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## Video | Spring Training | North America

# Natural Gas and LNG Commodity Strategy

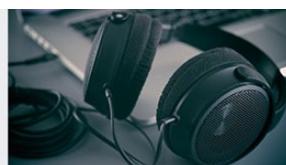
In our North American Spring Training series, Devin McDermott provides a comprehensive primer and overview of US Natural Gas and Global LNG markets, including the current state, key trends, and debates shaping the longer term outlook.



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2023 North America Spring Training

# Natural Gas and LNG Commodity Strategy

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# Outline

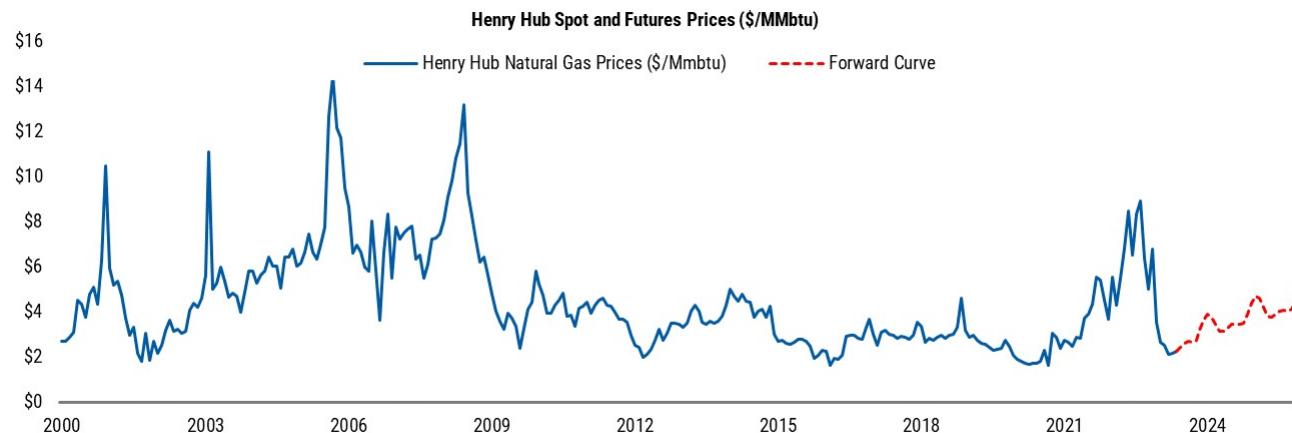
**Primer**

**US Natural Gas Outlook**

**Global Natural Gas & LNG**

## North America Natural Gas Basics & Terminology

- **Historically a “Closed” Market:** Pricing is dictated largely by domestic factors including demand trends (power generation, heating, weather, industrial activity) and the cost of new supply, including transport via pipelines
  - Price historically independent from oil, though gas “associated” with oil wells now a factor
  - Rising exports is starting to change pricing drivers
- **Prices** cited in \$ per million British Thermal Units (\$/MMBtu), and have historically been highly volatile: trading range of <\$2 to \$15 over the past ~10 years
- **Volumes**, including production, storage, and demand are measured in cubic feet (cf): thousands (Mcf), millions (MMcf), billions (Bcf), and trillions (Tcf) [1 MMBtu = 1.02 Mcf]



Source: Bloomberg, Morgan Stanley Research

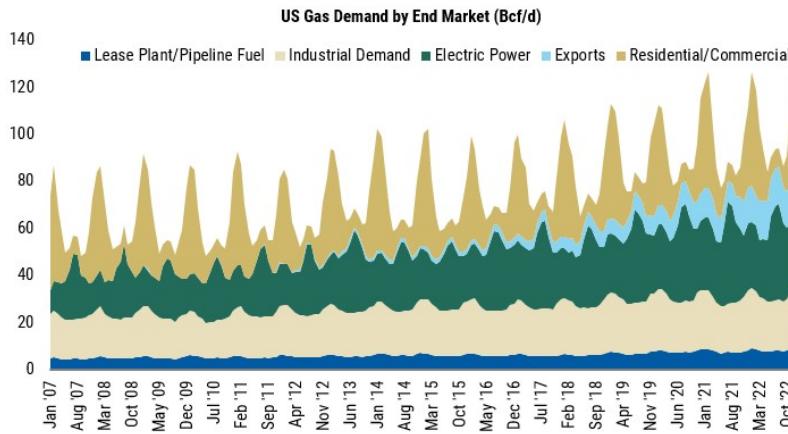
# Sources of Demand

**Demand is highly seasonal, peaking in the winter months, and is broken into four key categories:**

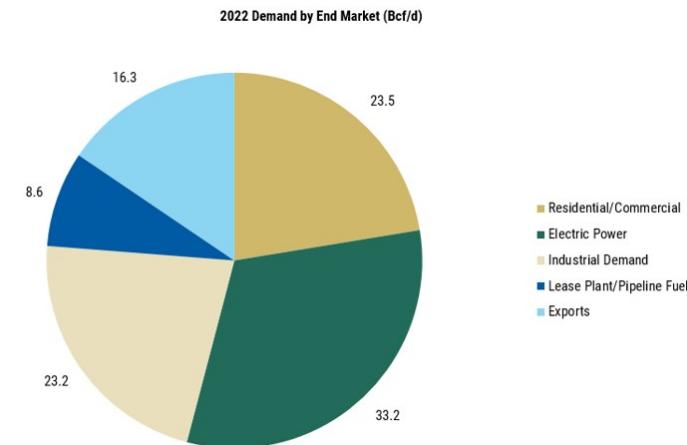
1. Residential and commercial, driven by winter heating needs
2. Industrial, driven by economic activity and oil/gas price ratios
3. Electric power, driven by fuel switching between natural gas and coal generation in the power sector
4. Exports, driven by Liquefied Natural Gas (LNG) and Exports to Mexico (MExports)

**Exports have been the primary driver of demand growth over past several years**

**Demand is highly seasonal**



**Electric Power was the largest source of demand in 2022**



Source: EIA, Morgan Stanley Research estimates

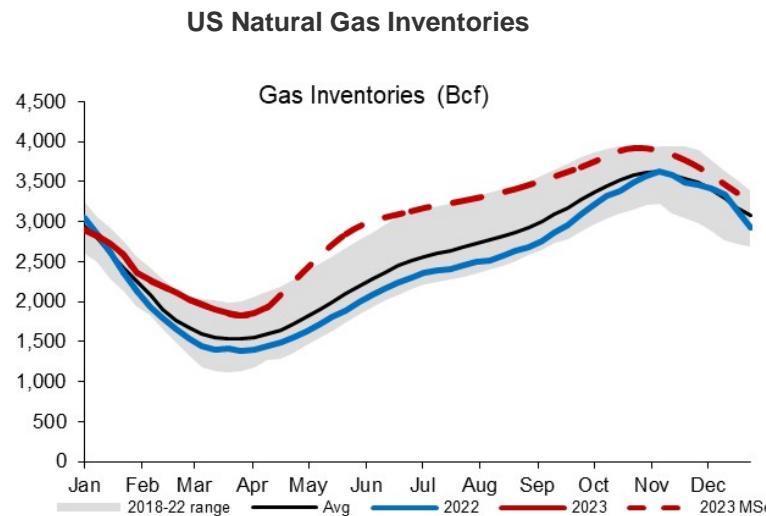
Source: EIA, Morgan Stanley Research estimates

# Seasonality Creates a Need for Storage

**In the winter, demand exceeds supply, while in the summer the reverse is true**

- The US has ~4.8 Tcf of storage capacity (~4.2-4.3 effective) which fills during the summer and is drawn down in the winter
- “End-Mar” signifies the end of the heating season (Nov – Mar) and the beginning of the injection season (Apr – Oct)
- “End-Oct” denotes the end of the injection season and the beginning of the heating season

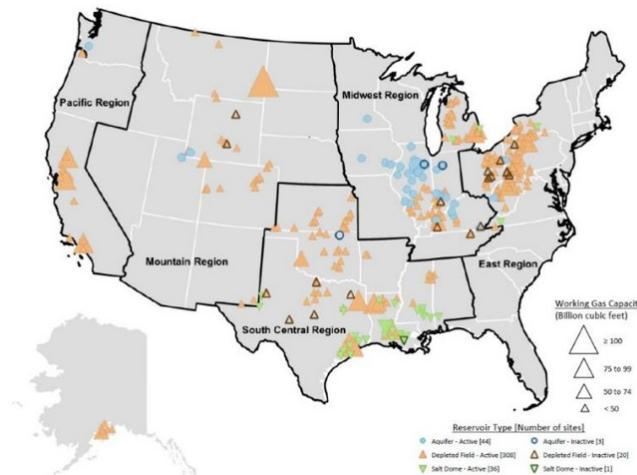
**Storage levels, or “inventories”, are reported weekly on Thursdays at 10:30am by the Energy Information Administration (EIA)**



Source: EIA, Bloomberg, Morgan Stanley Research

## US Natural Gas Storage Facilities

U.S. Underground Natural Gas Storage Facility, by Type (December 2019)



Source: EIA, Morgan Stanley Research

# Supply Fundamentals

**The US has an abundance of gas supply**

- Estimates of 2,926 Tcf of technically recoverable natural gas reserves imply ~80 years of potential gas supply

## **Shale gas exploration reversed decades of reverse stagnation**

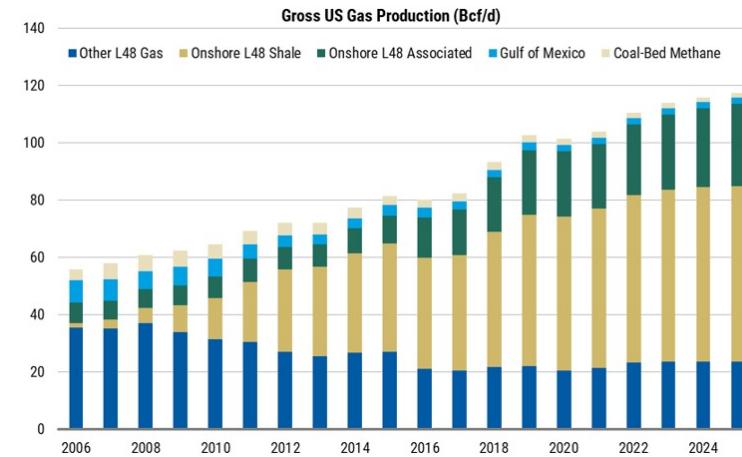
- Horizontal drilling “unlocked” previously unrecoverable shale resources in the mid-2000s

## **Lower 48 States Shale Plays**



Source: EIA, Morgan Stanley Research

## Supply by Type



Source: EIA, Morgan Stanley Research

# Transport and Infrastructure

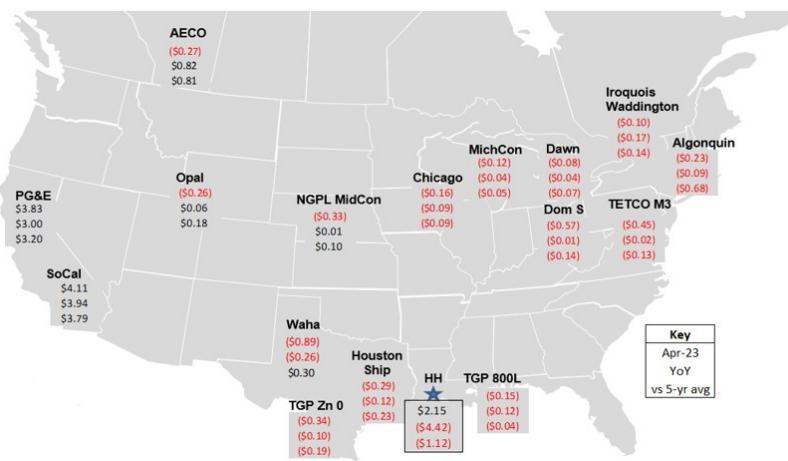
## Natural Gas Prices are very regional

- NYMEX prices represent Henry Hub in Louisiana
- Regional price points exist throughout the US and can trade at a positive or negative price spread, known as “Basis”, to Henry Hub

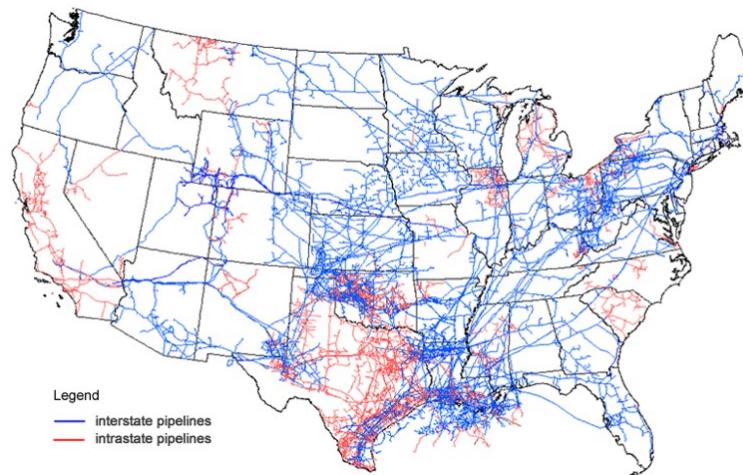
**Robust pipeline infrastructure exists to move supply to demand centers. Transport costs are a key driver of Basis.**

- Historically, gas was produced in the Gulf Coast and transported to demand centers across the Eastern US
- Growth in low-cost shale production across Appalachia is reversing these flows
- Gas prices in the Northeast and Appalachia now trade at a discount to Henry Hub, versus a historical premium

Local Basis Across the US



Intra and Interstate Pipeline Transport



Source: Bloomberg, Morgan Stanley Research

Source: EIA, Morgan Stanley Research

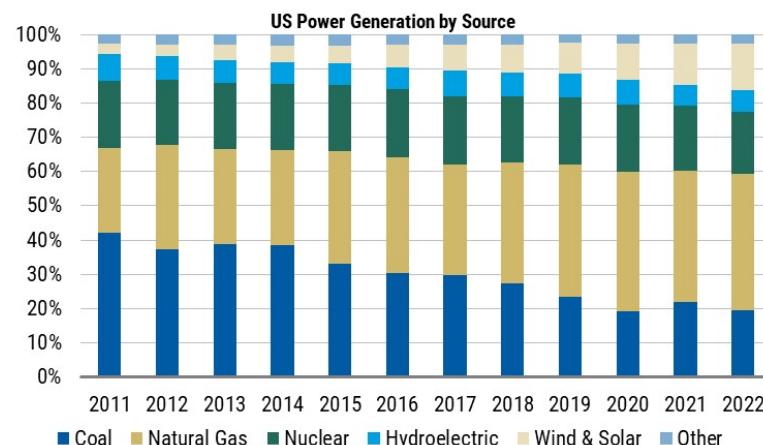
## Price Drivers & Fuel Switching

**In the short term, the market trades around inventory levels, with pricing dictated by supply and fuel switching.**

- Utilities have the ability to switch between natural gas and coal on a real-time basis
- This fuel switching occurs based on the relative economics of the two fuel types
- If inventories are low, gas prices will rise to incentivize a switch from natural gas to coal. If inventories are high, the reverse will happen. High coal prices can limit the level of fuel switching.
- Power has historically been the only elastic source of demand in the short term, making fuel switching a key driver of prices over the past decade
- Weather is a key variable

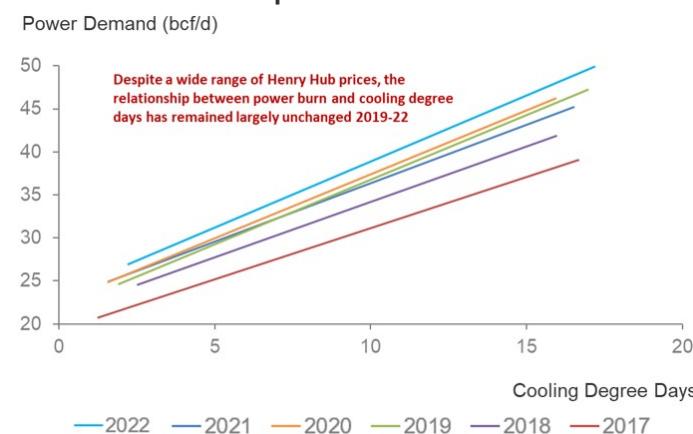
**In the long term, the marginal cost of supply and transport costs set prices.**

Gas has been gaining market share vs. coal...



Source: Morgan Stanley Research, EIA

...Post Covid, fuel switching has not been occurring as prices rise



Source: S&P Platts, Bentek, Morgan Stanley Research

# Outline

**Primer**

**US Natural Gas Outlook**

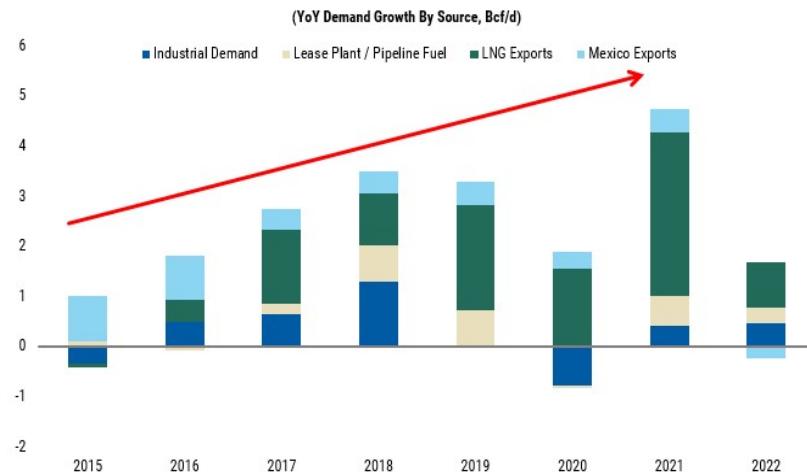
**Global Natural Gas & LNG**

# Demand Growth Has Been Robust Over the Past Several Years...

## US natural gas demand has grown significantly in recent years

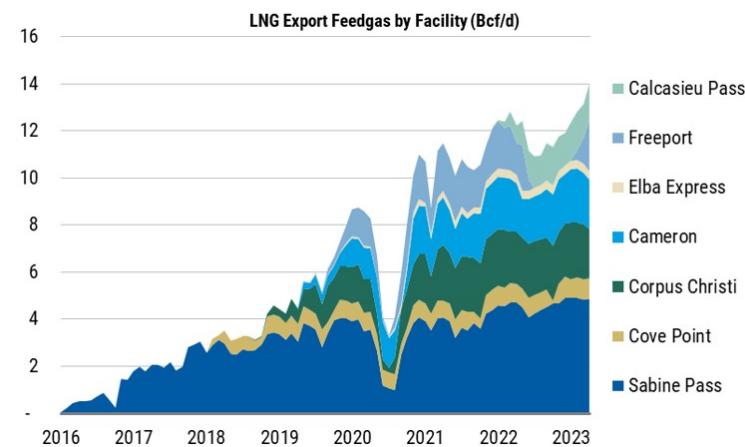
- Excluding power, demand has increased by an average of ~2.5 bcf/d annually since 2015, mainly due to new LNG export projects coming online
- Demand in 2022 grew by ~3 bcf/d, largely supported by LNG export feedgas
- Since 2016, LNG exports have added over 13 bcf/d of incremental US natural gas demand

**US natural gas demand has grown significantly since 2015...**



Source: EIA, Morgan Stanley Research Estimates

**...As >13 bcf/d of incremental LNG export projects have come online**



Source: S&P Platts, Bentek, Morgan Stanley Research

## ...Pre-Covid, Low-Cost Supply Growth Kept Prices Low

**Despite robust demand growth, low cost of supply and associated gas flooded the market**

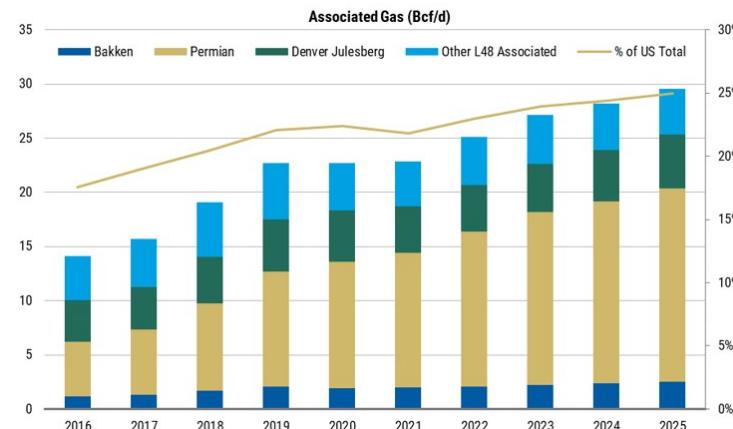
- Over the 2016-19 period, US associated gas supply grew ~8.5 bcf/d, an equivalent amount to almost all 2020 US LNG export needs and reaching ~25% of total supply
- “Free” associated gas met ~100% of incremental demand in 2018 and 2019
- As a result of oversupply, Henry Hub fell by ~40% 2010-2019 and >70% 2008-2019

**Renewables such as wind & solar have also eroded gas demand**

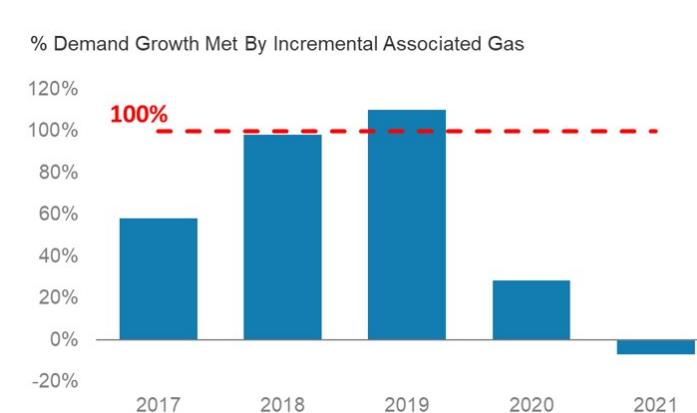
- Technology improvements have made wind the lowest cost form of generation in many regions

**Over the 2016-22 period, US associated gas supply grew ~11 bcf/d and now sits at ~25% of total supply...**

**...And met ~100% of incremental demand in 2018 and 2019**



Source: EIA, Morgan Stanley Research



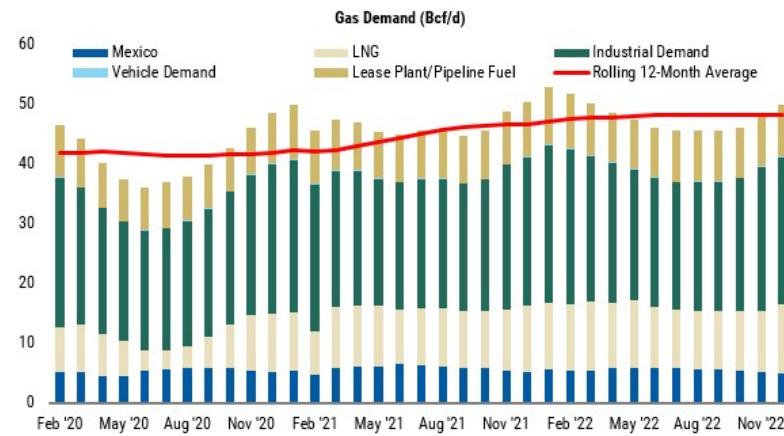
Source: EIA, Morgan Stanley Research estimates

# Covid Reset The Outlook: More Demand, Less Supply

## US gas demand recovered quickly to pre-Covid levels and has continued to grow

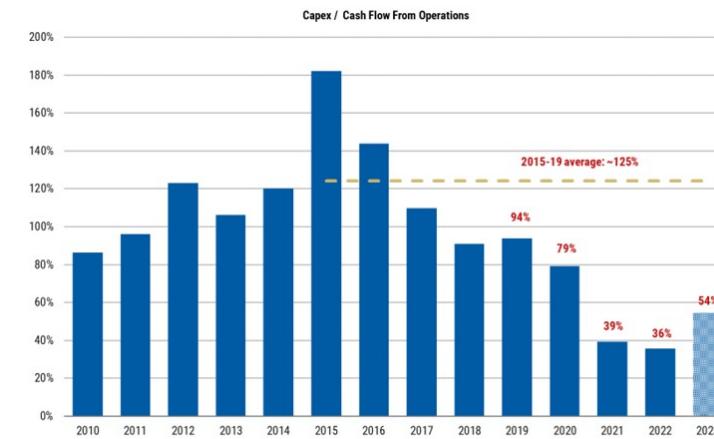
- After declining through summer 2020 due to Covid-19 headwinds, gas demand fully recovered by the end of 2020 and continued to exhibit strong growth
- At the same time, the covid downturn structurally changed the capital allocation framework for the E&P industry, shifting from production growth to returns, free cash flow generation, and shareholder distributions.

## US gas demand recovered quickly from the covid downturn and has continued to increase



Source: EIA, Morgan Stanley Research estimates

## After years of outspending cash flows, US E&Ps are taking a more disciplined approach



Source: Bloomberg, Morgan Stanley Research

## Since 2020, Supply Growth Has Been Subdued

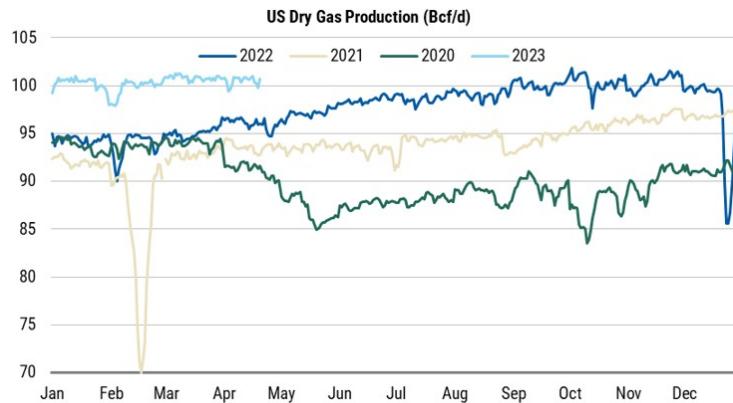
**Even with higher prices, US natural gas production growth remained subdued for much of the past two years before beginning to modestly increase in 2H22**

- Total US dry gas production averaged ~98 bcf/d in 2022, roughly flat with December '21 levels

**Gas focused rig counts rose in 2022 in response to higher prices**

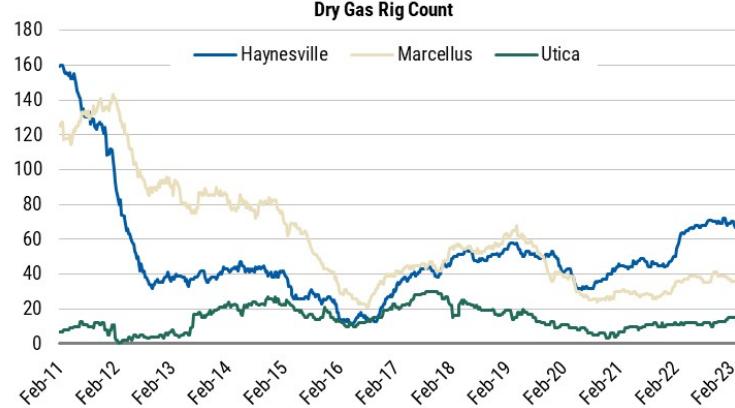
- Rig counts in the Haynesville have moved above pre-Covid levels, while the Marcellus has nearly recovered
- In the higher oil price environment, associated gas supply should also increase

**US natural gas supply has remained roughly flat year-to-date, near 2H22 levels...**



Source: S&P Platts, Bentek, Morgan Stanley Research

**...Gas directed rig counts are up ~10% y/y and roughly flat year-to-date**



Source: Baker Hughes, Morgan Stanley Research

# Largest Source of US Gas Supply Growth is Facing Infrastructure Constraints

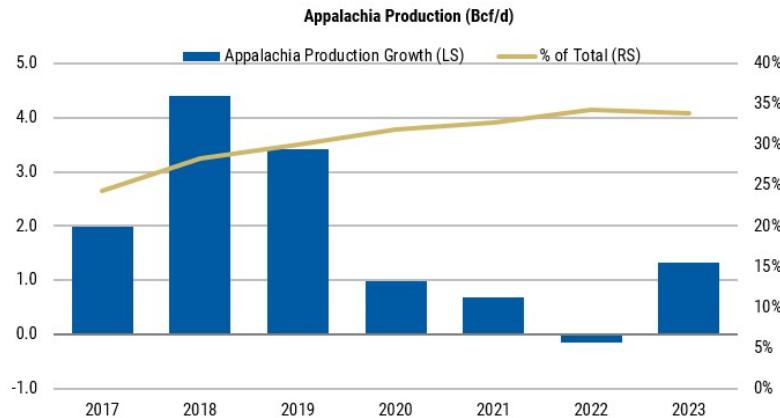
**Appalachia has been a key source of US supply growth in recent years**

- Since 2015, Appalachia (Marcellus/Utica) production has grown nearly 15 bcf/d and now represents >30% of total US dry gas supply

**Growing regulatory challenges have slowed the pace of pipeline expansions that are needed to move gas from Appalachia to demand centers elsewhere in the US**

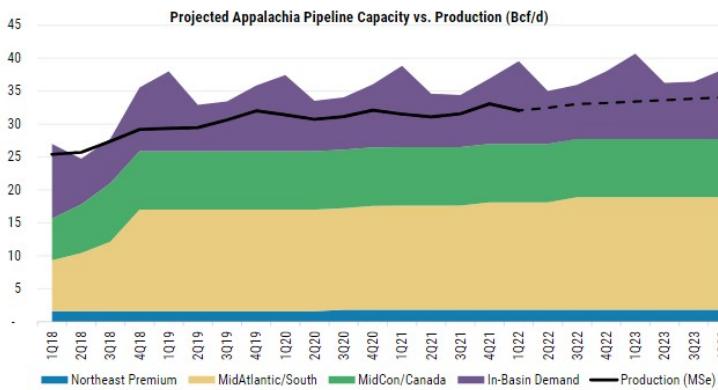
- In a scenario in which no additional pipelines move forward, takeaway out of the basin appears fairly tight this year

**Appalachia has been a key source of US supply growth...**



Source: EIA, Morgan Stanley Research Estimates

**...Though assuming no additional pipelines, we see capacity nearly full in 2H22, potentially limiting production growth thereafter**



Source: IHS Markit (local demand historical figures and estimates), EIA, Morgan Stanley Research

# Higher Supply and Limited New Demand Have Led to Elevated Storage Levels

**Higher supply, a milder winter and the delayed restart of Freeport LNG have inventory levels near the high end of the 5-year normal**

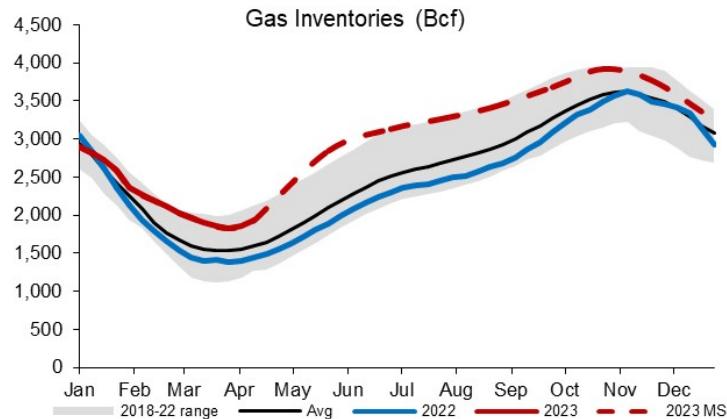
- US natural gas inventories are currently ~20% above the 5-year normal and have averaged 15-20% higher over the past several weeks

**Henry Hub prices have been low in 2023**

- High storage levels have driven front-month Henry Hub prices to a low of ~\$2/MMBtu, though prices may still need to move lower before recovering

**US natural gas inventories are ~20% above the 5-year normal...**

**...Resulting in ~50% decline in Henry Hub prices YTD**



Source: Bloomberg, EIA, Morgan Stanley Research Estimates



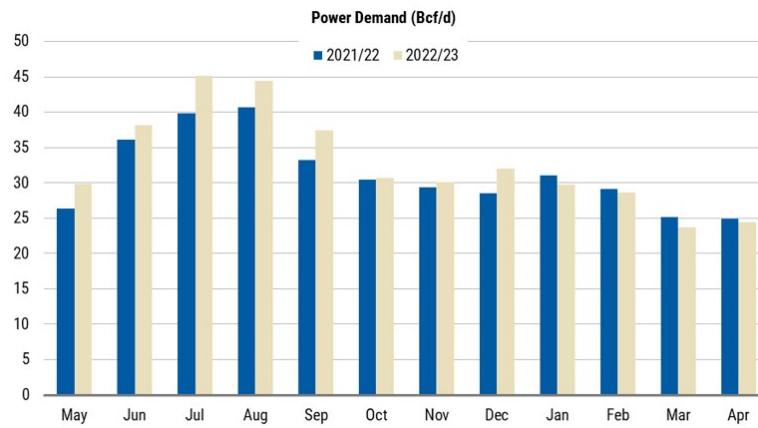
Source: Bloomberg, Morgan Stanley Research

# Gas-to-Coal Switching in the Power Sector

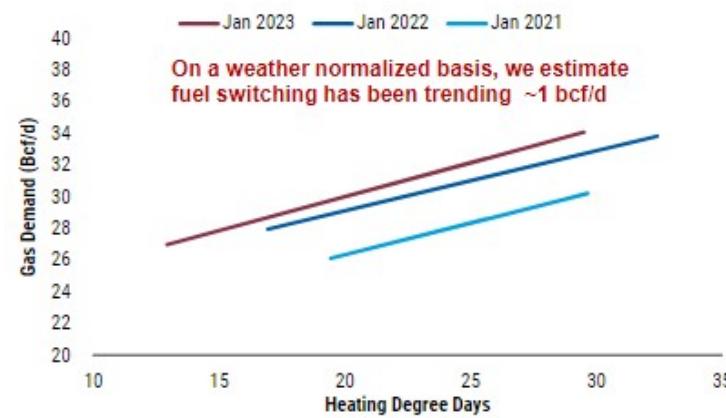
**Low gas prices since the start of 2023 have started to drive gas-to-coal switching higher**

- Power burn over the past year averaged 5% above the prior period
- While improving demand from coal-to-gas switching helps moderate oversupply, we still see a need for activity cuts to moderate supply growth — especially in the Haynesville.

**Average power burn over the past year averaged ~5% above prior year levels...**



**...Low gas prices have started to drive coal-to-gas switching in the power sector...**



Source: EIA, S&P Platts, Bentek, Morgan Stanley Research

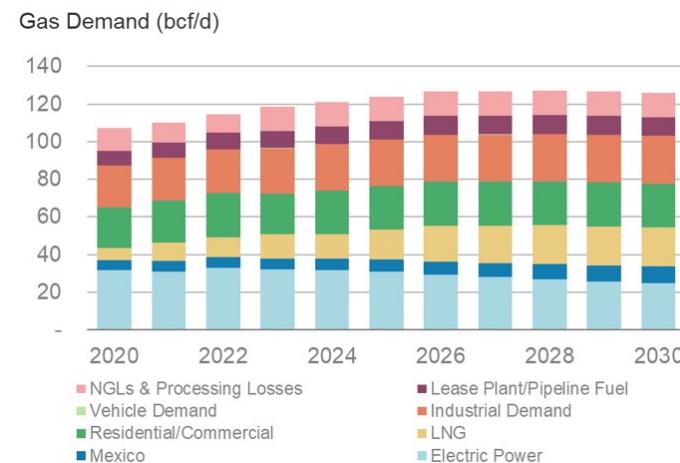
Source: S&P Global, Genscape, Bloomberg, Morgan Stanley Research

# Longer Term, Additional LNG Exports Should Drive Demand Higher

**Europe's pivot away from Russian gas requires more LNG, supporting another wave of US projects**

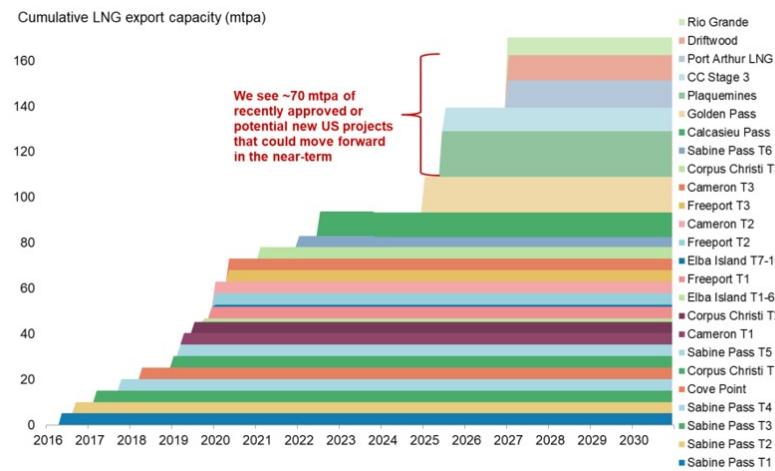
- ~45 mtpa of projects have been approved over the past year, and an additional ~30 mtpa has made progress signing offtake arrangements, representing the potential for a >50% increase in US export capacity
- Should additional export facilities move forward, this could tighten the US market and support higher Henry Hub prices

**Including already FID'd LNG projects, domestic demand is set to grow nearly 20% 2020-2030...**



Source: EIA, Morgan Stanley Research Estimates.  
Note: FID = "Final Investment Decision"

**...While additional LNG projects could result in a >50% in export capacity**



Source: Company Data, Morgan Stanley Research estimates

# Outline

**Primer**

**US Natural Gas Outlook**

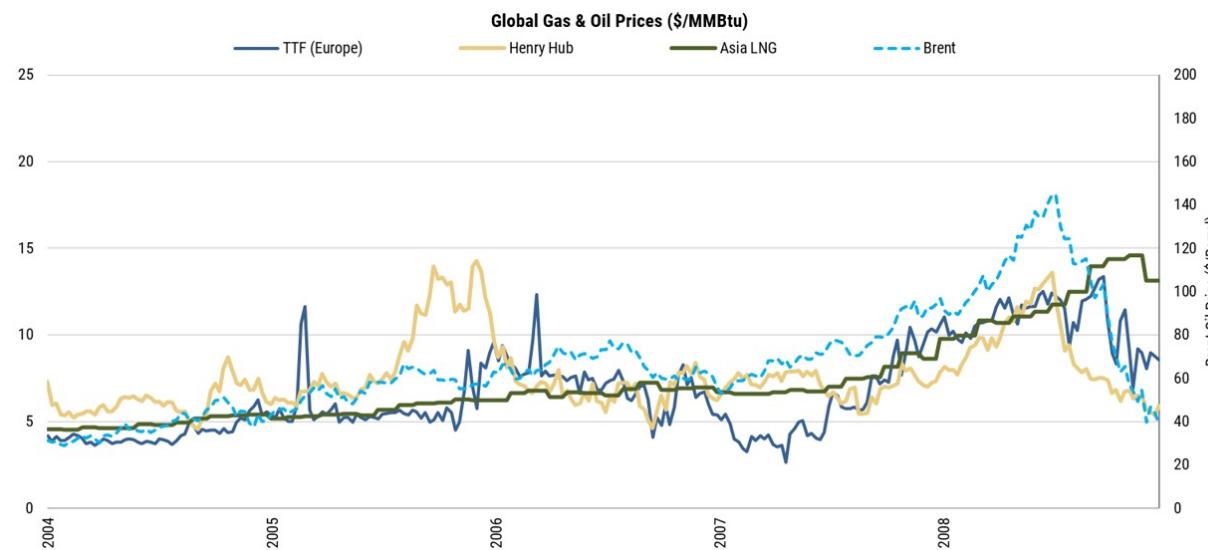
**Global Natural Gas & LNG**

# Evolution of Global Natural Gas Markets

**Global gas markets can be broken down into three primary regions:** North America (mostly the US), Europe, and Asia. Prior to 2008, each market had its own regional supply-demand and pricing drivers (such as local weather variability) but had prices primarily linked to oil

## Phase 1 (2004 – 2008): Historically, global gas prices moved with oil

- In the period from 2004 to mid-2008, Brent prices more than tripled to ~\$145/bbl, pushing global gas prices up by an average of ~135%

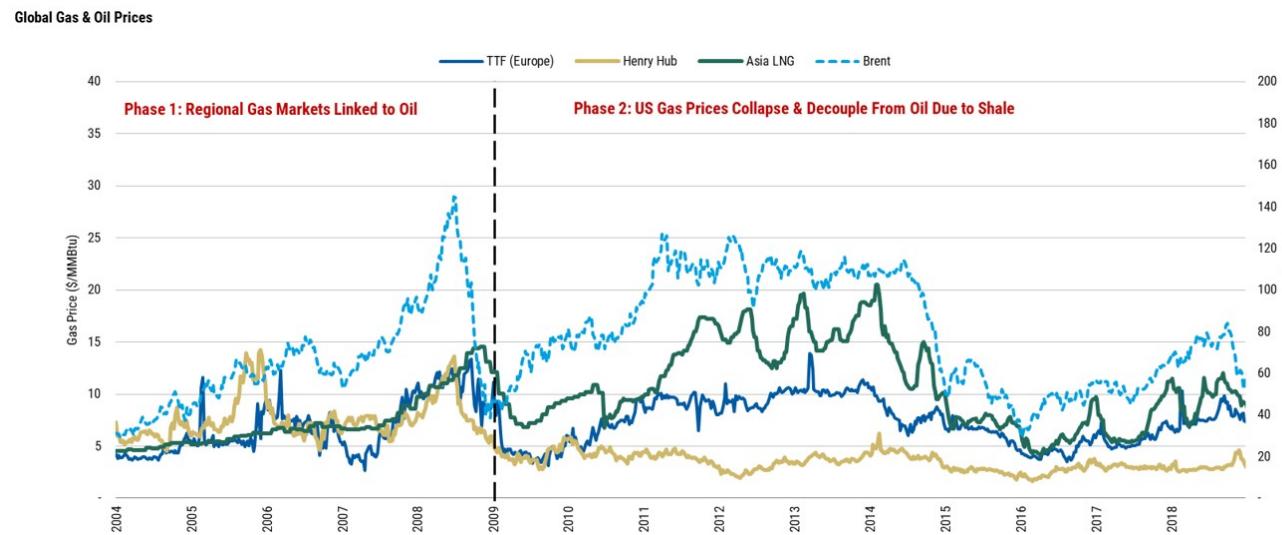


Source: IHS Markit, Platts, Eikon, Morgan Stanley Research

# Evolution of Global Natural Gas Markets

## Phase 2 (2009 – 2018): Innovation in US shale causes US natural gas prices to decouple from oil

- Exiting the 2008 Recession, oil prices saw a material recovery from lows of ~\$36/bbl in 2009 back to over \$100
- However, the “Shale Revolution” led to a substantial increase in US natural gas production, moving Henry Hub prices to a trough near \$1.75/mmbtu in 2016
- Meanwhile, European and Asian gas prices retained some oil linkage, but remained geographically isolated



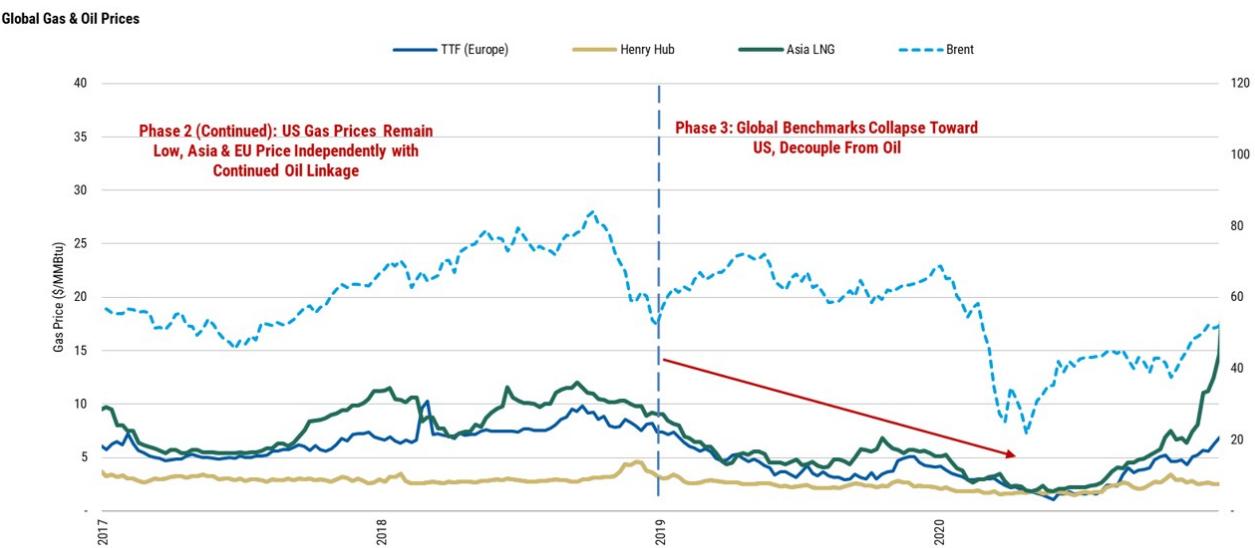
Source: IHS Markit, Platts, Eikon, Morgan Stanley Research

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# Evolution of Global Natural Gas Markets

## Phase 3 (2019-2020): LNG “unlocks” US and other low-cost natural gas

- The rise in US natural gas exports in the form of LNG has linked global markets and brought a decoupling of natural gas and oil prices
- In 2019, European and Asian gas prices moved substantially lower, despite relatively stable Brent prices
- Global gas prices remained close to US marginal costs in 2020

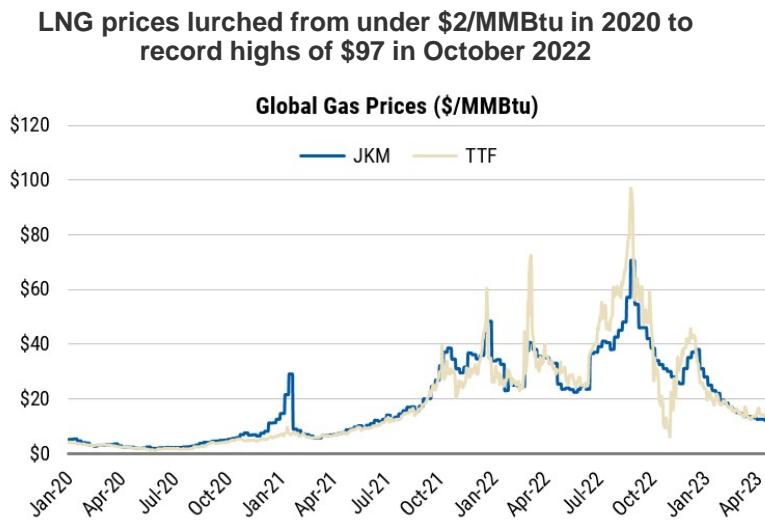


Source: IHS Markit, Platts, Eikon, Morgan Stanley Research

# Evolution of Global Natural Gas Markets

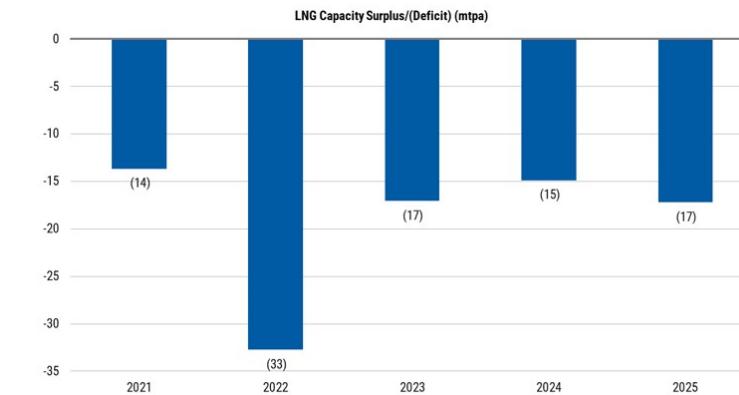
## Phase 4 (2021-2022): Covid “reset” & stronger for longer prices

- The Covid-driven price collapse in 2020 drove a wave of project delays and cancellations, while demand continued to grow
- By 2021, this had pushed the market into a multiyear upcycle with higher, more volatile prices
- Now, Europe's pivot away from Russian natural gas will require even more LNG, adding strain to an already tight market



Source: Refinitiv, Morgan Stanley Research

**As demand accelerated, Covid brought a wave of project delays and cancelations, leaving the market with limited new supply 2022-24**

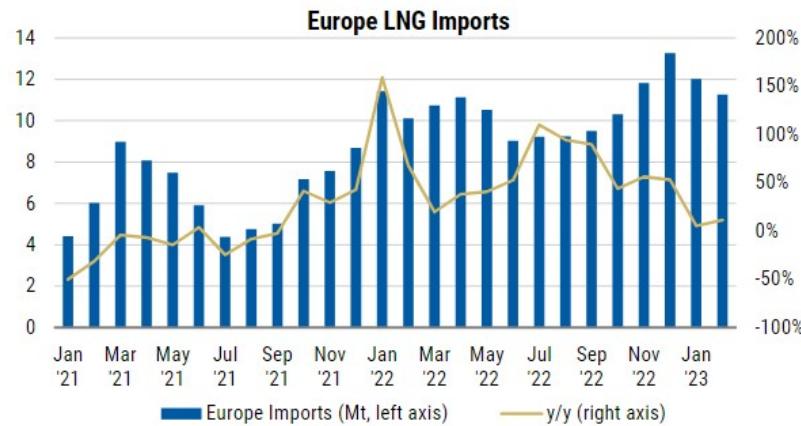


Source: Wood Mackenzie, Morgan Stanley Research estimates

## Russia Was Europe's Largest Gas Supplier...

**Russia Was Europe's largest gas supplier, accounting for ~40% of supply in recent years**

- Russian pipeline flows into Europe were materially lower y/y this past winter
- LNG imports have increased to fill the void



Source: Bloomberg, Morgan Stanley Research

### Pipeline flows from Russia into Europe

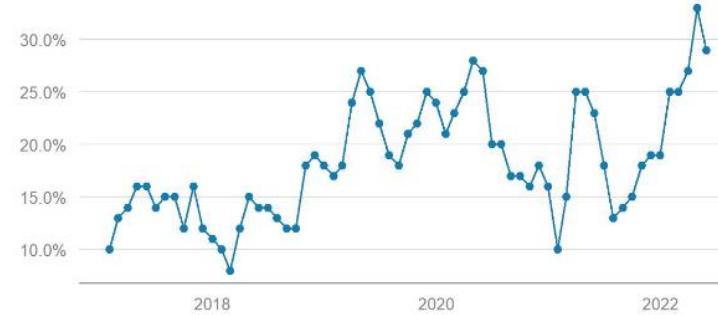
Daily data to 25 June 2022 (mcm/d)



Note: flows into Turkey not included  
Source: ENTSOG, Morgan Stanley Research

### Europe's share of global LNG imports

(mt per month)

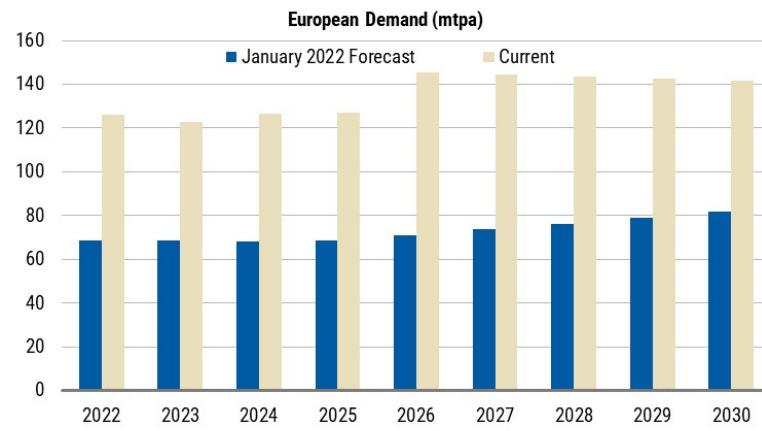


## ...Requiring Additional LNG Imports to Fill the Void

**Europe's pivot away from Russian gas requires more LNG, adding strain to an already tight market**

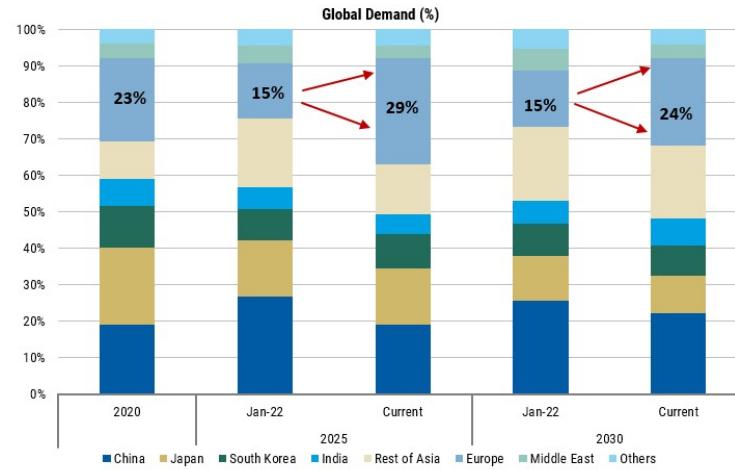
- With the REPowerEU plan calling for a shift away from Russian energy supplies, European gas consumption will need to fall rapidly and LNG imports will need to grow sharply
- Over the next decade, we see Europe's LNG demand more than doubling from ~70 mtpa in 2021 to over 140 mtpa in 2030 (average imports through 2030 are +65% vs our prior outlook)
- As such, we project European LNG growing to ~25% of total global demand by 2030 (up from 20% in 2021), supporting strong growth globally

**Our forecast for European LNG demand has increased substantially...**



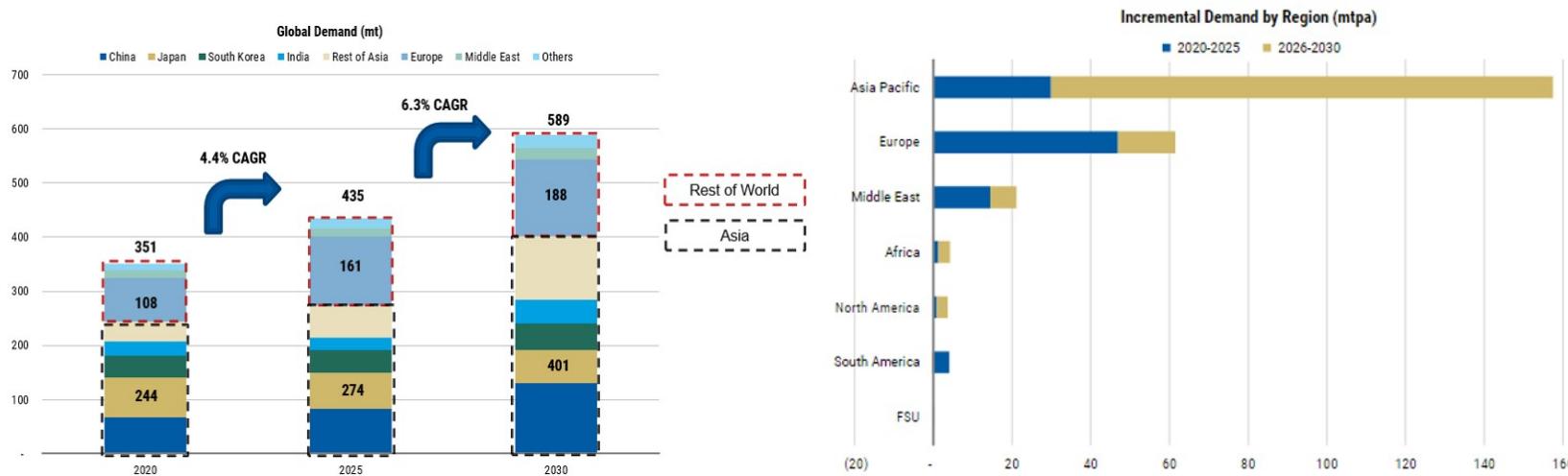
Source: Wood Mackenzie, Morgan Stanley Research estimates

**... With Europe now making up a larger share of global demand**



## Global LNG Demand Growth Led by Asia and Europe

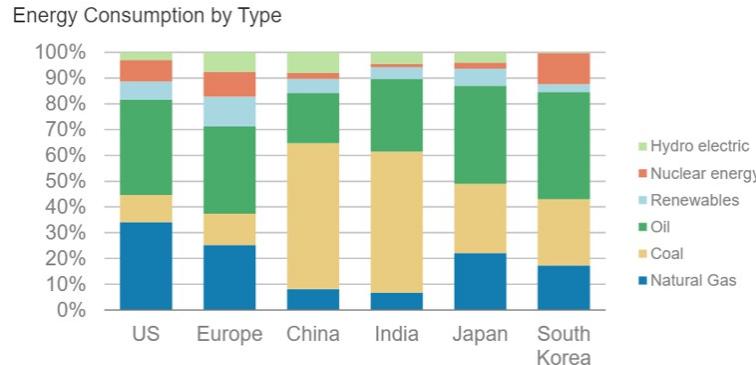
Policy has pushed LNG flows to Europe at the expense of Asia, though we see demand rising in both regions through 2030. Longer term, we see Europe retaining a larger share of global LNG demand, at ~25% of global demand through 2030.



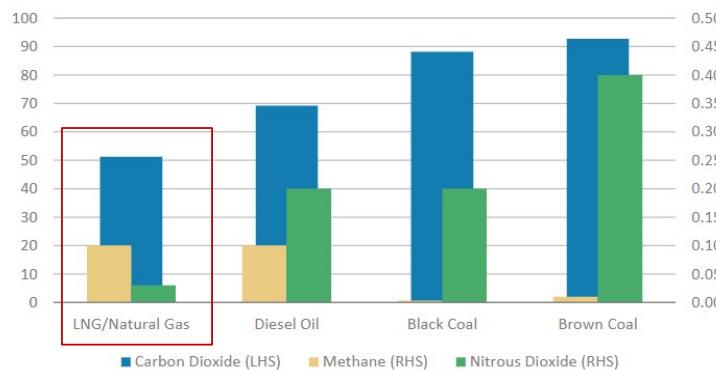
Source: Wood Mackenzie, IHS Markit, Morgan Stanley Research

# Increased Gas Consumption in China and India Can Help Reduce Emissions

**Natural gas represents <10% of primary energy consumption in India & China, versus 20-30% in the US and Europe, an opportunity for significant growth.**



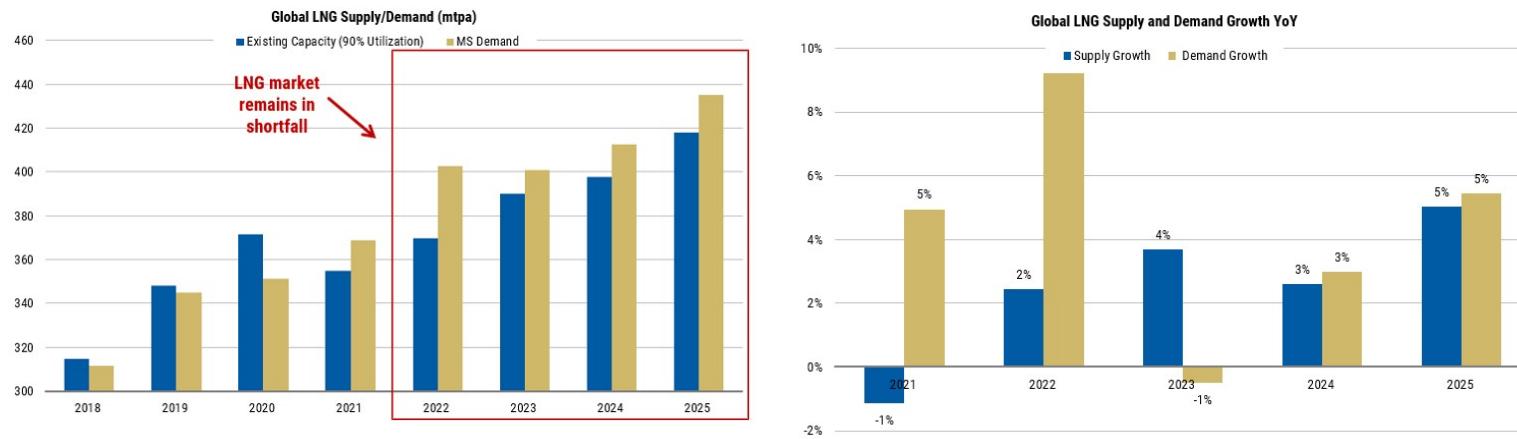
**LNG & natural gas used for electricity generation has lower GHG emissions than alternative fuels (kg CO2-e/ GJ)**



Source: Wood Mackenzie, IHS Markit, Morgan Stanley Research estimates

Source: Department of Climate Change and Energy Efficiency (DCCEE) 2010

## The LNG Market Remains Tight Through 2025, Oversupply Risks Thereafter



Global Supply Demand (mtpa)	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Global Demand	351	369	403	401	413	435	489	521	551	571	589
Sequential Growth	2%	5%	9%	-1%	3%	5%	12%	6%	6%	4%	3%
Global Supply	413	408	418	433	445	467	545	595	629	630	628
Sequential Growth	7%	-1%	2%	4%	3%	5%	17%	9%	6%	0%	0%
Global Supply at 90% utilization	372	355	370	384	400	420	491	536	566	567	565
Surplus/(shortage) at 90% utilization	20	(14)	(33)	(17)	(12)	(15)	1	15	16	(4)	(24)
MSe Supply From Unsanctioned Projects	0	0	-	-	3	3	12	53	67	72	72
Surplus/(shortage) at 90% utilization (Excluding potential FIDs)	20	(14)	(33)	(17)	(15)	(17)	(10)	(38)	(52)	(76)	(97)

Source: Morgan Stanley Research

# In Case You Missed it

Global

## **Searching for Demand**

March 8, 2023

North America

## **As Prices Fall, Demand is Rising**

February 7, 2023

Global

## **A Shrinking Shortfall**

January 6, 2023

North America

## **2023 Outlook: Stay Constructive, but Selective**

December 14, 2022

Global

## **Assessing the 2023 Setup - Tighter Conditions Ahead?**

October 6, 2022

North America

## **Winter Risks Skew to the Upside...For Now**

September 21, 2022



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Stock Rating Category	Coverage Universe		Investment Banking Clients (IBC)			Other Material Investment Services Clients (MISC)	
	Count	% of Total	Count	% of Total IBC	% of Rating Category	Count	% of Total Other MISC
Overweight/Buy	1357	37%	269	42%	20%	599	39%
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Underweight/Sell	639	17%	70	11%	11%	228	15%
Total	3,661		647			1549	

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