

KSE Conference and Fundraiser

The Ukrainian Independence War - Global Implications European Energy Crisis or Not

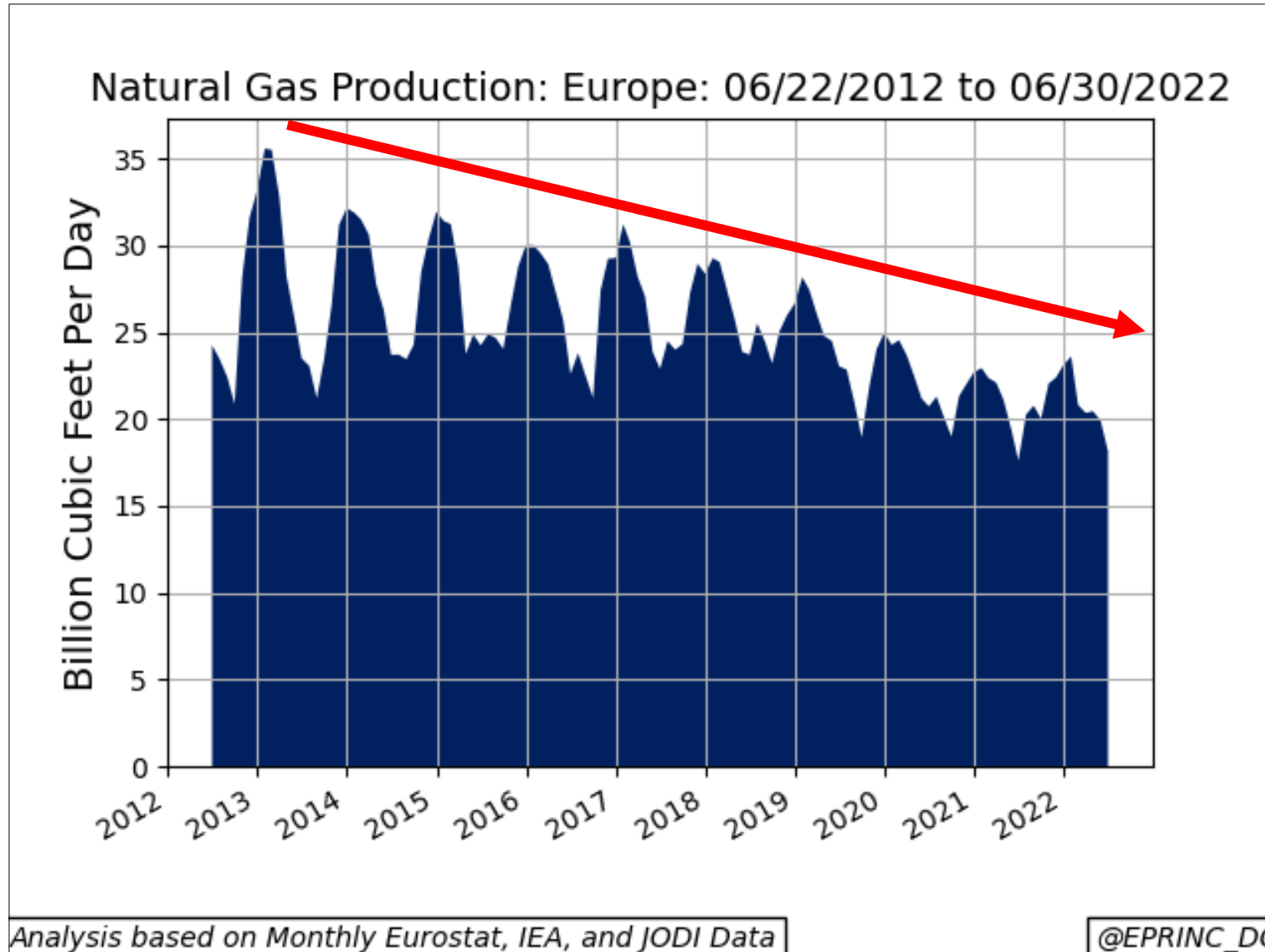
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September 17, 2022
maxp@eprinc.org

The Ukrainian Independence War and the Future of the World European Energy Crisis or Not?

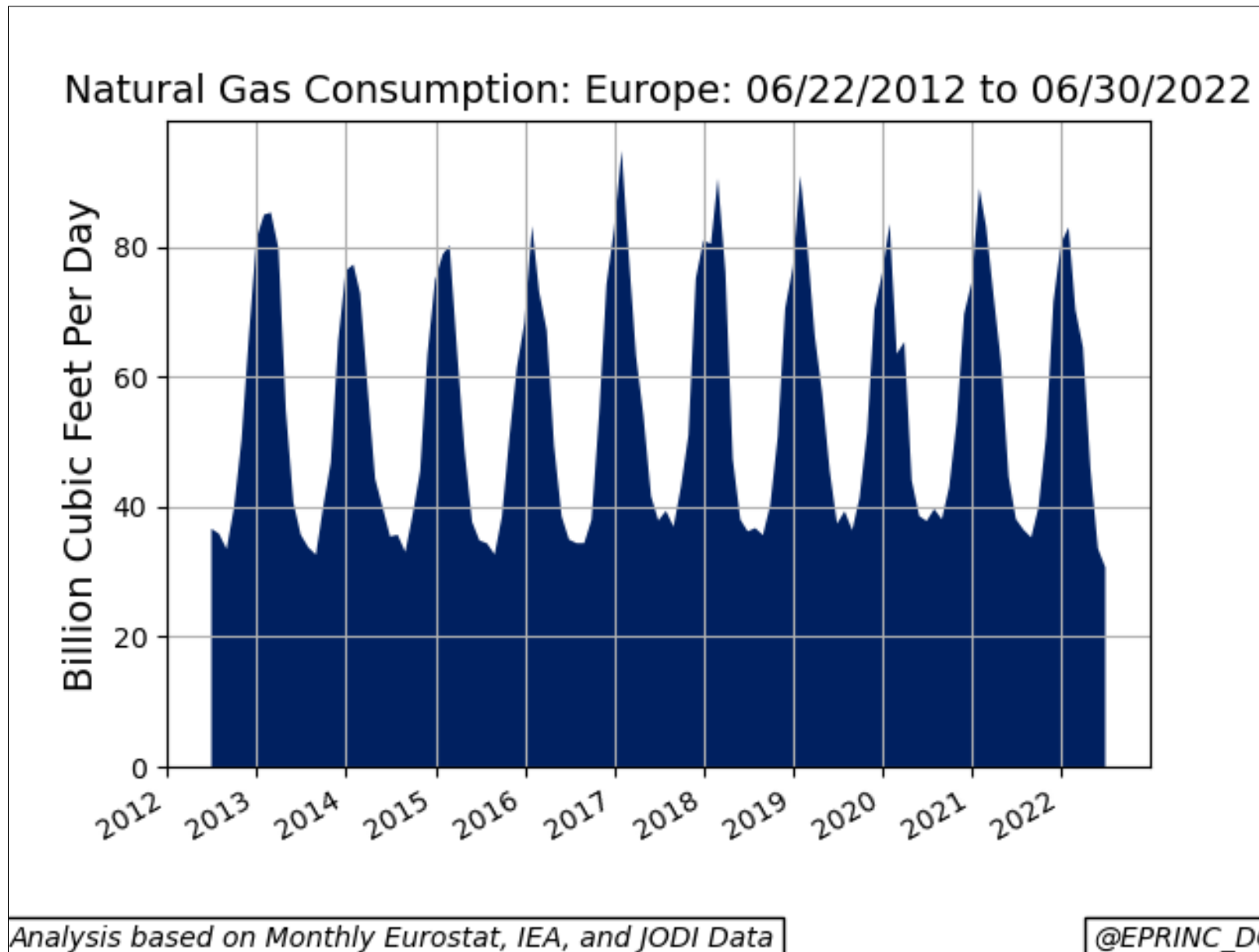
- **How prepared is Europe for winter 2022-2023?**
- **What is the capability of the U.S. to help Europe?**
- **Policy considerations, comments, and conclusions.**

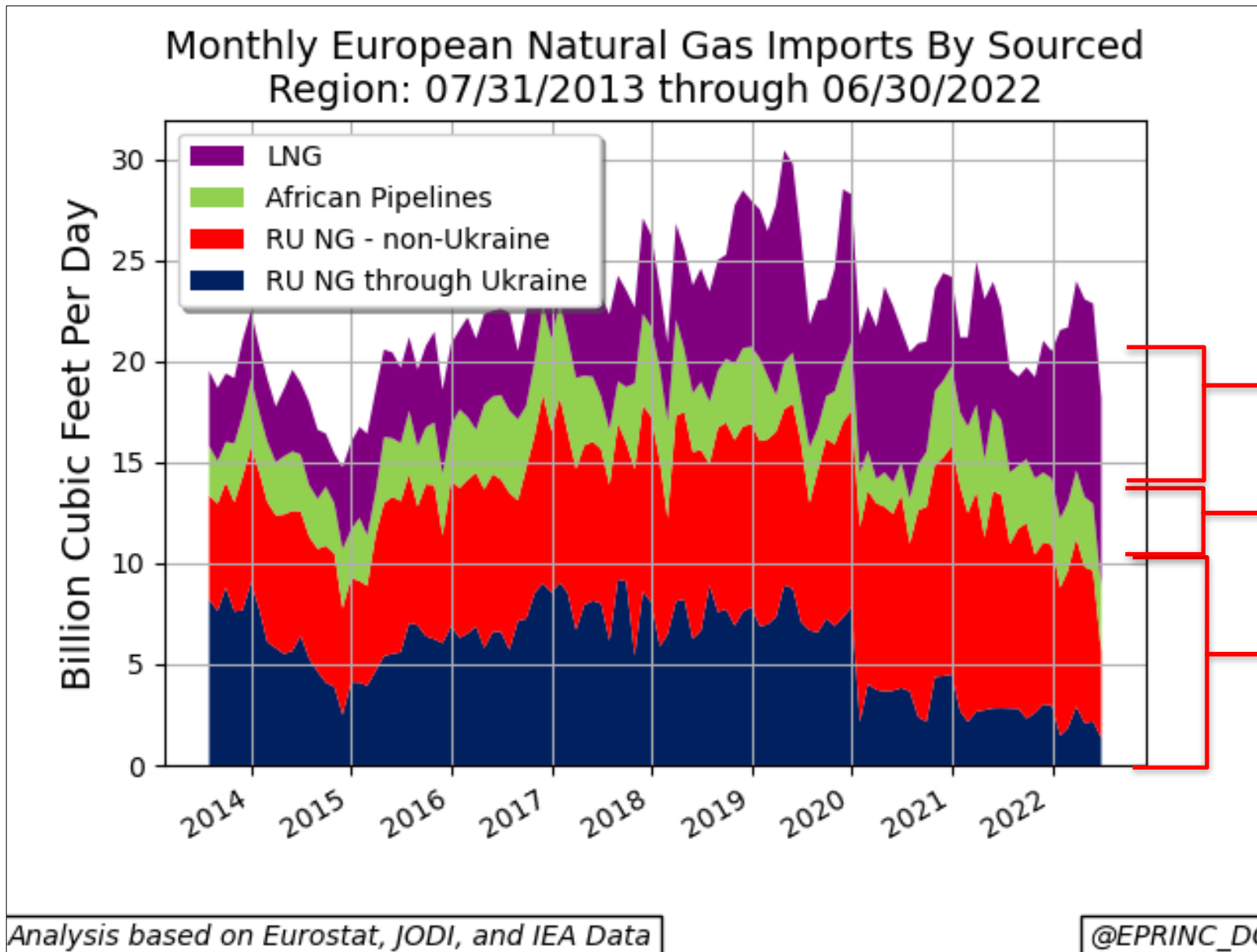
How prepared is Europe for winter 2022-2023?

European Natural Gas Production has been trending lower...



... while Consumption has been steady.



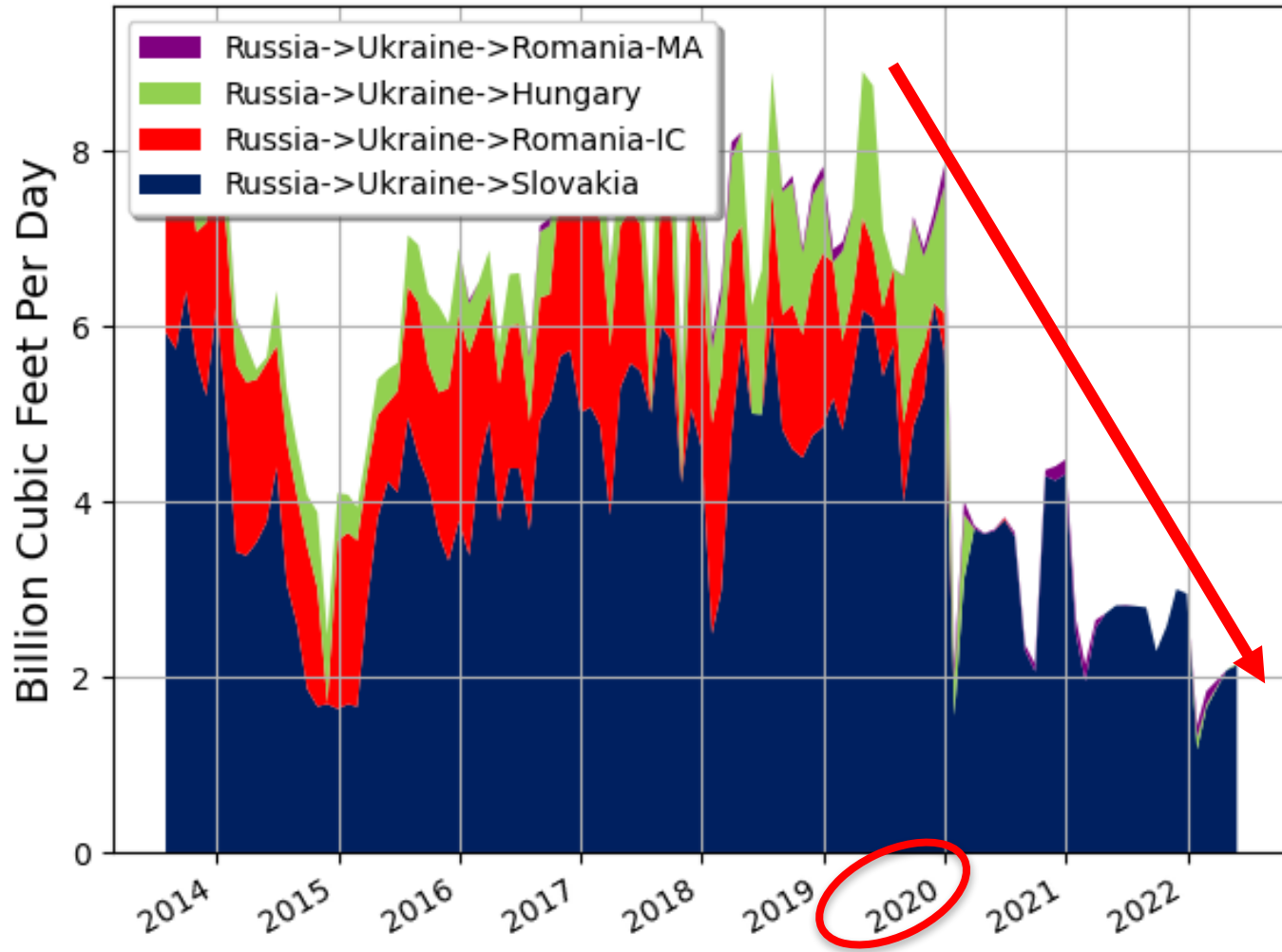


**LNG @
~40% of
European Imports**

**African Pipelines @
~15% of
European Imports**

**Russian Natural
Gas @
~45% of
European Imports**

Monthly European Natural Gas Imports Sourced From Russia Transited Through Ukraine: 07/31/2013 through 06/30/2022



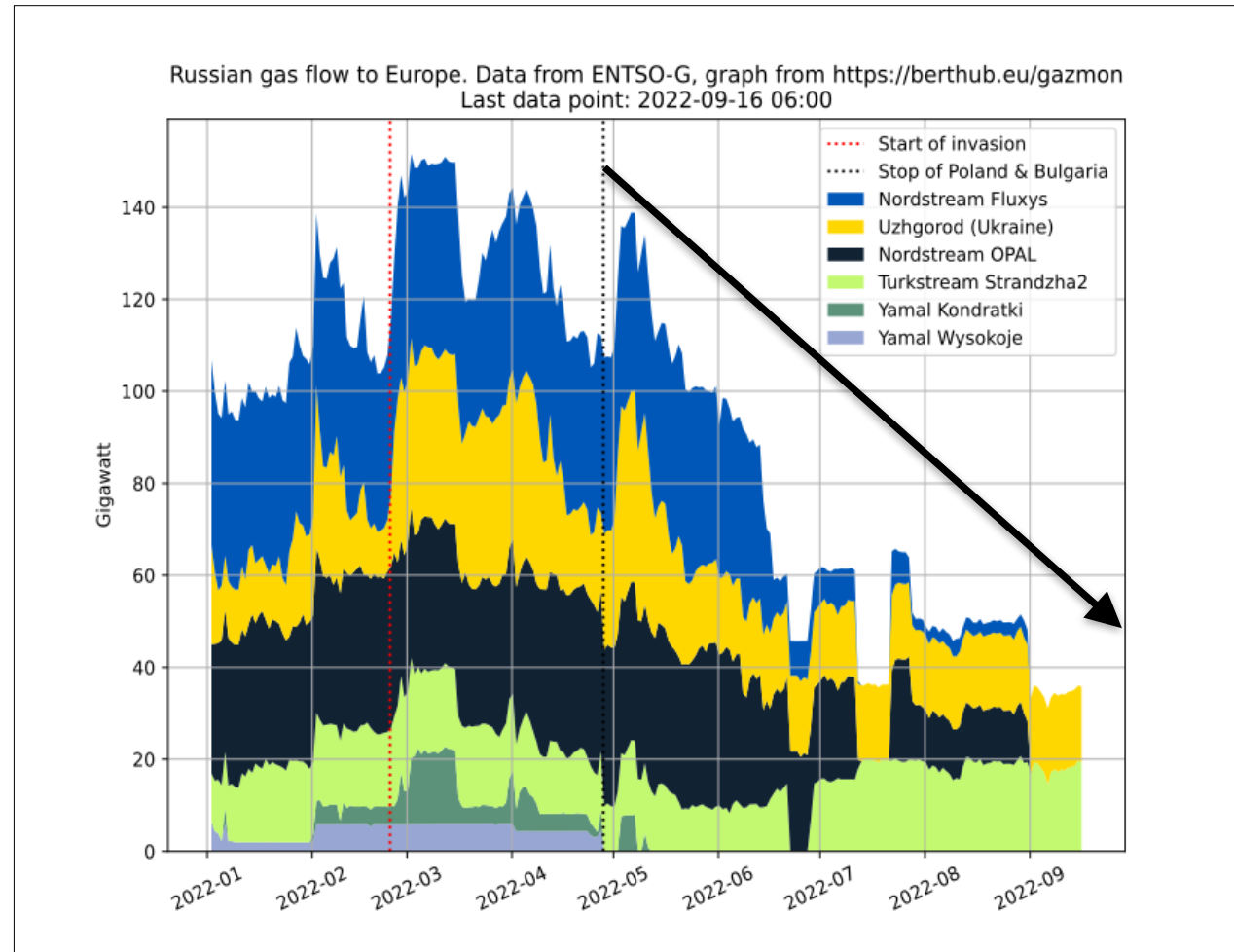
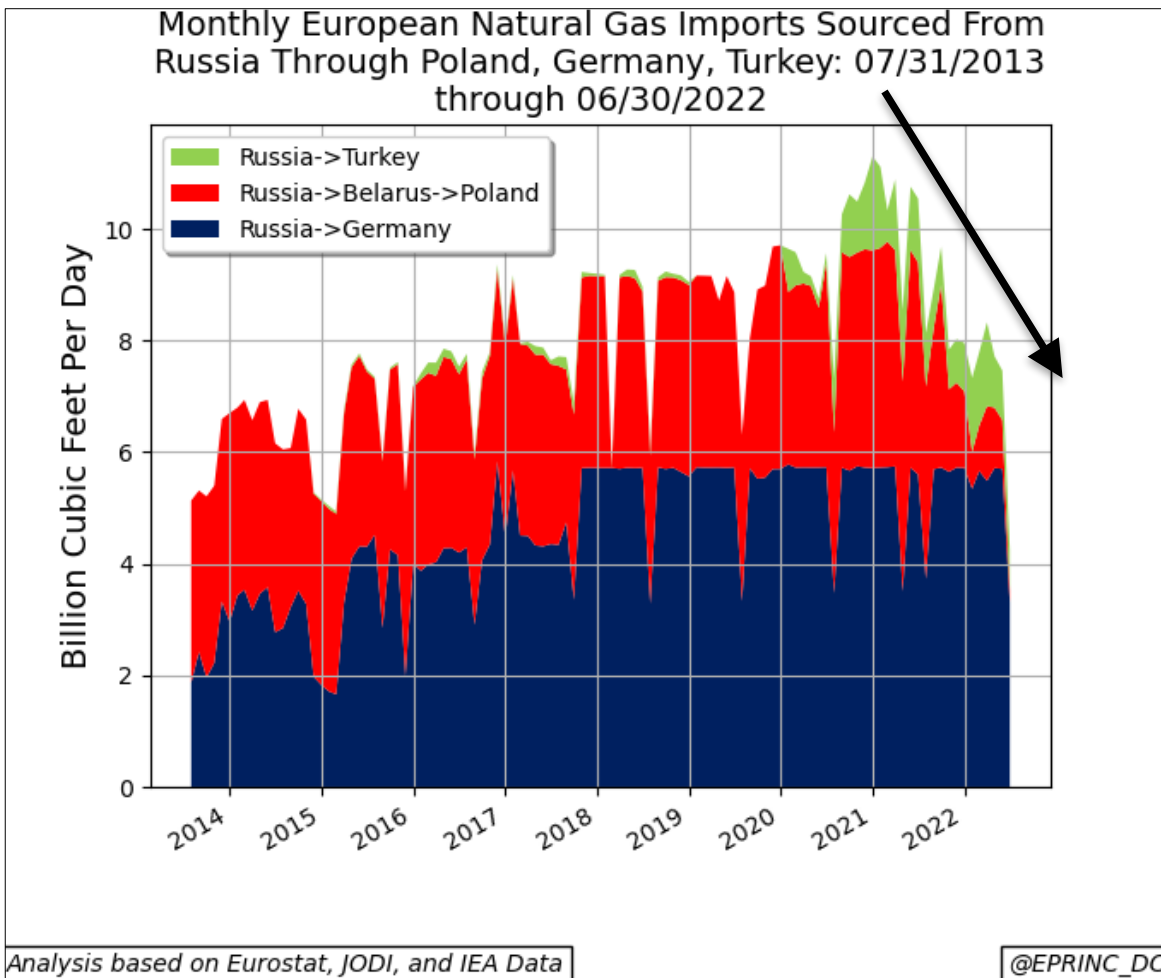
Russian natural gas transit through Ukraine has been declining, especially since the 2020 5-Year renegotiated transit deal between GazProm and NaftoGaz.

Analysis based on Eurostat, JODI, and IEA Data

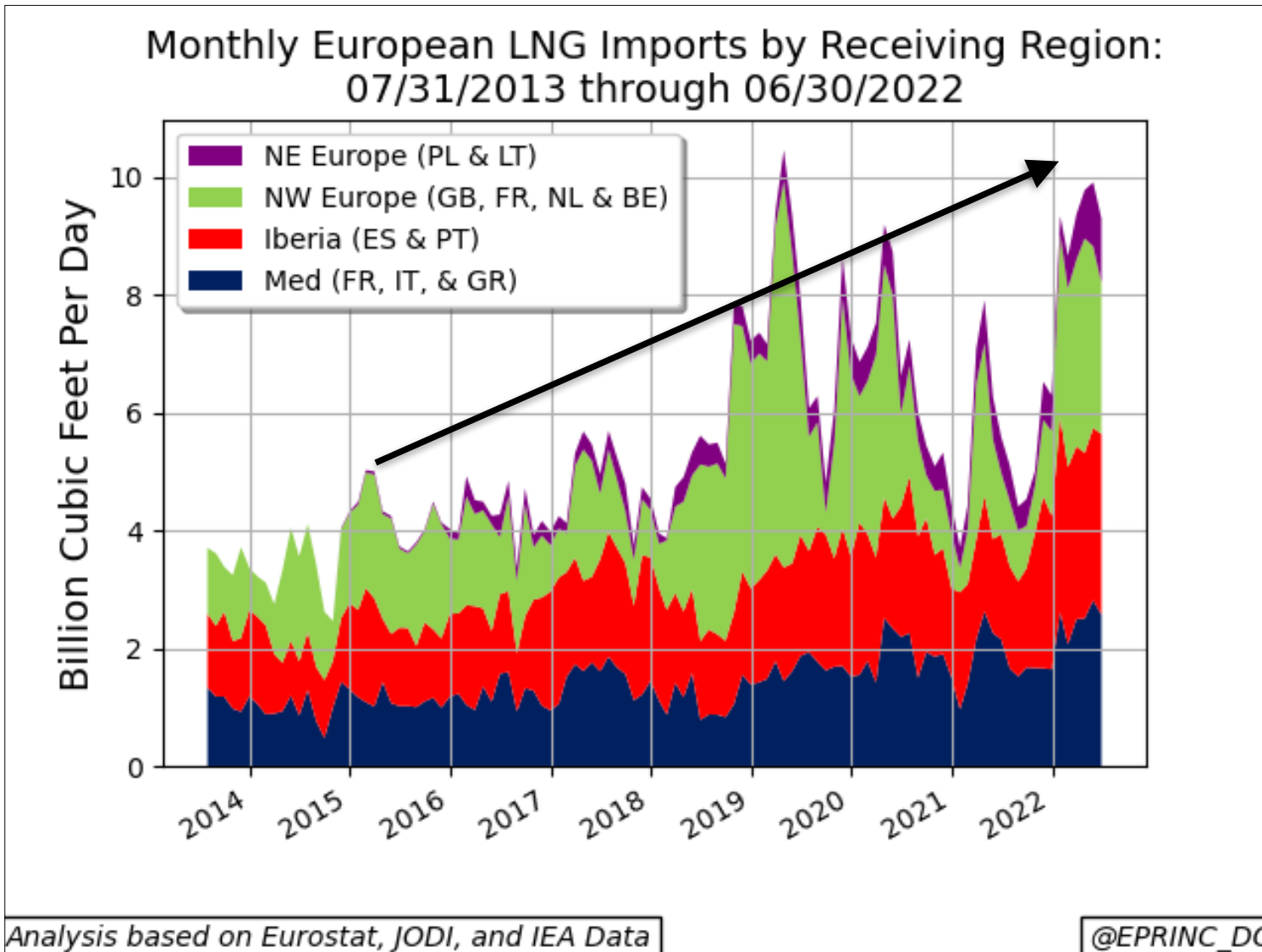
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After rising, non-Ukraine-transited gas volumes are on the decline.

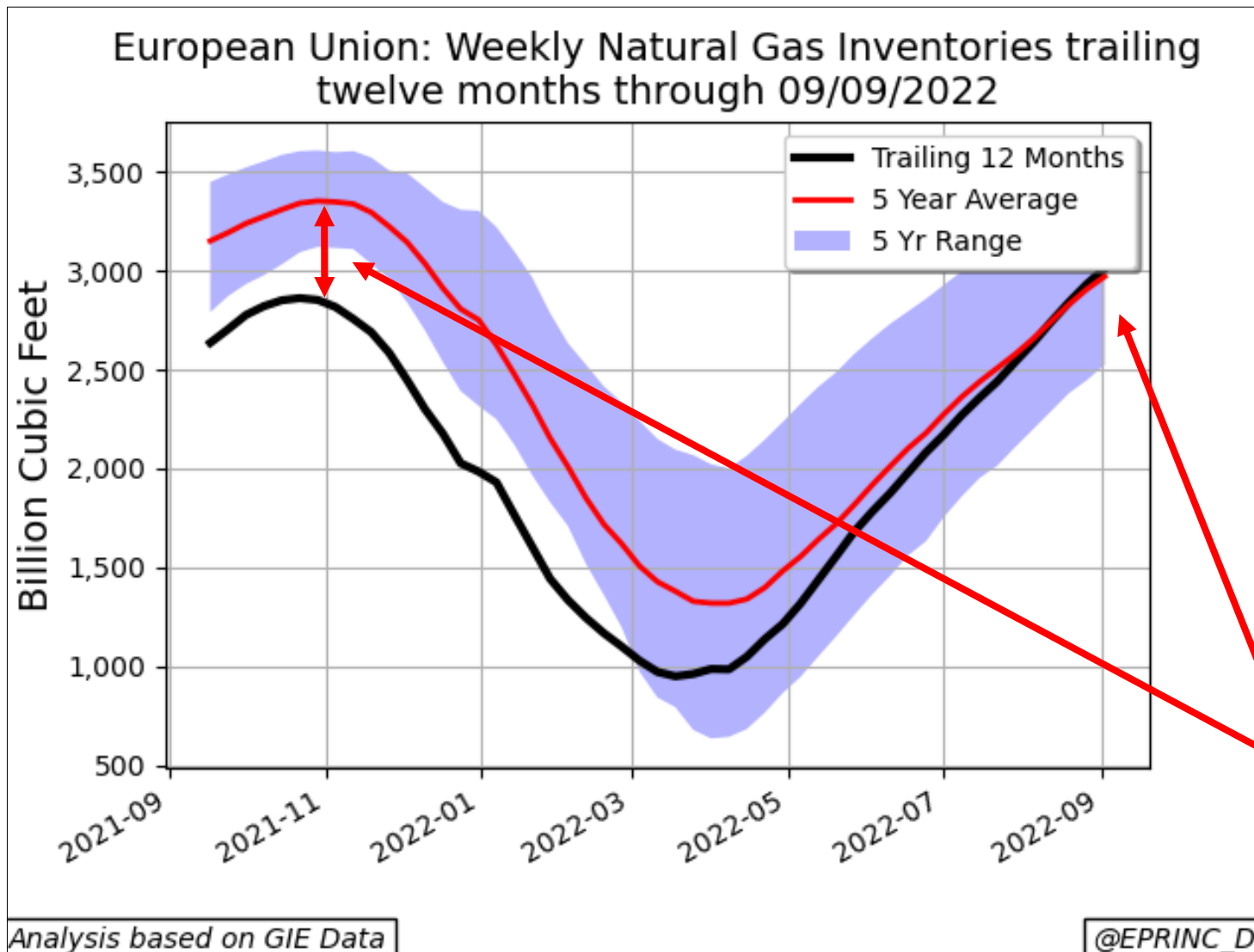
The left chart has monthly data through June 2022. The right has recent daily data.



2022 LNG European imports increased rapidly matching previous peaks.



European Natural Gas Storage Ahead of Winter 2022-2023



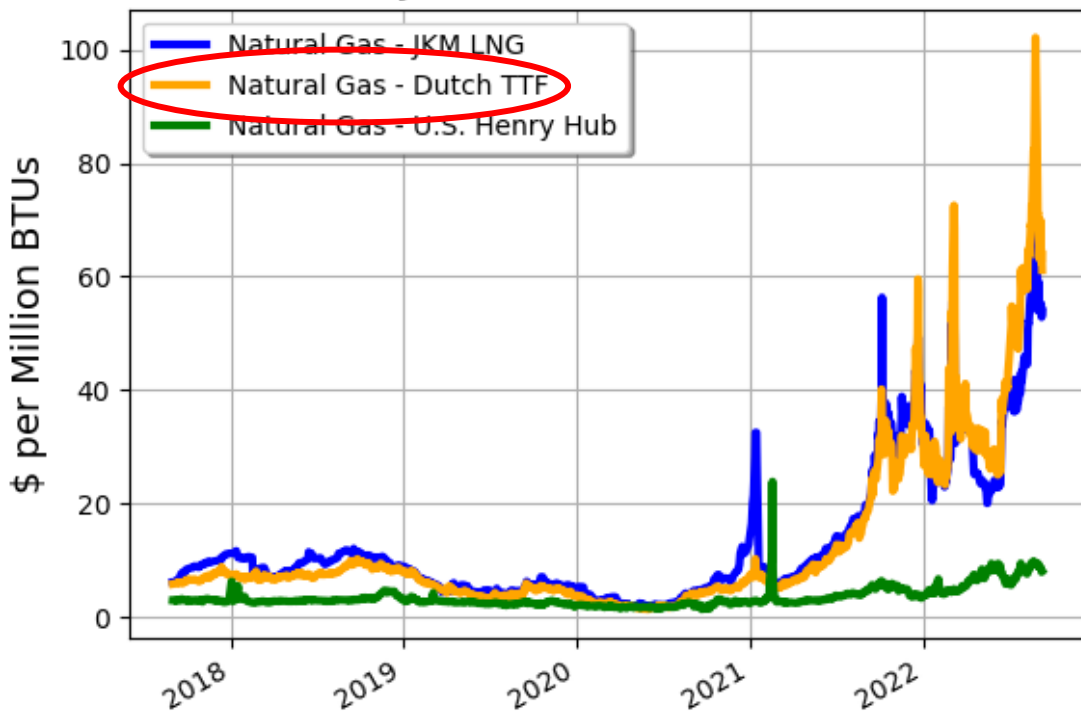
Natural gas storage operators have been aggressive at filling inventories ahead of winter 2022-2023 avoiding the deficit of the prior season.

Natural Gas Storage Ahead of Winter 2022-2023: But Costly

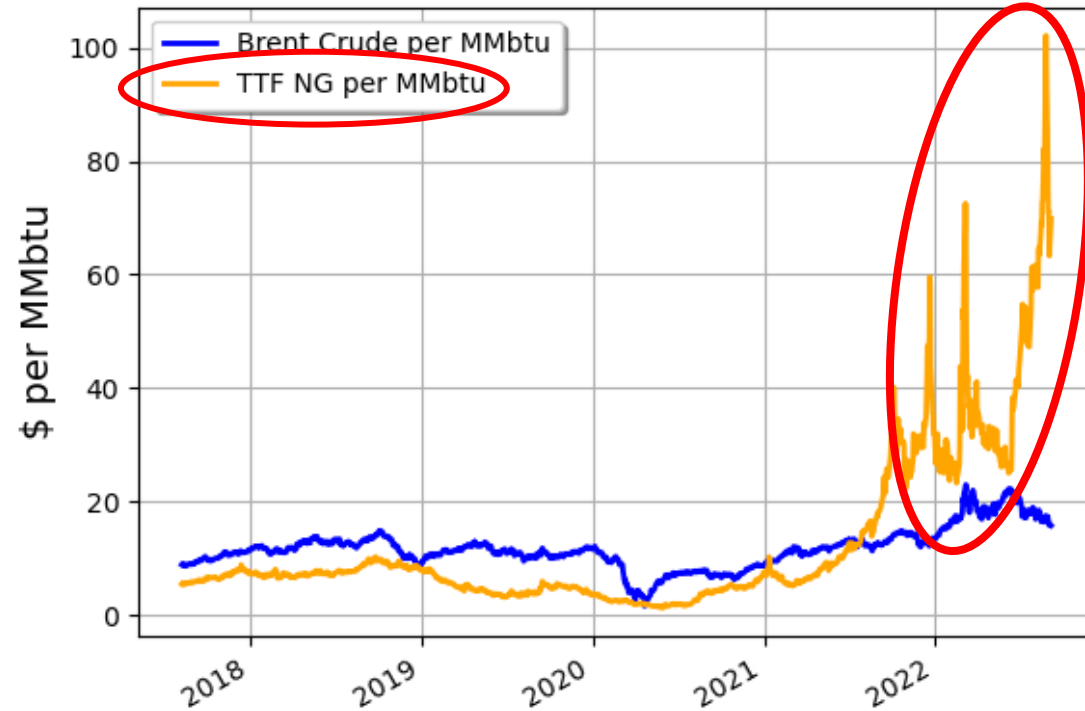
On an energy basis, European natural gas benchmark prices are well above that of Brent crude oil.

TTF = Dutch pricing location used as European natural gas benchmark

Natural Gas - JKM LNG, Natural Gas - Dutch TTF, Natural Gas - U.S. Henry Hub: 08/31/2017 to 09/09/2022



Adj Brent Crude vs TTF NG: 08/06/2017 through 09/09/2022



Analysis based on CME, EIA, and ICE Data

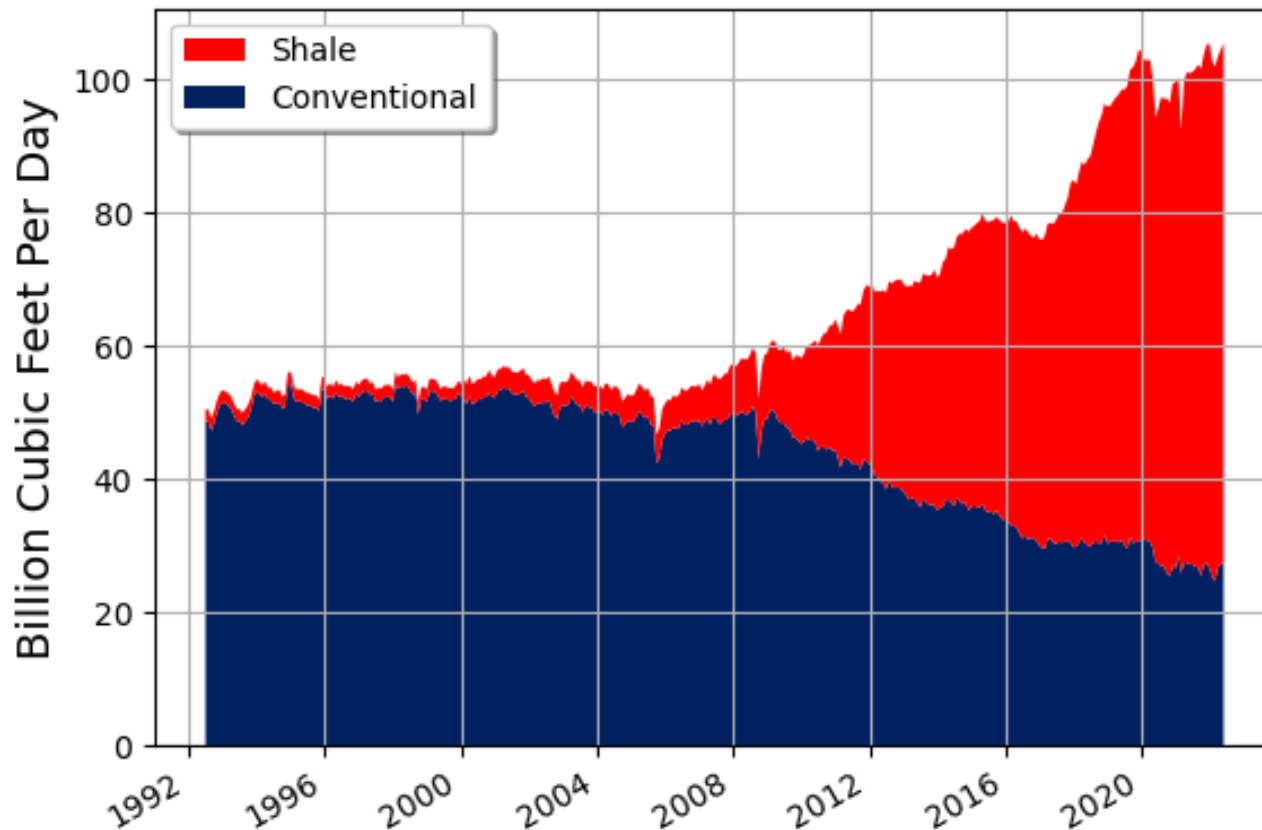
@EPRINC_DC - Sep 12, 2022

Analysis based on EIA and ICE Data

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What is the capability of the U.S. to help Europe?

Monthly U.S. Natural Gas Production - Conventional Vs Shale: 06/30/1992 through 06/30/2022

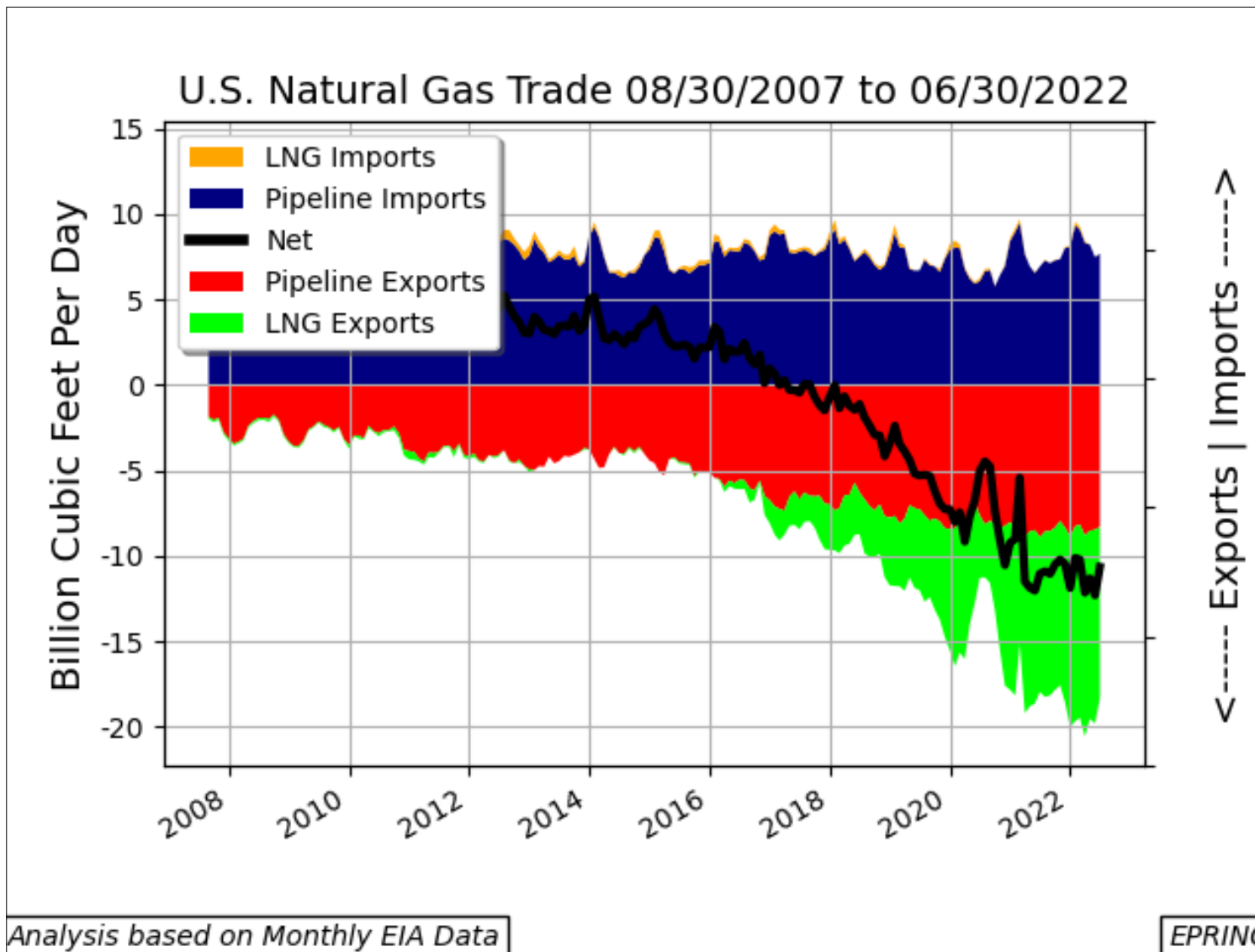


Analysis based on EIA Data

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	2007	2022	Annualized Growth
Total Production	55.3	105.5	5.5%
of which:			
Shale	6.2	78.2	18.4%

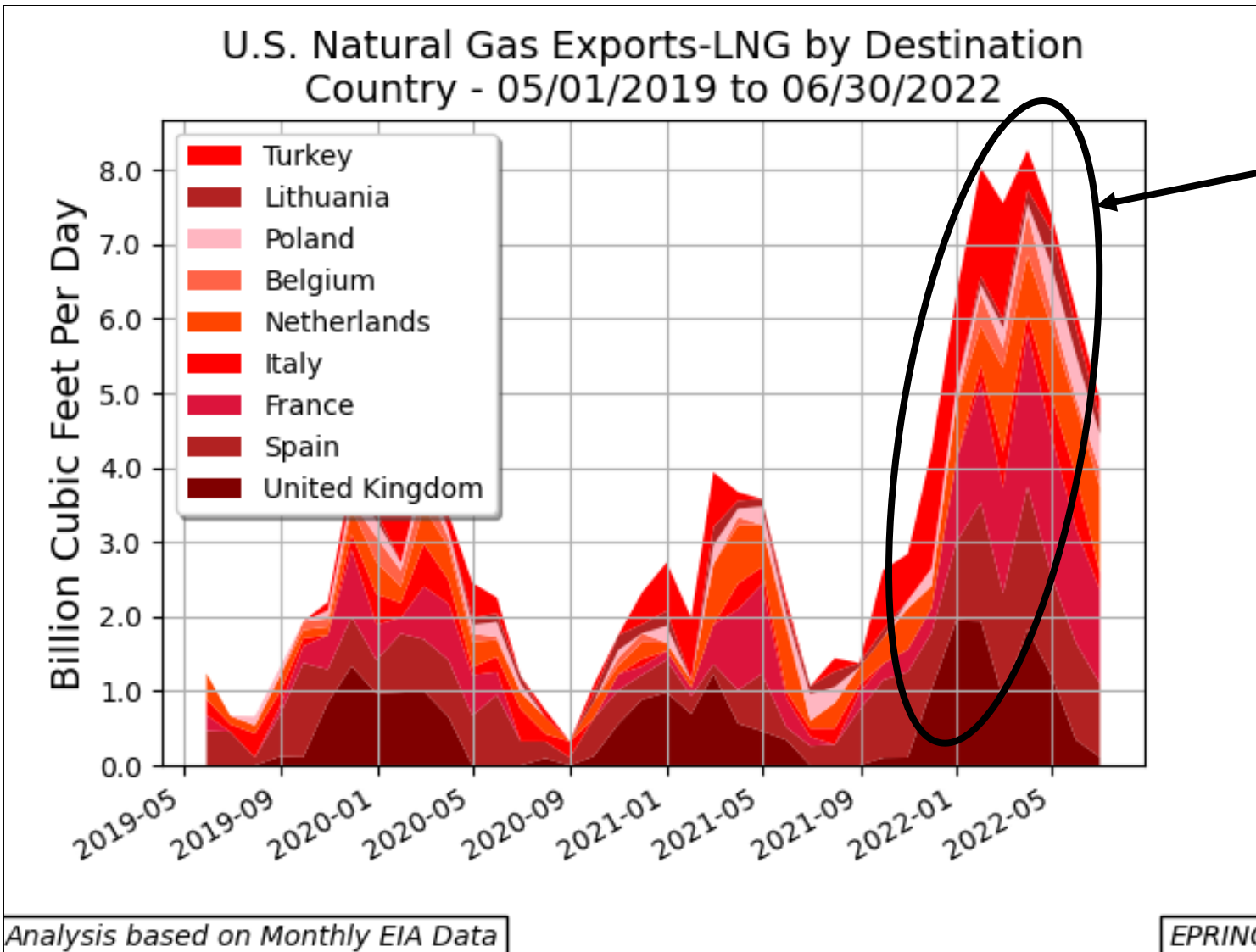
	2007	2022	Annualized Growth
Total Consumption	58.4	76.4	1.8%
of which:			
PowerGen	18.7	32.1	3.7%



With a major supply/demand imbalance, a large portion of U.S. natural gas production is being exported, both as pipeline gas and LNG.

Along with Qatar and Australia, this makes the U.S. one of the top three global LNG exporters

U.S. LNG Exports by Destination – Europe (incl. Turkey)



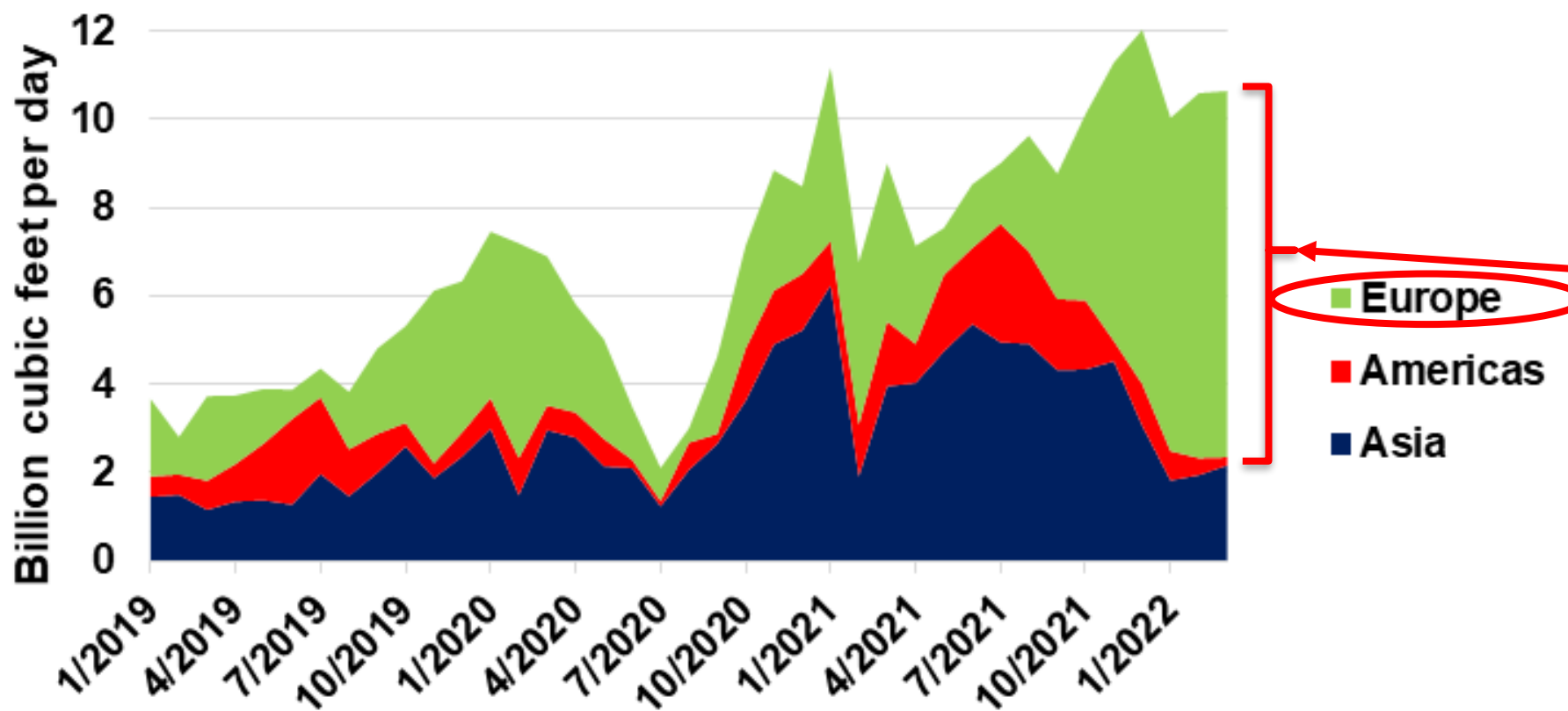
	Jan-Mar 2022 Avg BCF/d
Turkey	1.2
Lithuania	0.8
Poland	0.2
Netherlands	0.1
Belgium	0.4
France	1.7
Spain	1.6
Italy	0.3
United Kingdom	1.6

With the winter 2021-2022 shortfall in natural gas supplies from Russia, Europe accelerated purchases of U.S. LNG at the rate of 8 BCF/d in the first three months of 2022.

(includes Turkey)

U.S. LNG Exports by Destination Region

January 2019 - March 2022



Analysis Based on EIA Monthly Data

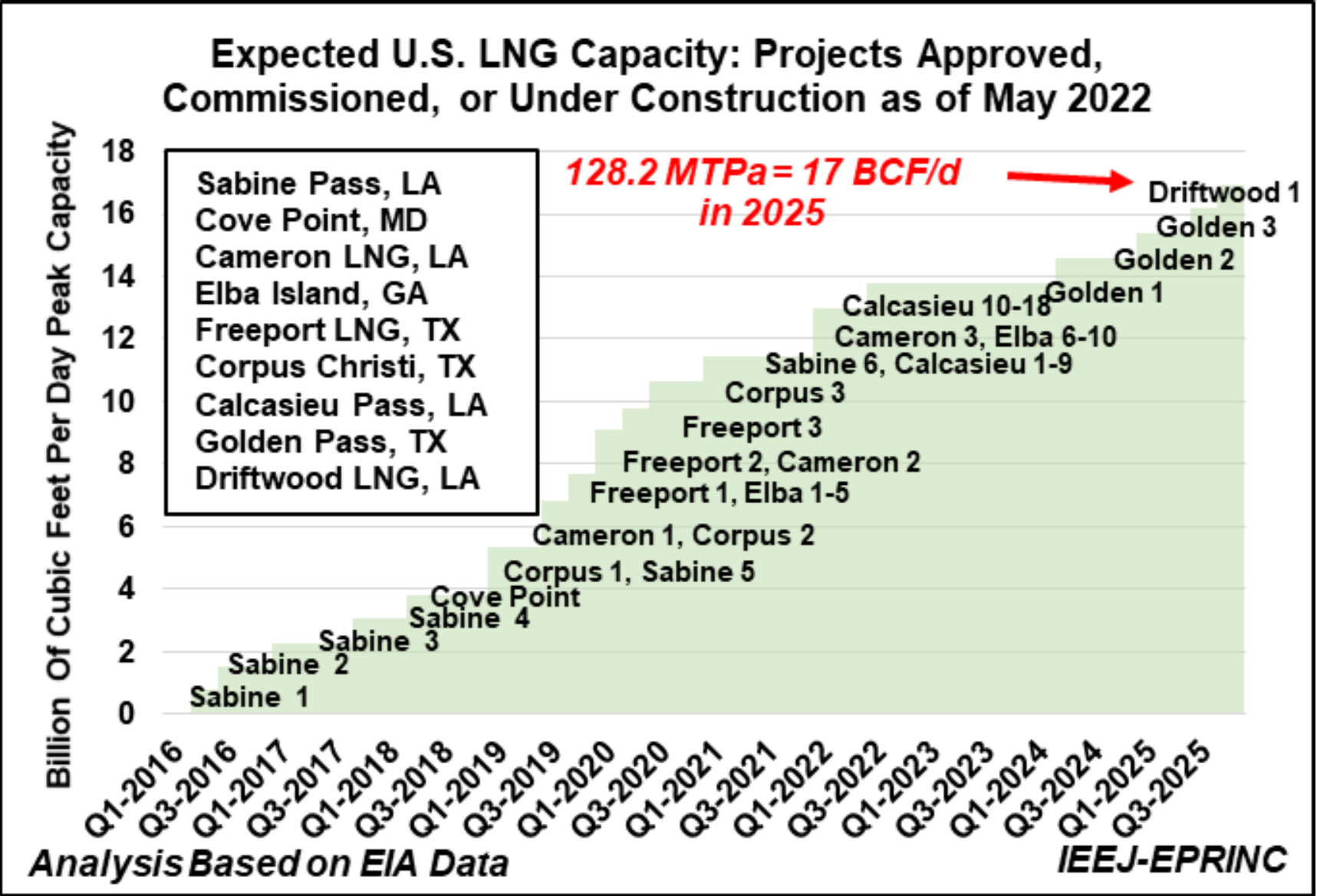
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With the winter 2021-2022 shortfall in natural gas supplies from Russia, Europe accelerated purchases of U.S. LNG at the rate of 8 BCF/d in the first three months of 2022.

Asian purchases of U.S. LNG fell ahead of winter 2021-2022 in the northern latitudes in favor of less expensive energy resources such as coal.

Most of the purchasers of U.S. LNG in the Americas that are located in the southern latitudes have countervailing seasonal requirements.

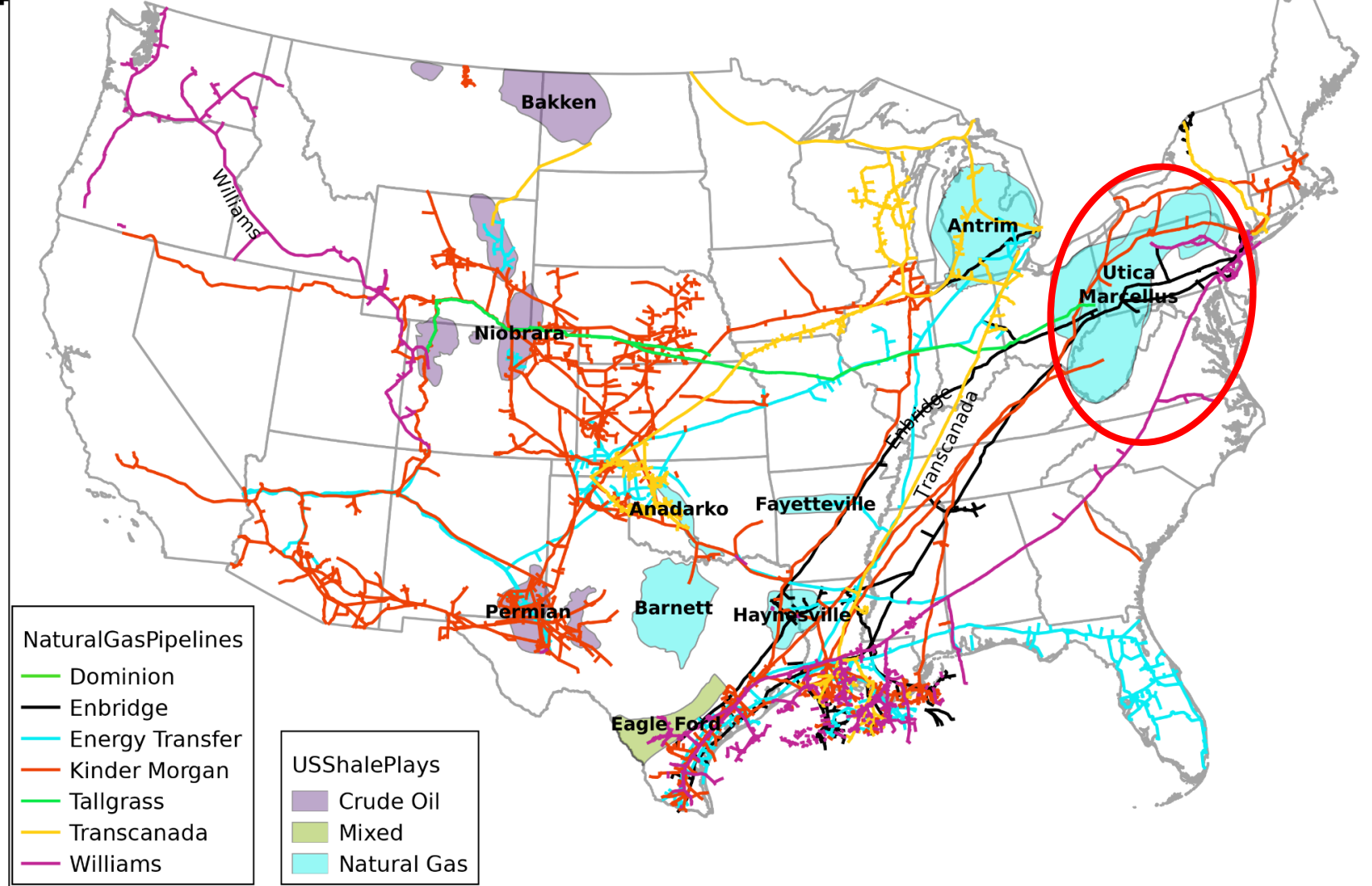
Expected U.S. LNG Capacity



Current U.S. U.S. LNG Liquefaction Capacity is about 10 BCF/d.

It is expected to reach 17 BCF/d by late 2025.

Main Shale Play Formations and U.S. Natural Gas Pipeline Systems



- Natural Gas Pipelines**
- Dominion
 - Enbridge
 - Energy Transfer
 - Kinder Morgan
 - Tallgrass
 - Transcanada
 - Williams

- U.S. Shale Plays**
- Crude Oil
 - Mixed
 - Natural Gas

One of the major U.S. energy policy challenges has been the inability to expand production from the large natural gas resource in the Western Appalachian region and move it to domestic consuming centers as well as LNG exporting facilities in the U.S.G.C.

Analysis Based on EIA, Company Data

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Policy considerations and conclusions

Policy Considerations: Economic sanctions against Russia

Thane Gustafson: “Energy revenues are the key to all of Russia's political system.”

There are numerous sanctions from different authorities with different timing and severity.

Will they be effective? Yes, but depending on the severity.

When? Soon.

A comment about the recent European price-capping and windfall-profits initiatives from Larry Goldstein, EPRINC President Emeritus & Trustee: “Conservation comes when consumers see the real cost of the product. Capping the price leads to rationing not conservation. By seeing the real price now, the consuming entities can make better-informed decisions today.”

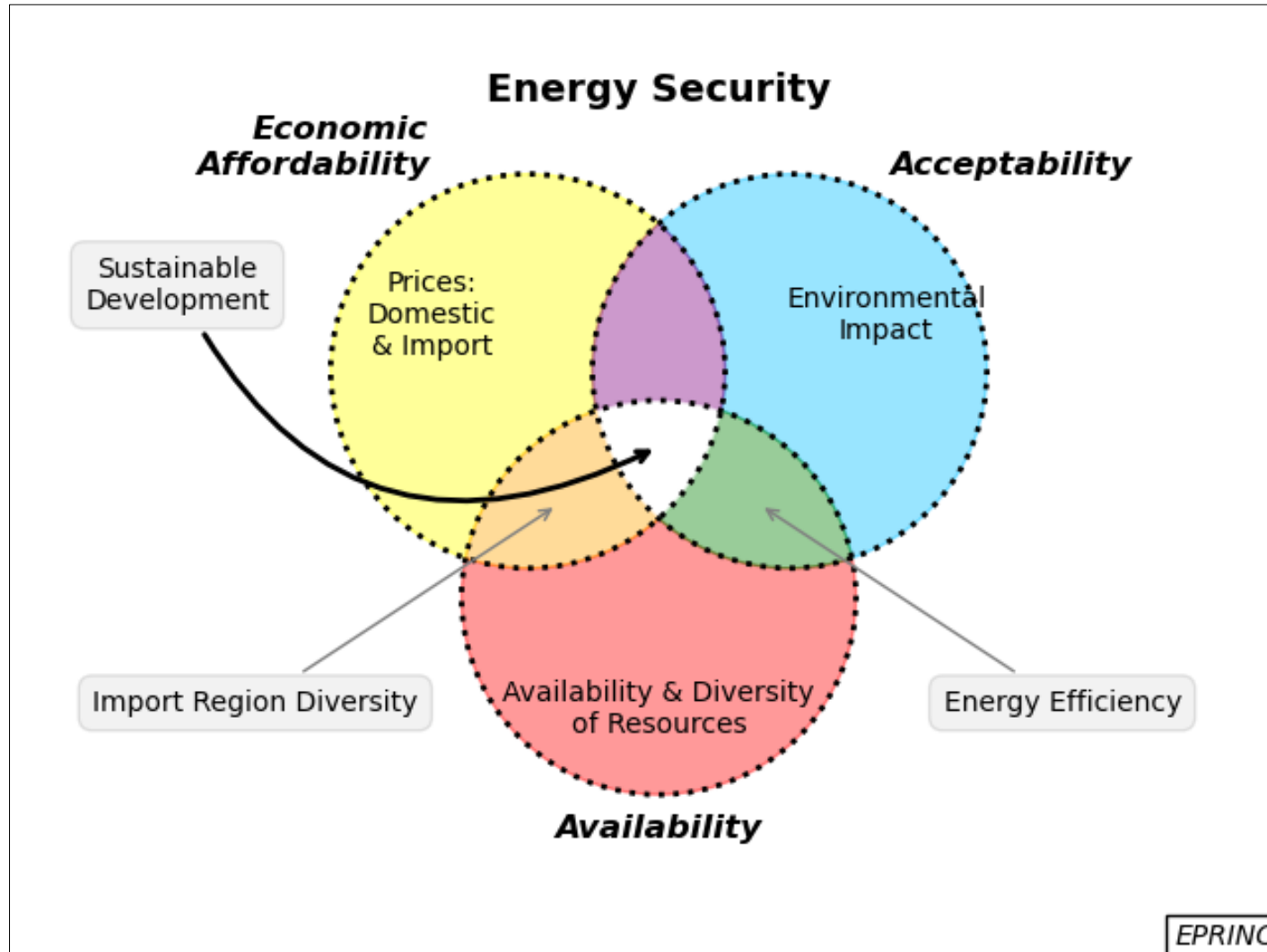
Energy Security – a Mathematical View

$$\text{Energy Security} = \beta_1 \text{AER} + \beta_2 \text{PDI} + \beta_3 \text{IRD} + \beta_4 \text{EI} + \beta_5 \text{EE}$$

- **Where:**
 - **AER = Availability & Diversity of Energy Resources**
 - **PDI = Prices – Domestic & Import**
 - **IRD = Import Region Diversity**
 - **EI = Environmental Impact**
 - **EE = Energy Efficiency**
 - **β_{1-5} = Parameter Coefficients**

Source: Sai, Furubayashi, Nakata, and others

Energy Security – Visualized



Source: Sai, Furubayashi, Nakata, and others

Conclusion: Energy Security – Predicates

Without economic security there is no national security.

Without energy security there is no economic security.

Asymmetric energy vulnerabilities and rent-transfers can undermine an economy and thereby subvert its national security.

Thank you.

Additional Slides

Key Global Commodities Production & Trade							
				Russia		Ukraine	
	Dec 2021	Feb 2022	Mar 2022	of Global Production	of Global Trade	of Global Production	of Global Trade
Energy							
WTI Crude (\$/bbl)	75.33	92.14 22.3%	101.05 34.1%	10-11 MBD 14.0%	5 MBD		
Natural Gas (\$/MMBtu)	3.82	4.59 20.2%	6.53 71.0%	77 BCF/d 2 nd largest	21 BCF/d Largest		
Metals							
Nickel (\$/mt) (impact on steel)	20,016	24,016 20.0%	33,924 69.5%	4.0%	25.0%	1.0%	12.0%
Agriculture							
Wheat (mt)	376.81	390.50 3.6%	486.30 29.1%	3 rd Largest	Largest 18.0%	8 th largest	6 th largest 8.0%
Corn (mt)	264.54	292.62 10.6%	335.53 26.8%		6 th largest	7 th largest	4 th largest 14.0%
Urea (mt)	890.00	744.17 -16.4%	907.89 2.0%		Largest		
Analysis based on World Bank Data				EPRINC			

Key U.S. Sanctions on Russian Commodities	
Crude & Products	U.S. seeking alternatives to heavy crude and Mazut Restrictions on financial and technological investments
Natural Gas	Nord Stream 2 Pipeline halted Russian ruble payment system reaction
Metals	Import ban on Steel Gold-related transactions with central banks prohibited
Shipping	Full ban on shipping as of March 1 st
Financial	Disconnecting from SWIFT Restrictions on access to U.S. dollars Key Russian banks sanctioned
<i>Analysis based on S&P Platts Data</i>	<i>EPRINC</i>

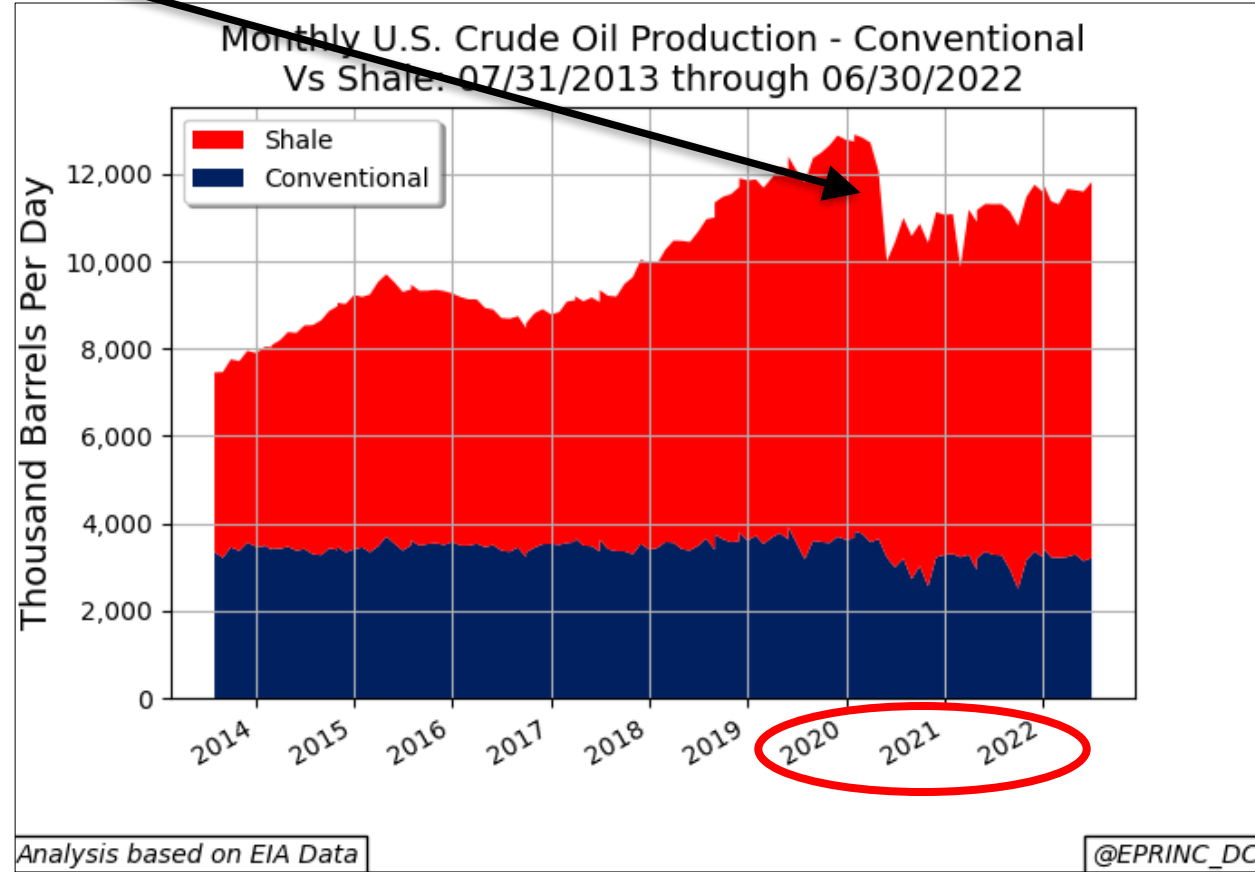
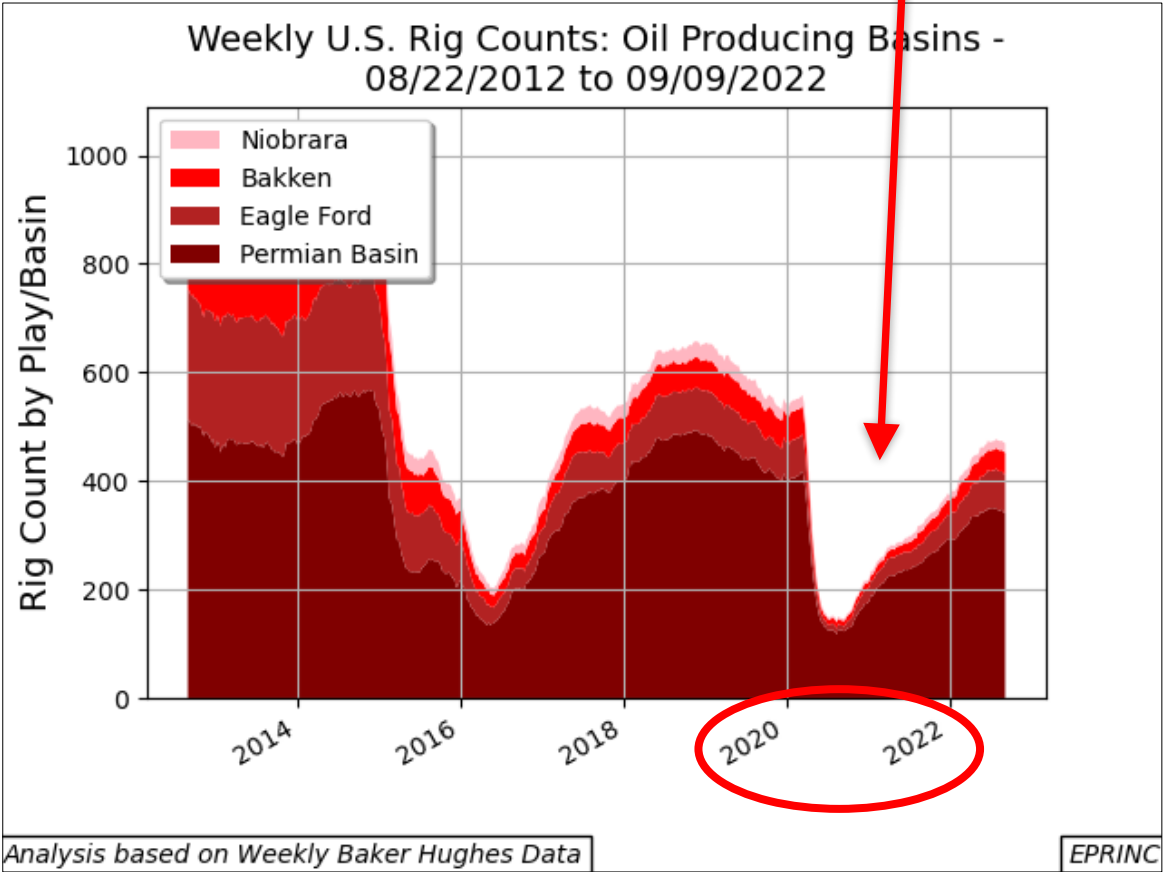
Concepts and Conclusion

Resilience

- **the ability to prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions**
- **The basis of statistics: what can be measured, can be improved. The absence of measurement, limits the effectiveness of governance. There is a great deal of research and numerous proposals. But there are no set resilience metrics.**

Post-COVID U.S. crude oil production recovery has been weak leading to lower associated natural gas volumes.

With limited associated gas production U.S. natural gas prices are trending higher.



Conclusion

21st Century satellite telecommunications and ...

- **Ukraine's GE locomotives and UkrZaliznytsia: Investigation of corruption and fuel-siphoning**
- **John Deere tractors in Iowa and Ukrainian hackers**
- **PEMEX and a U.S. Midwest-based manufacturer/provider of process controls systems and automation technologies**
- **Siemens machine tool technology and Russian military and oil & gas production.**