

Natural Gas and the Global Geopolitics of Energy

Presented to:
Western States and Tribal Nations
North American West Coast LNG Export Forum

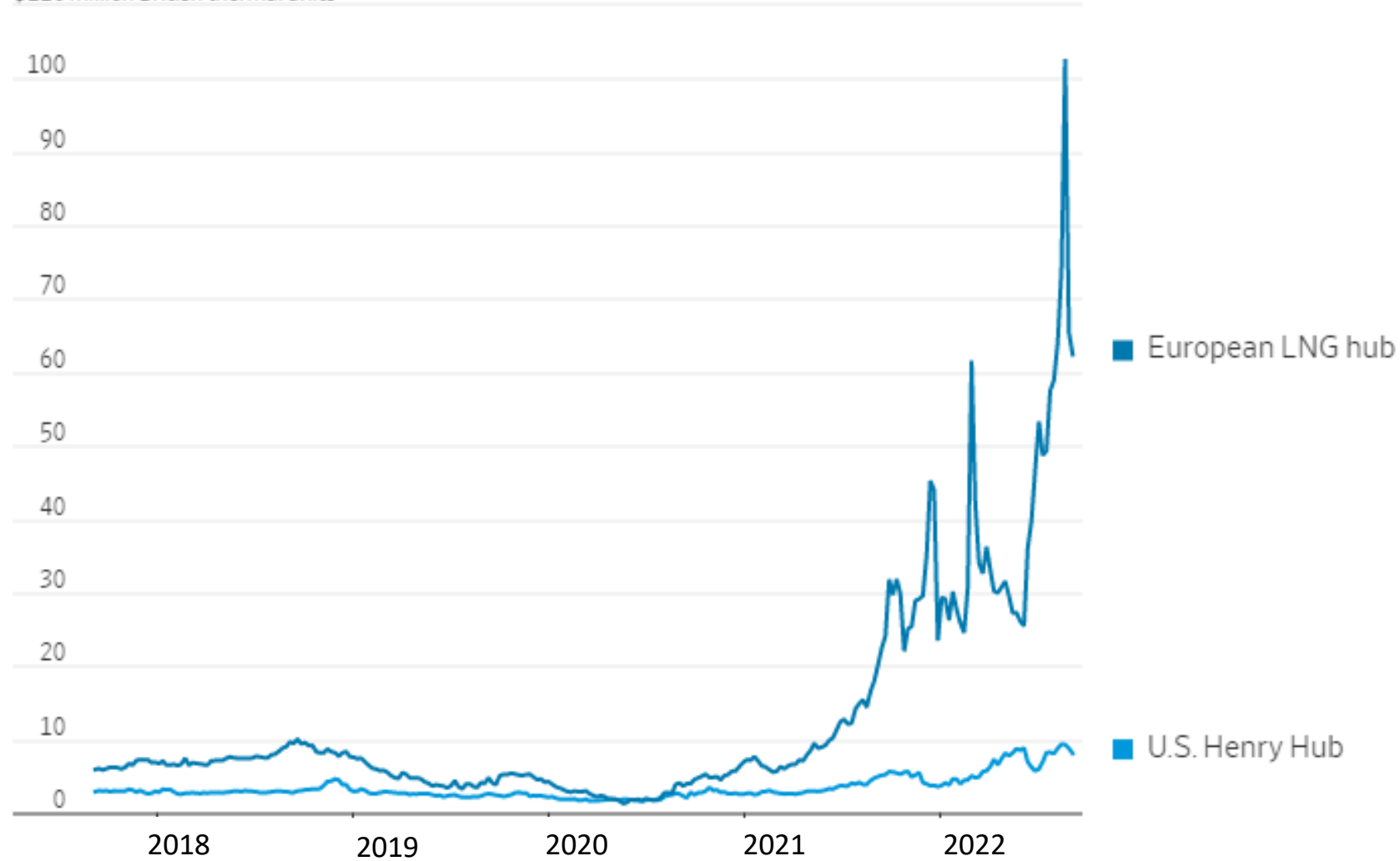
December 12, 2022



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Natural gas price

\$110 million British thermal units



Source: FactSet

One-Year Forward Strip

NYMEX Henry Hub	\$ 7.56
LNG Delivered Price to Japan (JKM)	\$67.32
LNG Delivered Price to Europe (Dutch TTF)	\$83.38

Comparative Forward Strips as of December 8, 2022

One-Year Forward Strip

NYMEX Henry Hub	\$ 5.18
LNG Delivered Price to Japan (JKM)	\$36.94
LNG Delivered Price to Europe (Dutch TTF)	\$43.82

Three-Year Forward Strip

NYMEX Henry Hub	\$ 4.54
LNG Delivered Price to Japan (JKM)	\$28.74
LNG Delivered Price to Europe (Dutch TTF)	\$33.59

* Settled price as of December 8, 2022

How did we get here?

- Over reliance on renewables
- Retired coal plants too early
- Retired nuclear plants too early
- Under reliance on fossil fuels

Energy Security?

- By the year 2020, Gazprom will supply nearly 70% of the European Union's natural gas.
- Would you pursue a conflict with a country that you depend on for the majority of your energy needs?

This is a trap laid by Vladimir Putin 20 years in the making.



Closing Bell

LNG Diplomacy: Keystone XL Pipeline, Part 2?

October 2012

Closing Bell

The Glacial Pace Of LNG Exports

By John Harpole

September 2014

Closing Bell

The Putin Vortex

April 2014

Closing Bell

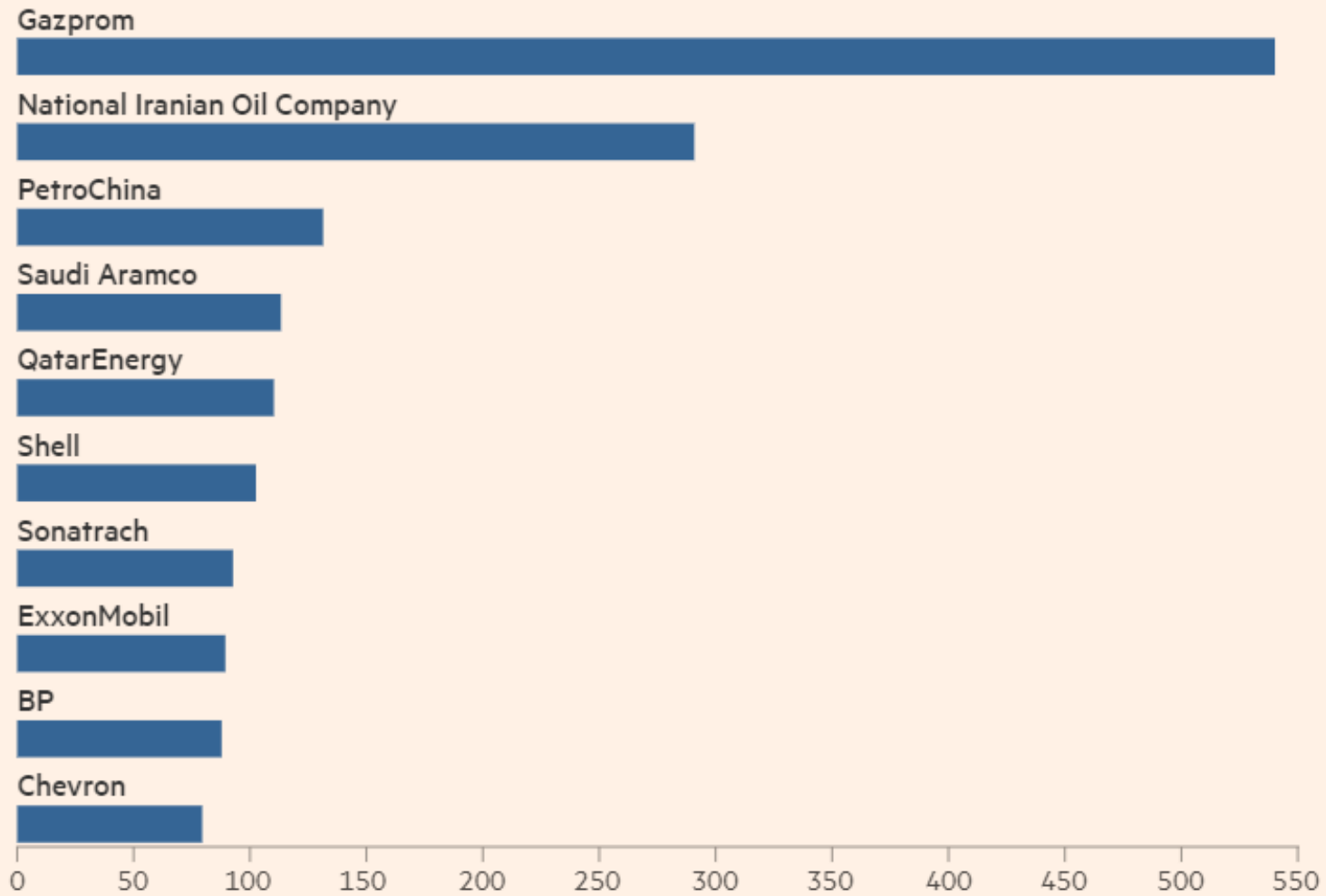
Time To 'Out' Russia?

By John Harpole

January 2015

The 10 largest gas companies

Total gas production (bn cubic metres, 2021)



FINANCIAL TIMES

Source: Wood Mackenzie

Rosneft and Gazprom represent
25%-40% of Russia's budget



- Putin's trap, enabled by the pro-scarcity environmentalists
- Germany and EU take the bait
- U.S. LNG to the rescue
- The 3-year impact on world LNG markets

Merkel's Major Mistake – Trusting Putin



Angela Merkel, Chancellor of Germany from 2005 to 2021



Francois Fillon, Angela Merkel, Mark Rutte, Dmitry Medvedev, Gunther Oettinger, Erwin Sellering

The Former Chancellor Who Became Putin's Man in Germany



Gerhard Schröder, Chancellor of Germany from 1998 to 2005

Title	Term	Income
Chancellor of Germany	1998 – 2005	? currently receives \$9,000/month stipend
Nord Stream I Chairman/Shareholder	2005 – 2022	\$270,000/year
Nord Stream II Board Member	2011 - ?	?
Rosneft Board President	2017 – present	\$600,000/year
Gazprom Board Member	2022 - ?	?

“Germany’s reliance on Russian gas surged to 55 percent before Russia’s attack on Ukraine began in February, from 39 percent in 2011, amounting to 200 million euros, or about \$220 million, in energy payments every day to Russia.”



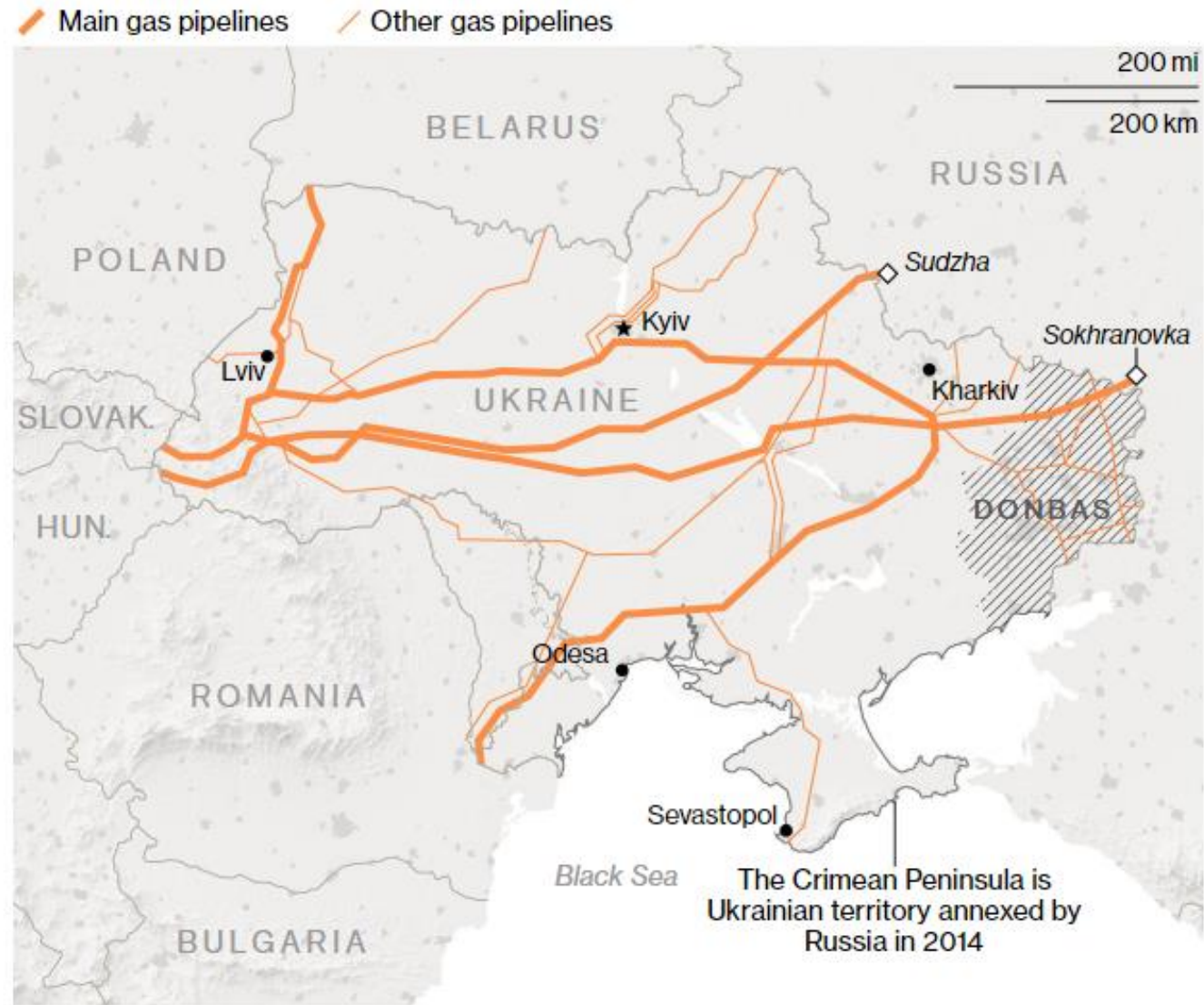
Russia's Energy Muscle

- Energy Used Over 55 times Against Former Soviet Nations Since 1990



Source: *Europe Doubles Down on Russian Gas to Feed its Energy Appetite*, by Andrew Haney, Ricardo Bracho, Nick Wolfe and Max Faith

Natural Gas Runs Through Ukraine



Source: The Oxford Institute for Energy Studies

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

Linking the Super Powers

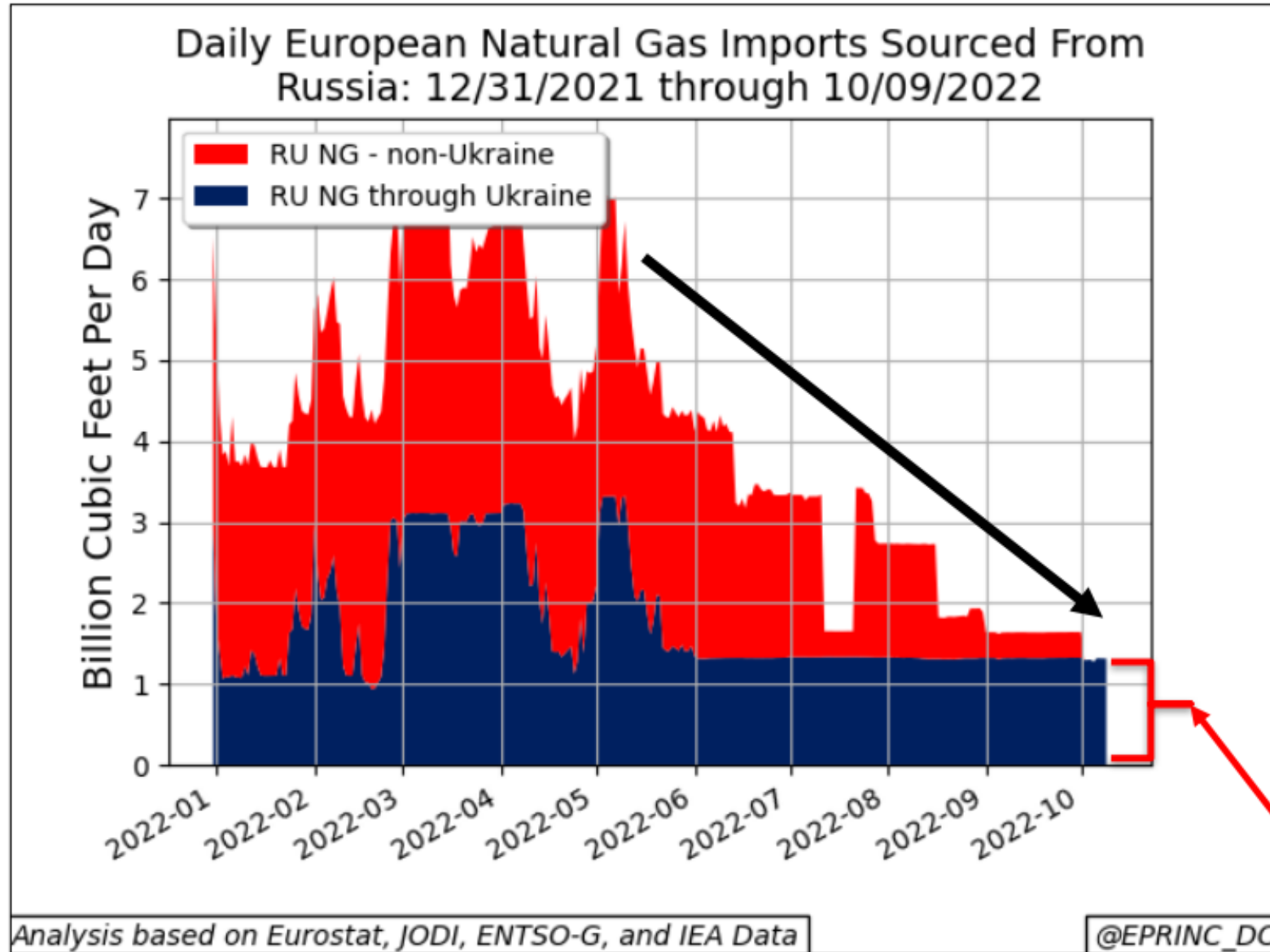


European supply diversification away from Russia
takes **17 bcf/d** of supply out of a **50 bcf/d** market



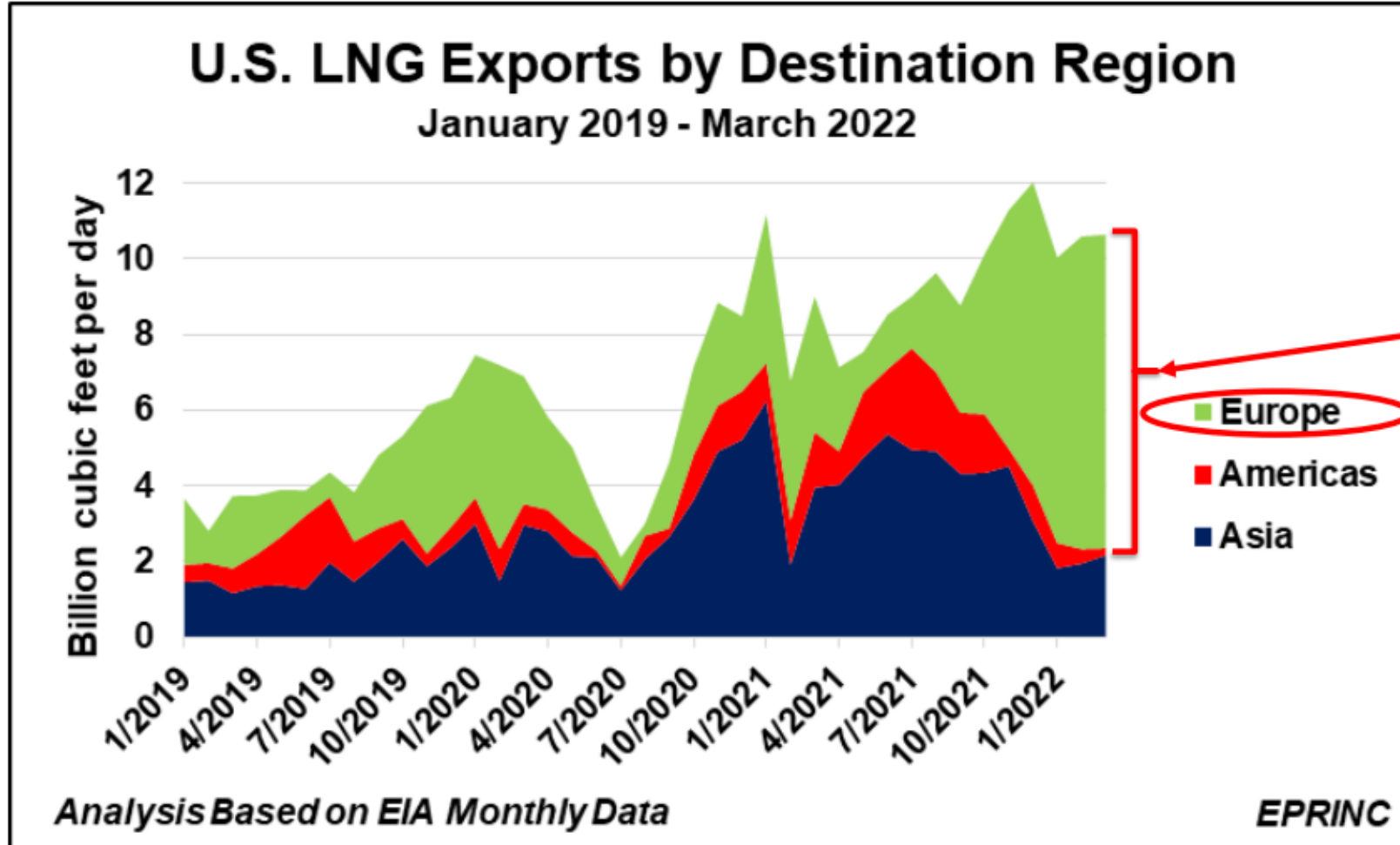
Source: Wood Mackenzie, "Wellhead to LNG: Producers & Export Deals," September 2022, Image: Reuters

Europe – Daily Natural Gas Receipts During 2022



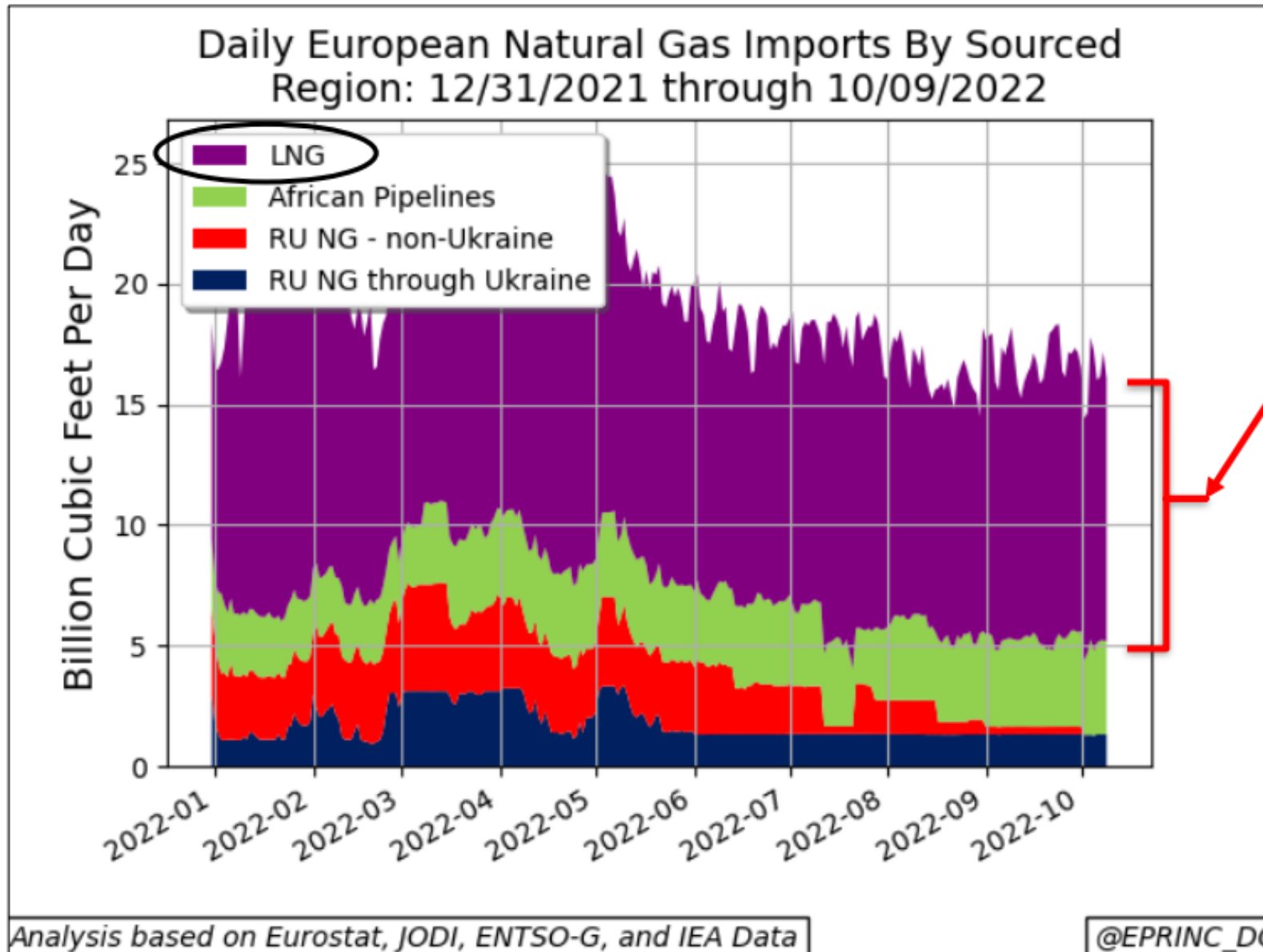


U.S. LNG Exports by Destination Region



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.

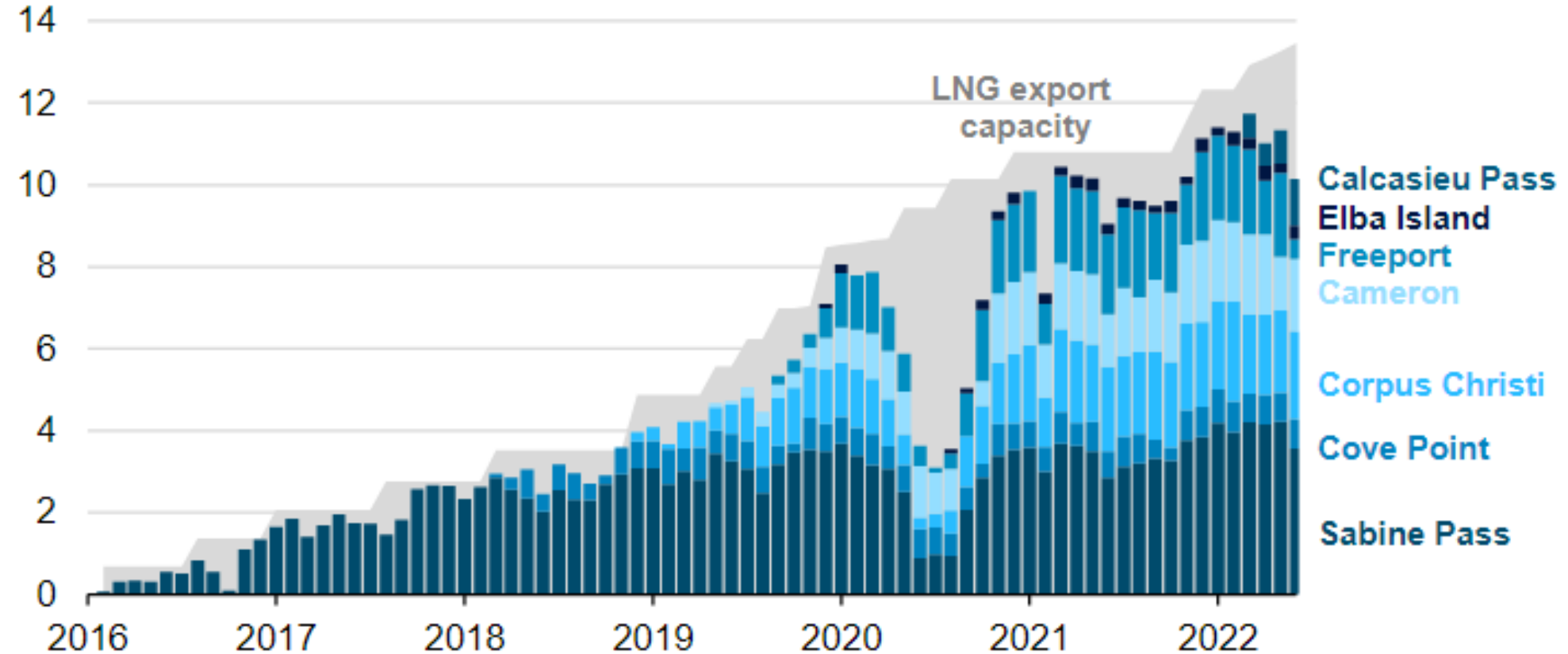
Europe – Daily Natural Gas Receipts During 2022



The United States became the world's largest LNG exporter in the first half of 2022

Monthly U.S. liquefied natural gas (LNG) exports (Jan 2016–Jun 2022)

billion cubic feet per day

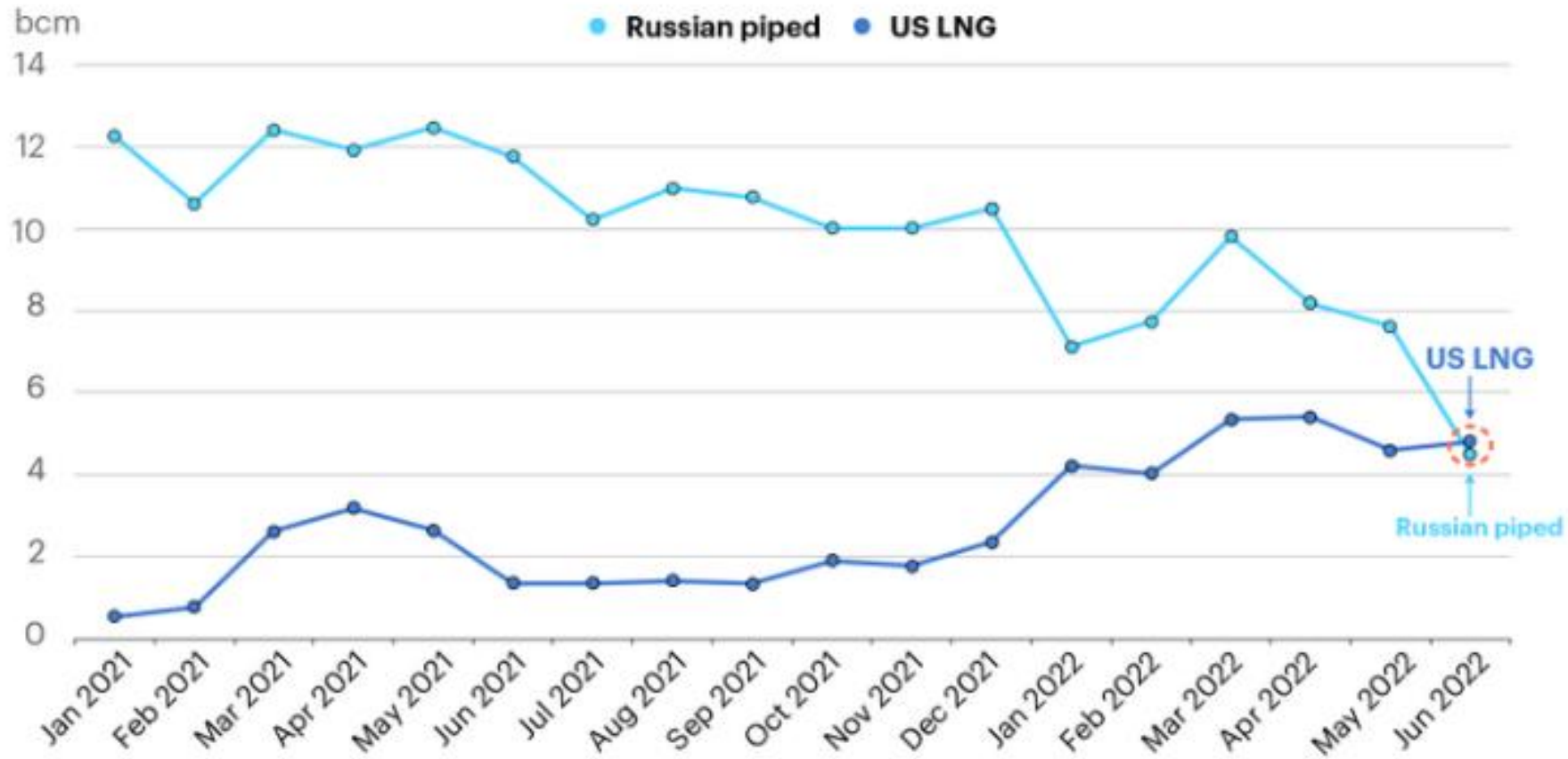


Data source: U.S. Energy Information Administration, [Liquefaction Capacity Table](#), and U.S. Department of Energy [LNG reports](#)

Note: June 2022 LNG exports are EIA estimates based on tanker shipping data. LNG export capacity is an estimated peak LNG production capacity of all operational U.S. LNG export facilities.

US liquefied natural gas (LNG) overtakes Russian piped gas in EU gas imports in June 2022

IEA analysis



International Energy Agency

September 27, 2022



Baltic Natural Gas Pipeline Map



Source: NS Energy, Baltic Pipe Project, GAZ-System

U.S., EU officials on edge over pipeline explosions



Nord Stream leaks will not delay Oct. 1 Baltic Pipe start-up

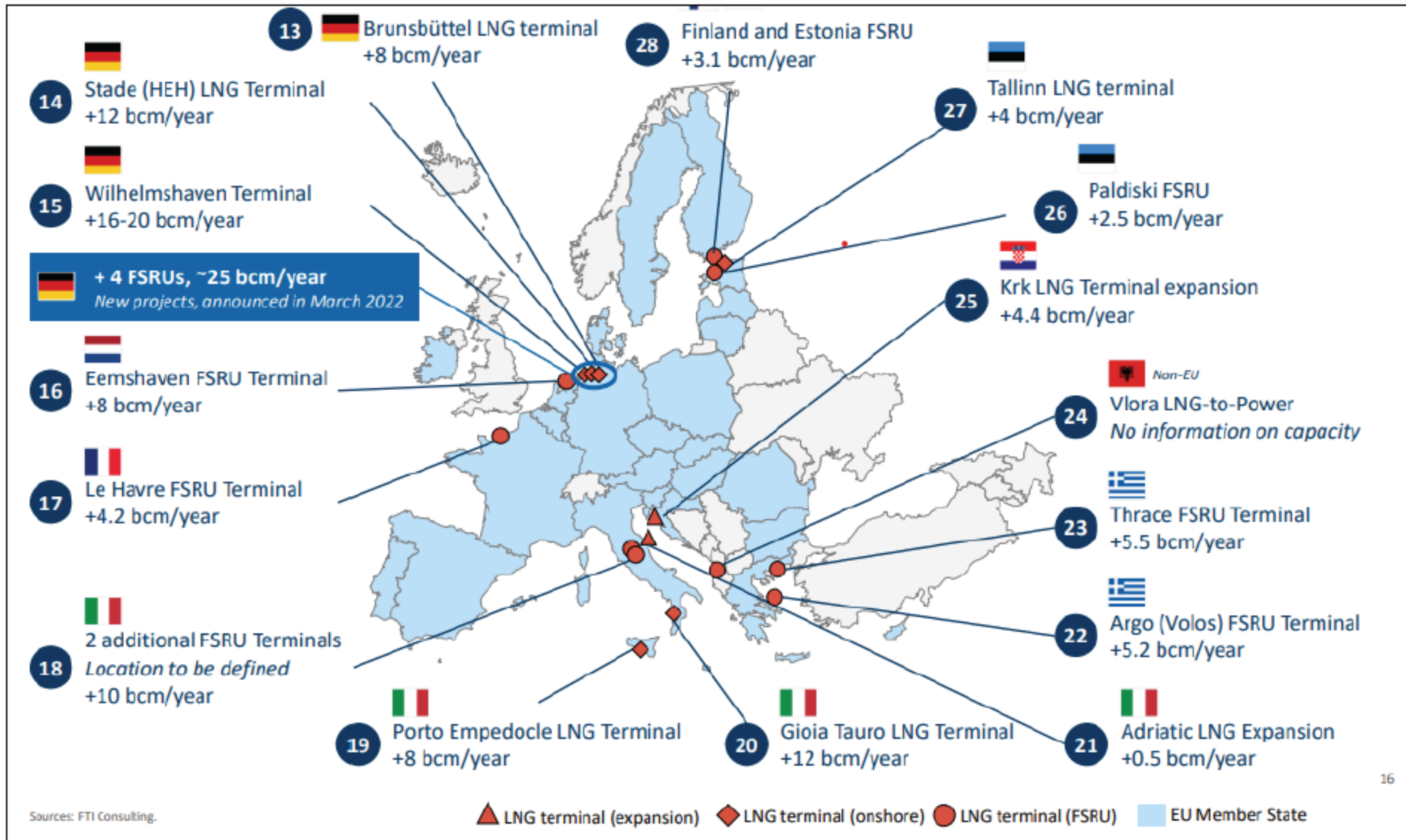


European LNG infrastructure



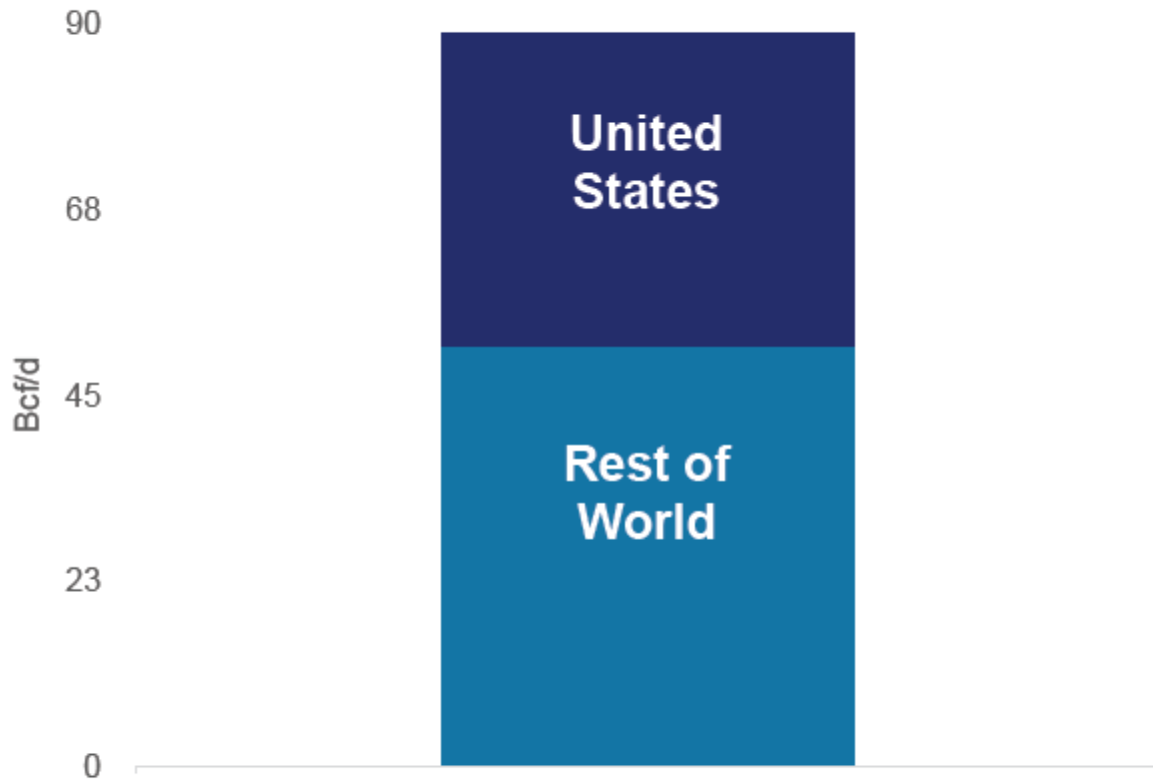
Source: European Commission 2022, Clean Energy Wire

Europe has authorized 21 new LNG projects



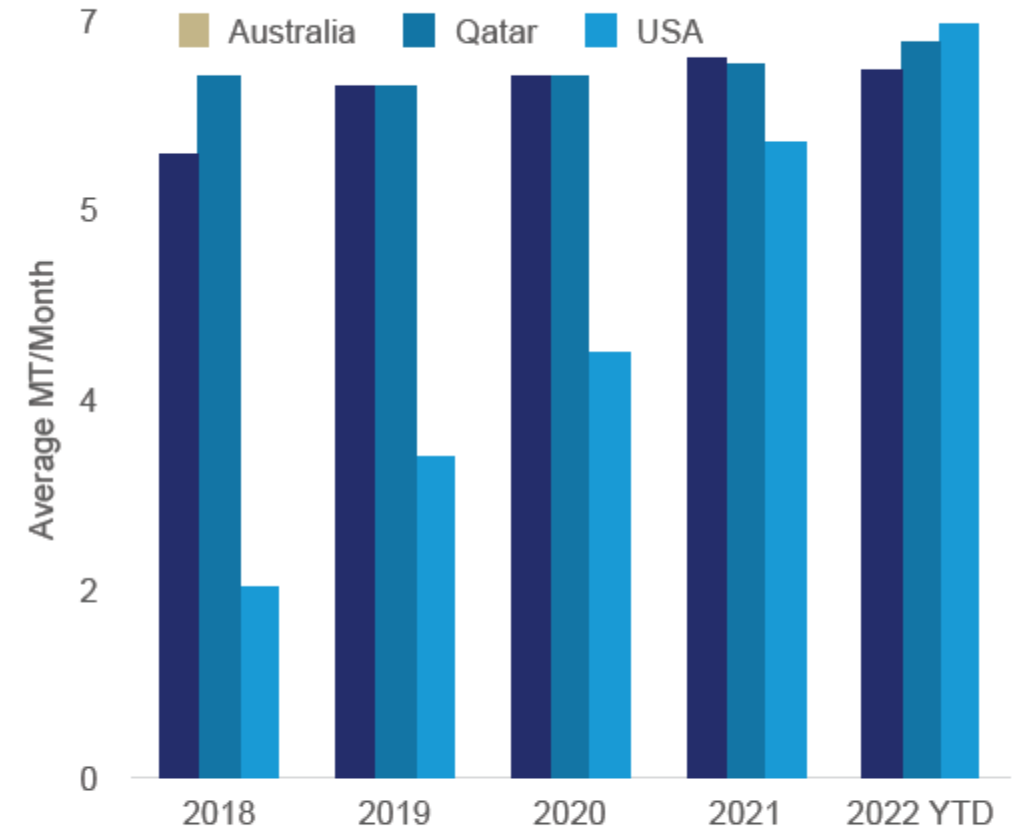
<https://www.fticonsulting.com/-/media/files/emea-files/insights/white-papers/2022/may/new-lng-regasification-terminals-europe.pdf>

Net Global Natural Gas Supply Growth Since 2007



- Since 2007, 42% of global natural gas supply growth has come from the United States

Top 3 LNG exporters



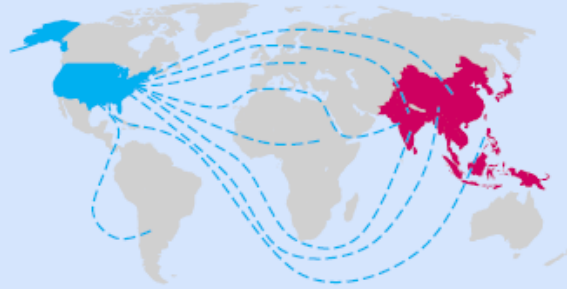
- US natural gas supply growth has supported LNG exports, with the US overtaking Qatar this year

Source: Wood Mackenzie, IHS Markit
 Note: 2022 YTD = January 1 to June 15, 2022



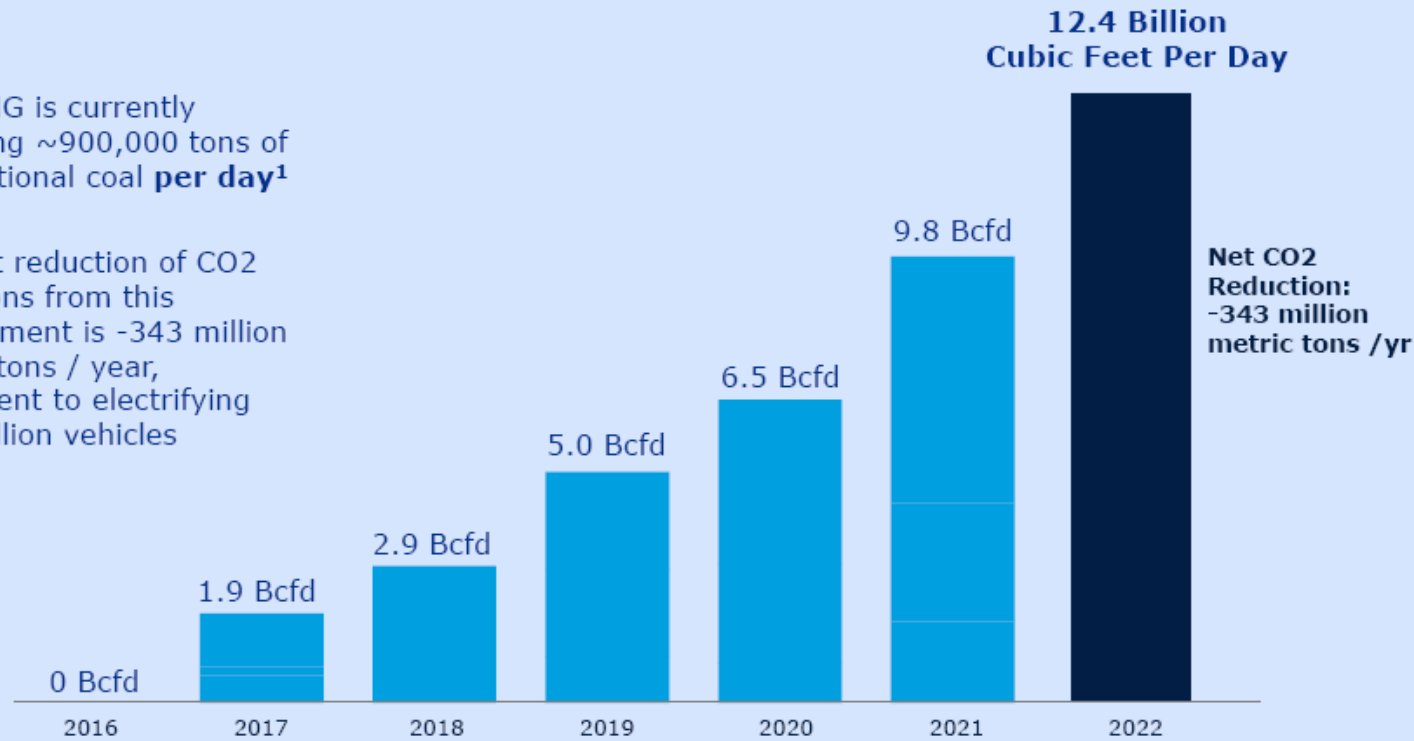
U.S. LNG Export Capacity

LNG export facilities are currently located predominantly on the Gulf Coast



U.S. LNG is currently replacing ~900,000 tons of international coal **per day**¹

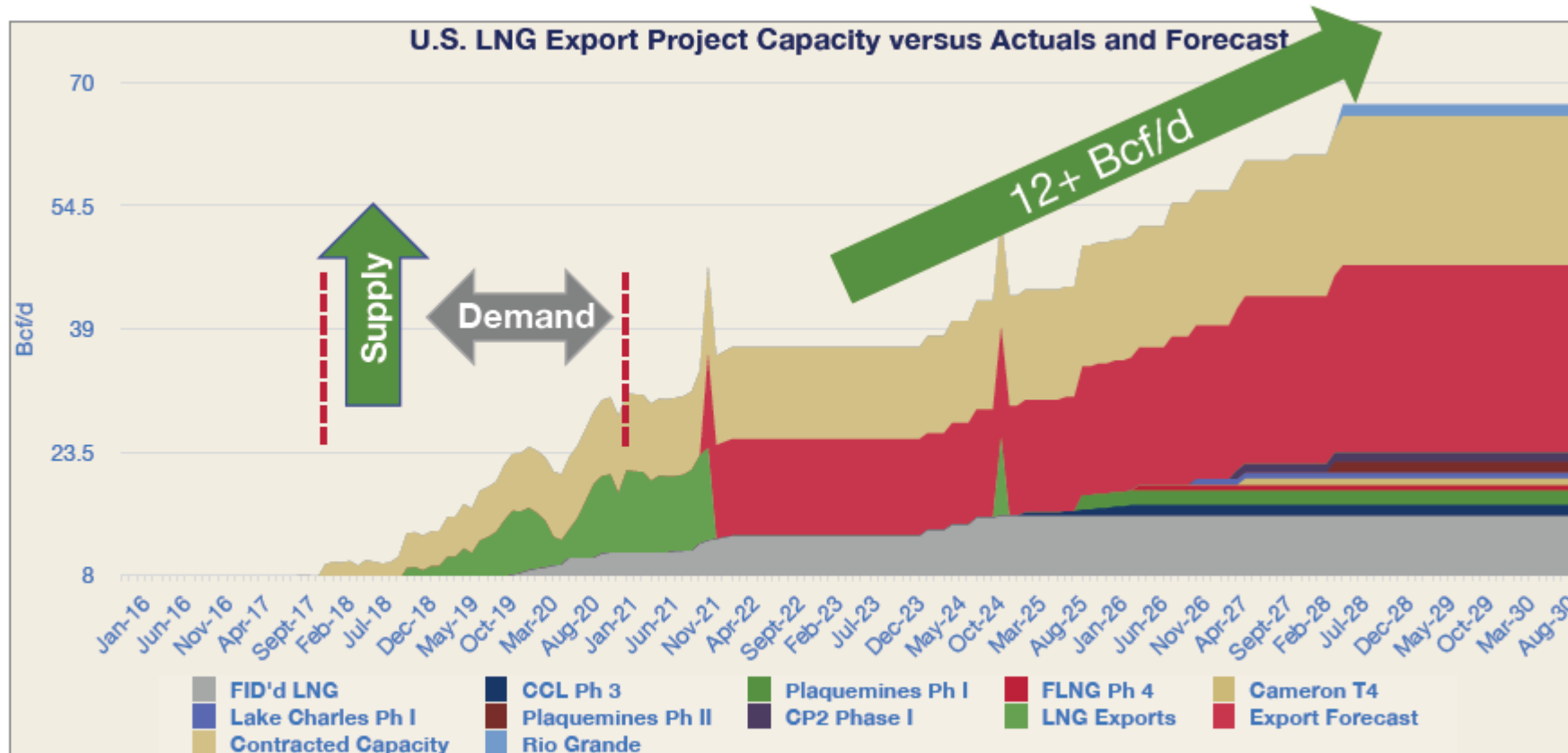
The net reduction of CO₂ emissions from this replacement is -343 million metric tons / year, equivalent to electrifying 125 million vehicles



1. International coal displaced is calculated by total thermal unit generated by gas divided by average heating content of coal (~19.8 mmbtu/short ton) // Net GHG reduction is calculated based on the emission differential between coal and natural gas (~560 CO₂e kg/MWh) based on a study from ICF.

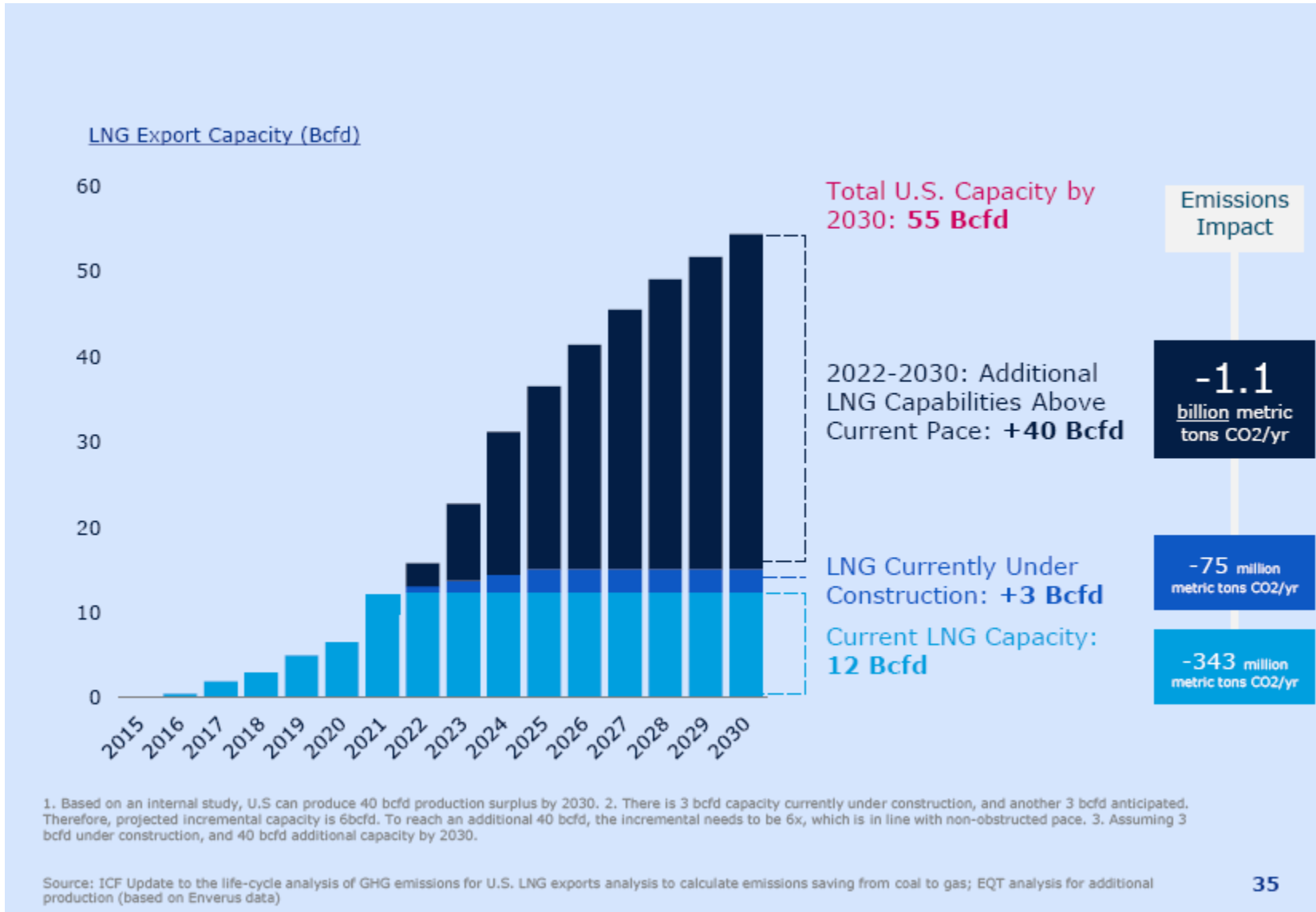
Source: EIA U.S. Natural Gas Exports and Re-Exports by Point of Exit, Reuters, EIA CO₂ emission coefficient.

2024 to 2030



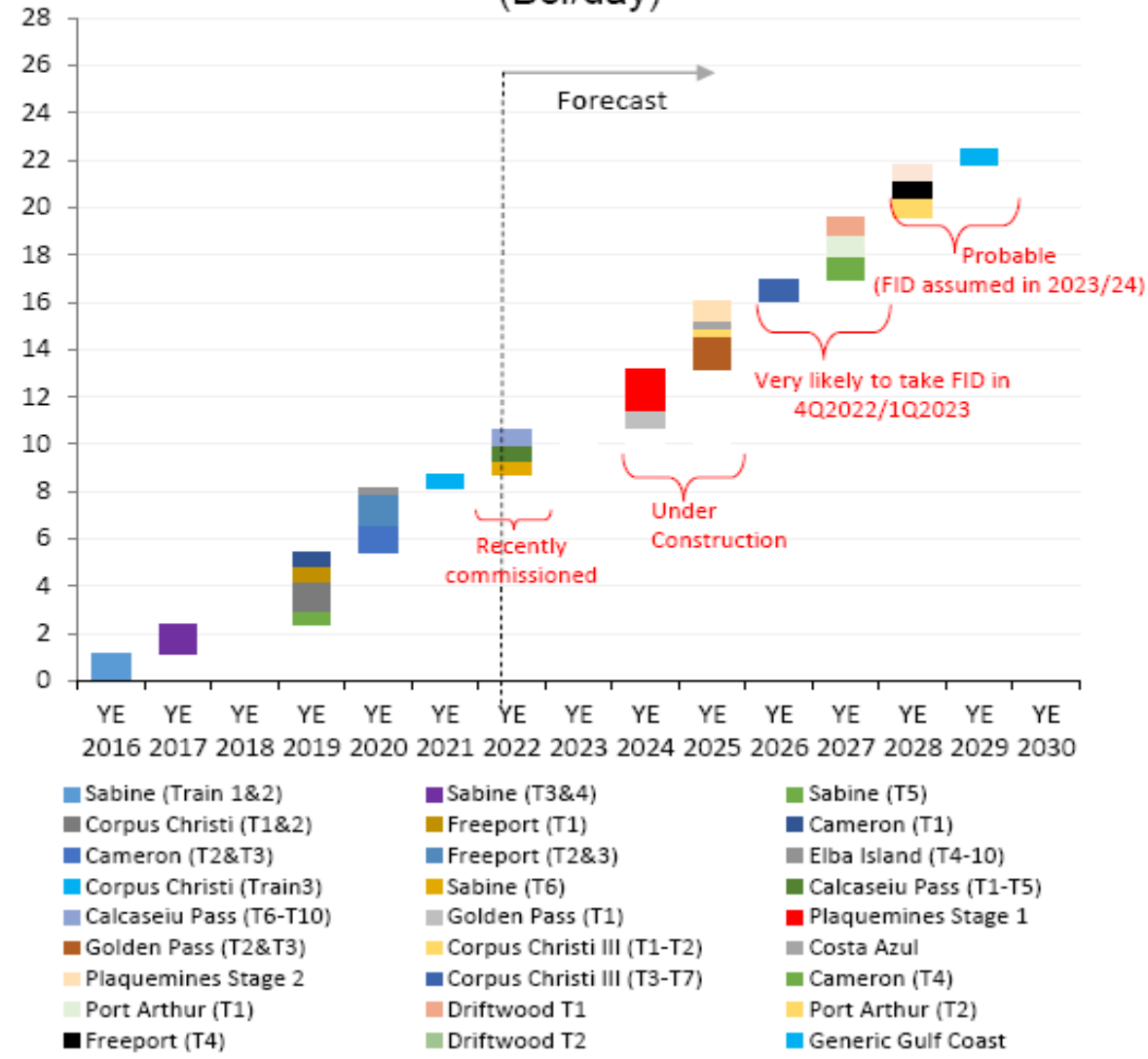
Where will all the gas come from to meet this massive increase in Demand?

Projected LNG Export Capacity Through 2030¹

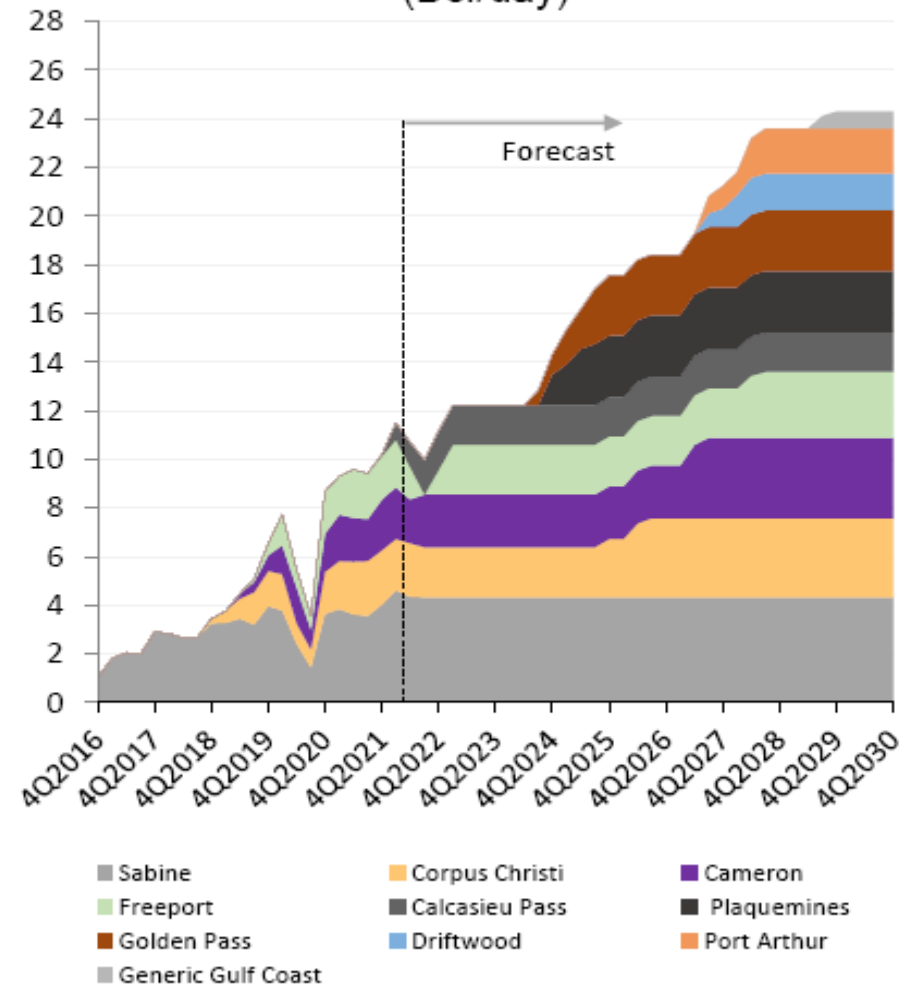


USGC LNG feed gas is expected to reach ~24 Bcf/d by 2030, adding ~14 Bcf/d to regional demand (from 2021 average of ~10 Bcf/d)

USGC LNG Export Nameplate Capacity Forecast (Bcf/day)



USGC LNG Feed Gas Volume Forecast (Bcf/day)



New Dutch LNG Regas Terminal Will Double Import Capacity



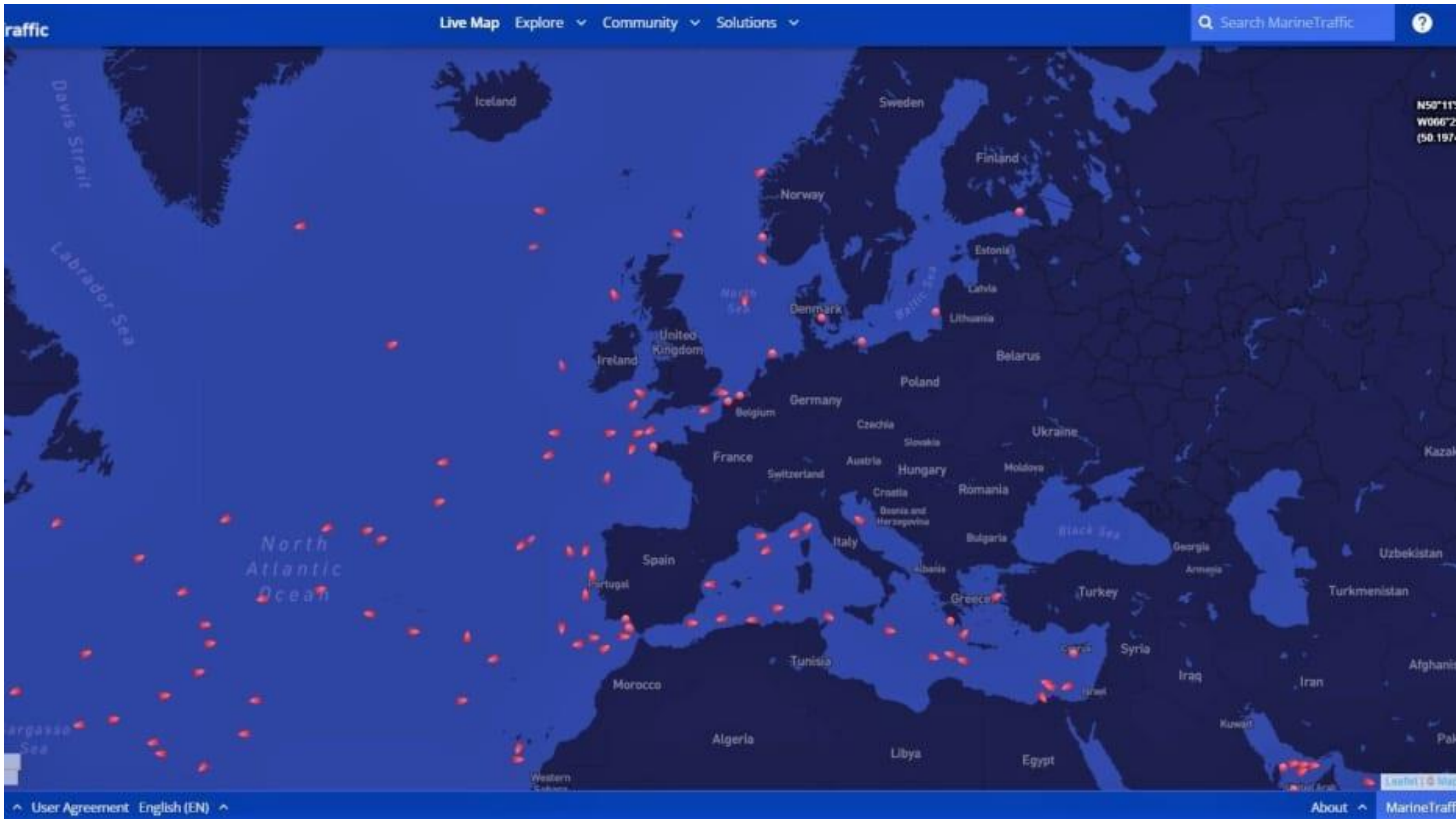
Source: Journal of Petroleum Technology, Blake Wright, September 19, 2022, Gasunie

German government announces fifth floating LNG terminal



Source: euractiv.com, Nikolaus J. Kurmayer, September 1, 2022, Photo credit: [Offshore-mag.com](https://www.offshore-mag.com),

Wave of LNG Tankers is Overwhelming Europe



Source: CNBC, Lori Ann LaRocco, October 24, 2022, MarineTraffic

Goldman Sees \$2 Trillion Surge in European Household Energy Bills by 2023

- September 6, 2022, Bloomberg.com

3,500 energy intensive industries are surveyed, only half have hedges in place for energy requirements

- July 25, 2022, Oilprice.com

Energy Prices Trigger Deindustrialization In Germany

- August 19, 2022, Oilprice.com

Germany Risks a Factory Exodus as Energy Prices Bite Hard

August 18, 2022, Bloomberg.com

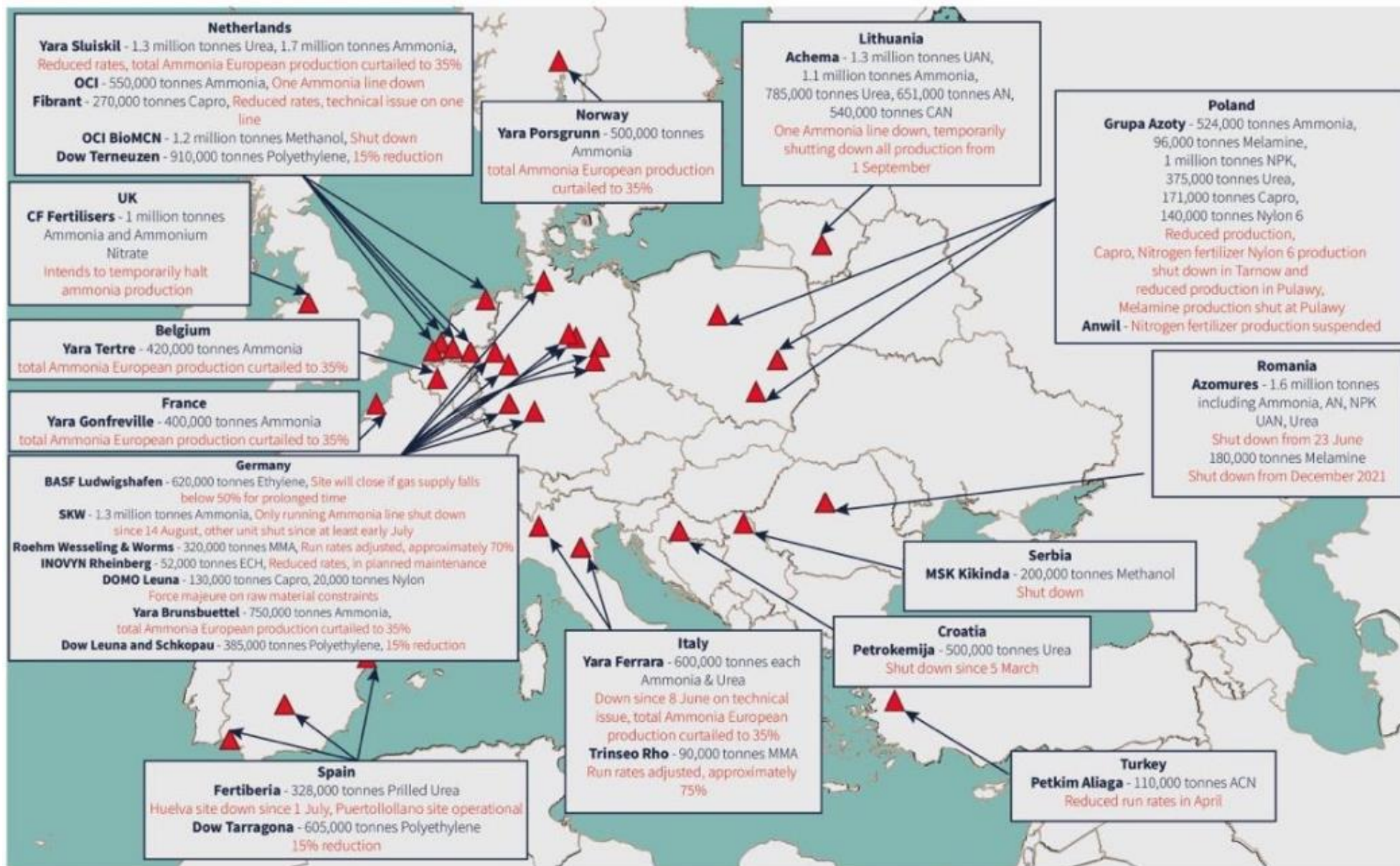
Germany's Natural Gas Crunch Could Cause Supply Chains to Collapse

- August 3, 2022, Oilprice.com

Europe's metals industry warns of existential threat to their future

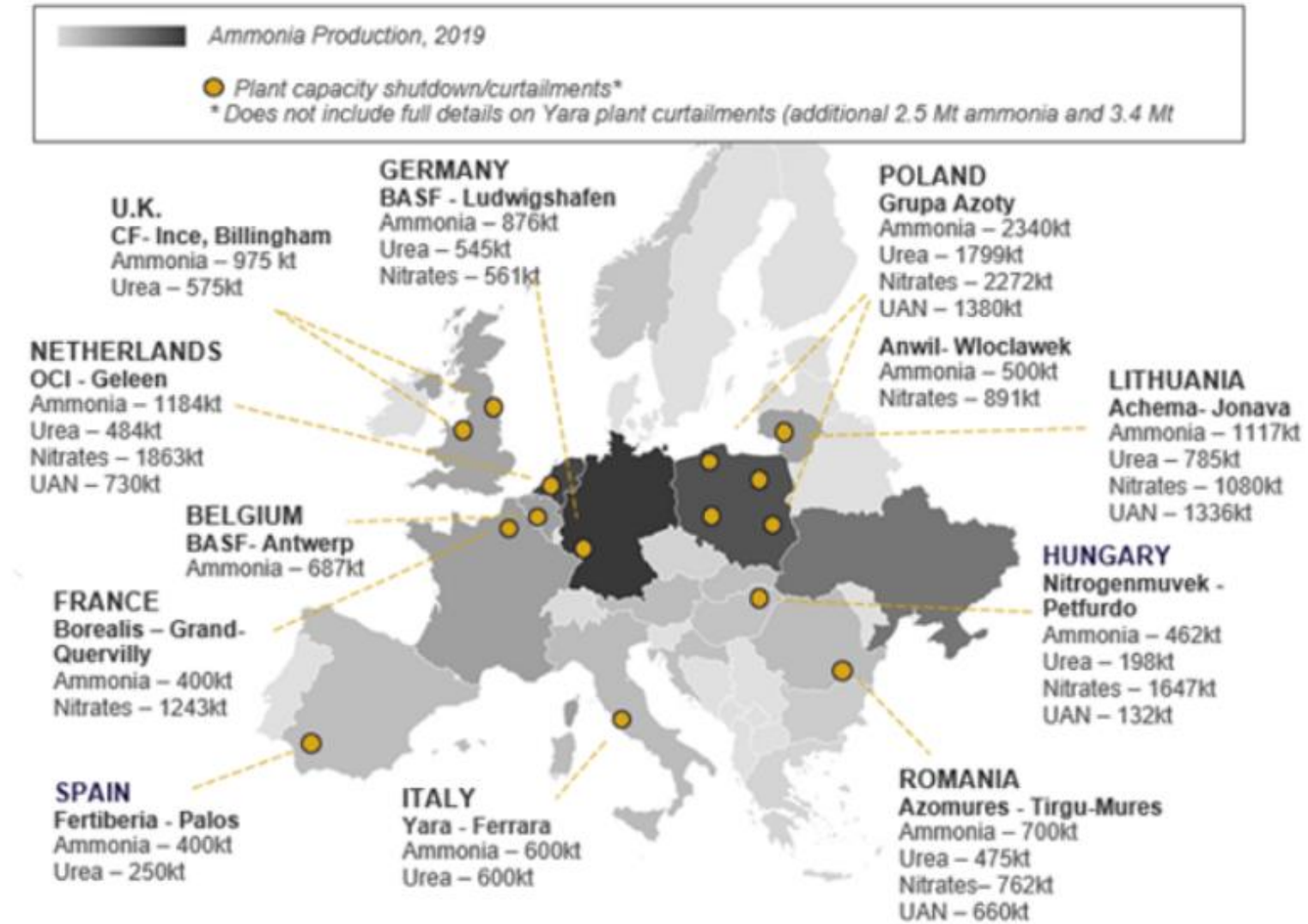
- September 2022, Eurometaux

Soaring gas prices hit Europe fertilizers, chemicals



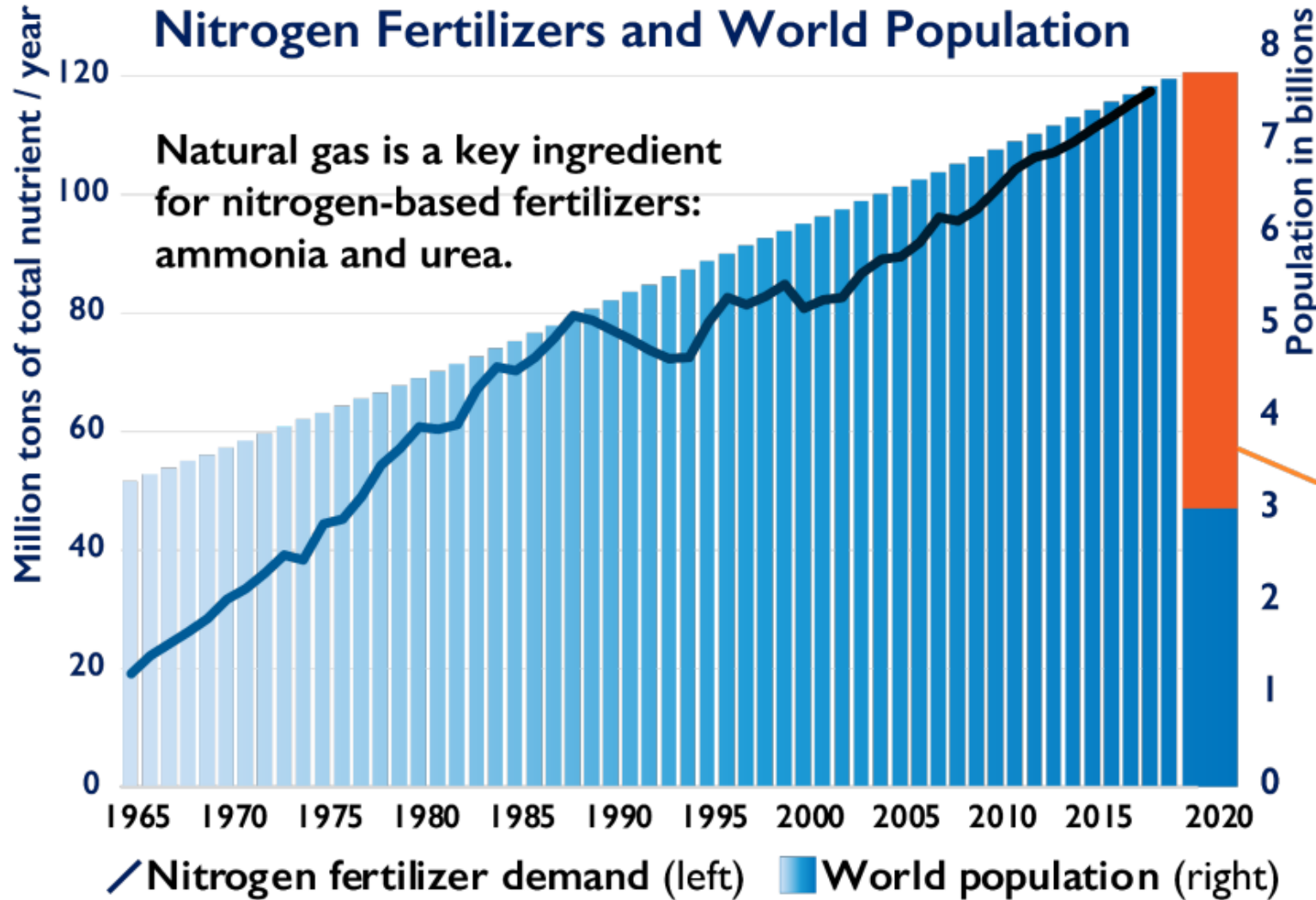
70% of Europe's nitrogen fertilizer plants have closed

Figure 1: European nitrogen production shutdowns and curtailments



DATA: CRU, IFA

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,

65-70% of the world caloric food intake is related to 4 grains:

- Wheat
- Rice
- Corn
- Soybeans



All require intense use of nitrogen fertilizers

- The goal of fertilizing grains is to increase the yield



Benchmark Tampa ammonia spot price is rising again



Source: Green Markets, a Bloomberg company

Bloomberg 

Today's EU Fertilizer Shutdowns Are Tomorrow's Food Shortages/Famine

- $\approx 70\%$ of Europe's fertilizer capacity has been shuttered due to high nat gas prices
- Ammonia prices up 5x since 1Q21
- China began restricting fertilizer exports October 2021
- Russia began restricting exports in March 2022
- Harpole: "Fertilizer production in Europe is over"
- Africa facing "shortage of at least 30 million metric tons of food"

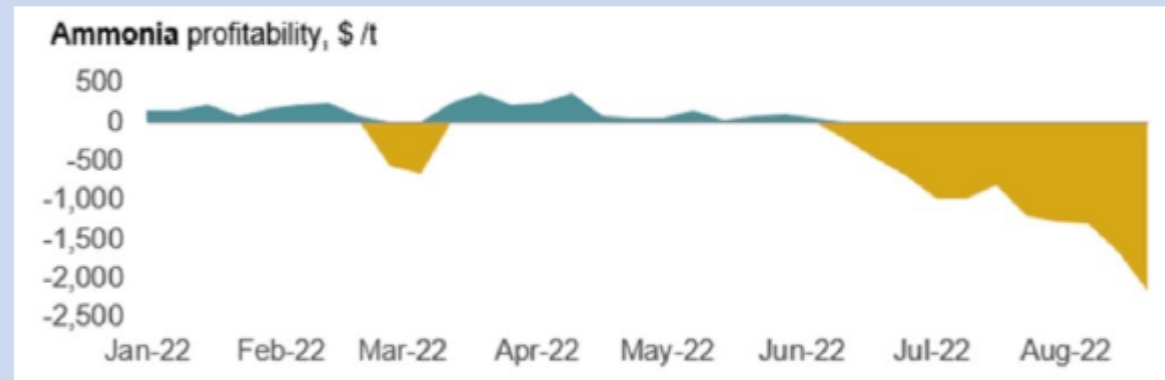
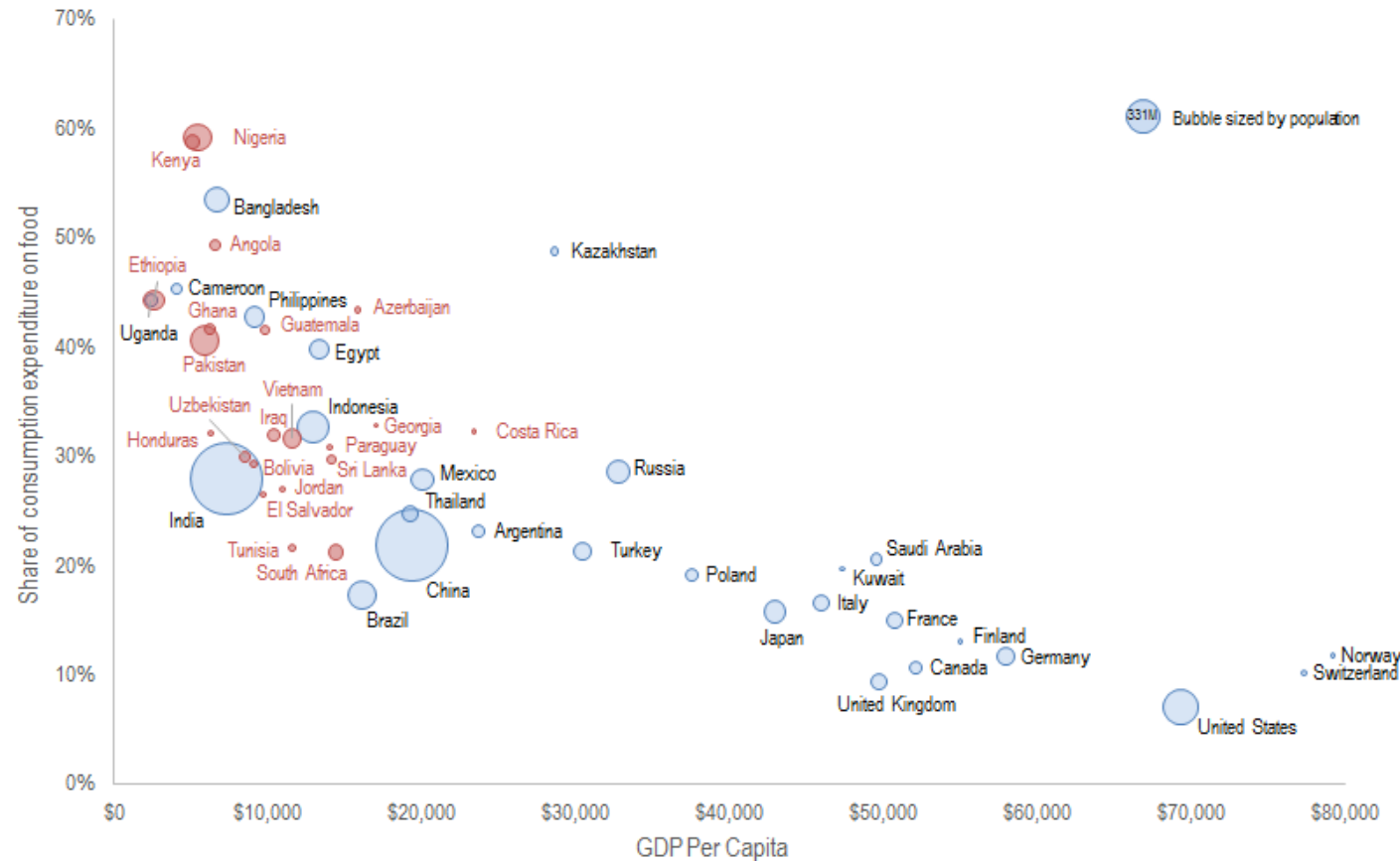


Figure 3: Low- and middle-income countries are most vulnerable to rising food prices given a larger share of income is spent on food

Share of consumer expenditure spent on food (2020, latest data available) vs. GDP per capita, 2021. Food expenditure relates only to food bought for consumption at home (i.e., it excludes out-of-home food purchases) and excludes alcoholic beverages and tobacco products.



*Countries highlighted in red are currently in NEXGEM

Surging Fertilizer Prices Set to Exacerbate African and Mid-East Food Crisis

- Use of nutrients may shrink by a third in sub-Saharan Africa
- Import-dependent region may face increasing food shortages



“That could potentially curb cereals output by 30 million tons, enough to feed 100 million people.”

– Sebastian Nduva, Program Manager at AfricaFertilizer.Org

Is this a sunset business?

A leading indicator of a sunset business is the inability to attract capital investments into expensive, long-term projects. This is not happening in natural gas.



- Over the past year and a half, nearly 50 binding contracts have been signed for LNG offtake from facilities on the U.S. Gulf Coast
- Of these contracts, about 75% contemplate a start date in 2026 or 2027
- Of these contracts, over 70% run for 20 years and about 25% run for 15 years
- Conclusion: **Sophisticated investors are betting material capital that this will remain a good business through at least 2045**

- European natural gas prices will remain 5x-10x the historical norm for the next 3 years
- That will cause the continued deindustrialization of Europe
- Putin's goal of separating the EU may succeed
- Food security and famine will be one of the top concerns of all world leaders
- This is essentially a clash between globalism and nationalism
- This is also the clash between the extreme radical environmental agenda and energy pragmatism

The far green left still doesn't understand scale.

Daniel Yergin: "... this is a \$90 trillion world economy that gets 80% of its energy from hydrocarbons. It's not going to change overnight."

John Harpole

President

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