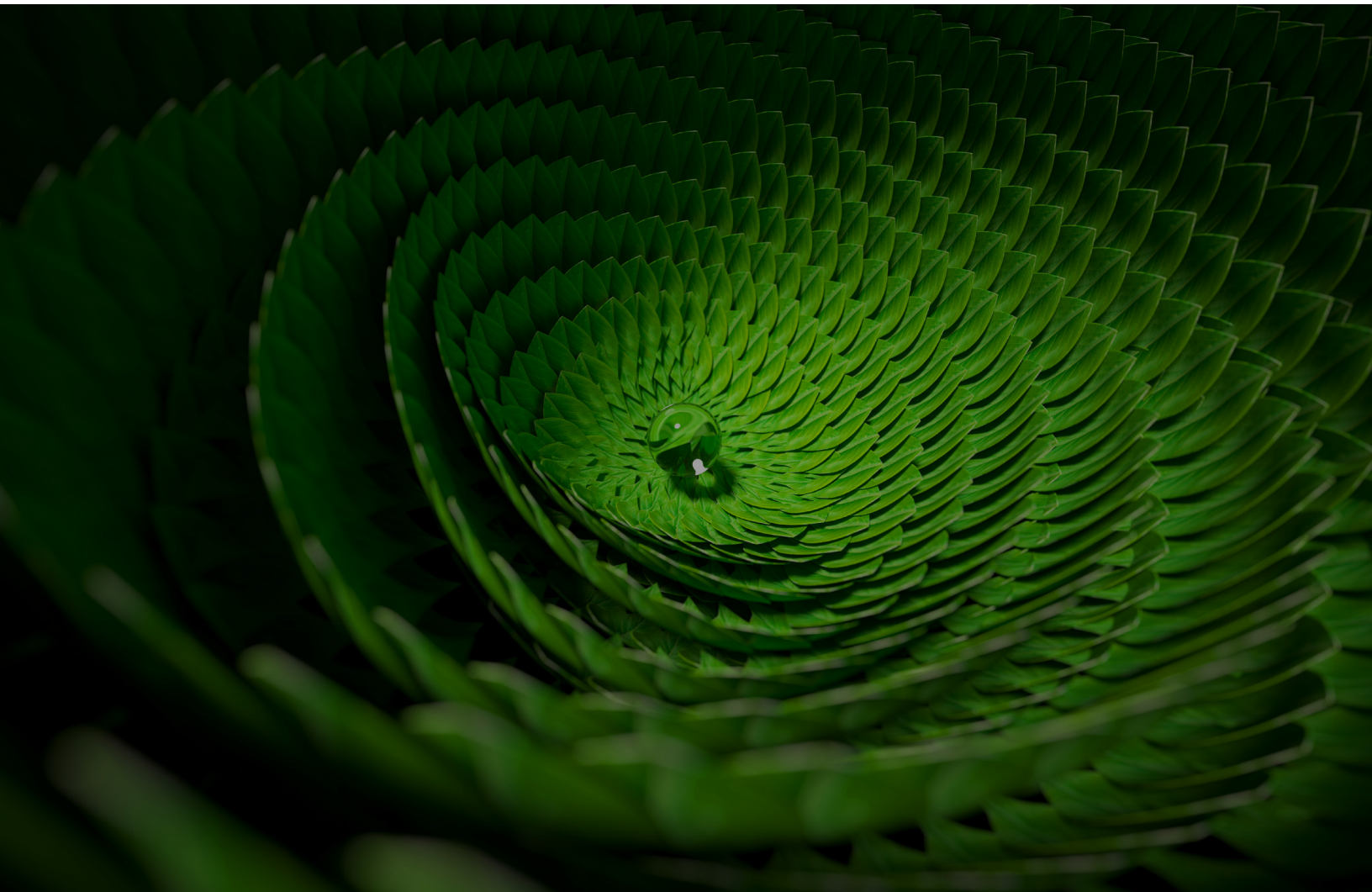
CAPCO

US LNG EXPANSION IN A SHIFTING GLOBAL ENERGY LANDSCAPE



With European supplies of liquid natural gas constrained by the fallout from the Ukraine conflict, demand for US LNG is set to remain high. We assess the current state of the US LNG sector, recent key developments – and the potentially uncertain outlook ahead.

Russia's invasion of Ukraine in February of 2022 and the subsequent economic sanctions and energy supply disruptions led to record energy prices around the globe. Even before Russia became a pariah state in the West, post-COVID demand surges for goods and energy had created supply shortages across the commodities spectrum, and prices for raw materials, energy, and finished goods had already begun to climb through the first three quarters of 2021, fueling inflation in developed nations.

Although the war in Eastern Europe continues to rage with little hope of a near-term conclusion, energy prices in Europe have moderated compared to most of 2022. With lower than anticipated demand due to mild weather and high levels of gas in storage, supplied by massive increases in LNG imports acquired on the spot markets, Europe avoided a feared energy crisis last winter.

However, with supplies of natural gas throttled by Moscow and the Nord Stream pipeline disabled, potentially never to restart, much of Europe will continue to rely on the global LNG markets for natural gas to replace the 40% of the continent's LNG demand that was supplied by Russia before the imposition of sanctions. Though some of Europe's increased demand for LNG can be supplied by the expanding capacity in Qatar, much of it is projected to be supplied from the US.

GROWING US LNG EXPORT CAPACITY

Development and construction of new LNG export capacity continue along the US Gulf Coast. With a total nameplate export capacity of approximately 13.3 BCFD, current exports are not necessarily straining US natural gas production capacity, and relatively minor projected increases in near-term demand can likely be met without huge new investments in growing gas production capacity.

However, new facilities that are under construction, and are scheduled to come online by the end of 2027, will increase natural gas demand by more than 11.8 BCFD, necessitating a sizable increase in US domestic production above today's 100 BCFD. Beyond 2027, approved but not yet under construction LNG facilities could add 17.6 BCFD of new export demand. And, with another 11 BCFD of new facilities in various stages of proposal (though some will surely not move forward), it can be assumed that given current events and the trajectory of global demand, at least 5 BCFD is likely to be added to capacity from this group in the next 10-15 years.

Should all these plants be built and come online as forecasted, US energy consumers could find themselves effectively competing with gas-starved global markets for this vital resource throughout the next decade, particularly so if US producers struggle to increase production.

To stave off having US natural gas consumers (including generators, industrial, commercial, and residential) compete with foreign gas buyers, production capacity must remain above total demand. According to the US Energy Information Agency, US consumption is expected to rise to 32 TCF in 2050 (or 87 BCFD) and total demand is estimated at approximately 40 TCF (or around 110 BCFD)1, with exports expected to comprise around 20-25 BCFD of that total demand. Meeting this demand would require US producers to not only maintain today's current production but also add 10 BCFD.

CURRENT STATE OF LNG DEVELOPMENT IN THE US

The US currently has eight LNG export facilities operating, with additional capacity being added at Venture Global's Cameron facility and a new plant being constructed by the firm in Plaquemines Parish, LA. Cheniere is also adding additional capacity at their Corpus Christi plant. The ExxonMobil/Qatargas joint facility at Sabine Pass, TX is also under construction and is anticipated to start production in late 2024/early 2025. Once these currently under-construction facilities are brought online, the US's total export capacity will reach about 25 BCFD. However, this includes 3.8 BCFD associated with the Driftwood LNG project which, though under limited scale construction, may still not be able achieve full financing and is at risk of being abandoned.

Figure 1

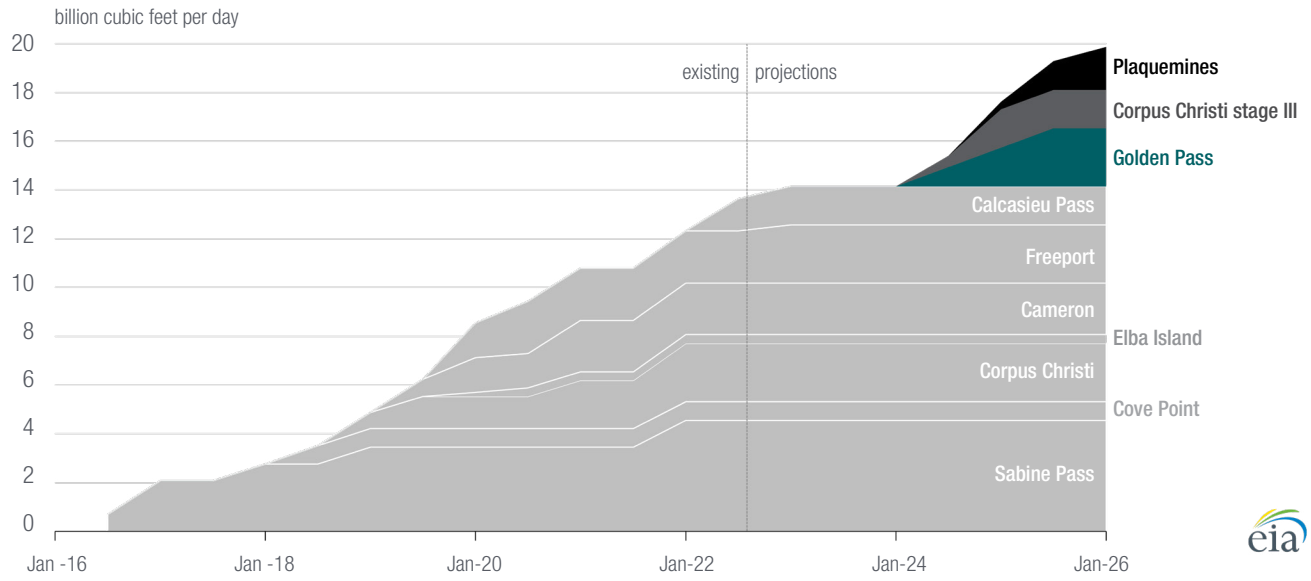
Facility	Capacity (Bcfd)	Operator	Description
Existing LNG Export Terminals			
Kanai, AK	0.20	Trans-Foreland	
Sabine, LA	4.55	Cheniere/Sabine Pass	Trains 1-6
Cove Point, MD	0.79	Dominion	Cove Point LNG
Corpus Christi, TX	2.40	Cheniere - Corpus Christi	Trains 1-3
Hackberry, LA	2.06	Sempra - Cameron LNG	Trains 1-3
Elba Island, GA	0.35	Southern LNG Company	Units 1-10
Freeport, TX	2.38	Freeport LNG	Trains 1-3
Cameron Parish, LA	1.11	Venture Global	Units 1-6
	13.84		
FERC Approved, Under Construction			
Cameron Parish, LA	0.55*	Venture Global	Calcasieu Pass Units 7-9
Sabine Pass, TX	2.57 **	ExxonMobil - Golden Pass	
Plaquemines Parish, LA	3.32	Venture Global	Plaquemines
Calcasieu Parish, LA	3.81	Driftwood LNG (Tellurian)	
Corpus Christi, TX	1.58	Cheniere - Corpus Christi	Corpus Christi Stage III
	11.83		

* 2023 Addition ** 2024 Addition

Source: Federal Energy Regulatory Commission[1]

Figure 2

U.S. liquefied natural gas export projects: existing and under construction (2016 – 2025)



Source: U.S. Energy Information Administration[2]

Final investment decisions (FIDs) were announced by Sempra in March of this year for their Port Arthur plant. This was followed soon after by Venture Global's FID for Plaquemines second phase expansion and, most recently in July 2023, Next Decade's FID for their Rio Grande plant. Energy Transfer's Lake Charles LA facility recently encountered a potential roadblock when their requested 3-year extension to their LNG export license was denied by the DOE. Energy Transfer has requested a rehearing on the matter and the outcome of that request is not yet clear.

Other projects that have not yet begun construction but are likely to reach final investment decisions (FIDs) soon include Magnolia LNG & Texas LNG (both owned by the same parent company, Glenfarne Group), and several others. Though not having reached FID by the end of 2022, several of these operators are now anticipating FID sometime in 2023.

Depending on the ultimate timing and outcome of these recent developments, as well as the other facilities' FIDs and the start of construction, it is possible that an additional 17-18 BCFD of supply could be available by 2030, more than doubling the current capacity.

Figure 3

Facility	Capacity (Bcfd)	Operator	Description
FERC Approved, NOT Under Construction			
Lake Charles, LA	2.27	Lake Charles LNG	
Lake Charles, LA	1.22	Magnolia LNG	
Hackberry, LA	0.97	Sempra	CLNG Trains 4&5
Port Arthur, TX	1.86	Sempra	Port Arthur Trains 1&2
Freeport, TX	0.74	Freeport LNG	Train 4
Pascagoula, MS	1.50	Gulf LNG	
Jacksonville, FL	0.13	Eagle LNG Partners	
Brownsville, TX	0.62	Texas LNG Brownville	
Brownsville, TX	3.73	Rio Grande LNG - NextDecade	
Nikiski, AK	2.76	Alaska Gasine	
MC, Gulf of Mexico	1.80	Delfin LNG	
	17.60		
Proposed to FERC - Pending Applications			
Port Arthur, TX	1.86	Venture Global	Calcasieu Pass Units
Cameron Parish, LA	3.96	ExxonMobil - Golden Pass	7-9
Cameron Parish, LA	0.06	Venture Global	
Plaquemines Parish, LA	0.45	Driftwood LNG (Tellurian)	Plaquemines
Corpus Christi, TX	0.45	Cheniere - Corpus Christi	
Elba Island, GA	0.06		Corpus Christi Stage III
	6.84		
Other Pre-Filing			
LaFourche Parish, LA	0.65	Port Fourchon LNG	
Plaquemines Parish, LA	2.76	Delta LNG - Venture Global	
Sabine, LA	0.90	Cheniere - Sabine Pass	Stage 5 Expansion
	4.31		

Source: Federal Energy Regulatory Commission[1]

NOTABLE RECENT DEVELOPMENTS

Other projects that have been proposed and are pending formal application to the FERC could add an additional 11 BCFD of net LNG supply within 10-12 years.

In 2022, it appears that about 50 MMTA or about 6.7 BCFD of capacity was taken up in Sales and Purchase Agreements (SPAs) at various plants across the Gulf Coast, helping to move several closer to positive final investment decisions (FIDs)

Buoyed by several new deals late in 2022, and a recent investment by TotalEnergies and Global Infrastructure Partners (GIP), NextDecade has announced a positive FID in July 2023 on the first three trains (phase 1) of its Rio Grande LNG export project, with FID of on an additional two trains (phase 2) to follow in short order.

Sempra, the operator of the Cameron LNG facility in LA and developer of the proposed Port Arthur facility in TX, inked four new SPAs in the last two months of 2022. They also announced new agreements with Williams to increase gas supply capacity to both facilities in anticipation of its expansion at Cameron I and the start of construction at Port Arthur. Earlier in 2022, Sempra also announced a Heads of Agreement (HOA) with affiliates of TotalEnergies, Mitsui & Co., and Japan LNG Investment, LLC (a company jointly owned by Mitsubishi Corporation and Nippon Yusen Kabushiki Kaisha), for the development of the Cameron LNG Phase 2 expansion. And, as previously noted, Sempra also announced a positive FID for their Port Arthur facility in May of 2023.

Venture Global announced in June 2023 a 20-year deal to provide Germany's Securing Energy for Europe GmbH (SEFE) with 2.25 MMTA, equivalent to 0.3 BCFD, from their second phase expansion at Plaquemines Parish. Energy Transfer LNG Export, LLC, committed to six new agreements with various customers in 2022 for its planned Lake Charles LNG project, bringing total contracted supply volumes to about 1 BCFD or a little less than half of the total planned capacity Energy Transfer had expected to make an FID by the end of the second quarter of 2023. However, with the recent denial of the extension of their export license by the DOE, their FID appears to be at risk.

STILL AN UNCERTAIN OUTLOOK

As we noted in a recent article about the growing potential for 'the perfect storm in energy', should all approved plants be built and come online as proposed in the next 5 to 10 years, a healthy and growing oil and gas industry will be required to ensure adequate gas supplies. However, given current market conditions, including high price volatility and an uncertain regulatory environment increasingly tilted toward decarbonization, it is difficult to predict any particular outcome regarding the future of most of these proposed facilities and the gas industry itself.

For LNG developers, this market uncertainty is particularly troubling given the scale in both time and money of the investment required to construct an LNG liquefaction and export facility. Financiers require plant developers to have long-term (15-20 plus years) offtake commitments in place for most of the capacity of that plant. And, given that the bulk of natural gas supplies for LNG production (particularly for those plants cited along the Gulf Coast) are indexed to Henry Hub, it's difficult for global LNG buyers to commit to those agreements unless they believe that key price marker will remain low relative to other global suppliers such as Qatar.

Though the Biden Administration has previously and unequivocally signaled their desire to quickly end oil and gas production in the US, which would of course completely derail future LNG development and force the premature closing of existing plants, global events and market realities have forced at least a partial shift in that stance.

In March of last year, as the energy crisis in Europe was heating up, President Biden announced an agreement to commit the U.S. liquefied natural gas industry to supply an additional 15 billion cubic meters (approximately 2 BCFD) of LNG to Europe through the remainder of 2022, with additional increases each year to reach to almost 5 BCFD through 2030. Although few

STILL AN UNCERTAIN OUTLOOK

industry professionals understand how the administration intends to force LNG producers/traders to meet those commitments, the announcement was welcomed as an indication of potential support and a clear, if temporary, change of policy.

Although the war in Europe and recent price spikes have forced some constructive changes in the administration's rhetoric toward the oil and gas industry to encourage near-term production increases, it's uncertain how long this change in attitude will continue. Should oil and gas supplies remain adequate, and prices continue to moderate, many industry experts expect a return to a full-on regulatory assault to limit the producers' ability to secure financing and permits that are often required to support new drilling and related infrastructure. And though US LNG producers and developers almost unanimously viewed the president's commitments to Europe as positive, it's too early for those commitments to have resulted in any significant increase in development activity.

Despite the previously noted new offtake agreements committed in 2022 and 2023, it does appear that many overseas buyers continue to sit on the sidelines for now. In particular, the utilities in the Asia-Pacific region that had previously been cornerstones in driving new development have been largely reluctant to commit to new long-term agreements, perhaps recognizing the price risks inherent in reactive and often conflicting US energy policy pronouncements.

European buyers, who are forecast to need as much as 4 TCF3 of gas per year to completely replace Russian supplies, have also seemly been waiting on the sidelines, in part due to the need to develop new import facilities to handle additional volumes and the financial toll the energy crisis has extracted on their utilities' balance sheets.

Though global events continue to signal a relatively positive outlook for the future development of US LNG export capacity, there remain several questions that can only be answered over time:

1. Will current conflicting US energy policies – on one hand, disparaging and attempting to block further investment in oil and gas production, while on the other committing US LNG volumes to Europe - prove to impede future investment in LNG export capacity?

2. Will European buyers be willing and or able to commit to the long-term contracts necessary to support the construction of new facilities in the US? Though Europe has been able to bridge its short-term needs with spot purchases from LNG portfolio buyers like Shell and Trafigura, they will need significantly increased volumes to support a complete replacement of Russian supplies.

3. Will the Asian markets continue to be a growing market for US LNG, or will a slowing of their economies limit that region's demand for LNG and/or their willingness to enter long-term agreements? Alternatively, and despite the Western nations' growing moratorium on energy purchases from Russia, will those countries continue and increase both their long-term and spot purchases from that nation?

4. Will Russian oil, natural gas, and LNG continue to be shunned by Western nations if US natural gas production and LNG export increases fail to materialize, and prices move toward historical highs?

Given the complexities and dynamics of the LNG markets and the underlying geopolitics that heavily influence it, new LNG development can be a high-risk endeavor. However, the rest of 2023 could very well provide several indicators as to the future direction and timing of new LNG plant development, with perhaps the most important being the number and volumes of new SPAs signed by European and Asian buyers.

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Capco, a Wipro company, is a global technology and management consultancy focused in the financial services and energy industries. Capco operates at the intersection of business and technology by combining innovative thinking with unrivalled industry knowledge to fast-track digital initiatives for banking and payments, capital markets, wealth and asset management, insurance, and the energy sector. Capco's cutting-edge ingenuity is brought to life through its award-winning Be Yourself At Work culture and diverse talent.

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