

WHITE PAPER / **TERMINAL AND PIPELINE PROJECT DELIVERY**

REDUCING TERMINAL STORAGE PROJECT RISK WITH EPC PARTNERSHIPS

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The complexities of terminal storage projects demand effective project management and execution. An integrated engineer-procure-construct (EPC) approach can lead owners and operators toward significant project advantages as compared to relying on tank fabricators for the entire process.



Increasing pipeline project investments and growing global exploration and production are driving a need for increased oil and gas storage handling. The global market for oil and gas storage services is projected to reach \$1.3 billion by 2025, up from \$1.1 billion in 2019, with North America continuing its dominance, as reported in a TechSci Research study. For all products, whether it is breakout storage in the pipeline, a terminal with rack sales, or storage to support rail and marine transfers, sufficient and flexible storage at terminals is critical for an efficient energy supply chain.

As owners and operators consider how to address the need for new terminal projects or the expansion of existing facilities, equal consideration is needed for project management and execution. When it comes to complex projects, it is natural to focus on the equipment that has the longest lead time or threatens to impact the budget. While the tank itself is a key element, projects led by sole-source equipment suppliers can expose the broader project to unnecessary risk.

New terminal and terminal expansion projects require comprehensive, upfront evaluation of overall project goals and execution backed by broad, multidisciplinary team experience. Owners and operators who utilize EPC services for complex terminal project management can realize significant advantages over relying on tank fabricators to lead the entire process.



THE EPC ADVANTAGE

For terminal projects, tanks are a critical path item. However, consideration and strategy for the balance of terminal project scope help realize a safe, efficient terminal facility that meets operating goals.

Focusing on only the tanks and partnering with a tank fabricator to lead a terminal project demands that operators must make terminal decisions around a predetermined tank solution. This approach can greatly impact project scope and feasibility and increase unnecessary risk, cost and project time frame.

EPC services use proven processes, in-house knowledge and experience in available technologies to meet terminal project objectives with less risk and optimized operability. This approach offers a holistic view of the overall project, rather than a perspective solely focused on the tank. For terminal owners and operators, working with an EPC team offers considerable advantages.

SMARTER TERMINAL DESIGN

An upfront understanding of a terminal site and the available space for terminal expansion projects means greater options for asset and equipment decisions. Instead of designing a project around a predetermined tank solution, an EPC partner will evaluate tank options and site constraints based on working capacity and spacing requirements to develop the right option to meet the operational goals.

A comprehensive evaluation of site, codes and regulations reveals the optimal tank and equipment options around which a project will be developed. For example, if acreage isn't available, owners can expect an EPC partner to offer alternatives for smaller diameter tanks, higher shell heights and hydraulics to meet requirements. Additionally, properly evaluating the processing needs in concert with the storage for natural gas liquids (NGLs) can save significant capital and maintenance costs compared to standard or prefabricated process units.

With a thorough understanding of available tank systems and technologies, operators can evaluate options and control cost at the front end, rather than making decisions to accommodate a prepackaged tank solution.

SITE OPTIMIZATION

Every proposed project site requires a critical and upfront evaluation of its potential challenges and design considerations. In addition to evaluating available transportation infrastructure to support a terminal, owners must examine regulatory and code requirements along with actual physical site features and limitations.

EPC services include extensive and careful initial site assessment to help identify how the balance of the site will evolve, over and above identified tank locations. Wetlands and flood plain review, restricted space and land grading, and environmental review are just some of the comprehensive evaluations that occur at a project outset to optimize a site and control cost.

Code requirements determine tank spacing and sizing to see that the volume of storage is met while efforts needed to prepare the site are minimized. Avoiding a one-size-fits-all tank solution allows owners the flexibility to get the most out of a site while achieving budget and schedule goals with reduced piping runs, electrical lines and wasteful terminal infrastructure.

STRATEGIC ENVIRONMENTAL COMPLIANCE

Avoiding a predefined tank solution gives owners the flexibility to address environmental regulations and code restrictions before the detailed design stage. This helps operators realize front-end cost savings that also align with environmental requirements.

Terminal projects that must secure a specific environmental permit, such as an air permit, are identified upfront. Any requirement that will affect tank design, type and technology — a geodesic dome or internal floaters, cooling, pressurization or gas blanketing — are evaluated and incorporated into the scope to help shape the entire project execution. Alternatively, products and compositions can be evaluated to consider blending or other scenarios that can minimize costs.

Unlike tank fabricators offering a standard package, EPC services provide extensive in-house engineering capabilities to design what is needed for the site and help determine the right technology for the project. Evaluation

of environmental restrictions, setback requirements, land optimization and balance of site at the conceptual design phase helps meet project objectives that a standard, predefined tank package cannot accommodate.

COMPETITIVE SOURCING

Owners can expect an EPC partner to competitively bid all tanks, equipment and needed assets after initial scoping and evaluation defines project requirements. Tanks are often the bulk of any terminal project; therefore, operators benefit from EPC partnerships where tank brand and fabricator purchases are unbiased. Through competitive bidding, owners have increased options and potential savings, even for schedule-driven projects.

Since tanks represent the highest investment cost of a terminal, it is beneficial for the tank package to be competitively bid with considerations of all aspects of safety, design, schedule and constructability. This offers the owner significant cost savings.

CONSIDERATIONS FOR TANK SELECTION

- **Have multiple tank sizes been evaluated to minimize site disturbance or maximize volume in the available area?**
- **Has the tank been engineered for the project’s needs or is it engineered based on materials available? Is there anything that can be done outside the tank to remove need for extra systems?**
- **Have all technologies been evaluated for the best fit for this service?**
- **How does the tank design affect my facility’s hydraulics? Can pumping requirements decrease if the tank is located at a higher elevation?**
- **Have the tanks been arranged to minimize overall piping? Are the nozzles placed in the optimal locations for maintenance access?**

Partnering with a tank fabricator or erector limits a terminal project to a sole source. While that can be an effective strategy for well-defined, less complex projects, it introduces risk for terminal projects that inherently have many elements and, by default, potential complications.

Terminals incorporate a large range of systems, assets and ancillary equipment. Whether storage tanks, loading equipment, transmission lines, digital controls, supply systems or support buildings, all assets should be evaluated for the optimal selection.

REDUCED PROJECT RISK

The risks for any new terminal build, upgrade or expansion project can be great. Incorporating an EPC project management approach helps control risk in several ways.

SINGLE SOURCE OF RESPONSIBILITY

A qualified EPC team assumes the risk as the single point of contact for a terminal project. Partnering with a tank fabricator as the sole-source tank solution and overall project lead requires subcontracts for the engineering, structural, mechanical and electrical requirements. While the fabricator takes responsibility for the tank, all other trades are the responsibility of subcontracting suppliers.

The EPC project management approach assumes responsibility for the entire project, including the tank. Not only does this approach lower risk, but it also avoids compounding an already complicated project. Fully integrated engineering and construction teams under one roof can minimize complicated problems and eliminate communication issues. The upfront design and construction efforts can accomplish safe, quality construction on time and under budget. This approach also provides firm construction plans and realistic contingency plans.

COMPLETE TEAM

With the necessary knowledge and experience available in-house for terminal projects, an EPC team can help projects run smoother and provide more robust design and technology solutions across a range of industries. An integrated team offers the capacity and needed



array of capabilities to evaluate different operating processes and conditions to determine the right options and technologies. While tank fabricators can provide proficiency in the tank solution itself, all other disciplines must be subcontracted out to other vendors.

SCHEDULE ADVANTAGE

EPC teams can start immediately on terminal projects. While tanks are typically the critical path on terminal projects, EPC teams are well-positioned to consider all the aspects of tank requirements (hydraulics, preliminary design, flow rates, nozzle sizes, civil grading, elevation, subsoil investigation and more), define the scope, and seek bids or indicative pricing. Tank fabricators must seek and rely on engineering input to adequately outline requirements, which is not always available in-house.

With experience across a wide range of terminal projects, EPC teams have developed tank package standards and understand the potential issues. This helps mitigate risk, even if package inputs are altered during execution. The understanding of the overall terminal design parameters and schedule objectives positions an EPC partner to have effective conversations about how to manage risk of change to speed up a project timeline and lower operator risk.

SAFETY CULTURE

When it comes to safety, statistics speak for themselves. Terminal owners and operators should demand an evaluation of how subcontracted organizations approach safety. An EPC partner’s commitment to complete project responsibility, backed by its safety statistics, can provide terminal owners with a clear path forward to safe project execution. Likewise, owners should plan on evaluating tank fabricators and all subcontractors to understand the myriad approaches and commitment to safety.

CONSIDERATIONS FOR TANKEE LED VS. INTEGRATED EPC EXECUTION

When selecting the approach for project management and execution on new terminal projects or the expansion of existing facilities, it is essential consider whether the partner can offer:

- Experience in integrating new tanks and assets into existing operations, with consideration given to access, maintenance, control schemes and constructability within an active terminal.
- In-house environmental and permitting services to leverage upfront in the project development process.
- In-house geotechnical engineers that can work with the layout team in siting the tank on the property to avoid poor soil.
- In-house civil design professionals that can work in conjunction with the tank layout for proper grading, access and site drainage.
- Informed recommendations on the most effective and efficient tank containment system.
- Schedule and layout considerations to accommodate both tank construction and balance of terminal activities.
- The lowest overall true interest cost project by optimizing the design to minimize piping and electrical runs.

CONCLUSION

Whether completing a new terminal facility or the upgrade and expansion of an existing site, terminal projects that rely on a wide range of disciplines deliver more successful project outcomes. Partnering with a proven EPC organization to lead the design, planning and execution of a project lowers risk, improves safety and leads to effective outcomes for terminal owners and operators.

BIOGRAPHY

BRIAN HIGHFIELD, PE, is a department manager at Burns & McDonnell, where he leads a team that specializes in the midstream oil and gas market. Brian is experienced in designing new booster stations and fuel terminals and providing design and construction support for design-build terminal projects. He has supported several projects that include systems such as crude and refined product pipeline receipt and storage, truck offloading, and loading with sequential ratio additive blending.

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