

North American LNG construction:
**Navigating the
challenges of the
current market**

Plus LNG Export Project Updates

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Conference & Expo (June 25-26,
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Introduction

An LNG export capacity construction boom is underway in North America, concentrated on the US Gulf Coast, but with a handful of projects also under development in Mexico and on Canada's West Coast. Management consulting firm McKinsey & Co. estimates that there was over 100mn tonnes per annum (mtpa) of LNG capacity already under construction across North America as of August 2023.

Even more liquefaction and export capacity has been proposed across the continent, with projects at various stages of development but not yet at the point of reaching a final investment decision (FID). Some of these projects already have their required regulatory approvals in hand, while others are still awaiting the necessary permits as their developers also seek financing and offtakers. Not all will ultimately move forward.

Given the rate of LNG demand growth, McKinsey sees a supply gap of 100-150 mtpa opening up by the 2030s, or even 200 mtpa under higher-demand scenarios. "What we see from our global cost curve is that a large share of the most competitive projects that can fill this supply gap of say 100-200 mtpa opening up in the 2030s is actually in the US," says Dumitru Dedi, a partner at McKinsey.

How many projects will ultimately move forward remains to be seen, given the wide range of factors that need to align in order for them to move forward. However, for a project that has obtained the necessary regulatory approvals, there are certain indicators that it could be close to FID. These include securing an engineering, procurement and construction (EPC) contractor and lining up LNG offtake agreements with buyers, as well as addressing financing requirements, according to Dedi. "Generally, once a project reaches about 80-85% of its capacity that is sold under long-term agreements, that's a good indication that the project is nearing FID," he says. "At this moment, we don't have many of the projects that have about 80%. It's only a handful of projects that have all the regulatory permits and are in a good spot for them to move to FID."

Three US Gulf Coast projects reached FID earlier in 2023 – Phase 1 of Port Arthur LNG, Phase 2 of Plaquemines LNG and Phase 1 of Rio Grande LNG. Jason Feer, the global head of business intelligence at Poten & Partners, sees potential for another two to three projects to reach FID by early 2024 – possibly two on the Gulf Coast and one in Mexico.

"There's a fairly significant gap, I think, between those and other projects," says Feer. "There are other projects that are that are much further back in terms of where they are, in terms of signing contracts." And for those pre-FID projects that are further back, the pressure is on. Nathan Tungseth, senior vice president of LNG and regasification at ABB, which provides automation and electrification services to LNG projects, notes that project developers can find their costs going up if they stall at the pre-FID stage. This is especially the case today, with cost inflation continuing to affect the LNG industry, and comes on top of the costs required to retain staff and take other steps to ensure the projects retain their contracts and certifications.

In the US, there is now additional regulatory pressure after the US Department of Energy (DoE) tightened up its rules for awarding export license extensions to LNG projects. Under its new rules, the DoE will no longer consider applications for extensions unless a developer can show it has physically begun construction and that it has faced "extenuating circumstances" beyond its control that have prevented it from meeting its existing deadline.

The DoE has already denied an extension request to Energy Transfer for its Lake Charles LNG project. Energy Transfer is now seeking a new, expedited export license and the outcome of this request will be closely watched as the industry considers how to approach delays in the face of this new regulatory hurdle.

An additional incentive to reach FID as fast as possible is that new North American projects are increasingly competing for a limited pool of resources in terms of EPC contractor capacity and availability of labor. The challenges are particularly apparent on the Gulf Coast, where resources are further stretched across a variety of industries that require the services of EPC contractors, including petrochemicals, oil and gas infrastructure and energy transition projects.

"There are a lot of projects that are coming up and the skilled workforce that is there in North America will not be able to cater to so many projects that are happening at the same time," says Prema Suresh, a project director at Technip Energies.

Suresh estimates that some stick-built LNG projects could require 8,000-12,000 workers on site at the peak of construction. With a growing number of LNG projects in construction in North America, especially on the Gulf Coast, securing the required workforce numbers is increasingly becoming a challenge.

Against this backdrop of increasingly scarce resources and other constraints resulting from the concentration of new capacity in one region, LNG developers are considering innovative approaches to building their projects. Notably, these include modularized designs for their projects, where the modules can be constructed offsite and shipped in. However, there are pros and cons to modularization, so developers have to decide what would make the most sense for them. This would generally have to happen at the outset of a project as redesigning a facility that is already permitted would be a complex and time-consuming process. Thus, for developers trying to move to FID, the best chance appears to be sticking with their pre-existing plans.

"For a lot of people, I think they're stuck with what their permit allows them to do," says Feer. On top of the interconnected challenges of labor shortages and design strategies, developers have to contend with ongoing supply chain challenges. These are easing somewhat as industries recover from the early impacts of the COVID-19 pandemic, but nonetheless continue to result in delays and equipment shortages, as well as elevated costs.

LNG developers are also under growing pressure to decarbonize their projects. A lot of new projects come with decarbonization proposals including adding carbon capture and storage (CCS) capacity to facilities and using renewable power and electric drive (e-drive) motors at liquefaction plants. However, despite public and regulatory pressure

to prioritize decarbonization, developers have seen relatively little interest from offtakers to date in buying LNG that is more costly because of measures to make it greener.

This could become a higher priority in the future, though, and developers could be pushed to prioritize decarbonization measures as a result of new regulations on emissions, rather than because of buyers. Indeed, Mehdy Touil, an LNG operations specialist at Solaris MCI, considers new emissions regulations that may require design changes to be among the main challenges LNG developers are facing currently. The other main challenges, he says, include qualified manpower shortages, the limited availability of construction yards in Asia for modular construction, waiting lists for certain key pieces of equipment and steel prices.

Some of these are easier to circumvent than others and could prove to be more short-lived. There are steps developers can take to mitigate the risks and challenges they face. However, consensus is mixed on how successful they are proving at this.

Certain challenges – execution and design strategies; construction labor shortages; supply chain and logistics; decarbonization; and EPC contracting and risk management – will be examined in more detail below. While taking innovative approaches can help developers mitigate risk, what works best for a specific project will need to be decided on a case-by-case basis.

Execution and design strategies

Modularization is being touted as one option for circumventing the limitations involved in drawing from a limited pool of contractors and workers on the Gulf Coast – or potentially elsewhere in North America. However, Sam Linder, an associate partner at McKinsey, warns that modularization is not a silver bullet.

“It’s still a debate in industry, whether or not that’s the chosen alternative,” he says.

Venture Global LNG is one of the players on the Gulf Coast that opted for a modular approach, with its Calcasieu Pass LNG project. The 10 mtpa facility comprises 18 liquefaction trains, each with a capacity of 0.626 mtpa, configured in nine blocks. Venture Global has touted Calcasieu Pass as being the fastest large-scale greenfield LNG facility to ever be built, moving from FID to LNG production in just 29 months. However, the facility remains in commissioning as of September 2023, and has only been operating on a pre-commercial basis for over a year, with the need for repairs cited as the reason for the delay. This has led to disputes with Venture Global’s customers and is now being viewed by some as evidence that modularization is no guarantee of construction running smoothly or swiftly.

“I think the record of modular construction is mixed,” says Feer. “I’m struggling to come up with an example of a project that was modular that just sailed in and proved that it can be dramatically cheaper and faster than the traditional stick-built approach,” he continues. “But I think the takeaway from at least some of the modular projects is that there’s promise there and maybe that’s a productive way to try to control costs.”

Indeed, Commonwealth LNG, which is aiming for an FID in early 2024, anticipates being able to cut both its cost and its schedule by taking a modularized approach.

"If we had decided to stick-build this project, we would need, at peak, 8,000-9,000 qualified construction personnel and 4-5 years to build the project," says Lyle Hanna, vice president of corporate communications at Commonwealth. "Using a highly modularized approach, we will average approximately 800 workers on site with a peak of around 2,000. We also anticipate a full year of reduction in schedule versus a stick-built approach and an outcome that achieves one of the lowest EPC costs per ton of any US LNG export project," he adds.

There may also be an additional benefit to modularization on the Gulf Coast as it reduces the presence of staff on site in a region that is prone to hurricanes.

"When a hurricane comes through, everybody has to wrap up what they're doing, they have to get away from site for several days, sometimes longer," says Tungseth. "And then if there's any damage to the site, it takes much longer for them to come back and get back to work." If modules are being built elsewhere, that reduces some of the risk posed by extreme weather during construction.

Tungseth says that while there are pros and cons to modularization, he is seeing more interest in it on the Gulf Coast. And some of the setbacks experienced by stick-built projects in the first wave of LNG export capacity construction in the region may be contributing to this.

Trends among contractors could also encourage developers to turn to modular design. In a paper recently authored by Linder for McKinsey, he notes that there is a shrinking pool of EPC contractors, with world-scale LNG projects now being executed by just six primary EPC contractors, which have a reduced appetite for risk and therefore are less willing to take on large-scale greenfield projects. As a result, this could spell an end to the notion that 'bigger is better' in LNG design. Projects can shift away from mega trains, with many smaller, modular trains being built instead that can be pre-assembled offsite, rapidly installed and scaled up. In theory this should accelerate project timelines and reduce costs and risks for contractors.

It is also possible to take a mixed approach, in which stick-built facilities can be combined with small-scale modular to reduce peak headcount and demand for craft resources. This could involve modular packaged equipment orders where fully fabricated pre-tested modules are delivered to the site or using a mix of on and off-site construction, according to Linder's paper. However, modularization comes with its own challenges, and whether it is in fact cheaper is disputed by some within the industry. Indeed, relocating a significant portion of the construction work to fabrication yards in Asia would shift some of the capacity shortages to the region.

"I believe that modularization makes sense, but at the same time, you put a lot of strain on the modular yards in Asia, because the Asian yards also have limited capacities," says Suresh. "The earlier anybody goes into FID for a modular construction, the better."

Touil echoes the fact the earliest projects to reach FID will have a clear advantage in terms of logistics. "Modular construction comes with disadvantages, especially if simultaneous projects are constructed," he says, citing examples including steel availability, yard slots, quality control issues, heavy lifting and shipping mobilization.

There are numerous and wide-ranging other factors to consider if opting for modularization. Certain conditions at site could make modularization an attractive option, including a lack of qualified local labor, a lack of lay-down space and the risk of extreme weather. But conversely, if these conditions do not exist, modularization could result in increased costs and construction times because of requirements such as more detailed engineering before material can be procured and additional structural steel, among other factors.

Opting to modularize a project could also result in the operator having to amend its contracting strategy from traditional lump-sum turnkey (LSTK) to some sort of hybrid model depending on how the various elements of the contract are packaged. More planning may be required further in advance to ensure that relationships with contractors, suppliers and shippers are established, any long-lead materials ordered and other aspects of having modules constructed off-site and shipped in are accounted for. On top of this, not all sites will be well-suited for receiving large modules.

Construction labor shortages

Concerns over construction labor shortages are closely tied in with questions over whether to take a modular or a stick-built approach. It does not help that all industry sectors, including upstream, refining and petrochemicals, are trying to catch-up on prior underspend following the onset of the pandemic. High demand for labor across all of these sectors is cutting into the labor supply that has typically been available for LNG construction.

Suresh notes that shortages can affect not only the construction phase, but also the earlier engineering and procurement phases. However, it is during the peak of construction that shortages can become especially challenging.

"I don't think that it is immediately possible to address this challenge, because I don't see any way it is possible to bring in so many skilled workers and labourers to the Gulf Coast or any other place in the US," Suresh says.

While there are programs that exist for developing the necessary skills, Suresh does not believe that these are widespread enough in the US to meet the growing demand for workers. In this situation, opting to modularize plants and build the modules off-site may be the best option for developers and contractors.

This is indeed the thinking among developers including Commonwealth LNG.

"We believe a key part of the solution will be in modular facility components being built elsewhere and transported to the field as well as partnering with proven, experienced local construction firms through our EPC contractor Technip Energies for onsite field construction activities," says Hanna of Commonwealth's approach to labor constraints. He notes that while Commonwealth encourages and participates in workforce development initiatives, these can only go so far in a high labor demand area such as Southwest Louisiana, especially when there is widespread competition for talent, both within and beyond the energy sector.

"We're starting to reach the limitations of the craft market," says Linder. "Now, that's not to say that we are only at 50,000 craft in the region working on process industry projects. We can get more craft in, but the quality and the supervision and the productivity of that craft starts to lessen as you get less experienced folks who haven't done these jobs, and you have to pay more to recruit them."

For a developer with several LNG projects in the pipeline and an ongoing relationship with one EPC contractor, scheduling construction projects one right after another so it can shift workers between those projects could be one way of retaining its workforce. This is what Cheniere Energy is reported to be doing with its contractor, Bechtel, as it plans to break ground on the next stage of expansion at Sabine Pass LNG around the time that it wraps up construction on the latest phase of Corpus Christi LNG, which is currently underway. However, Cheniere is in a minority with multiple LNG projects and phases of expansion at both its export terminals, whereas many developers only have one project.

Venture Global plans to exceed Cheniere's LNG export capacity in the coming years with four projects in Louisiana, but thus far it has not retained the same EPC contractor for more than one phase of expansion. Touil voices the concern that on the whole, current industry efforts may not be enough to mitigate labor shortages.

"Manpower costs are heavily factored in the overall capex of the project, but developers rarely review them while labor markets are rapidly evolving," he says. "A several-year gap between cost estimates and FID aggravates the issue."

Supply chain and logistics

Beyond labor constraints, broader supply chain and logistical issues continue to complicate the path forward for LNG developers, driving up prices and causing schedule delays. However, at least some of these are now reported to be easing after peaking in the wake of the pandemic and the start of the war in Ukraine.

"I think COVID introduced a lot of supply chain challenges for everyone," says Tungseth. "It took us a long time to work through a lot of that backlog of supply chain difficulties, especially on the electrical side. It was just difficult to get copper, difficult to get some of the raw materials for doing a lot of the electrical equipment."

Tungseth notes that transformers were hit particularly hard. "Sometimes there were upwards of two and a half, three years just to get some of these specific transformers," he says. "I think a lot of that – from what I'm seeing – is being worked through or has been worked through. Lead times for everything right now are just a little bit longer than what they typically would be, but they're not where they were, I would say a year, a year and a half ago. I think a lot of the supply chain has gotten better."

Tungseth says developers and contractors are now aware of the challenges involved in procuring certain specific pieces of equipment such as large transformers and certain kinds of big compressors and are working to order them as early as possible.

"As long as it's planned for, it's fine," he says. "It's when it's unplanned that the supply chain gets really taxed."

However, Linder, believes that where cost escalation is ongoing, it will not be resolved within the next year.

"We expect it to continue for the next 6-12 months and we see that not only with the steel and commodities market, but also with equipment pricing," he says. "There's just some late supply chain issues that are kind of plaguing or impacting projects. And then I think the one thing to highlight right is that geographic concentration will only make this worse, these aren't independent factors. The more the contractors' capacity goes up, the more craft is utilized right in the market. Those things will manifest themselves into cost escalation."

While some developers can try to look beyond the Gulf Coast, other North American regions favorable for LNG development will nonetheless have their own constraints, which can include permitting or the need to build long feed gas pipelines, which further complicates a project proposal.

McKinsey estimates that the cumulative impact of cost escalation for materials, equipment, and labor is that typical process industry projects are now 15-20% more expensive to deliver than they had been before the COVID-19 pandemic. And cost escalation, in turn, can translate into schedule delays.

As with labor, competition for materials and equipment is intensified on the Gulf Coast by the fact that various sectors, including upstream, downstream and clean energy are grappling with project backlogs. "Inflation has been particularly volatile over the past few years so mitigating the impacts is critical for the success of any project," says Hanna. "Developing close relationships with key equipment suppliers as well as creating competitive environments for bulk materials are effective strategies for mitigating inflationary pressures. Efficiently making progress in the development phase to lock in pricing and take FID in the optimal timing window is also critical, given the inherent time-based uncertainty of inflation." Feer says that to a certain extent there is only so much that can be done when faced with supply chain issues. He suggests steps such as trying to procure items with long lead times early and aiming for maximum efficiency. This should be particularly straightforward to EPC contractors that are replicating or expanding existing trains, as it allows them to know what materials they will need earlier in the process.

Feer also points to NextDecade's successful renegotiation of some of its offtake agreements as one way in which developers can help offset cost inflation.

"From a buyer's point of view, those are still pretty low prices," says Feer. "I think the project developers have a very strong argument that with cost inflation, with higher interest rates, high capital costs, prices have to come up from that sub-\$2/\$2 [per mmBtu] level. It's very, very difficult in the current environment to be able to develop capacity at those kinds of prices. I think the producers have been successful at arguing they just can't build the project for that kind of money. And I think you're seeing that reflected in the recent contracts that have been signed and NextDecade's success in being able to adjust some of its deals."

Decarbonization

Given the other challenges they are contending with, LNG developers are facing the dilemma of how to strike the best balance between decarbonizing their projects and keeping their costs from escalating further as a result of these decarbonization efforts. This is especially a challenge as buyers have shown limited appetite for LNG that is priced higher for having a lower carbon footprint.

"I think there is openness from project developers in North America to add solutions like carbon capture and storage or electric drive or decarbonization," says Dediu. "In the current environment, CCS and other solutions present them additional costs to the LNG price. At this point, we have few LNG buyers who are willing to pay the price. So as a result, what we see is a number of projects that move ahead, but have in their design readiness to add CCS, or some projects that were originally designed for mechanical drive with gas generation, that they then convert to an electric drive," he adds.

Dediu says that other approaches LNG producers can take include using responsibly sourced gas (RSG) to lower their Scope 3 emissions and using power generated from renewable energy sources.

Hanna notes that Commonwealth LNG is planning to secure RSG, which will then be pretreated to remove carbon dioxide (CO₂) from the feed gas stream.

"We will also install high efficiency state-of-the-art gas turbines and best-in-class dry low emissions control technology," he says.

Feer, meanwhile, cites the example of NextDecade as being one of the companies that had proposed a CCS component to its LNG project, which currently appears to be on hold.

"I think people are taking it seriously and doing what they can, but I think the problem is that there's no premium for low-carbon LNG, as near as I can see today," he says. "People are not willing to pay more for supply from a project that has a carbon capture system or is just very low carbon."

Feer notes that in Asian countries working towards long-term decarbonization goals, replacing coal-powered generation with gas-powered generation, this is already seen as a significant gain. For European buyers, with more aggressive emissions-reduction targets, decarbonization of LNG could become a more important issue sooner.

ABB is looking at how best to help the LNG industry decarbonize and Tungseth says he believes all-electric LNG is the way to do it.

"Once it gets to the LNG process, it's the energy intensity that it takes to cool the LNG down, that's really what drives a lot of the emissions on the LNG side," he says. "So anything we can do to reduce that or use green power to produce that is good, and that's where our focus is, it's moving more to the eLNG." Suresh notes that while switching from gas-powered to e-drive motors is certainly a significant step towards decarbonizing LNG, the electricity used to power the motors should also come from green sources. And indeed, various developers are pursuing decarbonization options

that include eLNG and renewable electricity. Notably, this is a common theme among Canadian proposals, with developers generally aiming to use renewable power and e-drive motors, albeit in some cases at a later stage of their projects, after initially starting out with gas-powered turbines.

In the US, meanwhile, Touil sees the main decarbonization tools as CCS, electrification and more efficient gas turbines. He cites examples including Cheniere upgrading its gas turbine combustion system at Sabine Pass LNG, proposed CCS facilities and Freeport LNG, which is sourcing its power from a partially decarbonized grid. The Train 4 expansion at Cameron LNG is expected to do the same. "Future regulatory changes might accelerate the drive for decarbonization efforts, but seriously limit the prospect of future LNG projects," says Touil.

EPC contracting and risk management

As they grapple with the various challenges presented by current market conditions, some North American LNG developers are also having to rethink EPC contracting strategies in order to secure contractors in an increasingly competitive environment.

"Traditionally, the LSTK model has been predominant in the LNG industry for decades and is still valid," says Touil. "However, there is an inherent risk where the contractor carry the burden alone." He cites the examples of McDermott International filing for bankruptcy protection after incurring losses with Cameron LNG and elsewhere, as well as KBR's decision to stop engaging in this type of contracting.

"LSTK contracts places a substantial financial risk on the EPC contractor, especially in LNG projects with evolving scopes and volatile market conditions," Touil continues. "I would say that today, both project owners and contractors are seeking more balanced risk-sharing arrangements to ensure project success, which is the ultimate goal. The main alternatives are the progressive LSTK, the target-cost contract, the alliance contract, the cost-plus contract and hybrid combinations."

While there is some diversification away from LSTK, however, these remain popular and there are other factors that play into what contracts parties can enter into.

"Your financing vehicle may affect whether or not you can even look at reimbursable," says Monica Hwang, a partner at law firm O'Melveny.

"I think what we're seeing is not necessarily 100% of a shift to reimbursable," Hwang continues. She notes that contracts may still be referred to as lump sum, but different cost elements may be changing within that. "Maybe before it would have been part of the overall costs, and now maybe there's more flexibility, under certain negotiated instances where the parties can renegotiate a cost component." Hwang also cites scenarios under which the price of a commodity such as steel can be tied to an index, and where certain cost components are carved out and subcontracted.

"Those are just specific cost components instead of the entire contract being reimbursable," she says. Suresh, meanwhile, points to the possibility for including fabrication (F) for a move away from EPC to EPFC, in which the EPF components are still lump sum, while construction is subcontracted and managed by the owner.

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"This kind of model can relieve the owner of carrying the entire risk of managing E plus P plus F," Suresh says. "It can shift the owner's time and efforts only to the most important part, which is the construction, commissioning and operations."

It remains difficult to gauge the full extent of how commonplace these reimbursable and hybrid contracts are becoming because of the confidential nature of such agreements. In May 2023, however, it emerged that Worley had been selected as the contractor for Venture Global's CP2 LNG project under a reimbursable contract. There will be others, the details of which have not been publicly disclosed, but on the other hand, there are reasons for LSTK contracts to remain popular.

"We still see project financing and the ability to make these contracts what I would call bankable and have the proper protections for the banks to want to invest," says Linder. "Unless you want to balance sheet fund these projects, there is a need for project financing and a need for this kind of LSTK or fixed-price arrangement," he adds.

Linder echoes Hwang in saying this is resulting in contracts where portions of the contracting scopes are carved out and given to the owners for risk.

"There are different ways to do it," he says. "There's conversion contracts, where it's open and then at some point, you convert to a fixed price at around construction or execution. And there's also where they're carving out pieces of the contract and making the provisional sums, which is in a sense reimbursable," he says. Feer also sees something of a shift, but not a major one as yet.

"I'm not sure I would say there's been a real sea change, I would say lump sum turnkey is preferred generally," says Feer. "It's not necessarily the cheapest way to go. In an ideal world, an hourly, reimbursable kind of contract has the best possibility of being cheaper, but that's in a world in which nothing goes wrong."

"With a lump sum turnkey contract, the huge benefit is predictability," says Feer. If a contractor can build a project on time and under budget, LSTK would be an attractive option. However, once again, this involves nothing going significantly wrong during the construction process, and for a number of contractors, things have gone wrong during construction in recent years.

Looking ahead it seems that at least some degree of flexibility would prove beneficial for developers as they seek to secure contractors. And indeed modularization could accelerate this trend. However, there are pros and cons to both traditional and newer approaches. Developers have to consider what works best for their specific project. Meanwhile, each new project that reaches FID puts further pressure on available labor, materials and other resources. Those developers that are close to FID on their projects will not want to waste any time.

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Sabine Pass LNG

Location: Cameron Parish, Louisiana

Status: In commercial operation, with 30 mtpa online across six trains of around 5 mtpa each and a further phase of expansion proposed.

Capacity under construction: n/a

Capacity proposed: Under the Sabine Pass Stage 5 Expansion Project, a further 20 mtpa of capacity would be added at Sabine Pass, consisting of three large-scale trains of around 6.5 mtpa each and a boil-off gas (BOG) re-liquefaction unit with production capacity of roughly 0.75 mtpa.

Partners: Cheniere Energy

EPC contractor: Bechtel, which built the first six trains at Sabine Pass and has been engaged to complete a FEED study for the proposed expansion project.

Start-up date: 2016

Targeted FID date for next stage: If regulatory approvals are received as expected, construction could start in 2025 according to filings with the US Federal Energy Regulatory Commission (FERC).

Notes: Sabine Pass is the first LNG export terminal in the Lower 48 US states and also the country's largest. Its construction the addition of liquefaction capacity to an existing regasification facility. In September 2022, it also became the first terminal in the world able to accommodate three LNG tankers simultaneously.

Corpus Christi LNG

Location: Corpus Christi, Texas

Status: In commercial operation, with 15 mtpa online across three trains of around 5 mtpa each and a further stage of expansion under construction.

Capacity under construction: More than 10 mtpa from seven midscale trains of around 1.49 mtpa each under the Stage 3 expansion project.

Capacity proposed: Two further midscale trains, 8 and 9, have been proposed and are undergoing regulatory review.

Partners: Cheniere Energy

EPC contractor: Bechtel, which built the first three trains and is currently constructing the Stage 3 expansion.

Start-up date: 2019

Targeted start-up date for next stage: 2025

Targeted FID date for Midscale Trains 8 and 9: If FERC approval is received as expected in 2024, construction would begin soon after. Cheniere says it already has the commercial support required to build these additional trains.

Notes: Corpus Christi LNG was the first greenfield export terminal to be built in the Lower 48 US states.



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Elba Island LNG

Location: Chatham County, Georgia

Status: In commercial operation, with 2.5 mtpa online across 10 modular trains of 0.25 mtpa each

Capacity under construction: n/a

Capacity proposed: No new capacity is planned, but an application was filed in 2023 to optimize the project, which would involve new installations and modifications to existing liquefaction facilities and would increase the terminal's capacity to around 2.9 mtpa. Company executives also said in April 2022 that there could be an opportunity for small-scale expansion, but no further news has come on this since.

Partners: Elba Liquefaction Co., which is a joint venture between Kinder Morgan (25.5%), Blackstone Credit (49%) and an unnamed partner that bought a 25.5% interest from Kinder Morgan in 2022. Kinder Morgan also operates the LNG terminal via its 100% ownership in Southern LNG, which also provides LNG storage, vaporization and ship-loading services.

EPC contractor: IHI E&C

Start-up date: 2019

Targeted FID date: n/a, but a regulatory decision on the optimization project is expected in 2024.

Notes: The small-scale Elba Island project involved conversion of an existing regasification terminal to liquefaction. The liquefaction facility was built using Movable Modular Liquefaction technology.

Cameron LNG

Location: Hackberry, Cameron Parish, Louisiana

Status: In commercial operation, with 13.5 mtpa online across three trains of around 4.5 mtpa each and a further stage of expansion proposed

Capacity under construction: n/a

Capacity proposed: Cameron LNG Phase 2 would consist of a single train, Train 4, with a capacity of 6.75 mtpa.

Partners: Sempra LNG (50.2%), Mitsui Group (16.6%), TotalEnergies (16.6%) and Japan LNG Investment (16.6%). Japan LNG Investment is a joint venture between Mitsubishi and Nippon Yusen Kabushiki Kaisha on a 70:30 basis.

EPC contractor: McDermott International and Chiyoda were the EPC contractors for Phase 1, comprising the first three trains. Sempra said on its second-quarter earnings call for 2023 that it had selected Bechtel for Phase 2.

Start-up date: 2019

Targeted start-up date for next stage: The current export authorization for Train 4 has a start-up deadline of May 2026. Sempra indicated in July 2023 that it could seek an extension, though this process is now more challenging after the US DoE tightened up its policy on extensions.

Targeted FID date for next stage: 2024

Notes: Phase 1 of the Cameron LNG export project entailed adding liquefaction capacity to an existing regasification terminal. In March 2023, the US FERC authorized Cameron LNG's amendment to its Phase 2 expansion plans. Under the amended plan, a single, larger train would now be built, instead of two trains previously. The amended expansion project also included plans to replace gas turbine drives with electric drive (e-drive) motors and tie-in facilities to enable the sequestration of carbon dioxide (CO₂). Efforts to expand production from the existing three trains by 5% via debottlenecking are also underway.

Freeport LNG

Location: Freeport, Texas

Status: In commercial operation, with 15 mtpa online across three trains of around 5 mtpa each and a further stage of expansion proposed

Capacity under construction: n/a

Capacity proposed: Train 4, with a further 5 mtpa of capacity

Partners: Freeport LNG Development, which in turn is owned by Freeport LNG Investment (63.5%), JERA (25.7%) and Osaka Gas (10.8%). Freeport LNG-GP is the sole general partner in the project.

EPC contractor: Zachry Group and C&I were awarded the EPC contract for Trains 1 and 2. For Train 3, the EPC contract went to an expanded venture comprising Zachry, CB&I and Chiyoda. Subsequently, CB&I was acquired by McDermott International in 2018, while construction of Freeport was underway.

Start-up date: 2019

Targeted start-up date for next stage: The current export authorization for Train 4 has a start-up deadline of August 2028.

Targeted FID date for next stage: Unclear, as it was previously targeted for 2022 but was delayed amid a 10-month outage at the existing terminal following an accident in mid-2022. There has been speculation that FID on Train 4 could now be pushed into 2024.

Notes: The first phase of the Freeport LNG export project involved the addition of liquefaction capacity to the existing regasification terminal. The liquefaction facility uses all-electric compression motor drive technology, and has been touted as the world's largest electric power-driven LNG facility of its kind.

Calcasieu Pass LNG

Location: Cameron Parish, Louisiana

Status: Operating on a pre-commercial basis since March 2022. The project consists of 18 liquefaction trains, each with a capacity of 0.626 mtpa, configured in nine blocks for a total capacity of over 10 mtpa.

Capacity under construction: n/a

Capacity proposed: n/a

Partners: Venture Global LNG

EPC contractor: Kiewit

Start-up date: March 2022 on a pre-commercial basis

Notes: Venture Global used a mid-scale, modular approach and touts Calcasieu Pass as being the fastest large-scale greenfield LNG facility to ever be built, moving from FID to LNG production in just 29 months. However, the facility still remains in what has become the longest-ever commissioning period for a US liquefaction project. Venture Global told long-term customers in early 2023 that commercial operations at Calcasieu Pass would be delayed due to the time needed to finish repairs at a power generation unit at the facility. As a result, Venture Global has run into disputes with foundation customers, some of whom have started arbitration proceedings against it. However, Venture Global maintained as of mid-2023 that it remained in full compliance with all obligations under its long-term contracts, including timing.

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Plaquemines LNG

Location: Plaquemines Parish, Louisiana

Status: Phase 1 under construction since May 2022 and Phase 2 since March 2023, with the first four liquefaction train modules reported to have been delivered to site by early September 2023.

Capacity under construction: 20 mtpa in total, with Phase 1 accounting for 13.33 mtpa of this

Capacity proposed: n/a

Partners: Venture Global LNG

EPC contractor: KBR as lead contractor, with the KZJV joint venture comprising KBR and Zachry Group executing the development, engineering, procurement and construction under the EPC contract

Targeted start-up date: In early September 2023, equipment supplier Baker Hughes said Phase 1 was on track to produce first LNG in 2024. This could be followed by Phase 2 in 2025.

Notes: Venture Global is replicating the approach it used at Calcasieu Pass at Plaquemines. The Plaquemines facility will comprise up to 36 liquefaction trains, each with a capacity of 0.626 mtpa configured in 18 blocks.

CP2 LNG

Location: Cameron Parish, Louisiana

Status: Proposed, with 9.25 mtpa of the terminal's 20 mtpa nameplate capacity sold as of August 2023 and further marketing discussions ongoing

Capacity under construction: n/a

Capacity proposed: 20 mtpa nameplate capacity with a peak capacity of around 24 mtpa

Partners: Venture Global LNG

EPC contractor: Worley for Phase 1

Targeted start-up date: 2026

Targeted FID date: According to an update from equipment supplier Baker Hughes in September 2023, Venture Global will begin construction on CP2 later this year, once it receives FERC authorization. The FERC issued an environmental approval for the project in July 2023, paving the way for a final decision.

Notes: The design of CP2 would be similar, and equipment would be identical, to Venture Global's midscale, modular Calcasieu Pass LNG and Plaquemines LNG facilities. CP2 would consist of 18 liquefaction blocks, each with a nameplate capacity of around 1.1 mtpa of LNG. Nine blocks would be constructed per 10 mtpa phase.



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Delta LNG

Location: Plaquemines Parish, Louisiana

Status: Proposed

Capacity under construction: n/a

Capacity proposed: 20 mtpa, consisting of 36 liquefaction trains, each with a capacity of 0.626 mtpa, configured in 18 blocks.

Partners: Venture Global LNG

EPC contractor: Not yet selected

Targeted start-up date: Unconfirmed

Targeted FID date: Unconfirmed

Notes: Little has been reported on Delta LNG as Venture Global focuses on building Plaquemines and reaching FID on CP2. However, the company would be expected to deploy the same midscale, modular approach at Delta, which it said may be built in two 10-mtpa phases.

Golden Pass LNG

Location: Sabine Pass, Port Arthur, Texas

Status: Under construction since 2019

Capacity under construction: 18.1 mtpa across three trains, each with a capacity of 6 mtpa

Capacity proposed: n/a

Partners: QatarEnergy (70%) and ExxonMobil (30%)

EPC contractor: CCZJV, a joint venture comprising Chiyoda, McDermott International and Zachry Group

Targeted start-up date: 2024

Notes: The Golden Pass LNG export project entails adding liquefaction capacity to the existing regasification terminal. The partners are using a traditional, stick-built approach to constructing the plant. The partners were initially authorized to build the plant with a capacity of 15.6 mtpa, but an increase to 18.1 mtpa was subsequently approved by the Biden administration. The companies said the increase had been driven by production efficiencies with the same equipment they had originally planned to build, rather than any changes.

Port Arthur LNG

Location: Port Arthur, Texas

Status: Under construction since March 2023, with a further stage of expansion proposed

Capacity under construction: 13.5 mtpa across two liquefaction trains with a capacity of 6.75 mtpa each

Capacity proposed: Port Arthur LNG Phase 2 would add a further two trains, also with a combined capacity of 13.5 mtpa.

Partners: Sempra Infrastructure Partners, which is 70% owned by Sempra, 20% by KKR and 10% by Abu Dhabi Investment Authority (ADIA), owns and operates Port Arthur. Phase 1 is owned by Sempra Infrastructure Partners, ConocoPhillips and KKR, though the exact breakdown of ownership was still being finalized as of August 2023. Sempra said on its second-quarter earnings call for 2023 that it expected to finalize its project-level ownership at 28% and ConocoPhillips previously agreed to buy a 30% non-controlling interest, implying that KKR is set to take a 42% indirect, non-controlling interest in Phase 1.



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EPC contractor: Bechtel has been awarded the contract for Phase 1.

Targeted start-up date: 2027 for Phase 1

Targeted FID date for next stage: Unclear

Notes: Port Arthur LNG is a greenfield facility. Sempra is also planning to build carbon capture and storage (CCS) capacity to serve the Port Arthur terminal.

Rio Grande LNG

Location: Brownsville, Texas

Status: Under construction since July 2023 with a further stage of expansion proposed

Capacity under construction: 17.6 mtpa across three liquefaction trains, each with a capacity of 5.9 mtpa

Capacity proposed: A second phase comprising two additional trains would bring Rio Grande LNG's total capacity to 27 mtpa.

Partners: NextDecade owns and operates Rio Grande LNG. For Phase 1, the company retains a 20.8% equity interest, Global Infrastructure Partners owns 46.1%, TotalEnergies holds 16.7%, GIC owns 9.9% and Mubadala Investment holds 6.5%. TotalEnergies has also acquired a 17.5% interest in NextDecade and Mubadala owns a 5.4% interest in the company.

EPC contractor: Bechtel has been awarded the EPC contract for Phase 1.

Targeted start-up date: 2027

Targeted FID date for next stage: Unclear

Notes: The original FEED for Rio Grande LNG was based on six trains, each with a capacity of 4.5 mtpa. NextDecade redesigned the project to produce 27 mtpa from five trains instead of six, unveiling the updated plans in 2020. The company has also planned to reduce CO2 emissions from the project by more than 90% and intends to deploy CCS to achieve this.

Lake Charles LNG

Location: Lake Charles, Louisiana

Status: Proposed and fully permitted, with almost 8 mtpa of its capacity sold as of August 2022. However, an application was filed with the US DoE for a new export authorization in August 2023 after a request for an extension of the project's existing authorization was rejected.

Capacity under construction: n/a

Capacity proposed: 16.45 mtpa across three liquefaction trains, each with a capacity of 5.5 mtpa

Partners: Energy Transfer, which said on its second-quarter earnings call for 2023 that it was seeking equity partners and was aiming to retain around 25% equity ownership.

EPC contractor: None yet selected, but Energy Transfer told the DoE in its application for a new export authorization that it was now in negotiations with a bidder and expected to finalize these negotiations by the end of September 2023.

Targeted start-up date: 2028, though Energy Transfer is seeking an extension of its deadline for placing the terminal into service to 2031 via a new application

Targeted FID date: Energy Transfer has requested the DoE to grant it a new export license by February 19, 2024. As the company had previously been pursuing an FID by the end of 2023, it seems that if the DoE issues a new authorization, an FID could soon follow.

Notes: The Lake Charles LNG export project entails adding liquefaction capacity to an existing regasification terminal. However, the company has said it cannot complete the project by the current deadline and needs more time. It has attributed this to unplanned delays, including those caused by the Covid-19 pandemic, and a decision to add a CCS component to the plant.



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Texas LNG

Location: Brownsville, Texas

Status: Proposed and fully permitted

Capacity under construction: n/a

Capacity proposed: 4 mtpa across two liquefaction trains, each with a capacity of 2 mtpa

Partners: Glenfarne Group, with Samsung Engineering holding a minority interest

Lead contractor: Technip Energies USA and Samsung Engineering

Targeted start-up date: 2027

Targeted FID date: 2023

Notes: Glenfarne expects that Texas LNG's liquefaction process will eliminate most CO2 emissions by using e-drive compression powered by renewable generation. The Texas LNG project will use Technip Energies' SnapLNG technology, which combines a compact modular design concept for mid-scale trains with standardized components and technology.

Magnolia LNG

Location: Lake Charles, Louisiana

Status: Proposed and fully permitted

Capacity under construction: n/a

Capacity proposed: 8.8 mtpa across four liquefaction trains, each with a capacity of 2.2 mtpa

Partners: Glenfarne Group

EPC contractor: Originally, the EPC contract was awarded to KSJV, a joint venture between KBR and SK Engineering & Construction. However, in 2020 KBR announced it would exit most of its LNG construction projects. Glenfarne executives said at the time they had received interest from other potential contractors, but there has been no update since.

Targeted start-up date: Unclear, but the US DoE's current export authorization has a deadline of November 2023. Glenfarne applied for an extension to April 2026 in March 2023, prior to the DoE tightening its rules for granting extensions and stood to have its request assessed based on the previous rules. Glenfarne subsequently filed an amended request seeking a longer extension, to November 2028, hoping it would also be considered under the old DoE rules. However, the DoE ruled in August 2023 that it would consider the amended request under its new rules, which will see extensions only being to projects that have not yet entered construction under extenuating circumstances. This looks set to complicate Magnolia LNG's path forward from a regulatory standpoint.

Targeted FID date: Unclear

Notes: Glenfarne intends to deploy its OSMR liquefaction technology at Magnolia, which it says will allow the facility to generate lower greenhouse gas (GHG) emissions than other conventional LNG processes.



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Driftwood LNG

Location: Calcasieu Parish, Louisiana

Status: Under limited, pre-FID construction since March 2022 but still seeking financing and buyers after its last offtake agreement was terminated in August 2023. The piling and compressor foundations for the first block of trains had been completed by early September 2023.

Capacity under construction: n/a

Capacity proposed: 27.6 mtpa across 20 liquefaction trains, each with a capacity of 1.38 mtpa, with the trains configured in five blocks of four trains each. Phase 1 would comprise 11 mtpa of capacity and two blocks of trains.

Partners: Tellurian, which is seeking partners to invest 55% of equity for 6 mtpa of capacity in Driftwood Phase 1 according to an August 2023 investor presentation.

EPC contractor: Bechtel

Targeted start-up date: 2027

Targeted FID date: 2023

Notes: Tellurian has suffered a series of setbacks including the termination of its offtake agreements and continues its efforts to find new equity partners, which could result in further delays to its schedule for building Driftwood. It is making progress in other areas, and announced in early September 2023 that Baker Hughes had agreed to supply eight main refrigerant compression packages for Phase 1 of Driftwood LNG.

Gulf LNG

Location: Jackson County, Mississippi

Status: Proposed and fully permitted, but shelved

Capacity under construction: n/a

Capacity proposed: 10.85 mtpa

Partners: Kinder Morgan, which also has a 50% interest in the existing regasification facility

EPC contractor: n/a

Targeted start-up date: n/a

Targeted FID date: n/a

Notes: The Gulf LNG export project would involve liquefaction capacity being added at the site of an existing regasification terminal. Kinder Morgan executives said in April 2022 that the company had a customer paying for the regasification capacity, but given market conditions this was not generally in use. The company would work with the customer to explore the potential for advancing its liquefaction project at the site. However, there have been no updates since.



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Delfin LNG

Location: Port Delfin, Cameron Parish, Louisiana

Status: Proposed and fully permitted, but Delfin filed a request in July 2023 for an extension until September 2027 to construct the project's onshore facilities with the US FERC

Capacity under construction: n/a

Capacity proposed: 13.3 mtpa across four FLNG vessels, each with a capacity of almost 3.5 mtpa

Partners: Delfin Midstream. In June 2023 it was announced that Mitsui OSK Lines (MOL) had agreed to make an investment into Delfin LNG, but the full extent of MOL's participation was unclear as of early September 2023.

EPC contractor: An LSTK EPC contract is under final negotiations with Samsung Heavy Industries and Black & Veatch, which completed the FEED for newbuild FLNG vessels for the project, for the first of the vessels, according to Delfin's March 2023 corporate presentation. In August 2023, Delfin also awarded a design and engineering contract to Wison Offshore & Marine for the development of further FLNG vessels for the project. Wison is aiming to continue into a full FEED later in 2023 so it can begin FLNG vessel construction in 2024. It has not been specified how many vessels are covered under this contract.

Targeted start-up date: Delfin's current FERC authorization for the construction of the onshore portion of the project has a deadline of September 2023, but in July 2023 the company for an extension until September 2027.

Targeted FID date: 2023 for the first FLNG vessel, with the second to follow soon after.

Notes: Delfin LNG is a brownfield deepwater project and requires minimum additional onshore infrastructure. The project will be served by the UTOS gas pipeline. On its website, Delfin notes that it also owns a second pipeline system, Grand Chenier, which may either be used to develop a second deepwater port known as Avocet LNG or to expand Delfin by a further two FLNG vessels with a combined capacity of 8 mtpa. Neither option had yet advanced to the regulatory review stage as of September 2023.

Alaska LNG

Location: Nikiski, Alaska

Status: Proposed and fully permitted

Capacity under construction: n/a

Capacity proposed: 20 mtpa across three liquefaction trains, each with a capacity of 6.7 mtpa

Partners: Alaska Gasline Development Corp. (AGDC), which is owned by the State of Alaska and is seeking equity partners to take over a 75% interest in Alaska LNG

EPC contractor: Not yet selected

Targeted start-up date: 2030

Targeted FID date: Unclear, but AGDC executives said in April 2023 that once new owners are found and fund the FEED process, it could take 12-16 months to reach FID.

Notes: Proposals for Alaska LNG has undergone various changes since the project was first conceived. Producers BP, ExxonMobil and ConocoPhillips pulled out as partners in the project in 2016 amid concerns over Alaska LNG's economics in a period of abundant gas supplies and low prices. AGDC has lowered the cost of the project from \$45bn to \$38.7bn, including the costs of developing the feed gas pipeline from the North Slope, but the price tag is still thought to be deterring potential investors. AGDC is also trying to improve the project's environmental credentials, for example by adding a carbon capture plant to the proposal.



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Commonwealth LNG

Location: Cameron Parish, Louisiana

Status: Proposed, with authorization to construction the terminal and to export LNG to FTA countries but still awaiting a non-FTA export permit from the US DoE.

Capacity under construction: n/a

Capacity proposed: 9.3 mtpa across six liquefaction trains, each with a capacity of 1.4 mtpa

Partners: Commonwealth LNG and Kimmeridge Energy Management, which agreed in August 2023 to take a minority stake of undisclosed size in Commonwealth LNG.

EPC contractor: Technip Energies

Targeted start-up date: 2027

Targeted FID date: 2024

Notes: Commonwealth is taking a modular approach to construction, with the aim of lowering costs and minimizing the time required to build its facility. The company anticipates starting pre-FID construction before the end of 2023. Aside from a non-FTA export license, Commonwealth needs to have 8 mtpa of its capacity covered by long-term contracts in order to reach FID. In early September 2023, company executives said they were about to announce one more supply deal, which would take them to 6 mtpa under contract.

Gulfstream LNG

Location: Plaquemines Parish, Louisiana

Status: Proposed, with permitting in process and an authorization to export to FTA countries received as of early September 2023

Capacity under construction: n/a

Capacity proposed: 4 mtpa across an unspecified multiple number of liquefaction trains, each with a capacity of less than 1 mtpa

Partners: Gulfstream LNG

EPC contractor: n/a

Targeted start-up date: Gulfstream said it anticipated initial production within six years but still needs to apply to the US FERC for construction authorization.

Targeted FID date: Unclear

Notes: Gulfstream has taken steps forward since the proposal was first launched in 2023. In the first half of the year, the company also entered into a term sheet agreement with a gas transportation firm that operates an extensive pipeline network in the area surrounding the project. As of July 2023 it was preparing to submit a FERC application once an initial round of equity funding had been completed. The company said it was designed its facility based on the use of mid-scale, modular liquefaction trains like those being deployed by other projects in the region. It also intends to use e-drive technology to lower Gulfstream LNG's emissions.

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Qilak LNG

Location: North Slope, Alaska

Status: Proposed, with a feasibility study underway as of March 2023 but not yet in the regulatory approval process

Capacity under construction: n/a

Capacity proposed: 4 mtpa

Partners: Lloyds Energy

EPC contractor: n/a

Targeted start-up date: Unclear

Targeted FID date: Qilak executives said in March 2023 that if the feasibility study was completed in 2023 and FEED in 2024, an FID could be possible in 2025 depending on a number of conditions.

Notes: Qilak LNG plans to use gravity-base structures set offshore of Alaska and to deliver 3-5 tankers per month to Asia. It will not require the addition of major pipeline infrastructure, given its proximity to Alaskan gas production.

CANADA

LNG Canada

Location: Kitimat, British Columbia

Status: Under construction and 85% complete as of July 2023, with the final module delivered from China also delivered in July

Capacity under construction: 14 million tonnes per annum (mtpa) from first two trains

Capacity proposed: a potential second phase, consisting of an additional 14 mtpa from two further trains

Partners: Shell (40%), Petronas (25%), PetroChina (15%), Mitsubishi Corp. (15%) and KOGAS (5%)

EPC contractor: JGC Fluor

Targeted start-up date: 2025

Notes: LNG Canada represents the largest energy investment in Canadian history. The project is relying on a combination of energy-efficient gas turbines and renewable electricity to emit less than half the greenhouse gas emissions of the average LNG facility currently in operation. If the partners proceed with Phase 2, they would initially build it with gas-powered turbines, switching to electric motors as more power becomes available, based on comments made by executives in 2023.

Woodfibre LNG

Location: Squamish, British Columbia

Status: The first of 18 modules is under construction at the Qingdao McDermott Wuchuan fabrication yard in China as of July 2023.

Capacity under construction: 2.1 mtpa from two trains

Capacity proposed: n/a

Partners: Pacific Energy (70%), Enbridge (30%)

EPC contractor: McDermott International

Targeted start-up date: 2027

Notes: Woodfibre aims to be a net-zero emission LNG project during both construction and operation and will be powered using renewable hydroelectricity.

Ksi Lisims LNG

Location: Pearse Island, British Columbia

Status: Proposed, undergoing regulatory review

Capacity under construction: n/a

Capacity proposed: 12 mtpa

Partners: The Nisga'a Nation, Rockies LNG Partners and Western LNG

EPC contractor: Not yet selected, but Black & Veatch, in collaboration with Samsung Heavy Industries (SHI), was awarded a front-end engineering design (FEED) contract for the project's nearshore floating LNG (FLNG) production facility in July 2023

Targeted start-up date: 2028

Targeted FID date: 2024, dependent on the receipt of regulatory approvals, among other factors

Notes: Ksi Lisims LNG is expected to be one of the most significant Indigenous-led infrastructure projects in Canadian history. The partners are also targeting net zero emissions from the project by 2030.

Cedar LNG

Location: Kitimat, British Columbia

Status: Proposed, with environmental approvals received in March 2023 and an LNG Facility Permit from the BC Energy Regulator received in July 2023

Capacity under construction: n/a

Capacity proposed: 3 mtpa from two trains

Partners: The Haisla Nation (50%) and Pembina Pipeline (50%)

EPC contractor: Not yet selected but in February 2022, Black & Veatch and SHI were awarded the FEED contract for the proposed FLNG facility. In August 2023, the Cedar partners said that had launched a second FEED process for the vessel in late 2022 and were waiting for that work to reach the same stage as the original FEED.

Targeted start-up date: 2027

Targeted FID date: Recently pushed back to the fourth quarter of 2023

Notes: If Cedar LNG proceeds in line with its current schedule, it will achieve its target of becoming the first Indigenous-majority-owned LNG export facility in Canada. The project will be powered by renewable electricity, which the partners say will make it one of the lowest carbon intensity LNG facilities in the world. The Cedar partners are planning to receive feed gas from the Coastal GasLink pipeline, which will also supply the nearby LNG Canada project.

MEXICO

Energia Costa Azul LNG

Location: Baja California

Status: Under construction, with a further expansion stage proposed

Capacity under construction: 3.25 mtpa from one train under construction since late 2020

Capacity proposed: A potential second phase, consisting of an additional 12 mtpa from two further trains

Partners: Sempra LNG (41.7%), IEnova – Sempra's subsidiary in Mexico – (41.7%) and TotalEnergies (16.6%).

EPC contractor: TechnipFMC

Targeted start-up date: 2025

Notes: Phase 1 of ECA LNG is a brownfield project involving conversion of an existing regasification terminal to exports. Feed gas for the project would be shipped in from the US and re-exported from Mexico.

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Vista Pacifico LNG

Location: Topolobampo, Sinaloa

Status: Proposed, with authorization received in 2022 from the US Department of Energy (DoE) to re-export US-sourced gas to countries with which the US does not have a free-trade agreement (FTA).

Capacity under construction: n/a

Capacity proposed: 3.5 mtpa according to a Sempra announcement from late 2022, though Sempra's quarterly earnings presentations show only 2 mtpa of capacity at the project as being under development.

Partners: Sempra Infrastructure, IEnova, Mexico's Federal Electricity Commission (CFE) and TotalEnergies, though as of August 2023, plans and partnerships for the project remained preliminary and non-binding, as noted in Sempra's second-quarter earnings presentation

EPC contractor: None yet selected

Targeted start-up date: Unclear, but DoE export authorizations have seven-year deadlines, meaning exports would have to start by 2029 at the latest.

Targeted FID date: Unclear

Notes: Little mention has been made of Vista Pacifico LNG since Sempra announced in December 2022 that it had obtained export authorization from the DoE. The project continues to be listed as being under development on a non-binding, preliminary basis in Sempra's quarterly earnings presentations, but comments made by executives in 2023 suggest the company is prioritizing projects that are already under construction. Feed gas for the project would be shipped in from the US and re-exported from Mexico.

Saguaro Energia LNG

Location: Puerto Libertad, Sonora

Status: Proposed, with a collaboration agreement signed with the state government of Sonora in July 2023 and enough sales volumes from Trains 1 and 2 to be preparing for FID.

Capacity under construction: n/a

Capacity proposed: 15 mtpa from three trains, potentially expandable by an additional three trains and a further 15 mtpa in a future second phase.

Partners: Mexico Pacific

EPC contractor: Mexico Pacific's website lists Bechtel as a partner in the project and touts a fully wrapped lump-sum turnkey (LSTK) EPC contract as part of the company's construction approach, though no announcement on the award of an EPC contract has been made public.

Targeted start-up date: 2027

Targeted FID date: 2023 for the first two trains, with an FID on Train 3 to follow "in quick succession" according to Mexico Pacific's website

Notes: Like other Mexican projects, Saguaro Energia would source its feed gas from the US. Mexico Pacific lists Bechtel, Techint, ConocoPhillips and Baker Hughes as strategic partners in the Saguaro project.



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Altamira Fast LNG

Location: Altamira, Tamaulipas

Status: The first of three planned FLNG projects is mechanically complete and being installed as of August 2023. A further two FLNG units are under construction.

Capacity under construction: 4.2 mtpa across three FLNG units, each with a capacity of 1.4 mtpa, including the one that is mechanically complete but not yet online as of August.

Capacity proposed: n/a

Partners: New Fortress Energy

Contractor: Fluor has been awarded the engineering, procurement and fabrication management contract for the first two units. No announcement has yet been made on the third unit.

Targeted start-up date: September 2023 for the first FLNG unit, with the second and third targeted to enter service in the first quarter of 2025.

Targeted FID date: n/a

Notes: New Fortress is deploying its floating, modular Fast LNG technology at Altamira. Together with Mexico's CFE utility, New Fortress is exploring the possibility of installing units 2 and 3 onshore.

AMIGO LNG

Location: Guaymas, Sonora

Status: Proposed, with a DoE re-export authorization to non-FTA countries received in 2020 and further permitting underway

Capacity under construction: n/a

Capacity proposed: 7.8 mtpa across two trains. Phase 1 would comprise a 3.9 mtpa train and a potential Phase 2 would add another train with a capacity of 3.9 mtpa.

Partners: LNG Alliance and its subsidiary, Epsilon LNG

EPC contractor: Contractors had been shortlisted in Singapore and China for the LNG liquefaction modules and in the US for the marine facilities as of September 2022 but there had been no further announcements as of September 2023.

Targeted start-up date: 2026

Targeted FID date: Previously 2023 but it is unclear if this is still the case

Notes: AMIGO LNG would use feed gas from the Permian Basin in the US, like other planned Mexican export terminals. As of 2022, feed gas availability for the second phase was unconfirmed.

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Confirmed Speakers for 2024 Include:



Farhan Mujib
President
JGC Corporation

JGC



Bhupesh Thakkar
SVP & General Manager - LNG
Bechtel Corporation

BECHTEL



Ralph Biediger
President - Construction
Zachry Group

ZACHRY



Mike VanderMate
SVP Engineering & Construction
Sempra Infrastructure

SEMPRA
INFRASTRUCTURE



Raquel Couri
Senior Vice President
Next Decade

NEXTDECADE



Pierre Bechelany
President - LNG
Fluor Corporation

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