

WHITE PAPER / EPC FOR LNG PROJECT DELIVERY

APPLYING MIDSTREAM LESSONS LEARNED TO THE LNG INDUSTRY

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As utilities develop liquefied natural gas peak shaver and satellite facilities across the U.S., they can turn to the oil and gas midstream industry for lessons on how to achieve efficient and cost-effective project delivery.



Today, the U.S. is the top global producer of natural gas and a top exporter of liquefied natural gas (LNG), which indicates there is an abundance of the fuel, often at an affordable price. These low prices coupled with favorable regulations and difficulty siting new pipelines drive the market for LNG facility expansions and investments in new infrastructure, particularly with peak shaver and satellite facilities.

The flexibility and availability of LNG offers energy providers a solution that's easy to mobilize and that contributes directly to a diversified energy mix. Leveraging resources and technologies available to the LNG industry today is critical to accelerating LNG as a reliable and affordable source of energy. Through small-scale LNG facilities — peak shavers or satellite facilities — power producers gain the flexibility to manage their energy supply on a local level.

As the LNG industry scales up facilities across the country, it can take a page from the oil and gas midstream industry, which offers a wealth of lessons learned on achieving efficient and cost-effective project delivery. The midstream approach can also help improve LNG facility operational efficiencies and protect new investments.

LEVERAGING EXPERIENCE

The lean project delivery approach commonly used for midstream projects can be translated to LNG project delivery, especially because small-scale, peak shaver facilities have focused responsibilities. A small-scale LNG facility typically only operates for a small fraction of the year; therefore, the project scope should reflect this limited need. With fewer requirements than a midstream project, peak shavers or satellite facilities should simplify and streamline efforts, focusing on the critical path to keep costs low.

Successful LNG projects rely heavily on the timely delivery of essential materials. Partnering with a firm that has midstream experience can make all the difference when it comes to safe, cost-effective and efficient delivery. Midstream projects also heavily prioritize safety, which needs to be a priority on all LNG projects. To streamline the critical path to improve project quality and efficiency, energy providers should seek to hire an



experienced engineer-procure-construct (EPC) team that offers in-house fabrication, as well as engineering, permitting energy and construction services.

The midstream approach can also offer insight into suitable process solutions and locations for projects of all sizes. LNG projects should follow the lead of midstream projects, often relying on multidisciplinary teams to conduct site permitting and environmental studies, solicit public input, obtain regulatory approvals, acquire appropriate land rights and monitor construction activities.

STARTING PROJECTS RIGHT

The oil and gas midstream industry often relies heavily on a disciplined front-end loading process to achieve predictable project success. Upfront planning considerations are essential to cost-effective and efficient LNG project delivery. The goal is to develop a detailed, thorough plan at the start and execute it once, with minimal changes.

Early integration of design, engineering, construction and operations teams is essential. At the core of the midstream approach is the ability to keep operability, constructability and safety in mind throughout the design process. This helps discern key factors in every project phase and minimizes costly design changes later in project development. Early collaboration also allows for those most experienced with LNG projects to identify

the critical elements that need the greatest project focus. Input on the design from construction teams also supports modularization, keeping more work in the shop rather than in the field. This improves safety and cuts costs.

It is also important to establish a clear understanding of the project scope right from the start. The team should narrow in on the project details so that there is a seamless process when the design is released for engineering and equipment purchasing. Each time that process is interrupted or rerouted, there are cost, time and safety repercussions. Additionally, the early phases of an LNG project should include a technology assessment to select the right process flow, remove contaminants, and liquefy, store, transport and vaporize in ways that meet economic and operability objectives.

Once the project planning, scope and schedule have been developed, teams should identify the elements that require equipment or a technology provider. LNG facilities often count on suppliers that sell standardized processes, whether they are equipment manufacturers or technology providers. Upfront decisions on these long-lead items minimize changes later and identify when funding will need to be released. Constant coordination and dialogue around funding is common for the midstream world and should be considered when delivering a small-scale LNG facility.

These considerations directly impact the speed to market. With an EPC delivery, there is time dedicated to collaborating on the project design and minimizing delays or unforeseen risks down the line. This approach also provides time to identify redundancies that can be streamlined, freeing up money and time to focus on what is critical to operation.

BLOCK DESIGN AND SPECIFICATION REVIEW

To increase efficiencies and prioritize focus, the design team should identify any repeatable designs that exist on a project or across projects within a program. In this scenario, the team could spend more time upfront developing “block” designs that can then be adapted for the site. This may involve standardizing the balance of plant scope that could be adapted for selected technology and for the specific site.

Many clients have improved their projects by asking EPC contractors to review their specifications and standards against industry standards. Owner specifications are important for operability and consistency across their assets, but very often these project standards evolve incrementally until these small changes add up to significant cost and schedule impacts to all projects. If such a review is performed early in the design, an engineering firm can evaluate specifications, identify areas for review, get approval from the owner’s stakeholders, and apply those cost and schedule savings to the project while still providing safe and operable designs. These efforts streamline the design process and reduce design redundancies.

Repeatable design blocks save time during detailed engineering. Finding efficiencies in equipment and construction specifications provides a significant opportunity to optimize overall project costs and schedule. This upfront investment in block design leads to time saved in the long run and allows the design team to focus on complex, critical aspects of the project.

OPERABILITY CONSIDERATIONS

When operators participate in an early review of the design, they can help identify facility priorities at the beginning. To maximize site layouts for efficiency, the design cannot be driven solely by the required codes — it must also consider operability. With fewer requirements on small-scale LNG facilities as compared to a midstream project, a project delivery team can focus its attention on the critical elements of a peak shaver facility, such as seeing that the tank does not become over-pressured or overfilled.

The specifications and standards for LNG facilities have evolved over the years based on isolated incidents. Early discussions about the client’s standards will balance the management of these cumbersome codes. The steps required to meet codes and obtain permits and authorizations should be discussed with all stakeholders at the beginning to gain buy-in.

PLANNING FOR SAFETY

The midstream sector knows the value of putting safety first. This also begins at the start of project planning. Teams should be intentional about identifying the key milestones and understanding the safety risk reviews that are required on the project. The focus on safety and excellence in project execution lays the groundwork for a successful LNG project. Whether it is going through the process hazard analysis or a hazard and operability study, these steps improve the overall facility safety by identifying the inherent and potential risks and recommending corrective actions.

CONCLUSION

Although the LNG industry is experiencing rapid expansion across the U.S., it doesn't mean that owner-operators or utilities need to recreate the wheel to meet the growing energy demand. The oil and gas midstream industry offers up many lessons learned in working with EPC contractors that can lead to cost-effective, efficient and safe LNG project delivery. This transfer of knowledge and experience will be instrumental in developing LNG facilities that offer affordable, reliable and sustainable power resources.

BIOGRAPHIES

CAITLIN GEISINGER, PE, a chemical engineer at Burns & McDonnell, works on refinery and terminal projects. Among them is a large-scale propane and butane export facility in the Gulf Coast, where she supported the project through on-site construction and commissioning.

BRIAN HIGHFIELD, PE, an associate engineer at Burns & McDonnell, leads a team that specializes in aspects of the midstream oil and gas market, from crude and refined product storage terminals to pipeline booster stations and reliability instrumentation. Brian's work is focused on working with oil and gas storage terminals and pipeline facilities.

MEGAN REUSSER, PE, is a senior development engineer at Burns & McDonnell specializing in LNG projects. Her experience includes process engineering, proposal management and cost estimation — creating a unique blend of technical and commercial knowledge that she uses to support EPC projects and proposals. She also works to provide clients with technical solutions that optimize process design, reduce energy consumption and decrease overall costs. She has experience with gas processing, natural gas liquids fractionation and floating LNG projects.

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