

CHALLENGES OF LSPB CONTRACT STRATEGY IN BROWNFIELD PROJECTS FOR THE OIL AND GAS INDUSTRY: A CASE FOR ADAPTABILITY IN BULK PLANT DEVELOPMENTS

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Abstract. This paper explores the limitations of employing Lump Sum Procure and Build (LSPB) contracts in brownfield oil and gas projects, particularly within bulk plant developments. While LSPB contracts offer cost predictability and defined deliverables, their rigid structure often proves unsuitable for the dynamic and complex nature of brownfield environments. Challenges such as scope uncertainty, late vendor input, unforeseen site conditions, and the integration of evolving digital systems frequently lead to delays, cost overruns, and disputes.

This paper highlights how the traditional waterfall project execution model, commonly used in LSPB contracts, struggles to accommodate the iterative design and real-time adjustments necessary in operational facilities. To address these shortcomings, the paper proposes several adaptive strategies, including hybrid contract models, early vendor involvement, phased execution, and performance-based contracting. These approaches aim to enhance flexibility, reduce risk, and improve collaboration between stakeholders.

By integrating best practices from project management and construction industry research, the paper advocates for a more adaptable and outcome-focused contracting strategy tailored to the unique demands of brownfield developments in the oil and gas sector.

INTRODUCTION

The oil and gas industry, especially in brownfield projects such as bulk plant developments, regularly confronts operational and technical complexities. Given the high-risk environment and the intricate task of working within existing operational facilities, both clients and contractors must adopt effective contracting strategies to manage scope, cost, and schedule. Among these, the Lump Sum Procure and Build (LSPB) contract model has become common due to its emphasis on cost control and defined deliverables.

While LSPB contracts offer benefits like price predictability and clarity in scope, their use in brownfield projects—where existing operations must continue during construction and new technologies must be integrated—can introduce serious challenges. These include scope uncertainty, late-stage vendor dependencies, and operational disruptions.

This article examines the critical limitations of LSPB contracts in brownfield oil and gas settings, particularly within bulk plant projects, and proposes alternative strategies to overcome these limitations.

1. THE WATERFALL APPROACH AND ITS LIMITATIONS

LSPB contracts often rely on a linear, waterfall-style project execution model, where the design is completed, requirements are fixed, and execution follows sequentially. This approach is suitable for greenfield projects with minimal uncertainty. However, brownfield environments—due to their ongoing operations and legacy infrastructure—do not align well with this rigidity.

For instance, integrating software-driven systems such as Terminal Management Systems (TMS), which involve iterative development and real-time operational considerations, becomes problematic. These systems typically evolve through the design and commissioning phases, meaning that early locking of requirements can hinder functionality and lead to numerous change orders.

Fixing the scope of TMS systems at contract award introduces the risk of misalignment with operational requirements and frequent update on the system by operation. As noted in PMI's *Pulse of the Profession* (2021), projects with rigid waterfall structures experience higher rates of change orders when software systems are involved.

This lack of flexibility often leads to disputes, misaligned deliverables, and delays, as neither party can easily accommodate evolving technical needs under the original contract terms.

2. UNFORESEEN SITE CONDITIONS AND SCOPE VARIABILITY

Unanticipated site conditions are a recurring issue in brownfield projects. Due to years of modifications, undocumented changes, and legacy infrastructure, the as-built site often differs significantly from available drawings. Even with subsurface scanning tools like ground-penetrating radar, field accuracy is not always reliable in congested areas (ASCE, 2019).

For example, electrical layouts may have been altered during prior maintenance but not updated in documentation. Consequently, once excavation or installation begins, contractors encounter equipment, cables, or supports not accounted for during the design phase.

This mismatch between actual field conditions and the design introduces the need for rework, material changes, or even safety reassessments—all of which are hard to accommodate within an LSPB framework where costs and deliverables are predetermined.

3. LATE VENDOR INPUT DISRUPTING DESIGN

Vendor-specific input is often unavailable during early design phases, particularly for proprietary systems or custom-fabricated equipment. When vendors provide critical information post-contract award, it often necessitates redesigns.

Take, for instance, electrical components or instrumentation skids: the contractor may design based on placeholder data, but when the vendor finalizes the specifications, actual electrical loads, sizes, or mounting requirements might differ. This affects everything from cable schedules to foundation sizing and software interface points.

Such deviations frequently require re-engineering, additional procurement, or redesign of electrical studies like ETAP. According to the Construction Industry Institute (CII, 2018), late vendor data contributes significantly to cost overruns and rework in industrial projects.

4. WORKING IN AN OPERATIONAL FACILITY

Brownfield projects require construction activities to proceed alongside live operations. This presents logistical and safety challenges that are not present in greenfield settings. Coordination is needed to obtain permits, plant shutdowns, and avoid conflicts with operational processes.

Delays in gaining site access or unforeseen operational constraints often force rescheduling of activities. In an LSPB framework—where both timeline and cost are fixed—these delays lead to idle labor costs, productivity loss, and claims for extension or compensation.

The lack of schedule flexibility in LSPB contracts can amplify these issues. A delay in one activity may cause cascading impacts throughout the schedule, increasing the risk of contract penalties and disputes between stakeholders.

POTENTIAL SOLUTIONS AND CONTRACTUAL ADAPTATIONS

To enhance LSPB effectiveness in complex brownfield scenarios, several contractual and project management adaptations are recommended:

1. HYBRID CONTRACT MODELS FOR SELECT SCOPES

Combining lump-sum contracting for stable scopes with flexible models—such as cost-reimbursable contracts—for evolving components offers a balanced approach. For example, civil works can remain under a lump-sum structure, while systems like TMS or metering skids are managed separately under adjustable frameworks.

Hybrid models allow dynamic scopes to be adjusted based on real-time input, without compromising budget control for fixed elements. Open-book accounting and incentive-sharing can improve trust and cost visibility (PMI, 2021). Price escalation clauses can further support fairness when vendor pricing shifts (IACCM, 2020).

2. EARLY VENDOR INVOLVEMENT

Engaging vendors early during the design phase ensures their specifications and integration requirements are incorporated before execution. This avoids late-stage design changes that disrupt the project timeline.

Instruments like design coordination meetings, interface control documents, and vendor technical workshops during FEED help align all stakeholders. According to CII (2018), projects with early vendor involvement report 20–30% fewer change orders and improved scheduling outcomes.

3. EXCLUDING TMS AND SIMILAR SYSTEMS FROM LSPB

Given their complexity and evolving nature, TMS and other software-driven systems are best managed outside the LSPB contract. Using a separate contract or direct owner procurement allows flexibility for iterative design, pilot testing, and staged deployment.

This approach supports operational integration, regulatory updates, and post-commissioning refinements without disrupting the broader construction contract. Industry experience shows that direct TMS procurement improves maintainability and operational buy-in (Oil & Gas Journal, 2020).

4. PHASED EXECUTION FOR BETTER ADAPTATION

Segmenting the project into logical phases—such as civil works, mechanical erection, and systems integration—allows for lessons learned and greater adaptability. This staged execution also facilitates checkpoint approvals (e.g., underground verification) before committing to follow-up phases.

According to CII (2018), phased execution can reduce cumulative delays by up to 40%, especially when operational shutdowns and underground discoveries are involved.

5. PERFORMANCE-BASED CONTRACTING

This model ties contractor payments to the achievement of performance outcomes rather than fixed deliverables. For example, instead of paying for installation alone, the client may link payments to TMS uptime or data integration success post-commissioning.

Such incentive structures promote long-term thinking and collaboration. They also reduce the likelihood of rushed delivery that overlooks operational needs. The IACCM (2020) notes that performance-based models lead to higher end-user satisfaction and faster defect resolution.

6. STRENGTHENED RISK PLANNING AND SHARED CONTINGENCIES

Risk management must be more robust in brownfield LSPB contracts. This includes:

- **Detailed risk registers** for ongoing review (PMI, 2021)
- **Dedicated contingency budgets** for vendor inputs and permitting issues (CII, 2018)
- **Incentive clauses** that reward contractors for proactive resolution of access or design challenges (IACCM, 2020)

These measures foster collaboration and ensure risks are not unfairly borne by one party alone.

CONCLUSION

Brownfield oil and gas projects—especially bulk plant upgrades—present challenges that rigid LSPB contracts often fail to manage effectively. Unpredictable field conditions, evolving digital system requirements, and operational constraints demand a more adaptive and collaborative approach.

By adopting hybrid contracts, encouraging early vendor input, excluding software systems from fixed scopes, phasing execution, and embracing performance-based metrics, stakeholders can significantly reduce delays, cost overruns, and disputes.

Adapting the LSPB model to meet the realities of brownfield environments is essential not only for project success but also for fostering innovation and accountability across the oil and gas sector.

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