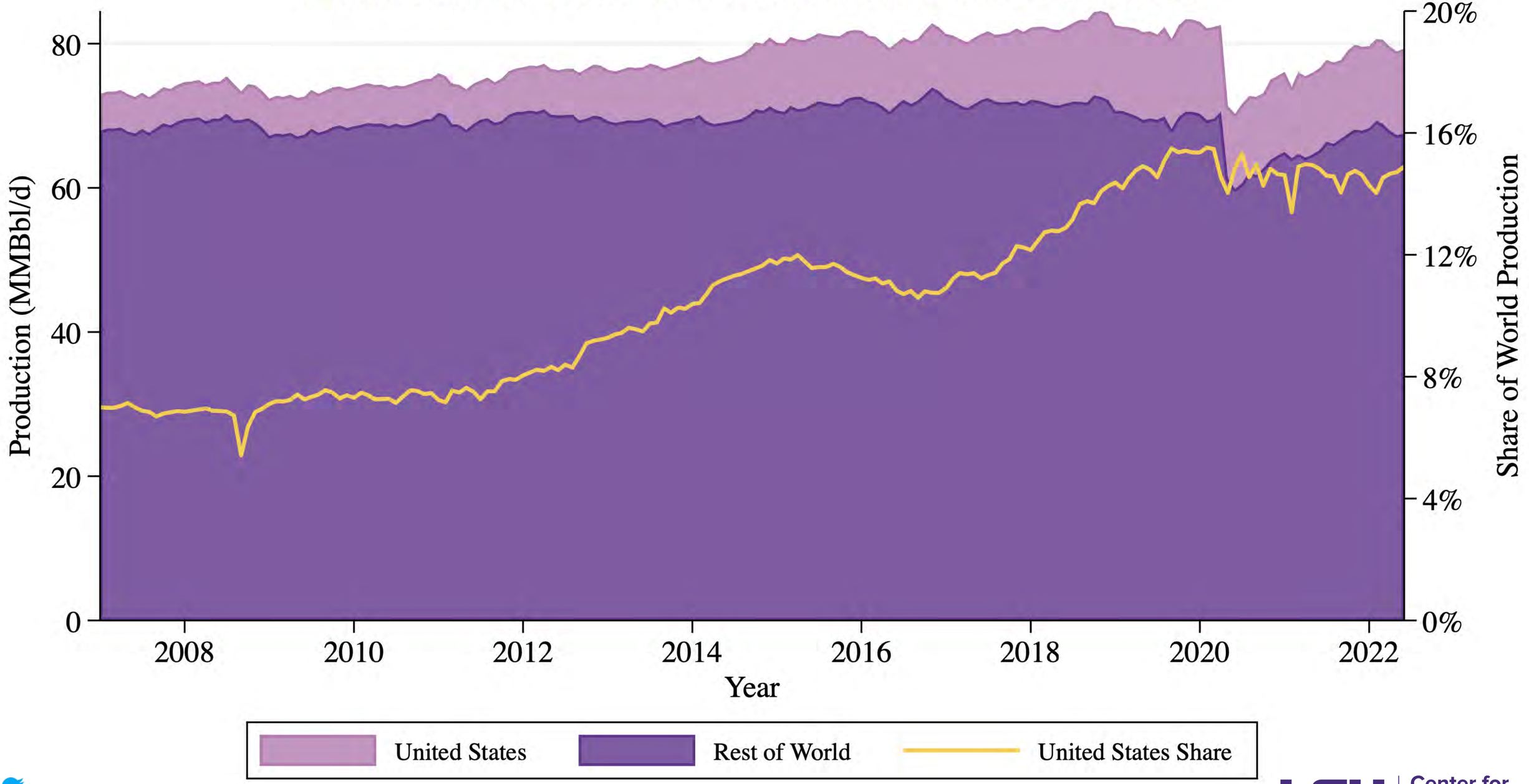
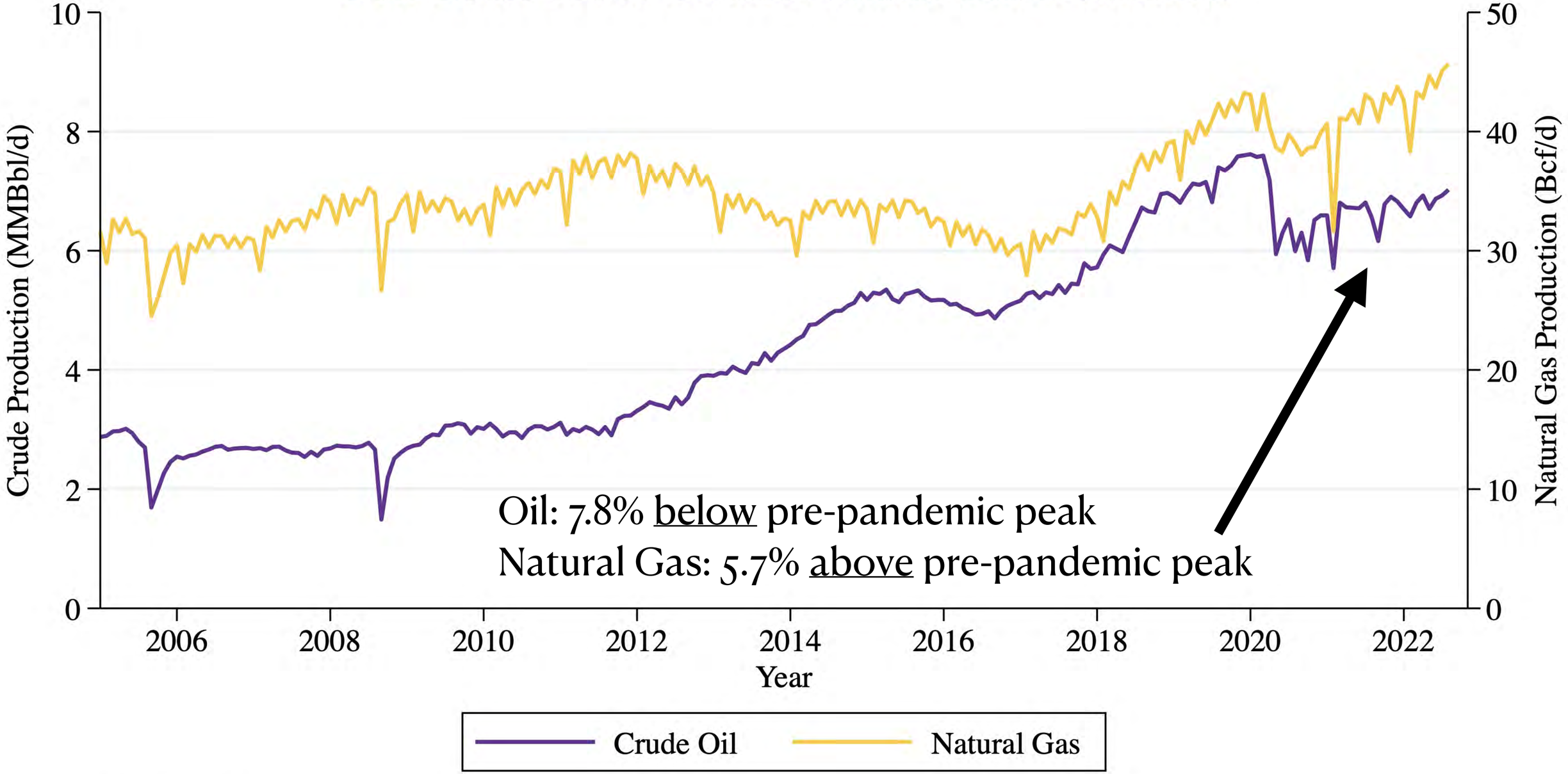
United States Share of Global Crude Oil Production



Gulf Coast Crude Oil and Natural Gas Production



Source: Energy Information Administration. U.S. Department of Energy.

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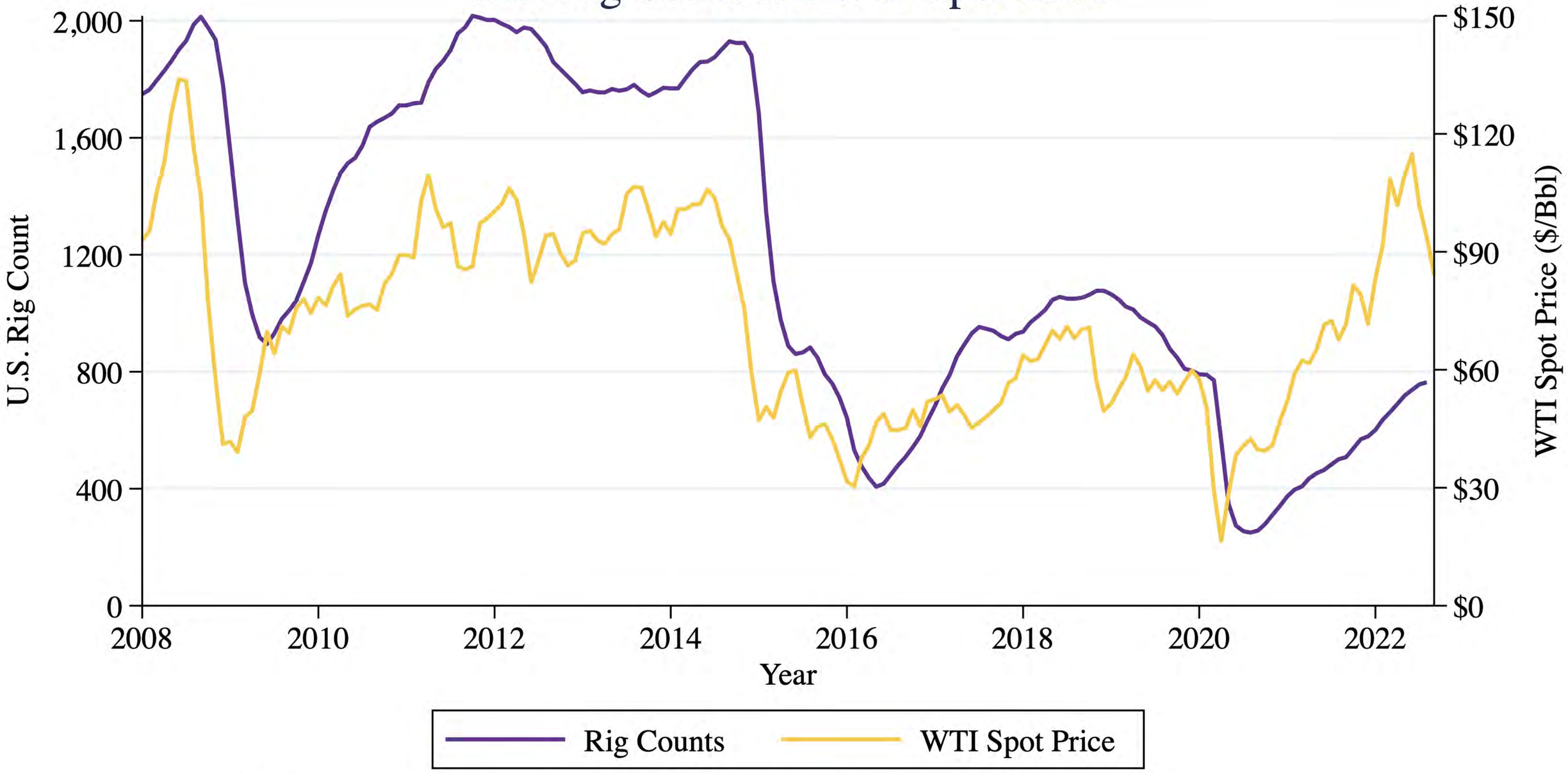
U.S. Rig Count and WTI Spot Price



Source: U.S. Energy Information Administration, Baker Hughes Rig Count Overview

United States Rig Count

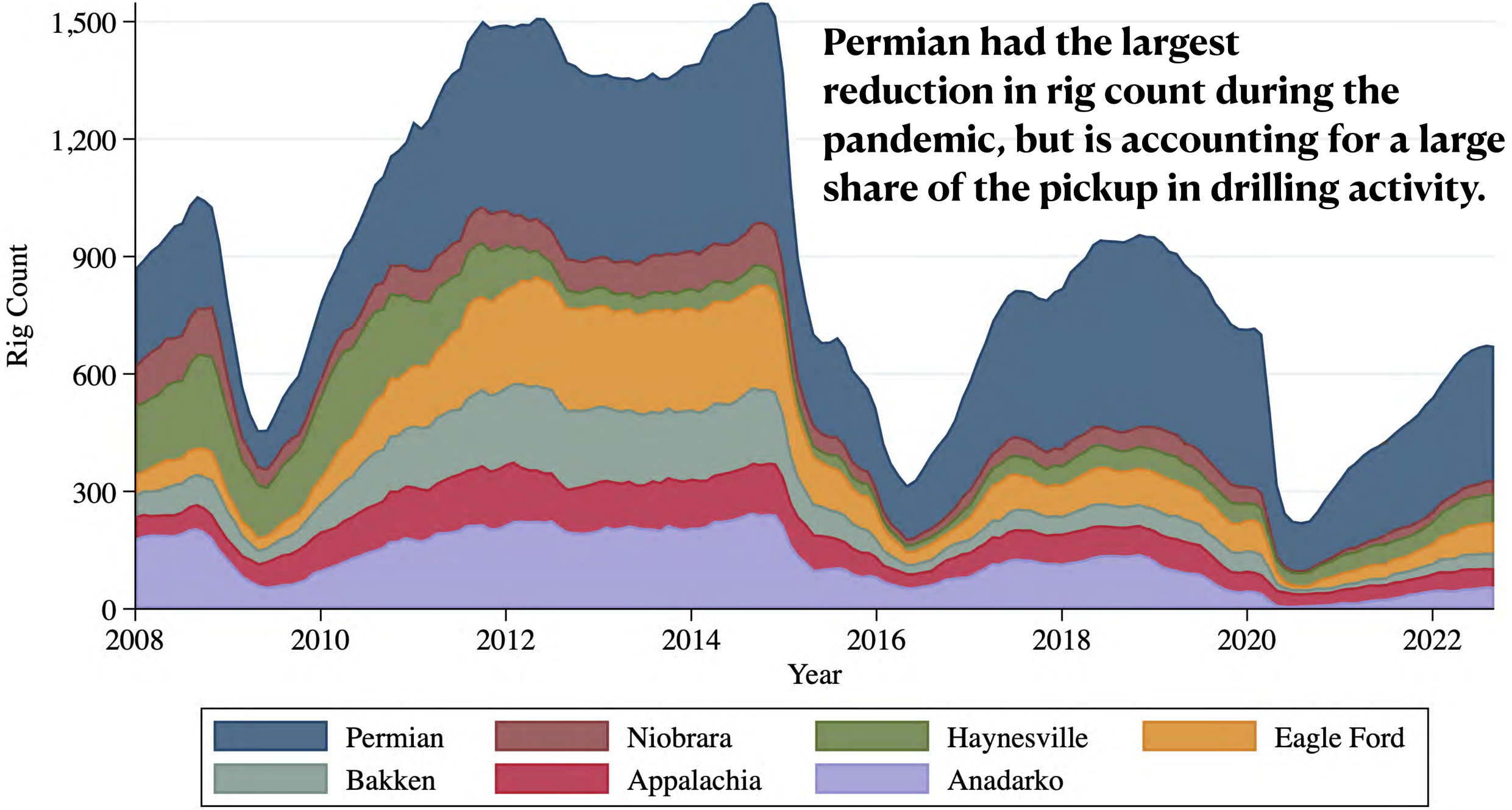
Source: Baker Hughes Rig Count Overview

Texas Rig Count

Source: Baker Hughes Rig Count Overview

Louisiana Rig Count

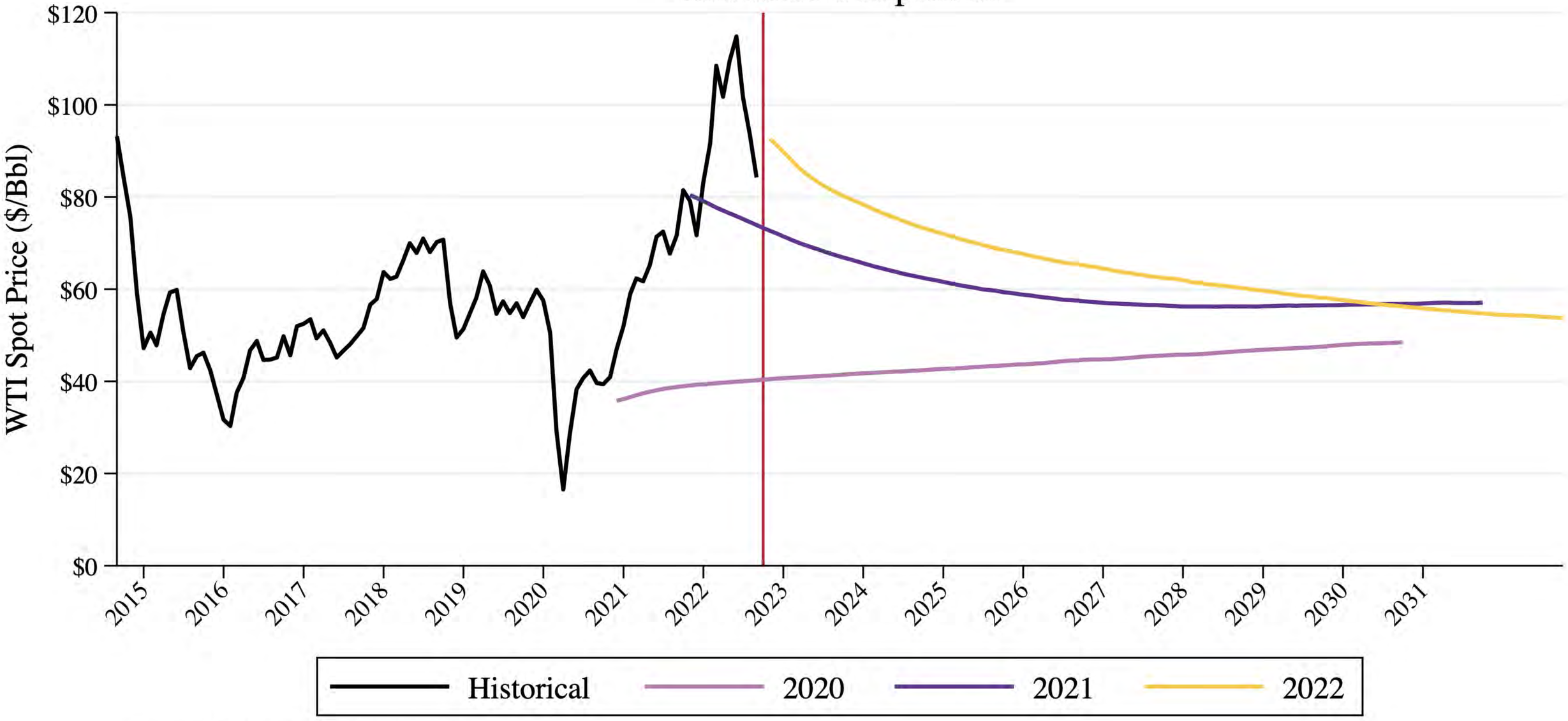
Source: Baker Hughes Rig Count Overview


Permian had the largest reduction in rig count during the pandemic, but is accounting for a large share of the pickup in drilling activity.
Rig Count
1,500
1,200
900
600
300
0
2008
2010
2012
2014
2016
2018
2020
2022
Year
Permian
Niobrara
Haynesville
Eagle Ford
Bakken
Appalachia
Anadarko

Haynesville Natural Gas Production

Crude Oil Future Prices

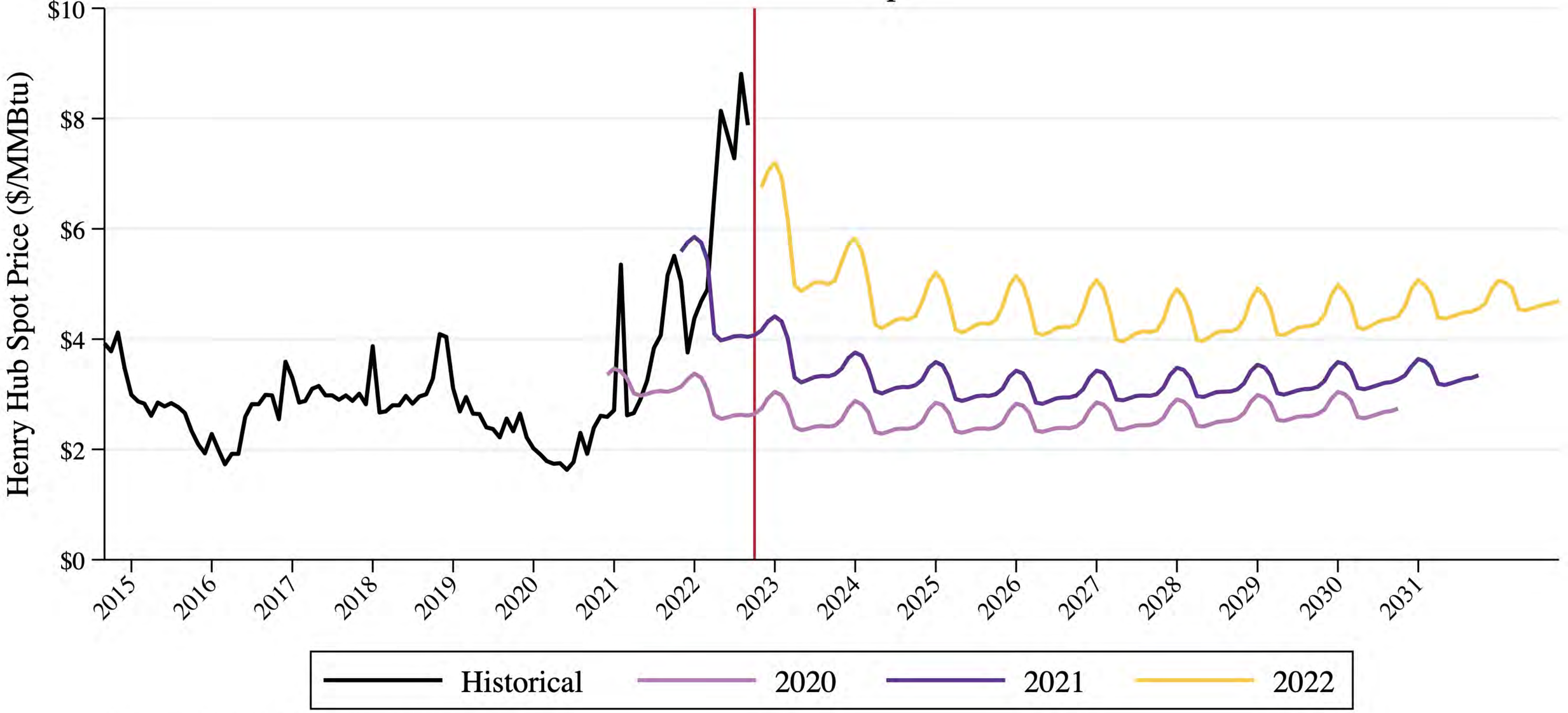
Historical Comparison



Source: S&P Global Market Intelligence

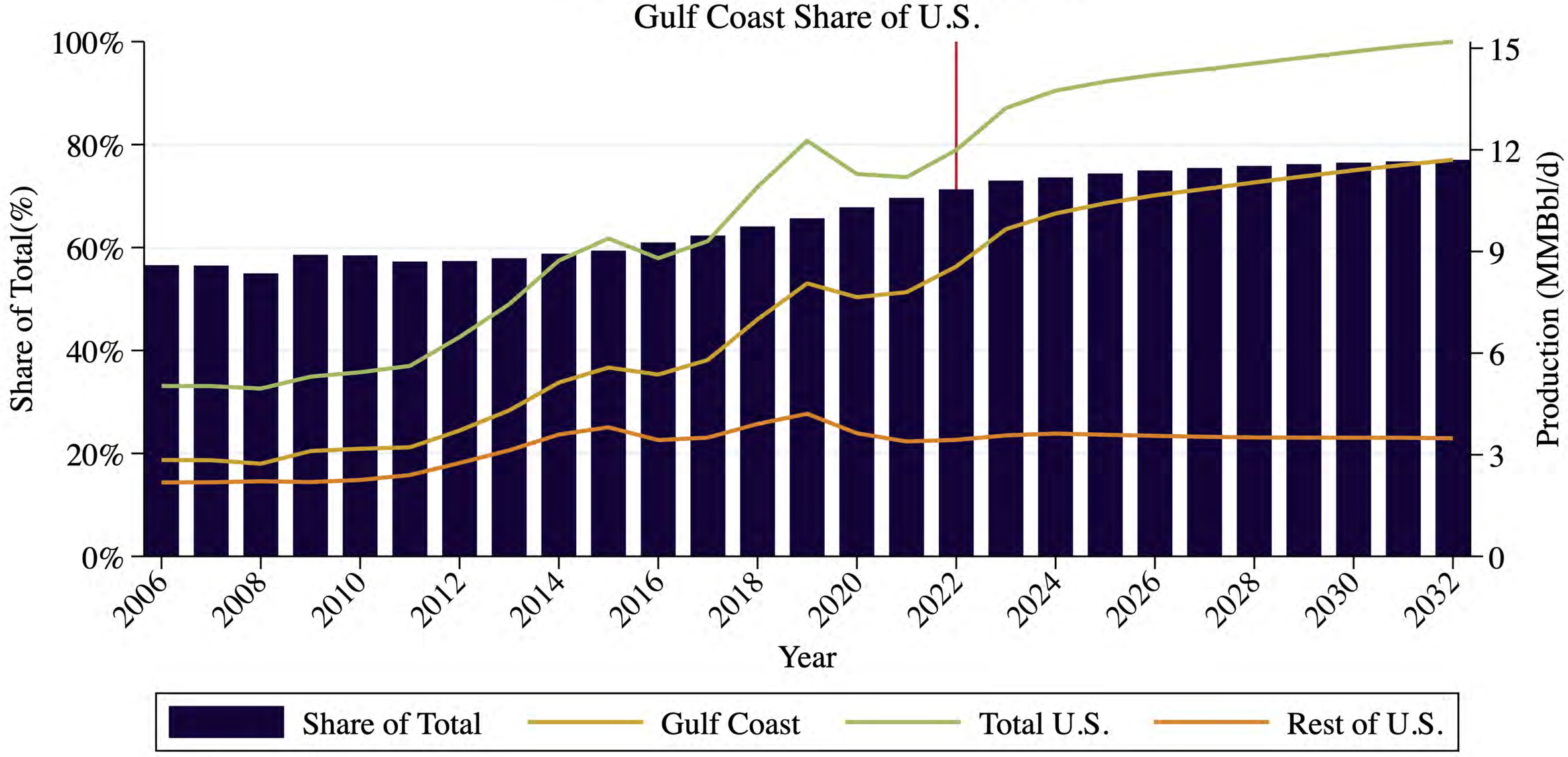
Natural Gas Future Prices

Historical Comparison



Source: S&P Global Market Intelligence

Crude Oil Production Forecast

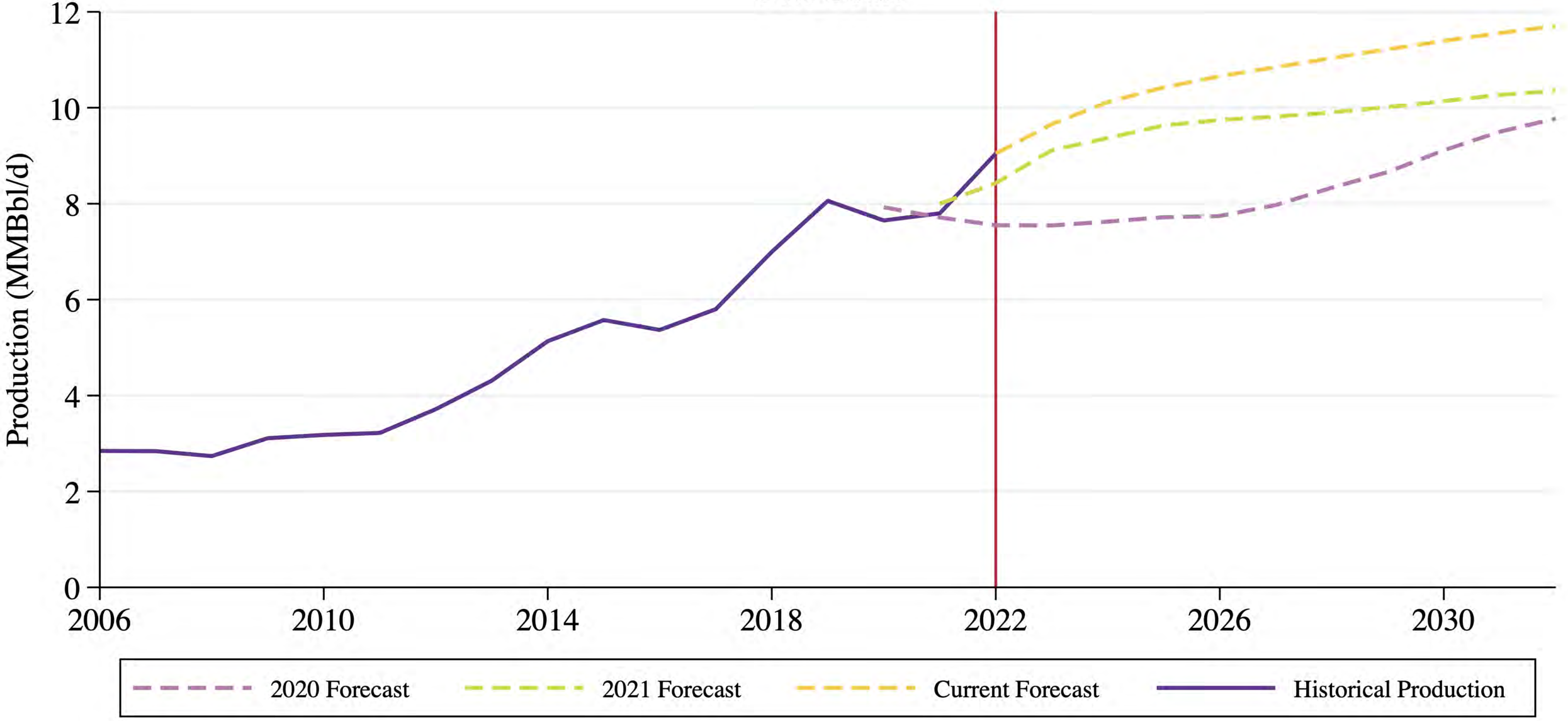


Source: Enverus. DrillingInfo Prodcast.

ENVERUS

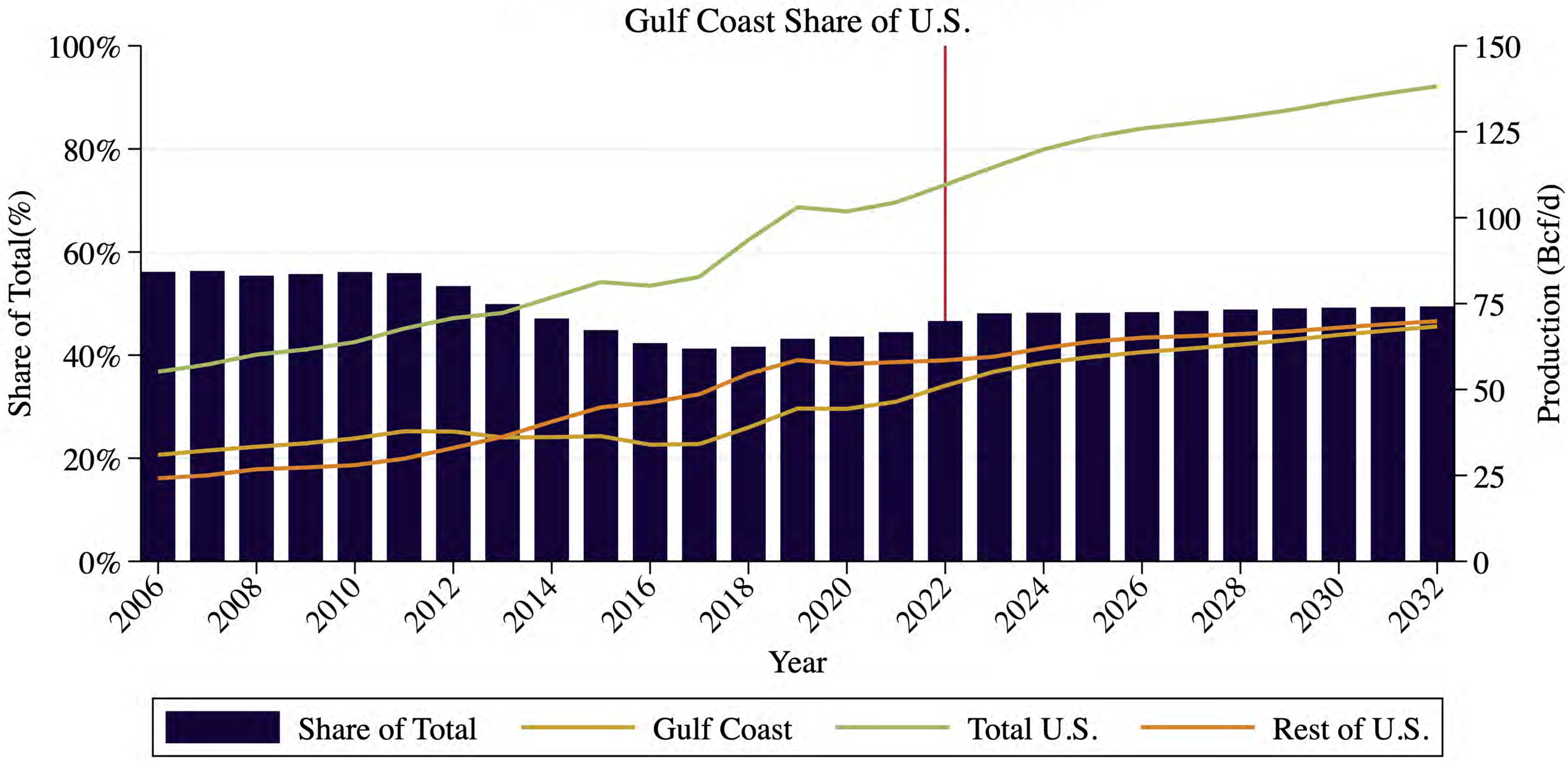
Crude Oil Production Forecast

Gulf Coast



Source: Enverus. DrillingInfo Prodcast.

Natural Gas Production Forecast

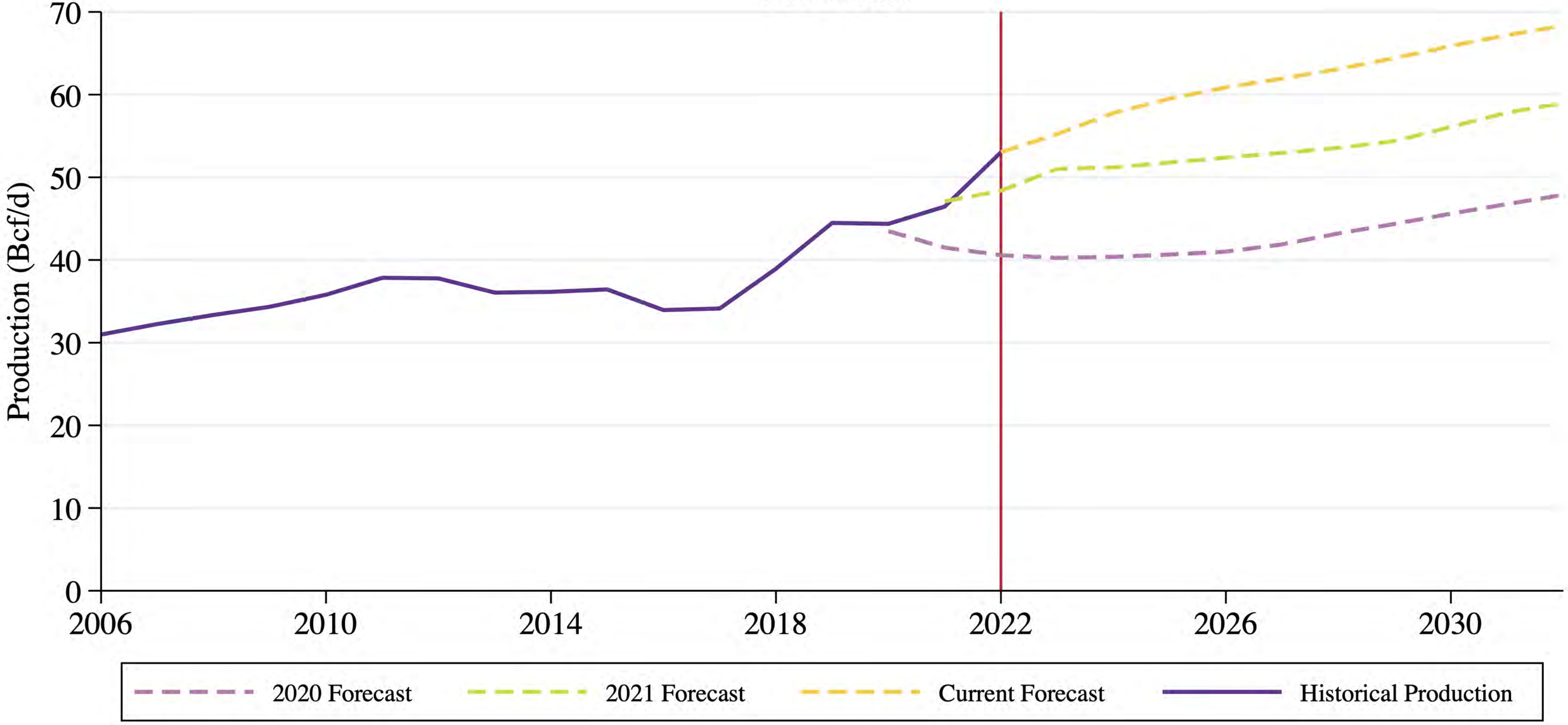


Source: Enverus. DrillingInfo Prodcast.

ENVERUS

Natural Gas Production Forecast

Gulf Coast



Source: Enverus. DrillingInfo Prodcast.

ENVERUS

Gulf Coast Value of Production

Historical and Forecast

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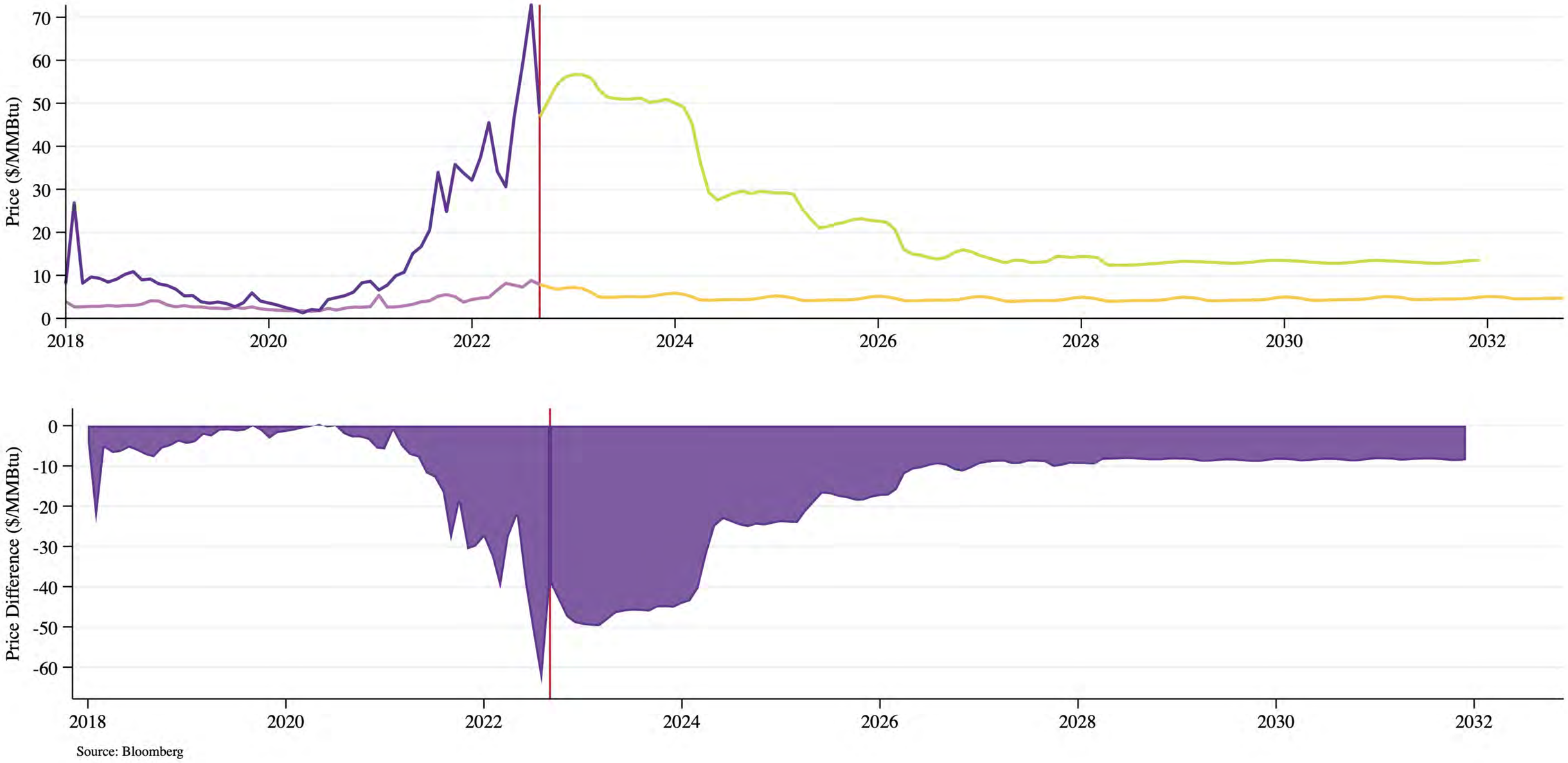
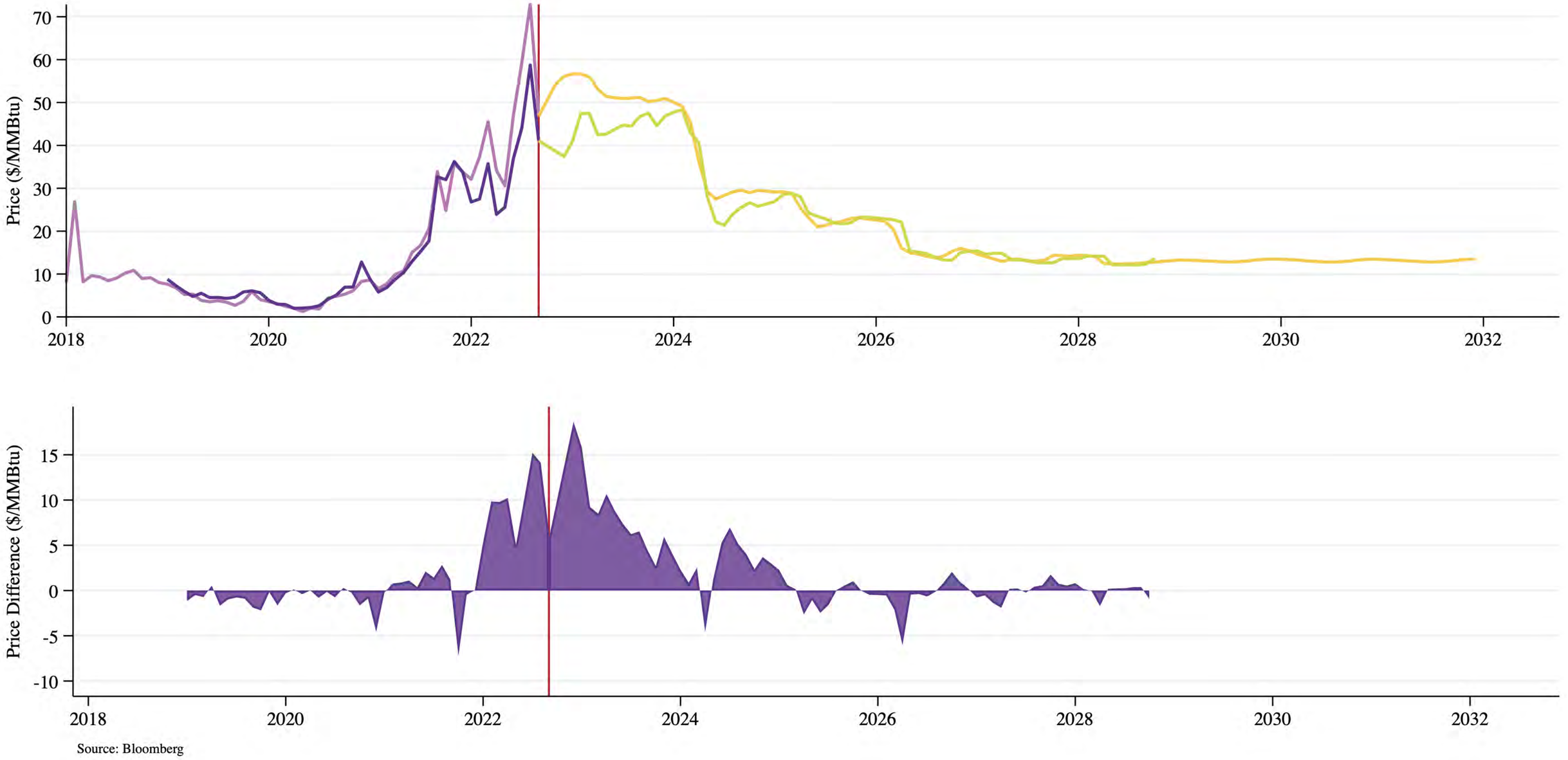

Price ($/MMBtu)
70
60
50
40
30
20
10
0
2018
2020
2022
2024
2026
2028
2030
2032
Price Difference ($/MMBtu)
0
-10
-20
-30
-40
-50
-60
2018
2020
2022
2024
2026
2028
2030
2032
Source: Bloomberg
Henry Hub
TTF
Henry Hub Futures
TTF Futures

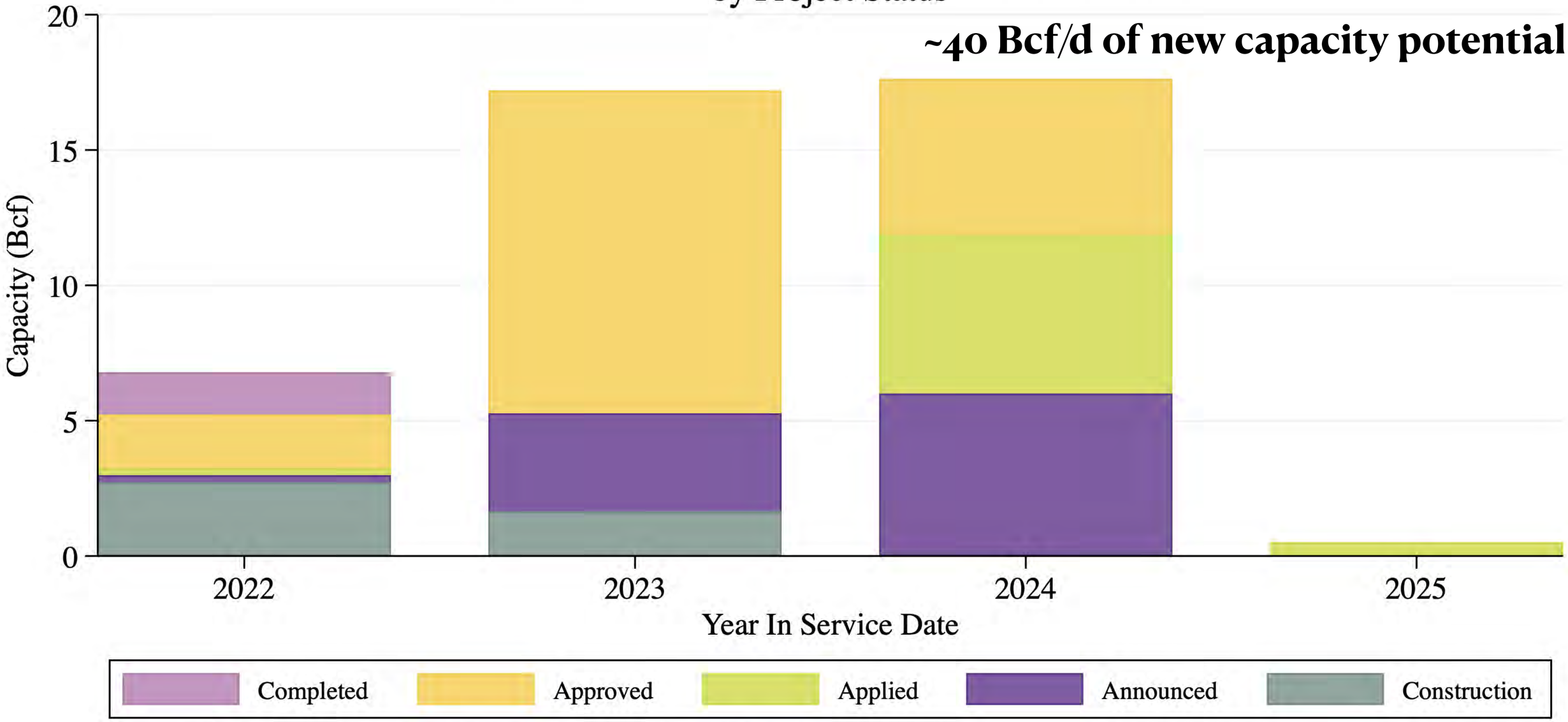


Source: Bloomberg

Natural Gas Pipeline Capacity Additions

by Project Status

~40 Bcf/d of new capacity potential.



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

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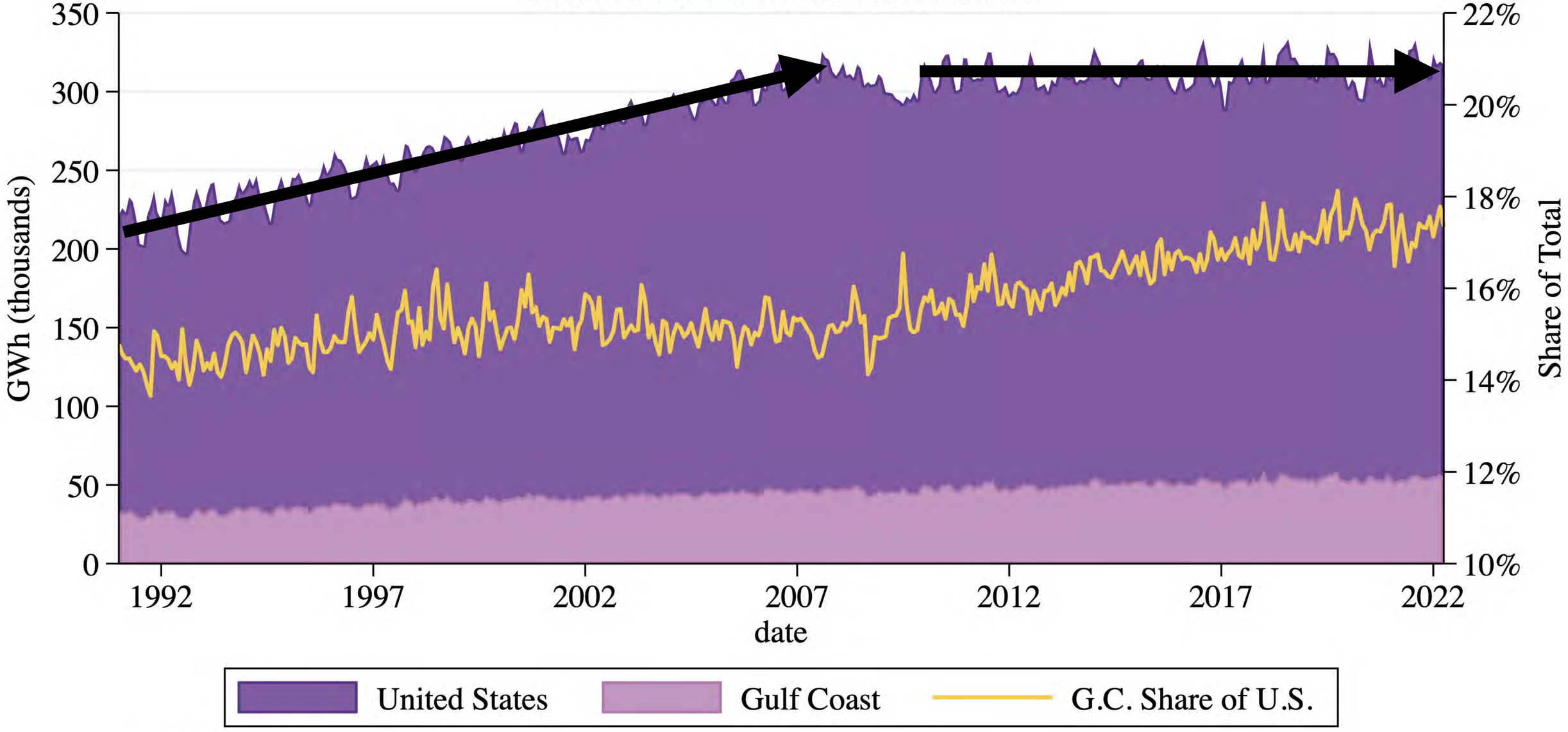
Gulf Coast Total Electricity Sales

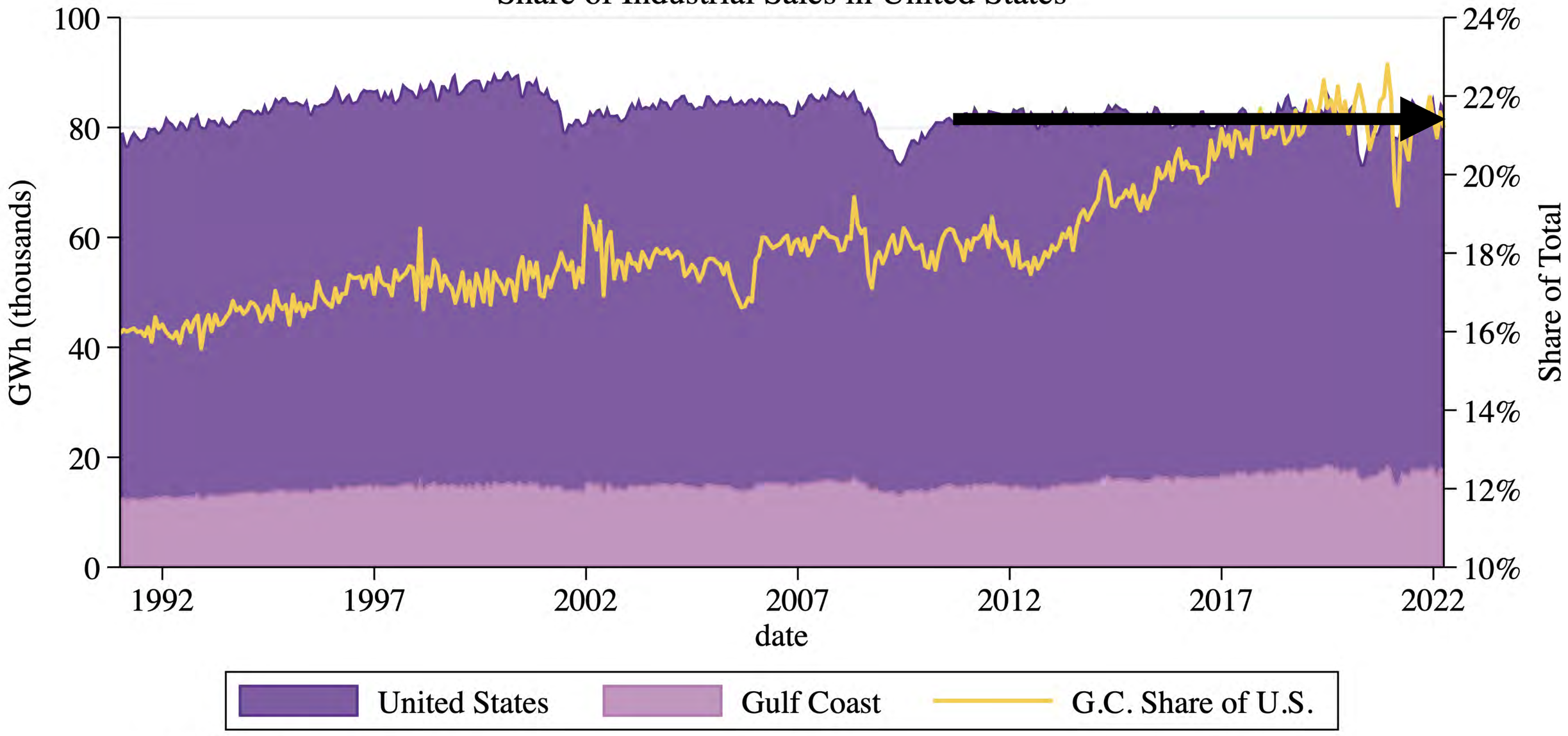
Share of Total Sales in United States



Source: U.S. Energy Information Administration

Gulf Coast Industrial Electricity Sales

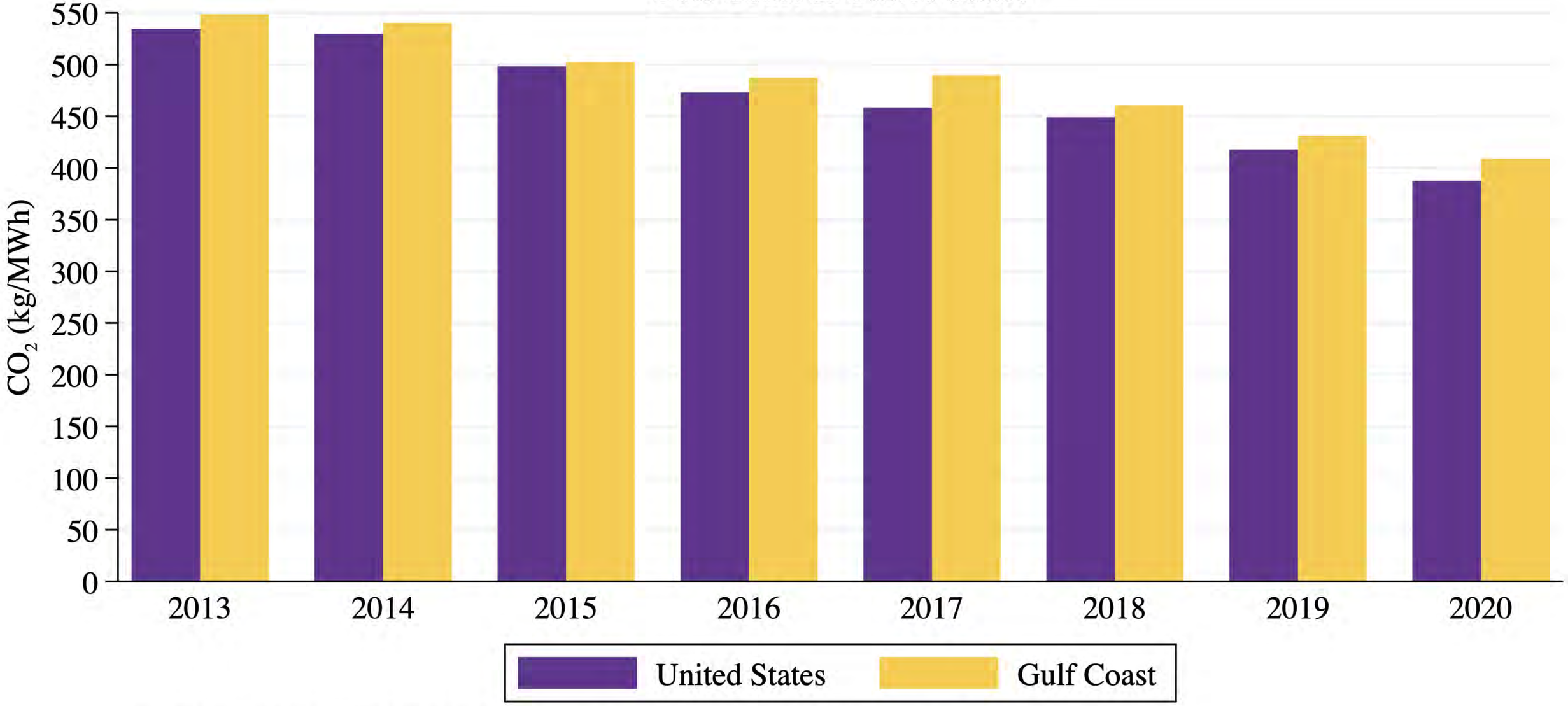
Share of Industrial Sales in United States



Source: U.S. Energy Information Administration

CO_2 Emissions per MWh of Generation

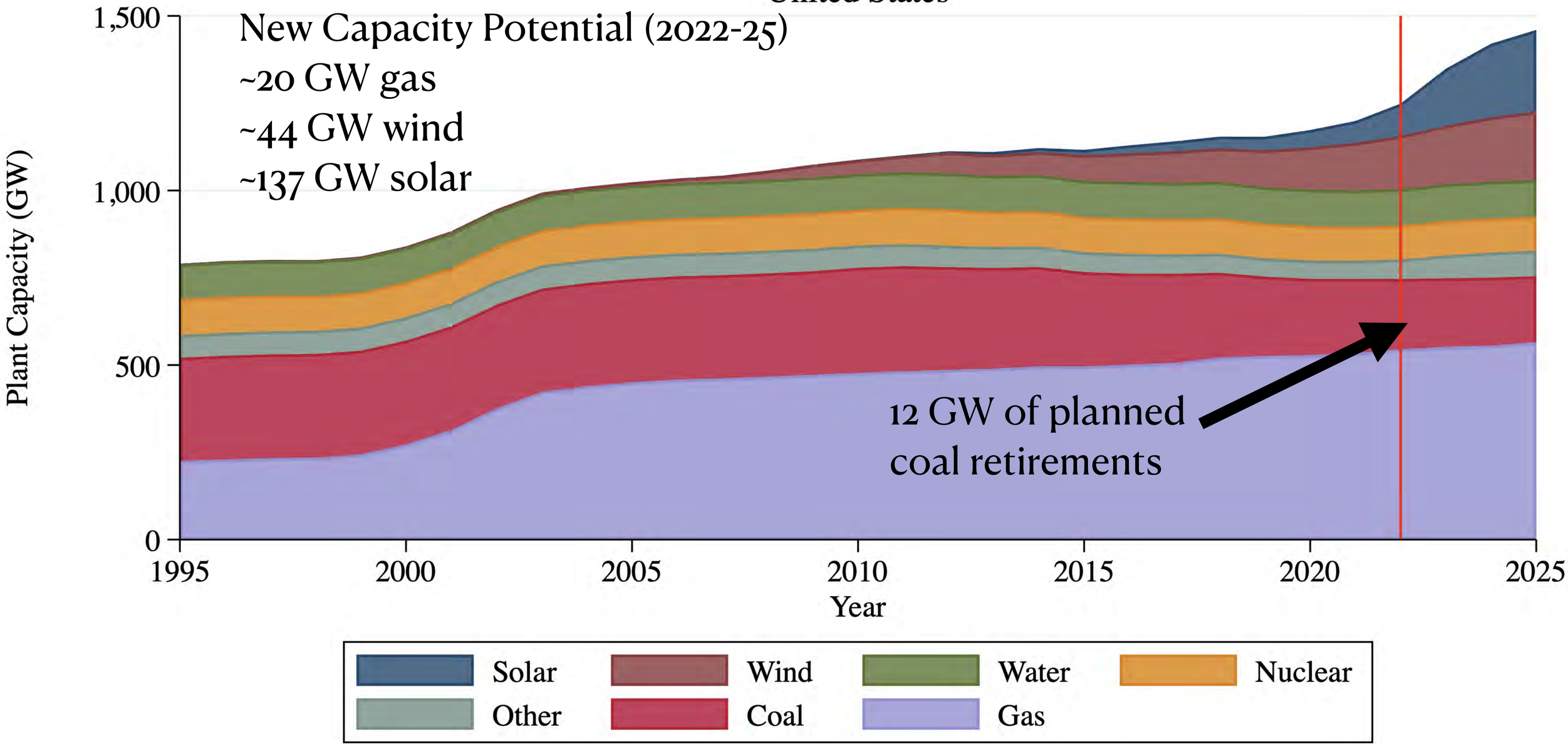
Gulf Coast & United States



Note: The emissions data presented include total emissions from both electrcity generation and the production of useful thermal output
Source: U.S. Energy Information Administration, Form EIA-923 Power Plant Operations Report, Form EIA-860 Annual Electric Generator Report

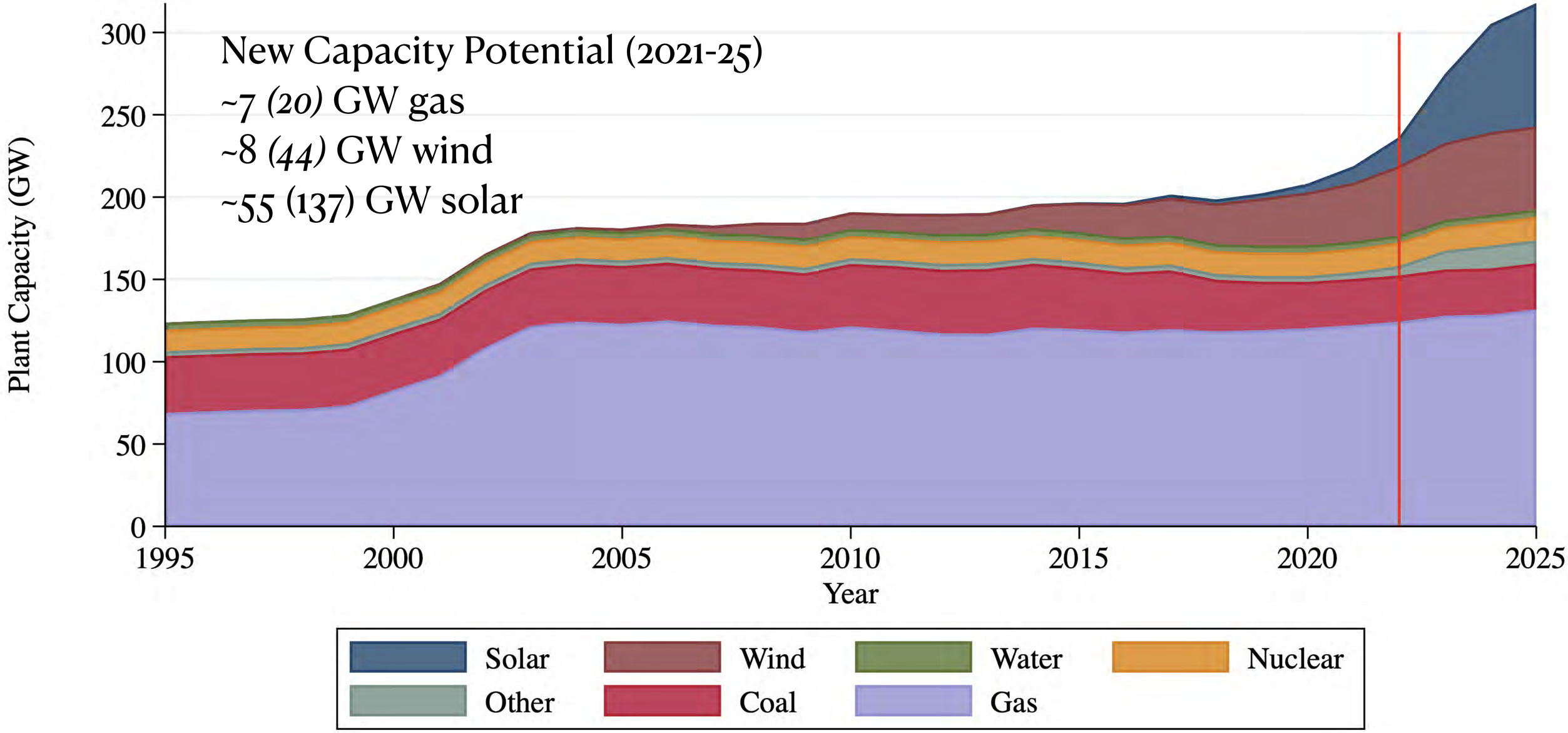
Historical & Future Power Plant Capacity

United States

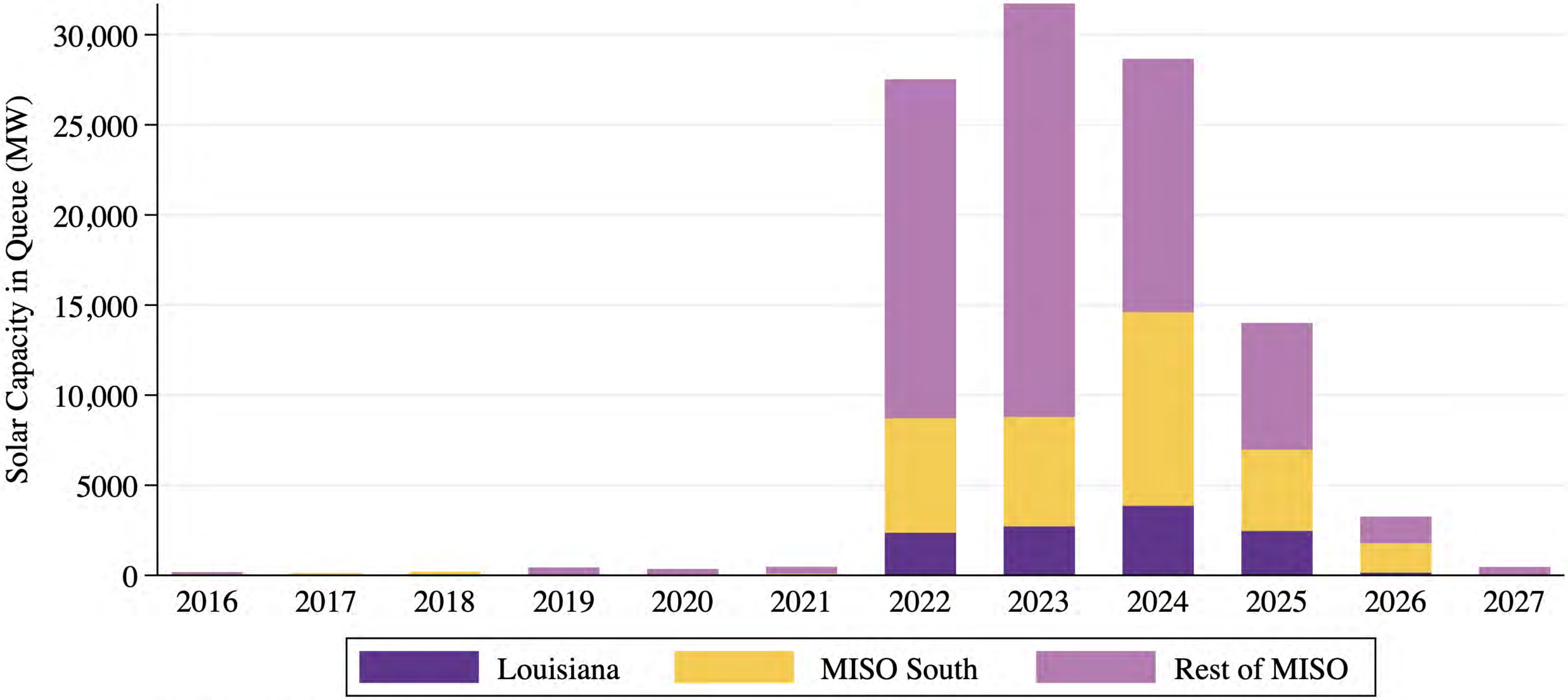


Historical & Future Power Plant Capacity

Gulf Coast



Historical and Future Solar Capacity in Interconnection Queue in MISO States



Note: 2022 includes both completed projects and projects in interconnection queue.
Projects listed by expected completion year.

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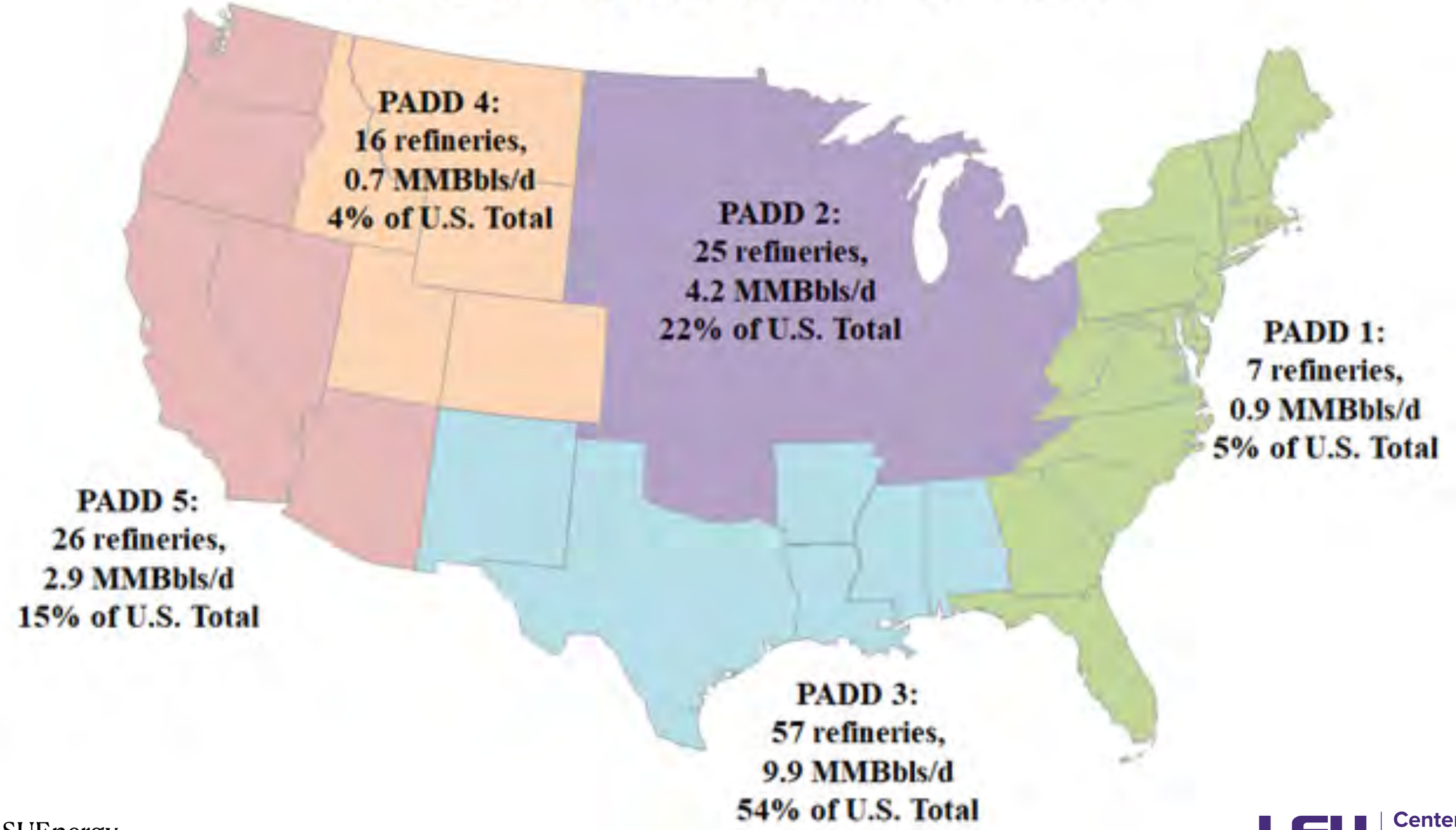
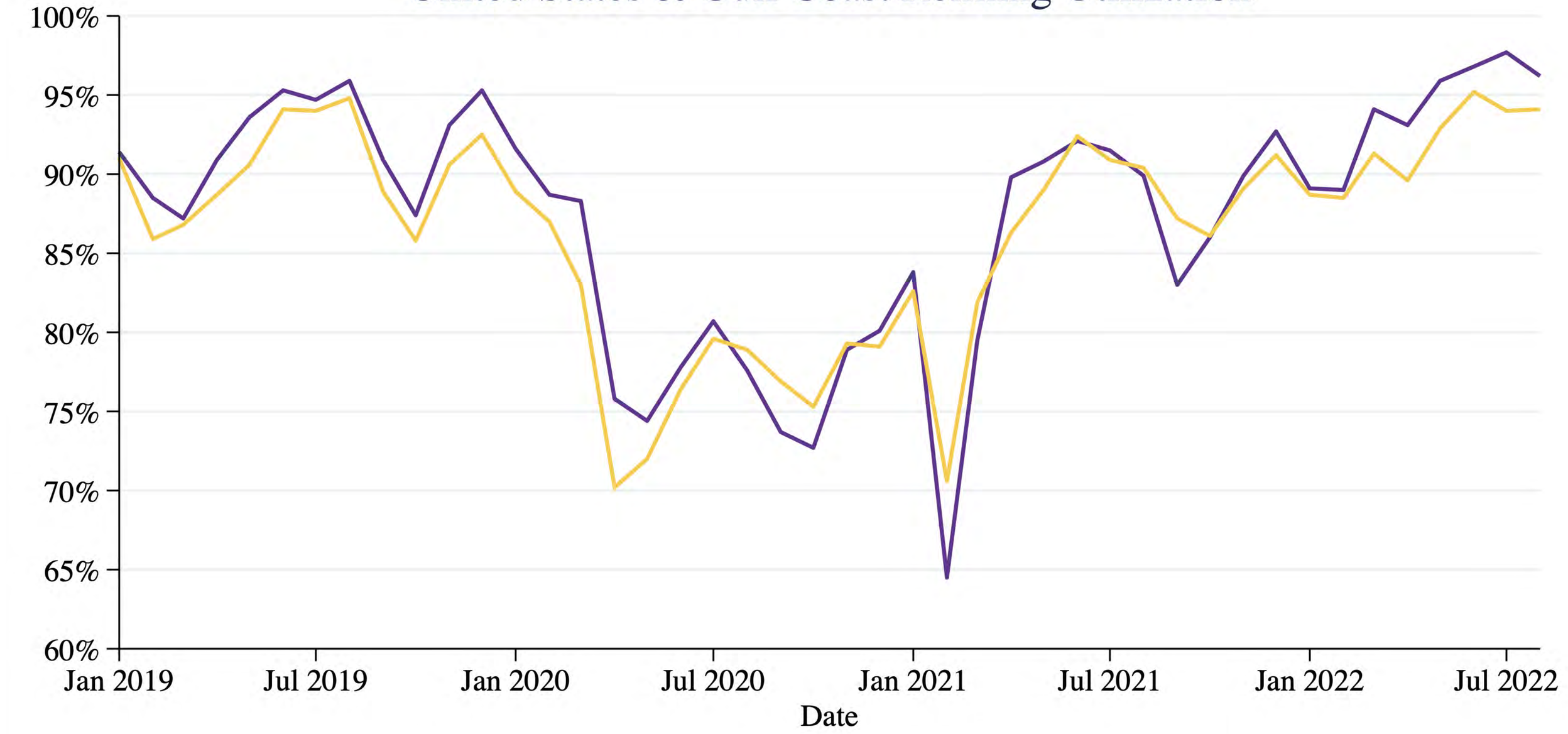
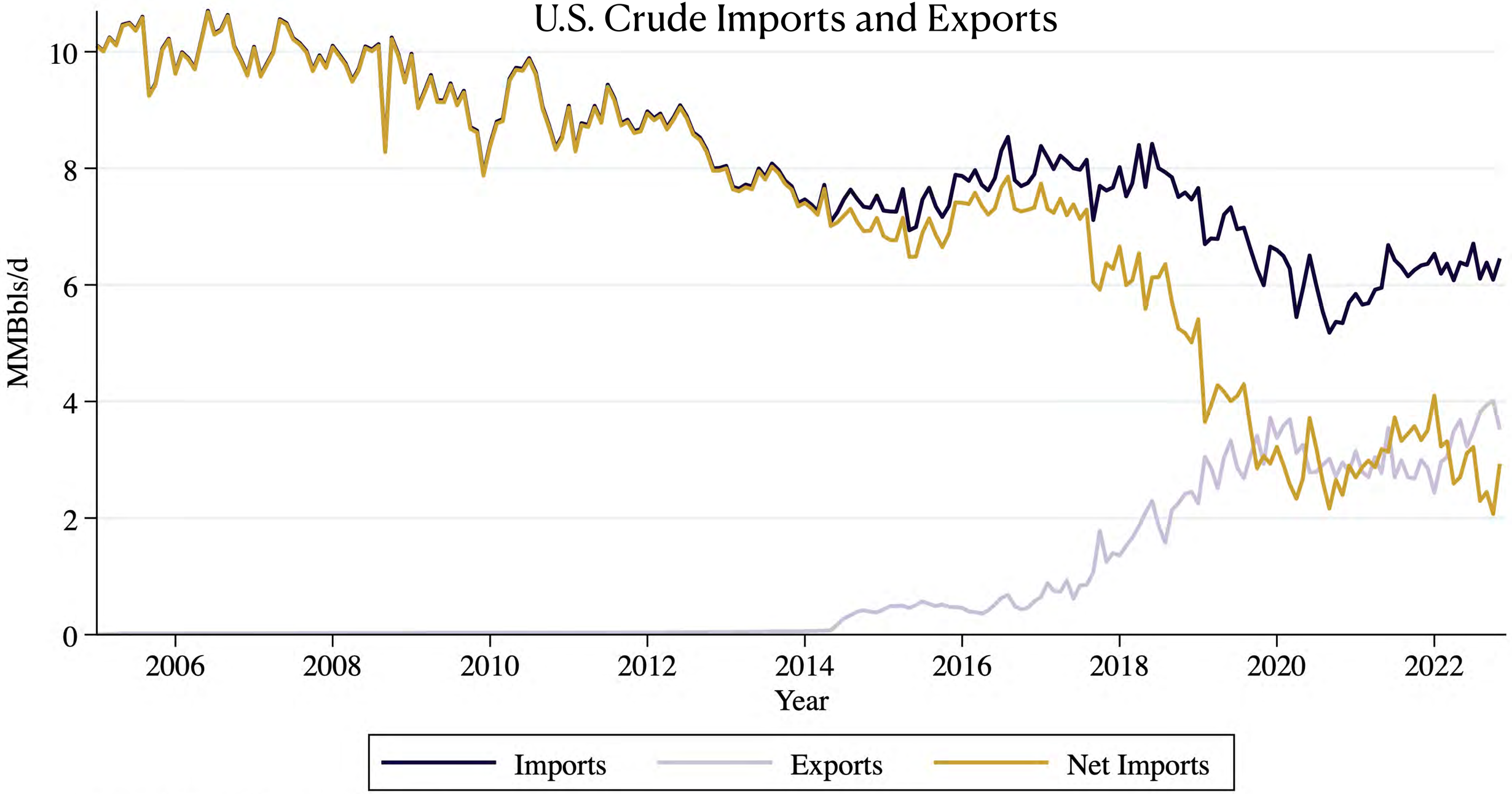
Total U.S. Operating Refining Capacity = 18.5 MMBbl/d



United States & Gulf Coast Refining Utilization

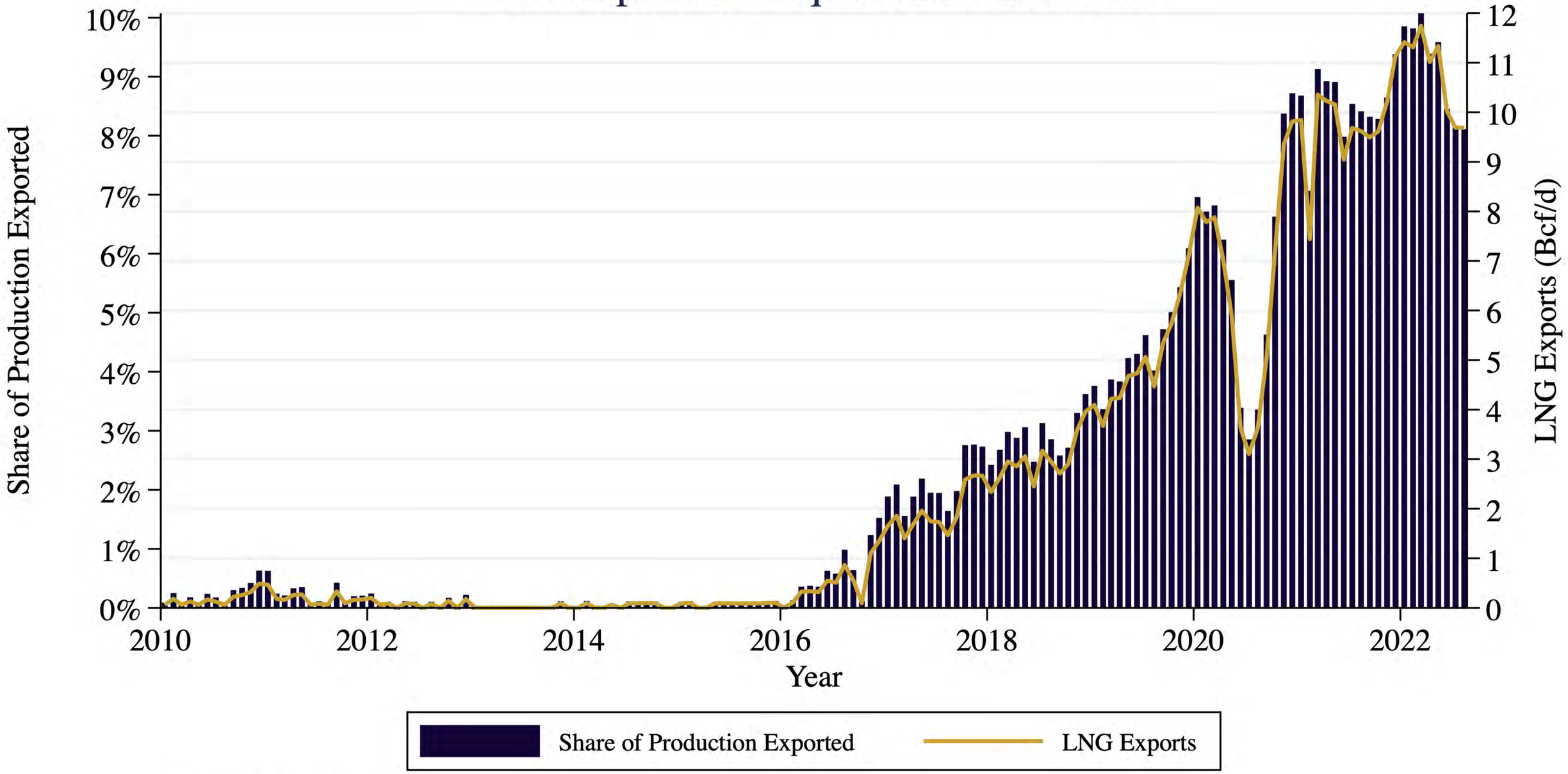


U.S. Crude Imports and Exports



Source: U.S. Energy Information Administration

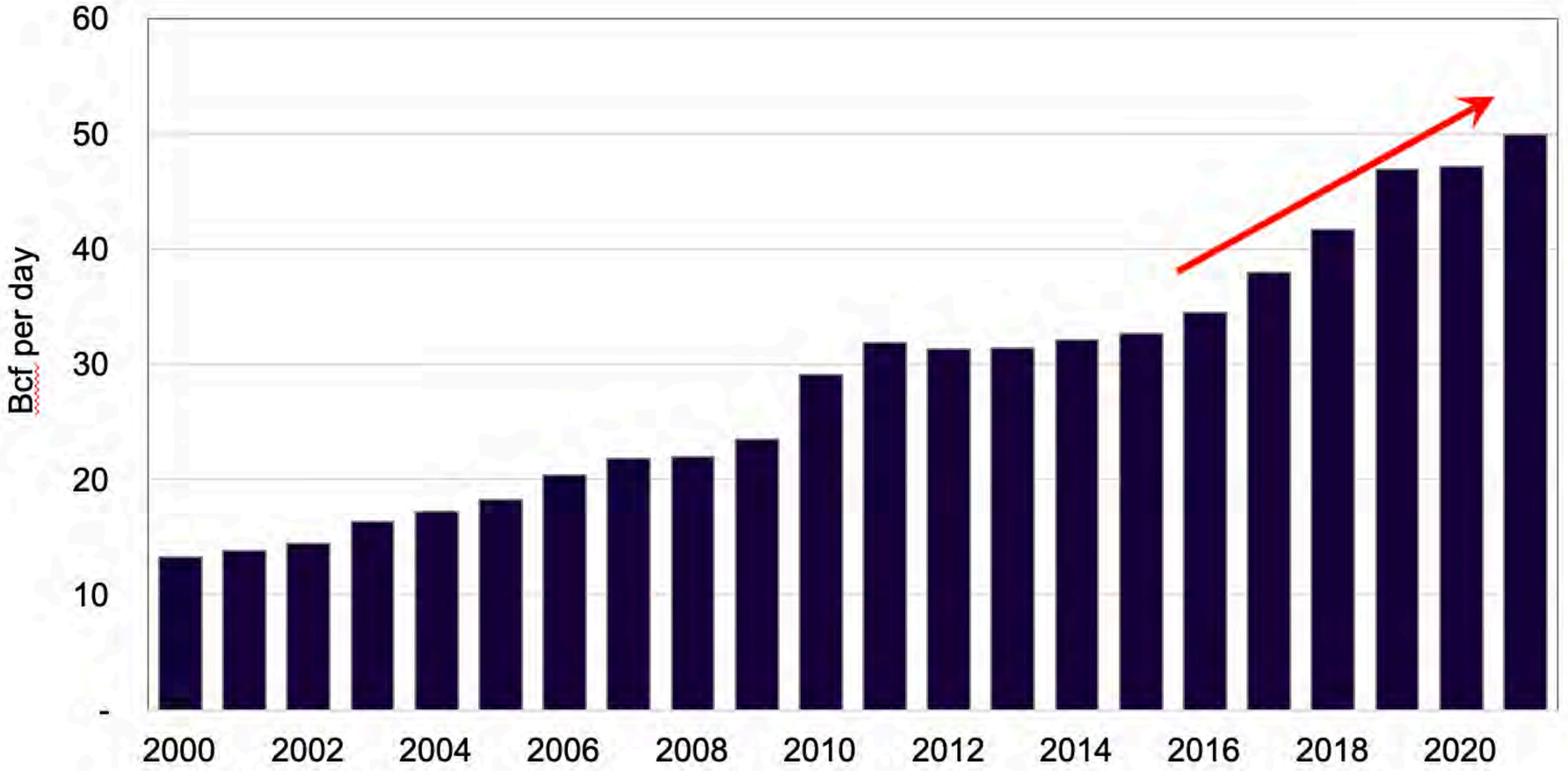
U.S. Exports of Liquefied Natural Gas



Source: U.S. Energy Information Administration

World LNG trade volumes

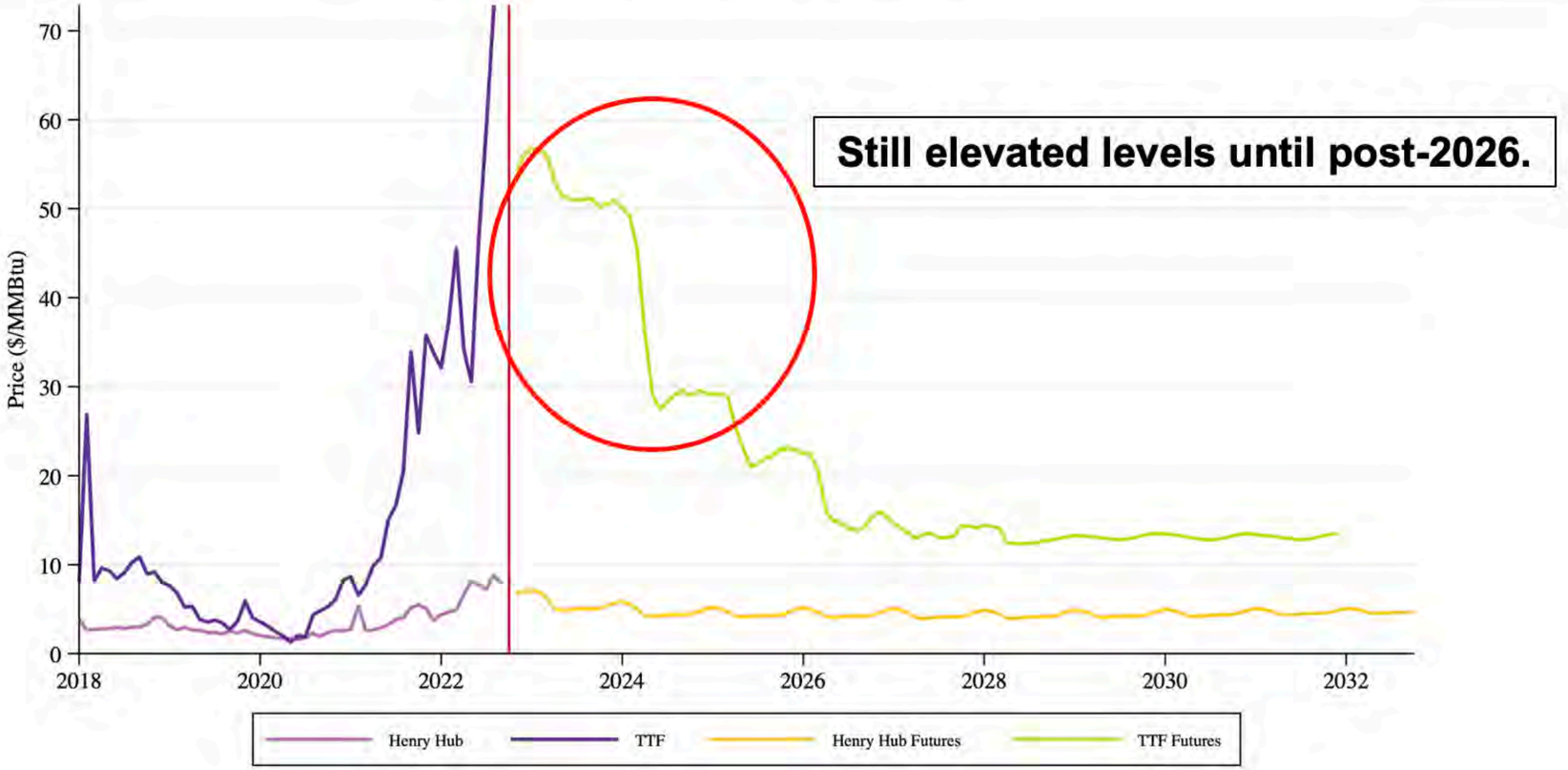
World trade in **LNG as grown considerably** over the past decade. Lastly three years has been considerable (over 24 percent).



Source: BP Statistical Review of World Energy.

European spot natural gas prices

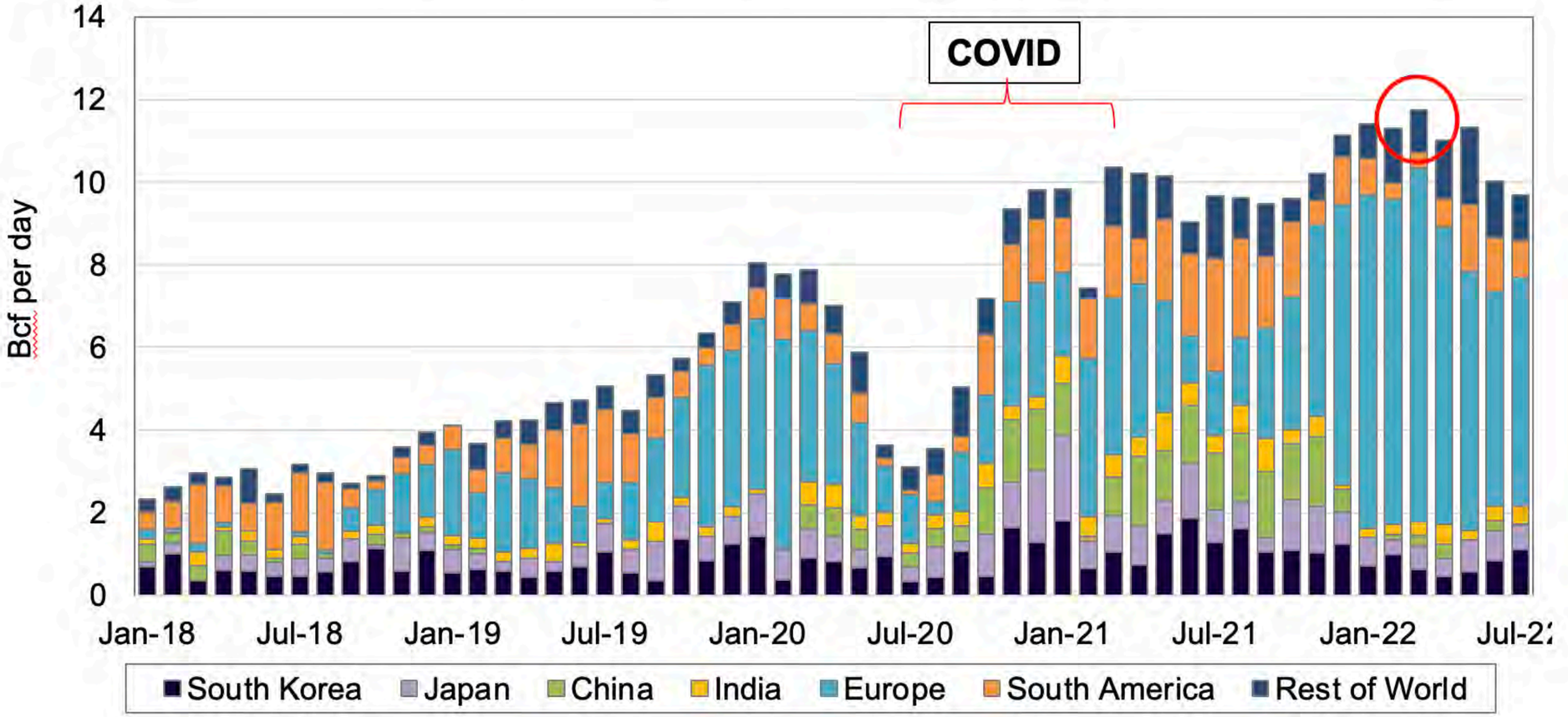
European **natural gas prices are astronomical** but expected to return to more normal levels over longer run (?).



Note: Spot-LNG" refers to LNG that are traded on a cargo to cargo basis and does not mean term contracts of LNG (so-called long, medium, short-term contracts). In addition, for spot-LNG, the price of which is linked to a particular price index (for example the Henry Hub link, and the JKM link) is excluded from these statistics. Objects of these statistics are spot-LNGs the prices of which are determined at the time of contract (so-called "fixed price").
Source: Bloomberg.

U.S. LNG exports by destination

U.S. **LNG exports rebounded quickly and strongly post COVD**.reached a high of 8 Bcf per day in the beginning of 2020. (recent decreases due to **Freeport outage**)

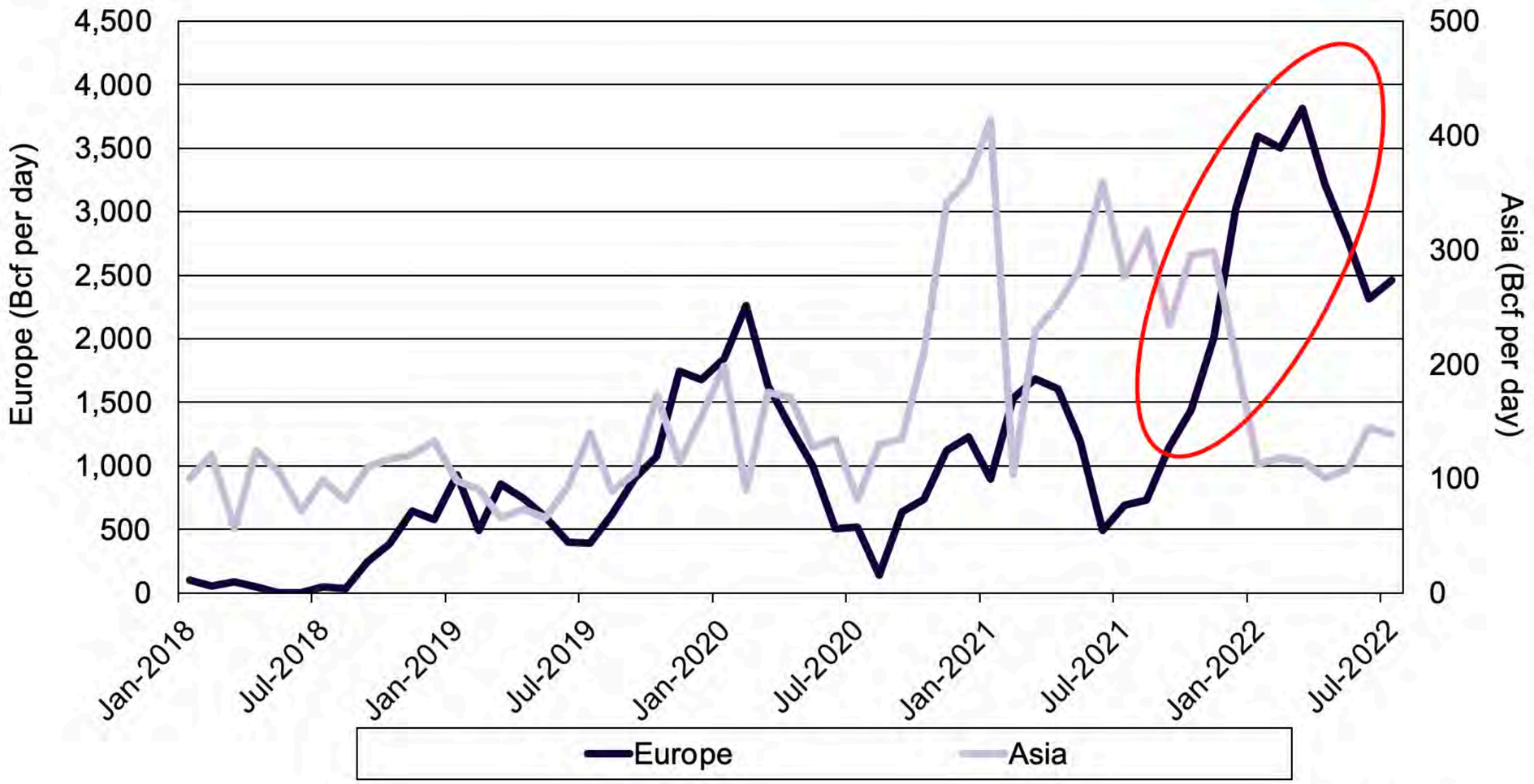


Note: Europe includes Belgium, France, Greece, Italy, Netherlands, Poland, Portugal, Spain, Turkey, and the U.K.; South America includes Argentina, Brazil, Chiles, Columbia, and Mexico.

Source: U.S. Energy Information Administration.

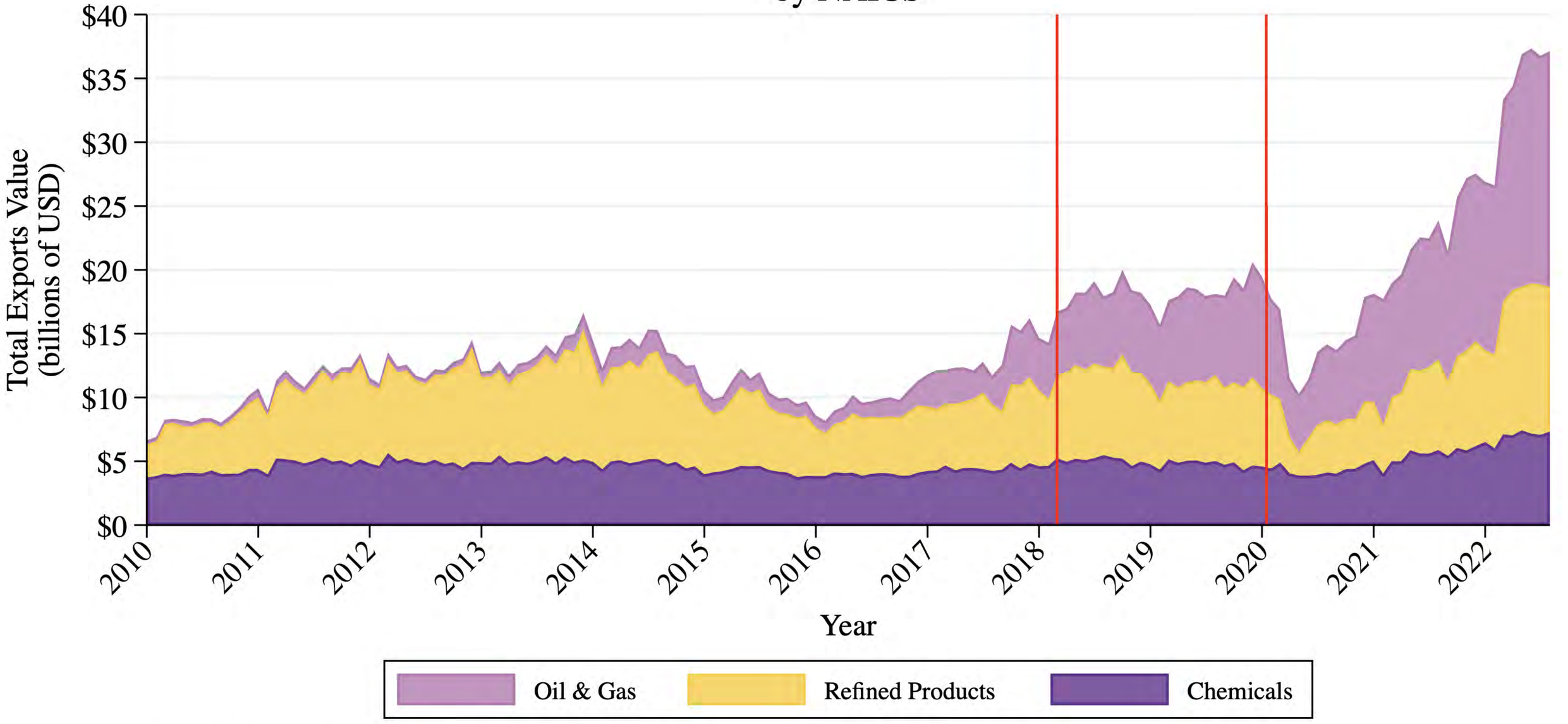
Asian v. European Exports from U.S.

Large recent surge in European exports.



Gulf Coast Exports to World

by NAICS

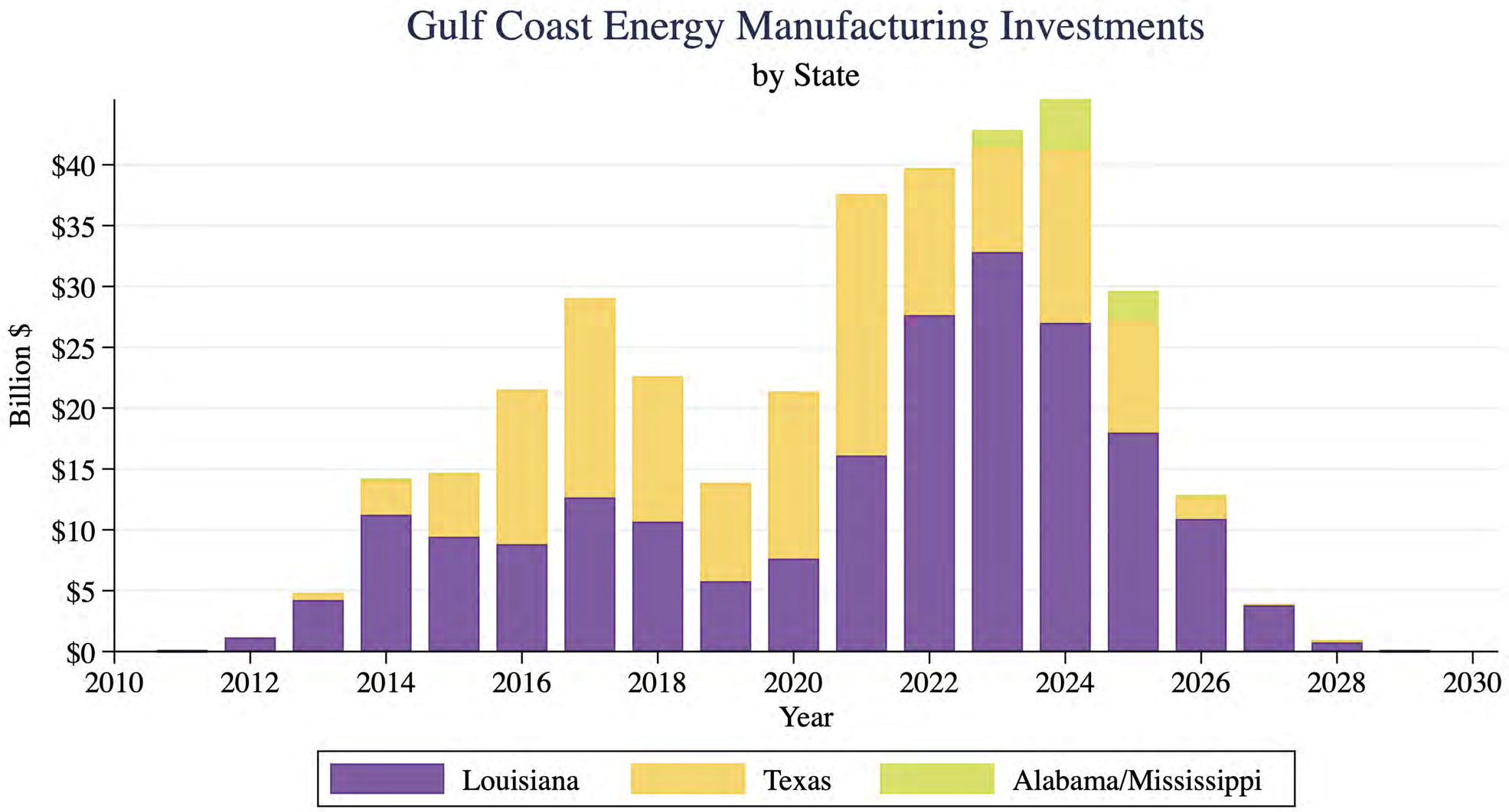


Source: U.S. Census Bureau: Economic Indicators Division USA Trade Online

Outline

1. Introduction & Uncertainties
2. Oil & Gas Production
3. Mid-stream Constraints
4. Power Sector
5. Energy Exports
6. Energy Manufacturing Activity
7. Employment
8. Conclusions

GOM Energy Manufacturing Investment by State

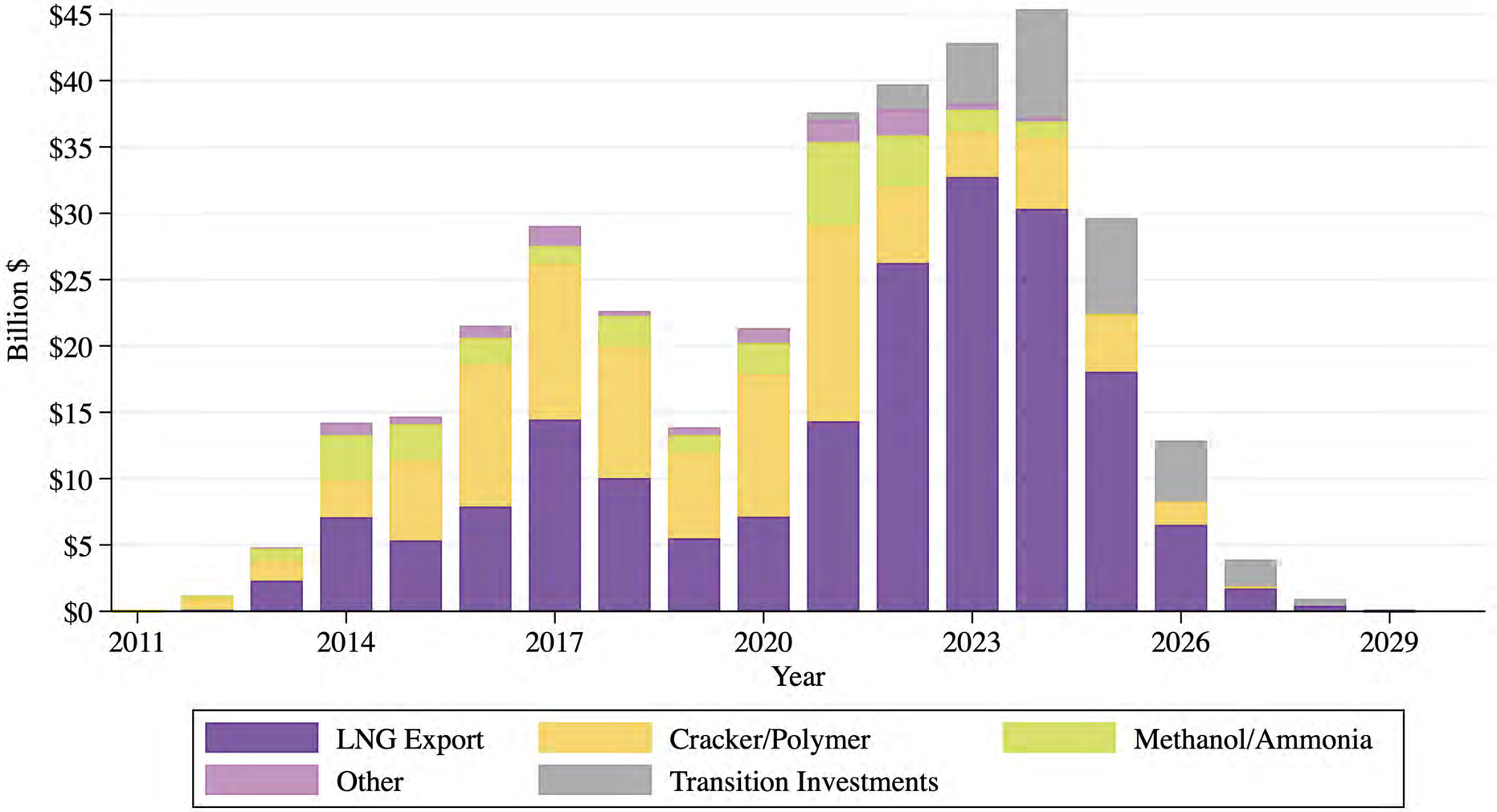


$180 billion through 2021) **and** **$175 billion** in announcements remaining.

To date, ~48% in LA and 52% in TX.

Remaining: 70% in LA and 30% in TX.

GOM Energy Manufacturing Investment by Sector



Prior to 2022, LNG investment accounted for **$74 billion** (41 percent) of capital investments. Olefins (cracker) and other petrochemical based investments accounts for **$107 billion** (59 percent).

GOM Energy Manufacturing Investment Announcements

Year	Texas					Louisiana					Other GOM					Total GOM				
	LNG	Non-LNG	Transition	Other	Total	LNG	Non-LNG	Transition	Other	Total	LNG	Non-LNG	Transition	Other	Total	LNG	Non-LNG	Transition	Other	Total
	(million $)																			
2022	5,529	4,699	54	1,762	12,044	20,687	4,916	1,815	225	27,642	33	-	-	-	33	26,249	9,615	1,869	1,987	39,720
2023	5,241	2,376	743	228	8,588	26,171	2,685	3,834	136	32,826	1,321	-	-	101	1,422	32,734	5,061	4,576	466	42,837
2024	7,142	4,335	2,720	-	14,197	19,155	2,227	5,507	117	27,005	4,038	-	-	149	4,187	30,335	6,562	8,226	265	45,389
2025	3,825	3,491	1,930	-	9,246	11,836	894	5,251	15	17,996	2,394	-	-	-	2,394	18,055	4,385	7,181	15	29,636
2026	336	1,005	424	-	1,765	5,963	745	4,180	-	10,889	213	-	-	-	213	6,513	1,750	4,604	-	12,867
2027	-	68	44	-	112	1,716	88	1,995	-	3,800	-	-	-	-	-	1,716	156	2,039	-	3,912
2028	-	-	187	-	187	412	-	336	-	748	-	-	-	-	-	412	-	523	-	936
2029	-	-	45	-	45	29	-	15	-	44	-	-	-	-	-	29	-	60	-	89
2030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	**$ 22,073**	**$ 15,974**	**$ 6,146**	**$ 1,990**	**$ 46,184**	**$ 85,970**	**$ 11,556**	**$ 22,934**	**$ 493**	**$ 120,951**	**$ 8,000**	**$ -**	**$ -**	**$ 250**	**$ 8,250**	**$ 116,043**	**$ 27,530**	**$ 29,080**	**$ 2,733**	**$ 175,385**

- **$175 billion** in new energy manufacturing activity from 2022-2030.
- Approximately **$29 billion in energy transition investments**, that include innovate plans and processes to avoid GHG emissions, including carbon capture and storage (CCS), “green” hydrogen, “green” ammonia, and various “blue” hydrogen/ammonia processes.
- Note that utility scale renewable energy generation is not included.

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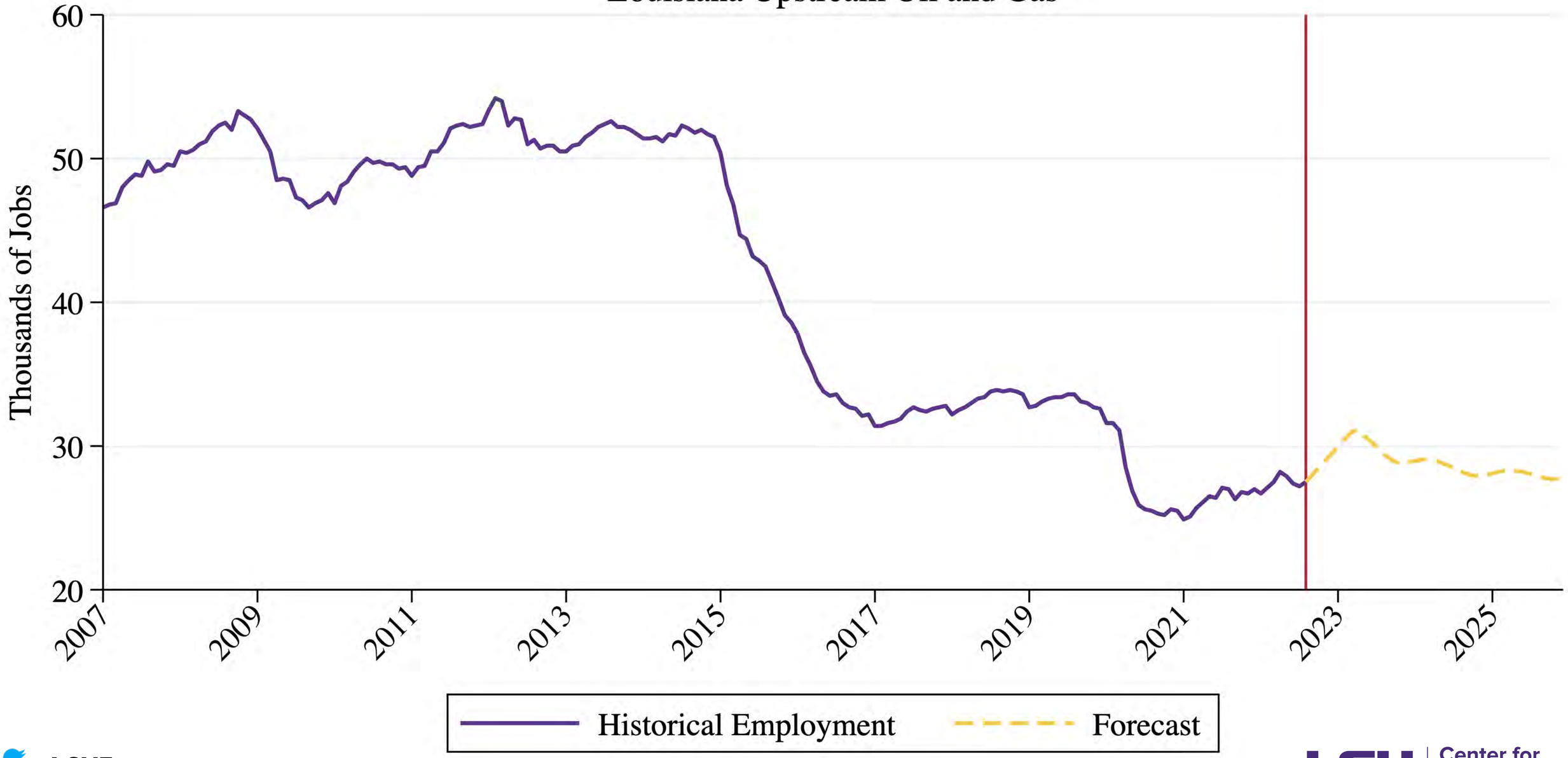
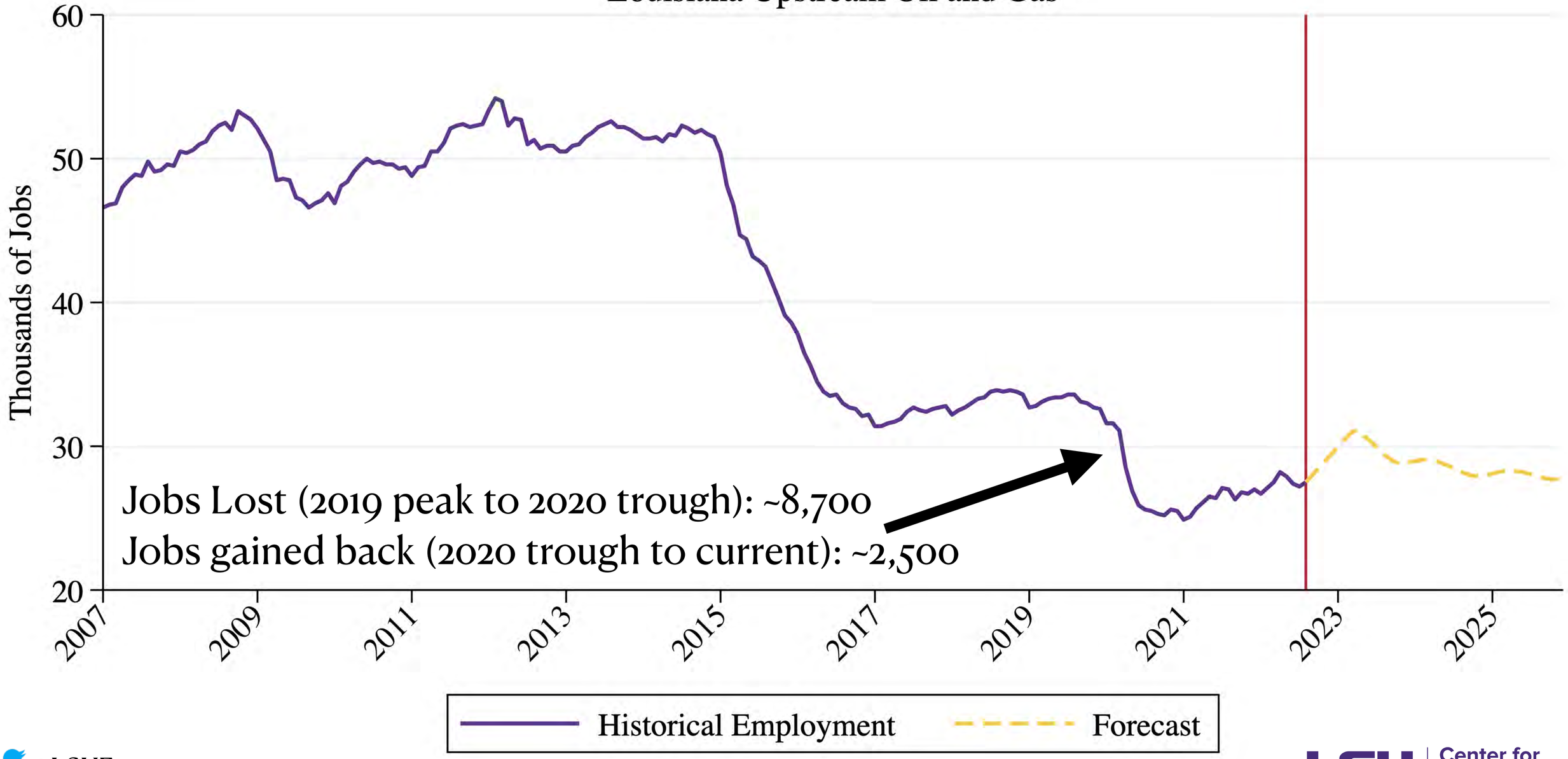
Employment Forecast

Louisiana Upstream Oil and Gas



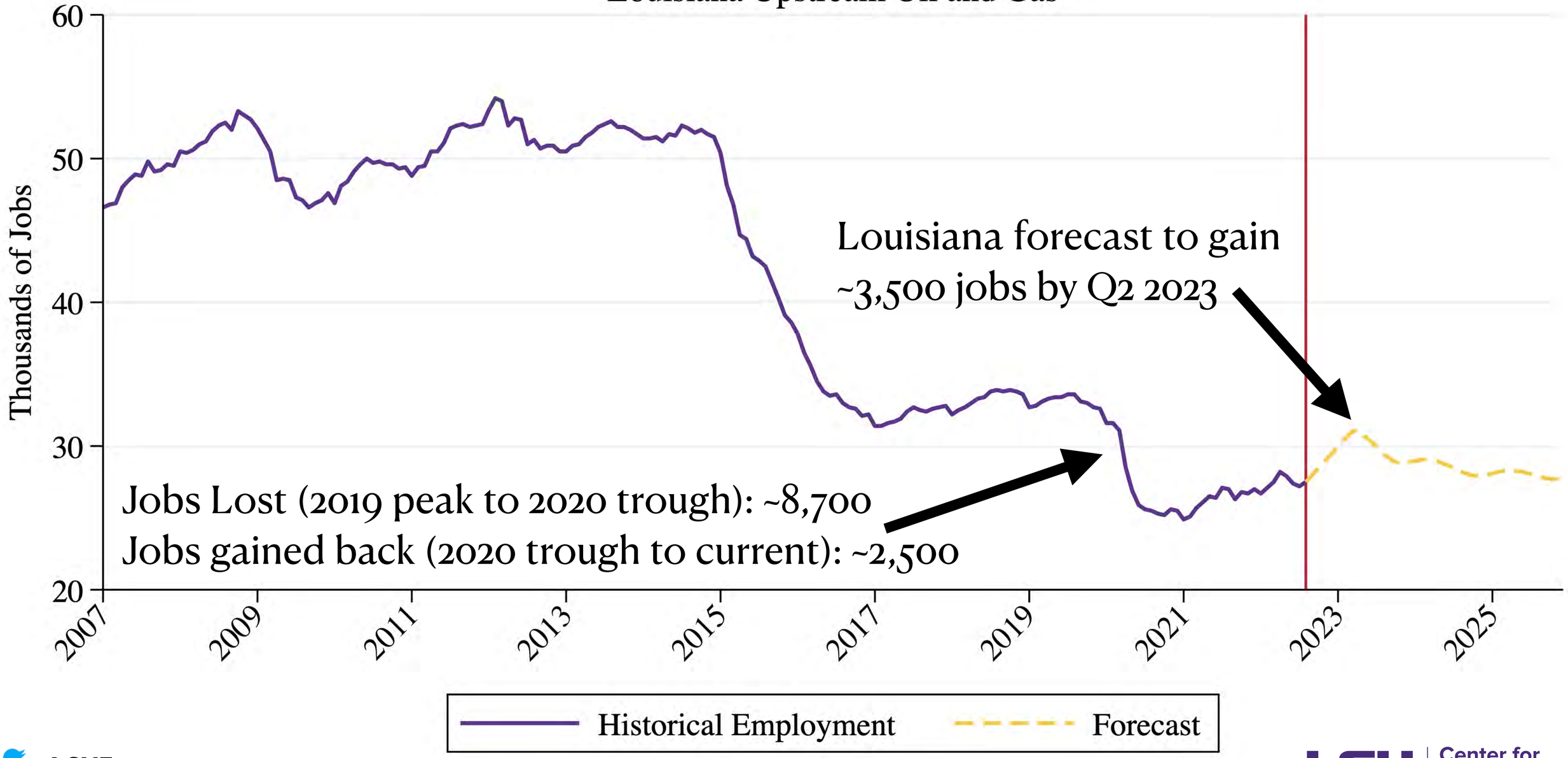
Employment Forecast

Louisiana Upstream Oil and Gas

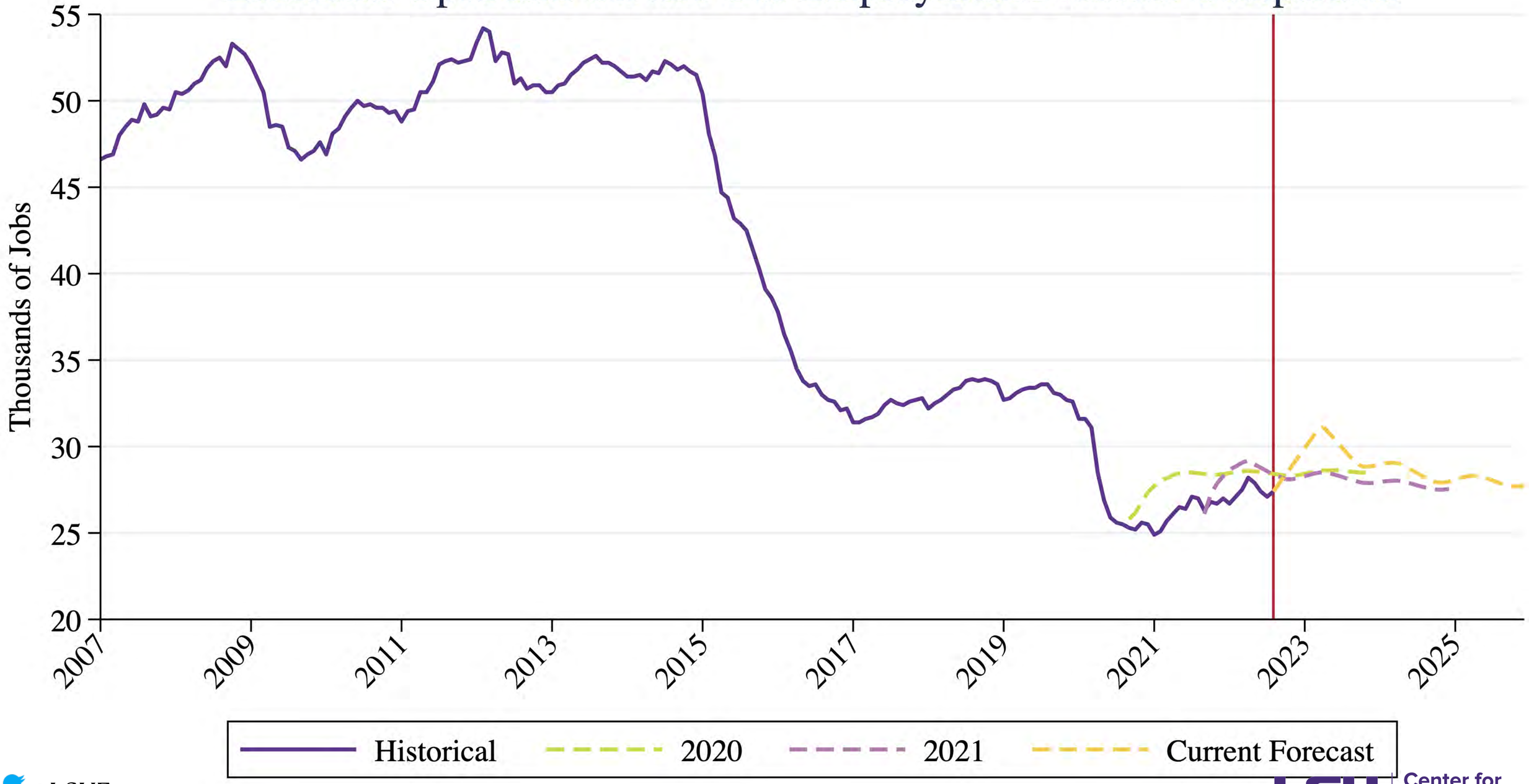


Employment Forecast

Louisiana Upstream Oil and Gas

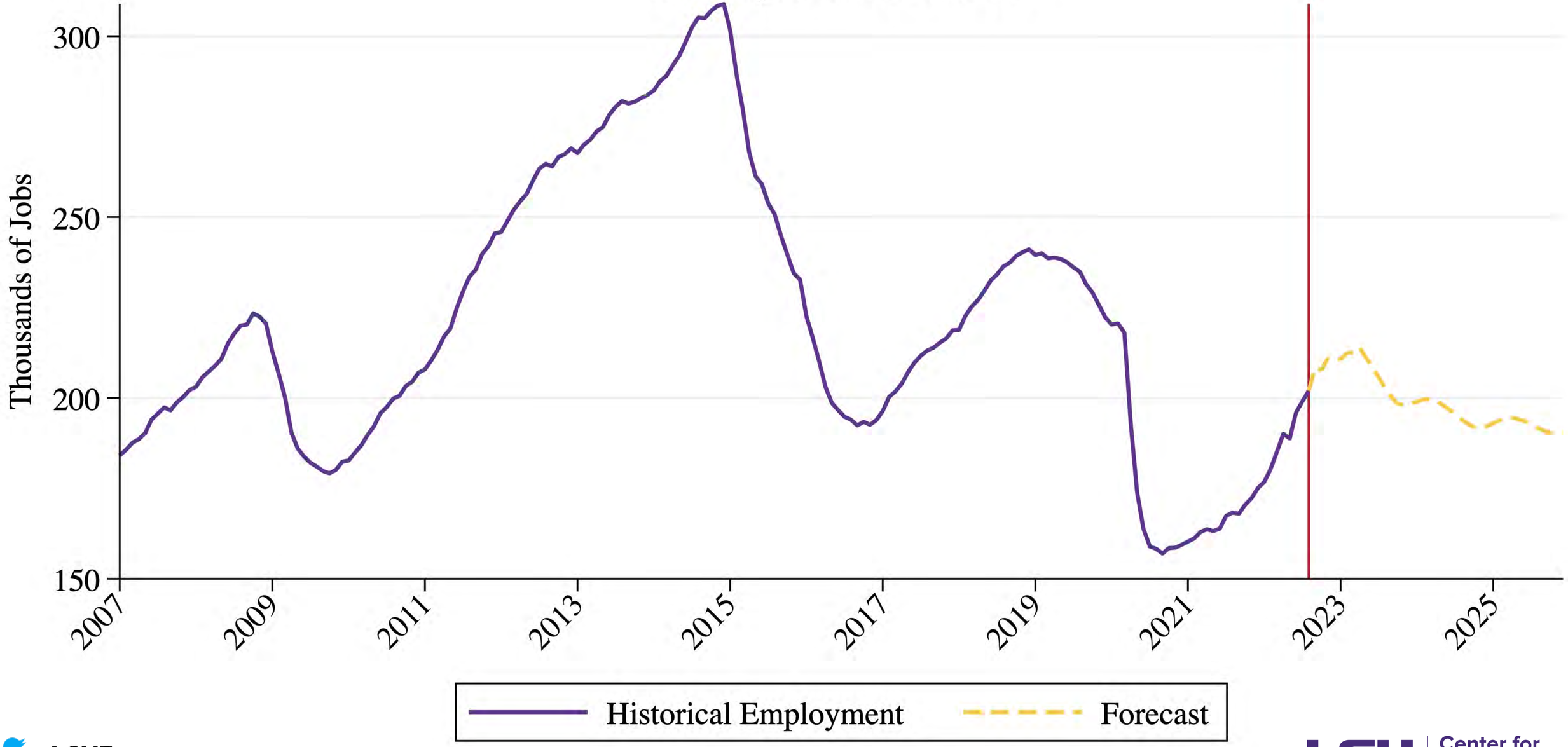


Louisiana Upstream Oil and Gas Employment Forecast Comparison



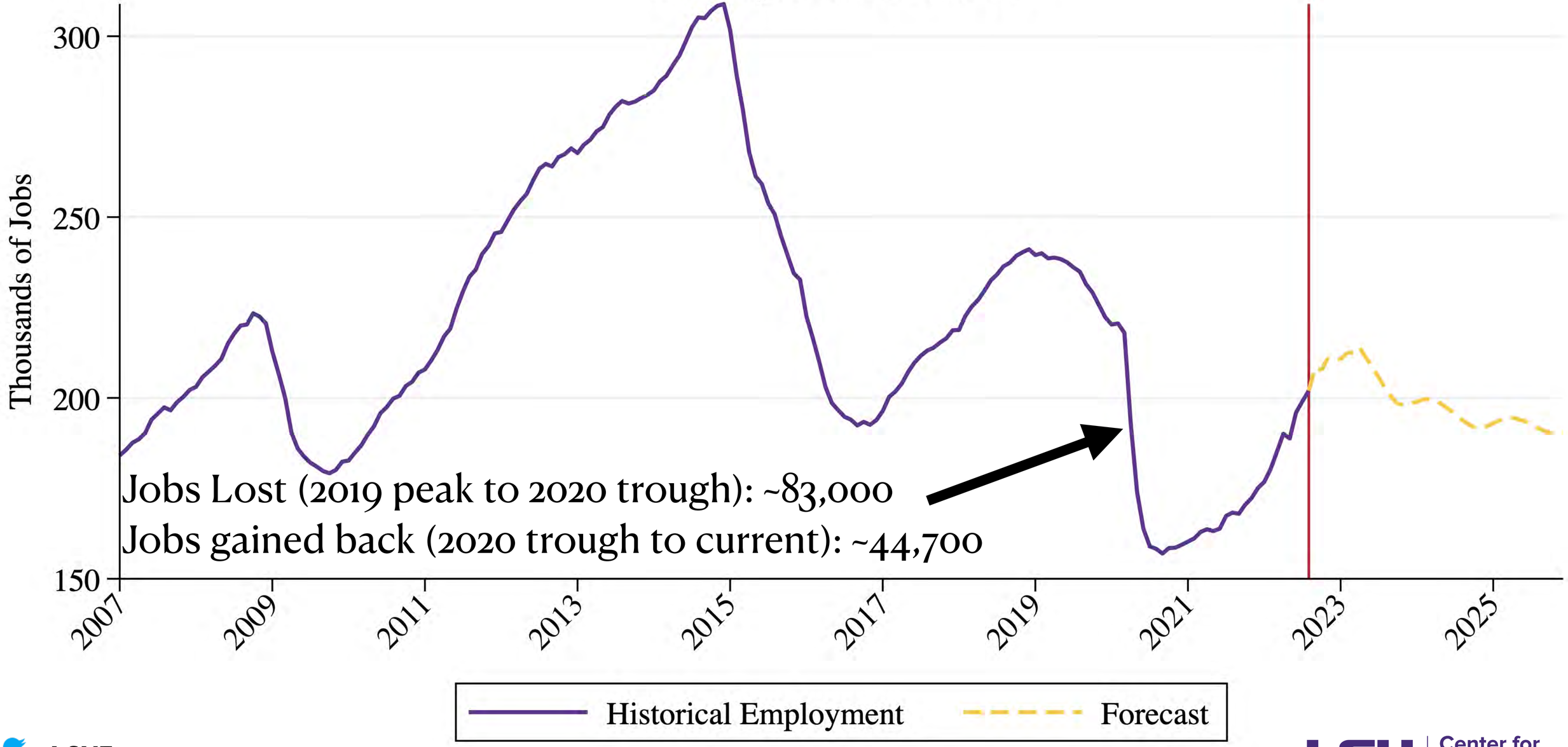
Employment Forecast

Texas Upstream Oil and Gas



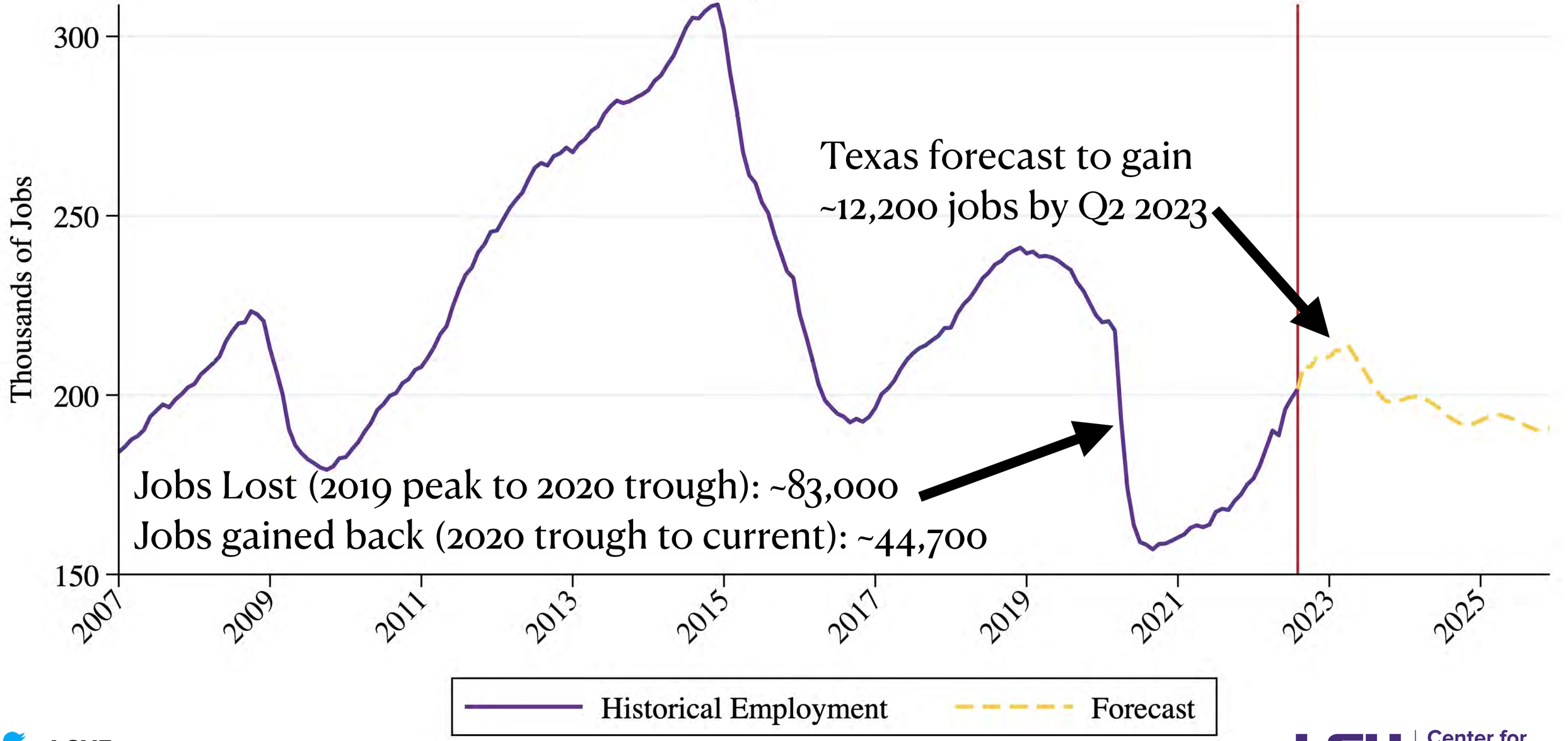
Employment Forecast

Texas Upstream Oil and Gas



Employment Forecast

Texas Upstream Oil and Gas



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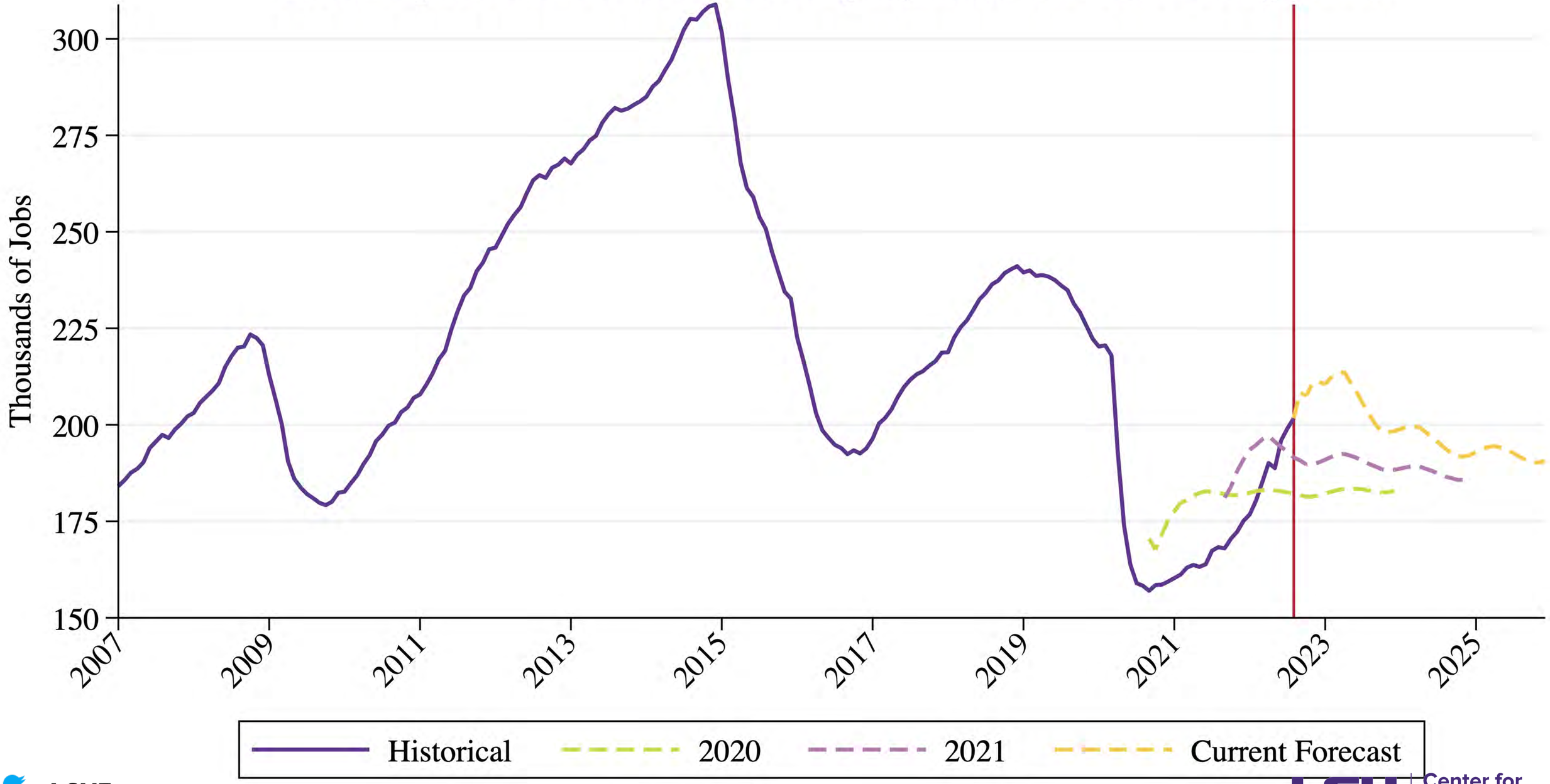
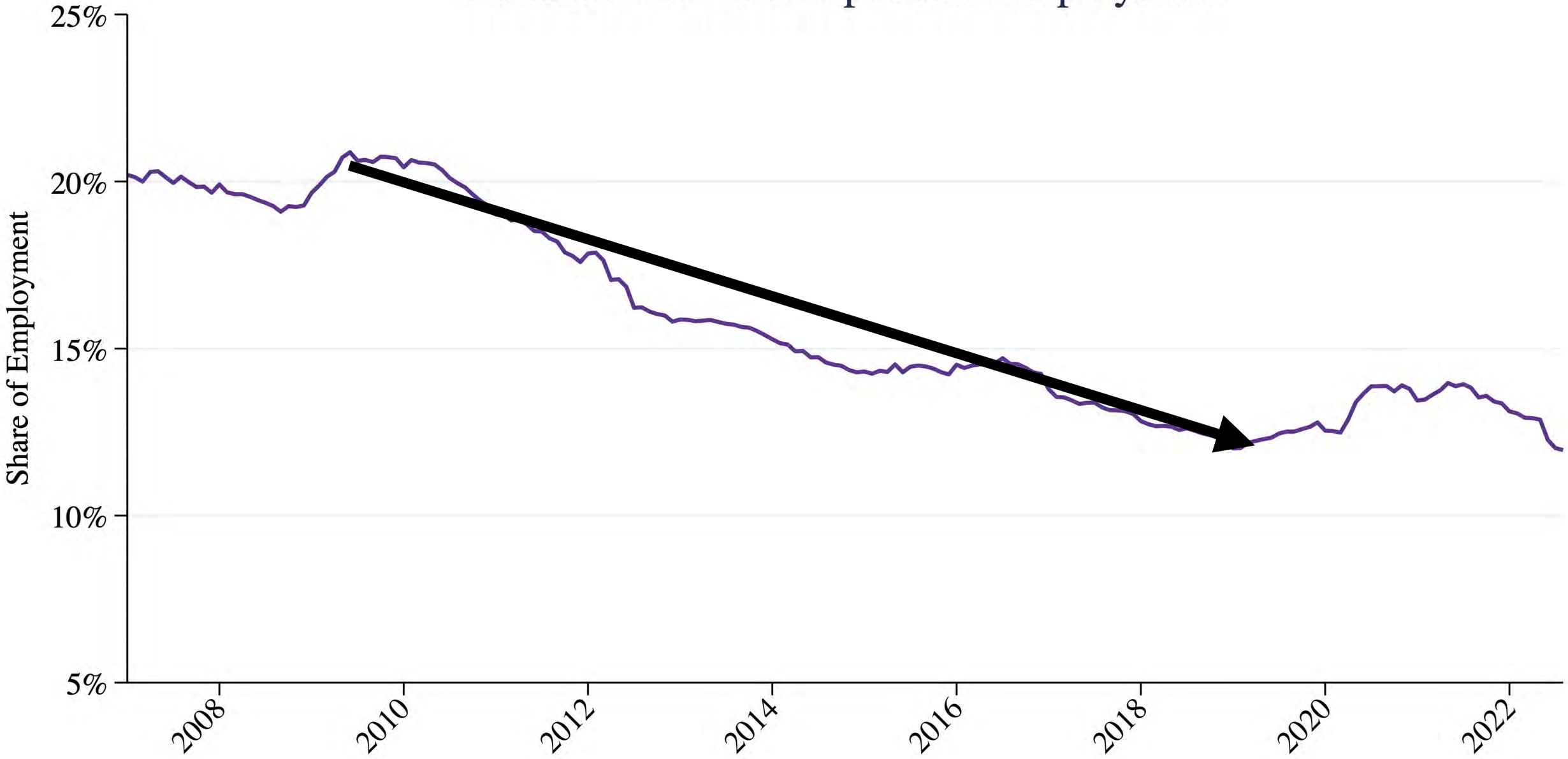
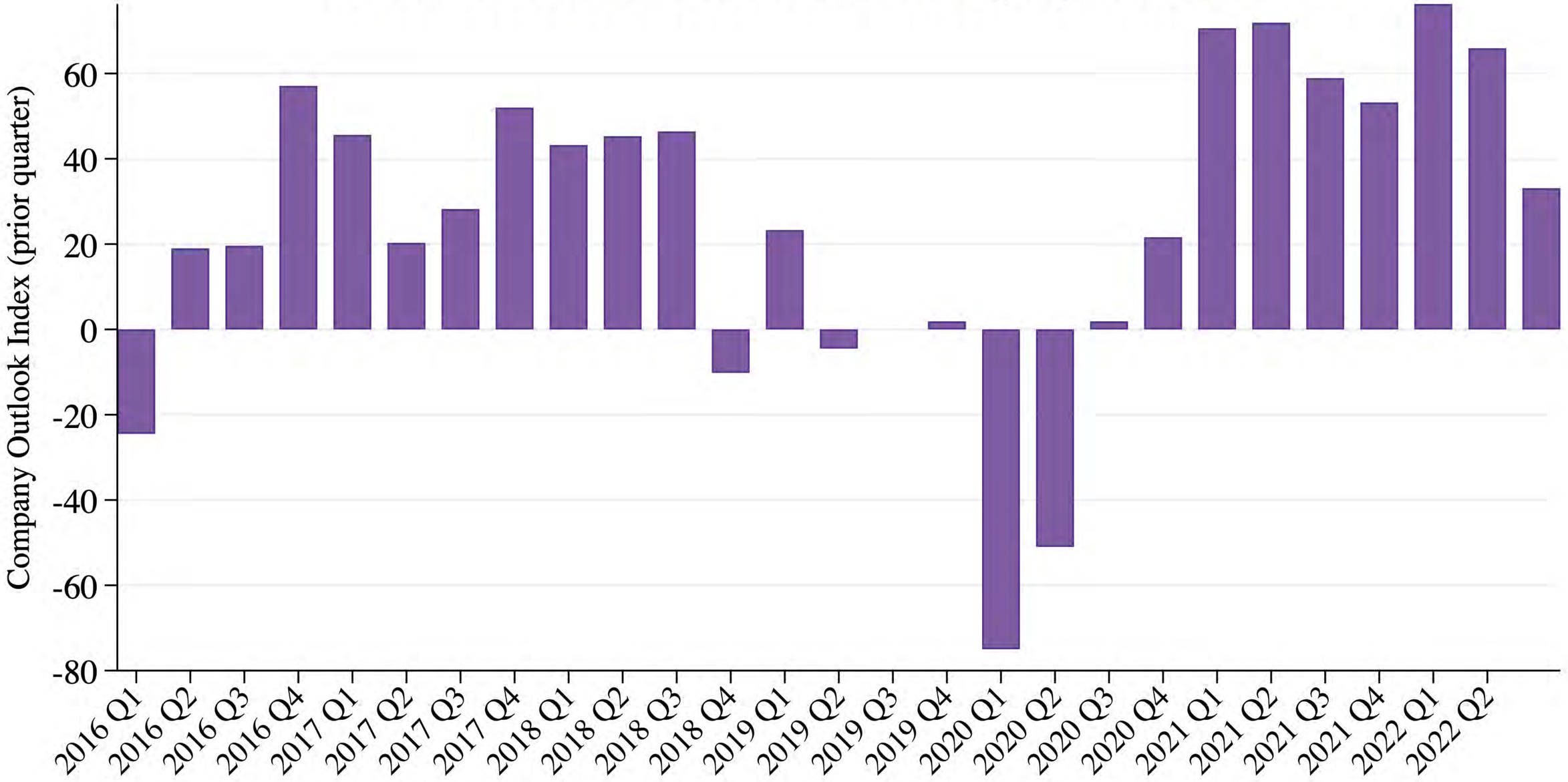


Louisiana Share of Upstream Employment



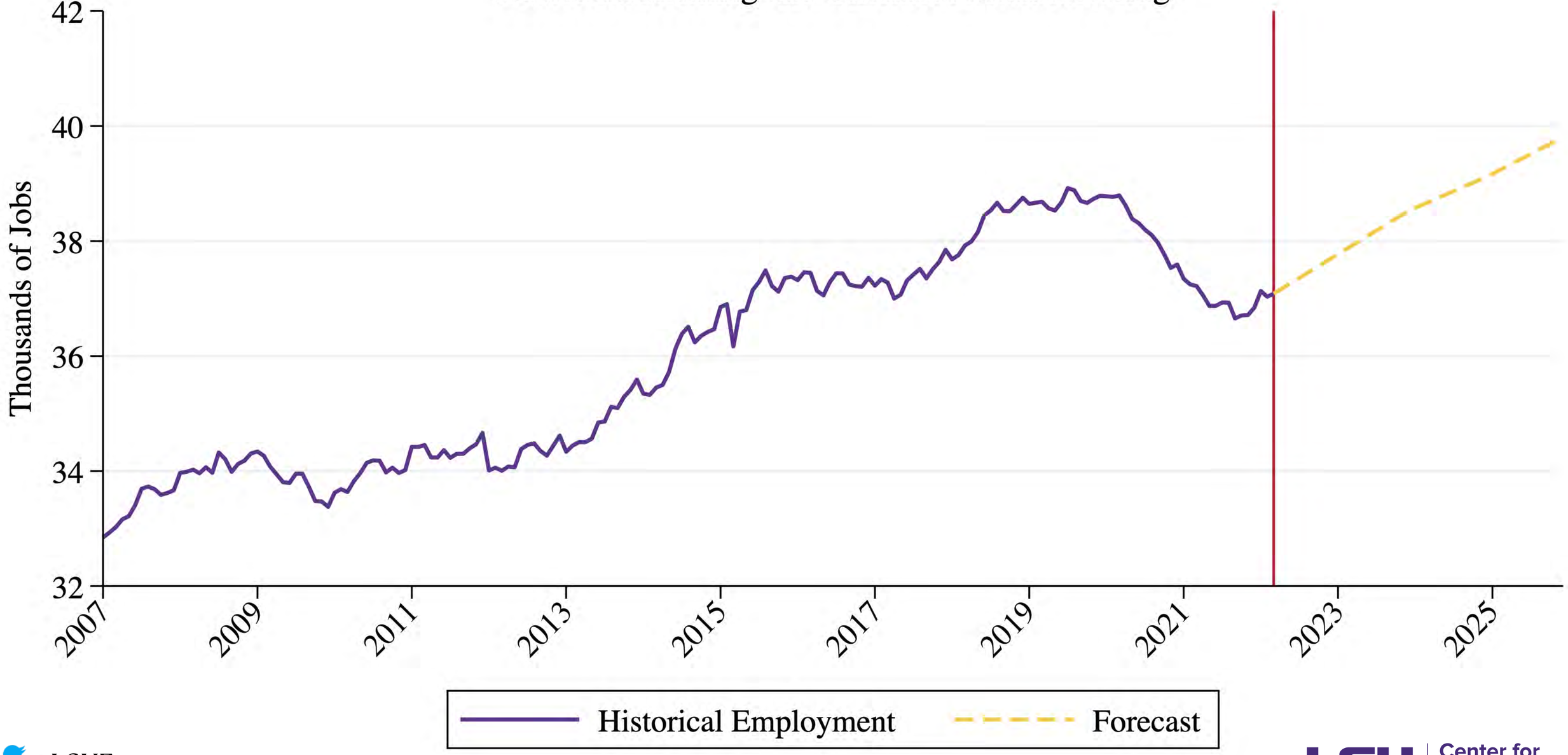
Source: Bureau of Labor Statistics. Current Employment Statistics (CES). Retrieved from FRED.

Dallas Federal Reserve Survey - Company Outlook Index



Employment Forecast

Louisiana Refining and Chemical Manufacturing



Employment Forecast

Louisiana Refining and Chemical Manufacturing

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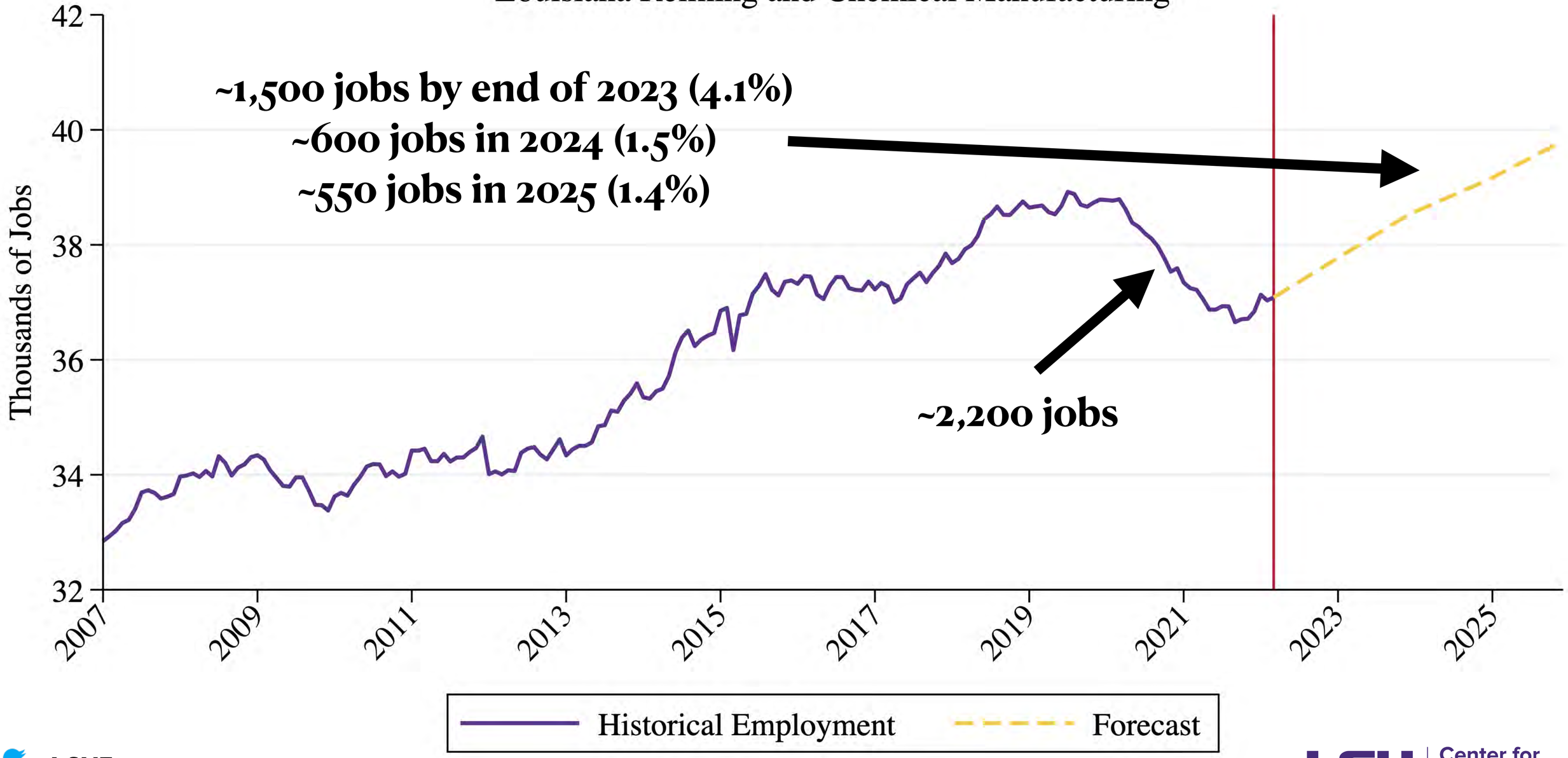
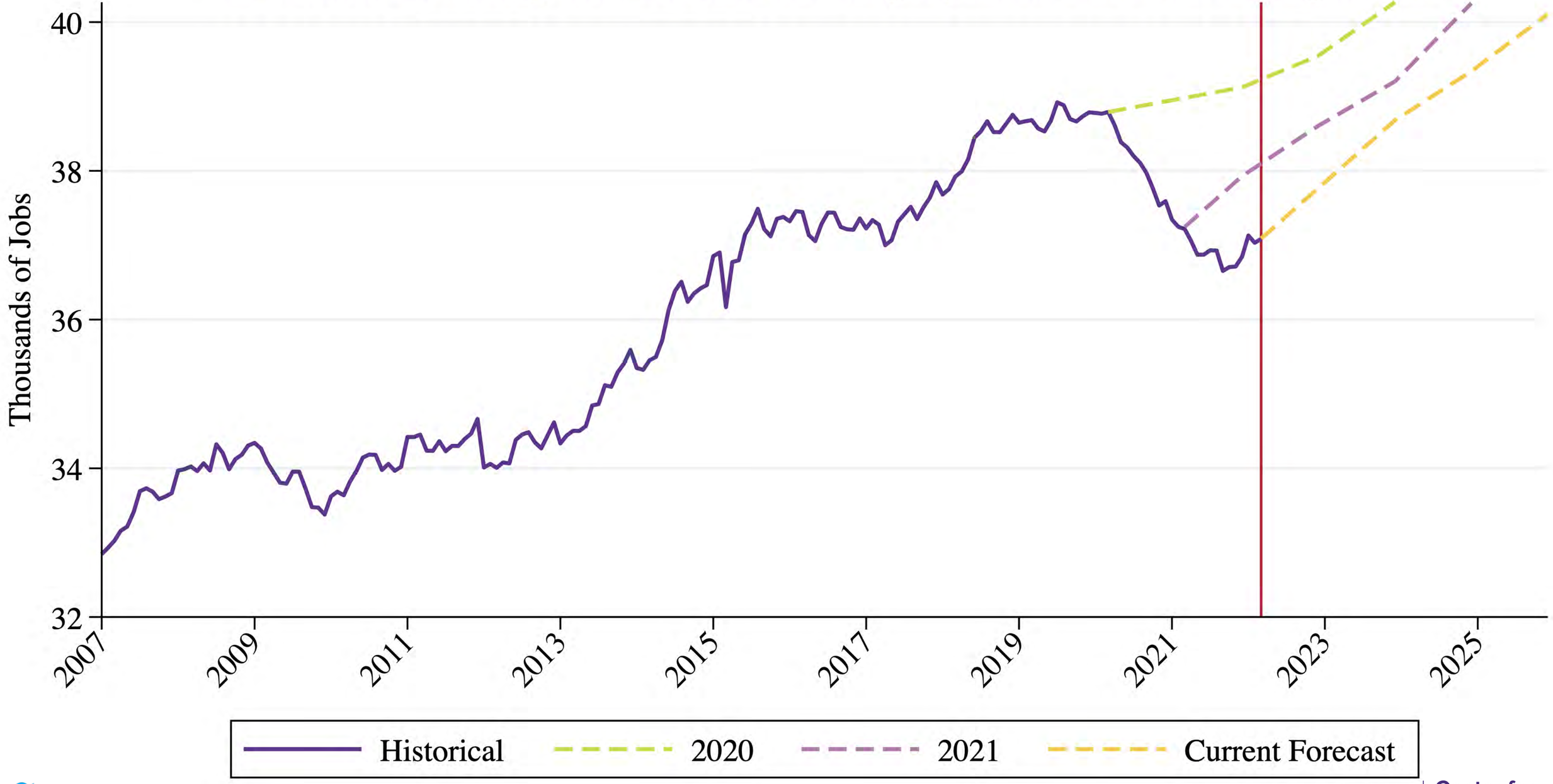
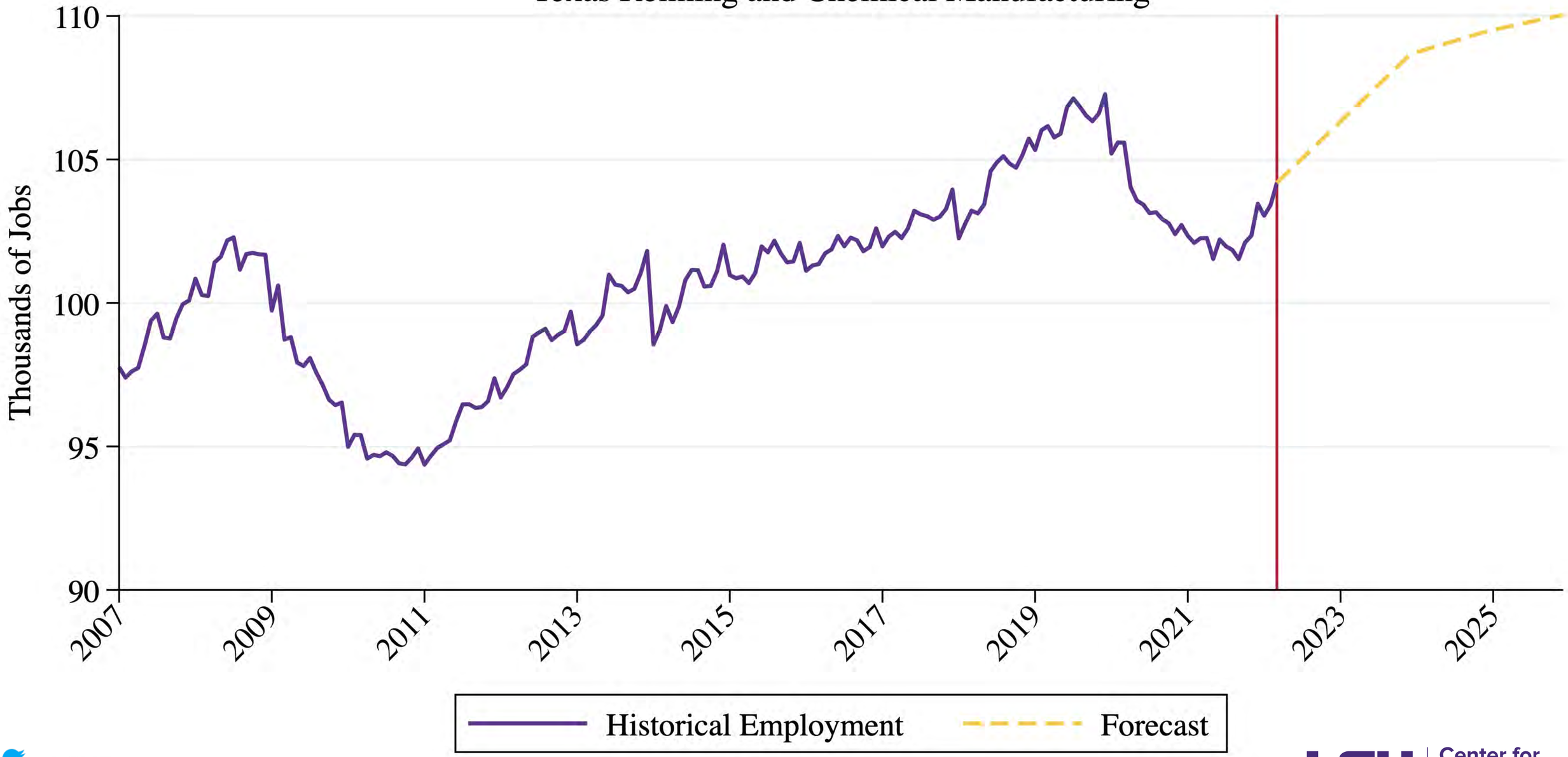


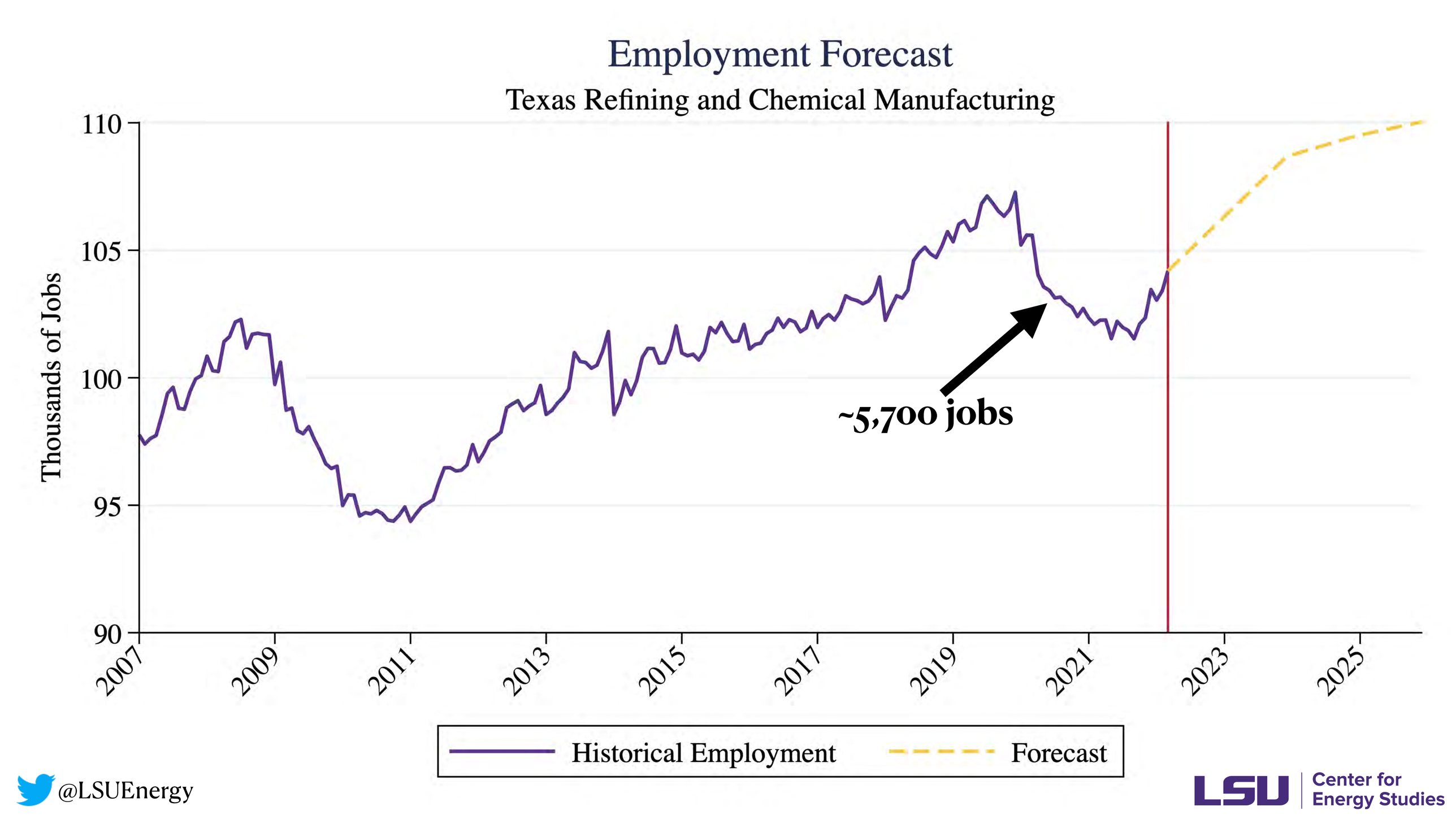
Louisiana Refining and Chemicals Employment Forecast Comparison



Employment Forecast

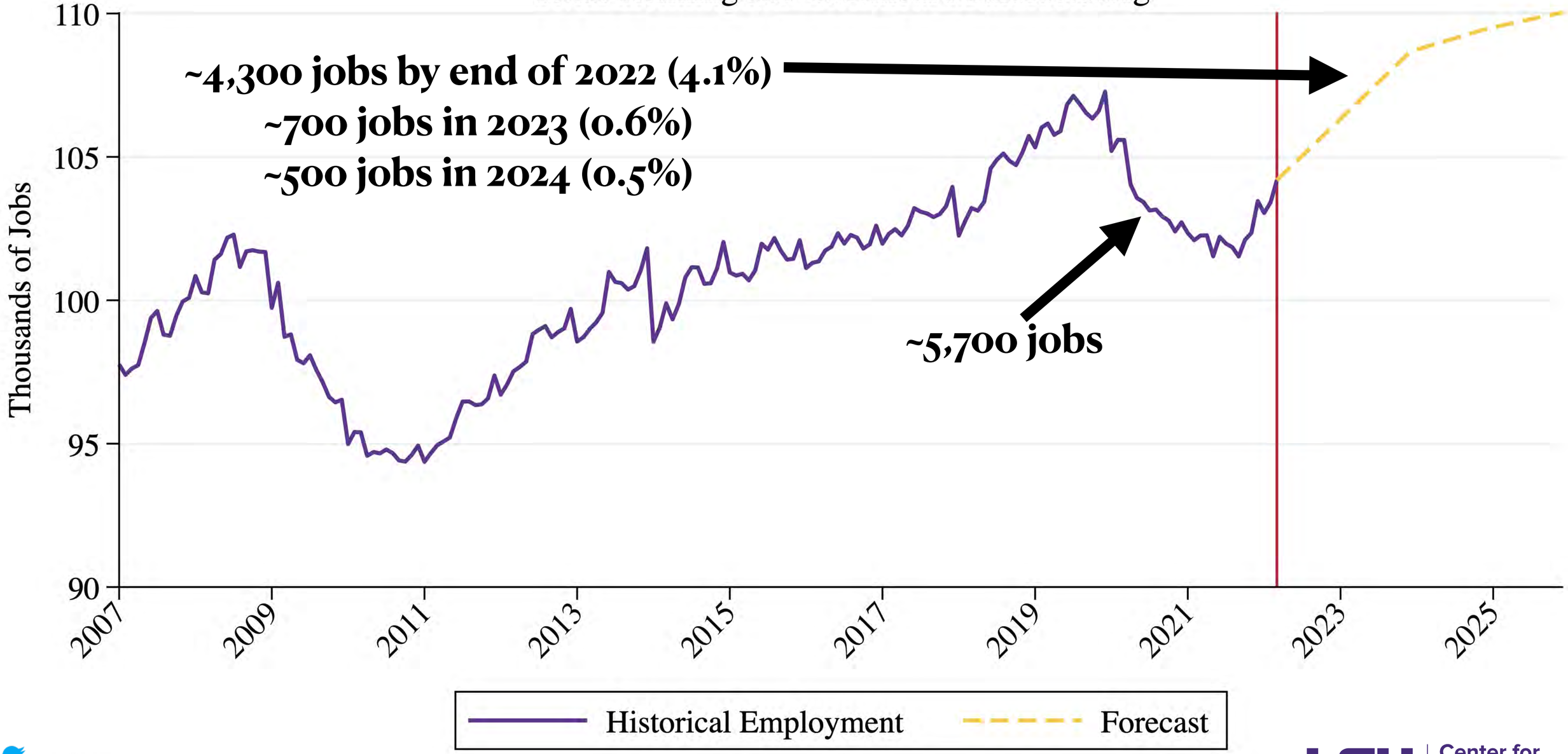
Texas Refining and Chemical Manufacturing



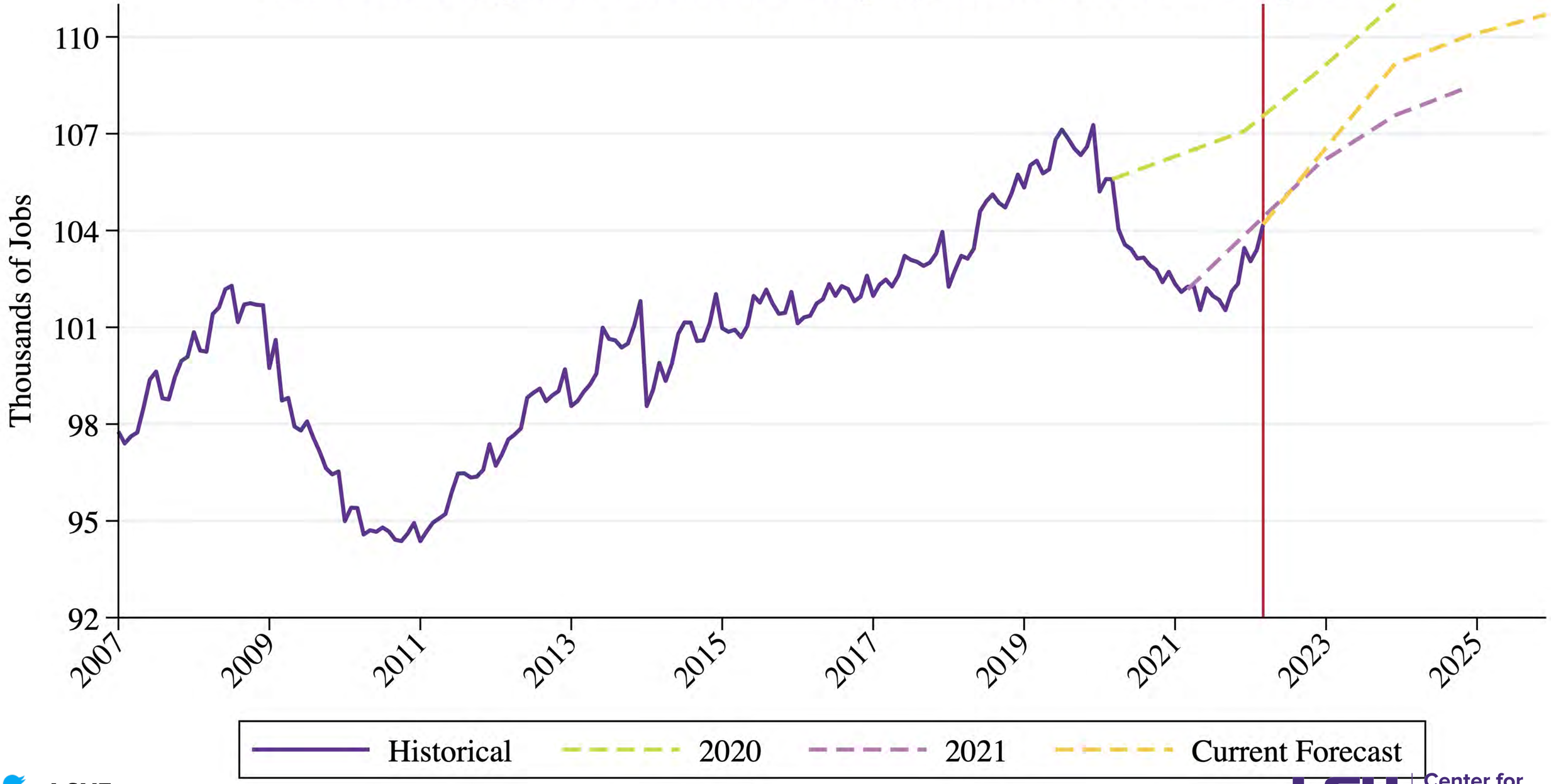

Employment Forecast
Texas Refining and Chemical Manufacturing
Thousands of Jobs
110
105
100
95
90
2007
2009
2011
2013
2015
2017
2019
2021
2023
2025
~5,700 jobs
Historical Employment
Forecast

Employment Forecast

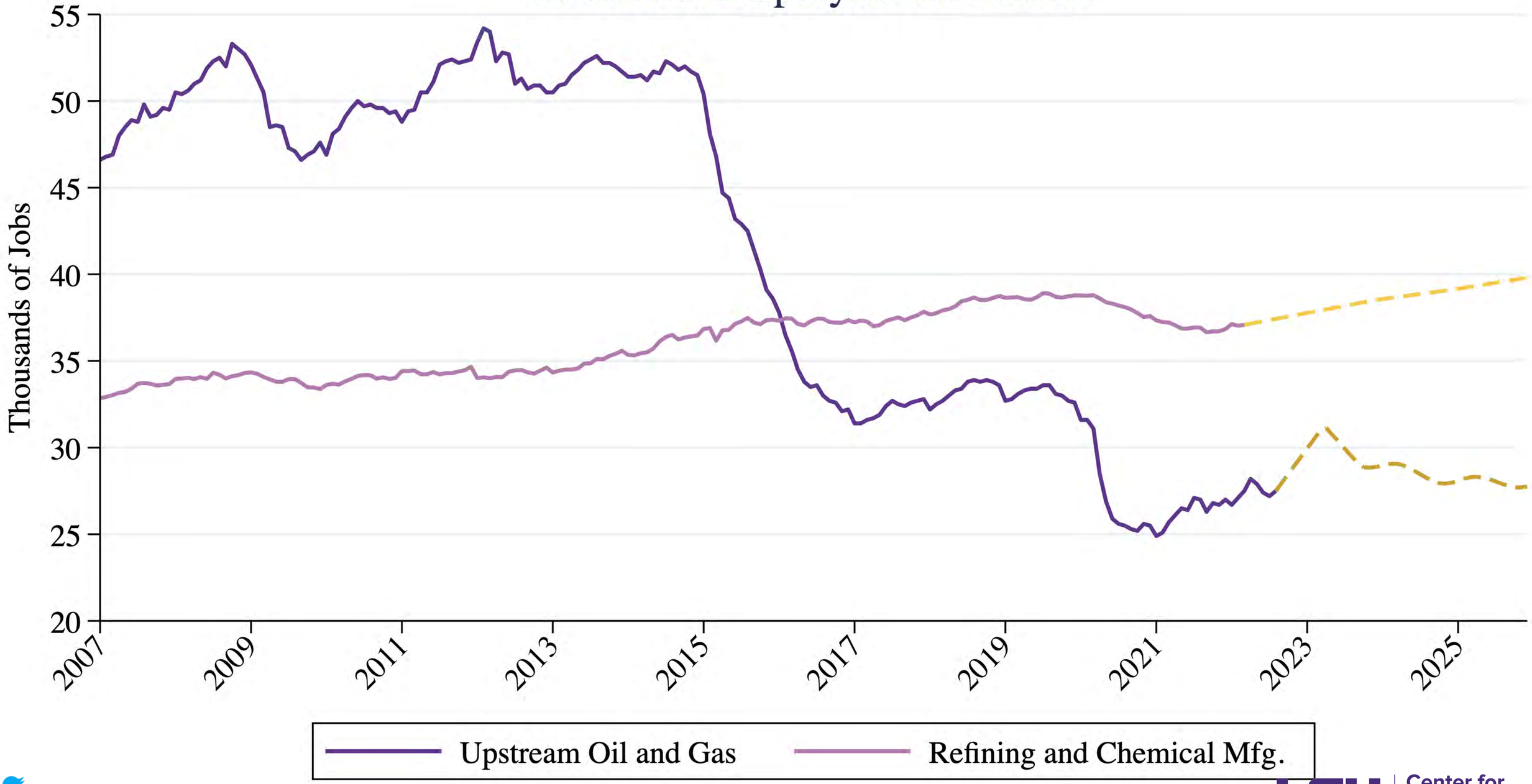
Texas Refining and Chemical Manufacturing



Texas Refining and Chemicals Employment Forecast Comparison



Louisiana Employment Forecast



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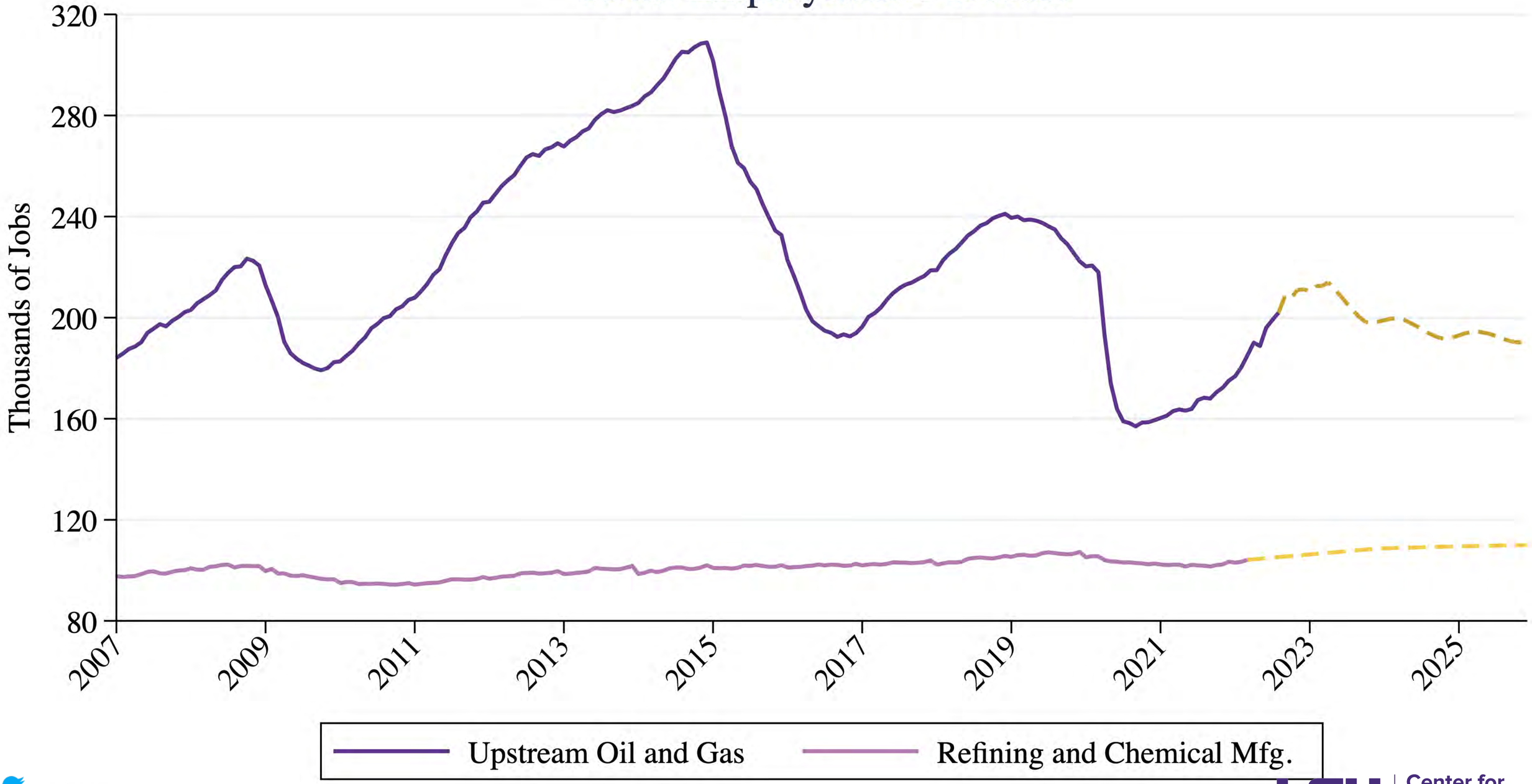

Broader Economic Implications

Industry	Multiplier
Upstream Oil and Gas	
Oil and Gas Extraction	2.3
Support Activities for Mining	3.1
Oil and Gas Manufacuring	
Petroleum and Coal Products Manufacturing	4.4
Chemical Manufacturing	4.8

Source: RIMS II Multipliers

Note: Multipliers represent the total change in number of jobs in all industries for each additional job in the industry corresponding to the entry

Energy Employment in Context

	Total Employment		Upstream		Refining and Chemicals	
	Louisiana	Texas	Louisiana	Texas	Louisiana	Texas
Peak Employment (2019)	1,998	12,921	33,600	240,000	38,900	107,200
Trough Employment (2020-21)	1,710	11,519	24,900	157,000	36,700	101,500
Most Recent Estimate	1,931	13,530	27,400	201,700	37,100	104,200
Job Losses (Peak to Trough)	288	1,402	8,700	83,000	2,200	5,700
Percent Jobs Lost	*14%*	*11%*	*26%*	*35%*	*6%*	*5%*
Jobs Gained Back	221	2,011	2,500	44,700	400	2,700
Percent Jobs Regained	*77%*	*143%*	*29%*	*54%*	*18%*	*47%*

Source: U.S. Bureau of Labor Statistics. Current Employment Statistics (CES) and Authors' calculations. Total state employment listed in thousands of jobs. Refining and chemicals employment as of March 2022. All others as of August 2022.

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Conclusions

- Overall: Energy economy continues to recover, emphasis rapidly shifting to transition investments and activities.
- Production: GOM production expected to grow to close 11.7 MMBbl/d by 2032 representing strong recovery exceeding pre-pandemic trends. Natural gas production very strong in order to support LNG opportunities (GOM: 68 Bcf/d by 2032).
- Prices: while prices are up on a relative basis, futures markets are predicting mean-reversion into 2025 and beyond. Crude oil prices influenced by global economic growth; natural gas prices included by weather and (increasingly) LNG demand in Asia. Longer term averages around $57/Bb; and $3.50/Mcf (much like last year).
- Refineries: considerable uncertainty, however, no new closures—European crisis creating strong demand for diesel and distillates – this will like continue near term.
- Exports: growth will be driven by Asian which is expected to grow over the next decade, but at a slower clop than the past decade. Political risk with China trade negotiations, as well as national security issues, still looms. Future Chinese growth and policies are a concern.
- Power: steady-growth opportunities. Slower pace of industrial load growth in Gulf Coast that will be driven by Asian export growth. Likely considerable infrastructure investments in power to support resiliency and the energy transition.
- Capital Expenditures: investment projections are down slightly from last year (down 8 % to $175.4 billion), but this is a transition year as industry re-tools and couples transition investments with traditional productive capacity investments.
- Economy/Policy: One political cycle is over, the next “big” one is beginning. Energy and environmental policies will be as divisive as ever. Industry will spend next two years absorbing and taking advantages of tax credits and incentives created by the Bipartisan Infrastructure Bill and the Inflation Reduction Act — excellent environment for renewables and transition investments, particularly carbon capture.

2023 Gulf Coast Energy Outlook

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