Insurgent shale: prospects and perils for US LNG exports

The emergence of the US as a major exporter has rapidly transformed the way the global LNG industry operates, but its economic success will not come without challenges, first and foremost from a potential bottleneck at the Panama Canal.

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INSURGENT SHALE: PROSPECTS AND PERILS FOR US LNG EXPORTS

In just a matter of years, American shale gas exports have loosened the grip of traditional exporters and restrictive long-term contracts.

The impact has been particularly strong in the Asian markets, the epicenter of the traditional LNG business model, based on destination-restricted, oil-indexed, long-term contracts, and by far, the largest recipient of US LNG volumes since exports began in February 2016.

The ramp-up in US LNG exports has only just begun. By 2020, volumes are forecast to more than quadruple from around 14.4 million mt in 2017 to 62 million mt, after the completion of Elba Liquefaction Project, Freeport LNG, Cameron LNG and Corpus Christi LNG.

Significant surplus gas production, increasingly competitive E&P techniques, rising oil prices and export-favorable policies at home are likely to support growth in the US LNG industry, with eleven LNG export projects approved by the US Department of Energy and 16 others proposed so far.

These projects, however, come with their own set of challenges, and their success depends on four key factors: cost competitiveness, midstream optionality, commodity price spreads and potential constraints in the Panama Canal, a major threat to US LNG global expansion,

Cost competitiveness

The US shale industry has become leaner and more efficient over the past decade, partly driven by lower commodity prices in 2014-2017 that have led to greater oil and gas production with fewer rigs and lower costs.

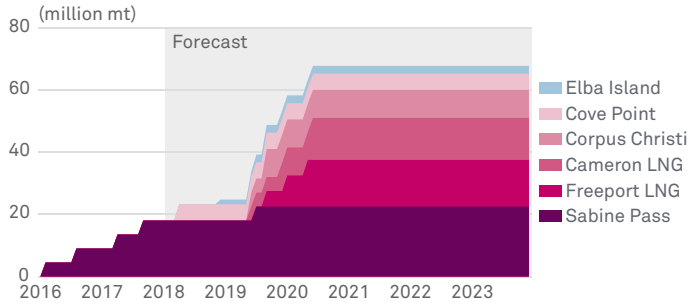
Over the next five years, US natural gas output is forecast to reach 2.7 Bcm/day, up 20% over the current production, driven by faster and cheaper well-completion techniques, rising initial production rates and shallower decline curves, according to S&P Global Platts Analytics.

In the domestic market, this would likely ensure that gas prices remained competitive for the industry, power plants and consumers, avoiding an eastern Australian-style gas crisis, wherein rising domestic gas prices have created political opposition to LNG exports.

In the global arena, this would likely raise the competitiveness of US LNG, even in the distant Asian markets, which have so far received around 45% of US LNG volume since exports began.

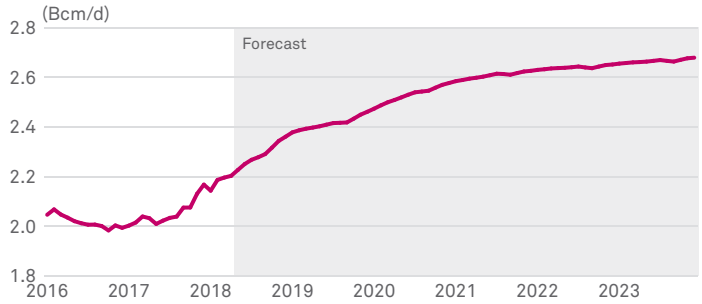
Looking forward, the continued ability of US shale producers to control their upstream costs, even in a high

US LNG EXPORT CAPACITY



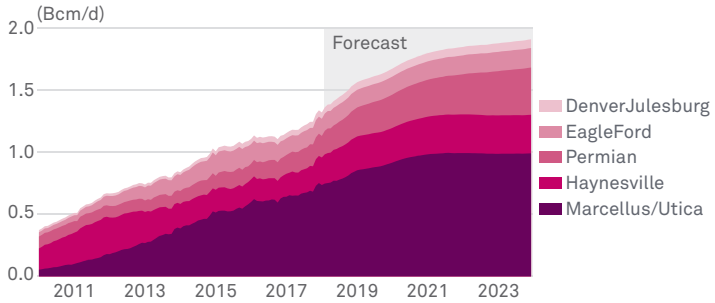
Source: S&P Global Platts Analytics

US NATURAL GAS PRODUCTION



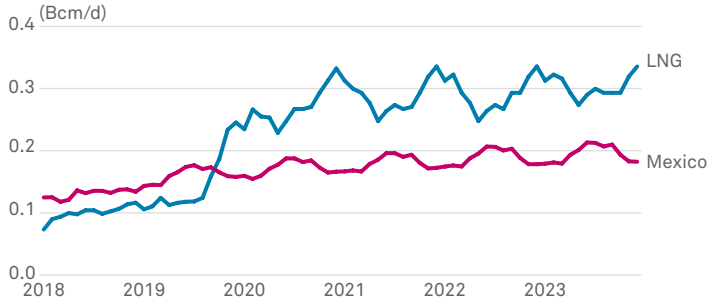
Source: S&P Global Platts Analytics

US GAS PRODUCTION BY MAJOR BASIN



Source: S&P Global Platts Analytics

US GAS EXPORT DEMAND FORECAST



Source: S&P Global Platts Analytics

commodity price environment, will partly determine the competitiveness of US LNG versus other key LNG producers such as Qatar and Australia.

Midstream optionality

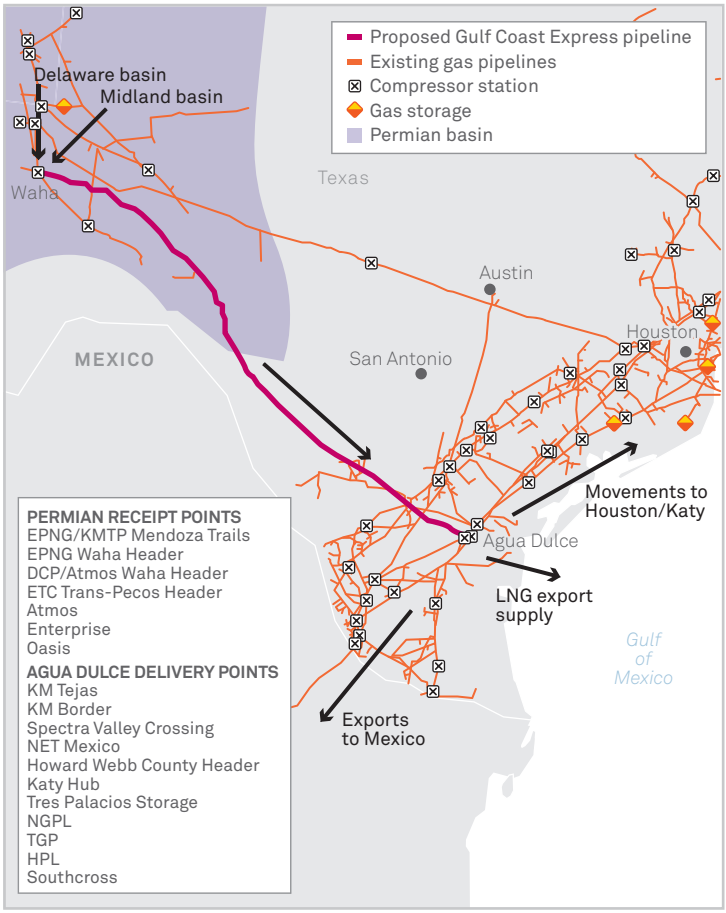
The diversification of supply sources helps de-risk the supply chain, and the US LNG industry is making rapid progress on that front. Already 11 US pipeline projects targeting an expansion in Gulf Coast supply are in various stages of construction, planning and regulatory approval, which will ensure Gulf Coast LNG exporters have access to increased supply optionality and competitive prices into the next decade.

Combined, these projects are expected to boost gas supply to the Gulf Coast by more than 215 million cu m/day by 2020. Several of these pipelines will also eliminate gas flow bottlenecks from basins where growing production is putting downward pressure on prices.

Kinder Morgan's Gulf Coast Express Pipeline, scheduled to start by October 2019, is among the projects that are mostly likely to have an outsized impact on the Gulf Coast gas supply and prices. Upon completion, the pipe will move nearly 57 million cu m/day of incremental supply from the Permian basin to the Agua Dulce hub in South Texas.

Less than 800 miles west of Henry Hub, the Permian Basin is home to the US' fastest growing source of associated gas production. In recent years, surging supply and limited transport capacity have seen the local upstream prices tumble to more than a $1/MMBtu discount to Henry Hub.

GULF COAST EXPRESS PIPELINE ROUTE TERRITORY



Source: Kinder Morgan

For mid-2019 delivery, forward markets are pricing the Permian's Waha Hub at more than $1.50/MMBtu discount to Henry Hub. Platts Analytics, meanwhile, is forecasting even lower prices there — closer to a $2/MMBtu discount to the benchmark.

Transcontinental Gas Pipe Line's Atlantic Sunrise project could have an impact much sooner. By September, the new pipe would move low-priced gas from the Marcellus Shale to Transco's mainline, bringing cheaper Appalachian supply into Louisiana.

Similar to the Permian, Appalachia's dry gas basins have experienced explosive growth in recent years, accompanied by a lagging buildout in midstream infrastructure. The combination has resulted in weaker prices at key upstream hubs like Pennsylvania's Dominion South and Tennessee Zone 4-300 leg.

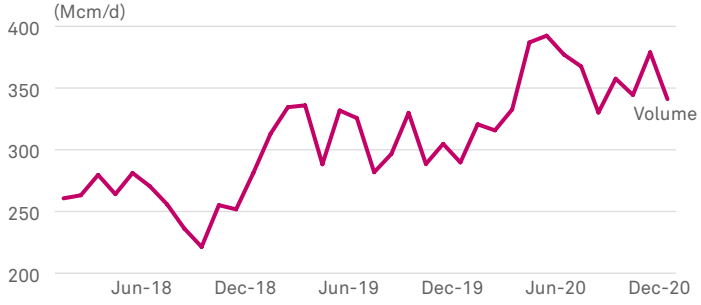
Based on volume alone, Cheniere Energy's 40 million cu m/day Midship Pipeline is another project that's likely to have an outsized impact on Gulf Coast gas supply and prices.

By June 2019, the project will start delivering gas from the burgeoning SCOOP and STACK plays of western Oklahoma to the Gulf Coast, potentially lowering prices at the Texas-Louisiana border area.

Commodity price spreads

Crude oil prices currently determine not only the rate at which much of the natural gas is produced in the US but also the competitiveness of Henry-Hub linked LNG cargoes

US SOUTHEAST NET GAS TRANSMISSION FORECAST



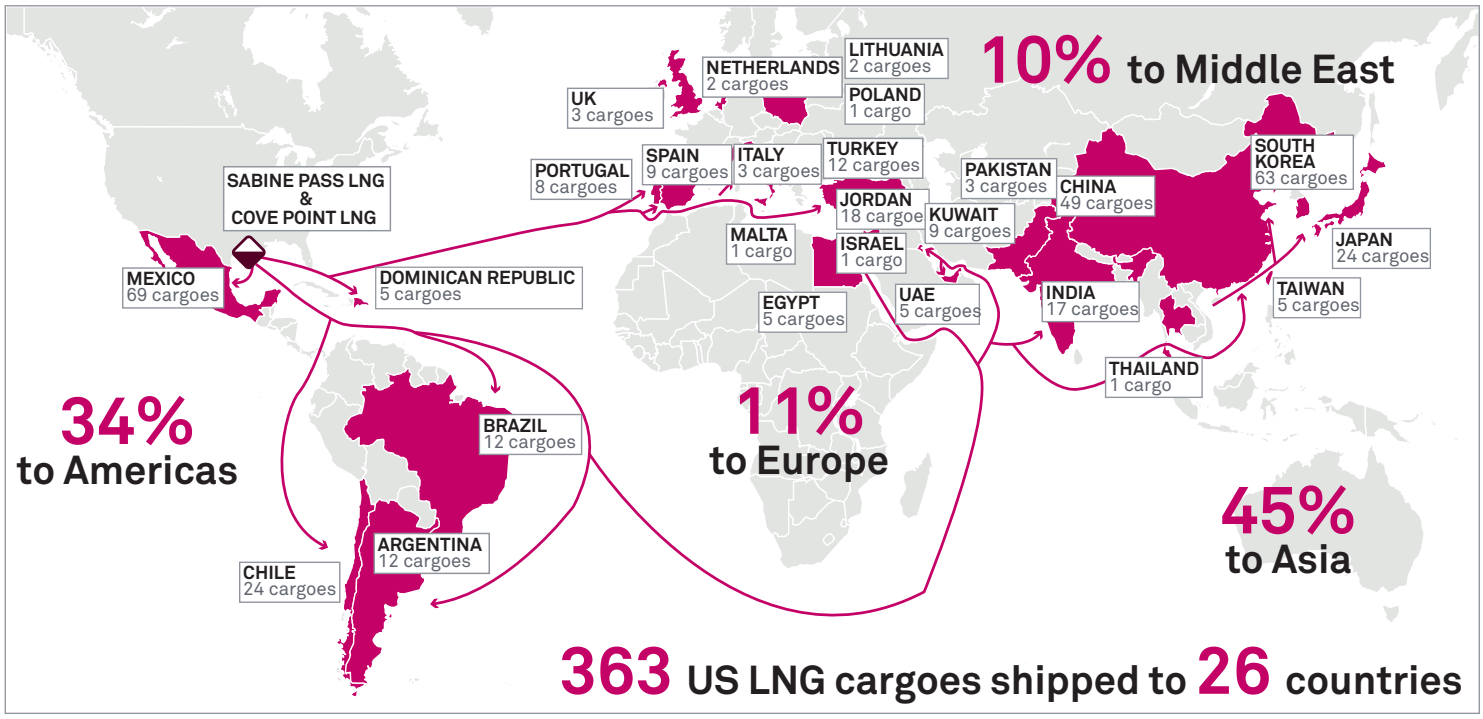
Source: S&P Global Platts Analytics

GULF COAST PIPELINE EXPANSION PROJECTS

Project	Estimated in-service date	Mcm/d
Florida Gas East-West Project	Jun-18	7.79
Tennessee Broad Run Expansion Project	Jun-18	5.66
Transco Atlantic Sunrise	Sep-18	24.07
NGPL Gulf Coast Southbound Expansion Project - Phase I	Oct-18	13.03
Columbia Gulf XPress	Feb-19	24.36
Texas Eastern Stratton Ridge Expansion	Feb-19	9.12
Kinder Morgan Louisiana Pipeline Sabine Pass Expansion	Apr-19	16.99
Cheniere Midship Pipeline	Jun-19	39.65
Transco Gulf Connector	Aug-19	13.45
Kinder Morgan Gulf Coast Express Pipeline	Oct-19	56.07
NGPL Gulf Coast Southbound Expansion Project - Phase 2	Nov-19	7.08
Total Capacity Expansion		**217.27**

Source: S&P Global Platts Analytics

LATIN AMERICA AND ASIA MAIN DESTINATIONS FOR FLEXIBLE US LNG: FEB 2016 - MAY 2018



Source: S&P Global Platts Analytics

into the key Asian markets, where most long-term LNG deliveries are still priced against crude oil benchmarks.

The arbitrage window began to close with the decrease in crude oil prices in 2014, driven by growing shale production in the US and the OPEC's decision in December of that year to not to reduce production.

In the past year, rising crude oil prices have been giving producers compelling incentives to keep oil and associated gas production growing, especially in oil-rich basins like the Permian, Bakken, Eagle Ford and STACK. At the benchmark WTI hub, the 12-month forward price curve has climbed to well-above $60/b this year, giving producers an opportunity to hedge oil production at some of the highest prices since late 2014.

Equally, US LNG exporters are currently earning estimated profit margins against the Platts JKM of almost $4/MMBtu, the highest since mid February, because of elevated crude-linked contract prices and continuing strength in spot demand from China, according to S&P Global Platts Analytics. That profit calculation — which includes gas feedstock and transport costs, shipping, Panama Canal and terminal fees — typically reaches above $3/MMBtu only during the elevated-demand months of winter.

Looking ahead, with high oil forward price curves keeping associated gas production growing, the Henry Hub benchmark could see downward pressure in the years to come.

However, the LNG arbitrage opportunity between the US Gulf Coast and East Asian markets may increasingly depend more on Asian LNG supply and demand fundamentals than on crude oil benchmarks in a commoditizing industry, as LNG is increasingly priced against itself rather than against an associated commodity.

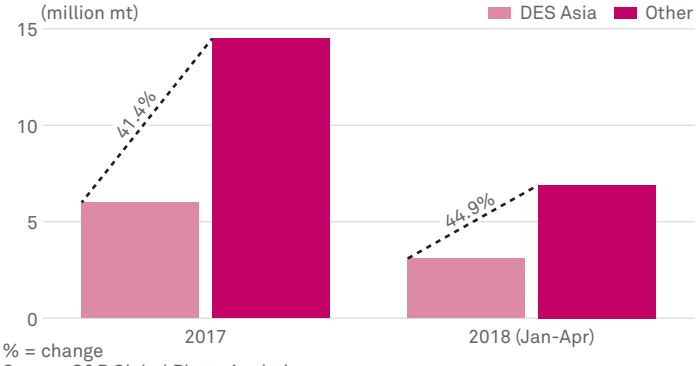
> *"Dynamic US LNG suppliers are well positioned to capture value in an increasingly commoditized LNG space, with their upstream supply chain already well founded in the highly liberalized North American gas markets. With ample access to financial risk products on the supply side, US LNG exporters can hedge their upstream risk and take advantage of price differentials in downstream markets. Should the market move against a US exporter, they can simply unwind the trade into the domestic market and settle their downstream commitments with spot LNG purchases."*
>
> *– Ross Wyeno, Senior Energy Analyst, S&P Global Platts*

"The evolution of risk management surrounding the trade of LNG will be essential as LNG becomes increasingly commoditized. This will include greater liquidity and depth in financial risk products such as the JKM Swap, but could also be bolstered with new LNG contract frameworks and project financing arrangements," Ross Wyeno, senior energy analyst with S&P Global Platts Analytics, said.

Panama canal restrictions

The main logistical challenge facing US LNG exporters is the physical limitation of the Panama Canal, the fastest and most cost-effective route to key downstream markets in Asia.

US LNG EXPORTS BY DESTINATION



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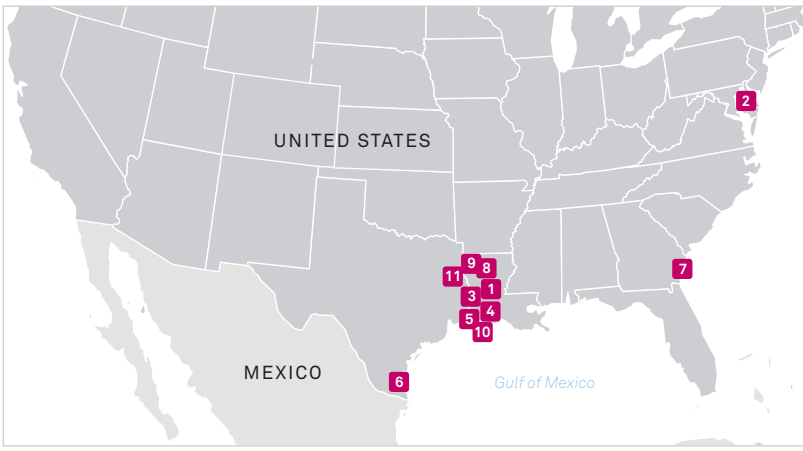
Source: S&P Global Platts Analytics

US LNG EXPORT PLANTS APPROVED



APPROVED - OPERATING:

	Location	Size (Bcf/d)	Company
1	Sabine Pass, LA:	1.40	Sabine Pass Liquefaction
2	Cove Point, MD:	0.82	Dominion Cove Point LNG

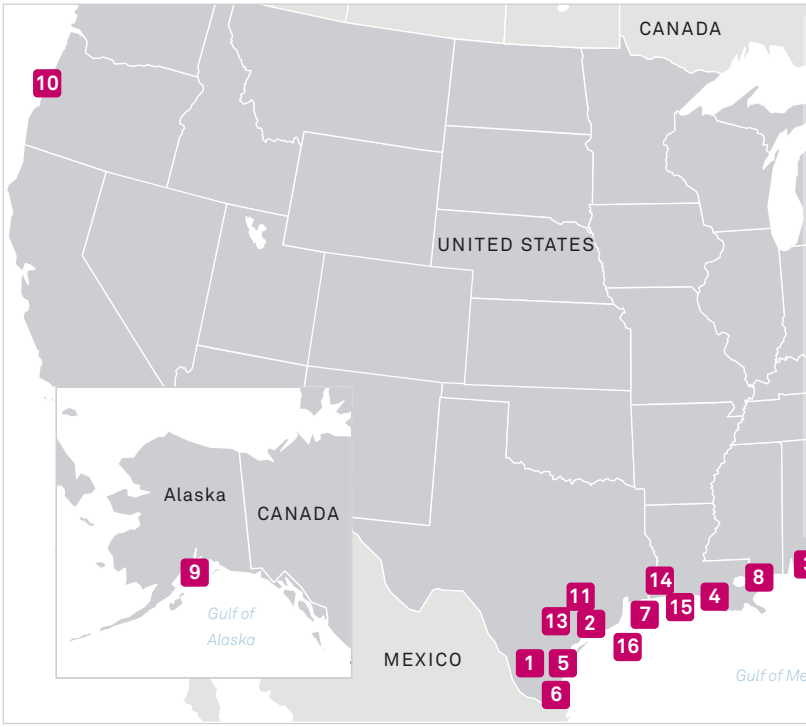
APPROVED – UNDER CONSTRUCTION

3	Sabine, LA:	0.70	Cheniere/Sabine Pass LNG
4	Hackberry, LA:	2.10	Sempra–Cameron LNG
5	Freeport, TX:	2.14	Freeport LNG Dev/Freeport LNG Expansion/FLNG Liquefaction
6	Corpus Christi, TX:	2.14	Cheniere – Corpus Christi LNG
7	Elba Island, GA:	0.35	Southern LNG Company

APPROVED – NOT UNDER CONSTRUCTION

8	Lake Charles, LA:	2.20	Southern Union – Lake Charles LNG
9	Lake Charles, LA:	1.08	Magnolia LNG
10	Hackberry, LA:	1.41	Sempra - Cameron LNG
11	Sabine Pass, TX:	2.10	ExxonMobil – Golden Pass

US LNG EXPORT PLANTS PROPOSED



PENDING APPLICATIONS:

	Location	Size (Bcf/d)	Company
1	Brownsville, TX:	3.60	Rio Grande LNG – NextDecade
2	Port Arthur, TX:	1.86	Port Arthur LNG
3	Pascagoula, MS:	1.50	Gulf LNG Liquefaction
4	Cameron Parish, LA:	1.41	Venture Global Calcasieu Pass
5	Brownsville, TX:	0.90	Annova LNG Brownsville
6	Brownsville, TX:	0.55	Texas LNG Brownsville
7	Calcasieu Parish, LA:	4.00	Driftwood LNG
8	Plaquemines Parish, LA:	3.40	Venture Global LNG
9	Nikiski, AK:	2.63	Alaska Gasline
10	Coos Bay, OR:	1.08	Jordan Cove
11	Freeport, TX:	0.72	Freeport LNG Dev
12	Jacksonville, FL:	0.132	Eagle LNG Partners

PROJECTS IN PRE-FILING:

13	Corpus Christi, TX:	1.86	Cheniere – Corpus Christi LNG
14	Cameron Parish, LA:	1.18	Commonwealth, LNG
15	LaFourche Parish, LA:	0.65	Port Fourchon LNG

PROPOSED TO U.S.-MARAD/COAST GUARD

16	Gulf of Mexico:	1.80	Delfin LNG

Source: Federal Energy Regulatory Commission

By early next year, the Panama Canal Authority will likely provide LNG shippers with two transit-reservation slots per day. Considering that roughly half of these slots would accommodate return or ballast voyages, this would equate to an annual transit volume of roughly 22.6 million mt-24.7 million mt/year.

Even assuming that the Canal Authority could accommodate an average of 2.5 LNG vessels per day, the potential for an LNG bottleneck at the Panama Canal is high, with more profound implications for the US than for any other LNG exporter.

US LNG export volumes are set to quadruple by 2020 and most of the world's additional demand growth will be in Asia, so it seems clear that the waterway's transit-demand constraints would begin pushing back on US exports to Asia by the early 2020s or much sooner.

In 2017, over 41% of US export cargoes, or roughly 6 million mt, were delivered to Asian markets. This year, a higher Platts JKM price, averaging above $8/MMBtu, has seen that percentage climb to around 45%, with delivered volume totaling over 5 million mt through May.

If the percentage of US cargoes destined for Asia remain in the low- to mid-40% range, then US export volume transiting the Panama Canal could approach 25.7 million mt to 27.7 million mt by 2020.

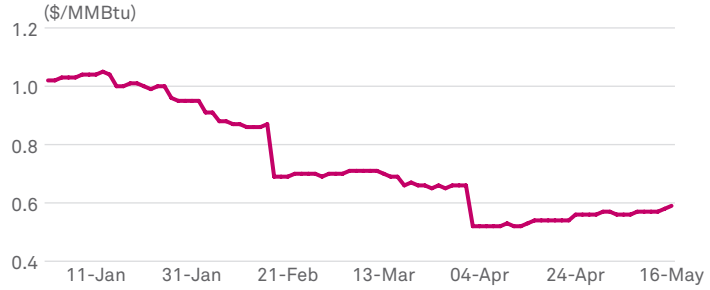
There are of course multiple shipping routes from the US to Asia. Compared to the Panama Canal route, the cheapest alternative is a route that travels below South Africa's Cape of Good Hope. During the peak months of winter demand, the cost of that journey exceeded the Panama Canal route by over $1/MMBtu. On an average though, the additional cost in 2018 has been roughly 74 cents/MMBtu, according to S&P Global Platts.

Routes alternative to the Panama Canal would effectively handicap US LNG exports to Asia.

In 2018, the profit margin of a US cargo shipped to Asia — including onshore gas transport, shipping costs, canal and terminal fees — has averaged well above $3/MMBtu. Stronger Platts JKM prices have meant that even significantly higher shipping costs would not have impeded the flow of US cargoes to Asia.

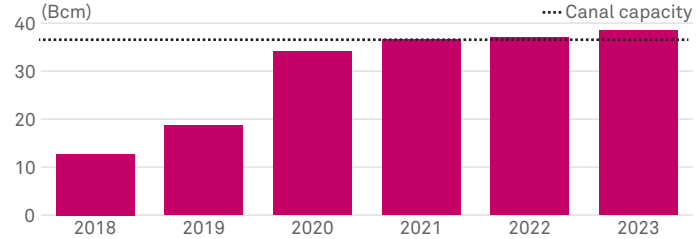
During a brief period in 2017 though, the profit margin had sunk to less than 10 cents/MMBtu, meaning that significantly higher shipping costs would have effectively pushed US exports out of the Asian market.

US LNG FREIGHT ROUTE COST TO JAPAN/KOREA: CAPE OF GOOD HOPE vs PANAMA CANAL



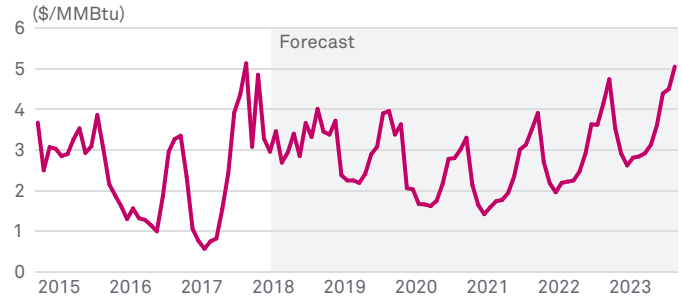
Source: S&P Global Platts Analytics

PANAMA CANAL TRANSIT CAPACITY vs FORECAST US LNG EXPORTS TO EAST ASIA



Note: Panama Canal transit capacity assumes two vessel transits per day, including return or ballast voyages. The US LNG export to Asia forecast assumes 40% of cargoes are shipped to East Asia. A standard cargo size of 75,837 mt is also assumed
Source: S&P Global Platts Analytics, Panama Canal Authority

US LNG WEIGHTED AVERAGE EXPORT MARGIN



Source: S&P Global Platts Analytics

A forward-looking analysis by Platts Analytics showed that the profit margin of US cargoes shipped to the highest-priced export market falls below $2/MMBtu only briefly during the spring shoulder seasons in 2020 and 2021. The forecast implies a very low risk that US LNG exporters would opt to sell contracted-gas supply back into the US market, leaving liquefaction capacity idle.

That forecast, however, does leave open the possibility that a Panama Canal bottleneck would drive a significantly larger share of US cargoes to Europe, where they would likely compete with low-priced pipeline supplies from Russia, or to more opaque, illiquid markets of Latin America and the Middle East.

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